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A STUDY OF THE USE OF REGRESSION EQUATIONS FOR PROJECTING LONGRUN TRENDS IN DEMAND FOR PAPER AND BOARD, WITH PROJECTIONS OF DEMAND TO 1985 FOR MAJOR GRADES OF PAPER AND BOARD, WOOD PULP, AND PULPWOOD.

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With Projections of Demand to 1985 for Major Grades of Paper and Board, Wood Pulp, and Pulpwood

by
Dwight Hair

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A STUDY OF THE USE OF REGRESSION EQUATIONS FOR PROJECTING LONGRUN TRENDS IN DEMAND FOR PAPER AND BOARD

With Projections of Demand to 1985 for Major Grades of Paper and Board, Wood Pulp, and Pulpwood

Dissertation Abstract

A STUDY OF THE USE OF REGRESSION EQUATIONS FOR PROJECTING LONGRUN TRENDS IN DEMAND FOR PAPER AND BOARD,

With Projections of Demand to 1985 for Major Grades of Paper and Board, Wood Pulp, and Pulpwood

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Dwight Hair

This study presents (1) a brief discussion of alternative ways of projecting longrun trends in demand; (2) an analysis of a comprehensive series of regression equations tested for use in making longrun projections for paper and board; and (3) projections of demand for paper and board, wood pulp, and pulpwood at five-year intervals to 1985. The discussion of the various ways of making longrun projections and the analysis of the use of regression equations are intended for other researchers. The longrun demand projections are intended as guides for making decisions that have effects extending into the future, such as those involving the construction of new plants in the pulp and paper industry or the acquisition and management of forests and forest lands.

The discussion in Section I of the study indicates that regression equations, extensively supplemented by graphics, is the best way at the present time for projecting longrun trends in demand for paper and board. Some general guides on the use of regression equations, including choice of independent variables, equation forms, and base time periods, were also developed in this section. These are:

1. Per capita consumption and per capita income data should be used in projecting demands for all grades of paper and board where the historical relationships were close enough to justify use as a projection base.

2. Simple regression equations are preferable to multiple regression equations for making longrun projections with the independent variables that are available for use.

3. An equation with the general form $Y = a + b \log X$ is preferable for making longrun projections of demand for most grades of paper and board. However, for grades where consumption has been rising rapidly, the equation $Y = a + b X$ may be the best choice, at least for the years immediately ahead.

4. The post World War II years are preferable as the base time period for making longrun projections for all grades of paper and board.

Projections of demand for paper and board derived from regression equations and a graphical analysis of recent changes in relationships and trends in use are presented in Section II of the study. These projections indicate that the demand for all grades of paper and board will rise to 70.8 million tons in 1975 and 99.5 million tons in 1985--levels that are respectively 52 percent and 114 percent above 1964. Domestic production of paper and board in 1985 is estimated at 95.3 million tons, about 53.6 million tons above 1964. Projected demands and production for each of the major grades of paper and board also show substantial increases over 1964, especially so for container board, newsprint, and bending board.

Largely on the basis of this projection of domestic paper and board production, wood pulp requirements are estimated at 84.6 million tons in 1985. This is 2.5 times the 33.8 million tons consumed in 1964. Most of the increase is expected to be for sulfate paper grade pulps although substantial growth is anticipated in semichemical, defibrated or exploded, and groundwood pulps. Domestic production of all grades of wood pulp in 1985 is estimated at 85.1 million tons, some 2.6 times output in 1964.

With this level of domestic wood pulp output, the requirements for pulpwood in U.S. pulp mills are expected to be 120.2 million cords in 1985--about 2.4 times the 49.7 million cords used in 1964. Domestic production in 1985 is expected to be 118.7 million cords, or 70.2 million cords above output in 1964.

The study repeatedly brought out that there were many uncertainties associated with the level of the above projections. Nonetheless, it seems fairly clear that the demand for paper and board, wood pulp, and pulpwood is likely to show rapid growth in the decades immediately ahead.

PREFACE

This study presents a discussion of alternative ways of projecting longrun trends in demand; the results of an analysis of a comprehensive series of regression equations tested for use in projecting longrun trends in demand for major grades of paper and board; and projections of demand for paper and board, wood pulp, and pulpwood, at 5-year intervals to 1985. It also contains appendices which show (1) the results of a graphical analysis of the relationships between changes in selected independent variables (Appendix A); (2) the regression equations (including the a and b coefficients, errors of estimate, the coefficients or indexes of determination, and related statistical measures) tested for use in making longrun projections (Appendix B); and (3) detailed historical data on trends in production, trade, and consumption of paper and board, wood pulp, and pulpwood (Appendices C through G).

The discussion of the various ways of making longrun projections and the results of the statistical and graphical analyses are intended for use by other researchers involved in projecting longrun trends in demand. The demand projections for paper and board, wood pulp, and pulpwood are intended as guides for decisions whose effects extend far into the future, such as those involving the construction of new pulp and paper plants or the acquisition and management of forests and forest lands.

In the past, population and income have been the principal determinants of consumption of paper and board. Thus the assumptions concerning future growth in these variables are of key importance in determining the level of projected demand. Because of this importance

and the great uncertainty associated with projections of population and income, two series of alternative projections of demand for paper and board, based on different population and income assumptions, have been worked out (see page 97). These illustrate the conditional nature of demand projections and provide a measure of their sensitivity to changes in population and income.

Most of the demand projections in this study, including those for wood pulp and pulpwood, are significantly above those published early in 1965 in the Forest Service report Timber Trends in the United States.[1/] Over half of the increase reflects the use of higher projections of gross national product and the related measures of economic activity. The remainder is attributable to the use of more recent data, which include the rapid rise in consumption of paper and board and general economic activity that took place in 1963, 1964, and 1965; further refinement in the projection methods; and an upward revision of the exports of paper and board and wood pulp.

These new and higher demand projections have important implications, especially for prospective timber supplies. They mean that by 1980 the cut of pulpwood from domestic forests will be some 38 percent above that shown in Timber Trends in the United States. This in turn means that the prospective timber supply situation is less favorable than envisaged, and that supplies of timber are likely to fall short of projected demands sooner than anticipated in that study. However, the outlook for timber supplies for the pulp and paper

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[1/] U.S. Department of Agriculture, Forest Service, Timber Trends in the United States, Forest Resource Report No. 17 (Washington: U.S. Government Printing Office, 1965).

industry still looks relatively good although greater use of small sized and relatively low quality timber will be necessary.

This study was prepared while the author was employed in the Division of Forest Economics and Marketing Research, U.S. Forest Service, Washington, D. C. It is a part of the work going on under Section 9 of the McSweeney-McNary Forest Research Act of May 22, 1928, as amended. This act authorized and directed the Secretary of Agriculture to cooperate with State and other agencies: " . . . in making and keeping current a comprehensive survey of the present and prospective requirements for timber and other forest products in the United States."

All members of my doctoral committee are thanked for their help, especially G. Robinson Gregory, who guided my work at the University of Michigan and provided general advice and assistance in the preparation of this study. I am deeply indebted to H. R. Josephson, Committee Member and Director of the Forest Service's Division of Forest Economics and Marketing Research, who has directed my work on this and a series of other economic studies during the past 15 years.

Several colleagues and friends have also made contributions. Special thanks are due to Perry R. Hagenstein of the Public Land Law Review Commission, Clark Row of the Forest Service, and I. Irving Holland of the University of Illinois, for their help and advice on the statistical problems which arose; to Gardner H. Chidester and his colleagues at the Forest Products Laboratory for guidance on prospective trends in the use of fibrous materials in the manufacture of paper and board; to John Fedkiw of the Department of Agriculture

for a careful review of an earlier manuscript; and to Helen C. Whiton, Alice H. Ulrich, and Carrie L. Martin of the Forest Service who compiled the data in the statistical appendices and made many other important contributions.

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PROJECTION MODELS AND AN ANALYSIS OF REGRESSION EQUATIONS TESTED FOR USE IN PROJECTING LONGRUN TRENDS IN DEMAND FOR PAPER AND BOARD

Introduction

The pulp and paper industry in the United States has been growing rapidly since the late 1800's. In the last two decades, consumption and production of paper and board have increased some 2-1/2 times. The output of wood pulp, nearly all of which is used in the manufacture of paper and board, has more than tripled. The cut of pulpwood, the raw material for making wood pulp, has shown proportional growth and this product now accounts for over a quarter of the timber harvested from the Nation's forests.

Because of the rapid growth in demand for paper and board, wood pulp, and pulpwood, businessmen and government administrators concerned with planning plant expansions in the pulp and paper industry or with the adequacy of timber resources have felt a continuing need for long-run appraisals of demand. This need has been met by a series of studies by public and private agencies.[2/] In these and related studies

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[2/] Recent major studies in the United States which have contained longrun projections of demand for paper and board include:

U.S. Department of Agriculture, Forest Service, Timber Trends in the United States; Timber Resources for America's Future, Forest Resource Report No. 14 (Washington: U.S. Government Printing Office, 1958).

John A. Guthrie and William Iulo, Some Economic Aspects of the Pulp and Paper Industry with Particular Reference to Washington and Oregon (Pullman: Washington State University, 1963).

U.S., Congress, House, Committee on Interstate and Foreign Commerce, Pulp, Paper and Board Supply-Demand, Union Calendar No. 292, House Report No. 693, 88th Cong., 1st Sess., 1963.

Resources for the Future, Inc., Resources in America's Future, Patterns of Requirements and Availabilities, 1960-2000 (Baltimore: Johns Hopkins Press, 1962).

such as those conducted by the Food and Agriculture Organization of the United Nations for western Europe and other regions of the world,[3] the usual procedure has been to make projections of demand for the major grades of paper and board--the end products of the industry. These projections have then been converted into equivalent demands for wood pulp and pulpwood.

Most of the projections of demand for paper and board shown in recent U.S. and FAO studies have been derived from regression equations. These equations have been used to project the historical relationship between consumption of various grades of paper and board and one or more independent variables, such as population or income, which were important determinants of demand and for which estimates of future values were available. Such equations are relatively simple projection models. In other studies concerned with demand and longrun projections[4]

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[2] Continued

John A. Guthrie and George R. Armstrong, Western Forest Industry, An Economic Outlook (Baltimore: Johns Hopkins Press, 1961).

Stanford Research Institute, America's Demand for Wood, 1929-1975 (Stanford: Stanford Research Institute, 1954).

[3] United Nations, Food and Agriculture Organization, European Timber Trends and Prospects, A New Appraisal, 1950-1975 (New York, 1964); Latin American Timber Trends and Prospects (New York, 1963); Pulp and Paper Prospects in Western Europe (Rome, 1963); Pulp and Paper Prospects in Asia and the Far East (Bangkok, 1962); Timber Trends and Prospects in the Asia-Pacific Region (Geneva, 1961); World Demand for Paper to 1975 (Rome, 1960); Pulp and Paper Prospects in Latin America (New York, 1955); World Pulp and Paper Resources and Prospects (New York, 1954).

[4] Recent examples of such studies are:

William McKillop, "Consumption and Price of Forest Products in the United States: An Econometric Study of Past Determinants and Future Levels" (unpublished Ph.D. dissertation, School of Forestry, University of California, 1965).

both more elaborate and simpler alternatives have been used or suggested for use.

This part of the study begins with a brief discussion of these alternative models or ways of making longrun projections. This is followed by an analysis of a comprehensive series of regression equations that were tested for use in making projections of longrun trends in demand for the 11 major grades of paper and board listed below:[5/]

Newsprint	Construction paper
Groundwood paper	Container board
Book paper, coated and uncoated	Bending board
Fine paper	Building board
Coarse and industrial paper	Other board
Sanitary and tissue paper	

The term "projected demand" is defined as the volume of paper and board that will be consumed in the projection years if the explicit

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[4/] Continued

Arthur D. Little, Inc., Ohio River Basin Comprehensive Survey, Appendix B, Projective Economic Study (Cambridge, Mass.: Arthur D. Little, Inc., 1964).

Paivio Riihinen, "Sales of Newsprint in Finland, 1949-59, Models of Short Term Forecasting," Acta Forestalia Fennica 74 (Helsinki: The Societe Forestiere de Finlande, 1962).

G. Robinson Gregory, "A Statistical Investigation of Factors Affecting the Market for Hardwood Flooring," Forest Science, Vol. 6, No. 2 (1960), 123-134.

Mordecai Ezekiel and Karl A. Fox, Methods of Correlation and Regression Analysis (New York: John Wiley & Sons, 1959).

Richard J. Foote, Analytical Tools for Studying Demand and Price Structures, U.S. Department of Agriculture Handbook No. 146 (Washington: U.S. Government Printing Office, 1958).

Herman Wold and Lars Jureen, Demand Analysis, A Study in Econometrics (New York: John Wiley & Sons, 1953).

[5/] Definitions of each grade of paper and board and other technical names and terms used in this study are given in Appendix H.

and implicit assumptions concerning the changes in population, economic activity, prices, and other determinants of consumption are realized.[6/] This concept has been employed in nearly all of the recent longrun demand studies made by public and private agencies. Such usage is at variance, however, with technical economic terminology where demand is used to mean the curve or schedule which indicates the quantity of a commodity which would be consumed (or purchased) through a range of prices.[7/]

Alternative Ways of Making Longrun Projections of Trends in Demand for Paper and Board

The input-output model--a complicated model still in the developmental stages

The most complicated model that has been suggested for use in making longrun projections of demand for paper and board and other

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6/ There are three basic kinds of assumptions underlying the longrun projections of demand for timber products in most of the recent studies. These are (1) the assumptions concerning the "demand shifters" such as population and income which determine the horizontal movements of the demand curve, (2) the assumptions (usually implicit) concerning the form or shape of the demand curve (determined mainly by the marginal utility of the good), and (3) the assumptions concerning the supply curve. Assumptions about the supply curve are usually expressed as a price assumption which indicates that no significant change is anticipated in the relative price of the good in question in the projection period. This implicitly assumes a highly elastic longrun supply curve over the range in which demand is expected to vary.

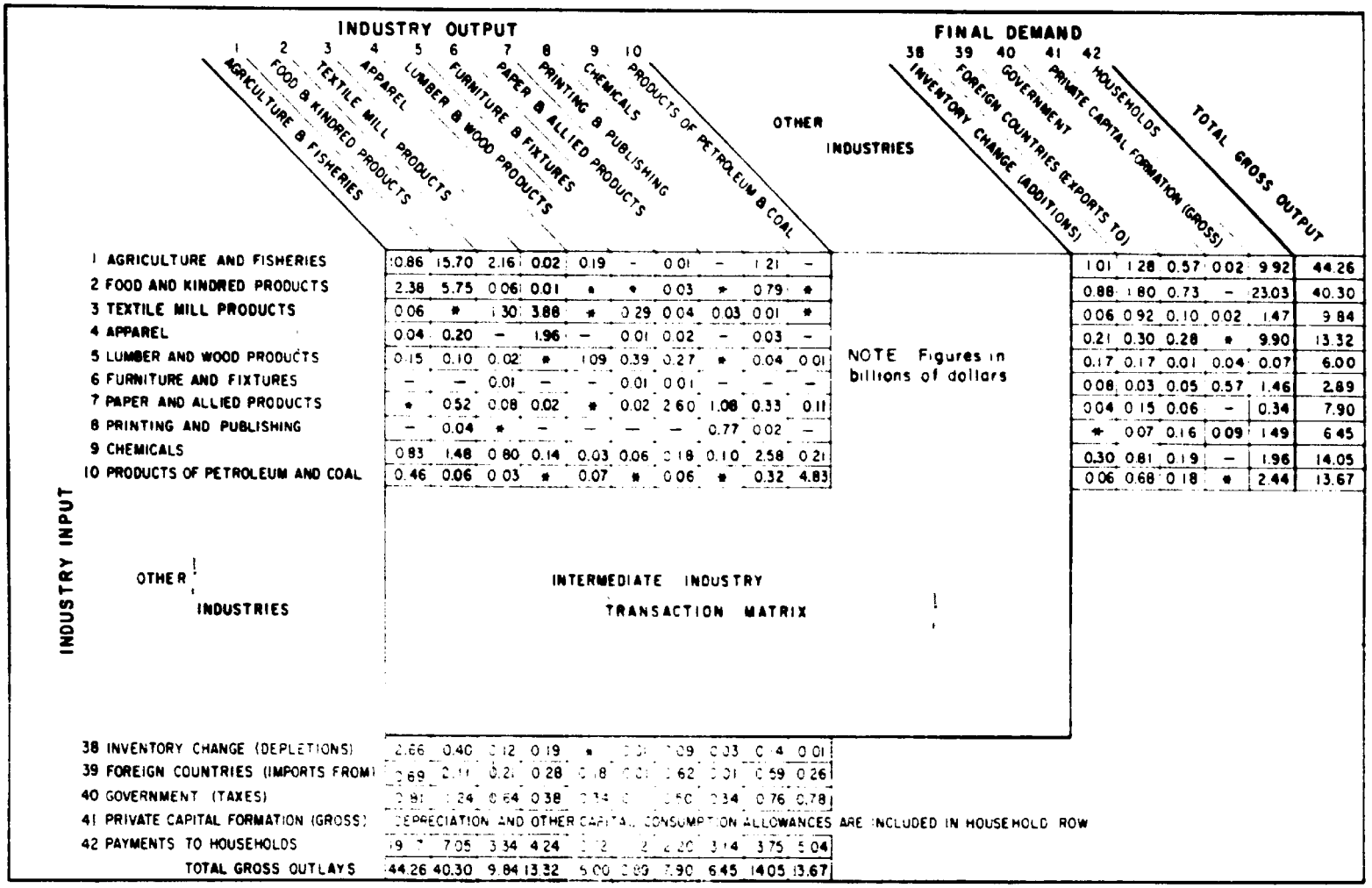
7/ Projected demand is a point on a demand curve. Once the form or shape of the curve is defined, the quantities of the good that will be purchased at various prices can be determined. However, the general form of the demand curve is still largely unknown for the various timber products, including paper and board.

products is the input-output or Leontief model.[8/] This model shows the interrelationships among the various sectors of the economy through the medium of an input-output table such as that schematically illustrated in figure 1. In this table each sector of the economy is represented by a horizontal row and a vertical column. The column for a sector shows its purchases of goods and services from all other sectors. The row for a sector shows its distribution of output to all other sectors. Each number in a row also appears in a column and indicates how the output of each sector is the input to another sector. This double-entry bookkeeping reveals how the various sectors of the economy are linked together by the flow of trade.

The links between the paper and allied products sector and all other sectors of the economy are illustrated in part by the data in row 7 and in column 7 of figure 1. The sum of the numbers in row 7 indicates that the gross output of the sector was $7.90 billion. The remaining numbers in this row show how this output was distributed among the other sectors of the economy. For example, $1.08 billion was shipped to the printing and publishing sector--a major market for various grades of paper. Purchases of goods and services from other sectors are shown in column 7. A substantial amount--$2.20 billion--was payments to households in the form of wages, salaries, and dividends.

[8/] This model was developed by Wassily W. Leontief who constructed input-output tables for the United States for 1919, 1929, and 1939. These tables were published in Leontief's work, The Structure of the American Economy (Cambridge, Mass.: Harvard University Press, 1941). The most recent set of input-output tables has been prepared by Morris R. Goldman, Martin L. Marimout, and Beatrice N. Vaccara, "The Inter-industry Structure of the United States, A Report on the 1958 Input-Output Study," Survey of Current Business, Vol. 44, No. 11 (Washington: U.S. Department of Commerce, 1964), 10-29.

Schematic model of an input–output table



Note: In the vertical column at left the entire economy is broken down into sectors. In the horizontal row at the top the same breakdown is repeated. When a sector is read horizontally, the numbers indicate what it ships to other sectors. When a sector is read vertically, the numbers show what it consumes from other sectors. The asterisks stand for sums less than $5 million. Totals may not check due to rounding.

Source: Derived from a table published by Wassily W. Leontief "Input-Output Economics," Scientific American, Vol 185 No 4 (November 1951), 16 — 17.

Figure 1

The links among the sectors of the economy, as shown in an input-output table, provide a powerful tool for analyzing and calculating the effects of a change in the gross national product, or any of its components, on the value of the output of any sector of the economy such as the paper and allied products industry. By using supplementary data on physical output per unit of value, it is also possible to convert value output data into physical units such as tons of paper and board.

Using the simplest procedures that have been developed to date, longrun projections of demand for paper and board can be derived from estimates of final demand and of the series of links between final demand and the paper and allied products sector of the economy.[9/] The problems associated with obtaining longrun estimates of final demand are common to most methods of projecting future demands for a product such as paper and board. That of estimating the links, however, is unique and represents a major problem area in making an input-output table operational for longrun projections. In fact, at the present time there are not enough historical data available to provide an adequate basis for projecting longrun changes in the links between final demand and the various sectors of the economy.[10/]

9/ One of the input-output tables for 1958, ibid., measures the total requirements (direct and indirect) per dollar of delivery to final demand (see table 3, pp. 16-17) and the coefficients (links) in the table can be used directly to calculate the impact on the various sectors of the economy from any given change in final demand.

10/ The basic data and techniques for using the input-output model for making longrun projections are now being developed in the Departments of Commerce and Labor. It will probably be some time, however, before this model will be fully operational. Although it is not operational, the input-output model offers some interesting

A multi-equation model--simpler than an input-output model but problems are involved in operational use

Although all sectors of the economy are interrelated in some degree, as indicated by the links in an input-output table, only a few sectors are important determinants of demand for a particular product such as a major grade of paper or board. Thus, it is possible to use a fairly restrictive multi-equation system in which only the important determinants are included in making longrun projections.

A multi-equation system can be either recursive or simultaneous. A recursive system is illustrated by the following equations:[11]

$$Y = a\, b_1 X_1 + b_2 X_2 + b_3 X_3$$

$$S = a' + b'_1 X'_1 + b'_4 X'_4 + b'_5 X'_5$$

$$P = a'' + P_{-1} + b''_6 X''_6 + b''_7 X''_7 + b''_8 X''_8$$

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[10] Continued

possibilities for use in longrun demand studies involving countries at different stages of development. It may be that the coefficients measuring the links among the sectors of the economy are roughly similar for countries at comparable stages of development. If this is the case, input-output tables can be used to project demands in countries at various stages of development--much as cross-sectional data on income have been used in several recent studies.

[11] Adapted from a model prepared by Gregory for short range forecasting in the hardwood flooring market, op. cit., p. 127. This adaptation is intended only as an illustration. It has not been tested to see if it is operational for making longrun projections of demand for paper and board. Presumably it would not be operational because many of the variables included, especially price, have not had a measurable impact on consumption.

where:

Y = annual demand for paper in tons.

X_1 = per capita gross national product.

X_2 = the Federal Reserve index of industrial production.

X_3 = the deflated wholesale price index of paper (deflated by the consumer price index).

S = annual production of paper in tons.

X'_1 = X of the demand equation.

X'_4 = the deflated wholesale price index of paper lagged one year.

X'_5 = the deflated wholesale price index of wood pulp lagged one year.

P = the deflated wholesale price index of paper.

P_{-1} = the deflated wholesale price index of paper lagged one year.

X''_6 = $(S_{-1} - D_{-1})$ or the difference between last year's production and shipments of paper in tons.

X''_7 = the level of paper inventories in tons lagged one year.

X''_8 = $(P - P_{-1})$ the annual change in the deflated wholesale price index of paper.

In this system of equations, which is made recursive by the use of lagged variables, demand is treated as a function of consumer-related variables; supply as a function of producer-related variables; and price as the factor which causes demand and supply to move toward equilibrium. These equations, with the lagged variables, form a recursive causal chain which can be used to project demand year by year (or any other interval) through any desired length of time.

A simultaneous system is illustrated by the following equations:[12/]

$$Y = f(P)$$

$$S = f(P)$$

$$P = f(Y, S)$$

where:

Y = annual consumption of paper in tons.

S = annual production of paper in tons.

P = the price of paper.

f = a specified functional relationship between the variables.

This system differs from the recursive system because it contains simultaneous influences between variables. Price, for example, is simultaneously determined by the interaction of demand and supply. In contrast, in the recursive system price is a dependent variable and variations in price reflect disequilibrium between consumption and production, in accord with classical price theory.

Both systems of equations have been used in making projections. However, Wold and others[13/] have stated that the recursive system is applicable to and preferable for use in most of the economic problems for which the simultaneous system has been utilized. The formulation of a recursive system is also relatively simple in comparison with a simultaneous system.

[12/] For information on fitting systems of two or more simultaneous equations and computational methods, see Ezekiel and Fox, op. cit.; and Joan Friedman and Richard J. Foote, Computational Methods for Handling Systems of Simultaneous Equations, U.S. Department of Agriculture Handbook No. 94 (Washington: U.S. Government Printing Office, 1957).

[13/] Wold and Jureen, op. cit.; Mordecai Ezekiel, "Statistical Analysis and the Laws of Price," Quarterly Journal of Economics, Vol. XLII (1928), 199-225.

Although the recursive system is fairly simple, it is nonetheless unwieldy when used to make projections over any long period of time where repeated calculations are required, unless a computer is available. In addition, any distortions caused by random influences in the relationships in the base year will be magnified as they are carried through the projection period. This cumulative error is likely to be very large in any longrun projection. This source of error, which applies also to simultaneous models, has been widely recognized and attempts have been made to adjust the models by changing the value of coefficients, adding new variables, or altering the length of lag.[14/] However, such attempts have been confined to models intended for use in shortrun forecasting.

The single equation or regression model--widely used for making projections

In making longrun projections for a single dependent variable, such as a specified grade of paper or board, and where the independent variables which are important determinants of demand are known, it is possible to use a single equation of the general form $Y = f(X)$ where:

Y = the dependent variable.

X = the independent variable or variables.

f(X) = a specified form of relationship between the dependent and independent variables.

This model, commonly called a regression equation, has been frequently used for making longrun projections.

[14/] For example, see Richard J. Crom and Wilburn R. Maki, "Adjusting Dynamic Models to Improve Their Predictive Ability," Journal of Farm Economics, Vol. 47, No. 4 (1965).

The equation mathematically measures the functional relationship between dependent and independent variables. Such a functional relationship[15] is illustrated in figure 2[16] which, by means of a scatter diagram, shows the level of per capita newsprint consumption associated with per capita disposable personal income in all the years 1929-62. It is evident that the points are arranged in a definite pattern or band. A closer examination also indicates that annual changes in per capita newsprint consumption and per capita disposable personal income have generally been in the same direction. Whenever these two things occur, it is evidence that a functional relationship exists between the variables although nothing is implied about causality. Under such circumstances, when the value of one variable is known, it is possible to estimate the likely value of the other variable.

Although it is possible to estimate values for either variable when the other is known, per capita newsprint consumption would not ordinarily be used as the independent variable for estimating per

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15/ Strictly speaking this is a stochastic rather than a functional relationship because it contains a set of unexplained residuals or error terms.

16/ The data plotted in figure 2 are time series data which show the relationship between per capita newsprint consumption and per capita disposable personal income in the period 1929-62. The Food and Agriculture Organization of the United Nations in its studies of demand for paper and board has utilized similar diagrams which show the relationship between consumption and income in different countries in a given year (see World Demand for Paper to 1975, and Pulp and Paper Prospects in Western Europe). This cross sectional analysis is particularly well adapted for use in studies concerned with projections of demand for a number of different countries where income, and the associated consumption, are known. However, it is not adaptable to the detailed time series data available in the United States.

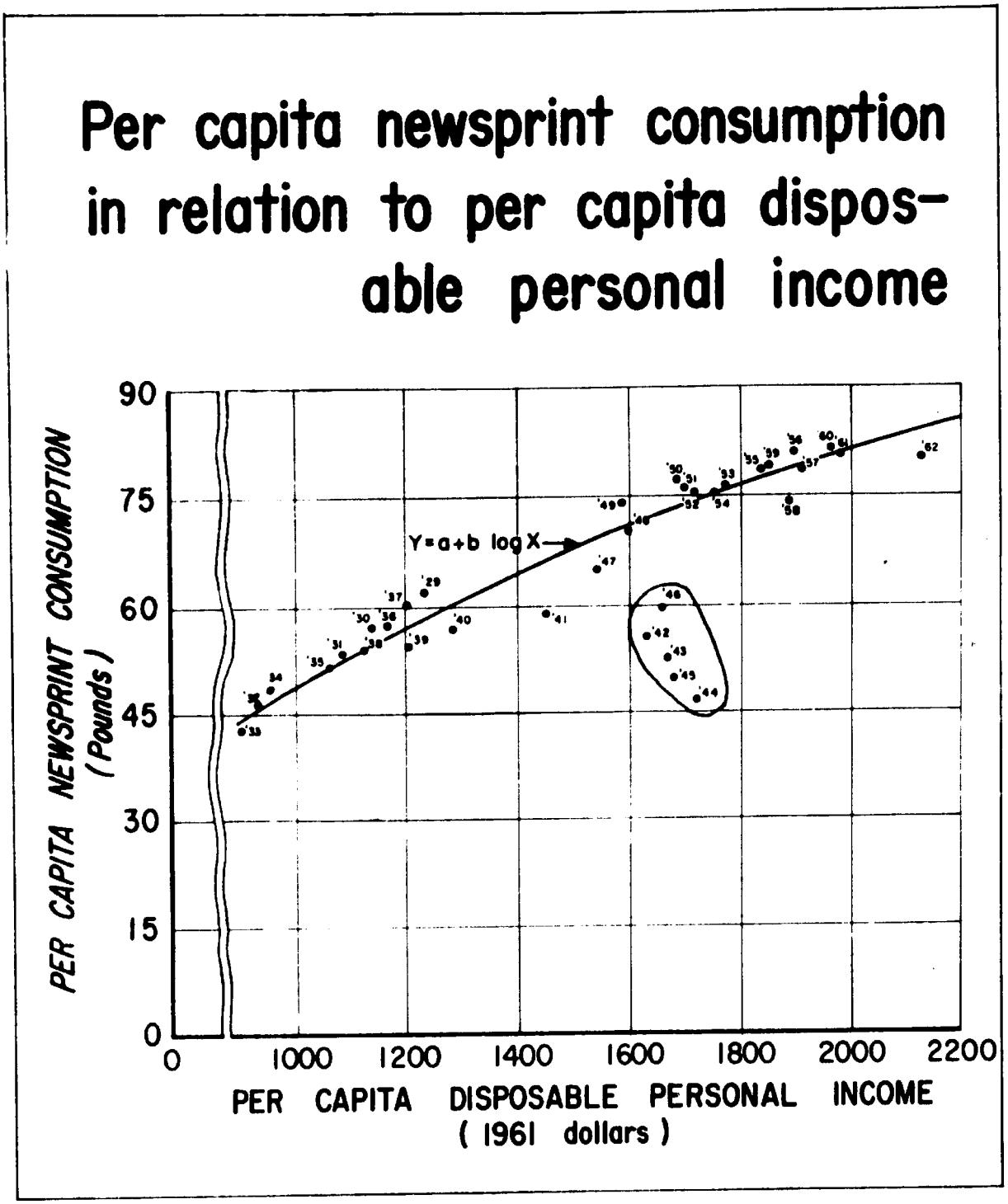

Per capita newsprint consumption in relation to per capita disposable personal income
PER CAPITA NEWSPRINT CONSUMPTION (Pounds)
90
75
60
45
30
15
0
Y=a+b log X
0
1000
1200
1400
1600
1800
2000
2200
PER CAPITA DISPOSABLE PERSONAL INCOME
(1961 dollars)

Figure 2

capita disposable personal income because the relationship is not causal, i.e., a change in per capita newsprint consumption cannot cause an appreciable change in the total output of goods and services. On the other hand, per capita disposable personal income, which is a measure of the buying power of the final consumers of newsprint, is logically one of the primary determinants of per capita newsprint consumption. Thus the relationship is both causal and functional and per capita disposable personal income is one logical choice as an independent variable for estimating per capita newsprint consumption--the dependent variable.

A regression equation is an equation for a line (see the line in figure 2) and thus represents a precise relationship between variables. Economic data rarely have such a relationship because the actual observations, as in figure 2, are usually scattered around the line described by the regression equation. In general, the closer the observations to the line the greater the confidence in the estimates derived from the equation, particularly if they are in the range of the observations used in establishing the relationship.

Longrun projections usually extend well beyond the range of the base observations, and it is thus necessary to assume that the historical relationship between the variables will continue during the projection period. Because relationships between economic variables are subject to change, this assumption is an important element of uncertainty in demand projections extending as far in the future as 1985.

The graphic model--the simplest way to make a projection

Some relationships, such as that between time and the velocity of a falling body, are fairly exact and should logically be expressed by a mathematical equation. However, many of the relationships between economic series, such as those between the consumption of a grade of paper and income, are not very exact or are so complex that they cannot be represented in elementary algebraic terms. Under such circumstances, and especially where there are no logical reasons for believing a definite kind of relationship exists, a freehand curve (the graphic model) fitted by eye to the data, may provide a satisfactory description of the relationship and as good a basis for estimating one variable from another as a mathematical model.[17/] In other problems there are not enough data available to permit the determination of a mathematical relationship. Under these conditions, a freehand curve is the only practical means of describing the relationship. In the final analysis, of course, the effective use of the graphic model depends on the knowledge and judgment of the analyst.

Analysis of a Series of Regression Equations Tested for Use in Projecting Longrun Trends in Demand

Regression equations have been widely used in making longrun projections but little attention has been given factors which determine projection levels

All of the above models, including the variations that have been worked out by various researchers, are potentially usable for making

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17/ Ezekiel and Fox, op. cit., pp. 101-102; and Frederick V. Waugh, Graphic Analysis in Agricultural Economics, U.S. Department of Agriculture Handbook No. 128 (Washington: U.S. Government Printing Office, 1957).

longrun projections of demand. However, for several decades the regression model has been almost universally used for projecting longrun trends in demand for paper and board. There are several reasons for this choice. First, it is well suited for use with the detailed time series data that are available on consumption of paper and board by major grades and on population, gross national product, and other related measures of economic activity. Second, it is generally understood by researchers in Government and industry and can be used for making longrun projections without computers or other elaborate data processing equipment. And finally, its predictive reliability seems to be as good as any alternatives that are presently available for operational use.

Although the regression model has had wide use over an extended period of time in making longrun projections of demand, very little attention has been given to the underlying factors which affect the projected values of the dependent variables. The importance of these factors is illustrated in figure 3 which shows projected demands for newsprint obtained from a series of regression equations tested for use in projecting demands for that product. The projected values shown in figure 3 for 1985 range from 9.7 million tons to 15.7 million.[18/] The coefficients or indexes of determination and the standard errors

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[18/] The projections of population and economic activity shown in Appendix B, table 16, were used as the independent variables in making these and the other projections of demand for paper and board shown in tables 1 through 6 in the first section of this report. Thus, none of the difference in the projected demands for newsprint, or the other grades used as examples, is attributable to the use of different values for the independent variables.

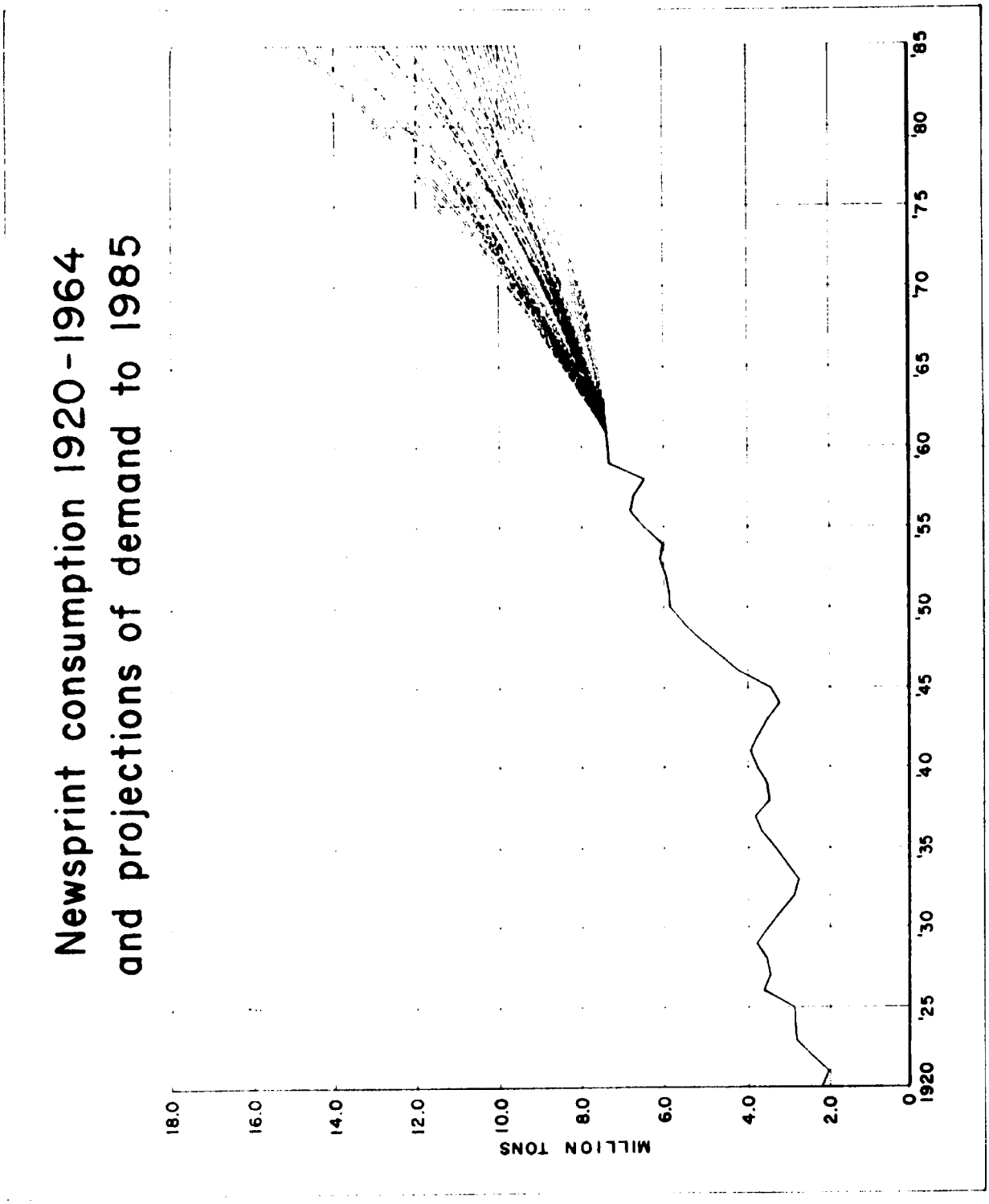

Newsprint consumption 1920-1964
and projections of demand to 1985
MILLION TONS
18.0
16.0
14.0
12.0
10.0
8.0
6.0
4.0
2.0
0
1920
'25
'30
'35
'40
'45
'50
'55
'60
'65
'70
'75
'80
'85

Figure 3

of estimate in the equations used were all in the range normally accepted in making projections (app. B, table 1) and the differences reflect:

1. The independent variables used in making the projections.[18/]
2. The units used in measuring the variables, i.e., the use of per capita or aggregate data.
3. The use of simple or multiple regression equations.
4. The form of the function, or mathematical equation, used to describe the relationship between the variables.
5. The historical time period used as a base for the projections.

The rest of this section is concerned with a discussion of the effects of these factors on the level of longrun projections of demand for paper and board and the most logical choices concerning them.

Traditionally three basic criteria have been used in choosing independent variables for projecting longrun demands

The independent variable is, by definition, a major determinant of the projected values for a dependent variable. Traditionally, three criteria have been used in choosing independent variables for projecting demands for paper and board and other products. These are:

1. The availability of longrun estimates or projections of future values of the independent variables.
2. The closeness of the historical functional relationships between the independent and dependent variables.
3. The causality of the relationship between the independent and dependent variables.

Longrun projections of potentially usable independent variables such as population, households, gross national product, disposable personal income, industrial production, construction expenditures,

residential construction, and prices are prepared and published at more or less regular intervals by several responsible public and private agencies.[19/] All potentially usable independent variables for which longrun projections are likely to be available were considered for use in projecting demand for the major grades of paper and board. As a first step, scatter diagrams were plotted to determine if functional relationships existed between these independent variables and each major grade of paper and board (Appendix A). In all cases where it appeared that a functional relationship existed,

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19/ Recent major studies which have included longrun projections of population and/or gross national product, and other related measures of economic activity are:

U.S. Department of Commerce, Bureau of the Census, "Revised Projections of the Population of the United States by Age and Sex to 1985," Current Population Reports: Population Estimates, Series P-25, No. 329 (1966); "Projections of the Population of the United States by Age and Sex: 1964 to 1985 with Extensions to 2010," ibid., No. 286 (1964); "Interim Revised Projections of the Number of Households and Families: 1964 to 1980," Current Population Reports: Population Characteristics, Series P-20, No. 123, (1963).

Missouri Basin Inter-Agency Committee, Standing Committee on Comprehensive Basin Planning, The Missouri River Basin, Comprehensive Framework Study: Preliminary Economic Projections for the Missouri River Basin (Kansas City, Mo.: Missouri Basin Comprehensive Plan Economic Work Group, 1965).

U.S. Department of Agriculture, Forest Service, Timber Trends in the United States.

U.S., Congress, House, Committee on Interstate and Foreign Commerce, op. cit.

Outdoor Recreation Resources Review Commission Staff, National Planning Association, and U.S. Department of Labor, Bureau of Labor Statistics, Projections to the Years 1976 and 2000: Economic Growth, Population, Labor Force, Leisure, and Transportation, ORRCC Study Report No. 23 (Washington: U.S. Government Printing Office, 1962).

Resources for the Future, Inc., op. cit.

U.S., Congress, Senate, Select Committee on National Water Resources, "Population Projections and Economic Assumptions," Water Resources Activities in the United States, Committee Print No. 5, 86th Cong., 2nd Sess., 1960.

regression equations were fitted mathematically (Appendix B). The results of the graphical and statistical tests indicated that there were close functional relationships between changes in the consumption of most grades of paper and board and changes in most of the independent variables such as population, gross national product, and disposable personal income for which projections of future values are likely to be available.

There was one notable exception--price. The price of a product has always been considered an important determinant of consumption--with consumption tending to vary inversely to price changes. However, and especially in recent years, prices of most grades of paper and board (also wood pulp and pulpwood) have not shown much change in relation to the general price level (fig. 4; app. C, tables 1-4). As a result, the statistical tests showed no functional relationship between prices and consumption (both per capita and total) of the various grades of paper and board (for example, see fig. 5). Presumably there was a concealed causal relationship with the stability in relative prices being a contributing factor to the rapid increases in consumption shown by most grades of paper and board.

Tests showed close functional relationships between several independent variables and consumption of paper and board--relationships also appeared to be causal

Although the graphical and statistical tests indicated that there was a close functional relationship between changes in most of the independent variables and changes in consumption of most of the major grades of paper and board, there is no statistical way to

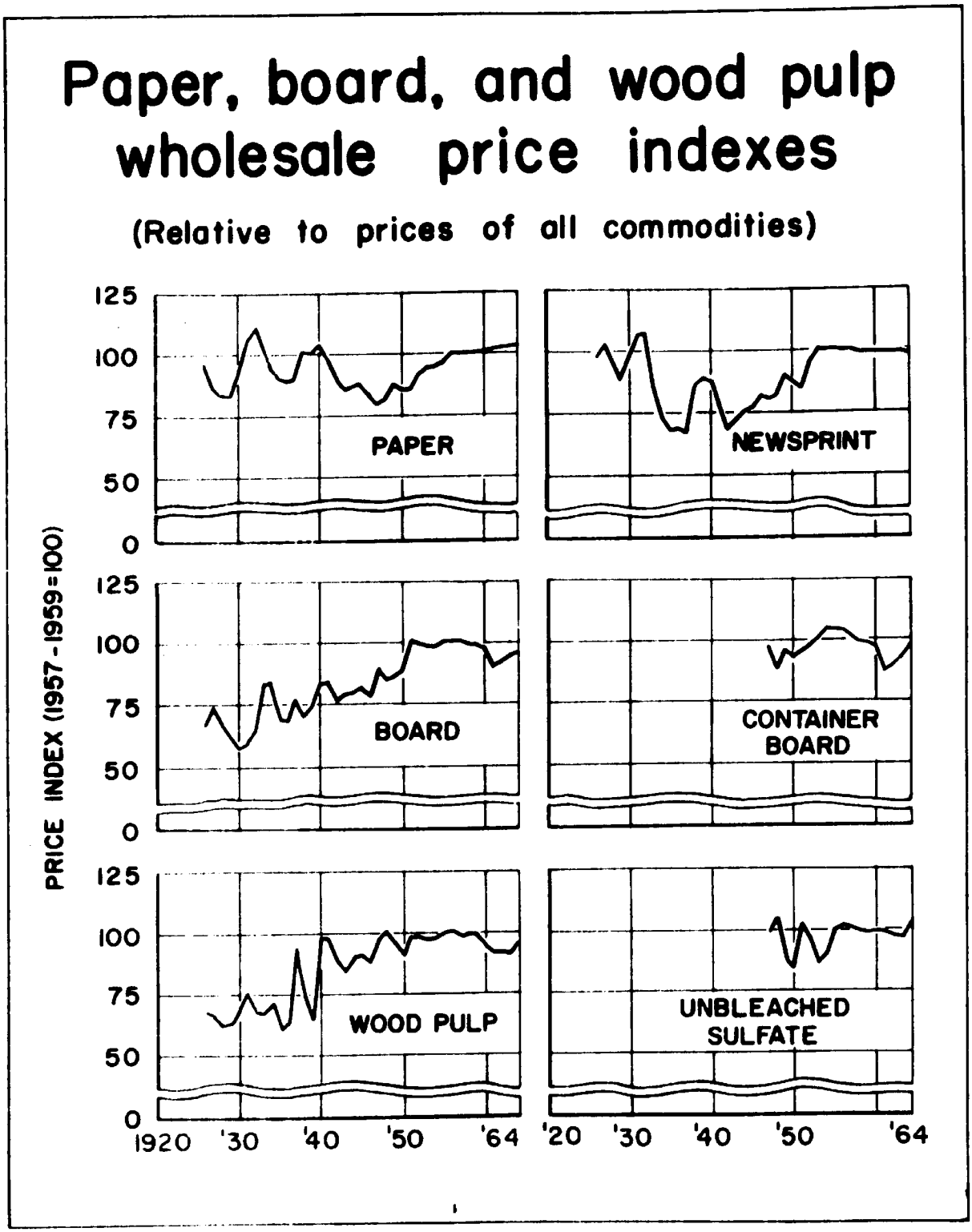

Paper, board, and wood pulp wholesale price indexes
(Relative to prices of all commodities)
PRICE INDEX (1957-1959=100)
125
100
75
50
0
PAPER
NEWSPRINT
BOARD
CONTAINER BOARD
WOOD PULP
UNBLEACHED SULFATE
1920
'30
'40
'50
'64
'20
'30
'40
'50
'64

Figure 4

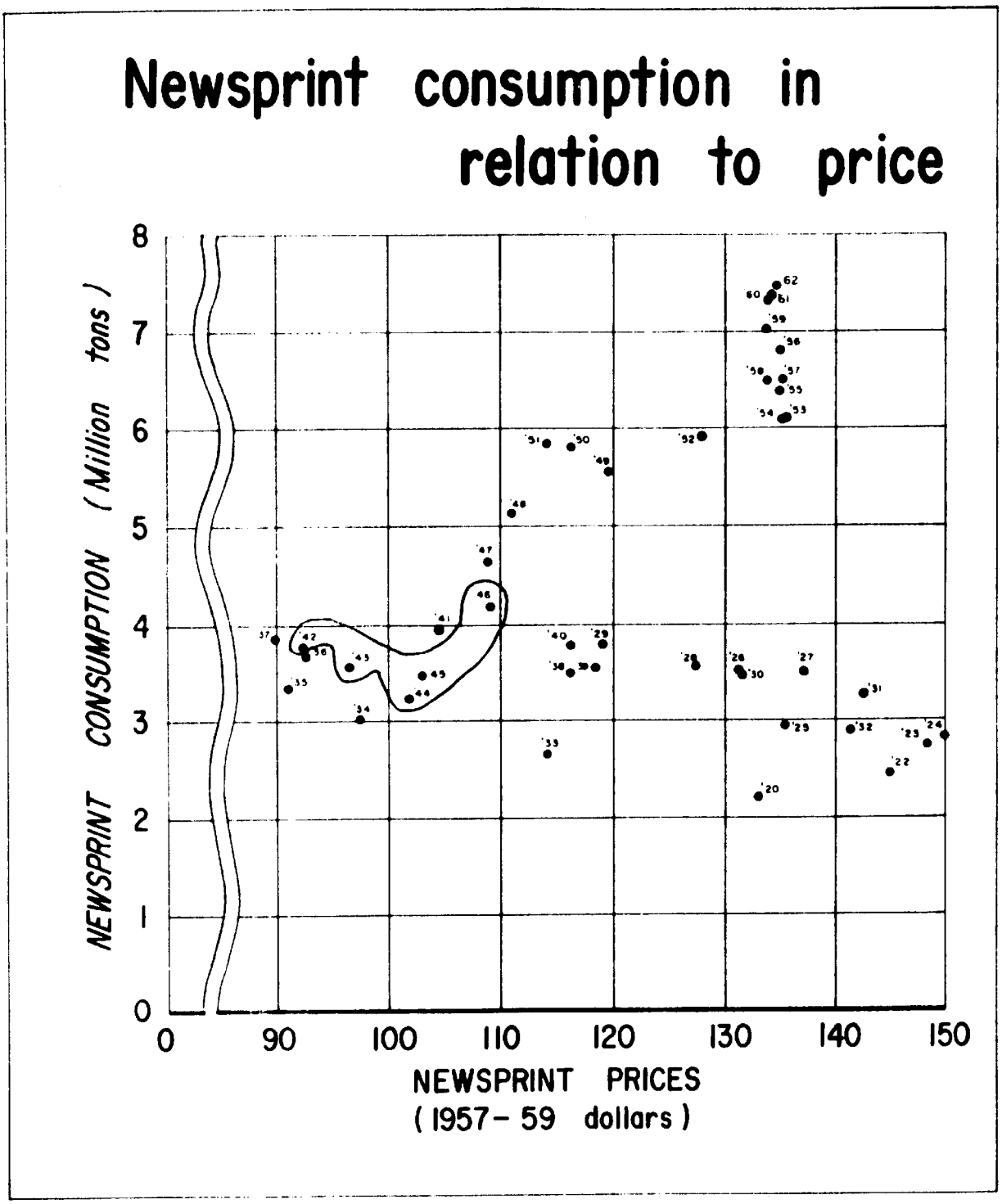

Newsprint consumption in relation to price
NEWSPRINT CONSUMPTION (Million tons)
0
1
2
3
4
5
6
7
8
0
90
100
110
120
130
140
150
NEWSPRINT PRICES
(1957 - 59 dollars)

Figure 5

establish that these relationships were causal, i.e., that the changes in the independent variables caused the changes in the dependent variables. Yet this is a matter of great importance in making projections which extend beyond the range of the base data. The reasonableness of such projections rests in part upon the assumption that the relationships in the base period will continue through the projection period. The chances that this will occur are increased if the relationship is causal and not a chance correlation.

While it cannot be mathematically established that the historical relationships were causal, it seems logical to conclude that in nearly all cases the relationships between changes in such independent variables as population and income and changes in the consumption of the major grades of paper and board were both functional and causal. Admittedly, in many relationships the cause and effect were indirect. The volume of newsprint consumption, for example, is directly a function of such factors as number of newspapers, circulation, frequency of publication, number of pages, and page size. Somewhat more indirectly, consumption can be considered as a function of such things as the demand for advertising and news space; prices of newsprint and advertising space; and income of subscribers, advertisers and other customers.[20/] However, longrun projections of these and the more direct determinants are usually not available and thus they are not readily adaptable for use as independent variables.

Changes in the direct determinants are, of course, a function of changes in the aggregate variables such as population and gross national

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[20/] Riihinen, op. cit.

product and the effects of the direct variables on demand are thus implicitly included in any model using these aggregates as the independent variables. Also most of the overall measures of economic activity used as independent variables, such as the gross national product, implicitly include the effects of a host of factors or influences such as the level of literacy, consumer tastes, and technological developments which cannot be readily quantified and/or explicitly recognized in a regression equation

Several independent variables meet traditional tests--but the projected values of the dependent variables are substantially different

Thus on the basis of causality and the other criteria that have traditionally been applied (see page 18), it appears that several independent variables could be used in projecting demands for most of the major grades of paper and board. The various possibilities for container board[21]--the most important grade of paper and board in terms of volume consumed--are as follows:

Population
Households
Gross national product
Disposable personal income
Industrial production

However, the use of these independent variables results in projections that are substantially different, especially by 1985. This is illustrated in table 1 and figure 6. The data in this table and figure were derived by holding constant all the other factors that affect the level

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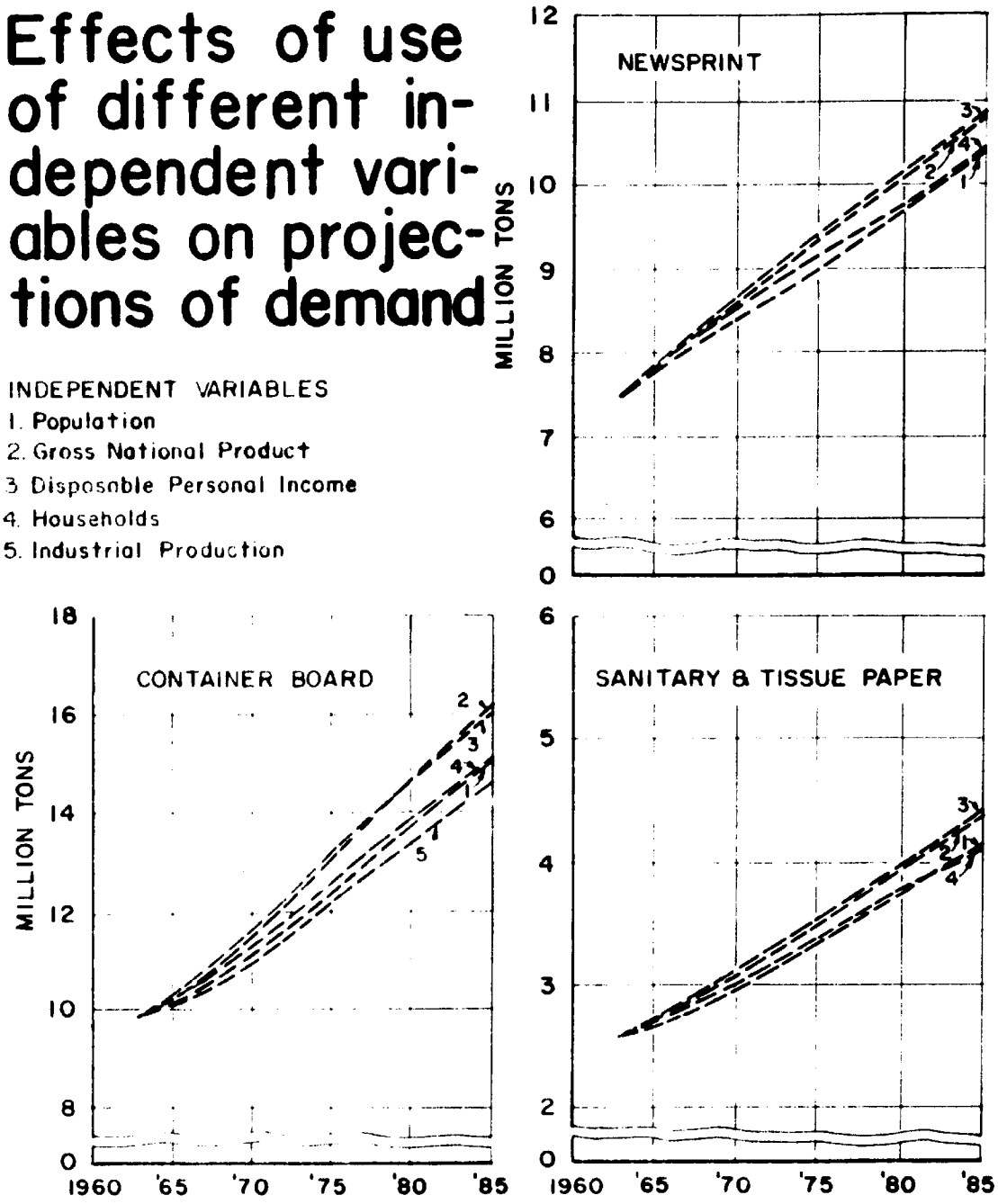
[21] Newsprint, sanitary and tissue paper, and container board have been chosen as representative grades to illustrate differences resulting from changing independent variables, functions, time periods, etc., in the text of this study.

Table 1.--Effects of use of different independent variables on projections of demand for selected grades of paper and board
(All projections derived from the use of the equation $Y = a + b \log X$ fitted to data in the period 1948-63)

Variable	Consumption		Projected demand							
	1963		1970		1975		1980		1985	
	Total	Per capita	Total	Per capita	Total	Per capita	Total	Per capita	Total	capita
	Thousand tons	Pounds	Thousand tons	Pounds	Thousand tons	Pounds	Thousand tons	Pounds	Thousand tons	Pounds
Newsprint:										
Newsprint consumption is a function of:										
Population	7,557	79.80	8,387	80.64	8,994	80.66	9,671	80.26	10,333	79.48
Gross national product	"	"	8,559	82.30	9,306	83.46	10,036	83.29	10,797	83.05
Disposable personal income	"	"	8,637	83.05	9,362	83.96	10,047	83.38	10,803	83.10
Households	"	"	8,505	81.78	9,100	81.61	9,759	80.99	10,366	79.74
Sanitary and tissue paper:										
Sanitary and tissue paper consumption is a function of:										
Population	2,566	27.10	2,951	28.38	3,320	29.78	3,732	30.97	4,135	31.81
Gross national product	"	"	3,037	29.20	3,485	31.26	3,923	32.56	4,380	33.69
Disposable personal income	"	"	3,095	29.76	3,534	31.70	3,950	32.78	4,407	33.90
Households	"	"	3,006	28.90	3,364	30.17	3,760	31.20	4,125	31.73
Container board:										
Container board consumption is a function of:										
Population	9,846	103.97	11,073	106.47	12,328	110.56	13,726	113.91	15,093	116.10
Gross national product	"	"	11,472	110.31	13,032	116.88	14,556	120.80	16,145	124.19
Disposable personal income	"	"	11,604	111.58	13,107	117.55	14,529	120.57	16,096	123.82
Industrial production	"	"	10,923	105.03	12,135	108.83	13,379	111.03	14,619	112.45
Households	"	"	11,290	108.56	12,513	112.22	13,866	115.07	15,112	116.25

Effects of use of different independent variables on projections of demand

INDEPENDENT VARIABLES
1. Population
2. Gross National Product
3. Disposable Personal Income
4. Households
5. Industrial Production



Note: All projections based on relationships in the 1948-63 period as described by the equation $Y = a + b \log X$

Figure 6

of a projection, i.e., the form of the equation, the historical time period used as the base for the projection, the units used in measuring the variables, and the kind of equation (see page 18) and reflect only the effects of the different independent variables. With these restrictions, projected demands for container board in 1985 ranged from 14.6 million tons to 16.1 million tons.

Part of the difference in the projections may be due to chance. The level of a projection, particularly one extending as far in the future as 1985, is very sensitive to the values of the observations at the beginning and ending of the time period used as the base. Thus, any chance variation in one of the independent variables[22/] in these critical periods could alter the slope of the regression line and materially affect the level of a projection. However, there was no evidence that this was the cause of the differences as projections obtained from a series of tests, using different time periods (see data in tables 1, 6, and 8 in Appendix B), showed about the same ranking and amount of variation as those in table 1.

In appraising the differences shown in table 1, it should be also noted that projections have a steadily widening band of uncertainty--one that would be quite large by 1985. Some indication of the width of this band can be obtained by calculating the standard error of the forecast. Of course, standard errors of forecast have no real meaning because they do not apply to projections, which by definition are

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22/ Chance variation in the dependent variable would tend to affect the results obtained from the different independent variables in much the same way and would not be a cause of differences in the projections.

conditional statements about what will happen under given assumptions.[23] There is also a theoretical question about the applicability of all error formulas to the time series data used in the equations. Most statisticians feel that error formulas can only be used with sample data drawn at random from a bivariate or multivariate normal universe--a condition that does not hold for the economic time series data used in the equations.[24]

Trends in per capita use give best indication as to which independent variable to use

Although chance could be involved, all tests indicated that the differences in the projections reflected the basic relationships between the variables. Thus the choice of the independent variable is an important consideration.

There was no statistical basis for choosing among the several independent variables that could be used for projecting demands for container board or any of the other major grades of paper or board (see data in the tables in Appendix B). Generally, the relationships were causal, the standard errors of estimate were in the range usually accepted in making projections, and changes in the independent variables explained nearly all of the variation in the dependent variables--more than 94 percent of the total in the case of container board.

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[23] A forecast is an unconditional statement as to what will happen.

[24] For further discussion of this point see Ezekiel and Fox, op. cit., pp. 325-329.

Trends in per capita use seemed to provide the best indication of which of the independent variables to choose for projecting demands for each of the major grades of paper and board. For those grades where there has been little or no increase in per capita consumption in the time period used as a base for the projection, future changes in total use can logically be expected to be a function of changes in population or households. For those grades where there has been a slow increase in per capita use, presumably in response to increases in the output of goods and services or income, some measure of economic activity, such as the gross national product, appears to be the best choice as an independent variable for projecting total demand.

Either per capita or aggregate data can be used in projecting demands for most grades of paper and board but per capita data preferred where usable

In actual fact, there have been fairly rapid increases in per capita consumption of most of the major grades of paper and board. These increases have shown a high correlation with growth in per capita gross national product and per capita disposable personal income. Thus, for most grades of paper and board, it is possible to use either per capita or aggregate data in making projections.

This is another important choice because the projections derived from the use of equations with per capita data were usually substantially different from those obtained from equations using aggregate data (table 2; fig. 7). For example, projected demands for container board, derived from the equation $Y = a + b \log X$ with all other factors influencing the level of the projection except the unit of

Table 2.--Effects of use of per capita and aggregate data on projections of demand for selected grades of paper and board
(All projections derived from the use of the equation $Y = a + b \log X$ fitted to data in the period 1948-63)

Variable	Consumption		Projected demand							
	1963		1970		1975		1980		1985	
	Total	Per capita	Total	Per capita	Total	Per capita	Total	Per capita	Total	Per capita
	Thousand tons	Pounds	Thousand tons	Pounds	Thousand tons	Pounds	Thousand tons	Pounds	Thousand tons	Pounds
Newsprint:										
Per capita newsprint consumption is a function of per capita gross national product	7,557	79.80	8,788	84.50	9,746	87.41	10,852	90.06	12,076	92.89
Newsprint consumption is a function of gross national product	"	"	8,559	82.30	9,306	83.46	10,036	83.29	10,797	83.05
Per capita newsprint consumption is a function of per capita disposable personal income	"	"	8,850	85.10	9,791	87.81	10,881	90.30	12,106	93.12
Newsprint consumption is a function of disposable personal income	"	"	8,637	83.05	9,362	83.96	10,047	83.38	10,803	83.10
Sanitary and tissue paper:										
Per capita sanitary and tissue paper consumption is a function of per capita gross national product	2,566	27.10	3,217	30.93	3,880	34.80	4,618	38.32	5,472	42.09
Sanitary and tissue paper consumption is a function of gross national product	"	"	3,037	29.20	3,485	31.26	3,923	32.56	4,380	33.69
Per capita sanitary and tissue paper consumption is a function of per capita disposable personal income	"	"	3,282	31.56	3,919	35.15	4,632	38.44	5,482	42.17
Sanitary and tissue paper consumption is a function of disposable personal income	"	"	3,095	29.76	3,534	31.70	3,950	32.78	4,407	33.90
Container board:										
Per capita container board consumption is a function of per capita gross national product	9,846	103.97	12,236	117.65	14,581	130.77	17,198	142.72	20,214	155.49
Container board consumption is a function of gross national product	"	"	11,472	110.31	13,032	116.88	14,556	120.80	16,145	124.19
Per capita container board consumption is a function of per capita disposable personal income	"	"	12,284	118.12	14,463	129.71	16,910	140.33	19,807	152.36
Container board consumption is a function of disposable personal income	"	"	11,604	111.58	13,107	117.55	14,529	120.57	16,096	123.82

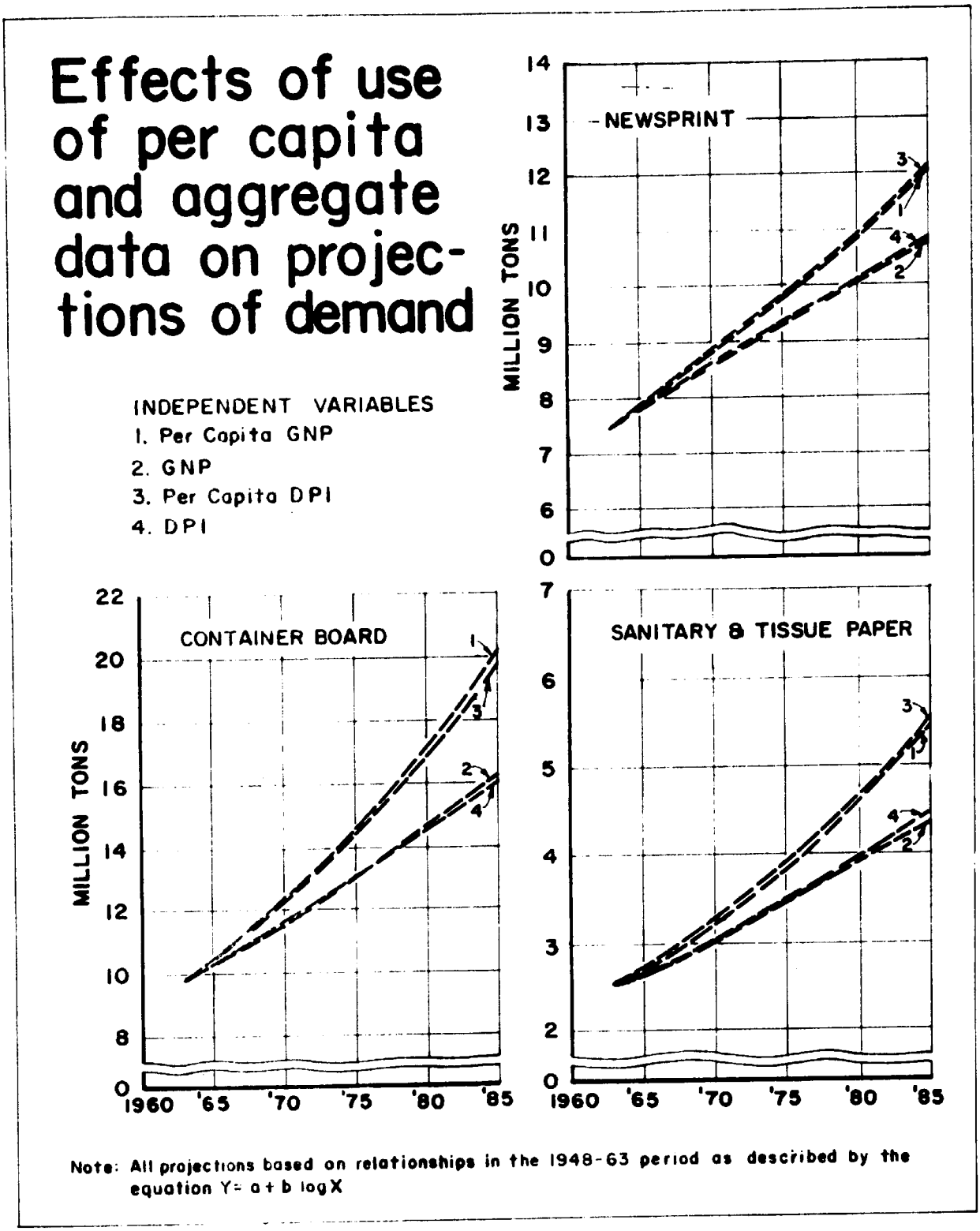

Effects of use of per capita and aggregate data on projections of demand
INDEPENDENT VARIABLES
1. Per Capita GNP
2. GNP
3. Per Capita DPI
4. DPI
NEWSPRINT
MILLION TONS
CONTAINER BOARD
MILLION TONS
SANITARY & TISSUE PAPER
1960 '65 '70 '75 '80 '85
Note: All projections based on relationships in the 1948-63 period as described by the equation Y= a + b logX

Figure 7

measurement held constant (see list of other factors on page 18), ranged from 16.1 million tons (aggregate data) to 20.2 million tons (per capita data).

The regression equations used in deriving these figures met all the tests commonly applied in determining suitability for use in making projections and thus there was no statistical basis for choosing between per capita and aggregate data. However, where the correlations between per capita use and per capita gross national product or per capita disposable personal income are in the range usually accepted in making projections, statisticians recommend that per capita data be used because the relationships between per capita consumption and per capita output or income are relatively direct and not confused by the growth in population which accounts for part of the change in aggregate consumption and output or income.[25/] As a practical matter, the projections obtained when per capita data were used also seemed to be more in line with historical trends than those obtained from aggregate data, especially when equations of the general form $Y = a + b \log X$ (fig. 8) or $\log Y = a + b \log X$ were used.[26/]

Although it seems fairly clear that per capita data should be used for projections where possible, there still remains a choice between the use of per capita disposable personal income and per capita gross national product as the independent variables. Because these independent

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[25/] Foote, op. cit., p. 28; and others have recommended the use of per capita data wherever applicable for this reason.

[26/] The tests showed that projections obtained from household data, i.e., consumption per household and output or income per household, also gave projections of demand which were in line with historical trends. However, since the projections of households are derived from population projections, it seemed simpler and easier to use the per capita data.

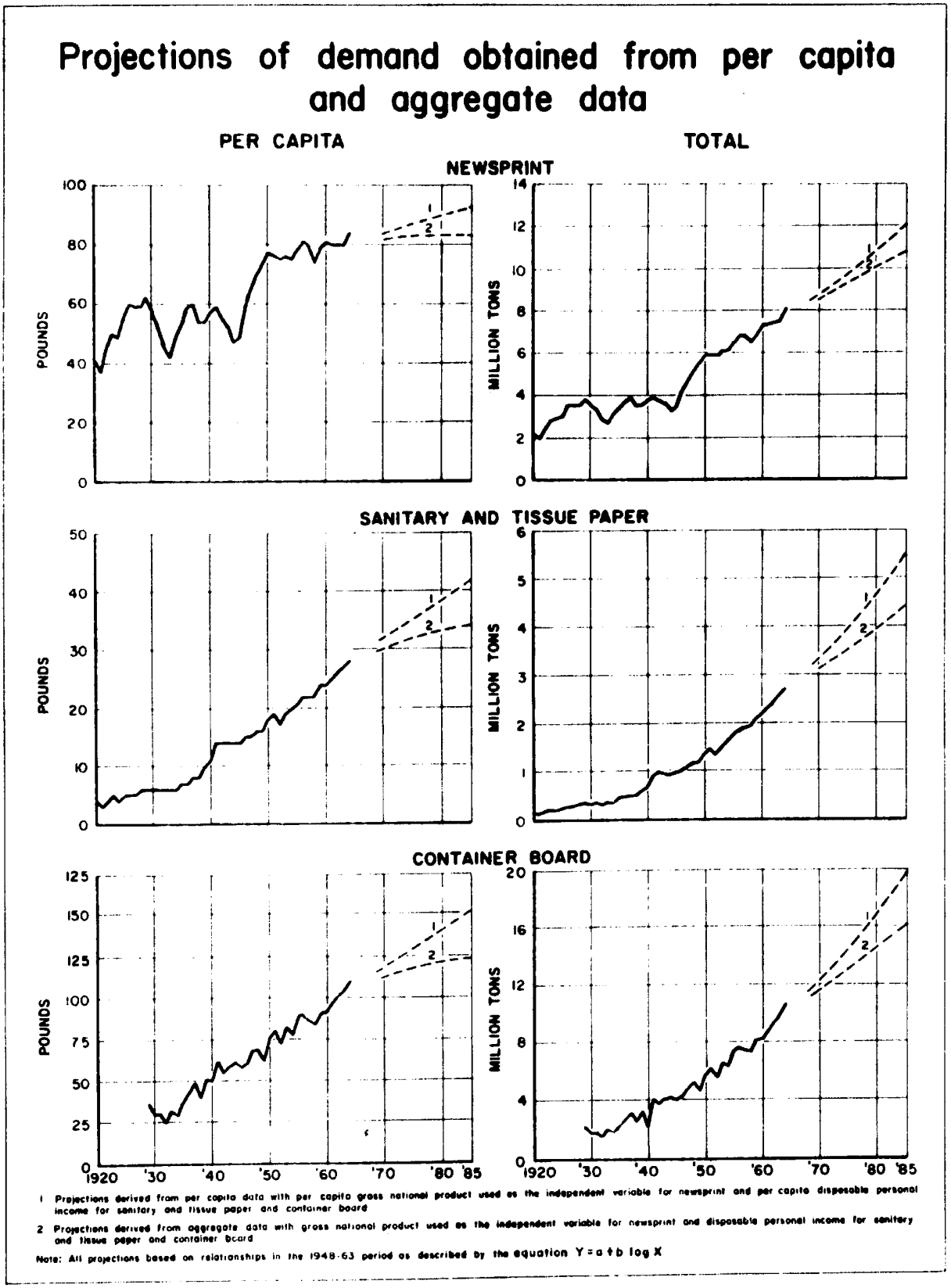

Projections of demand obtained from per capita and aggregate data
PER CAPITA
TOTAL
NEWSPRINT
POUNDS
MILLION TONS
SANITARY AND TISSUE PAPER
CONTAINER BOARD
1920
'30
'40
'50
'60
'70
'80
'85
1 Projections derived from per capita data with per capita gross national product used as the independent variable for newsprint and per capita disposable personal income for sanitary and tissue paper and container board
2 Projections derived from aggregate data with gross national product used as the independent variable for newsprint and disposable personal income for sanitary and tissue paper and container board
Note: All projections based on relationships in the 1948-63 period as described by the equation Y = a + b log X

Figure 8

variables are very closely related, the projected values derived from their use are about the same, and this choice is not a matter of much practical significance.

The use of first differences considered but not used

In attempting to decide how the variables were to be measured during the exploratory stages of the study, the use of "first differences"[27] was considered as an alternative to using actual aggregate or per capita data. According to Foote:[28]

> " . . . first differences should be used in preference to actual data when the successive unexplained residuals from single-equation analyses based on actual data are almost perfectly serially correlated with a positive sign . . . If the unexplained residual in one year on the average equals a fixed proportion of the unexplained residual in the preceding year plus a random variable, resulting in some degree of positive serial correlation, then a transformation to first differences may remove some of the serial correlation in the residuals. If the serial correlation is less than 0.5 or negative, a conversion to first differences tends to make the degree of serial correlation in the residuals greater in the transformed than in the original analysis and first differences should not be used."

Several series of residuals for different grades of paper and board were tested for serial correlation.[29] All tests indicated a low or negative correlation and thus first differences were not used in this analysis.

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[27] First differences measure the change in each observation from that of the preceding year. They may be expressed in terms of actual year to year changes, as percents, or as first differences of logarithms.

[28] Foote, op. cit., pp. 29-30.

[29] Computer "print outs" of the calculated values of the dependent variables and the "residuals," i.e., the difference between the actual and calculated values for all the equations tested, are on file in the Washington Office of the Forest Service. These print outs also show the correlation coefficients between the independent variables.

Simple regression equations preferred to multiple regression equations

The preceding discussion has been concerned with choices among regression equations with a single independent variable, that is, simple regression equations. It is also possible to use equations with more than one independent variable or multiple regression equations. This alternative is another important consideration in projecting demands for paper and board since the projections obtained from the two kinds of regression equations, with all other factors affecting the level of the projection held constant (see list of other factors on page 18), usually showed fairly large differences. For example, the projections of demand for container board ranged from about 16 million tons with the multiple regressions to 20 million tons with the simple regressions (table 3; fig. 9).

The statistical measures obtained from the tests showed that a little more of the variation in the dependent variables was explained by the multiple regressions. These tests also showed a high correlation among the independent variables such as population and income or output available for use in multiple regressions.[29/] Generally this correlation (multicollinearity) among the independent variables is considered as undesirable by statisticians because it results in a distortion of the b coefficients in the equations. The coefficients or indexes of partial correlation are also distorted, and it is difficult to determine the net explanatory effect of each of the independent variables. Because of these distortions, the simple regressions seemed to be preferable for projecting demands for paper and board.

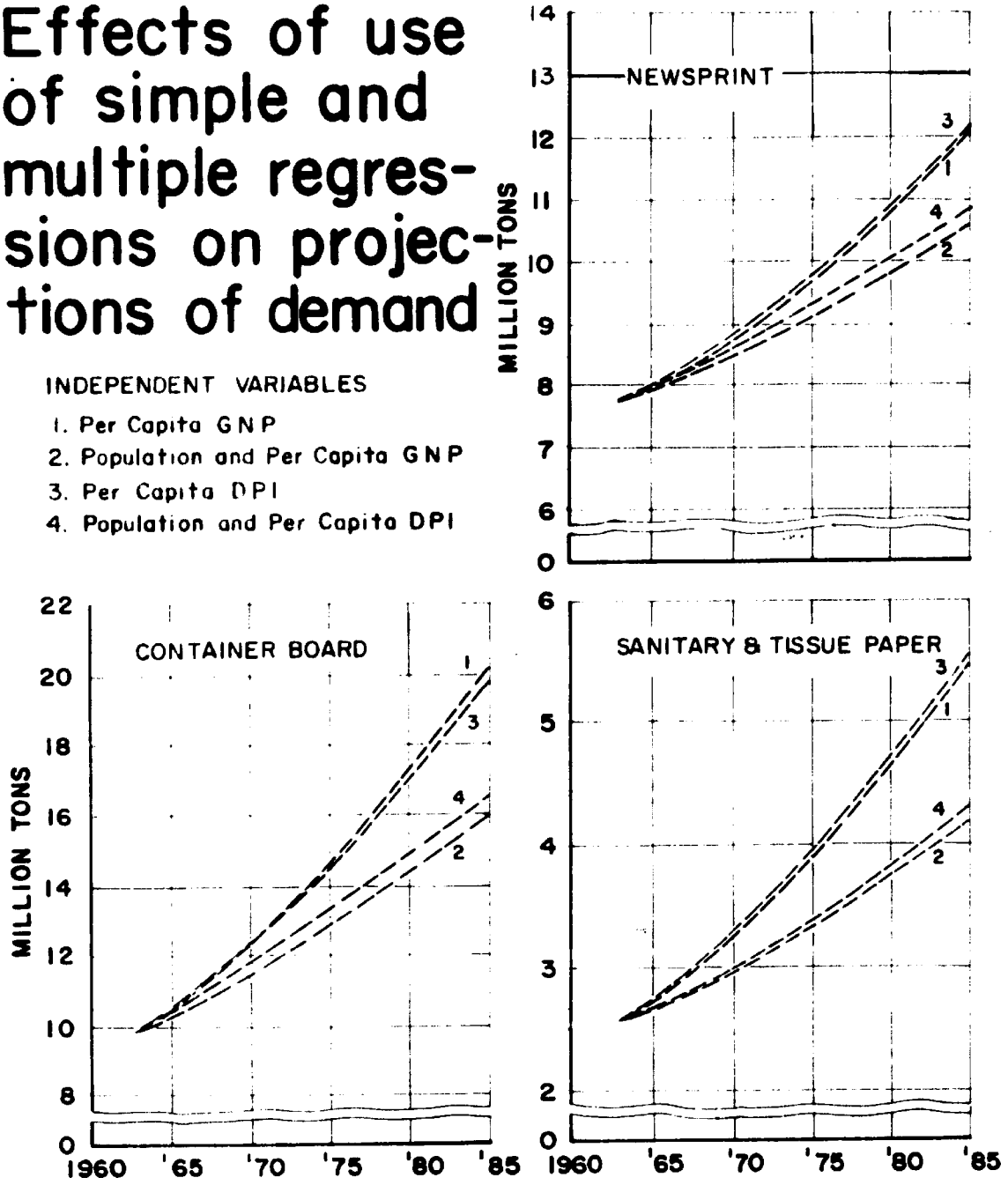
Table 3.--Effects of use of simple and multiple regressions on projections of demand for selected grades of paper and board (All projections derived from use of the equations $Y = a + b \log X$ and $Y = a + b \log X + b_1 \log X_1$ fitted to data in the period 1948-63)

Variable	Consumption		Projected demand							
	1963		1970		1975		1980		1985	
	Total	Per capita	Total	Per capita	Total	Per capita	Total	Per capita	Total	Per capita
	Thousand tons	Pounds	Thousand tons	Pounds	Thousand tons	Pounds	Thousand tons	Pounds	Thousand tons	Pounds
Newsprint:										
Per capita newsprint consumption is a function of per capita gross national product	7,557	79.80	8,788	84.50	9,746	87.41	10,852	90.06	12,076	92.89
Newsprint consumption is a function of population and per capita gross national product	"	"	8,490	81.63	9,158	82.13	9,874	81.94	10,585	81.42
Per capita newsprint consumption is a function of per capita disposable personal income	"	"	8,850	85.10	9,791	87.81	10,881	90.30	12,106	93.12
Newsprint consumption is a function of population and per capita disposable personal income	"	"	8,637	83.05	9,350	83.86	10,062	83.50	10,817	83.21
Sanitary and tissue paper:										
Per capita sanitary and tissue paper consumption is a function of per capita gross national product	2,566	27.10	3,217	30.93	3,880	34.80	4,618	38.32	5,472	42.09
Sanitary and tissue paper consumption is a function of population and per capita gross national product	"	"	2,960	28.47	3,329	29.86	3,744	31.07	4,149	31.91
Per capita sanitary and tissue paper consumption is a function of per capita disposable personal income	"	"	3,282	31.56	3,919	35.15	4,632	38.44	5,482	42.17
Sanitary and tissue paper consumption is a function of population and per capita disposable personal income	"	"	2,998	28.83	3,387	30.37	3,808	31.61	4,229	32.53
Container board:										
Per capita container board consumption is a function of per capita gross national product	9,846	103.97	12,236	117.65	14,581	130.77	17,198	142.72	20,214	155.49
Container board consumption is a function of population and per capita gross national product	"	"	11,388	109.50	12,852	115.27	14,372	119.27	15,903	122.33
Per capita container board consumption is a function of per capita disposable personal income	"	"	12,284	118.12	14,463	129.71	16,910	140.33	19,807	152.36
Container board consumption is a function of population and per capita disposable personal income	"	"	11,798	113.45	13,366	119.87	14,853	123.26	16,493	126.87

Effects of use of simple and multiple regressions on projections of demand

INDEPENDENT VARIABLES

1. Per Capita GNP
2. Population and Per Capita GNP
3. Per Capita DPI
4. Population and Per Capita DPI



Note: All projections based on relationships in the 1948-63 period as described by the equations $Y = a + b \log X$ and $Y = a + b \log X + b_1 \log X_1$

Figure 9

It should be noted that there is no statistical evidence that the projections obtained from multiple regressions, with highly correlated independent variables, are likely to be less reliable than those from simple regressions. However, the projected values, particularly the per capita values, obtained from most of the multiple regressions tested, appear to be below the levels which an extrapolation of historical trends would indicate as being reasonable.

The determination of the form of the functional relationships between economic series is a major problem in regression analysis

As brought out earlier, a regression equation is a means of mathematically measuring a relationship between variables. The relationships between most economic variables are complex and not very exact, and the determination of an equation which best describes the form of the relationship is a major problem in regression analysis.

If traced over a long enough period of time, relationships between consumption of most grades of paper and board and income have shown a typical pattern. Starting from a low level, the dependent variable first tends to rise very rapidly in relation to the independent variable, then gradually slows as the change associated with another increment in the independent variable becomes progressively smaller. This kind of a functional relationship is illustrated by the curve in figure 10. This curve or function also approximates the general concept of a production function and the growth curve followed by many plants and animals.

The mathematical equation for the curve in figure 10 is complex. However, it can be broken into three segments whose general forms can

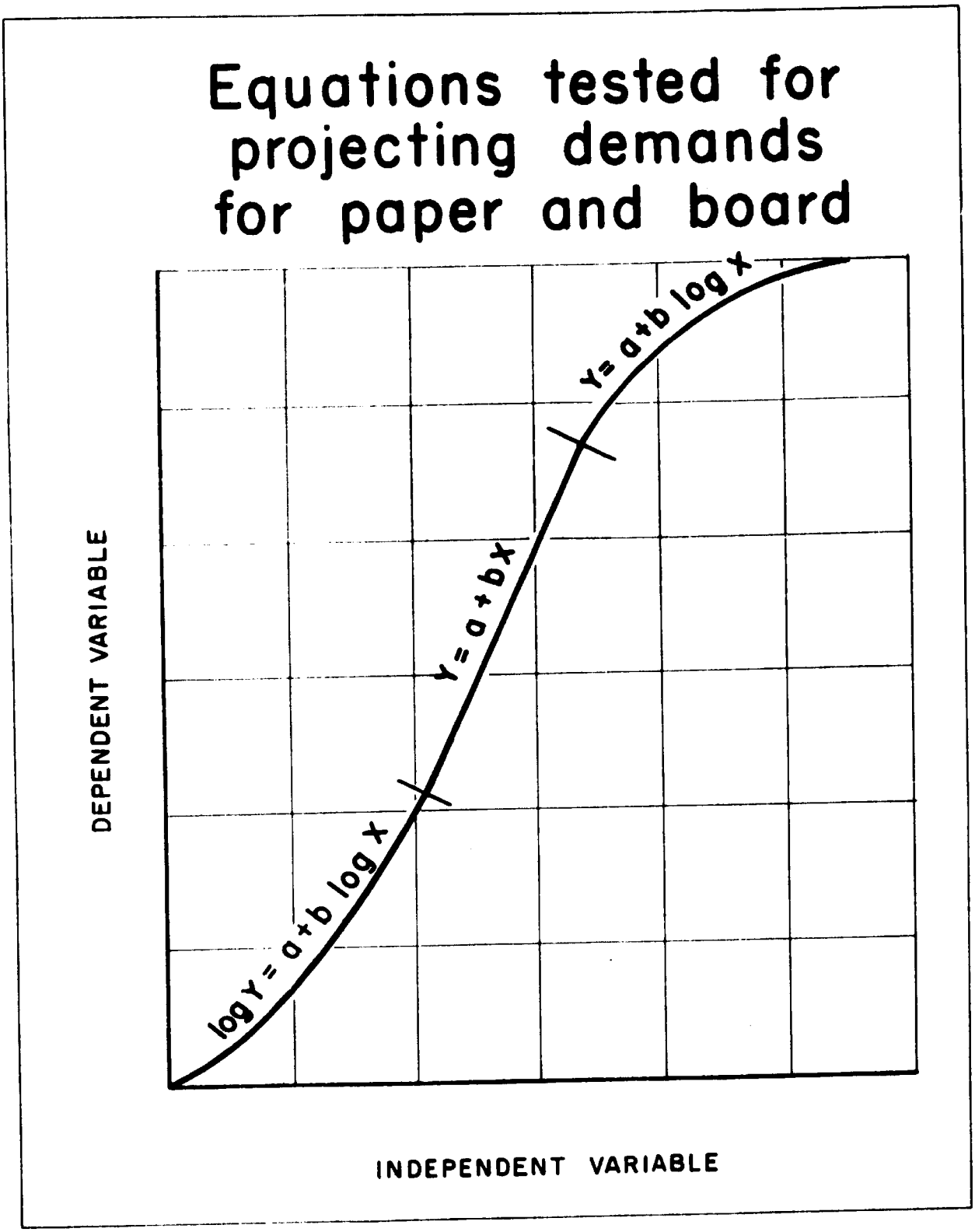

Equations tested for projecting demands for paper and board
DEPENDENT VARIABLE
INDEPENDENT VARIABLE
log Y = a + b log X
Y = a + bX
Y = a + b log X

Figure 10

be described by the simple equations $\log Y = a + b \log X$, $Y = a + b X$, and $Y = a + b \log X$. Two of these equations, $Y = a + b X$ and $\log Y = a + b \log X$, have been used in projecting demands for paper and board.

Statistical tests indicate three different equations describe historical relationships about equally well but level of projections show wide differences

In this study all three equations were tested to see which best described the relationship between consumption of each of the major grades of paper and board and all of the independent variables where graphical analysis indicated a reasonably close relationship existed. It was expected that there would be significant differences in the fit of the equations to the data and that it would be possible to determine mathematically which best described the historical relationships. However, all three equations seemed to describe the historical relationships between consumption of the major grades of paper and board and the independent variables about equally well. The differences in the coefficients or indexes of determination and in the standard errors of estimate among the equations tested were not large (see Appendix B), and there was no statistical basis for selecting one as the best for making projections.

Despite the apparent lack of differences in the fit of the three equations to the historical series, the projections obtained (with all other factors affecting the level of projection held constant) were widely different (table 4; fig. 11). In most of the equations tested the highest projections were derived from the equation

Table 4.--Effects of use of different regression equations on projections of demand for selected grades of paper and board
(All projections based on the relationships in the 1948-63 period)

Variable and regression equation	Consumption		Projected demand							
	1963		1970		1975		1980		1985	
	Total	Per capita	Total	Per capita	Total	Per capita	Total	Per capita	Total	Per capita
	Thousand tons	Pounds	Thousand tons	Pounds	Thousand tons	Pounds	Thousand tons	Pounds	Thousand tons	Pounds
Newsprint:										
Per capita newsprint consumption is a function of per capita gross national product										
$Y = a + b X$	7,557	79.80	8,891	85.49	9,977	89.48	11,263	93.47	12,760	98.15
$Y = a + b \log X$	"	"	8,788	84.50	9,746	87.41	10,852	90.06	12,076	92.89
$\log Y = a + b \log X$	"	"	8,834	84.94	9,840	88.25	11,012	91.39	12,329	94.84
Sanitary and tissue paper:										
Per capita sanitary and tissue paper consumption is a function of per capita disposable personal income										
$Y = a + b X$	2,566	27.10	3,415	32.84	4,208	37.74	5,138	42.64	6,332	48.71
$Y = a + b \log X$	"	"	3,282	31.56	3,919	35.15	4,632	38.44	5,482	42.17
$\log Y = a + b \log X$	"	"	3,477	33.43	4,563	40.92	5,774	47.92	7,452	57.32
Container board:										
Per capita container board consumption is a function of per capita disposable personal income										
$Y = a + b X$	9,846	103.97	12,735	122.45	15,416	138.26	18,564	154.06	22,573	173.64
$Y = a + b \log X$	"	"	12,284	118.12	14,463	129.71	16,910	140.33	19,807	152.36
$\log Y = a + b \log X$	"	"	13,078	125.75	16,134	144.70	19,828	164.55	24,747	190.36

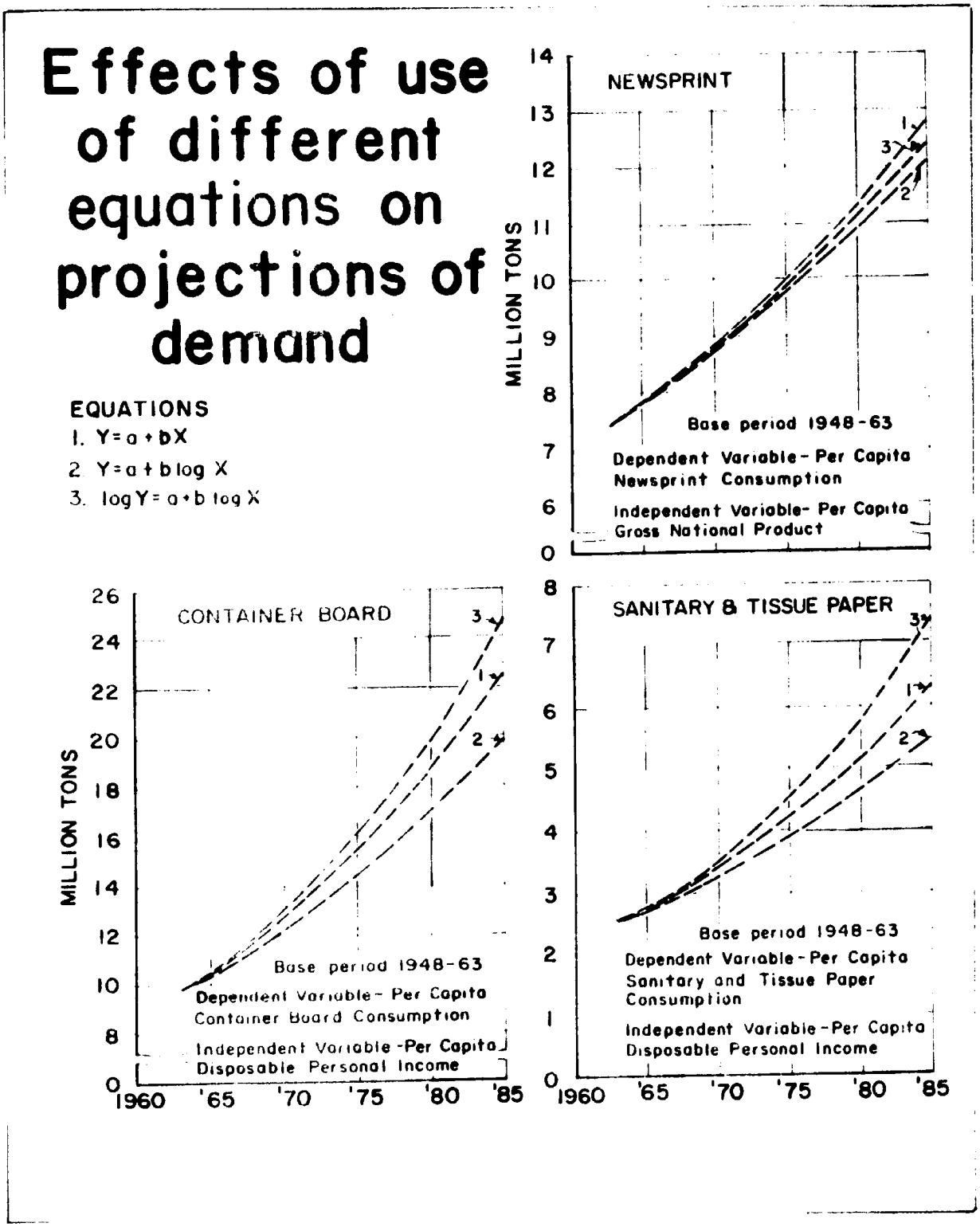

Effects of use of different equations on projections of demand
EQUATIONS
1. Y = a + bX
2. Y = a + b log X
3. log Y = a + b log X
NEWSPRINT
MILLION TONS
Base period 1948-63
Dependent Variable - Per Capita Newsprint Consumption
Independent Variable - Per Capita Gross National Product
CONTAINER BOARD
MILLION TONS
Base period 1948-63
Dependent Variable - Per Capita Container Board Consumption
Independent Variable - Per Capita Disposable Personal Income
SANITARY & TISSUE PAPER
Base period 1948-63
Dependent Variable - Per Capita Sanitary and Tissue Paper Consumption
Independent Variable - Per Capita Disposable Personal Income
1960 '65 '70 '75 '80 '85

Figure 11

$\log Y = a + b \log X$, intermediate projections from $Y = a + b X$, and the lowest projections from $Y = a + b \log X$ (see Appendix B). For example, the projected demand for container board in 1985 obtained from projecting the relationship between per capita consumption and per capita disposable income in the 1947-63 period ranged from a low of 19.8 million tons ($Y = a + b \log X$), to an intermediate level of 22.6 million tons ($Y = a + b X$), and a high of 24.7 million tons ($\log Y = a + b \log X$).

Substantive and theoretical considerations indicate that the equation $Y = a + b \log X$ is the best choice for projecting longrun demands for most grades of paper and board

Although the standard statistical measures, such as coefficients or indexes of determination and errors of estimate, provided no basis for choosing among equations, there were other grounds for making a choice. First, a visual examination of the plotted relationships between most grades of paper and board and the independent variables, which seemed suitable for projecting demands, indicated that most relationships were of the general form described by the equation $Y = a + b \log X$ (see graphs in Appendix A).

Second, for most grades of paper and board and most test relationships, the projections obtained from the equations $\log Y = a + b \log X$ and $Y = a + b X$ fitted to the data in postwar years were substantially below those obtained when they were fitted to data that included the prewar years (Appendix B). This means that the slope of the lines describing the actual relationships has flattened out and suggests that the relationships for most grades of paper and board were approaching the general form of the equation $Y = a + b \log X$.

Third, the residuals--the differences between actual consumption of a grade of paper or board and the calculated consumption derived from the equations $Y = a + b X$ and $\log Y = a + b \log X$--tended to be grouped for most grades of paper and board, with actual consumption being above calculated consumption in the middle of the series of data and below the calculated values near the extremes. In contrast, the distribution of the residuals around the equation $Y = a + b \log X$ tended to be randomly distributed--a further indication that this equation best described the historical relationships for most grades of paper and board.

The above evidence on the choice of equation is in agreement with the theory of diminishing marginal utility of income. This theory indicates that as an individual's income rises beyond some threshold value (the point of change from equation $\log Y = a + b \log X$ to equation $Y = a + b X$ in figure 10) a progressively smaller portion of each increment will be spent on any given good. Thus, beyond the threshold value, the income elasticity of demand[30/] for a given grade of paper or board declines as income rises, and the form of the function describing the relationship gradually flattens out until the change in per capita consumption associated with an increment of per capita income becomes infinitesimal--a characteristic of the equation $Y = a + b \log X$.

Some evidence of a decline in the income elasticity of demand is provided by the following data which show the average per capita income

---

30/ The income elasticity of demand is defined as the percentage change in quantity demanded resulting from a 1 percent change in income when other factors such as prices are held constant.

elasticity of consumption[31/] of newsprint for various periods between 1920 and 1963.

Time period	Per capita income elasticity of consumption[31/]
1920-35	1.09
1925-40	0.74
1930-40 and 1948-53	.66
1935-40 and 1948-58	.62
1947-61	.61
1947-62	.58
1947-63	.53
1948-61	.44
1948-62	.43
1948-63	.39
1949-61	.35
1949-62	.35
1949-63	.31

The logic behind the theory of diminishing marginal utility of income can be applied in other ways, such as the use of building board per unit of construction, or the use of container board per unit of goods packaged. For example, building board is adaptable for only a few uses in residential construction, such as sheathing and subflooring, and once these uses are taken over per unit use levels off, both as an average for all units built and in individual units. There are also limits on the amount of container board that can be used per unit of goods packaged.

Of course, this reasoning, which indicates that per capita or per unit use must in the longrun approach a saturation value, does not

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31/ The percentage change in per capita consumption associated with a 1 percent change in per capita income. These estimates are b coefficients obtained by fitting the equation $\log Y = a + b \log X$ to data showing per capita newsprint consumption and per capita gross national product in the indicated periods. The b coefficient obtained from fitting this equation to cross sectional consumption and income data is a direct measure of the average income elasticity of demand over the specified range of income.

necessarily apply to total or aggregate use. As long as there is no actual decline in per capita or per unit use, total consumption of the various grades of paper and board will rise if there are increases in the magnitude of the independent variables, such as the gross national product or construction.

Although the equation $Y = a + b \log X$ seems to be the best choice for projecting longrun demands for most grades of paper and board, it is necessary to look carefully at all factors which give some indication of the form of the relationship

In summary, it seems fairly clear that the relationship between consumption of most grades of paper and board and the independent variables tested has approximated the general form of the equation $Y = a + b \log X$ and that an equation of this general form is the best choice for making longrun projections for most grades. There were, however, some important exceptions. Consumption of a few grades of paper and board, such as sanitary and tissue paper and container board, has been rising rapidly and the analysis of the graphs showing historical relationships, the levels of the projections obtained from the two base time periods, and the distribution of residuals around the lines of the three equations indicated that the linear equation $Y = a + b X$ best described the general form of the relationships. Because of such exceptions, it is necessary in choosing an equation to look carefully at all the factors which give some indication of the form of the relationship in the base projection period.

The equation $\log Y = a + b \log X$, in which the income elasticity of demand is constant, did not appear to be a desirable choice for projecting longrun demands for any grade of paper or board. However,

it should be noted that in the period following the introduction of specific grades of paper or board, as new markets are being taken over and new uses developed, this equation may be the best to use, especially for making fairly shortrun projections.

The postwar period is the best choice as a base time period for projections

As some of the above discussion has indicated, one of the important determinants of the level of a projection is the time period or years used as a base in fitting the equation. Two base time periods were tested in this study--(1) a period which included all prewar years 1920-61, exclusive of World War II years, for which data were available, and (2) the postwar years, i.e., 1947-61 in most tests. The rather substantial differences in the projections obtained from fitting the same equation ($Y = a + b \log X$) to the data in these two base periods, while holding all other factors which affect the level of the projection constant, are shown in table 5 and figure 12. For container board the projections ranged from 16.9 million tons to 19.5 million tons, a difference of 2.6 million tons.

An analysis of the statistical measures obtained in the tests of the two base periods (Appendix B) indicated that in nearly all cases the a and b coefficients obtained from equations fitted to the postwar period were significantly different from those obtained when the prewar years were included. This reflects a structural change in the relationships--presumably that associated with diminishing marginal utility. Statisticians generally agree that when there is evidence of

Table 5.--Effects of base time periods on projections of demand for selected grades of paper and board
(All projections derived from the use of the equation $Y = a + b \log X$)

Variable and time period	Consumption		Projected demand							
	1963		1970		1975		1980		1985	
	Total	Per capita	Total	Per capita	Total	Per capita	Total	Per capita	Total	Per capita
	Thousand tons	Pounds	Thousand tons	Pounds	Thousand tons	Pounds	Thousand tons	Pounds	Thousand tons	Pounds
Newsprint:										
Per capita newsprint consumption is a function of per capita gross national product										
1929-61	7,557	79.80	9,128	87.77	10,252	91.95	11,539	95.76	12,978	99.83
1948-61	"	"	8,902	85.60	9,910	88.88	11,069	91.86	12,357	95.05
Sanitary and tissue paper:										
Per capita sanitary and tissue paper consumption is a function of per capita disposable personal income										
1929-61	2,566	27.10	2,844	27.35	3,312	29.70	3,837	31.84	4,456	34.28
1948-61	"	"	3,279	31.53	3,916	35.12	4,628	38.41	5,477	42.13
Container board:										
Per capita container board consumption is a function of per capita disposable personal income										
1929-61	9,846	103.97	11,076	106.50	12,772	114.55	14,691	121.92	16,936	130.28
1948-61	"	"	12,171	117.03	14,308	128.32	16,709	138.66	19,548	150.37

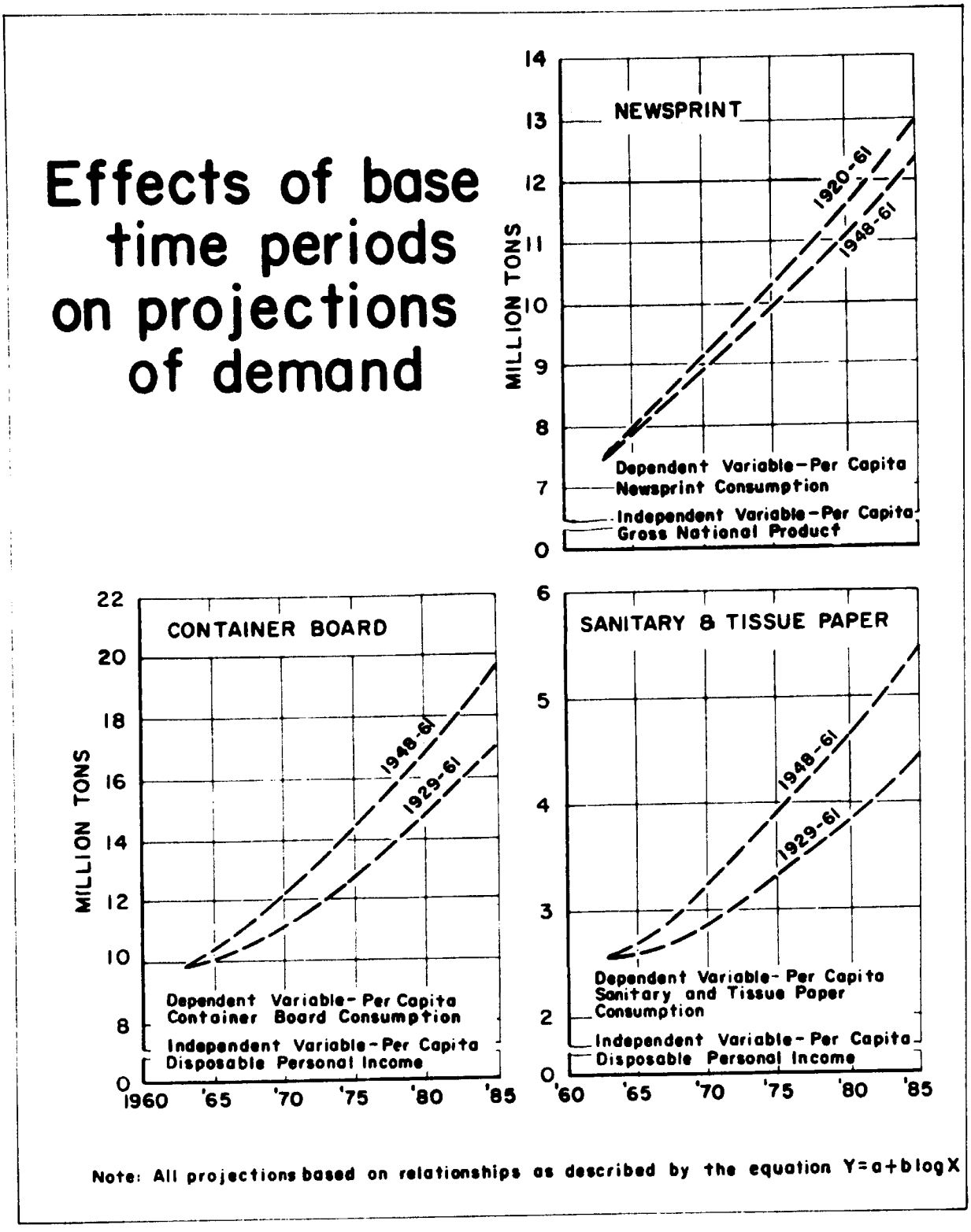

Effects of base time periods on projections of demand
NEWSPRINT
MILLION TONS
1920-61
1948-61
Dependent Variable-Per Capita Newsprint Consumption
Independent Variable-Per Capita Gross National Product
CONTAINER BOARD
MILLION TONS
1948-61
1929-61
Dependent Variable-Per Capita Container Board Consumption
Independent Variable-Per Capita Disposable Personal Income
1960 '65 '70 '75 '80 '85
SANITARY & TISSUE PAPER
1948-61
1929-61
Dependent Variable-Per Capita Sanitary and Tissue Paper Consumption
Independent Variable-Per Capita Disposable Personal Income
'60 '65 '70 '75 '80 '85
Note: All projections based on relationships as described by the equation Y=a+blogX

Figure 12

such structural changes the latest period, in this case the postwar period, is the better choice as a time base for projections.[32/]

Projections are especially sensitive to the values of the observations at beginning and ending of projection period

In addition to the tests of base time periods, a series of tests were run to determine the effects of including or excluding years at the beginning and ending of the postwar period. These tests indicated that any deviation of the observations at the beginning or ending of the base period from the normal pattern of the relationship had an important effect on the level of the projection. For example, the projected demand in 1985 for newsprint obtained from fitting the function $Y = a + b \log X$ to per capita data in the period 1947-63 was 12.7 million tons--nearly a million tons above the projection obtained from using 1949-63 as the base period (table 6, fig. 13). The a and b coefficients were also significantly different.

It was established that newsprint was in short supply in 1947 and that consumption was abnormally low. As a result, the slope of the line describing the relationship between the series which included this low observation was steeper than it otherwise would have been and the level of the projection was higher. Where such abnormal or special conditions prevail, it has been the general practice of statisticians to exclude the affected observation from the analysis.

This practice, however, has not been generally applied to high or low observations which reflect cyclical fluctuations. For most grades

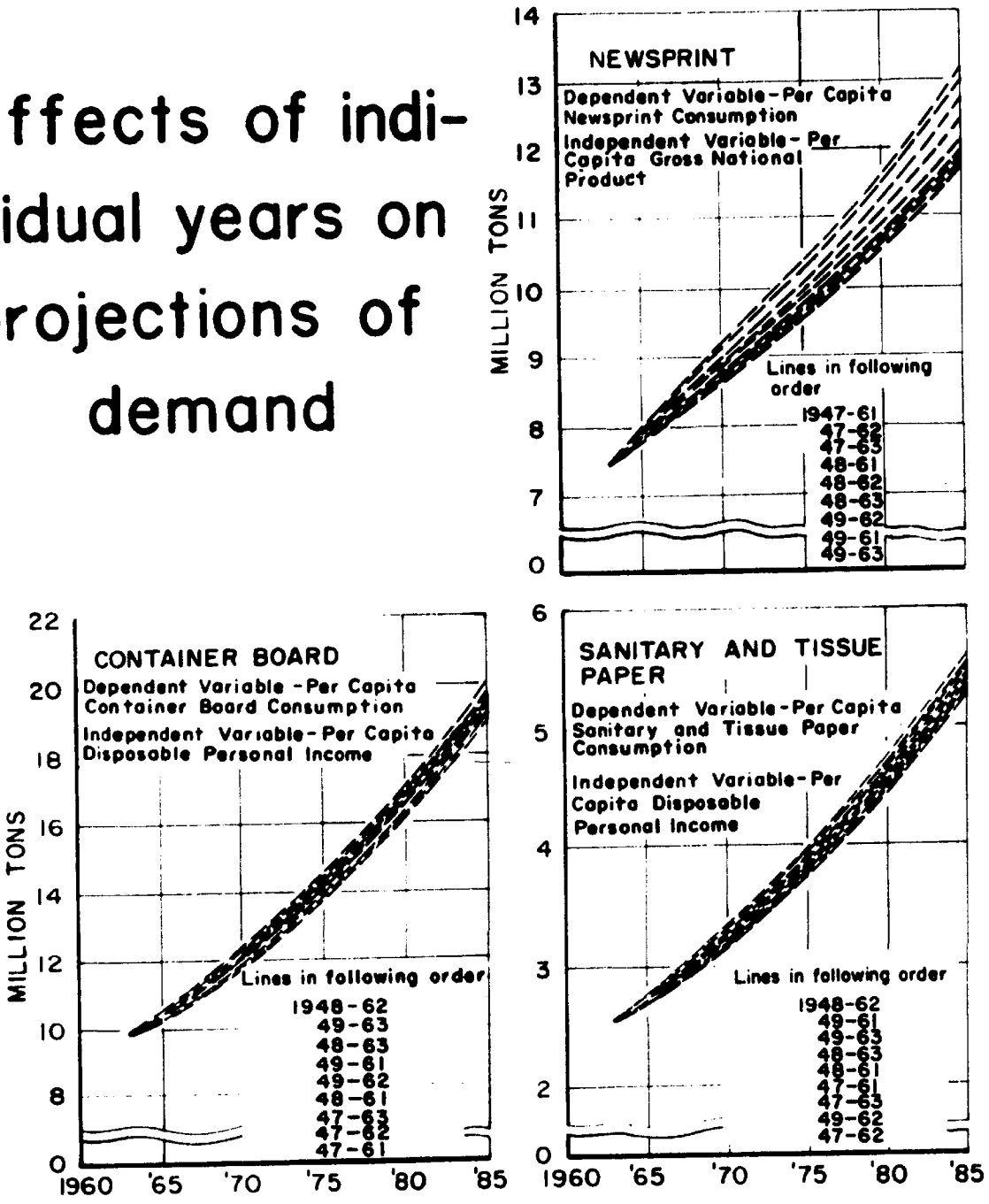
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[32/] See Foote, op. cit., pp. 20-21.

Table 6.--Effects of individual years on projections of demand for selected grades of paper and board
(All projections derived from the use of the equation $Y = a + b \log X$)

Variable and time period	Consumption		Projected demand							
	1963		1970		1975		1980		1985	
	Total	Per capita	Total	Per capita	Total	Per capita	Total	Per capita	Total	Per capita
	Thousand tons	Pounds	Thousand tons	Pounds	Thousand tons	Pounds	Thousand tons	Pounds	Thousand tons	Pounds
Newsprint:										
Per capita newsprint consumption is a function of per capita gross national product										
1947-61	7,557	79.30	9,192	88.38	10,342	92.75	11,656	96.73	13,127	100.98
1948-61	"	"	8,902	85.60	9,910	88.88	11,069	91.86	12,357	95.05
1949-61	"	"	8,746	84.10	9,669	86.72	10,738	89.11	11,916	91.66
1947-62	"	"	9,108	87.58	10,230	91.75	11,513	95.54	12,948	99.60
1948-62	"	"	8,885	85.43	9,884	88.65	11,035	91.58	12,312	94.71
1949-62	"	"	8,747	84.11	9,672	86.74	10,740	89.13	11,920	91.69
1947-63	"	"	8,988	86.42	10,060	90.22	11,288	93.68	12,659	97.38
1948-63	"	"	8,788	84.50	9,746	87.41	10,852	90.06	12,076	92.89
1949-63	"	"	8,664	83.31	9,550	85.65	10,579	87.79	11,709	90.07
Sanitary and tissue paper:										
Per capita sanitary and tissue paper consumption is a function of per capita disposable personal income										
1947-61	2,566	27.10	3,270	31.44	3,901	34.99	4,608	38.24	5,451	41.93
1948-61	"	"	3,279	31.53	3,916	35.12	4,628	38.41	5,477	42.13
1949-61	"	"	3,295	31.68	3,938	35.32	4,657	38.65	5,516	42.43
1947-62	"	"	3,221	30.97	3,833	34.38	4,520	37.51	5,336	41.05
1948-62	"	"	3,326	31.98	3,979	35.69	4,709	39.08	5,581	42.93
1949-62	"	"	3,240	31.15	3,862	34.64	4,559	37.83	5,387	41.44
1947-63	"	"	3,268	31.42	3,897	34.95	4,601	38.18	5,440	41.85
1948-63	"	"	3,282	31.56	3,919	35.15	4,632	38.44	5,482	42.17
1949-63	"	"	3,292	31.65	3,934	35.28	4,651	38.60	5,507	42.36
Container board:										
Per capita container board consumption is a function of per capita disposable personal income										
1947-61	9,846	103.97	11,993	115.32	14,049	126.00	16,361	135.78	19,092	146.86
1948-61	"	"	12,171	117.03	14,308	128.32	16,709	138.66	19,548	150.37
1949-61	"	"	12,267	117.95	14,448	129.58	16,898	140.23	19,800	152.31
1947-62	"	"	12,007	115.45	14,065	126.14	16,380	135.93	19,114	147.03
1948-62	"	"	12,378	119.02	14,591	130.86	17,076	141.71	20,019	153.99
1949-62	"	"	12,163	116.95	14,303	128.28	16,709	138.66	19,555	150.42
1947-63	"	"	12,146	116.79	14,254	127.84	16,624	137.96	19,426	149.43
1948-63	"	"	12,284	118.12	14,463	129.71	16,910	140.33	19,807	152.36
1949-63	"	"	12,352	118.77	14,566	130.64	17,052	141.51	19,998	153.83

Effects of individual years on projections of demand



Note: All projections based on relationships as described by the equation $Y = a + b \log X$

Figure 13

of paper and board these cyclical fluctuations are large enough to have a tilt effect on the slope of the line describing the relationship. This can be of major importance if the cycles occur at the beginning or ending of the base period where observations have the maximum impact on the slope of the relationship and the level of the projection. Thus, the use of observations, which may be high or low because of cyclical fluctuations, must be carefully considered if they occur in these critical periods.

In projecting demands for paper and board it is desirable to make separate projections for the major grades but the sum of these projections may be about the same as a single projection of total demand

As indicated in the introduction to this section, all grades of paper and board were classified into several major grades in common use in industry and government. Such a classification provides more useful information for the paper and board industry where most firms are interested in prospective growth trends in specific grades. In addition, better estimates of wood pulp requirements (shown in the second section of the study) can be derived as both the use of new wood pulp and the mixture of the various types of new wood pulp vary widely among the different grades of paper and board manufactured. Because many grades of paper and board have shown widely varying rates of growth in consumption, it also seems logical to expect that more reliable projections can be obtained by working with the separate grades, particularly where the varying rates of growth have been related to growth in different sectors of the economy.

There is a question, however, as to whether a projection of total demand for paper and board obtained by summing the projections for the major grades would be statistically as reliable as one obtained by projecting such a total directly. The tests showed that the coefficients or indexes of determination, which may be the best indicators of the reliability of a projection, were slightly higher for a projection of all grades combined than for most of the projections made for individual grades. The tests also indicated, however, than when most of the factors which affect the level of a projection, such as the regression equation and base time period, were the same, the difference between the sum of the projections of individual grades and a projected total for all grades was small and of no practical significance (table 7).

Some general guides on the use of regression equations in projecting longrun demands for the major grades of paper and board

This concludes the analysis of the series of regression equations tested for use in projecting longrun trends in demand for the major grades of paper and board. This analysis indicated that there are some general guides on the use of regression equations for projecting longrun trends in demand for these products. These are summarized as follows:

1. On the choice of an independent variable and the use of per capita or aggregate data.

   For those grades of paper and board where there has been little or no increase in per capita use in the time period used as the base for the projection, and no indication of change, population or households logically is the best choice for projecting demand (aggregate demand).

   For those grades where there has been a slow increase in per capita use, presumably in response to growth in the output of goods and services or income, gross national product or disposable personal income logically is the best choice for projecting demand (aggregate demand).

Table 7.--Comparison of projections of total demand for paper and board with sum of projections for major grades of paper and board
(All projections derived from the use of the equation $Y = a + b \log X$ fitted to data in the period 1947-61)

Variable	Consumption		Projected demand							
	1963		1970		1975		1980		1985	
	Total	Per capita	Total	Per capita	Total	Per capita	Total	Per capita	Total	Per capita
	Thousand tons	Pounds	Thousand tons	Pounds	Thousand tons	Pounds	Thousand tons	Pounds	Thousand tons	Pounds
Paper:										
Per capita paper consumption is a function of:										
Per capita disposable personal income	23,976	253	28,619	275.18	32,425	290.81	36,774	305.18	41,770	321.31
Per capita gross national product	"	"	28,191	271.07	32,070	287.62	36,473	302.68	41,445	318.81
Sum of individual grades derived from separate grade analysis 1/	"	"	28,651	275.49	32,522	291.68	36,832	306.02	41,913	322.40
Board:										
Per capita board consumption is a function of:										
Per capita disposable personal income	19,937	211	24,889	239.32	29,066	260.68	33,769	280.24	39,312	302.40
Per capita gross national product	"	"	24,280	233.46	28,547	256.03	33,328	276.58	38,812	298.55
Sum of individual grades derived from separate grade analysis 1/	"	"	24,526	235.84	28,660	256.23	33,062	274.38	38,307	294.67
Paper and board:										
Per capita paper and board consumption is a function of:										
Per capita disposable personal income	43,913	464	53,507	514.49	61,488	551.46	70,531	585.32	81,078	623.68
Per capita gross national product	"	"	52,468	504.50	60,616	543.64	69,803	579.28	80,258	617.37
Sum of individual grades derived from separate grade analysis 1/	"	"	53,177	511.33	61,182	547.91	69,894	580.40	80,220	617.07

1/ The following independent variables were used to form the sum of individual grades for paper and board:
a. Per capita disposable personal income: Newsprint, book paper, fine paper, sanitary and tissue paper, container board, and bending board.
b. Per capita gross national product: Coarse and industrial paper and building board.
c. Population and residential construction: Construction paper.
d. Population and per capita gross national product: Other board.

For those grades where there has been a fairly rapid increase in per capita use, and a good correlation between changes in per capita use and changes in per capita output or income, per capita gross national product or per capita disposable personal income logically is the best choice for projecting demand (per capita demand).

2. On the choice between simple and multiple regression equations.

Simple regression equations are preferable to multiple regression equations for making longrun projections with the independent variables that are available for use.

3. On the choice of an equation describing the form of the relationship.

An equation with the general form $Y = a + b \log X$ is preferable for making longrun projections of demand for most grades of paper and board. However, for grades where consumption has been rising rapidly, the equation $Y = a + b X$ may be the best choice, at least for the years immediately ahead. There was no evidence that the equation $\log Y = a + b \log X$, which implicitly assumes a constant income elasticity of demand, was a desirable choice for projecting longrun trends in demand for any grade of paper or board.

4. On the choice of a base time period.

The post World War II years are preferable as the base time period for making longrun projections for all grades of paper and board. Observations for individual years, particularly those near the beginning and ending of the base period which deviate from the normal pattern of the relationship should be carefully examined and omitted if abnormal or special conditions prevailed.

The use of these guides will not necessarily result in a more accurate forecast of future trends in demand for the major grades of paper and board. Such use, however, does require consideration of the factors which determine the level of projections obtained from regression equations and provides a more logical foundation.

The above guides were used in making the projections of demand for the major grades of paper and board, shown in the following section. Graphical analysis was also extensively used in appraising the results obtained from the regression equations, and in determining the projected values shown for each grade.

PROJECTED DEMANDS FOR PAPER AND BOARD, WOOD PULP, AND PULPWOOD

> "The question is not whether economic analysis can, in a changing economy, give highly accurate forecasts on which to base plans. It is whether economics can give a better answer than would otherwise be obtainable."[33]

This section of the report presents projections of demand for the major grades of paper and board to 1985 by 5-year intervals. These projections are also converted into equivalent demands for wood pulp and pulpwood. The discussion begins with the basic assumptions which in large part determine the level of the projections.

Basic Assumptions

The analysis in the preceding section indicated that it is desirable to use several different independent variables, such as population, gross national product and disposable personal income (total and per capita), industrial production, and construction in projecting demands for the various grades of paper and board. The assumed future values of these independent variables are shown in table 8 and discussed below. There is, of course, a lot of uncertainty associated with these assumed values because it is not known to what degree the underlying determinants such as the fertility of women, productivity of the labor force, institutions, and technology will change.

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[33] S. T. Dana, "Functions of Forest Economics Research," Research in the Economics of Forestry (Washington, D. C.: Charles Lathrup Pack Forestry Foundation, 1953).

Table 8.--Measures of population and economic growth, 1920-85

Year	Population	Households	Gross national product (1961 prices)		Disposable personal income (1961 prices)		Index of industrial production	Construction expenditures (1961 prices)	Number of housing starts
			Total	Per capita	Total	Per capita			
	Millions	Millions	Billion dollars	Dollars	Billion dollars	Dollars	(1957-59=100)	Billion dollars	Thousands
1920	106.5	24.5	142.8	1,340	--	--	26.2	19.1	--
1925	115.8	27.5	179.5	1,550	--	--	31.5	39.8	--
1930	123.1	30.0	191.7	1,560	144.4	1,170	32.0	34.3	--
1935	127.3	31.9	177.4	1,390	136.9	1,080	30.7	22.4	--
1940	132.1	34.9	237.6	1,800	172.8	1,310	43.9	34.5	--
1945	139.9	37.5	371.7	2,660	238.7	1,710	70.5	23.8	--
1950	152.3	43.6	371.6	2,440	259.4	1,700	74.9	61.8	1,726
1955	165.9	47.9	458.1	2,760	308.3	1,860	96.6	72.4	1,643
1960	180.7	52.8	510.2	2,820	353.4	1,960	108.7	73.9	1,296
1961	183.8	53.5	520.1	2,830	364.4	1,980	109.8	75.2	1,365
1962	186.7	54.7	554.3	2,970	381.9	2,050	118.3	78.3	1,492
1963	189.4	55.2	575.3	3,040	395.4	2,090	124.3	79.9	1,641
1964 1/	192.1	56.0	604.1	3,140	422.4	2,200	132.0	82.4	1,591
PROJECTIONS									
1970	208	62.5	755	3,630	530	2,550	160	105	1,630
1975	223	67.5	905	4,060	630	2,830	190	120	1,770
1980	241	73.5	1,090	4,520	760	3,150	225	140	1,920
1985	260	79.5	1,310	5,040	920	3,540	270	155	2,080

1/ Preliminary.

Sources: Population, U.S. Department of Commerce, Bureau of the Census, Current Population Reports: Population Estimates, No. 302 (1965).

Households, U.S. Department of Commerce, Bureau of the Census, Historical Statistics of the United States, Colonial Times to 1957 (Washington: U.S. Government Printing Office, 1960) and Current Population Reports: Population Characteristics, No. 140 (1965).

Gross national product, derived from data published by the U.S., Congress, Joint Committee on the Economic Report, Potential Economic Growth of the United States During the Next Decade, 83d Cong., 2d Sess., 1954 and the U.S. Department of Commerce, Office of Business Economics, op. cit., Vol. 45, No. 8 (1965).

Disposable personal income, derived from data published by the U.S. Department of Commerce, Office of Business Economics, ibid.

Index of industrial production, Board of Governors of the Federal Reserve System, Industrial Production 1957-59 Base, and the Council of Economic Advisors, Economic Indicators (Monthly).

Value of new construction, derived from data published by the U.S. Departments of Labor and Commerce, Construction Volume and Costs 1915-1956: Construction Review (Washington: U.S. Government Printing Office, 1958) and the U.S. Department of Commerce, Bureau of the Census, Construction Reports: Construction Activity, C30 (Monthly).

Housing Starts, U.S. Department of Commerce, Bureau of the Census, Construction Reports: Housing Starts, C20 (Monthly), and U.S. Department of Agriculture, Forest Service.

Projections, U.S. Department of Agriculture, Forest Service.

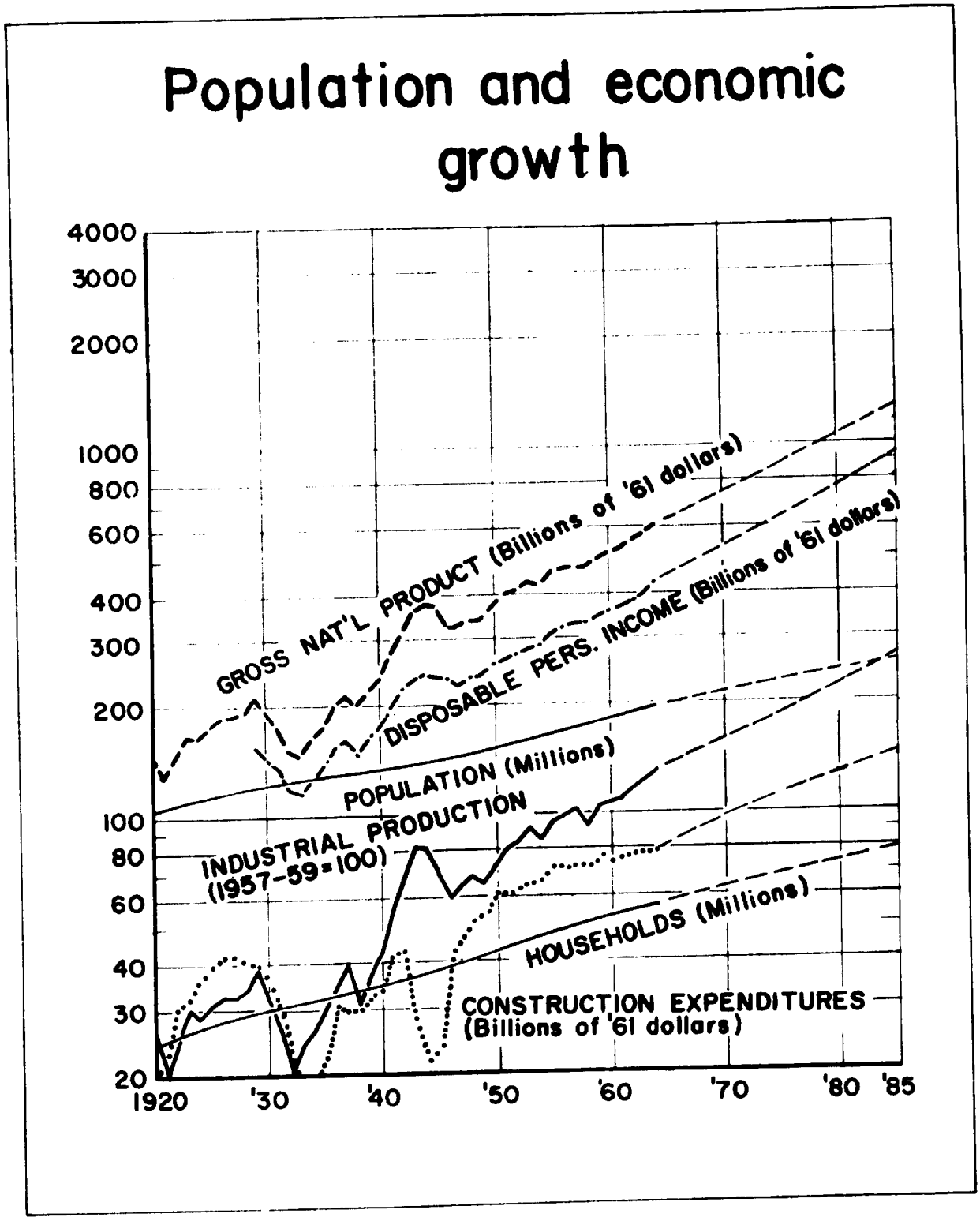

Population and economic growth
4000
3000
2000
1000
800
600
400
300
200
100
80
60
40
30
20
1920
'30
'40
'50
'60
'70
'80
'85
GROSS NAT'L PRODUCT (Billions of '61 dollars)
DISPOSABLE PERS. INCOME (Billions of '61 dollars)
POPULATION (Millions)
INDUSTRIAL PRODUCTION (1957-59=100)
HOUSEHOLDS (Millions)
CONSTRUCTION EXPENDITURES (Billions of '61 dollars)

Figure 14

Population estimated at 260 million in 1985--about 33 percent above 1965

Population has been one of the major determinants of aggregate demand for paper and board. In the 20 years between 1945 and 1965, population rose from about 140 million to 195 million, an increase of 39 percent (table 8; fig. 14).[34/] Most recent projections indicate[19/] that growth will continue although at a slower rate. On the basis of such expectations, it was assumed that population would amount to 260 million in 1985. This represents an annual rate of growth of about 1.5 percent, which is somewhat below the average of 1.7 percent between 1945 and 1965.

The assumed population in 1985, and the other projection years shown in table 8, is close to the median of a series of projections published by the Bureau of the Census in 1964[35/] and a revised series published in 1966.[36/] The median of the most recent Census series is below (about 6 percent in 1985) that of the Census series prepared for the Senate Select Committee on Water Resources in 1960,[37/] and the

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[34/] The estimates of population and housing starts in 1970 and 1980 used in this study are the same as those in Timber Trends in the United States. Estimates for 1975 and 1985 are interpolations of the decadal figures shown in that report.

[35/] U.S. Department of Commerce, Bureau of the Census, "Projections of the Population of the United States, by Age and Sex: 1964 to 1985 with Extensions to 2010."

[36/] U.S. Department of Commerce, Bureau of the Census, "Revised Projections of the Population of the United States, by Age and Sex to 1985."

[37/] U.S., Congress, Senate, Select Committee on National Water Resources, op. cit.

estimates used by the Outdoor Recreation Review Commission.[38] It is, however, substantially above that of the projections used a decade or so ago.[39]

Gross national product to more than double by 1985--most other related measures of economic activity show similar increases

Largely on the basis of the expected increase in population and the assumption that recent trends in the proportion of the population in the labor force, hours worked, and man-hour productivity will continue, the gross national product was projected to rise from $604 billion in 1964 to $1,310 billion in 1985[40] (1961 prices) (table 8; fig. 14). This represents an annual rate of increase of 3.75 percent, slightly above the average rate in the last decade and a half but substantially below that of the last few years. Per capita gross national product in 1985 averages $5,040, about 61 percent above the average of $3,140 in 1964.

Other measures of economic activity are also expected to show rapid growth. Disposable personal income is projected at $920 billion (1961 prices) in 1985--an increase of about 118 percent over 1964. Per capita disposable personal income, the preferred independent variable for projecting demands for most grades of paper and board, rises from $2,200 in 1964 to $3,540 in 1985.

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[38] Outdoor Recreation Resources Review Commission, op. cit.

[39] U.S. Department of Agriculture, Forest Service, Timber Resources in America's Future.

[40] Projections of gross national product and the other measures of economic activity used in this study are above those used in Timber Trends in the United States, p. 8. This upward revision brings the projections more in line with recent rates of growth in economic activity and current expectations of future growth.

Relative price relationships assumed to remain about the same

As indicated earlier, prices of paper and board relative to the prices of other commodities have been fairly stable in the last decade or so (fig. 4; app. C, tables 1 and 2). In making the projections of demand for the major grades of paper and board, it was assumed that these recent relationships would continue through the projection period.

Implicit in this assumption are further assumptions that there will be adequate supplies of raw material, including wood, available to the pulp and paper industry and that technological improvements will keep pace with those in competing industries. These are reasonable expectations in view of the prospective supplies of wood and other raw materials in the projection period and the long history of technological progress in the paper, board, and wood pulp industries.

It is, of course, possible that growth in demand for paper and board, wood pulp, and pulpwood of the magnitudes envisaged in this study will result in price increases because of limitations on labor, raw materials, or capital. However, there are reasons for believing that the demand for paper and board is rather insensitive to changes in price and thus is not likely to be much affected by any price change which could reasonably be assumed to be in prospect in the projection period.[41/] This price insensitivity, or inelastic demand, reflects in part the lack of acceptable substitutes for paper or board in most end uses. It also reflects the low cost of paper or board in the items used by final consumers. In fact for many products such as books,

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41/ Because prices were fairly stable in recent years, it is impossible to derive a quantitative measure of their impact on consumption.

toilet paper, and various kinds of containers, the cost of the paper or board to the final consumer is so small in relation to the total price of the product or the income of the consumer that even fairly large changes in tonnage prices are unlikely to have much impact on consumption.

Many unstated assumptions underlie projections of demand

There are many implicit assumptions underlying the projections of demand for paper and board. For example, historical statistics were used in making all projections. These statistics are in part the end result of forces, such as the educational level of the population and consumer tastes, that are not explicitly recognized but which are implicitly assumed to continue to operate much as they have in the past.

Because of such simplifying assumptions and the use of simple mathematical equations, all projections are "trend" projections which do not show cyclical or random fluctuations. The meaning of a trend projection is illustrated in figure 2. The solid line in this figure was calculated from a regression equation $Y = a + b \log X$ and is the trend level of consumption with this equation. Actual consumption, as shown by the dots in figure 2, fluctuated around this trend level. This fluctuation, caused by many factors, is expected to continue and actual demand is likely to vary around the projected trend level much as it has in the past.

Projections of demand for paper and board are conditional statements based on many assumptions--they should be rerun at frequent intervals

From the above discussion and the analysis in the preceding section, it should be clear that projections of demand for the major grades of paper and board are determined by a host of stated and implicit assumptions. Thus, the projections are conditional statements which indicate the level of consumption that would come about if the assumptions concerning the form of the relationships, population, income, and all other determinants were realized. This, of course, is not likely to happen, and it is therefore highly desirable to rerun projections at fairly frequent intervals so that unforeseen changes in the relationships and turning points in the trends in such factors as population, economic growth, consumption, productivity, technological developments, and prices can be taken into account. Perhaps Mark Twain best expressed the need for frequent new appraisals in his famous comment on projections:[42/]

> " . . . In the space of one hundred and seventy-six years the Lower Mississippi has shortened itself two hundred and forty-two miles. That is an average of a trifle over one mile and a third per year. Therefore, any calm person, who is not blind or idiotic, can see that in the Old Oolitic Silurian Period, just a million years ago next November, the Lower Mississippi River was upward of one million three hundred thousand miles long, and stuck out over the Gulf of Mexico like a fishing-rod. And by the same token any person can see that seven hundred and forty-two years from now the Lower Mississippi will be only a mile and three-quarters long, and Cairo and New Orleans will have joined their streets together, and be plodding comfortably along under a single mayor and a mutual board of aldermen."

[42/] Mark Twain, Life on the Mississippi (Boston: James R. Osgood and Co., 1883), p. 208.

Projected Demand for Paper and Board

Paper and board consumption was 46.6 million tons in 1964--projections indicate a rise to 99.5 million tons by 1985

In 1964 the consumption of paper and board was 46.6 million tons (table 9; figs. 15 and 16).[43/] This was almost twice use in 1948 and five times the volume consumed in 1924--just four decades ago.

Projected demand for all grades of paper and board combined rises to 70.8 million tons in 1975 and to 99.5 million tons in 1985 (table 9; figs. 15 and 16). Demand in this latter year is a little over twice consumption in 1964.

As indicated in the following tabulation, projected demand in 1970 (58.9 million tons) is somewhat above the median of projections recently prepared by the Department of Commerce,[44/] and by Resources for the Future, Inc.,[45/] but about the same as the projection of the American Paper Institute.[46/]

[43/] Annual data on production, trade, and consumption of paper and board, by major grades, are shown in the tables in Appendix D.

[44/] U.S., Congress, House, Committee on Interstate and Foreign Commerce, op. cit.

[45/] Resources for the Future, Inc., op. cit., p. 707

[46/] Benjamin Slatin, "U.S. Integrated Pulp and Paper Mills Keep Pace with Changing Markets," Pulp and Paper, Vol. 40, No. 26 (June 1966), 34-36.

Table 9.--Apparent consumption of paper and board by grade, 1920-85

Year	Total paper and board		Total paper		Newsprint		Groundwood paper		Book paper						Fine paper		Coarse and industrial paper		Sanitary and tissue paper	
	Total 1/	Annual rate of increase 2/	Total 1/	Annual rate of increase 2/	Total	Annual rate of increase 2/	Total	Annual rate of increase 2/	Total 1/	Annual rate of increase 2/	Coated	Annual rate of increase 2/	Uncoated	Annual rate of increase 2/	Total	Annual rate of increase 2/	Total	Annual rate of increase 2/	Total	Annual rate of increase 2/
	Million tons	Percent	Million tons	Percent	Million tons	Percent	Million tons	Percent	Million tons	Percent	Million tons	Percent	Million tons	Percent	Million tons	Percent	Million tons	Percent	Million tons	Percent
1920	7.7	--	5.4	--	2.2	--	0.2	--	0.9	--	--	--	--	--	0.4	--	1.2	--	0.2	--
1925	10.4	6.2	7.1	5.6	3.0	6.4	.2	--	1.2	5.9	--	--	--	--	.5	4.6	1.4	3.1	.3	8.4
1930	12.3	3.4	8.4	3.4	3.5	3.1	.2	--	1.4	3.1	--	--	--	--	.7	7.0	1.8	5.2	.4	5.9
1935	12.8	.8	8.2	--	3.4	--	.4	14.9	1.3	--	--	--	--	--	.6	--	1.7	--	.5	4.6
1940	16.8	5.6	10.6	5.3	3.7	1.7	.6	8.4	1.6	4.2	--	--	--	--	.7	3.1	2.6	8.9	.7	7.0
1945	19.8	3.3	11.0	.7	3.5	--	.6	--	1.5	--	0.3	--	1.1	--	.9	5.2	2.7	.8	1.0	7.4
1950	29.1	8.0	16.8	8.8	5.9	11.0	.7	3.1	2.6	11.6	1.0	27.2	1.6	7.8	1.2	5.9	3.7	6.5	1.4	7.0
1955	35.0	3.8	19.4	2.9	6.5	2.0	.9	5.2	3.0	2.9	1.3	5.4	1.5	2.4	1.4	3.1	4.2	2.6	1.8	5.2
1960	39.3	2.3	22.1	2.6	7.4	2.6	.9	--	3.8	4.8	1.8	6.7	1.9	1.1	1.7	4.0	4.7	2.3	2.2	4.1
1961	40.5	3.1	22.5	1.8	7.4	--	.9	--	3.8	--	2.1	16.7	1.7	--	1.9	11.8	4.8	2.1	2.3	4.5
1962	42.3	4.4	23.2	3.6	7.5	1.4	.9	--	4.0	5.3	2.2	4.8	1.8	5.9	2.0	5.3	5.0	4.2	2.4	4.4
1963 3/	43.9	3.8	24.0	3.4	7.6	1.3	1.0	11.1	4.3	7.5	2.4	9.1	1.9	5.6	2.1	5.0	5.1	2.0	2.6	8.3
1964 4/	46.6	6.1	25.4	5.8	8.1	6.6	1.0	--	4.6	7.0	2.6	8.3	2.0	5.3	2.2	4.8	5.2	2.0	2.7	3.9
PROJECTED BOARD																				
1970	58.9	4.0	31.1	3.4	9.4	2.5	1.1	1.6	6.0	4.5	3.7	6.1	2.3	2.8	2.9	4.7	6.3	3.2	3.7	5.4
1975	70.8	3.7	36.8	3.4	10.6	2.4	1.2	1.8	7.5	4.6	4.9	5.8	2.6	2.5	3.7	5.0	7.4	3.3	4.6	4.5
1980	84.2	3.5	43.3	3.3	11.9	2.3	1.3	1.6	9.2	4.2	6.3	5.2	2.9	2.2	4.6	4.5	8.6	3.1	5.8	4.7
1985	99.5	3.4	50.6	3.2	13.5	2.6	1.4	1.5	11.0	3.6	7.8	4.4	3.2	2.0	5.6	4.0	9.8	2.6	7.3	4.7

Year	Construction paper		Total board		Container board		Grading board						Building board						Other board	
	Total	Annual rate of increase 2/	Total 1/	Annual rate of increase 2/	Total	Annual rate of increase 2/	Total 1/	Annual rate of increase 2/	Special food board	Annual rate of increase 2/	Folding boxboard	Annual rate of increase 2/	Total 1/	Annual rate of increase 2/	Insulating board	Annual rate of increase 2/	Hardboard	Annual rate of increase 2/	Total	Annual rate of increase 2/
	Million tons	Percent	Million tons	Percent	Million tons	Percent	Million tons	Percent	Million tons	Percent	Million tons	Percent	Million tons	Percent	Million tons	Percent	Million tons	Percent	Million tons	Percent
1920	0.4	--	2.3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1925	.6	8.4	3.3	7.5	--	--	--	--	--	--	--	--	3/	--	--	--	--	--	--	--
1930	.5	--	3.9	3.4	--	--	1.0	--	--	--	--	--	0.1	--	--	--	--	--	--	--
1935	.4	--	4.6	3.4	--	--	1.1	1.9	--	--	--	--	.1	--	--	--	--	--	--	--
1940	.7	11.8	6.2	6.2	3.3	--	1.4	4.9	--	--	--	--	.2	14.9	--	--	--	--	1.3	--
1945	.9	5.2	8.8	7.3	4.1	4.4	2.3	10.4	0.4	--	1.9	--	.9	35.0	0.6	--	0.3	--	1.6	4.2
1950	1.4	9.2	12.3	6.9	5.8	7.2	3.1	6.2	.7	11.8	2.5	5.6	1.2	5.9	.8	5.9	.4	5.9	2.1	5.6
1955	1.6	2.7	15.6	4.9	7.4	5.0	3.9	4.7	1.2	11.4	2.8	2.3	1.7	7.2	1.1	6.6	.6	8.4	2.6	4.4
1960	1.4	--	17.2	2.0	8.2	2.1	4.6	3.4	1.2	4.6	3.1	2.1	1.9	2.2	1.1	--	.8	5.9	2.5	--
1961	1.4	--	18.0	4.6	8.8	7.3	4.7	2.2	1.6	6.7	3.1	--	1.9	--	1.1	--	.9	12.5	2.5	--
1962	1.4	--	19.1	6.1	9.5	8.0	5.0	6.4	1.7	6.2	3.3	6.5	2.1	10.5	1.1	--	1.0	11.1	2.6	4.0
1963 3/	1.4	--	19.9	4.2	9.8	3.8	5.1	2.0	1.7	--	3.4	3.0	2.3	9.5	1.1	--	1.1	10.0	2.7	3.8
1964 4/	1.5	7.1	21.2	6.5	10.6	8.2	5.4	5.9	1.8	5.9	3.6	5.9	2.5	8.7	1.2	9.1	1.2	9.1	2.8	3.7
PROJECTED BOARD																				
1970	1.7	2.1	27.8	4.6	14.0	4.7	7.1	4.7	2.8	7.6	4.3	3.0	3.3	4.7	1.4	2.6	1.9	8.0	3.4	3.3
1975	1.8	1.1	34.0	4.1	17.3	4.3	8.7	4.1	3.7	5.7	5.0	3.1	4.1	4.4	1.6	2.7	2.5	5.6	3.9	2.8
1980	1.9	1.1	40.9	3.8	21.1	4.0	10.4	3.6	4.6	4.5	5.8	3.0	4.9	3.6	1.8	2.4	3.1	4.4	4.5	2.9
1985	2.0	1.0	48.9	3.6	25.4	3.8	12.3	3.4	5.7	4.4	6.6	2.6	6.0	4.1	2.1	3.1	3.9	4.7	5.2	2.9

1/ Data may not add to totals because of rounding.

2/ The average annual rate of increase for five year periods ending in the specified years, except for the years 1961-64 when annual changes are shown, and 1970 when the averages are for the period 1964-70.

3/ Less than 50 thousand tons.

4/ Preliminary.

Sources: American Paper and Pulp Association, The Statistics of Paper (Annual) 1960 and 1965 Supplement and Monthly Statistical Summary No. 3 (New York: American Paper and Pulp Association). U.S. Department of Commerce, Bureau of the Census, Current Industrial Reports: Pulp, Paper and Board Series M26A (Annual). U.S. Department of Commerce, Business and Defense Services Administration, Quarterly Industry Report: Pulp, Paper and Board. U.S. Department of Agriculture, Forest Service.

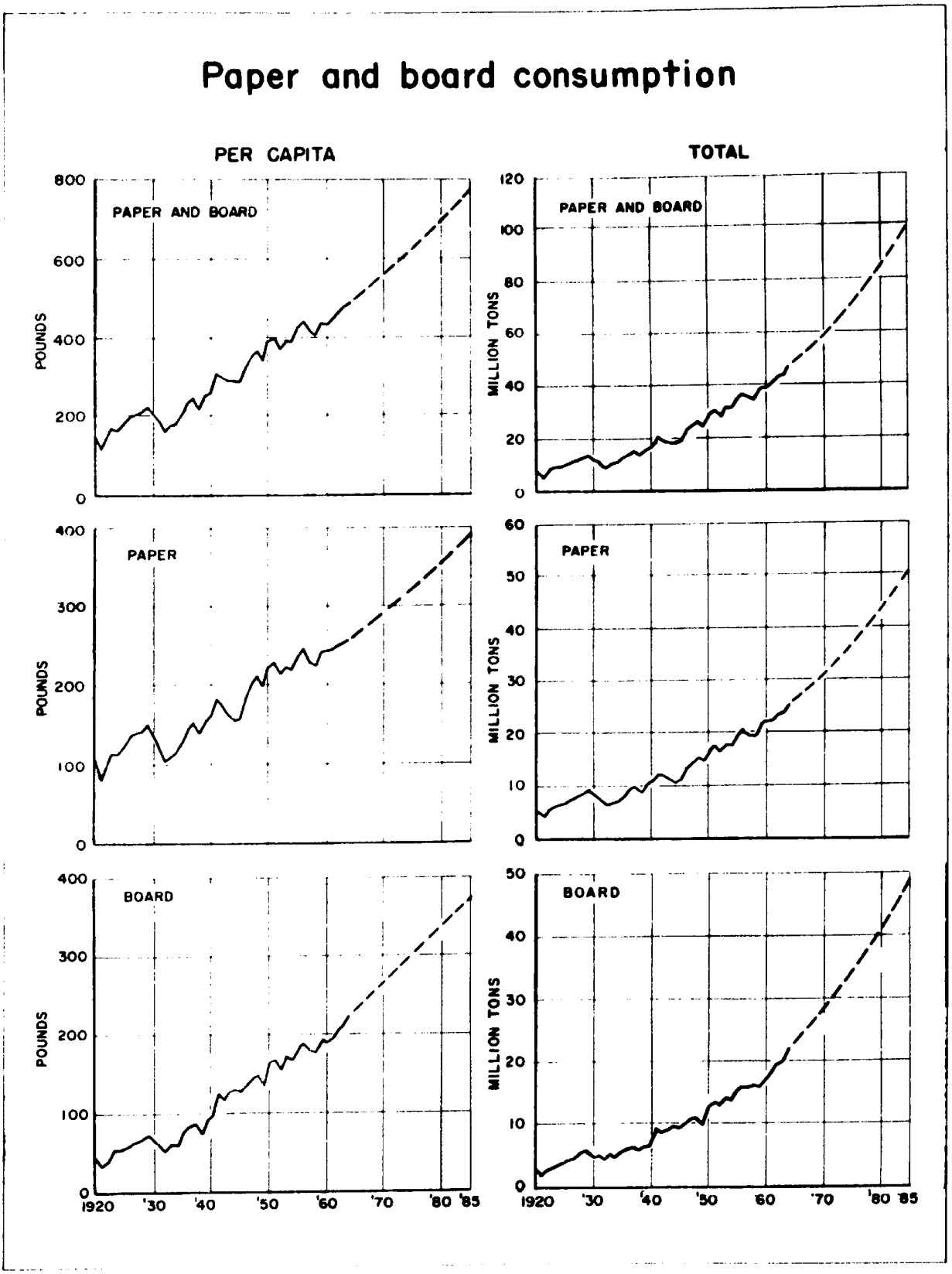

Paper and board consumption
PER CAPITA
TOTAL
PAPER AND BOARD
PAPER
BOARD
POUNDS
MILLION TONS
0
200
400
600
800
20
40
60
80
100
120
100
200
300
400
10
30
50
60
1920
'30
'40
'50
'60
'70
'80
'85

Figure 15

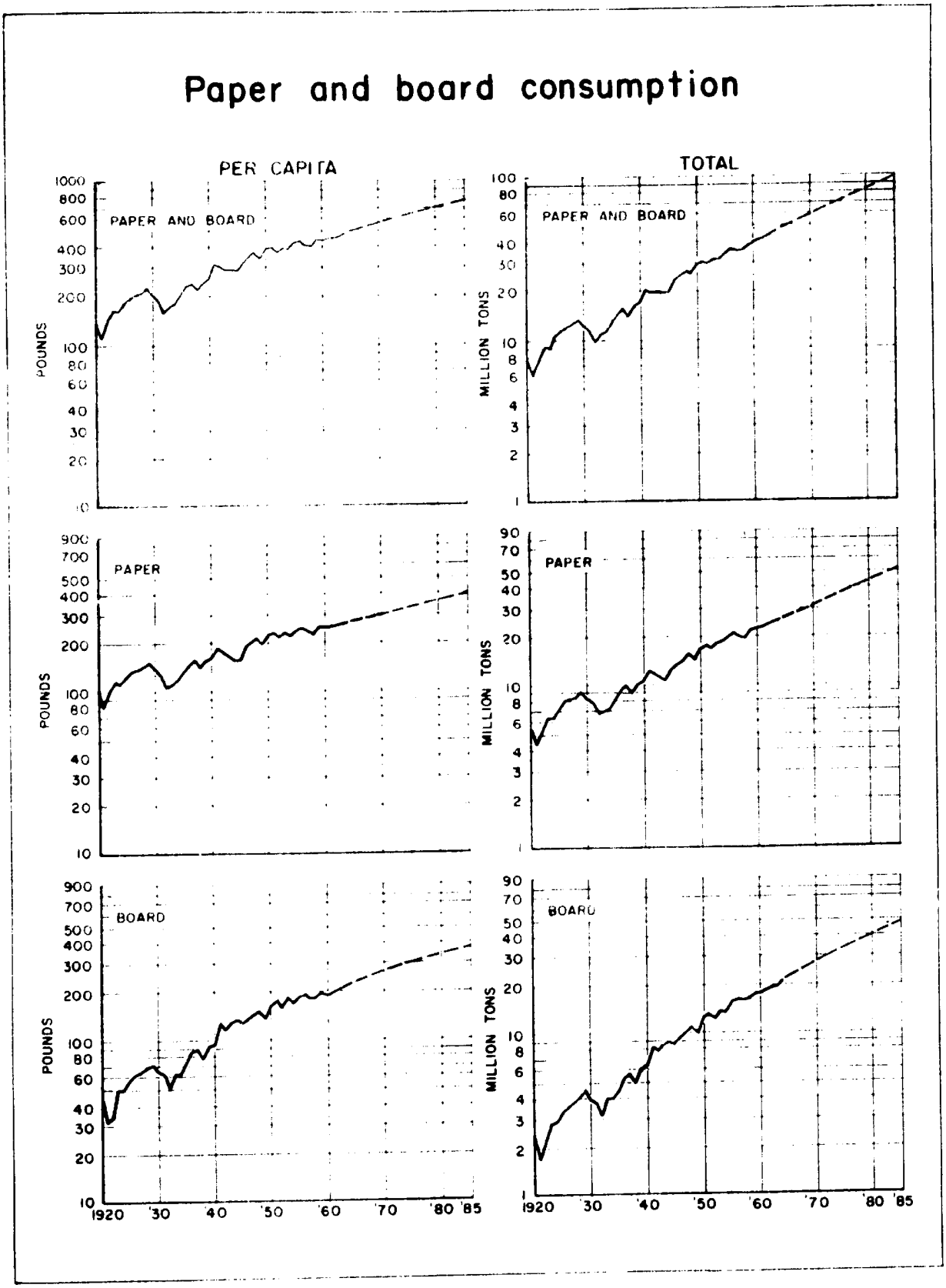

Paper and board consumption
PER CAPITA
PAPER AND BOARD
POUNDS
TOTAL
PAPER AND BOARD
MILLION TONS
PAPER
POUNDS
PAPER
MILLION TONS
BOARD
POUNDS
BOARD
MILLION TONS
1920
30
40
50
60
70
80
85

Figure 16

Projections of Demand for Paper and Board Prepared by:

Year	U.S. Forest Service: This study	U.S. Forest Service: Timber Trends[47]	U.S. Department of Commerce[44]	Resources for the Future, Inc.[45]	American Paper Institute[46]
	(Million tons)				
1970	58.9	52.7	55.6 - 61.8	50.6 - 54.9 - 61.4	58.4
1975	70.8	--	--	--	69.4
1980	84.2	69.3	--	64.6 - 76.1 - 93.7	--
1985	99.5	--	--	--	--

The 1975 projection is also about the same as the projection of the American Paper Institute. However, projections for both 1970 and 1980 are above those recently published by the Forest Service in the report Timber Trends in the United States.[47] Over half of this increase reflects the use of higher projections of gross national product and the related measures of economic activity. The remainder is attributable to the use of more recent data, which include the rapid rise in consumption of paper and board and general economic activity that took place in 1963, 1964, and 1965; and further refinement in the projection methods.[48] Some of the increase in the projections of paper and

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[47] U.S. Department of Agriculture, Forest Service, p. 48.

[48] The regression equations, independent variables, and base time periods used as the base for the projections of demand for each grade of paper and board (tables 9 and 10) are shown in table 11. The regression coefficients, coefficients or indexes of correlation and determination, and related statistical measures are also shown in this table. Graphical analysis was extensively used in appraising the projections obtained from the equations and the rapid rise in consumption in 1965. The projections adopted for use, as shown in tables 9 and 10, are the result of the combined statistical and graphical analysis.

For most grades of paper and board the form of the equation used in making the projections in tables 9 and 10 is much closer to

board production and in wood pulp and pulpwood consumption and production shown in later tables reflects the use of higher projections (in comparison to the projections in the Timber Trends report) of exports of paper, board, and wood pulp.

Per capita paper and board consumption in 1964 was 485 pounds--about a third higher than in 1948 (table 10; figs. 15 and 16). Projected per capita demand rises to 633 pounds in 1975 and to 766 pounds in 1985--levels that are respectively 31 percent and 58 percent above 1964.

The projections of per capita demand between 1970 and 1975 show an average annual rate of growth of 2.2 percent. Between 1980 and 1985, this average falls to 1.9 percent. These rates compare with the long-term average of 2.8 percent in the years 1924 through 1964 and the 1954-64 decadal average of 2.3 percent. Average annual rates of change in total consumption, although higher, show the same general pattern.

48/ Continued

$Y = a + b X$ than in the Timber Trends report. On the basis of preliminary study of some of the material in Appendices A and B, most of the projections in that report were derived from the equation $Y = a + b \log X$. Further study and analysis showed that an equation closely approaching $Y = a + b X$ should have been used for making projections for several grades in the early projection years.

The projections in the Timber Trends report were based on relationships in the 1947-62 period. In contrast, the years 1948 through 1964 were used as the time base for the projections in table 11. The slopes of the relationships between some grades of paper and board and the selected independent variables in this latter period are somewhat steeper, and the projections higher, than in the earlier period. This reflects the "tilt effect" of the rapid rise in consumption in 1963 and 1964, especially 1964, on the slope of the relationships. For further discussion of this point see page 50.

Table 13.--Apparent per capita consumption of paper and board by grade, 1920-65

Year	Total paper and board		Total paper		Newsprint		Groundwood paper		Book paper						Fine paper		Coarse and industrial paper		Sanitary and tissue paper	
	Total[1]	Annual rate of increase[2]	Total[1]	Annual rate of increase[2]	Total	Annual rate of increase[2]	Total	Annual rate of increase[2]	Total[1]	Annual rate of increase[2]	Coated	Annual rate of increase[2]	Uncoated	Annual rate of increase[2]	Total	Annual rate of increase[2]	Total	Annual rate of increase[2]	Total	Annual rate of increase[2]
	Pounds	Percent	Pounds	Percent	Pounds	Percent	Pounds	Percent	Pounds	Percent	Pounds	Percent	Pounds	Percent	Pounds	Percent	Pounds	Percent	Pounds	Percent
1920	145	--	102	--	41	--	7	--	17	--	--	--	--	--	7	--	23	--	4	--
1925	180	4.4	123	3.8	52	4.9	8	--	20	3.3	--	--	--	--	9	5.2	25	1.7	5	4.6
1930	201	2.2	137	2.2	57	1.9	9	5.9	22	1.9	--	--	--	--	12	5.9	29	3.0	6	3.7
1935	201	--	129	--	53	--	6	-7.4	20	--	--	--	--	--	11	--	27	--	7	3.1
1940	254	4.8	161	4.5	57	1.5	9	8.4	25	4.6	--	--	--	--	11	1.9	34	7.6	11	9.5
1945	283	2.2	157	--	49	--	9	--	21	--	3	--	16	--	13	3.4	36	--	14	4.9
1950	382	6.2	221	7.1	77	9.5	9	--	34	10.1	13	21.1	21	5.6	15	2.9	49	5.2	18	5.2
1955	422	2.0	234	1.1	78	1.3	11	4.1	37	1.7	16	4.2	21	--	17	2.5	51	.8	21	3.1
1960	435	.6	244	.8	81	.8	10	--	42	2.6	21	5.6	21	--	19	2.2	52	.4	24	2.7
1961	440	1.1	245	.4	81	--	10	--	41	--	23	9.5	18	--	21	10.5	52	--	25	4.2
1962	454	3.2	249	1.6	80	--	11	--	44	4.9	26	4.3	19	5.6	22	4.8	53	1.9	25	4.0
1963	464	2.2	253	1.6	80	--	11	--	45	4.7	25	4.2	20	5.3	22	--	54	1.9	27	3.8
1964 3/	485	4.5	264	4.3	84	5.1	11	--	46	6.7	27	8.0	21	5.0	23	4.6	55	1.9	28	3.7
PROJECTED DEMAND																				
1970	567	2.6	300	2.2	90	1.2	11	1.0	58	3.0	36	4.9	22	0.9	28	3.1	61	1.7	36	4.3
1975	633	2.2	329	1.9	95	1.1	11	--	67	2.9	45	4.1	23	.9	33	3.3	66	1.6	41	2.6
1980	698	2.0	359	1.8	99	.8	11	--	76	2.6	52	3.4	24	.9	38	2.9	71	1.5	48	3.2
1985	766	1.9	390	1.7	104	1.0	11	--	85	2.3	62	2.9	25	.8	43	2.5	75	1.1	56	3.1

Year	Construction paper		Total board		Container board		Bending board						Building board						Other board	
	Total	Annual rate of increase[2]	Total[1]	Annual rate of increase[2]	Total	Annual rate of increase[2]	Total[1]	Annual rate of increase[2]	Special food board	Annual rate of increase[2]	Folding boxboard	Annual rate of increase[2]	Total[1]	Annual rate of increase[2]	Insulating board	Annual rate of increase[2]	Hardboard	Annual rate of increase[2]	Total	Annual rate of increase[2]
	Pounds	Percent	Pounds	Percent	Pounds	Percent	Pounds	Percent	Pounds	Percent	Pounds	Percent	Pounds	Percent	Pounds	Percent	Pounds	Percent	Pounds	Percent
1920	7	--	43	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1925	10	7.4	57	5.8	--	--	--	--	--	--	--	--	1	--	--	--	--	--	--	--
1930	8	--	64	2.3	--	--	17	--	--	--	--	--	2	14.9	--	--	--	--	--	--
1935	7	--	72	2.4	--	--	19	1.1	--	--	--	--	1	--	--	--	--	--	--	--
1940	10	7.4	93	5.3	50	--	21	3.1	--	--	--	--	2	14.9	--	--	--	--	20	--
1945	12	3.7	126	6.3	58	3.0	32	8.6	5	--	27	--	13	45.4	9	--	4	--	23	2.8
1950	19	9.6	161	5.0	76	5.6	41	5.1	9	12.5	33	4.1	16	4.2	11	4.1	5	4.6	28	4.0
1955	19	--	188	3.1	89	3.2	47	2.8	14	9.2	34	.6	20	4.6	13	3.4	7	7.0	31	2.1
1960	16	--	191	.3	91	.4	51	1.6	16	2.7	35	.6	21	1.0	12	--	9	5.2	28	--
1961	15	--	196	2.6	96	5.5	52	2.0	17	6.2	34	--	21	--	12	--	9	--	28	--
1962	15	--	205	4.6	101	5.2	54	3.8	19	11.8	35	2.9	22	4.8	12	--	11	22.2	28	--
1963	15	--	211	2.9	104	3.0	54	--	18	--	36	2.9	24	9.1	12	--	12	9.1	28	--
1964 3/	16	6.7	221	4.7	110	5.8	56	3.7	19	5.6	37	2.8	26	8.3	13	8.3	13	8.3	29	3.6
PROJECTED DEMAND																				
1970	16	--	267	3.2	135	3.5	68	3.3	27	6.0	41	1.7	31	3.0	13	1.3	18	5.6	33	2.2
1975	16	--	304	2.6	155	2.8	78	2.9	33	4.1	45	1.9	36	3.0	14	1.5	22	4.1	35	1.2
1980	16	--	339	2.2	175	2.5	86	2.0	38	2.9	48	1.3	41	2.6	15	1.4	26	3.4	37	1.1
1985	16	--	376	2.1	195	2.2	95	2.0	44	3.0	51	1.2	46	2.3	16	1.3	30	2.9	40	1.6

1/ Data may not add to totals because of rounding.

2/ The average annual rate of increase for five year periods ending in the specified years, except the years 1961-64 when annual changes are shown, and 1970 when the averages are for the period 1964-70.

3/ Preliminary.

Sources: Derived from data published by the American Paper and Pulp Association, The Statistics of Paper and Monthly Statistical Summary; U.S. Department of Commerce, Bureau of the Census, Current Industrial Reports: Pulp, Paper and Board; U.S. Department of Commerce, Business and Defense Services Administration, op. cit. U.S. Department of Agriculture, Forest Service.

The projected drop in the average annual rate of growth in per capita and total consumption is a continuation of an historical trend as graphically illustrated in figure 16. The consumption data in this figure are plotted on a semi-logarithmic scale and the slopes of the lines are direct indicators of annual rates of change. Although considerable fluctuation has occurred, it is apparent that the slopes have tended to flatten out in recent decades, an indication that the rates of change have been declining.

Projections show increase in demand for each of the major grades of paper and board, but with wide differences in the size of increase

Projections of total demand for each of the major grades of paper and board and per capita demand for most grades are substantially higher than in 1964 (tables 9 and 10). However, the size of these increases varies widely among the individual grades.

Newsprint.--Newsprint is the paper used in printing newspapers, comic books, handbills, shopping news, and other similar items. In the years 1948 through 1964, newsprint consumption increased from 5.1 million tons to 8.1 million tons and per capita use from 70 pounds to 84 pounds (fig. 17; app. D, table 3).

Projections of per capita demand, based largely on the relationship between per capita use and per capita gross national product in the 1948-64 period (table 11), rise to 104 pounds in 1985 (table 10). This increase, when multiplied by the projected population (table 8), indicates a total demand for newsprint in 1985 of 13.5 million tons--some 1.7 times consumption in 1964 (table 9).

Table 11.--Regression equations used 1/ as the base for projections of demand for the major grades of paper and board, dissolving and special alpha grades of wood pulp, and imports of newsprint and sulfate wood pulp

Variable, time period, and regression equation	Regression coefficients		Standard errors of estimate 2/	Standard errors of b coefficients 3/	Coefficient or index of correlation 4/	Coefficient or index of determination 5/	Degrees of freedom	F or t ratios 6/	Projected demand					
									1970		1975		1980		1985	
	a	b		b					Total	Per capita	Total	Per capita	Total	Per capita	Total	Per capita
									Thousand tons	Pounds	Thousand tons	Pounds	Thousand tons	Pounds	Thousand tons	Pounds
Per capita newsprint consumption as a function of per capita gross national product																
1948-64																
Y = a + b X	43.8291	0.0125	1.7806	0.0019	0.859	0.738	15	6.5	9,277	89.20	10,546	94.58	12,090	100.33	13,888	106.93
Y = a + b log X 7/	-184.0511	76.2511	1.8030	11.9241	.855	.732	15	6.4	9,090	87.40	10,158	91.10	11,407	94.66	12,774	98.26
Groundwood paper consumption as a function of industrial production																
1949-64																
Y = a + b X	413.9446	4.4608	43.2507	.6176	.888	.788	14	7.2	1,128	10.85	1,261	11.31	1,418	11.77	1,618	12.45
Y = a + b log X 7/	-1143.1030	1005.0863	39.4883	124.3022	.906	.824	14	8.1	1,072	10.31	1,147	10.29	1,291	10.13	1,301	10.01
Uncoated book paper consumption as a function of gross national product																
1948-64																
Y = a + b X	900.6807	1.7365	100.5851	.3141	.814	.671	15	5.5	2,212	21.27	2,472	22.17	2,773	23.18	3,175	24.42
Y = a + b log X 7/	-3073.4510	1736.8098	102.9513	336.5748	.809	.655	15	5.3	2,098	20.17	2,239	20.08	2,384	19.78	2,526	19.45
Per capita coated book paper consumption as a function of per capita disposable personal income																
1947-64																
Y = a + b X	-36.1003	.0288	1.0966	.0015	.978	.957	16	18.8	3,883	37.34	5,062	45.40	6,583	54.62	8,560	65.85
Y = a + b log X 7/	-381.3656	122.0443	1.2041	7.1755	.973	.948	16	17.0	3,576	34.38	4,450	39.91	5,472	45.56	6,730	51.77
Per capita fine paper consumption as a function of per capita disposable personal income																
1948-64																
Y = a + b X	-12.5146	.0163	.9760	.0013	.953	.909	15	12.2	3,021	29.05	3,748	33.61	4,679	38.83	5,875	45.19
Y = a + b log X 7/	-210.1978	69.7441	.9043	4.3720	.949	.901	15	11.7	2,849	27.39	3,405	30.54	4,072	33.79	4,852	37.32
Per capita coarse and industrial paper consumption as a function of per capita gross national product																
1947-64																
Y = a + b X	17.3713	.0121	2.3736	.0022	.834	.696	16	6.0	6,374	61.29	7,415	66.50	8,683	72.06	10,187	78.36
Y = a + b log X 7/	-204.1230	74.1432	2.0508	12.3720	.838	.702	16	6.1	6,221	59.82	7,071	63.42	8,059	66.86	9,151	70.39

See footnotes at end of table.

Table 11.--Regression equations used 1/ as the base for projections of demand for major grades of paper and board, dissolving and special alpha grades of wood pulp, and imports of newsprint and sulfate wood pulp--Continued

Variable, time period, and regression equation	Regression coefficients		Standard errors of estimate 2/	Standard errors of b coefficients 3/	Coefficient or index of correlation 4/	Coefficient or index of determination 5/	Degrees of freedom	F or t ratios 6/	Projected demand					
									1970		1975		1980		1985	
	a	b		b					Total	Per capita	Total	Per capita	Total	Per capita	Total	Per capita
									Thousand tons	Pounds	Thousand tons	Pounds	Thousand tons	Pounds	Thousand tons	Pounds
Per capita sanitary and tissue paper consumption as a function of per capita disposable personal income																
1947-64																
Y = a + b X	-21.1256	0.0229	0.6368	0.0009	0.988	0.976	16	25.7	3,876	37.27	4,870	43.68	6,147	51.01	7,792	59.94
Y = a + b log X 7/	-296.4506	97.2693	.6673	3.9764	.987	.974	16	24.5	3,630	34.90	4,382	39.30	5,282	43.83	6,339	48.76
Per capita container board consumption as a function of per capita disposable personal income																
1948-64																
Y = a + b X	-55.6727	.0758	2.8865	.0044	.976	.952	15	17.2	14,312	137.62	17,711	158.84	22,064	183.10	27,646	212.66
Y = a + b log X 7/	-981.9131	326.5891	2.8886	18.9940	.976	.952	15	17.2	13,586	130.63	16,212	145.41	19,352	160.60	23,030	177.15
Folding boxboard consumption as a function of gross national product																
1948-64																
Y = a + b X	506.4084	4.9399	145.5650	.4545	[illegible]	.887	15	10.9	4,236	40.73	4,977	44.64	5,891	48.89	6,978	53.68
Y = a + b log X 7/	-10913.5510	5154.4651	149.4143	488.4759	.939	.881	15	10.6	3,921	37.70	4,326	38.80	4,743	39.36	5,154	39.65
Per capita special food board consumption as a function of per capita disposable personal income																
1948-64																
Y = a + b X	-31.0444	.0239	1.0268	.0016	.969	.939	15	15.2	3,110	29.90	4,080	36.59	5,331	44.24	6,963	53.56
Y = a + b log X 7/	-325.9669	103.8301	.8714	5.7359	.971	.956	15	18.1	2,884	27.73	3,616	32.43	4,490	37.26	5,529	42.53
Insulating board consumption as a function of gross national product																
1948-64																
Y = a + b X	225.8140	1.6623	74.8365	.2337	.878	.771	15	7.1	1,481	14.24	1,730	15.52	2,038	16.91	2,403	18.48
Y = a + b log X 7/	-3699.7455	1765.5546	71.0736	232.3590	.891	.794	15	7.6	1,381	13.28	1,520	13.63	1,663	13.80	1,804	13.88
Per capita hardboard consumption as a function of per capita disposable personal income																
1947-64																
Y = a + b X	-20.4583	.0190	.7590	.0010	.[illegible]	.935	16	15.1	1,850	17.79	2,452	21.99	3,226	26.79	4,243	32.64
Y = a + b log X 7/	-199.7504	63.4.78	.7941	4.7320	.[illegible]	.918	16	13.4	1,693	16.28	2,135	19.15	2,663	22.10	3,292	25.32

See footnotes at end of table.

Table 11.--Regression equations used [1] as the base for projections of demand for major grades of paper and board, dissolving and special alpha grades of wood pulp, and imports of newsprint and sulfate wood pulp--Continued

Variable, time period, and regression equation	Regression coefficients		Standard errors of estimate [2]	Standard errors of b coefficients [3]	Coefficient or index of correlation [4]	Coefficient or index of determination [5]	Degrees of freedom	F or t ration [6]	Projected demand					
									1970		1975		1980		1985	
	a	b		b					Total	Per capita	Total	Per capita	Total	Per capita	Total	Per capita
									Thousand tons	Pounds	Thousand tons	Pounds	Thousand tons	Pounds	Thousand tons	Pounds
Other board consumption as a function of gross national product																
1948-64																
Y = a + b X	718.5882	3.5359	113.4945	0.3388	0.928	0.861	15	9.7	3,388	32.58	3,919	35.15	4,573	37.95	5,351	41.16
Y = a + b log X [7]	-7644.0741	3758.0147	103.4546	349.8396	.940	.884	15	10.7	3,171	30.49	3,467	31.09	3,771	31.29	4,071	31.32
Newsprint imports as a function of newsprint consumption																
1948-64																
Y = a + b X	2340.2715	.4277	142.2671	.0438	.930	.864	15	9.8	6,361	61.16	6,874	61.65	7,430	61.66	8,114	62.42
Y = a + b log X [7]	-19410.1670	6438.7923	140.9131	652.4094	.931	.867	15	9.9	6,172	59.35	6,508	58.37	6,831	56.69	7,184	55.25
Dissolving and special alpha grades of wood pulp consumption as a function of gross national product																
1948-64																
Y = a + b X	-45.3615	2.0279	61.1501	.1978	.939	.875	15	10.3	1,486	14.29	1,790	16.05	2,165	17.97	2,611	20.06
Y = a + b log X [7]	-4824.4870	2149.8533	54.7282	185.0510	.954	.910	15	11.6	1,363	13.11	1,532	13.74	1,706	14.16	1,877	14.44
Sulfate wood pulp imports as a function of paper and board production in the U.S.																
1948-64																
Y = a + b X	-374.9301	.0472	69.8267	.0027	.977	.954	15	17.7	2,183	20.99	2,754	24.70	3,396	28.18	4,123	31.72
Y = a + b log X [7]	-13303.5400	3210.2187	79.4632	221.4736	.966	.933	15	14.5	1,894	18.21	2,175	19.51	2,435	20.29	2,680	20.62

[1] The regression equations shown in this table were selected from a series of equations which were tested to determine the historical relationship between changes in consumption of each grade of paper and board and changes in population, gross national product, and other related economic variables for all years 1900-04 for which data were available, excepting 1942-46 (see Appendix B). These equations were chosen partly on judgment and partly on an analysis of various statistical measures such as the b coefficients, indexes of determination, and the standard errors of estimate. Graphical analysis was extensively used in appraising the projections obtained from the equations, and the projections shown in tables 9 and 10 are the result of the combined statistical and graphical analysis.

[2] A measure of the closeness with which values of a dependent variable can be estimated from the values of an independent variable.

[3] A measure of the closeness with which the true values of the regression coefficients can be estimated from the values in the sample.

[4] A measure of the degree of relationship between the dependent and independent variables.

[5] A measure of the percent of the variation in the values of the dependent variable that is associated with variation in values of the independent variable.

[6] A measure of the probability that the given values of b might have been obtained by chance from a population in which the true regression coefficient is zero.

[7] Expressed in common logarithms.

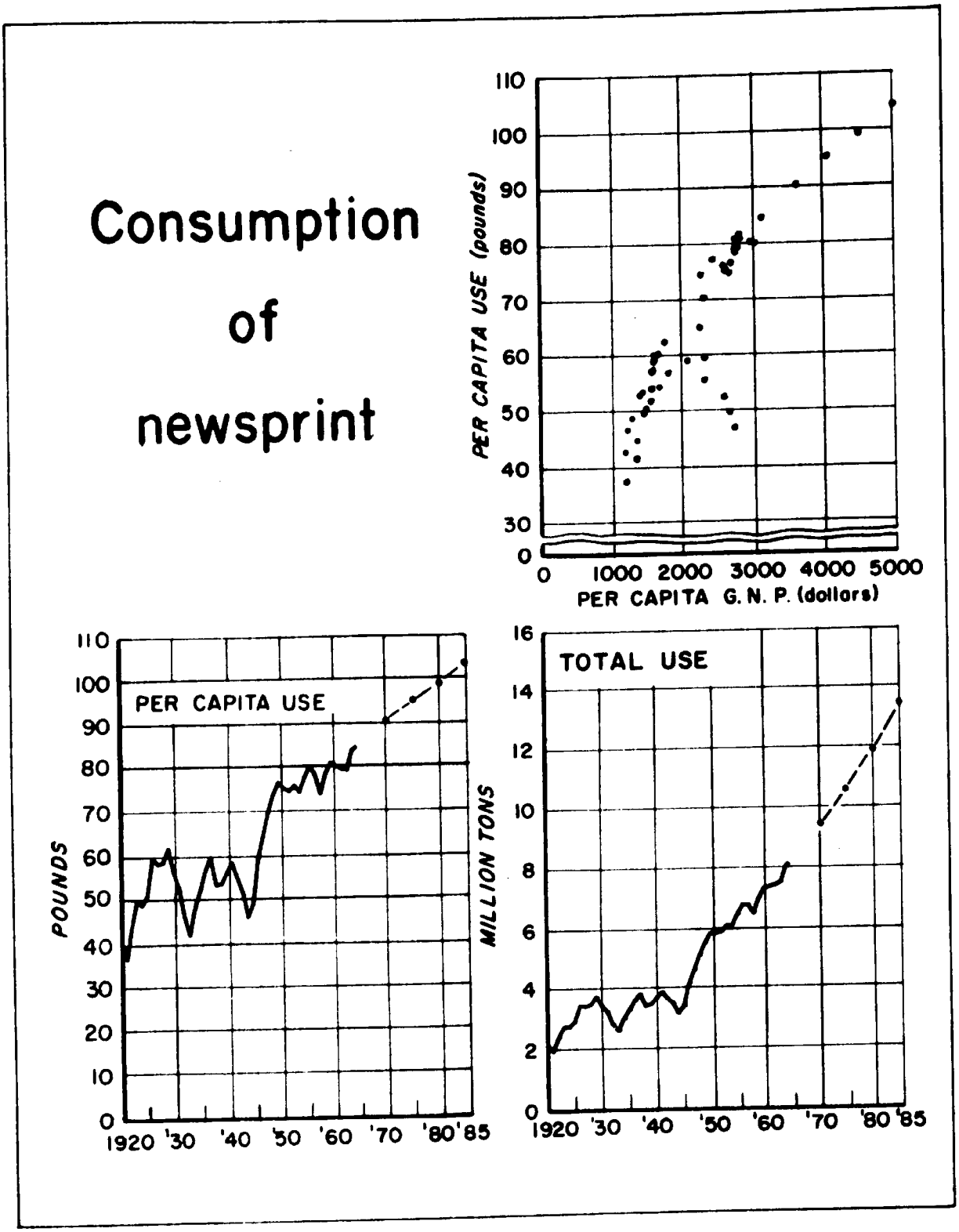

Consumption
of
newsprint
PER CAPITA USE (pounds)
110
100
90
80
70
60
50
40
30
0
0 1000 2000 3000 4000 5000
PER CAPITA G. N. P. (dollars)
PER CAPITA USE
POUNDS
110
100
90
80
70
60
50
40
30
20
10
0
1920 '30 '40 '50 '60 '70 '80 '85
TOTAL USE
MILLION TONS
16
14
12
10
8
6
4
2
0
1920 '30 '40 '50 '60 '70 '80 '85

Figure 17

Groundwood paper.--Most of the groundwood paper, about nine-tenths of the total in 1964, is used in printing catalogs, directories, farm journals, paperbound books, and other similar items. A small quantity--hanging stock--is made into wall paper. Nearly all of the remainder is used as converting paper in the manufacture of such products as office forms, waybills, salesbooks, and small roll products used in office machines.

Consumption of groundwood paper in all uses increased from 0.8 million tons in 1948 to 1.0 million tons in 1964 (fig. 18; app. D, table 4). Per capita use did not show much change, averaging about 10 pounds a year in this period. Because of this lack of trend, there was no correlation between per capita use and per capita gross national product or per capita disposable personal income in the 1948-64 period. There was, however, a fairly close relationship between changes in total consumption and changes in industrial production (table 11). Chiefly on the basis of this relationship, demand was projected to 1.4 million tons in 1985--an increase of 40 percent over 1964 (table 9). With this level of total demand and the projected population, per capita use would average about 11 pounds, which is not significantly different from the average of recent years (table 10).

Book paper.--Book paper includes "coated book paper" and "uncoated book paper." Both kinds are used in printing magazines, books, pamphlets, folders, and brochures, with the coated paper being used where fine halftone illustrations are desired.

In the years 1948 through 1964, consumption of coated book paper increased from 0.8 million tons to 2.6 million tons and per capita use from 11 pounds to 27 pounds (fig. 19; app. D, table 5). Consumption

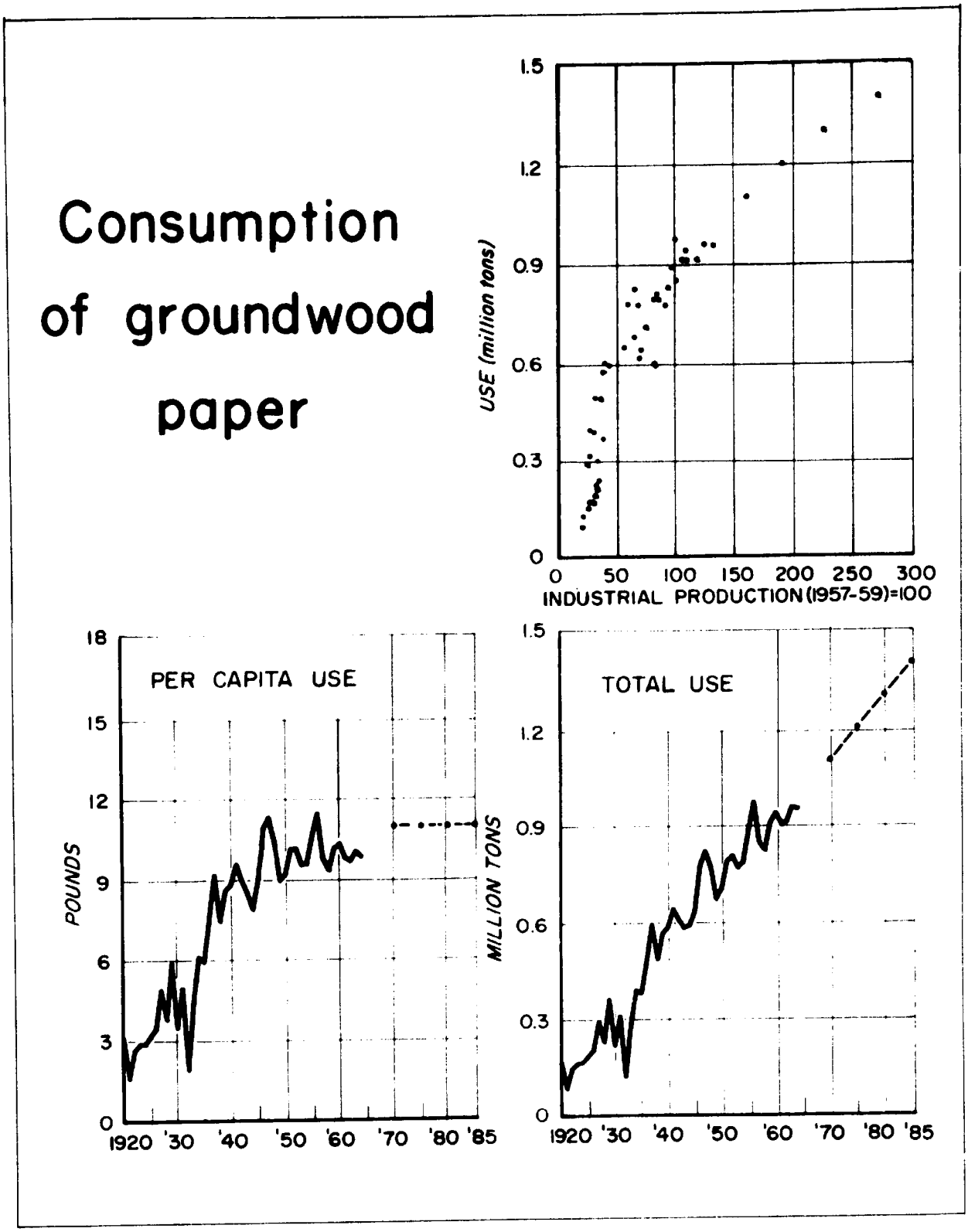

Consumption of groundwood paper
USE (million tons)
1.5
1.2
0.9
0.6
0.3
0
0 50 100 150 200 250 300
INDUSTRIAL PRODUCTION (1957-59)=100
PER CAPITA USE
POUNDS
18
15
12
9
6
3
0
1920 '30 '40 '50 '60 '70 '80 '85
TOTAL USE
MILLION TONS
1.5
1.2
0.9
0.6
0.3
0
1920 '30 '40 '50 '60 '70 '80 '85

Figure 18

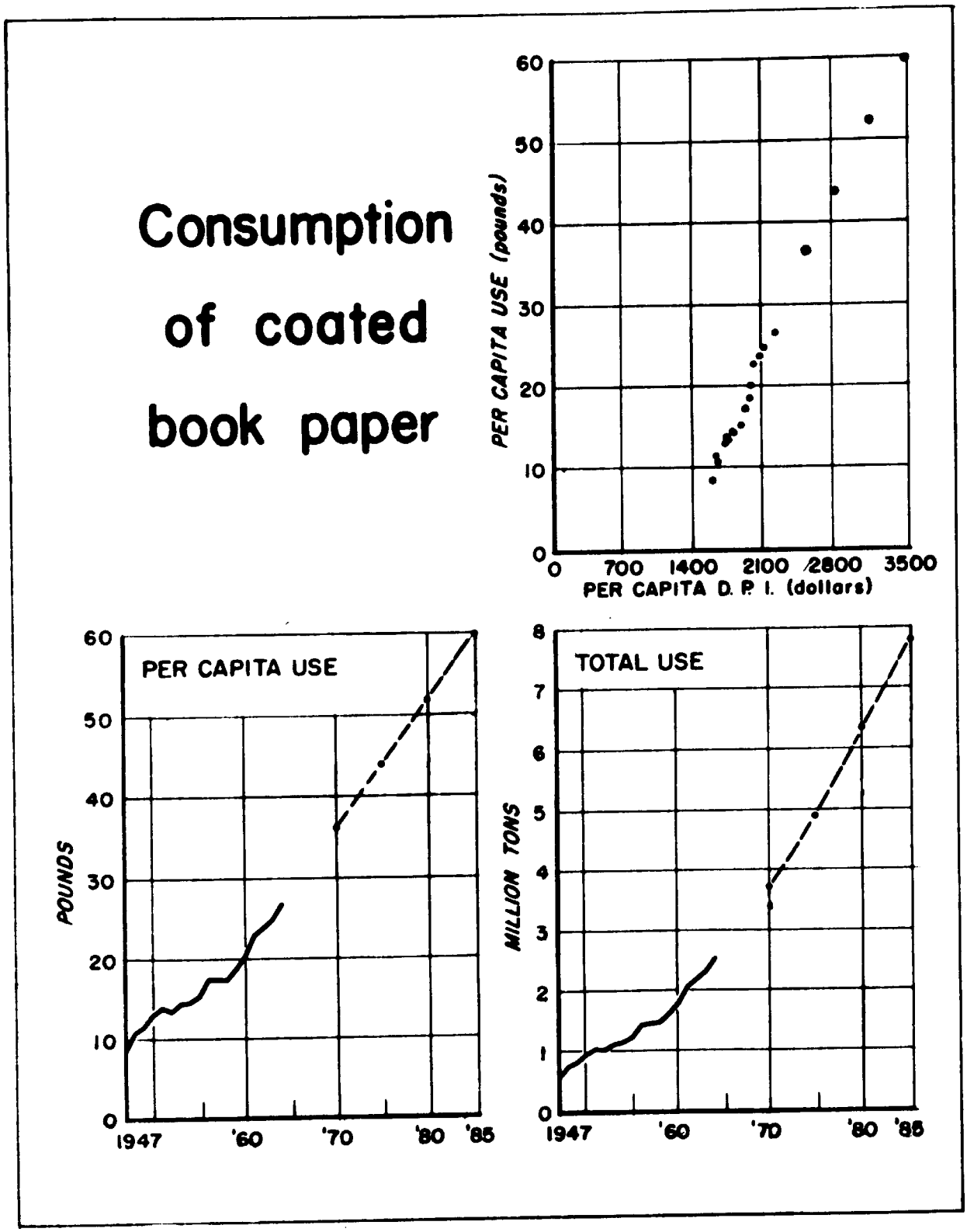

Consumption of coated book paper
PER CAPITA USE (pounds)
60
50
40
30
20
10
0
0
700
1400
2100
2800
3500
PER CAPITA D. P. I. (dollars)
PER CAPITA USE
POUNDS
60
50
40
30
20
10
0
1947
'60
'70
'80
'85
TOTAL USE
MILLION TONS
8
7
6
5
4
3
2
1
0
1947
'60
'70
'80
'85

Figure 19

of uncoated book paper rose at a much slower rate, with total use increasing from 1.6 million tons to 2.0 million tons (fig. 20; app. D, table 5). Per capita use showed no trend, averaging about 21 pounds per year.

There was a close relationship between changes in per capita coated book paper consumption and changes in per capita disposable personal income in the 1948-64 period. Projections of per capita demand based on this relationship rise to 60 pounds by 1985 (table 10). The associated total demand is 7.8 million tons (table 9). Projected demand for uncoated book paper, based largely on the relationship between total consumption in the 1948-64 period and gross national product amounts to 3.2 million tons in 1985 (table 9). Given this level of total demand, per capita use averages 25 pounds.

The total projected demand for book paper (coated and uncoated) amounts to 11 million tons in 1985--some 2.4 times consumption in 1964 (table 9). Per capita use rises from 48 pounds to 85 pounds (table 10).

Fine paper.--Fine paper includes a variety of writing papers; cover, text, and thin papers; and bristols--a type of cardboard used for postcards and various other kinds of index and printed cards. The writing papers are presently the most important grades, composing more than three-fourths of all the fine papers used.

In the years 1948 through 1964, consumption of fine paper rose from 1.1 million tons to 2.2 million tons and per capita use from 15 pounds to 23 pounds (fig. 21; app. D, table 6). In this period, the changes in per capita consumption were closely related to changes in per capita disposable personal income. Projections of per capita

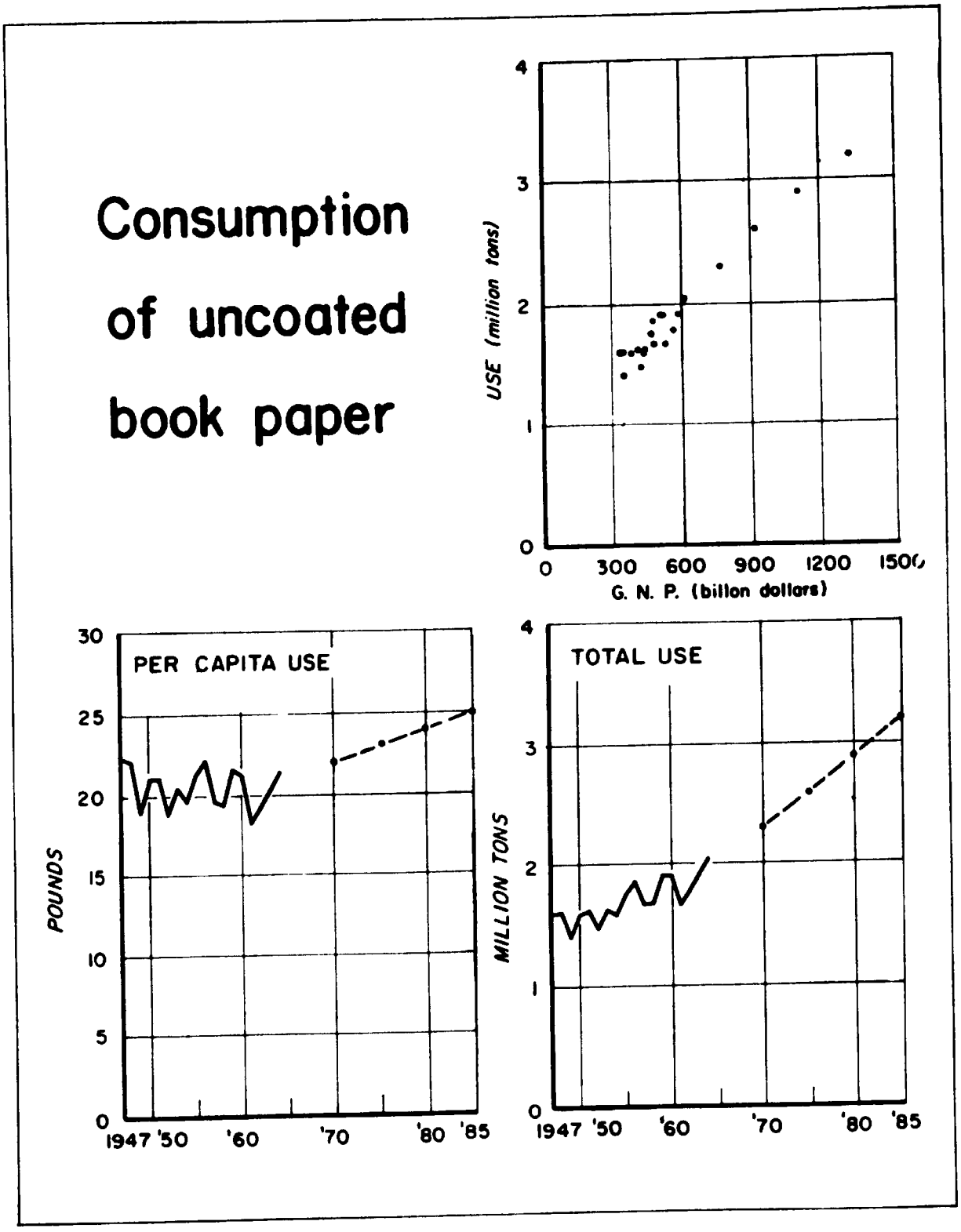

Consumption of uncoated book paper
USE (million tons)
G. N. P. (billon dollars)
PER CAPITA USE
POUNDS
TOTAL USE
MILLION TONS
1947 '50 '60 '70 '80 '85

Figure 20

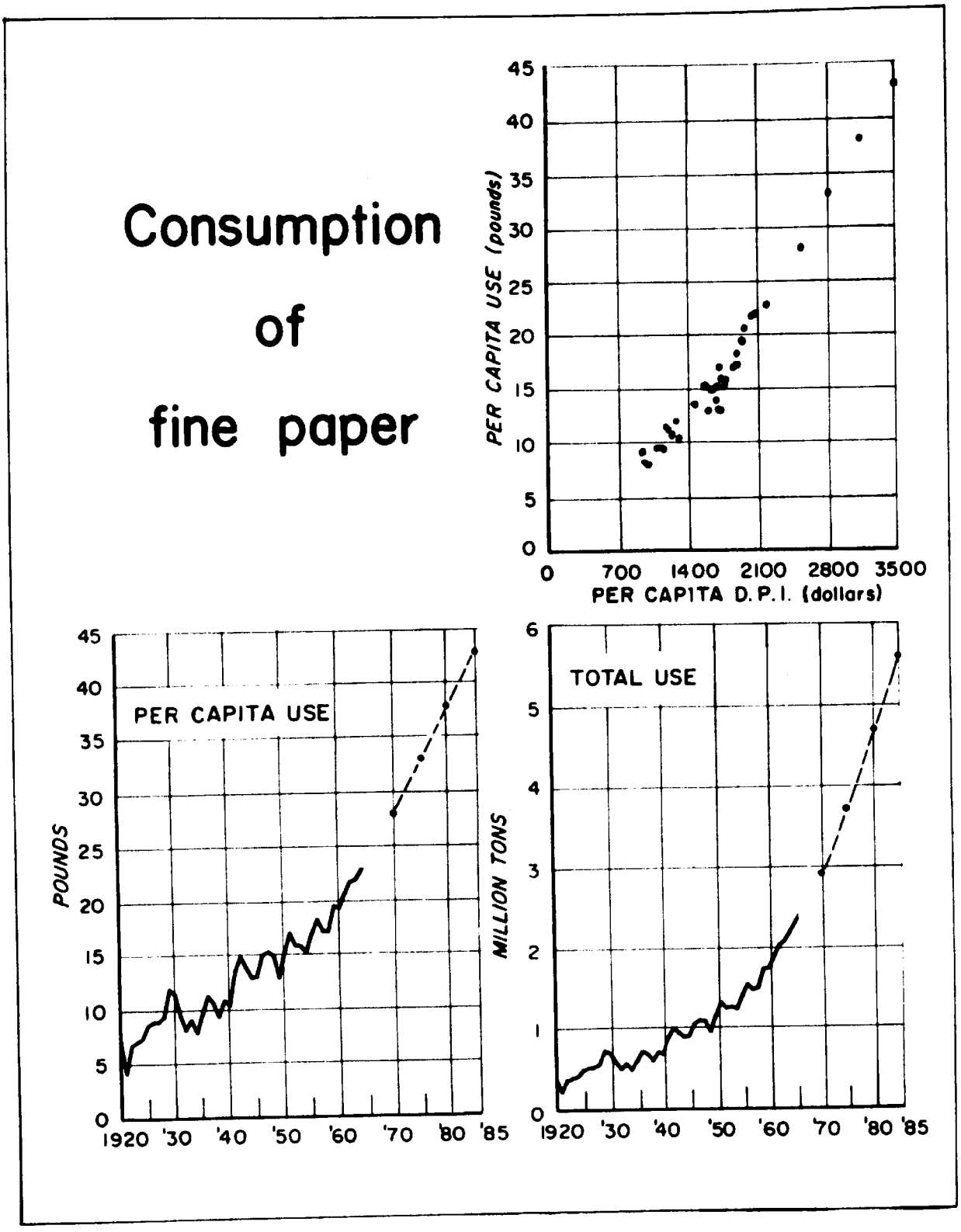

Consumption
of
fine paper
PER CAPITA USE (pounds)
PER CAPITA D.P.I. (dollars)
0
5
10
15
20
25
30
35
40
45
0
700
1400
2100
2800
3500
PER CAPITA USE
POUNDS
1920
'30
'40
'50
'60
'70
'80
'85
TOTAL USE
MILLION TONS
0
1
2
3
4
5
6

Figure 21

demand derived from this relationship rise to 43 pounds in 1985. The associated total demand is 5.6 million tons--about 2.5 times use in 1964.

Coarse and industrial paper.--Coarse and industrial paper includes bag paper; shipping sack paper; wrapping paper; converting papers such as asphalting paper, envelope stock, gumming stock, and waxing stock; glassine and greaseproof paper; and special industrial papers such as tabulating card stock, tag stock, and resin impregnated stock. In 1964 the bag, shipping sack, and wrapping papers composed nearly three-fifths of the coarse and industrial paper consumed. Converting and special industrial paper accounted for most of the remaining two-fifths.

Consumption of all grades of coarse and industrial paper increased from 3.4 million tons in 1948 to 5.2 million tons in 1964 (fig. 22; app. D, table 7). Per capita use rose from 47 pounds to 55 pounds. Projections, based on the relationship between per capita use and per capita gross national product in the 1948-64 period, indicate a per capita demand in 1985 of about 75 pounds. With this level of per capita use, total demand would be 9.8 million tons--1.9 times that of 1964.

Sanitary and tissue paper.--Sanitary and tissue paper includes such items as toilet tissue stock, toweling stock, facial tissue stock, napkin stock, and tissue paper. Toweling and toilet tissue are the important grades in terms of volume, composing about two-thirds of total use in recent years.

Consumption of all grades in 1964 was 2.7 million tons--about 2.3 times the 1.2 million tons used in 1948 (fig. 23; app. D, table 8).

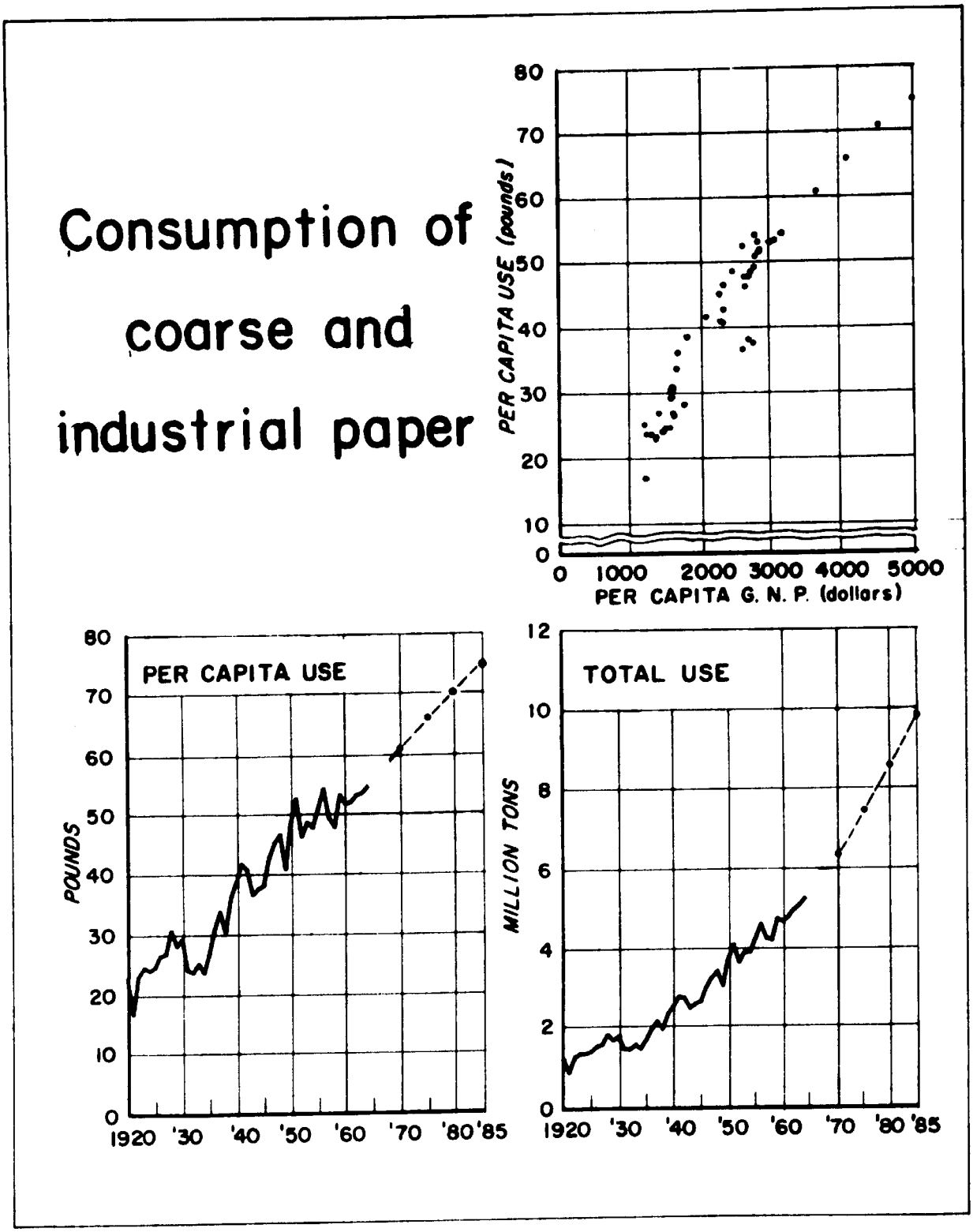

Consumption of coarse and industrial paper
PER CAPITA USE (pounds)
80
70
60
50
40
30
20
10
0
0 1000 2000 3000 4000 5000
PER CAPITA G. N. P. (dollars)
PER CAPITA USE
POUNDS
80
70
60
50
40
30
20
10
0
1920 '30 '40 '50 '60 '70 '80 '85
TOTAL USE
MILLION TONS
12
10
8
6
4
2
0
1920 '30 '40 '50 '60 '70 '80 '85

Figure 22

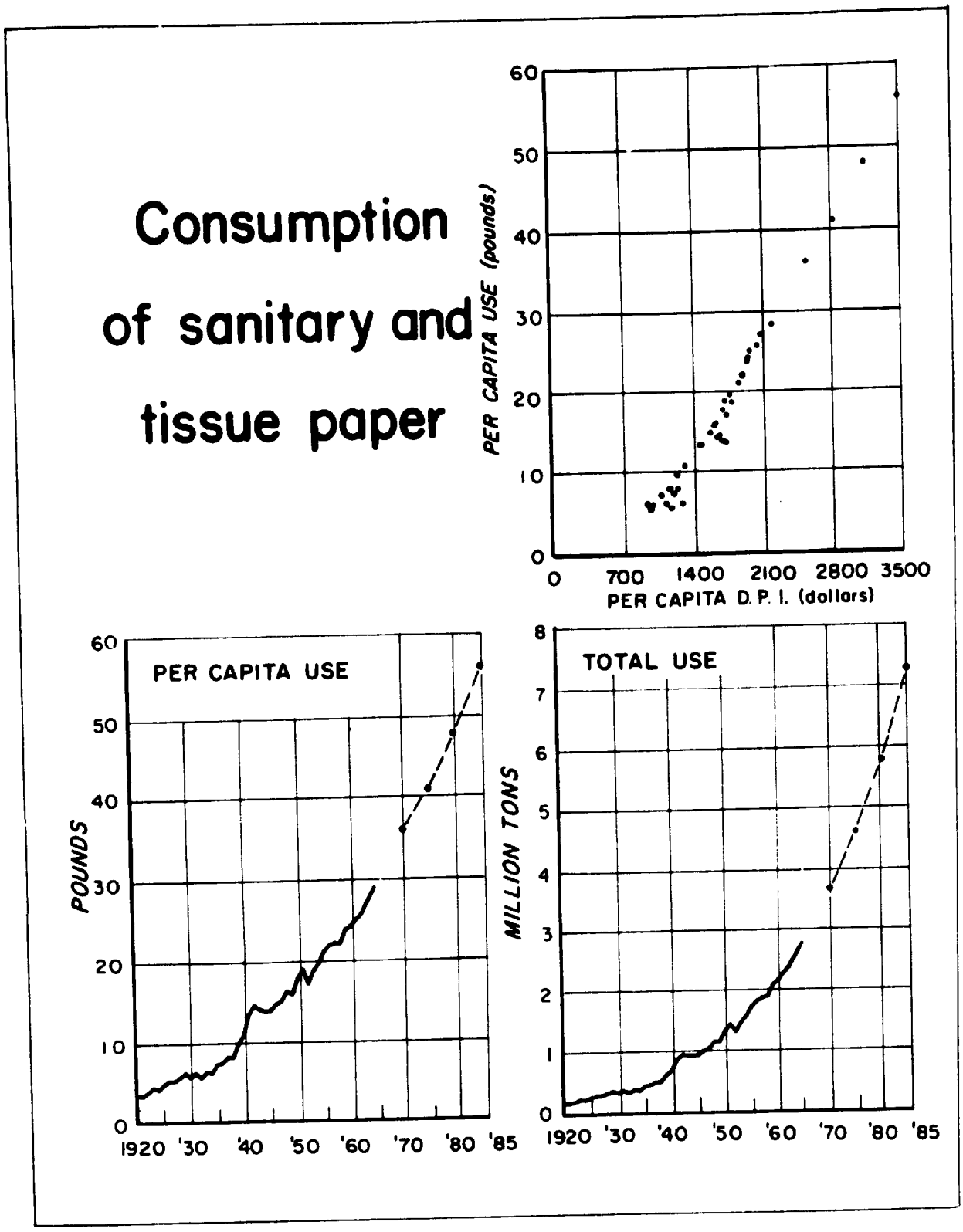

Consumption of sanitary and tissue paper
PER CAPITA USE (pounds)
60
50
40
30
20
10
0
0 700 1400 2100 2800 3500
PER CAPITA D. P. I. (dollars)
PER CAPITA USE
POUNDS
60
50
40
30
20
10
0
1920 '30 '40 '50 '60 '70 '80 '85
TOTAL USE
MILLION TONS
8
7
6
5
4
3
2
1
0
1920 '30 '40 '50 '60 '70 '80 '85

Figure 23

Per capita use nearly doubled in this period, rising from 16 pounds to 28 pounds. Projected per capita use, derived from the relationship between per capita consumption and per capita disposable personal income in the 1948-64 period, rises to 56 pounds in 1985. The associated total demand is 7.3 million tons--some 2.7 times use in 1964.

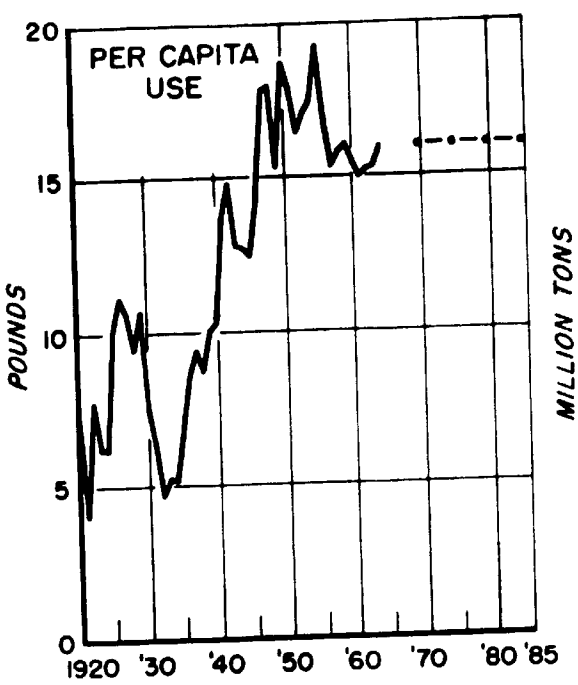
Construction paper (building paper).--Construction paper is the term applied to a class of strong, heavy papers used in buildings as a covering for sheathing and underflooring; and in manufacturing for conversion to such products as roofing, sheathing, and tarred or asphalt-coated vapor barriers. Some construction paper is also used in the manufacture of rock wool, mineral wool, and fiberglass insulation batts.

Consumption of construction paper, largely in the form of roofing felts used as the base in the manufacture of roofing papers, increased from 1.3 million tons in 1948 to a peak of 1.6 million tons in 1955 (fig. 24; app. D, table 9). Since then, consumption has averaged about 1.4 million tons a year. Per capita use fluctuated around 18 pounds in the early 1950's but subsequently declined to 16 pounds in 1964.

The relationship between the changes in consumption of construction paper and changes in housing starts, construction expenditures, population, and all of the other independent variables tested was not close enough in the 1948-64 period to justify the use of regression equations in making a projection of demand. Largely on the basis of recent trends in use and expectations concerning future levels of residential construction, it was assumed that total demand will rise

Consumption of construction paper

No relationship between consumption and the independent variables tested in the 1948-64 period.



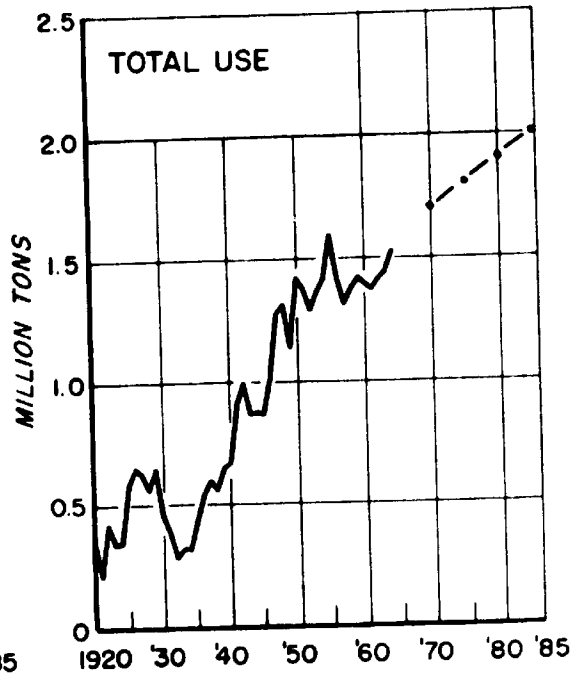


Figure 24

slowly, reaching a level of about 2.0 million tons a year by 1985. With this level of consumption, per capita use would remain at about 16 pounds.

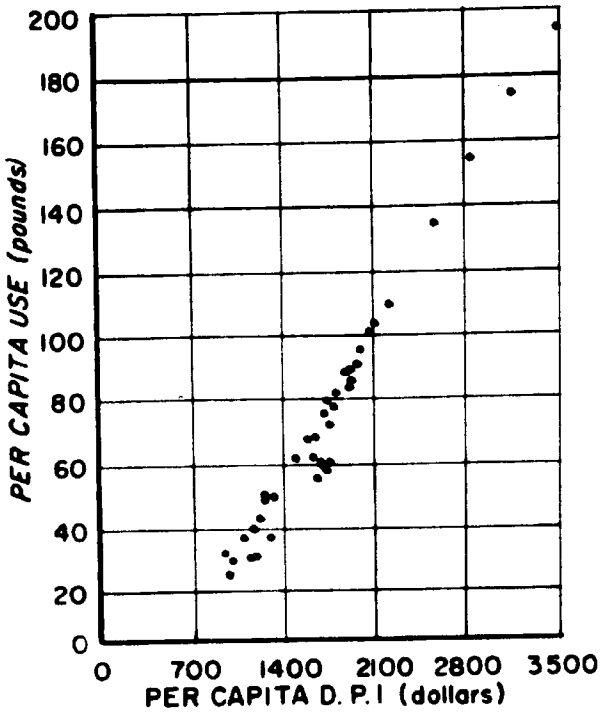
Container board.--Container board includes liners (the material used as a facing on corrugated or solid fiberboard), corrugating material (the material used as the fluted member in making corrugated board), and container chipboard. In the recent past, liners have composed about two-thirds of the container board used, and corrugating material nearly all of the remainder.

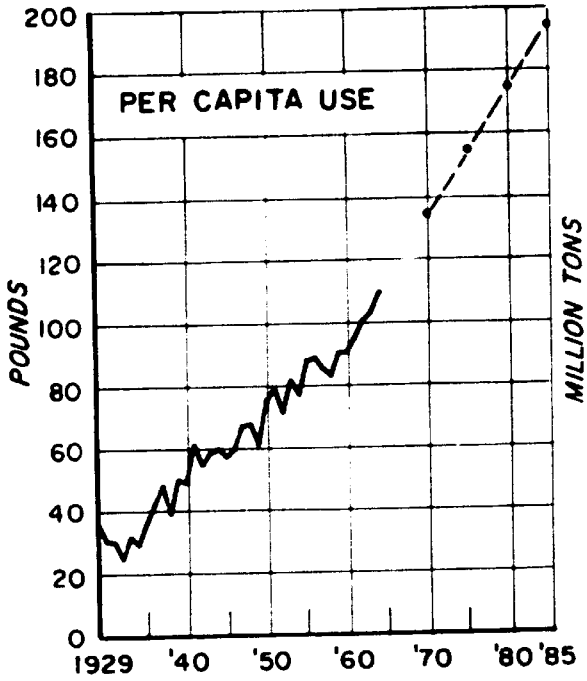
Consumption of container board in 1964 was 10.6 million tons--some 2.1 times the 5.0 million tons consumed in 1948 (fig. 25; app. D, table 11). Per capita use in this base period increased 1.6 times, rising from 68 pounds to 110 pounds.

On the basis of the relationship between per capita container board consumption and per capita disposable personal income in the years 1948 through 1964, per capita demand is projected to rise to 195 pounds in 1985. Total demand in 1985 is 25.4 million tons--about 2.4 times use in 1964.

Bending board.--Bending board includes "folding boxboard" used in the manufacture of collapsible or folding cartons for packaging such items as cereal, toothpaste, and cigarettes; and "special food board" used in packaging goods such as milk and frozen foods, and as containers for hot and cold drinks.

Consumption of container board





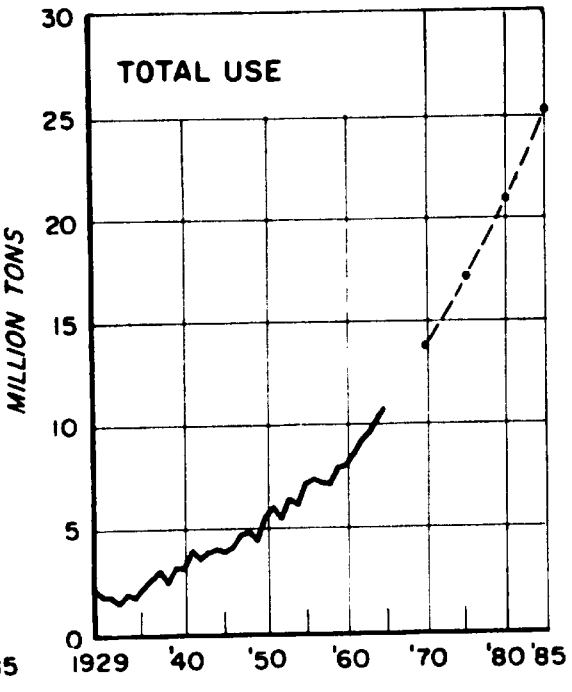


Figure 25

Consumption of folding boxboard rose from 2.2 million tons in 1948 to 3.6 million tons in 1964 and per capita use from 30 to 37 pounds (fig. 26; app. D, table 12). The consumption of special food board increased nearly 4-1/2 times--from 0.4 million tons to 1.8 million tons--and per capita use roughly tripled, rising from 6 pounds to 19 pounds (fig. 27; app. D, table 12).

On the basis of the relationship between aggregate consumption of folding boxboard and gross national product in the 1948-64 period, demand is projected to 6.6 million tons in 1985. The per capita use associated with this volume is 51 pounds. Projected per capita demand for special food board, based on the relationship between per capita consumption and per capita disposable personal income, rises to 44 pounds in 1985 and aggregate demand to 5.7 million tons.

The total projected demand for bending board (including folding boxboard and special food board) in 1985 is 12.3 million tons, and per capita demand 95 pounds. These volumes are respectively 2.3 times and 1.7 times the 1964 levels.

Building board.--Building board includes "insulating board," used largely for sheathing in residential construction, and "hardboard," chiefly used in the manufacture of furniture, fixtures, paneling, millwork, and various other items.

In the years 1948 through 1964, consumption of insulating board increased from 0.9 million tons to 1.2 million tons while per capita use fluctuated between 11 and 13 pounds (fig. 28; app. D, table 13). Total and per capita hardboard use rose from 0.4 million tons to 1.2 million tons and from 5 pounds to 13 pounds, respectively (fig. 29; app. D, table 13).

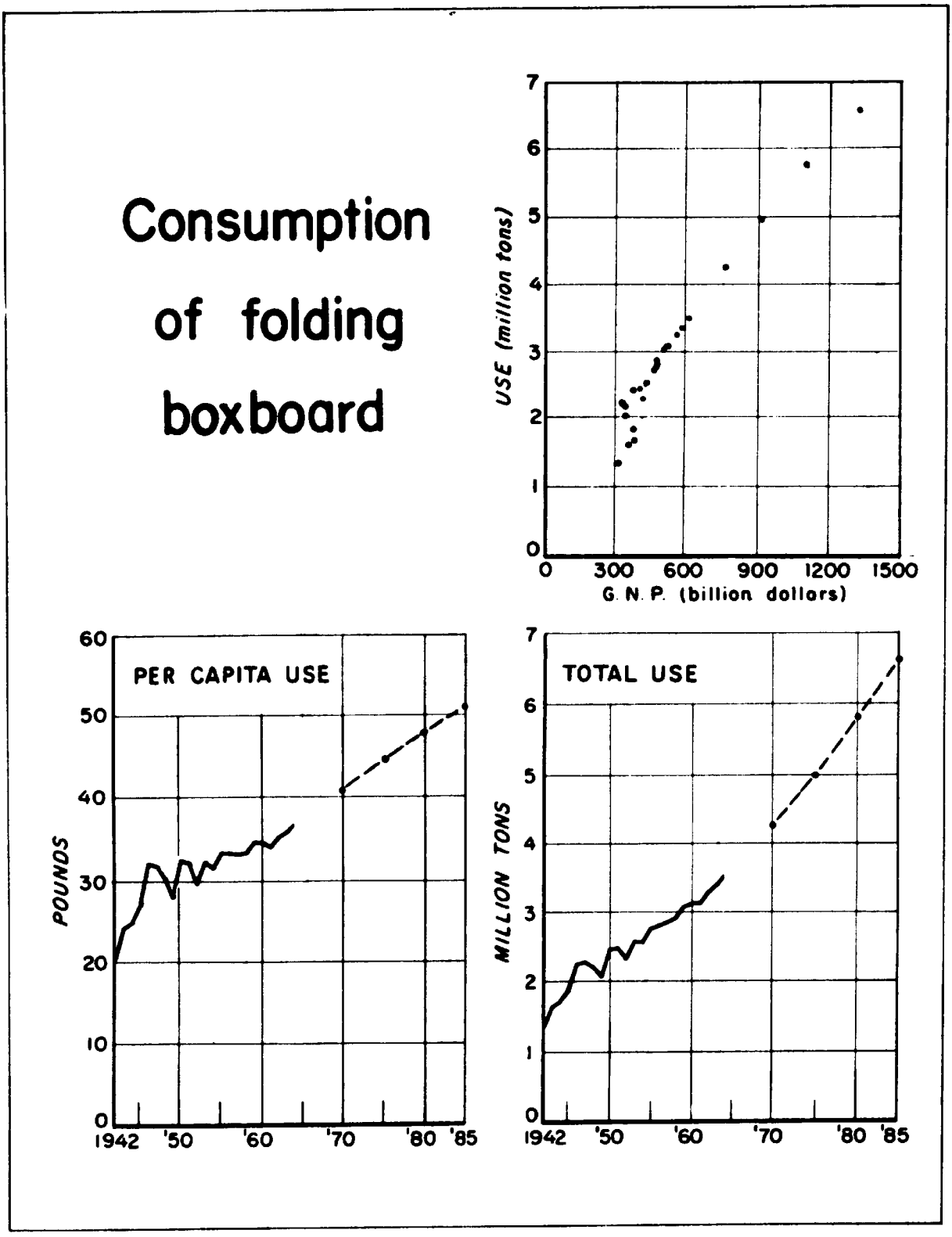

Consumption of folding boxboard
USE (million tons)
G. N. P. (billion dollars)
0
1
2
3
4
5
6
7
0
300
600
900
1200
1500
PER CAPITA USE
POUNDS
0
10
20
30
40
50
60
1942
'50
'60
'70
'80
'85
TOTAL USE
MILLION TONS
0
1
2
3
4
5
6
7
1942
'50
'60
'70
'80
'85

Figure 26

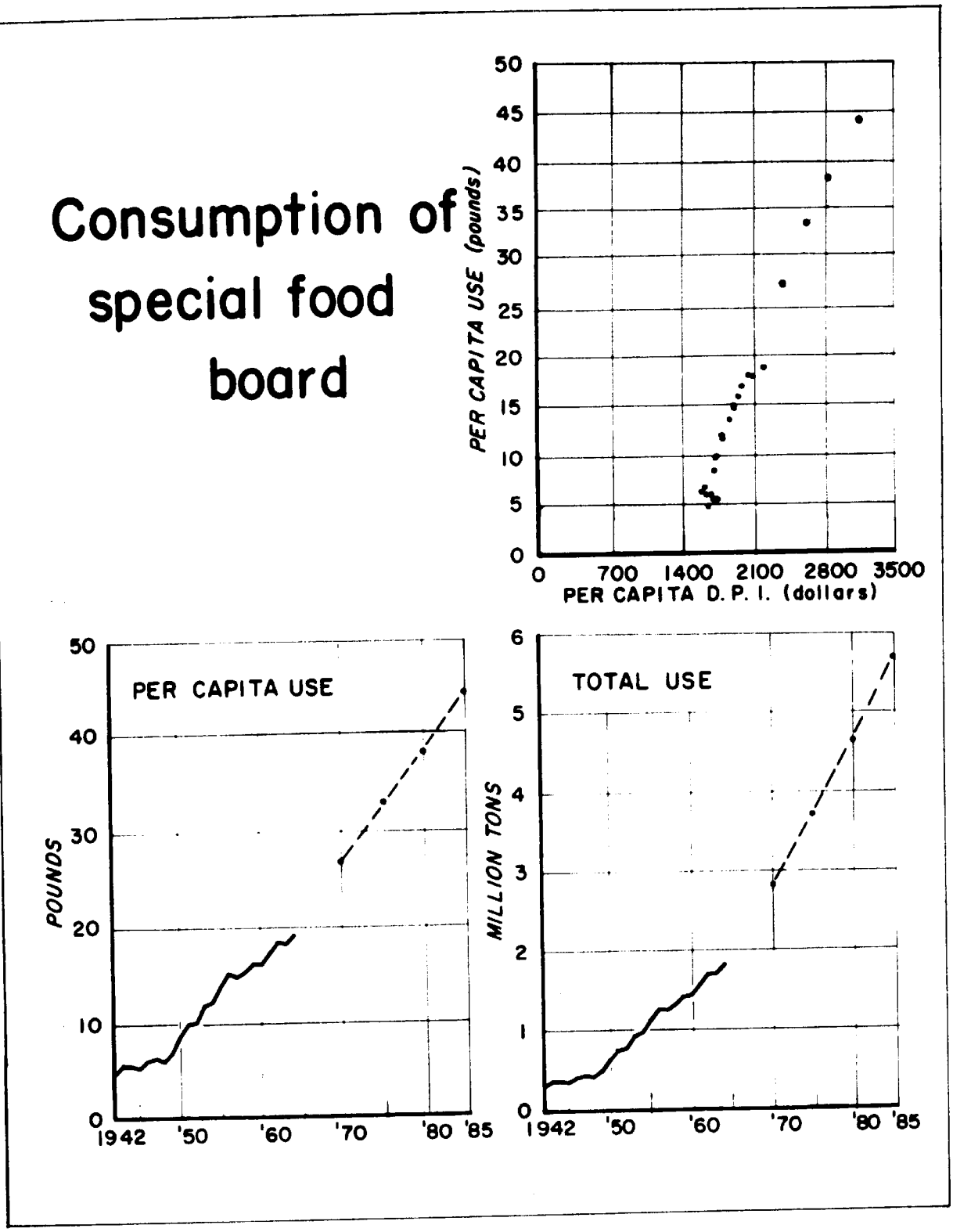

Consumption of special food board
PER CAPITA USE (pounds)
50
45
40
35
30
25
20
15
10
5
0
0 700 1400 2100 2800 3500
PER CAPITA D. P. I. (dollars)
PER CAPITA USE
POUNDS
50
40
30
20
10
0
1942 '50 '60 '70 '80 '85
TOTAL USE
MILLION TONS
6
5
4
3
2
1
0
1942 '50 '60 '70 '80 '85

Figure 27

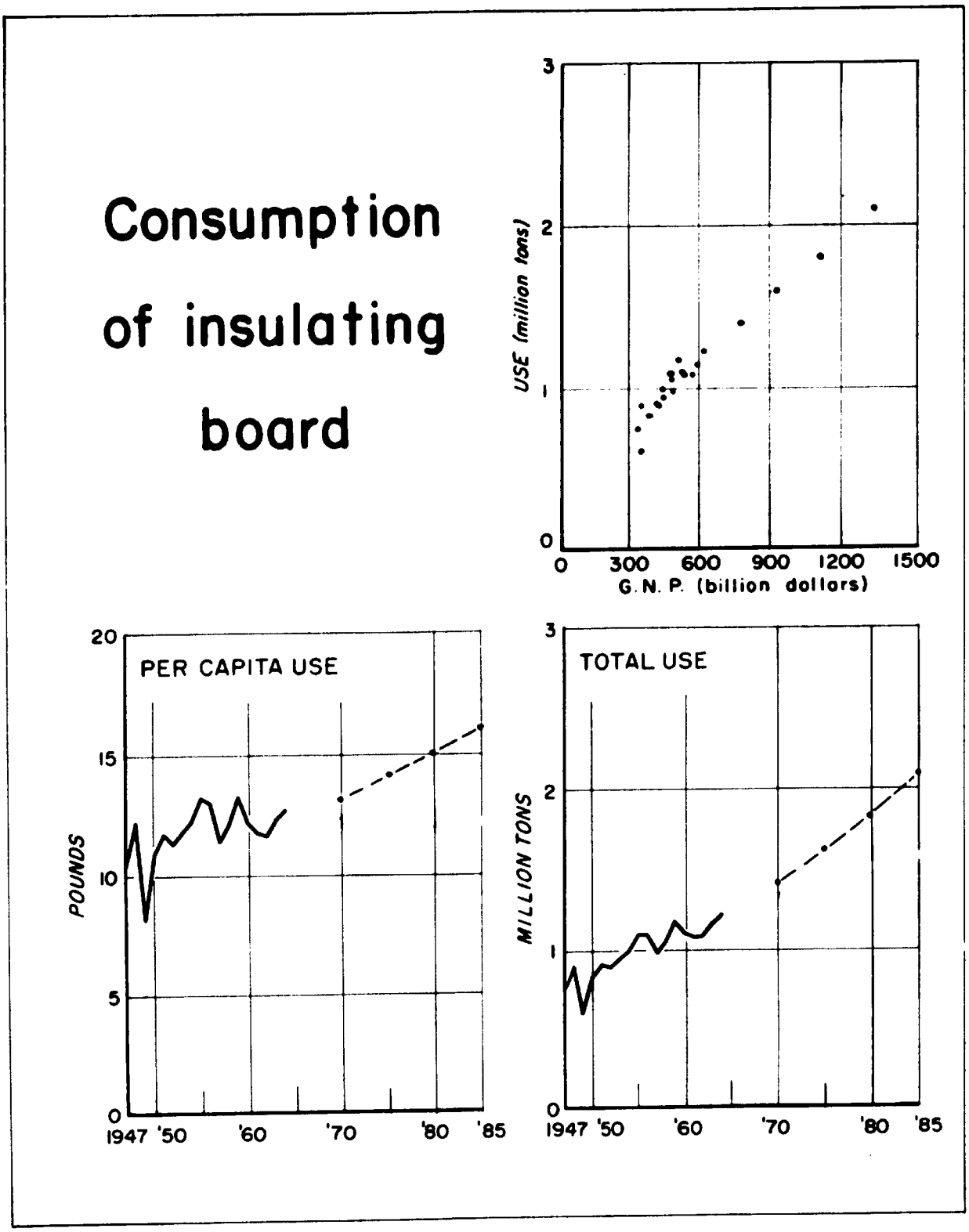

Consumption of insulating board
USE (million tons)
G.N.P. (billion dollars)
0
300
600
900
1200
1500
1
2
3
PER CAPITA USE
POUNDS
0
5
10
15
20
1947
'50
'60
'70
'80
'85
TOTAL USE
MILLION TONS

Figure 28

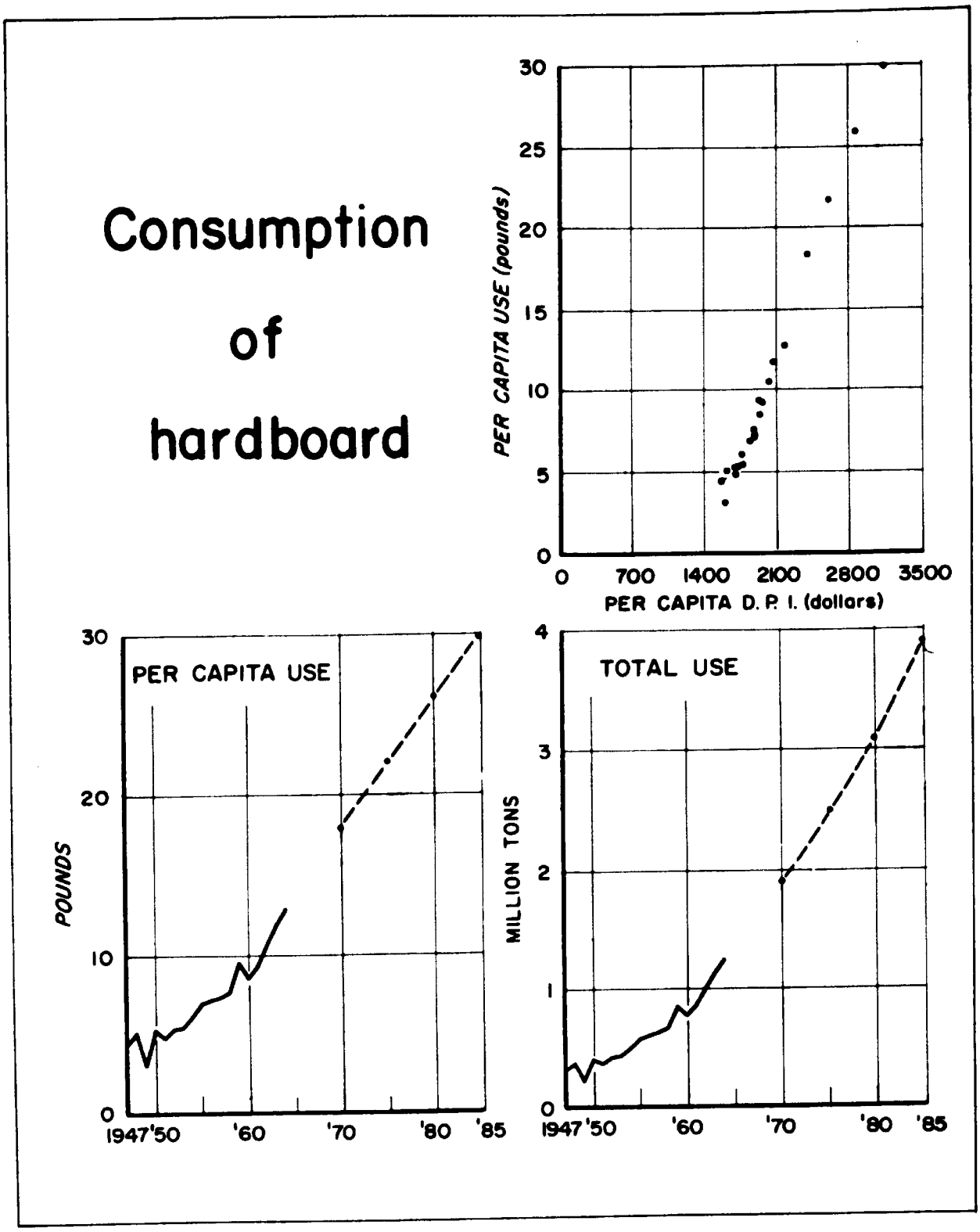

Consumption
of
hardboard
PER CAPITA USE (pounds)
30
25
20
15
10
5
0
0
700
1400
2100
2800
3500
PER CAPITA D. P. I. (dollars)
PER CAPITA USE
POUNDS
30
20
10
0
1947'50
'60
'70
'80
'85
TOTAL USE
MILLION TONS
4
3
2
1
0
1947'50
'60
'70
'80
'85

Figure 29

Projected demand for insulating board, based on the relationship between total use and gross national product in the 1948-64 years, rises to 2.1 million tons in 1985. The associated per capita demand is 16 pounds. Projected demand for hardboard in 1985, based on the relationship between per capita use and per capita disposable personal income in the 1948-64 period, rises to 30 pounds and total demand to 3.9 million tons.

Total demand for building board in 1985 amounts to 6.0 million tons--some 2.4 times consumption in 1964. Per capita demand rises from 26 to 46 pounds.

Other board.--Other board includes building board stock; setup boxboard; tube, can, and drum stock; cardboard; other special grades of paperboard; and wet machine board. About a quarter of the other board consumed is used as liner for gypsum plasterboard. Another 10 percent or so is used for such things as binding books, and in the manufacture of playing cards, posters, postcards, and shoes. Most of the remainder is consumed in the manufacture of rigid containers such as hat boxes, shoe boxes, and filing boxes.

Consumption of other board in all uses rose from 1.8 million tons in 1948 to 2.8 million tons in 1964 (fig. 30; app. D, table 14). Per capita use increased in the late 1940's and early 1950's, but since 1955 has fluctuated around 30 pounds.

Projected demand for other board, derived from the relationship between total use and gross national product in the years 1948 through 1964, rises to 5.2 million tons in 1985, about 1.9 times that of 1964. Per capita use increases to about 40 pounds.

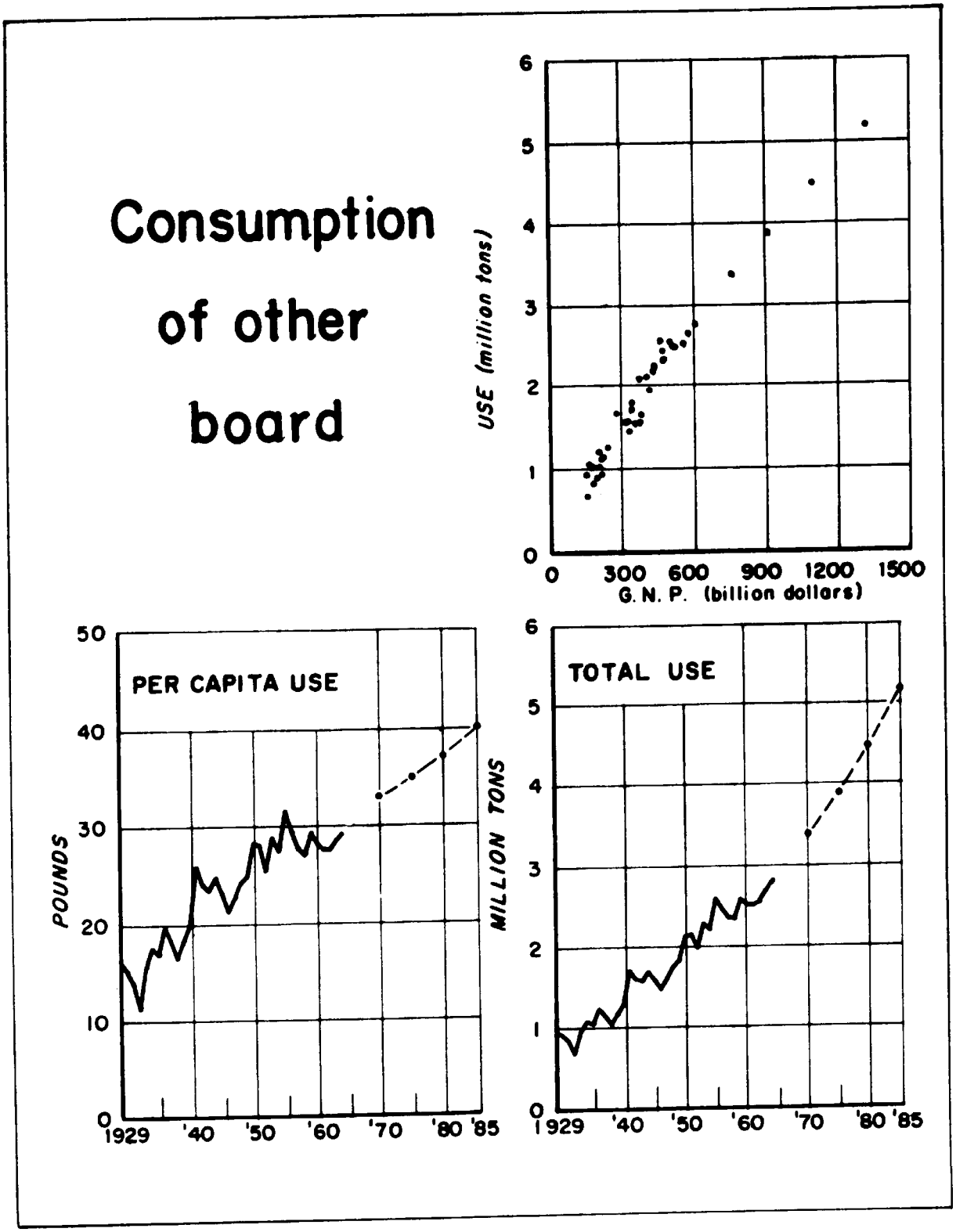

Consumption of other board
USE (million tons)
G. N. P. (billion dollars)
0
300
600
900
1200
1500
1
2
3
4
5
6
PER CAPITA USE
POUNDS
10
20
30
40
50
1929
'40
'50
'60
'70
'80
'85
TOTAL USE
MILLION TONS

Figure 30

Projections of demand for paper and board sensitive to changes in population and income

The projections of demand in tables 9 and 10 are based on what, at this time, appear to be the most reasonable assumptions concerning growth in population and economic activity. However, past experience has indicated that actual growth in these variables is likely to deviate significantly from assumed levels. Because of this uncertainty, a series of alternative projections of demand for paper and board are presented in table 12.

These alternatives are based on assumed levels of population and economic activity which bracket the ranges in which the actual future values are likely to fall. Thus, they give some indication of the band of uncertainty around the projections of demand for paper and board shown in table 9. They also illustrate the sensitivity of these projections to population and economic growth.

It is apparent that the range in projections of demand for paper and board, resulting from different but reasonable assumptions concerning population and the gross national product, are large. If, for example, the gross national product increases at a rate of 3.25 percent per year, instead of the 3.75 percent assumed in this study, the demand for paper and board in 1985 would be about 10 percent below that shown in table 9. If it grows by 4.25 percent per year, a rate well within the range of possibilities, demand in 1985 would be about 9 percent above that projected in table 9.

The above alternatives illustrate the dependency of projections, such as those in tables 9 and 10, on the underlying assumptions. The projections in these tables should be considered as only one carefully

Table 12.--Projected demand for paper and board based on alternative assumptions concerning the future levels of population and economic activity

Year	Projections based on alternative assumptions on growth in population						Projections based on alternative assumptions on growth in economic activity					
	Low		Medium[1]		High		Low		Medium[1]		High	
	Population[2]	Demand for paper and board[3]	Population	Demand for paper and board	Population[4]	Demand for paper and board[5]	Gross national product[6] (1961 prices)	Demand for paper and board[7]	Gross national product (1961 prices)	Demand for paper and board	Gross national product[8] (1961 prices)	Demand for paper and board[9]
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Millions	Million tons	Millions	Million tons	Millions	Million tons	Billion dollars	Million tons	Billion dollars	Million tons	Billion dollars	Million tons
1970	204.1	57.9	208	58.9	208.9	59.2	730	56.1	755	58.9	775	61.0
1975	214.1	67.8	223	70.8	227.5	72.0	860	65.6	905	70.8	955	74.4
1980	226.0	78.9	241	84.2	249.4	87.0	1,010	76.7	1,090	84.2	1,175	89.7
1985	239.8	91.8	260	99.5	273.3	104.7	1,180	89.8	1,310	99.5	1,450	108.0

1/ The projections under the column headings are the same as those shown in tables 8 and 9.

2/ The lowest projection of population (Series D) in the Bureau of the Census report "Revised Projections of the Population of the United States by Age and Sex to 1985."

3/ Derived by multiplying the projected per capita demands for paper and board shown in table 10 by the population in column 1. The use of the projections of per capita demand shown in table 10 implicitly assumes that the relationships between population and the various measures of economic activity will be the same as shown in table 8. Among other things this means that per capita gross national product and per capita disposable personal income shown in table 8 would be the same. The totals, however, would be lower.

4/ The highest projections of population (Series A), ibid.

5/ Derived by multiplying the projected per capita demands for paper and board shown in table 10 by the population shown in column 5. The use of the projections of per capita demand shown in table 10 implicitly assumes that the relationships between population and the various measures of economic activity will be the same as shown in table 8. Among other things this means that per capita gross national product and per capita disposable personal income shown in table 8 would be the same. The totals, however, would be higher.

6/ Based on the assumption that the gross national product will increase at an annual rate of 3.25 percent.

7/ Based on the gross national product projections shown in column 7, the population projections shown in column 3, and the assumption that the relationships between the gross national product shown in column 7 and other measures of economic activity will be the same as those shown in table 8.

8/ Based on the assumption that the gross national product will increase at an annual rate of 4.25 percent.

9/ Based on the gross national product projections shown in column 11, the population projections shown in column 3 and the assumption that the relationships between the gross national product shown in column 11 and the other measures of economic activity will be the same as those shown in table 8.

worked out indication of possible changes in demand. Other patterns of change may be equally probable.

Projected Imports and Exports of Paper and Board

The United States carries on an extensive trade in paper and board with many countries of the world. In 1964 imports amounted to 6.4 million tons and exports 1.5 million tons (table 13). Net imports of 4.9 million tons composed about 11 percent of paper and board consumption.

Imports expected to continue to rise rapidly but not as fast as domestic consumption

In the years 1948 through 1964 imports of paper and board increased from 4.6 to 6.4 million tons in a continuation of a trend that has been rising fairly rapidly since the early 1900's (fig. 31; app. D, table 17). Newsprint has composed 90 percent or more of total imports for several decades although in recent years some other grades, especially building board, have been increasing in importance. Canada, which in 1964 was the origin of about 92 percent of total paper and board imports and 96 percent of the newsprint imports, has been the chief source of supply (app. D, table 18).

In the late 1940's, imports composed more than four-fifths of the newsprint used in the U.S. (fig. 32; app. D, table 3). Since then, imports have slowly declined in relative importance and in 1964 accounted for 74 percent of the newsprint consumed. This decline largely reflects the development of a domestic newsprint industry in the South.

Table 13.--Apparent consumption, trade, and production of paper and board, 1920-85 [1/]

(Million tons)

Year	Consumption	Trade					U.S. production
		Imports			Exports	Net imports	
		Total	Newsprint	Other			
1920	7.7	0.8	0.7	2/	0.2	0.6	7.2
1925	10.4	1.5	1.4	0.1	.1	1.4	9.0
1930	12.3	2.3	2.3	2/	.2	2.2	10.2
1935	12.8	2.4	2.4	.1	.1	2.3	10.5
1940	16.8	2.8	2.8	2/	.5	2.3	14.5
1945	19.8	2.8	2.7	.1	.4	2.4	17.4
1950	29.1	5.0	4.9	.1	.3	4.7	24.4
1955	35.0	5.5	5.2	.3	.7	4.7	30.2
1960	39.3	5.7	5.5	.3	.9	4.8	34.4
1961	40.5	5.8	5.5	.3	1.0	4.7	35.7
1962	42.3	5.8	5.5	.3	1.0	4.8	37.6
1963 3/	43.9	5.8	5.4	.4	1.1	4.6	39.2
1964 3/	46.6	6.4	6.0	.4	1.5	4.9	41.7
PROJECTIONS							
1970	58.9	6.9	6.4	.5	2.2	4.7	54.2
1975	70.8	7.5	6.9	.6	3.0	4.5	66.3
1980	84.2	8.0	7.4	.6	3.7	4.3	79.9
1985	99.5	8.6	7.9	.7	4.4	4.2	95.3

1/ Data may not add to totals because of rounding.
2/ Less than 50 thousand tons.
3/ Preliminary.

NOTE: Annual data on production, trade, and consumption are shown in the tables in Appendix D.

Sources: See source note table nine.

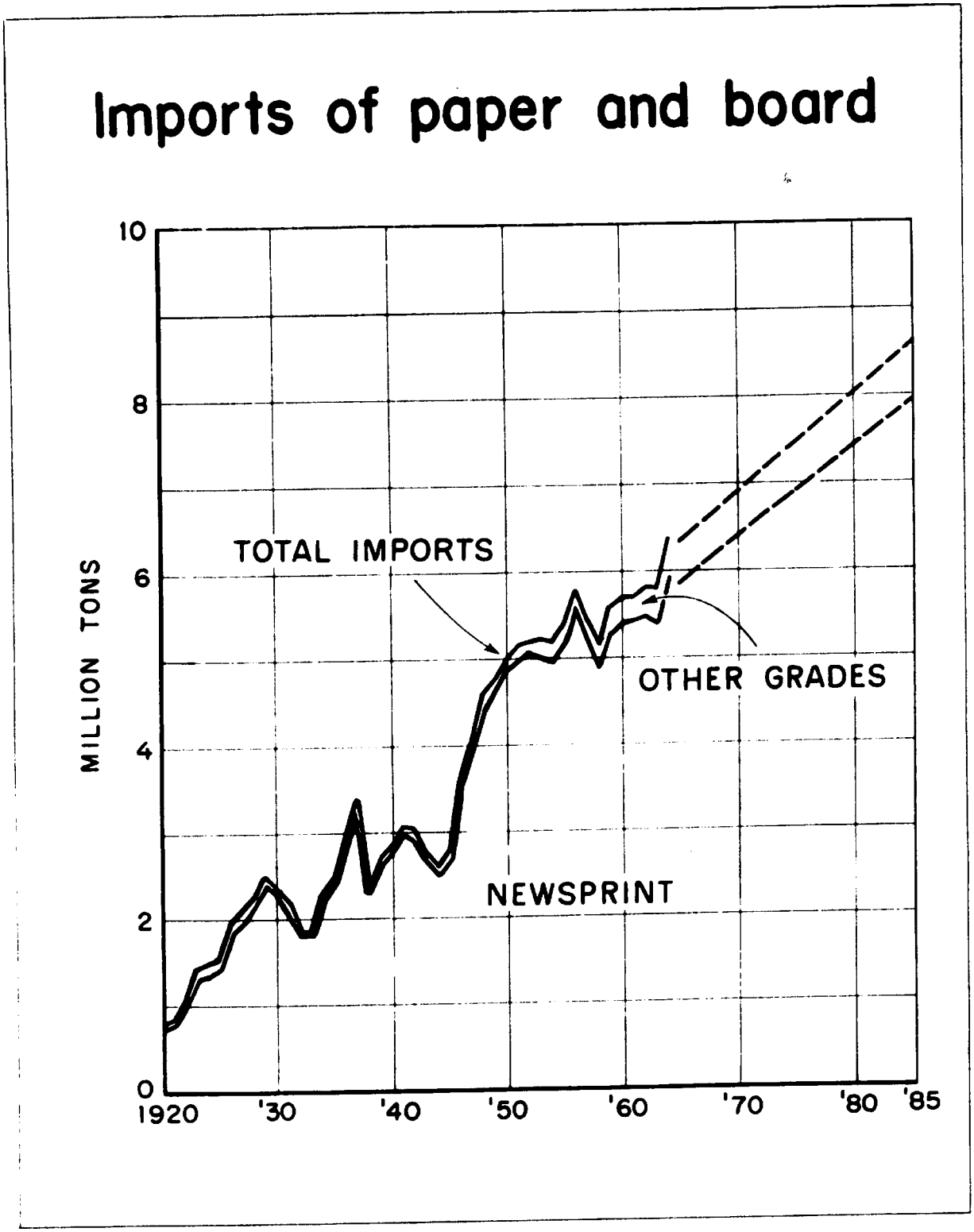

Imports of paper and board
MILLION TONS
10
8
6
4
2
0
1920
'30
'40
'50
'60
'70
'80
'85
TOTAL IMPORTS
OTHER GRADES
NEWSPRINT

Figure 31

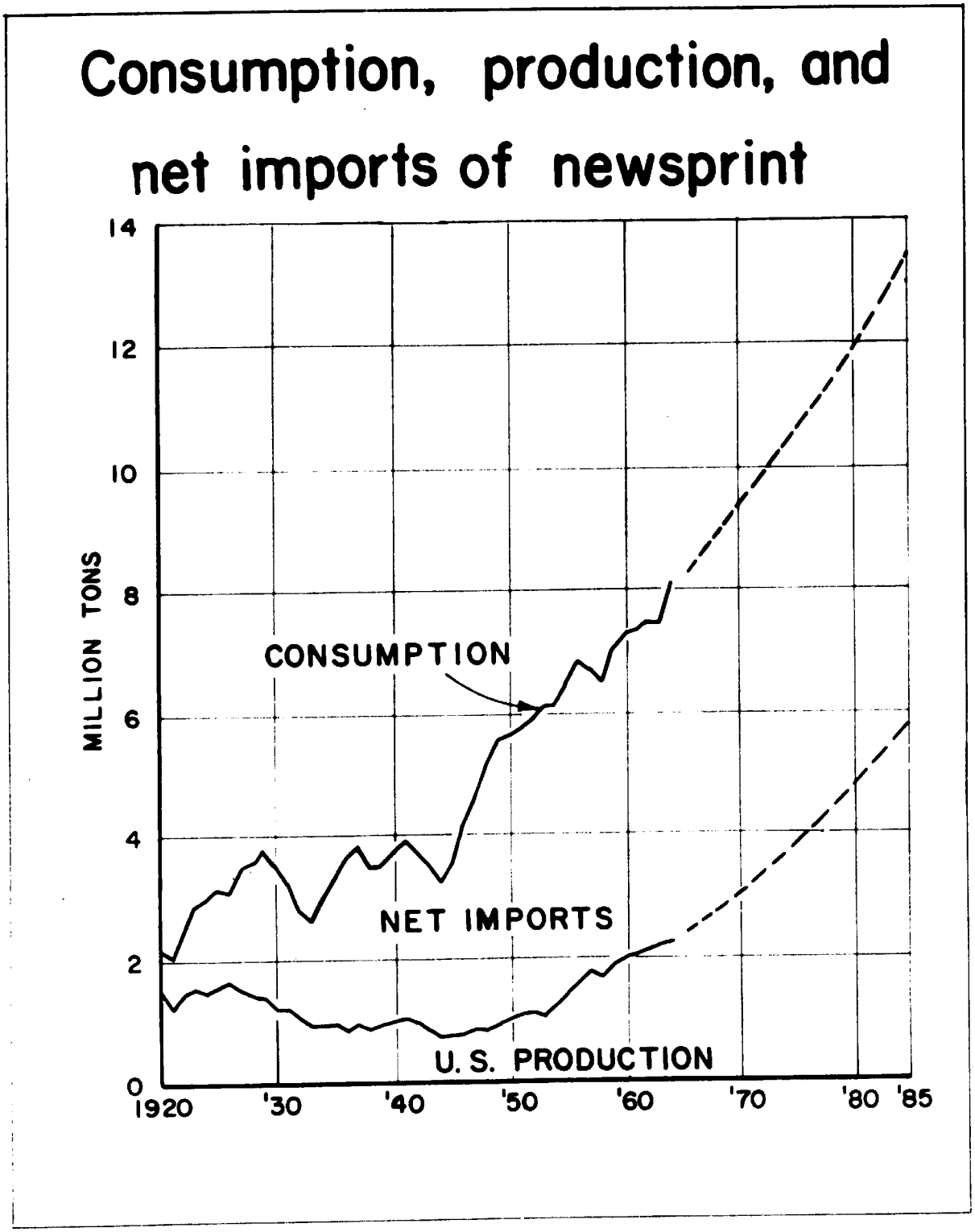

Consumption, production, and net imports of newsprint
MILLION TONS
14
12
10
8
6
4
2
0
1920
'30
'40
'50
'60
'70
'80
'85
CONSUMPTION
NET IMPORTS
U.S. PRODUCTION

Figure 32

Because imports have been the source of most of the newsprint used, there was a close relationship between newsprint consumption and imports in the 1948-64 period (table 11). Projections of newsprint imports, based on this relationship, rise to 7.9 million tons in 1985--some 32 percent above 1964 (table 13). Canada is expected to be the source of nearly all of these imports.

Given this level of imports, domestic mills will supply an increasing proportion of the country's newsprint needs--with output rising from 2.3 million tons in 1964 to 5.6 million tons in 1985. Most of the growth in the domestic industry is likely to be in the South and West.

On the basis of the extrapolation of freehand curves fitted to the historical data, made with consideration of the projected increases in domestic demands for paper and board, it is estimated that imports of grades of paper and board other than newsprint will total 0.7 million tons in 1985 (table 13). When these imports are added to the projected newsprint imports, it appears that total imports of paper and board in 1985 will be 8.6 million tons, some 34 percent above 1964.

Exports of paper and board have increased fivefold since 1948--expected to continue to rise in proportion to growth in world demands

In the years 1948 through 1964, exports of paper and board increased fivefold, rising from 0.3 million tons to 1.5 million tons (table 13; fig. 33). Nearly all grades of paper and board showed some increase, although most of the growth, especially since the mid 1950's, has been in container board (app. D, table 19).

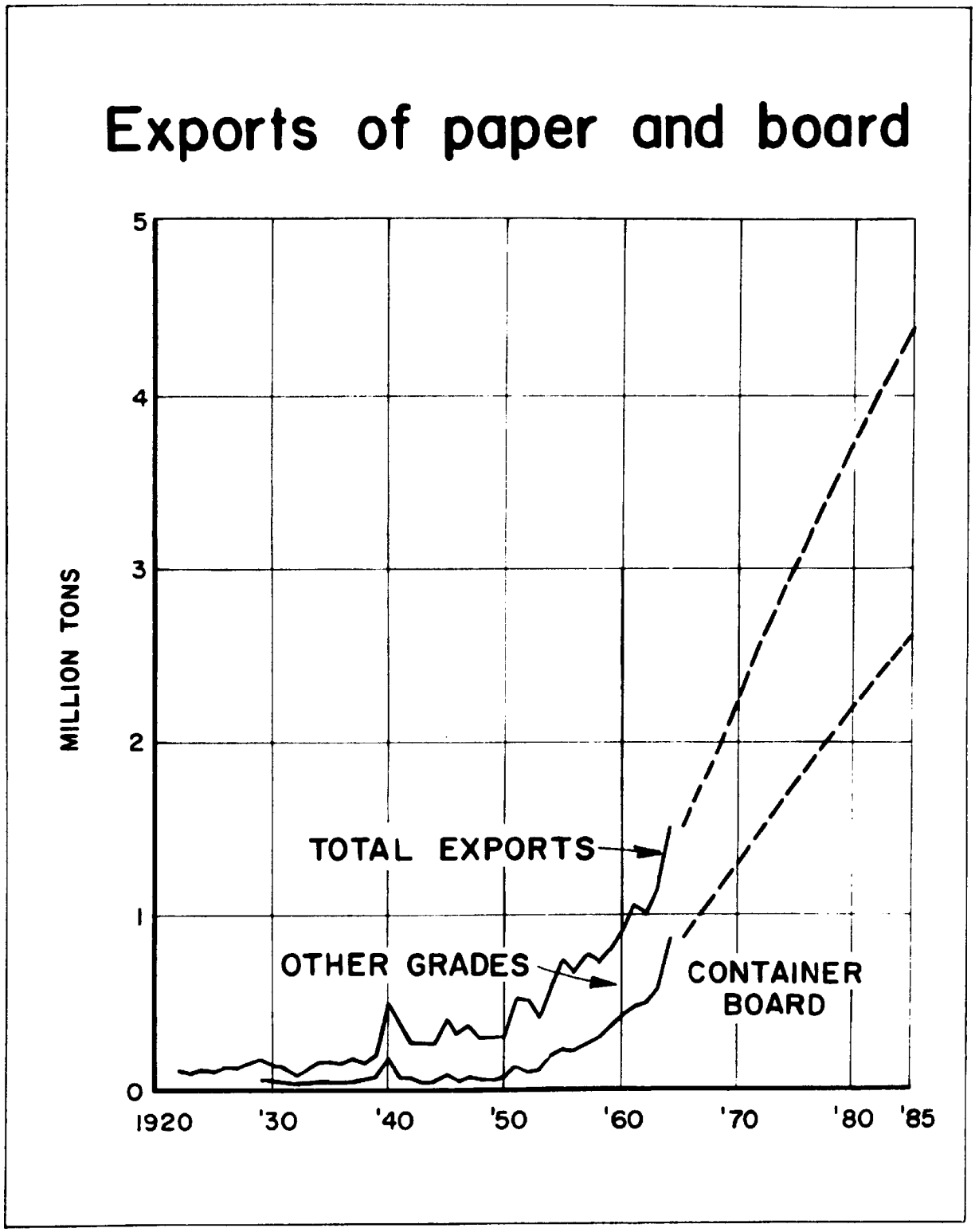

Exports of paper and board
MILLION TONS
5
4
3
2
1
0
1920
'30
'40
'50
'60
'70
'80
'85
TOTAL EXPORTS
OTHER GRADES
CONTAINER BOARD

Figure 33

Exports of paper and board have moved to all regions of the world (app. D, table 20). However, in 1964 about 42 percent of the total went to western Europe[49/] and most of the remainder to Latin America, the Far East, and Canada. The level of exports to Canada, about 144 thousand tons in 1964, has not changed much in recent years and nearly all of the recent growth in shipments has been to western Europe and Latin America.

Recent studies of the Food and Agriculture Organization of the United Nations indicate that there is likely to be substantial growth in the demand for paper and board in all regions of the world (see tabulation below).

Region	Projections of demand for paper and board		
	1965	1970	1975
	(Million short tons)		
Western Europe 1/	26.4	33.2	40.6
Latin America 2/	3.8	--	7.2
Far East 2/	7.6	--	15.2
All other (except North America) 2/	17.2	--	35.5

1/ United Nations, Food and Agriculture Organization, Pulp and Paper Prospects in Western Europe, p. 76.

2/ United Nations, Food and Agriculture Organization, World Demand for Paper to 1975, p. 51.

There are many factors, such as the location and extent of forest resources, especially the long-fibered softwood species; the comparative cost and availability of labor, pulpwood, wood pulp, and

49/ For definition of world regions see note to table 18, Appendix D.

other raw materials; the location and amount of paper and board mill capacity; tariffs, including the internal tariffs in organizations like the European Free Trade Association and the Common Market; and the trade and economic policies of countries like the U.S.S.R., which will determine how these prospective demands will be supplied. These factors have been discussed in a general way in many of the recent studies of prospective world demands for paper and board[50/] and of U.S. export markets.[51/] Most of this discussion was speculative because there are not enough quantitative data available at this time to adequately appraise the effects of many of the important determinants on future trade, especially for individual countries.

In the absence of more definitive information, it does seem reasonable to expect that U.S. exports will at least be able to maintain the present competitive position and that exports of paper and board will rise roughly in proportion to demand in various regions of the world. Under this assumption, exports are estimated at 3.0 million tons in 1975. A freehand extrapolation of the historical trends

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50/ United Nations, Food and Agriculture Organization, European Timber Trends and Prospects, A New Appraisal, 1950-1975; Pulp and Paper Prospects in Western Europe; World Demand for Paper to 1975.

51/ S. D. Richardson, Forestry in Communist China (Baltimore: The Johns Hopkins Press, 1966).

Richard A. Skok. Letter to James Morgan, Assistant Director, North Central Forest Experiment Station, St. Paul, Minnesota, reporting on a trip through western Europe made to study prospects for U.S. exports of pulp and paper (School of Forestry, University of Minnesota, 1965).

Albert W. Wilson, "Scandinavia Improves in World Competition," Pulp and Paper, Vol. 39, No. 40 (October 1965), 36-39.

John A. Zivnuska, The Forest Resources of the United States in a World Economy: A Problem Analysis (Berkeley: University of California, School of Forestry, 1965).

in exports, including the projections to 1975, indicate a further rise to 4.4 million tons in 1985.

The volume of net imports of paper and board to rise but compose a smaller proportion of total demand

If the above estimates of imports and exports of paper and board are realized, net imports in 1985 will amount to 4.2 million tons (table 13; fig. 34). This will represent about 4 percent of total demand--a figure substantially below 1964 when net imports accounted for 11 percent of total use. As net imports decline in relative importance, a growing part of total demand will need to be supplied by U.S. mills.

Domestic paper and board production to reach 95.3 tons in 1985--about 2.3 times output in 1964

Production of paper and board in domestic mills in 1964 was 41.7 million tons, nearly twice the 21.9 million tons produced in 1948 (table 13; fig. 34; app. D, table 1). By 1985, with the given projections of imports and exports, total domestic production will amount to 95.3 million tons--some 2.3 times output in 1964.

Domestic production of the major grades of paper and board are expected to show varying trends. For example, and because of the decline in the relative importance of imports, domestic output of newsprint is projected to grow more rapidly than projected demands. Anticipated increases in exports of such grades as container board and coarse and industrial paper mean that domestic output of these grades will also rise faster than demand. Domestic production of most grades, however, is expected to increase roughly in line with the projections of demand shown in table 9.

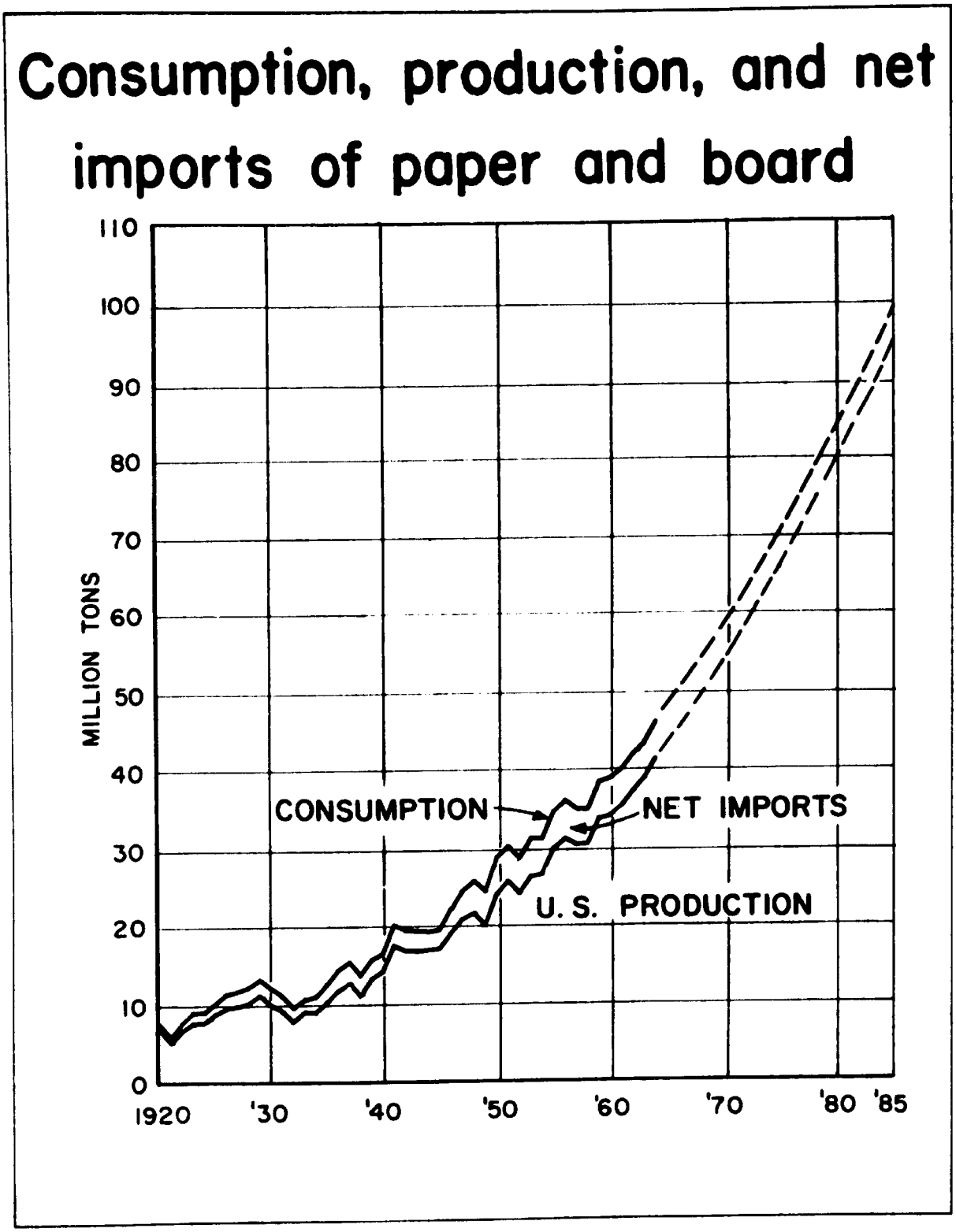

Consumption, production, and net imports of paper and board
MILLION TONS
110
100
90
80
70
60
50
40
30
20
10
0
1920
'30
'40
'50
'60
'70
'80
'85
CONSUMPTION
NET IMPORTS
U. S. PRODUCTION

Figure 34

Projected Demands for Wood Pulp

Wood pulp the chief fibrous material used in the manufacture of paper and board-- it has been displacing other materials

The domestic production of paper and board will be one of the major determinants of demand for wood pulp. In 1964 a total of 32.0 million tons, or about 95 percent of all the wood pulp consumed, was used in the manufacture of paper and board produced in U.S. mills (table 14; fig. 35).[52/] This was about 2.2 times the 14.4 million tons consumed in 1948.

The increase in consumption in this period, and in preceding years, has been somewhat faster than the growth in the domestic production of paper and board. This largely reflects the gradual displacement by wood pulp of the other fibrous materials used in the manufacture of paper and board, such as waste paper, straw, rags, and bagasse (table 14; fig. 35). For example, in the years 1948 through 1964 the use of wood pulp per ton of paper and board produced rose from about 0.66 tons to about 0.77 tons (app. F, table 1).[53/] In the same period

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[52/] Annual data on production, trade, and consumption of wood pulp, by type, are shown in the tables in Appendix E.

[53/] Basic statistics on the use of fibrous materials (including wood pulp by type) in the manufacture of the major grades of paper and board are contained in the tables in Appendix F. This appendix also includes graphs showing trends in the use of fibrous materials, and wood pulp by type, in the manufacture of the major grades of paper and board, with extrapolations to 1985. The extrapolations of wood pulp and other fibrous materials use shown in these graphs are based on freehand curves fitted to the data showing the use of fibrous materials in each major grade of paper and board in 1947, 1954, 1958, and 1963, and the informed judgment of pulp and paper scientists at the Forest Products Laboratory of the Forest Service. Since most grades of paper and board can be manufactured from a variety of mixtures of fibrous materials and grades of wood pulp, these extrapolations necessarily have a large measure of uncertainty.

Table 14.--Fibrous materials consumed in the manufacture of paper and board, 1919-85[1/]

	Consumption of fibrous materials				Consumption of fibrous materials per ton of paper and board produced			
	Total	Wood pulp	Waste paper	Other	Total	Wood pulp	Waste paper	Other
	Thousand tons	Thousand tons	Thousand tons	Thousand tons	Tons	Tons	Tons	Tons
1919	6,622	4,020	1,854	748	1.110	0.674	0.311	0.125
1929	11,575	6,289	3,842	1,443	1.039	.565	.345	.129
1935	10,999	6,442	3,587	969	1.050	.615	.342	.092
1939	14,177	8,650	4,366	1,161	1.049	.640	.323	.086
1940	15,493	9,782	4,668	1,044	1.070	.675	.322	.072
1945	18,969	10,825	6,800	1,344	1.092	.623	.391	.077
1950	25,904	16,509	7,956	1,439	1.062	.677	.326	.059
1955	31,835	21,454	9,041	1,340	1.056	.711	.300	.045
1960	35,703	25,700	9,032	971	1.036	.746	.262	.028
1961	36,595	26,683	9,018	894	1.025	.747	.253	.025
1962	38,636	28,598	9,075	963	1.029	.762	.242	.025
1963	41,117	30,220	9,613	1,285	1.048	.770	.245	.033
1964 2/	42,478	32,031	9,493	954	1.018	.767	.227	.023
PROJECTIONS								
1970	56,900	44,200	11,700	1,000	1.050	.815	.217	.018
1975	69,600	55,400	13,200	1,000	1.050	.835	.200	.015
1980	83,900	68,300	14,600	1,000	1.050	.855	.183	.012
1985	100,100	82,400	16,700	1,000	1.050	.865	.175	.010

1/ Data may not add to totals because of rounding.
2/ Preliminary.

Sources: United States Pulp Producers Association, Inc., Wood Pulp Statistics (New York: United States Pulp Producers Association, Inc., 1965, Annual). U.S. Department of Commerce, Bureau of the Census, Current Industrial Reports: Pulp, Paper and Board. U.S. Department of Agriculture, Forest Service.

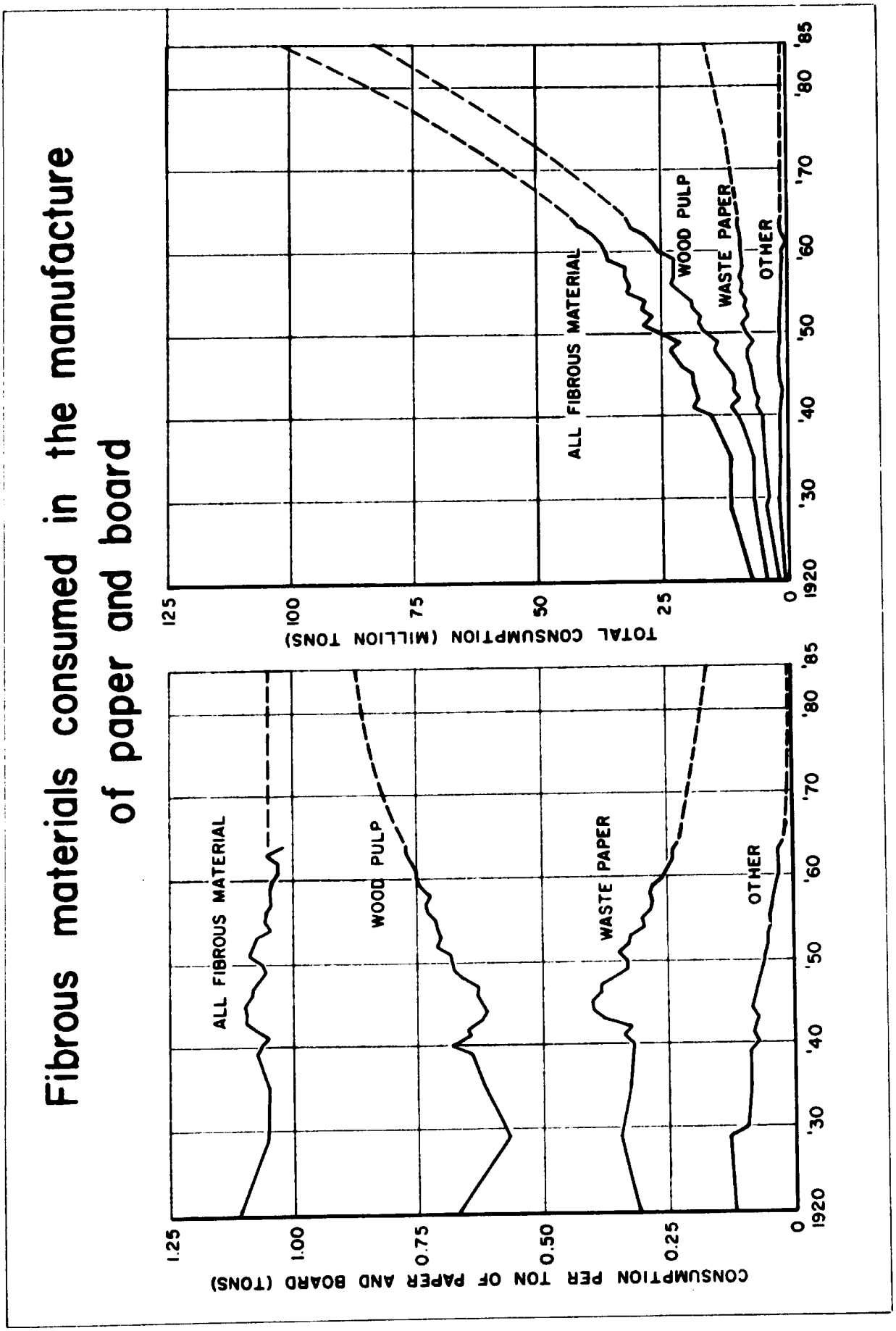

Fibrous materials consumed in the manufacture of paper and board
TOTAL CONSUMPTION (MILLION TONS)
125
100
75
50
25
0
1920
'30
'40
'50
'60
'70
'80
'85
ALL FIBROUS MATERIAL
WOOD PULP
WASTE PAPER
OTHER
CONSUMPTION PER TON OF PAPER AND BOARD (TONS)
1.25
1.00
0.75
0.50
0.25
0
1920
'30
'40
'50
'60
'70
'80
'85
ALL FIBROUS MATERIAL
WOOD PULP
WASTE PAPER
OTHER

Figure 35

the use of waste paper per ton of paper and board produced dropped from 0.35 tons to 0.23 tons, and other materials from 0.07 tons to 0.02 tons.

Wood pulp expected to continue to gradually displace other materials in the manufacture of paper and board--demand in 1985 estimated at 82.4 million tons--2.6 times use in 1964

These trends are expected to continue, and it is estimated that average use of wood pulp per ton of paper and board produced will rise to 0.87 tons in 1985.[53/] The use of waste paper is assumed to decline to about 0.17 tons and other materials to about 0.01 tons.

Estimates of the volume of wood pulp needed for the manufacture of paper and board, based upon the estimates of domestic production of paper and board summarized in table 13 and the extrapolated trends in wood pulp use per ton of output shown in table 14, rise to 82.4 million tons in 1985.[54/] This is about 2.6 times consumption in 1964. Because of the large anticipated rise in the domestic production of paper and board, the use of waste paper is also expected to increase, reaching 16.7 million tons in 1985--some 7.2 million tons above 1964. The use of other fibrous materials, however, will remain at about one million tons a year.

[54/] Small volumes of paper grade pulps are used in the manufacture of nonpaper products such as pressed and molded pulp goods. The projected demands include an allowance for this kind of use.

Widely divergent trends in the use of five major types of wood pulp in paper and board manufacture--most of the growth in demand expected to be for sulfate pulps

There are five major types of wood pulp used in the manufacture of paper and board, i.e., sulfite, sulfate, groundwood, semichemical, and defibrated or exploded pulps. There have been widely divergent trends in consumption of these pulps (table 15; fig. 36). Between 1948 and 1964, for example, consumption of sulfate pulp increased 3 times, rising from 6.7 million tons to 20.4 million tons. Use of semichemical pulp also showed fast growth, and groundwood and defibrated or exploded pulps moderate increases. Use of sulfite and soda pulps, however, showed small declines.

On the basis of these trends in consumption, and a detailed analysis of the use of each type of pulp in the manufacture of each of the major grades of paper and board,[53/] it is estimated that sulfate pulp consumption in paper and board manufacture in 1985 will amount to 55.8 million tons (table 15; fig. 36). This is about 2.7 times consumption in 1964. The use of semichemical, defibrated or exploded pulps, and groundwood pulps is also expected to grow substantially, but no significant change is anticipated in the use of sulfite and soda pulps.

About 1.2 million tons of highly purified pulps used in the manufacture of nonpaper products--demand expected to reach 2.0 million tons by 1985

In addition to the pulps used in the production of paper and board, about 1.2 million tons of highly purified pulps--dissolving and special alpha--were consumed in 1964 in the manufacture of non-paper products such as rayon, cellulose acetate, cellophane, and

Table 15.--Apparent consumption of wood pulp by type, 1920-85

Year	Total wood pulp		Dissolving and special alpha		Sulfite		Sulfate		Soda		Groundwood		Semichemical		Defibrated, exploded, and screenings	
	Total 2/	Annual rate of increase 3/	Total	Annual rate of increase 3/	Total	Annual rate of increase 3/	Total	Annual rate of increase 3/	Total	Annual rate of increase 3/	Total	Annual rate of increase 3/	Total	Annual rate of increase 3/	Total	Annual rate of increase 3/
	Million tons	Percent	Million tons	Percent	Million tons	Percent	Million tons	Percent	Million tons	Percent	Million tons	Percent	Million tons	Percent	Million tons	Percent
1920	4.7	--	--	--	--	--	0.4	--	--	--	1.8	--	--	--	--	--
1925	5.6	4.6	--	--	2.3	--	.8	14.9	0.5	--	1.9	1.1	--	--	--	--
1930	6.4	2.7	--	--	2.8	2.6	1.4	11.8	.5	--	1.9	--	(4/)	--	--	--
1935	5.7	-.9	--	--	2.5	--	2.1	8.4	.4	--	1.5	--	0.1	--	--	--
1940	9.7	7.7	0.3	--	2.7	3.8	3.9	13.2	.5	4.6	1.8	3.7	.2	14.9	0.3	--
1945	11.8	4.0	.5	10.8	2.8	.7	4.9	4.7	.4	--	2.0	2.1	.3	8.4	.3	22.1
1950	17.1	7.7	.7	7.0	3.2	2.7	8.4	11.4	.6	8.4	2.5	4.6	.7	18.5	1.1	6.6
1955	22.3	5.5	1.0	7.4	3.2	--	11.4	7.2	.5	--	3.0	3.7	1.4	14.9	1.3	3.4
1960	26.6	3.6	1.0	--	3.2	--	15.2	5.0	.5	--	3.6	3.7	2.3	7.4	1.3	--
1961	27.8	4.5	1.0	--	3.1	--	16.1	5.9	.5	--	3.5	--	2.4	20.1	1.3	--
1962	29.5	6.1	1.1	10.0	3.0	--	17.3	7.5	.4	--	3.7	5.7	2.5	4.2	1.4	7.7
1963	31.5	6.8	1.1	--	3.1	3.3	18.8	8.7	.4	--	3.8	2.7	2.6	4.0	1.6	14.3
1964 5/	33.8	7.3	1.2	9.1	3.1	--	20.9	11.2	.4	--	3.9	2.6	2.7	3.8	1.6	--
PROJECTED DEMAND																
1970	45.7	5.2	1.4	2.6	3.2	0.5	28.4	5.2	.4	--	4.8	3.5	4.7	3.7	2.5	9.8
1975	57.2	4.6	1.6	2.7	3.2	--	36.7	5.3	.4	--	5.7	3.5	6.4	6.4	3.3	3.3
1980	70.2	4.2	1.8	2.4	3.3	.6	45.7	4.5	.4	--	6.7	3.3	8.6	6.1	3.5	2.9
1985	84.6	3.8	2.0	2.1	3.5	1.2	55.8	4.1	.4	--	7.7	2.8	10.9	4.9	4.3	2.5

1/ Includes a number of highly purified types of wood pulp obtained from the sulfite and sulfate pulping processes.

2/ Data prior to 1940 may not add to totals because of the inclusion in the totals of wood pulps not shown separately by type. In other years, figures in columns may not add to totals because of rounding.

3/ The average annual rate of increase for 5 year periods ending in the specified years except for the years 1961-64 when annual changes are shown, and 1970 when the averages shown are for the period 1964-70.

4/ Less than 50 thousand tons.

5/ Preliminary.

NOTE: Annual data on production, trade, and consumption by type of pulp are shown in the tables in Appendix E.

Sources: United States Pulp Producers Association, Inc., op. cit. U.S. Department of Commerce, Bureau of the Census, Current Industrial Reports: Pulp, Paper and Board. U.S. Department of Commerce, Business and Defense Services Administration, op. cit. U.S. Department of Agriculture, Forest Service.

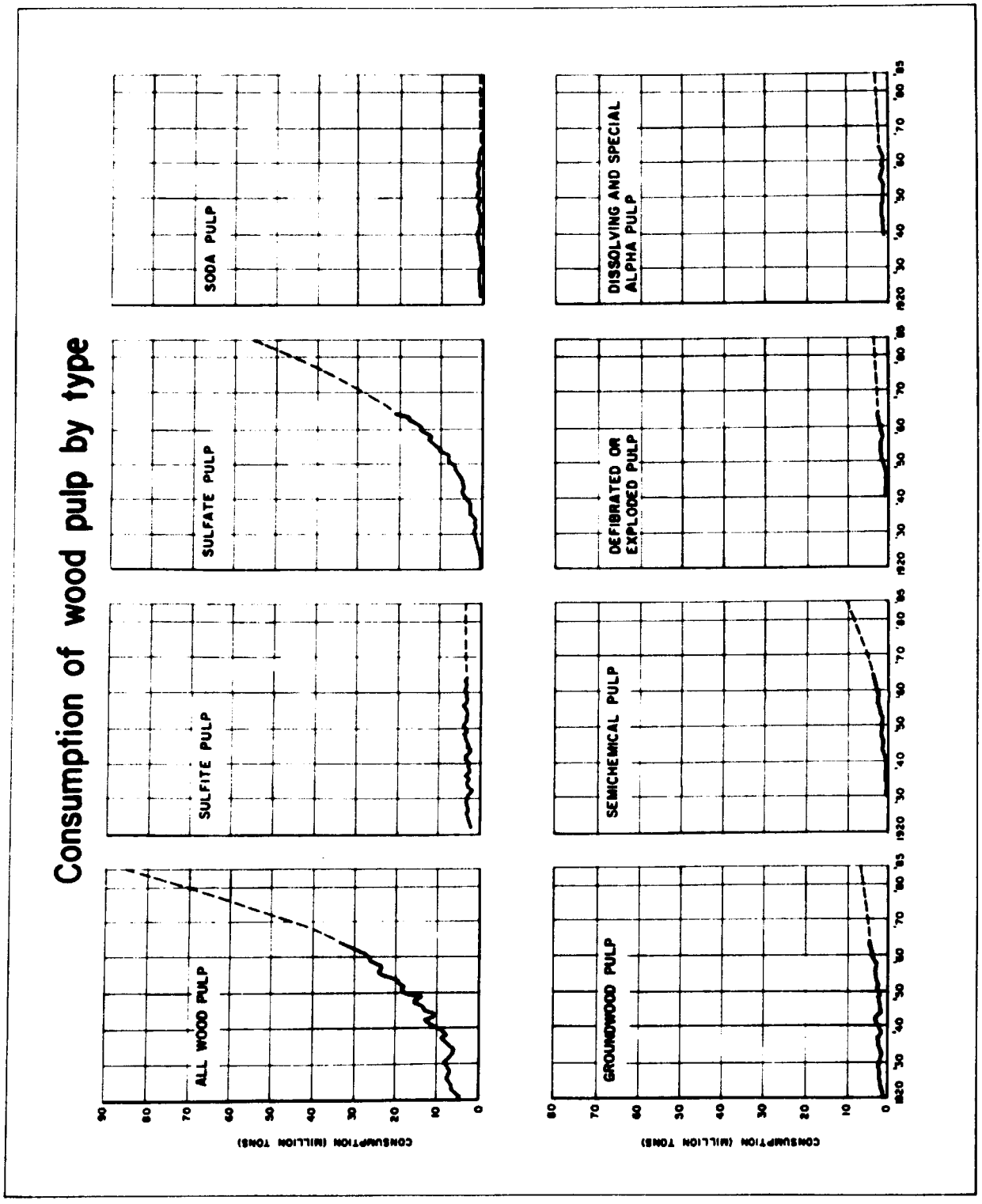

Consumption of wood pulp by type
ALL WOOD PULP
SULFITE PULP
SULFATE PULP
SODA PULP
GROUNDWOOD PULP
SEMICHEMICAL PULP
DEFIBRATED OR EXPLODED PULP
DISSOLVING AND SPECIAL ALPHA PULP
CONSUMPTION (MILLION TONS)

Figure 36

nitration products used as a base for gunpowder, lacquers, and certain types of plastics (table 15; fig. 36).[55/] This was nearly double the 0.6 million tons consumed in 1948. Per capita use rose from 9 pounds in 1948 to 12 pounds in 1955--a level that, with a little fluctuation, was maintained through 1964 (app. E, table 2).

There was a fairly close relationship between changes in total consumption of the dissolving and special alpha pulps and changes in the gross national product in the 1948-64 period (table 11). On the basis of this relationship, the demand for the highly purified pulps is projected to 2.0 million tons in 1985--some 67 percent above 1964. The associated level of per capita use is 15 pounds, a slight increase over the 1964 average of 12 pounds.

Total demand for all types of wood pulp in 1985 estimated at 84.6 million tons--2.5 times use in 1964

When the projected demands for dissolving and special alpha pulps are added to the pulps required for the manufacture of paper and board, it appears that the total demand for wood pulp in 1985 will amount to 84.6 million tons--about 2-1/2 times consumption in 1964 (table 15; fig. 37). Sulfate paper grade pulps will account for most of this increase although substantial growth is also expected in semichemical, defibrated or exploded, and groundwood pulps.

55/ The volume figures on dissolving and special alpha pulps in table 15 and quoted in the text include small quantities that are used in the manufacture of paper and board.

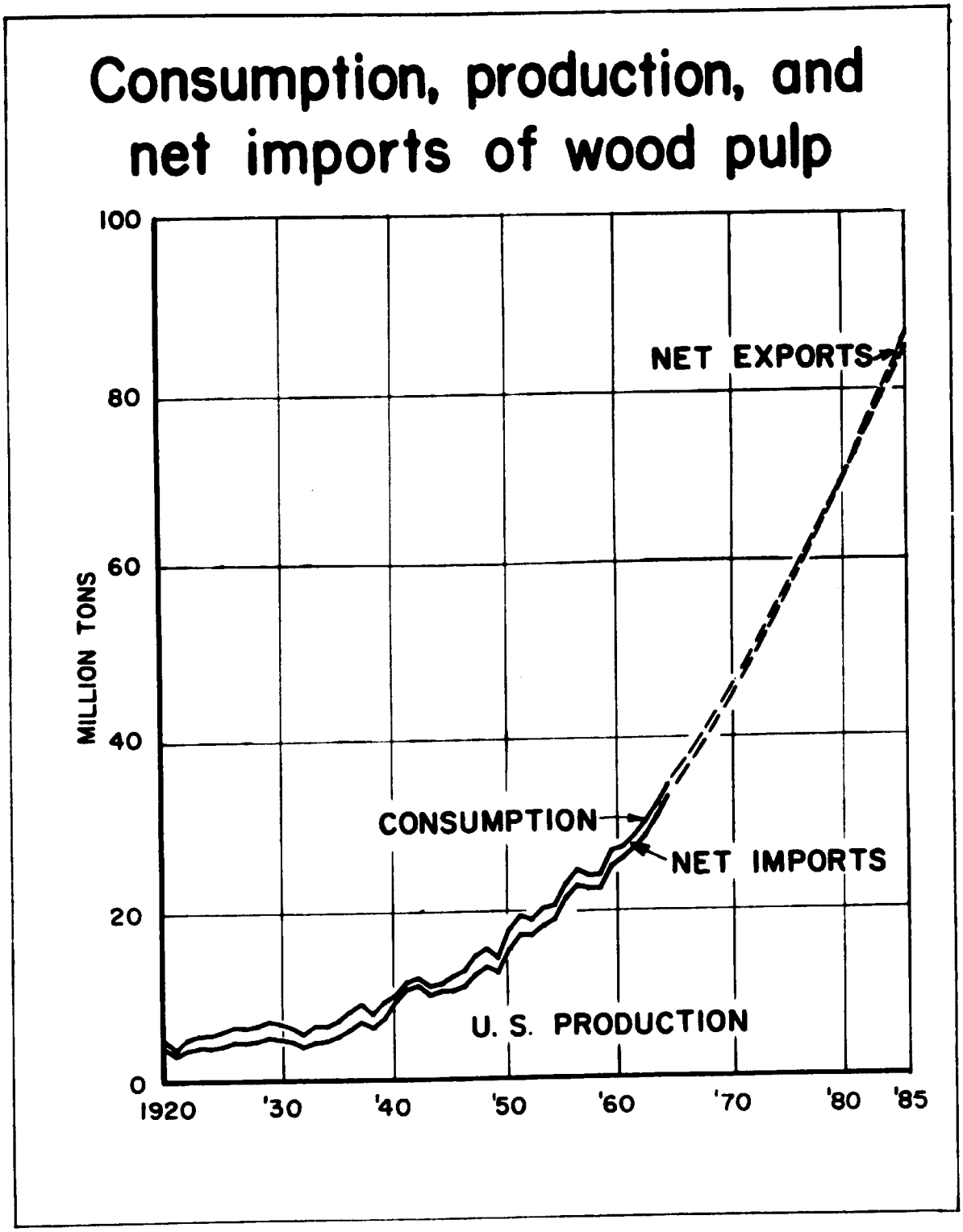

Consumption, production, and net imports of wood pulp
MILLION TONS
100
80
60
40
20
0
1920
'30
'40
'50
'60
'70
'80
'85
NET EXPORTS
CONSUMPTION
NET IMPORTS
U. S. PRODUCTION

Figure 37

Projected Imports and Exports of Wood Pulp

For several decades the U.S. has carried on wood pulp trade with various countries of the world. In 1964 imports were 2.9 million tons and exports 1.6 million tons (table 16; fig. 37). The net imports of 1.4 million tons composed about 4 percent of the wood pulp consumed.

Imports of sulfate pulp have shown an upward trend and projections indicate further increases--not much change expected for other grades

From the late 1940's to the late 1950's, wood pulp imports fluctuated around 2.2 million tons a year. Starting in the early 1960's, imports increased and in 1964 totaled 2.9 million tons (fig. 38; app. E, table 11). Canada has been the chief source of wood pulp imports, accounting for 92 percent of the 1964 total (app. E, table 12). Nearly all of the remaining imports in 1964, and in preceding years, originated in Sweden, Finland, and Norway.

Imports of the major types of pulp have shown varying trends. In the 1948-58 period, imports of sulfite pulp dropped from about 1 million tons to 0.6 million tons--a level that was maintained without much change through 1964. Imports of dissolving and special alpha pulps, groundwood, and soda pulps showed no trend from 1948 through 1964. Imports of sulfate pulp, however, nearly tripled, rising from 0.6 million tons to 1.6 million tons.

Because the imported sulfate pulp is used in paper and board manufacture, there was a close relationship between changes in sulfate pulp imports and changes in U.S. paper and board production in the 1948-64 period (table 11). Projections of sulfate pulp imports, based

Table 16.--Apparent consumption, trade, and production of wood pulp, 1920-85[1]

(Million tons)

Year	Consumption	Trade			U.S. production
		Imports	Exports	Net imports	
1920	4.7	0.9	[2]	0.9	3.8
1925	5.6	1.7	[2]	1.6	4.0
1930	6.4	1.8	[2]	1.8	4.6
1935	6.7	1.9	0.2	1.8	4.9
1940	9.7	1.2	.5	.7	9.0
1945	11.8	1.8	.1	1.6	10.2
1950	17.1	2.4	.1	2.3	14.8
1955	22.3	2.2	.6	1.6	20.7
1960	26.6	2.4	1.1	1.2	25.3
1961	27.8	2.5	1.2	1.3	26.5
1962	29.5	2.8	1.2	1.6	27.9
1963	31.5	2.8	1.4	1.4	30.1
1964 [3]	33.8	2.9	1.6	1.4	32.4
PROJECTIONS					
1970	45.7	3.3	2.4	.9	44.8
1975	57.2	3.8	3.2	.6	56.6
1980	70.2	4.2	4.0	.2	70.0
1985	84.6	4.5	5.0	[4] .5	85.1

[1] Data may not add to total because of rounding.
[2] Less than 50 thousand tons.
[3] Preliminary.
[4] Net exports.

NOTE: Annual data on production, trade, and consumption are shown in the tables in Appendix E.

Sources: See source note table 15.

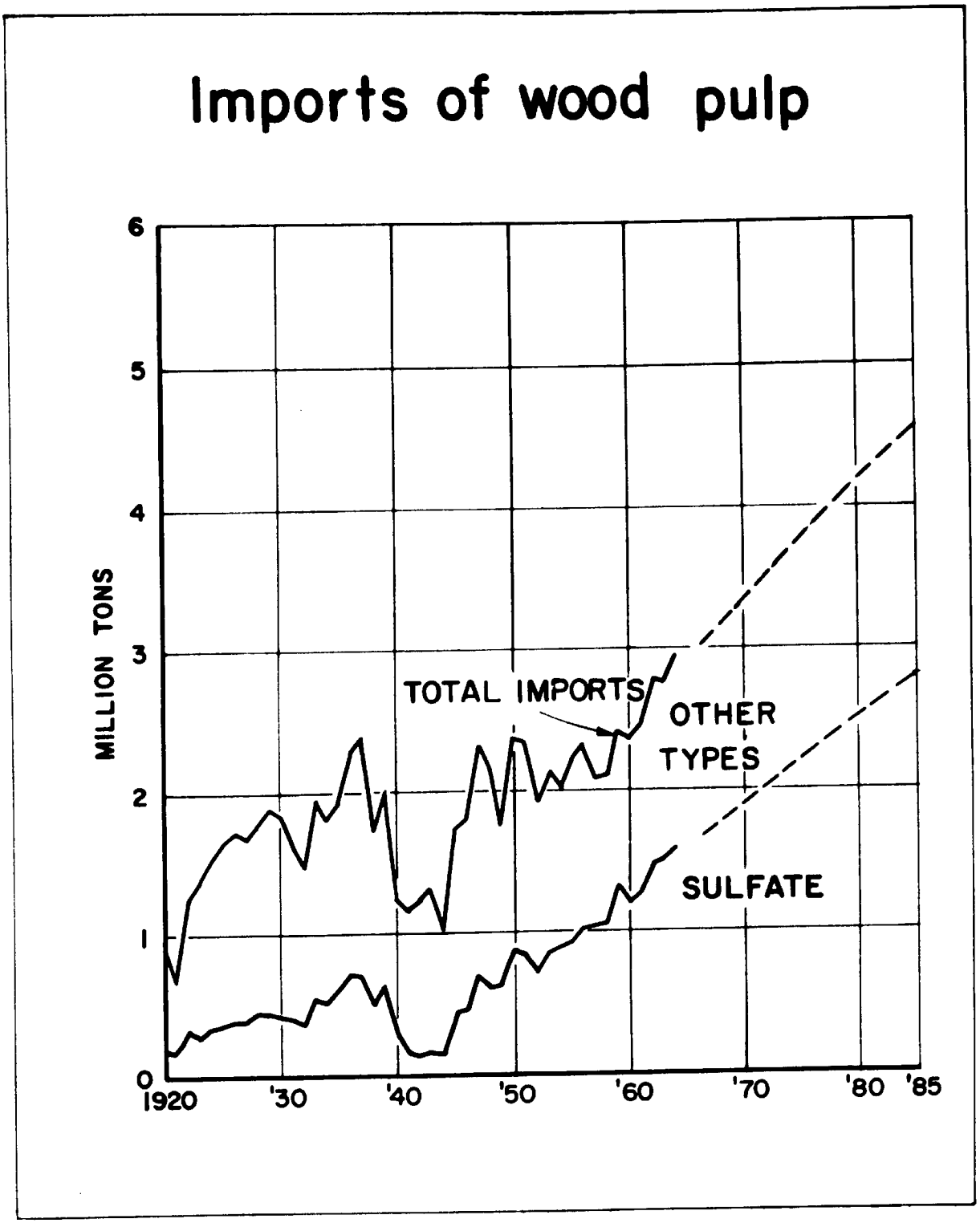

Imports of wood pulp
MILLION TONS
6
5
4
3
2
1
0
1920
'30
'40
'50
'60
'70
'80
'85
TOTAL IMPORTS
OTHER TYPES
SULFATE

Figure 38

on this relationship, rise to 2.8 million tons in 1985. Imports of other grades of wood pulp are expected to show small increases over the levels of the late 1950's and early 1960's. Total imports of all grades of wood pulp are estimated at 4.5 million tons in 1985--about 55 percent above 1964.

Wood pulp exports have been rising in last decade and by 1985 may total 5.0 million tons--some 3.1 times exports in 1964

Prior to 1953 there was no well defined trend in wood pulp exports (table 16; fig. 39; app. E, table 11). Since then, however, they have increased nearly 10 times, rising from about 160 thousand tons to 1.6 million tons in 1964. Sulfate and dissolving and special alpha pulps have accounted for most of the growth in this period.

Wood pulp exports go to all parts of the world, although in recent years western Europe and the Far East (mainly Japan) have been the major markets (app. E, table 13). Trends in shipments to the various regions have varied. Exports to western Europe rose from an average of about 0.1 million tons in the early 1950's to about 0.7 million tons in 1960--a level that was maintained through 1964 without significant change. Shipments to the Far East increased from about 0.1 million tons in the 1950's to about 0.5 million tons in 1964. The volume shipped to Latin America has been rising slowly in this period but that to Canada has not changed significantly.

Recent studies of the Food and Agriculture Organization of the United Nations indicate that the demand for wood pulp is likely to grow rapidly in all regions of the world (see following tabulation).

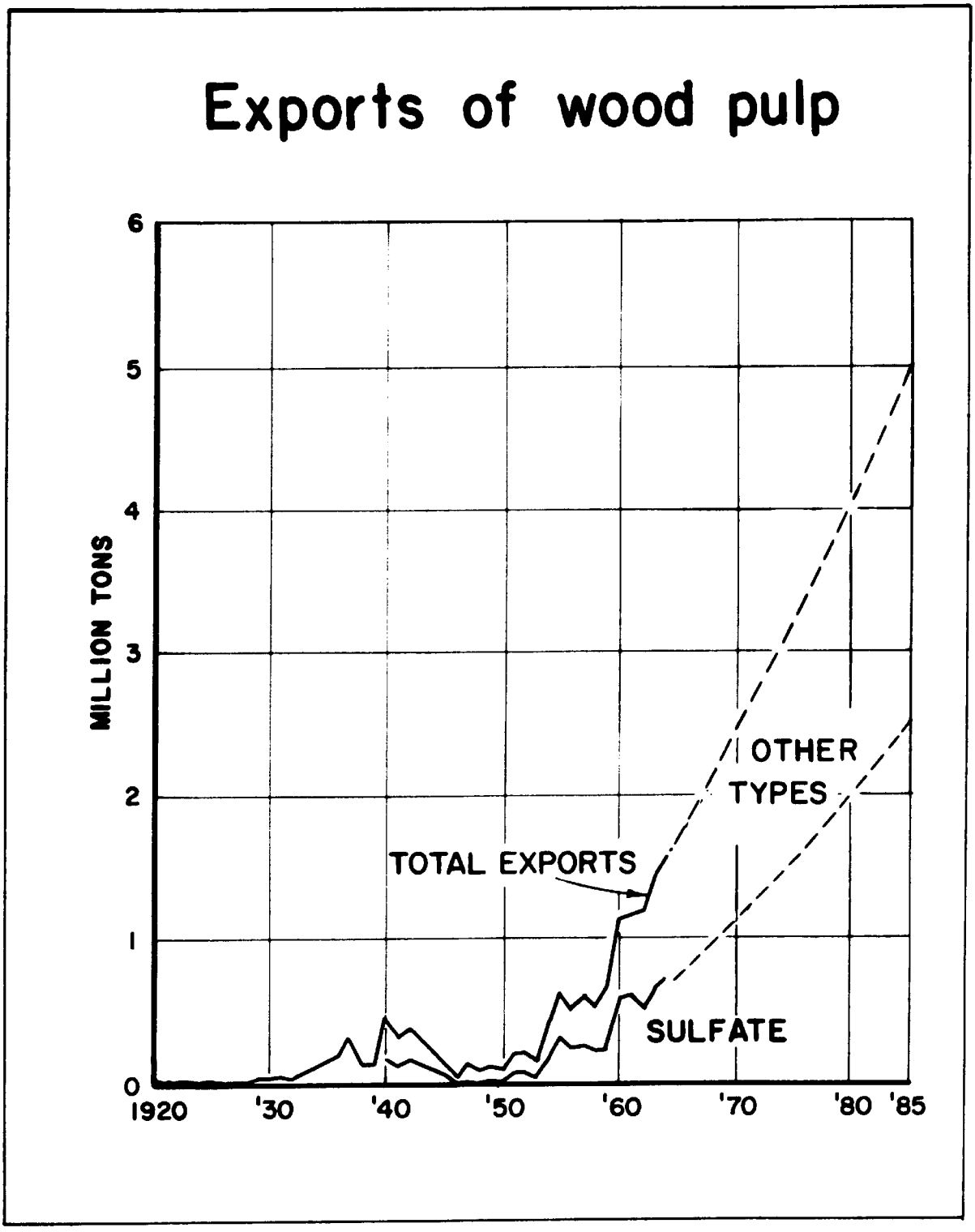

Exports of wood pulp
MILLION TONS
6
5
4
3
2
1
0
1920
'30
'40
'50
'60
'70
'80
'85
OTHER
TYPES
TOTAL EXPORTS
SULFATE

Figure 39

Region	Projected pulp requirements[1]	
	1965	1975
	(Million short tons)	
Western Europe [2]	19.0	29.3
Latin America [3]	3.3	6.1
Far East (except Mainland China) [3]	6.2	12.5
All other (except North America) [3]	15.7	31.8

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[1] Data for western Europe cover wood pulp requirements; the data for other regions include other fibrous pulps.

[2] United Nations, Food and Agriculture Organization, Pulp and Paper Prospects in Western Europe, p. 165.

[3] United Nations, Food and Agriculture Organization, World Demand for Paper to 1975, p. 53.

These and related studies also indicate that many of the major pulp consuming regions do not have enough timber, especially the long-fibered softwood species, to meet the anticipated demands for wood pulp.[56] For example, studies of the timber demand and supply situation in western Europe show that a substantial softwood timber supply deficit is likely to begin to develop in the late 1960's and grow rapidly thereafter. This means that this area will have to look to other parts of the world for wood pulp supplies, particularly the long-fibered pulps made from softwoods. It also means that the countries

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[56] United Nations, Food and Agriculture Organization, European Timber Trends and Prospects, A New Appraisal, 1950-1975; Pulp and Paper Prospects in Western Europe; World Demand for Paper to 1975.
Skok, op. cit.
Wilson, op. cit.
Zivnuska, op. cit.

now importing wood pulp from western Europe will have to turn to other sources of supply.

There are, of course, many uncertainties associated with the various analyses of prospective demands for wood pulp and timber supplies in the various regions of the world. As an illustration, it is possible that the recent FAO studies have underestimated the prospective timber yields from western European forests (also in other regions of the world) and that the wood deficit may be smaller than expected. This point was made in the study World Demand for Paper to 1975[57] as follows:

> " . . . This leads" (referring to preceding data showing the magnitude of the prospective wood shortage) "to the conclusion that western Europe may, in the long term, be faced with serious difficulties in meeting her own needs of fibrous raw materials for paper. On the other hand, it should not be overlooked that similar warnings have been expressed earlier that the limit of possible yields from the forests would soon be reached; nevertheless, considerable increases in fellings have taken place, and new forest inventories have indicated more standing timber and higher growth rates than were earlier estimated. The improved silvicultural methods which have been put into practice have certainly contributed to rising yields and it may well be that the potential effect of these measures is presently estimated on the conservative side. Also, additional pulpwood supplies could be obtained if more plantations of fast-growing species are established, especially in the southern part of the region."

A shift from present use of timber for fuelwood and lumber could also augment supplies.

On the other hand, the recent expansion in wood pulp exports to western Europe and present marketing difficulties of mills in the Nordic countries suggest that U.S. and Canadian producers can successfully

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[57] United Nations, Food and Agriculture Organization, World Demand for Paper to 1975, p. 68.

compete in European markets. If this is the case, pulp imports into western Europe may grow faster than the current FAO studies anticipate.

Granting that the appraisals of demand and supply are reasonable, it is still very difficult to appraise how U.S. producers will share in what promises to be much larger world markets for wood pulp. Both Canada and U.S.S.R. have large volumes of softwood timber suitable for the manufacture of long-fibered pulps and are potential suppliers. Of these two, Canada, with its huge reserves of softwood timber, is likely to be the principal competitor. The best available evidence indicates that the remote location and lack of access to the unexploited forests in the U.S.S.R. and the growing pressure for increased domestic consumption are formidable barriers to any substantial expansion in the wood pulp exports of that country.[58/] FAO studies also indicate that tropical hardwood forests, sometimes mentioned as major potential sources of wood pulp, are not likely to be exploited until the cost of pulpwood from temperate zone forests and plantations rises sharply--something that is not likely to happen in the decades immediately ahead.

Despite all the uncertainties, it does seem reasonable to expect that U.S. pulp producers will supply a growing part of the expanded wood pulp needs of western Europe. Exports to that region have therefore been increased more rapidly than the projected requirements for wood pulp shown in the tabulation on page 123. It was also assumed that exports to the Far East and Latin America would increase somewhat more rapidly than the projected needs for pulp in these areas. Under these assumptions, exports of wood pulp rise to 3.2 million tons in 1975.

[58/] Zivnuska, op. cit.

An extrapolation of the trends in exports to 1975 indicates that by 1985 exports will amount to 5.0 million tons--some 3.1 times 1964. Most of the growth is expected to be in sulfate pulp although dissolving and special alpha pulps may also show a substantial rise.

Net imports of wood pulp to change to net exports by 1985

Given the above estimates of imports and exports, net imports will decline rather sharply to about 0.2 million tons in 1980. By 1985 the Nation will have a net export balance of about 0.5 million tons.

Domestic wood pulp production in 1985 estimated at 85.1 million tons--about 2.6 times output in 1964

When these anticipated net exports are added to the estimated domestic demand, it appears that it will be necessary to produce 85.1 million tons of wood pulp in U.S. mills in 1985 (table 16; fig. 37). This is about 2.6 times output in 1964. The increase is a continuation of a trend that has been rising since the late 1800's (app. E, table 1).

Domestic production of each of the major types of pulp in the projection period is expected to roughly follow the trends in consumption shown in table 15 and figure 36. It is anticipated that sulfate pulp will account for by far the largest part of the increase in domestic output, although semichemical and defibrated or exploded pulps are also likely to show substantial growth.

Projected Demands for Pulpwood

Nearly 50 million cords of pulpwood consumed in U.S. pulp mills in 1964--demand expected to rise to 120.2 million cords in 1985

Domestic production of wood pulp will be one of the primary determinants of the demand for pulpwood. In 1964 some 49.7 million cords of pulpwood were used to manufacture the 32.4 million tons of wood pulp produced in U.S. mills (table 17; fig. 40; app. G, table 1).[59/] This level of pulpwood use was about 2.3 times that in 1948 when consumption was 21.2 million cords. The trend in this period was a continuation of one that has been rising rapidly for several decades.

Of the pulpwood consumed in U.S. mills in 1964, about 65 percent, or 32.3 million cords, was used in the manufacture of sulfate pulp (app. G, table 2). Another 13 percent was used for sulfite pulps, and most of the remainder for groundwood and dissolving and special alpha pulps.

Average pulpwood use in cords per ton of pulp produced in 1964 was as follows:[60/]

Type of pulp	Pulpwood consumed (Million cords	Wood pulp produced (Million tons)	Pulpwood consumption per ton of pulp produced (Cords)
Dissolving and special alpha	3.2	1.5	2.2
Sulfite (includes soda)	6.2	3.0	2.1
Sulfate	32.3	20.0	1.6
Groundwood	3.6	3.6	1.0
Semichemical	2.8	2.7	1.0
Defibrated or exploded	1.5	1.6	0.9
All grades	49.7	32.4	1.5

59/ Annual data on production, trade, and consumption of pulpwood are shown in the tables in Appendix G.

60/ U.S. Department of Commerce, Bureau of the Census, Pulp, Paper and Board, 1964, p. 3.

Table 17.--Consumption, production, and trade of pulpwood, 1920-85[1/]

(Thousand cords)

Year	Total consumption	Consumption in U.S. mills						Net pulpwood imports	Net imports of paper, board, and wood pulp (pulpwood equivalent)
		Total	U.S. production				Chipped residues		
			Total	Roundwood					
				Total	Softwoods	Hardwoods			
1920	8,240	6,114	4,873	4,703	4,157	546	170	1,241	2,126
1925	10,778	6,094	4,624	4,468	3,963	505	156	1,470	4,684
1930	13,188	7,196	5,744	5,148	4,479	669	596	1,452	5,992
1935	13,810	7,628	6,620	6,327	5,561	766	293	1,008	6,182
1940	18,026	13,743	12,369	12,142	10,819	1,323	227	1,374	4,283
1945	22,795	16,912	15,254	14,851	12,772	2,079	403	1,523	5,883
1950	33,659	23,627	20,716	19,466	16,679	2,787	1,250	1,385	10,032
1955	41,989	33,356	30,948	28,598	23,363	5,234	2,350	1,704	8,633
1960	48,730	40,485	40,012	33,468	25,454	8,014	6,544	1,158	8,245
1961	50,316	42,191	40,272	32,118	23,997	8,121	8,155	1,162	8,125
1962	52,855	44,070	42,772	33,811	24,866	8,945	8,961	1,292	8,785
1963	54,610	46,435	44,708	34,471	25,044	9,426	10,237	1,543	8,175
1964[2/]	58,306	49,711	48,477	37,289	27,209	10,080	11,188	1,391	8,595
PROJECTIONS									
1970	73,600	66,700	65,200	50,700	34,900	15,800	14,500	1,500	6,900
1975	89,400	83,400	81,900	66,100	44,400	21,700	15,800	1,500	6,000
1980	106,000	101,400	99,900	82,900	55,700	27,200	17,000	1,500	4,600
1985	123,200	120,200	118,700	100,700	66,800	33,900	18,000	1,500	3,000

[1/] Data may not add to totals because of changes in inventories, rounding, and statistical discrepancies in imports.
[2/] Preliminary.

Sources: U.S. Department of Commerce, Bureau of the Census, Current Industrial Reports: Pulp, Paper and Board; United States Imports of Merchandise for Consumption FT 110 (Washington: U.S. Government Printing Office, Annual); and United States Exports of Domestic and Foreign Merchandise FT 410 (Washington: U.S. Government Printing Office, Annual). American Paper and Pulp Association, Monthly Statistical Summary. American Pulpwood Association, Pulpwood Statistics (New York: American Pulpwood Association, Annual). U.S. Department of Agriculture, Forest Service.

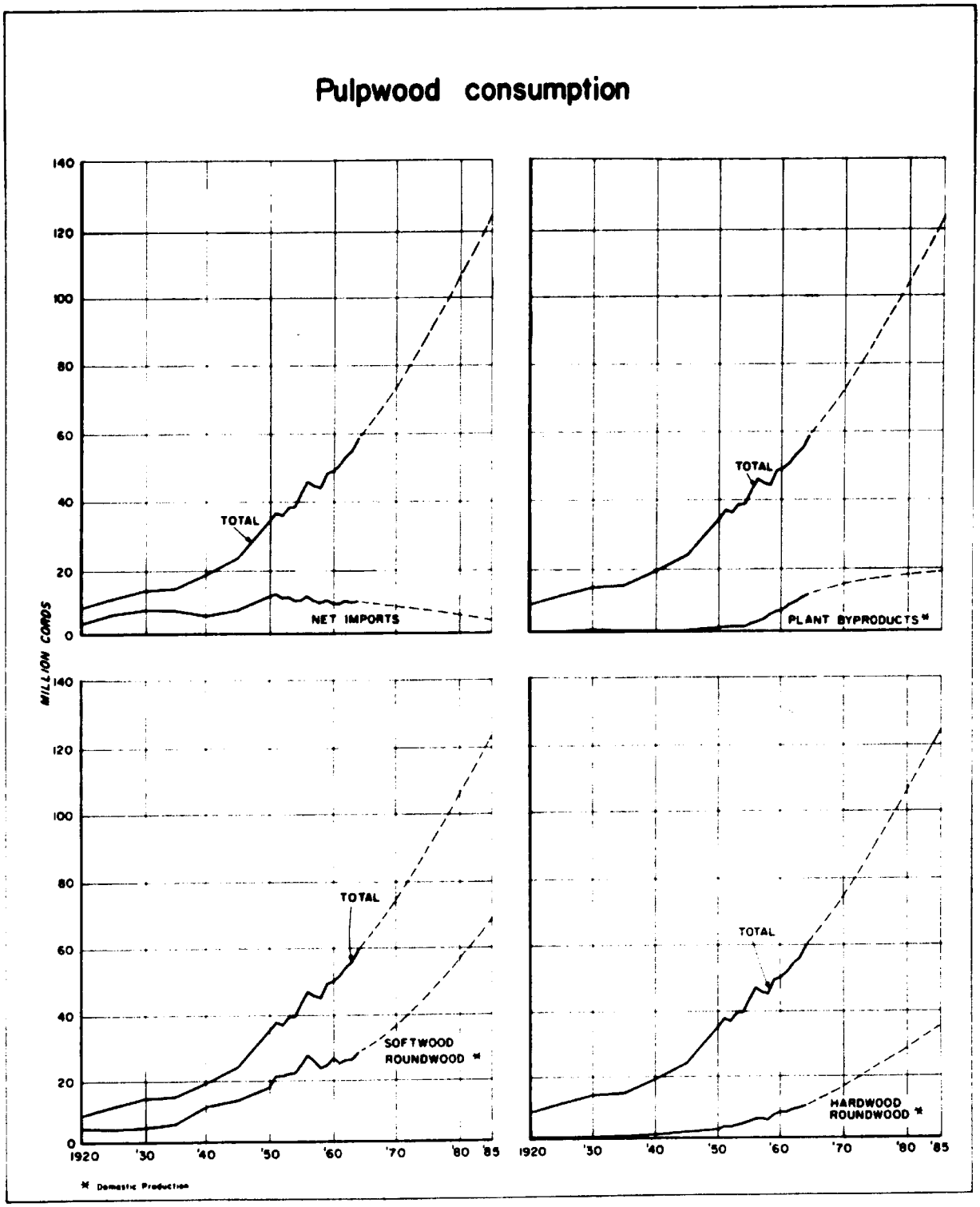

Pulpwood consumption
MILLION CORDS
140
120
100
80
60
40
20
0
TOTAL
NET IMPORTS
TOTAL
PLANT BYPRODUCTS *
TOTAL
SOFTWOOD ROUNDWOOD *
TOTAL
HARDWOOD ROUNDWOOD *
1920
'30
'40
'50
'60
'70
'80
'85
* Domestic Production

Figure 40

As illustrated in table 3 and figure 1 in Appendix G, these averages have been maintained for some time without significant change.[61] On the basis of this apparent stability in requirements and expectations about the kinds of wood that will be used and pulping processes, it has been assumed that the present averages will remain unchanged through 1985 for all types of pulp except sulfate. A small drop in average use to 1.5 cords per ton in 1985 has been assumed for this type, largely in anticipation of increasing use of higher yield hardwood pulpwood.

When the above averages are multiplied by the estimates of domestic output of wood pulp by type, it appears that the prospective demand for pulpwood in U.S. mills will total 120.2 million cords in 1985--about 2.4 times use in 1964 (table 17; fig. 40).

Imports expected to supply only a small part of the pulpwood demands of U.S. pulp mills

About 1.4 million cords, or 3 percent of the pulpwood consumed in U.S. mills in 1964, was imported, largely from Canada (table 17). Net imports of pulpwood have fluctuated around this level for several decades (app. G, table 1)--and it has been assumed that they will continue at about the same volume, averaging 1.5 million cords a year through 1985.

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[61] There have been many technological developments which have tended to increase pulp yields. However, these have apparently been offset by increases in the production of bleached and semibleached paper pulps and the dissolving and special alpha pulps which, because of processing losses, require more wood per unit of output.

Domestic pulpwood production to increase 2.4 times by 1985, rising from 48.5 million to 118.7 million cords

If these net imports are realized, domestic pulpwood production in 1985 will amount to 118.7 million cords--some 2.4 times the 48.5 million cords produced in 1964 (table 17). This increase will be a continuation of a long historical trend. In the 1959-64 period, for example, domestic production increased at an average annual rate of about 2.2 million cords a year. By the end of the projection period, production will be growing by about 3.8 million cords a year. The rate of increase underlying the projections, however, is lower than the historical averages because of the projected slackening off in the rate of growth in the demand for paper and board.

The use of chips from plant byproducts by pulp mills has shown rapid growth and further increases are expected

The use of chips (produced from the plant byproducts of sawmills, veneer mills, and other wood-using plants) by wood pulp mills increased from 0.9 million cords in 1948 to 11.2 million cords in 1964. As a result of such rapid growth, most of the coarser softwood plant by-products such as slabs, edgings, and veneer cores that can be considered economically available are currently being utilized. However, there is still a large volume of sawdust and other fine residues, estimated at about 10 million cords in 1962, available for utilization. There is also a substantial volume of unused coarse hardwood residues in the East.

Recent improvements in the technology of pulping fine residues and in the use of hardwoods indicate that much greater use of present residues is likely. In addition, a larger volume of residues of all kinds is likely to be available as present use for fuel declines and as lumber and veneer production increases. With these considerations in mind, it was estimated that the use of plant byproducts will rise to 18 million cords in 1985--about 7 million cords more than in 1964.

Production of round pulpwood was 37.3 million cords in 1964--projections show rise to 100.7 million cords in 1985

If the use of plant byproducts increases as anticipated, domestic production of roundwood in 1985 will total 100.7 million cords. This is about 2.7 times the 37.3 million cords produced in 1964.

Softwood species, such as southern pine, spruce, true fir, hemlock, jack pine, and Douglas-fir, composed about 73 percent of the round pulpwood produced in 1964. Hardwoods, chiefly aspen and gum, with small volumes of other species such as birch, beech, maple, cottonwood, willow, and oak, accounted for the remainder.

Softwoods have traditionally been preferred for pulping and have accounted for most of the round pulpwood produced in past decades. In recent years, however, in response to technological advances in pulping processes, the availability of large volumes of hardwoods at relatively low cost per ton of fiber, and the improvement in the properties of many grades of paper and board resulting from the use of hardwood pulps in the furnish, the use of round hardwood pulpwood has been rising much more rapidly than round softwoods. For example,

the output of round hardwoods rose at an average rate of 9.5 percent in the 1948-64 period--over 3 times the rate for softwoods.

Further rapid expansion in the use of round hardwoods is anticipated and total production is estimated at 33.9 million cords in 1985, about 3.4 times production in 1964. With this level of output, round softwood production will be 66.8 million cords--some 2.5 times the 1964 level.

Round pulpwood requirements 38 percent above 1980 estimates in Timber Trends, but timber supply outlook for the pulp and paper industry still relatively good

The projections of round pulpwood production in 1970 and 1980, shown in table 17, are substantially above those in the recent Forest Service report, Timber Trends in the United States.[62/] To produce the required roundwood in 1980, it will be necessary to cut about 5.8 billion cubic feet from the timber growing stock in domestic forests. This is about 1.6 billion cubic feet or 38 percent above the cut used in appraising prospective trends in timber supplies in the Timber Trends report. This higher cut means that the prospective timber supply situation is less favorable than envisaged and that supplies of timber are likely to fall short of projected demands sooner than anticipated in that report. However, the outlook for timber supplies for the pulp and paper industry still appears relatively good, largely because of the large inventory volume of small and relatively low-quality timber.

62/ U.S. Department of Agriculture, Forest Service, p. 59.

Total pulpwood consumption in the U.S., including pulpwood equivalents of net imports of paper, board, and wood pulp, was 58.3 million cords in 1964--projections show a rise to 123.2 million cords in 1985

The volume of pulpwood consumed in U.S. pulp mills has represented only part of the total volume of wood required to meet U.S. needs for paper, board, and nonpaper products. In 1964, for example, the pulpwood equivalents of the net imports of paper, board, and wood pulp amounted to 8.6 million cords (table 17; fig. 40; app. G, table 1). When this is added to the 49.7 million cords used in domestic mills, the volume of pulpwood consumed by the American people totaled 58.3 million cords.

There has been little change in the pulpwood equivalent of the net imports of paper, board, and wood pulp in recent years. However, and largely because of the anticipated rapid increases in exports of wood pulp and board, such net imports are expected to drop to about 3 million cords in 1985. Given this level of net imports, the volume of pulpwood required to meet the Nation's needs for pulp and paper will total 123.2 million cords--more than double consumption in 1964.

SUMMARY

This study has presented (1) a brief discussion of alternative ways of projecting longrun trends in demand; (2) an analysis of a comprehensive series of regression equations tested for use in making longrun projections for paper and board; and (3) projections of demand for paper and board, wood pulp, and pulpwood at five-year intervals to 1985. The discussion of the various ways of making longrun projections and the analysis of the use of regression equations are intended for other researchers. The longrun demand projections are intended as guides for making decisions that have effects extending into the future, such as those involving the construction of new plants in the pulp and paper industry or the acquisition and management of forests and forest lands.

The discussion in Section I of the study indicates the regression equations, extensively supplemented by graphics, is the best way at the present time for projecting longrun trends in demand for paper and board. Some general guides on the use of regression equations, including choice of independent variables, equation forms, and base time periods, were also developed in this section. These are:

1. <u>On the choice of an independent variable and the use of per capita or aggregate data</u>.

   For those grades of paper and board where there has been little or no increase in per capita use in the time period used as the base for the projection, and no indication of change, population or households logically is the best choice for projecting demand (aggregate demand).

   For those grades where there has been a slow increase in per capita use, presumably in response to growth in the output of goods and services or income, gross national product or disposable personal income logically is the best choice for projecting demand (aggregate demand).

For those grades where there has been a fairly rapid increase in per capita use and a good correlation between changes in per capita use and changes in per capita output or income, per capita gross national product or per capita disposable personal income logically is the best choice for projecting demand (per capita demand).

2. On the choice between simple and multiple regression equations.

Simple regression equations are preferable to multiple regression equations for making longrun projections with the independent variables that are available for use.

3. On the choice of an equation describing the form of the relationship.

An equation with the general form $Y = a + b \log X$ is preferable for making longrun projections of demand for most grades of paper and board. However, for grades where consumption has been rising rapidly, the equation $Y = a + b X$ may be the best choice, at least for the years immediately ahead. There was no evidence that the equation $\log Y = a + b \log X$, which implicitly assumes a constant income elasticity of demand, was a desirable choice for projecting longrun trends in demand for any grade of paper or board.

4. On the choice of a base time period.

The post World War II years are preferable as the base time period for making longrun projections for all grades of paper and board. Observations for individual years, particularly those near the beginning and ending of the base period which deviate from the normal pattern of the relationship should be carefully examined and omitted if abnormal or special conditions prevailed.

Projections of demand for paper and board derived from regression equations and a graphical analysis of recent changes in relationships and trends in use are presented in Section II of the study. These projections indicate that the demand for all grades of paper and board will rise to 70.8 million tons in 1975 and 99.5 million tons in 1985--levels that are respectively 52 percent and 114 percent above 1964. Domestic production of paper and board in 1985 is estimated at 95.3

million tons, about 53.6 million tons above 1964. Projected demands and production for each of the major grades of paper and board also show substantial increases over 1964, especially so for container board, newsprint, and bending board.

Largely on the basis of this projection of domestic paper and board production, wood pulp requirements are estimated at 84.6 million tons in 1985. This is 2.5 times the 33.8 million tons consumed in 1964. Most of the increase is expected to be for sulfate paper grade pulps although substantial growth is anticipated in semichemical, defibrated or exploded, and groundwood pulps. Domestic production of all grades of wood pulp in 1985 is estimated at 85.1 million tons, some 2.6 times output in 1964.

With this level of domestic wood pulp output, the requirements for pulpwood in U.S. pulp mills are expected to be 120.2 million cords in 1985--about 2.4 times the 49.7 million cords used in 1964. Domestic production in 1985 is expected to be 113.7 million cords, or 70.2 million cords above output in 1965.

The study repeatedly brought out that there were many uncertainties associated with the level of the above projections. Nonetheless, it seems fairly clear that the demand for paper and board, wood pulp, and pulpwood is likely to show rapid growth in the decades immediately ahead.

APPENDIX A

GRAPHICAL ANALYSIS OF THE RELATIONSHIPS BETWEEN CHANGES IN CONSUMPTION OF THE MAJOR GRADES OF PAPER AND BOARD AND CHANGES IN SELECTED INDEPENDENT VARIABLES

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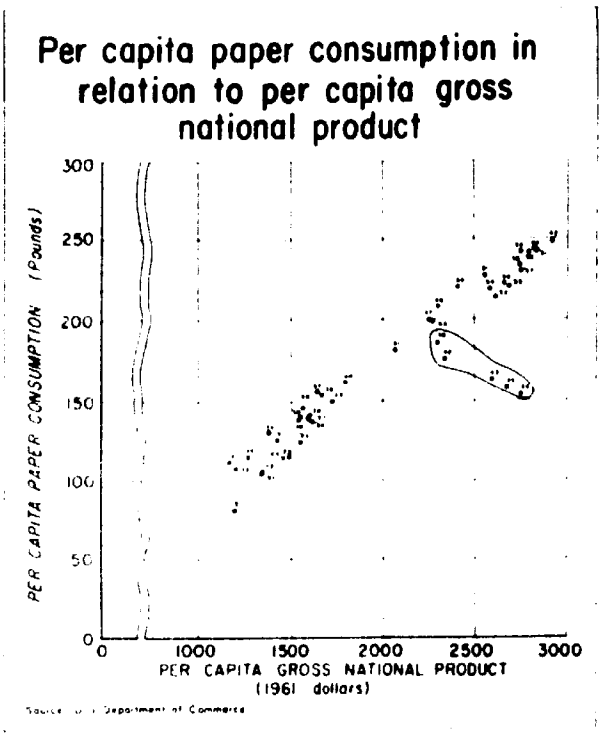


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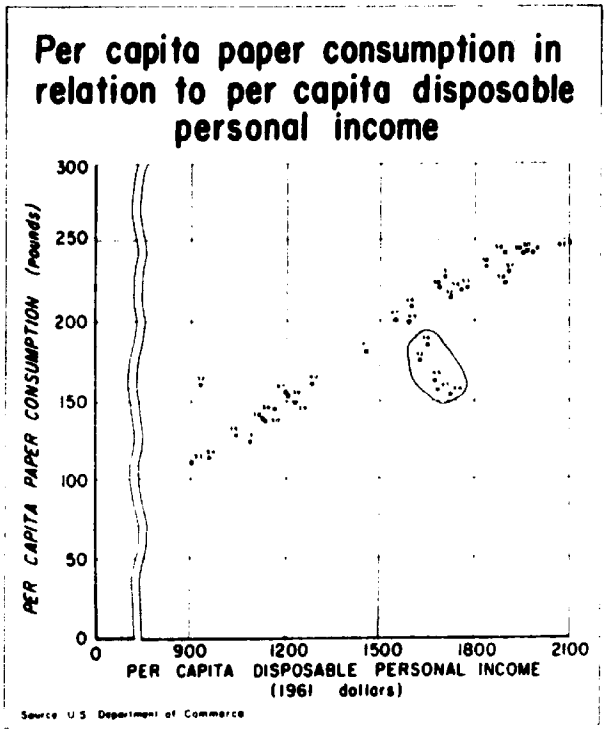


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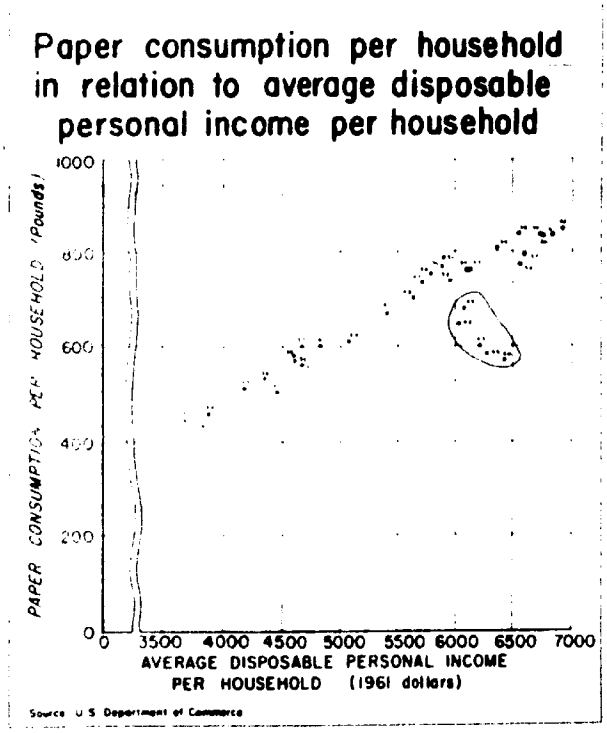


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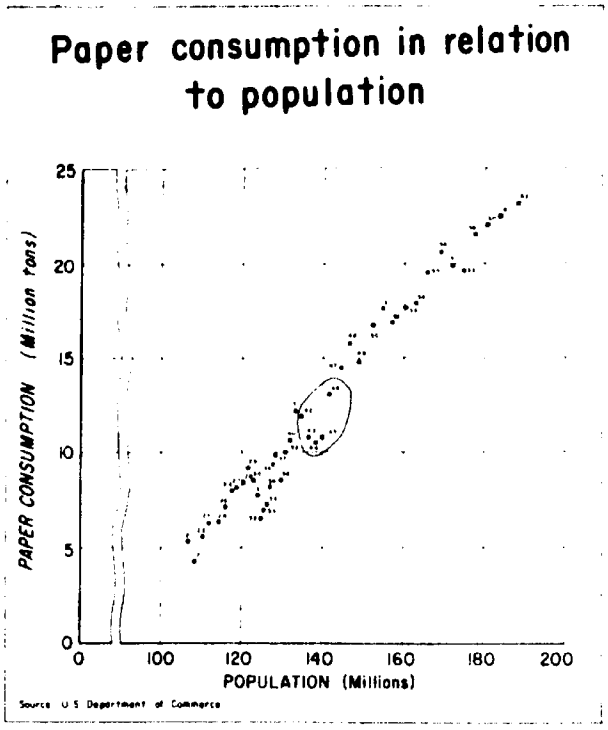


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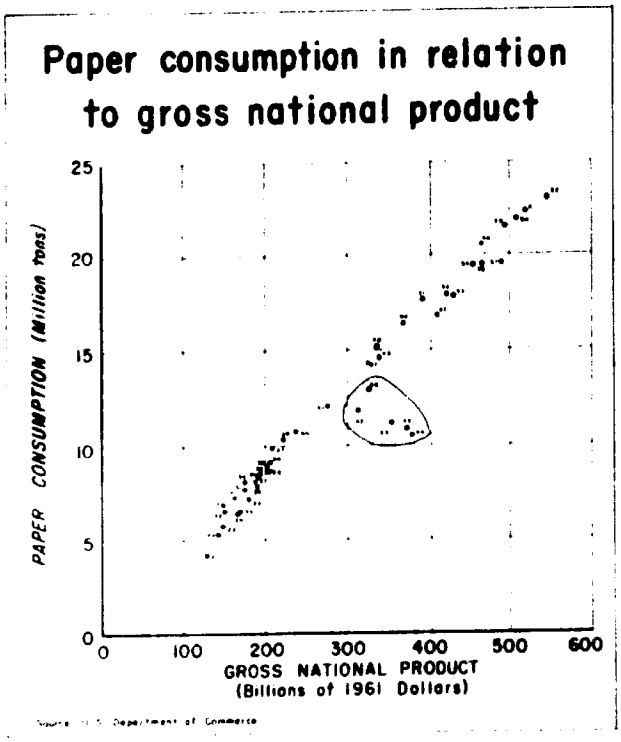


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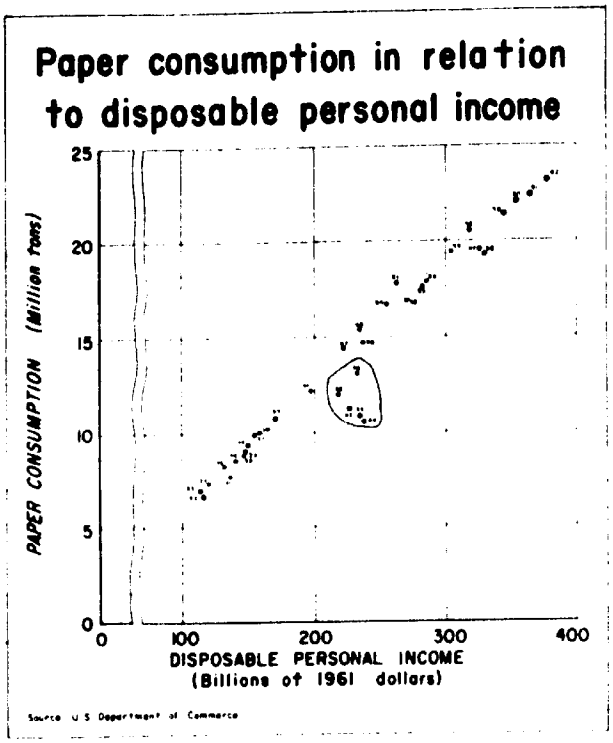


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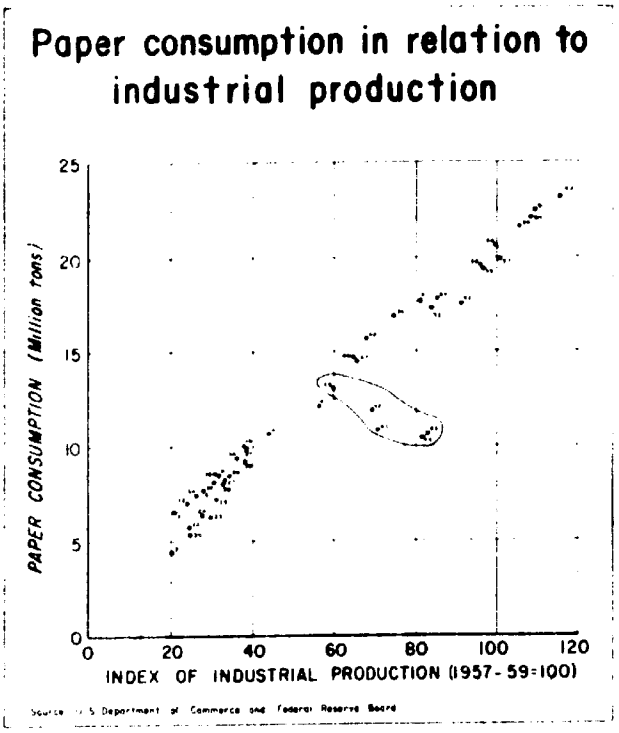


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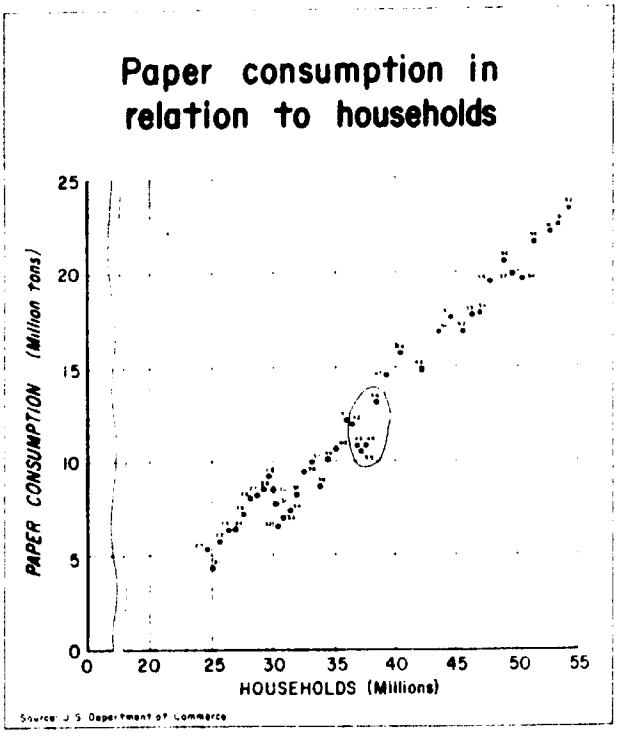


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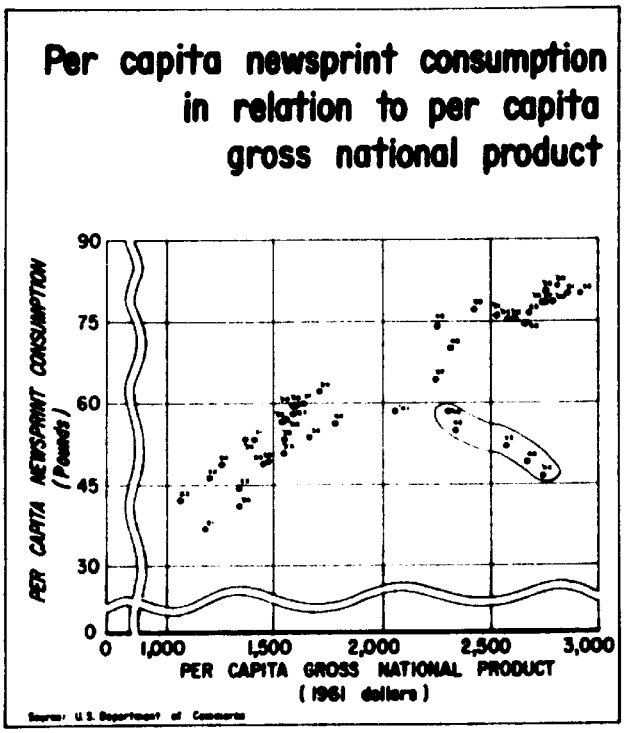


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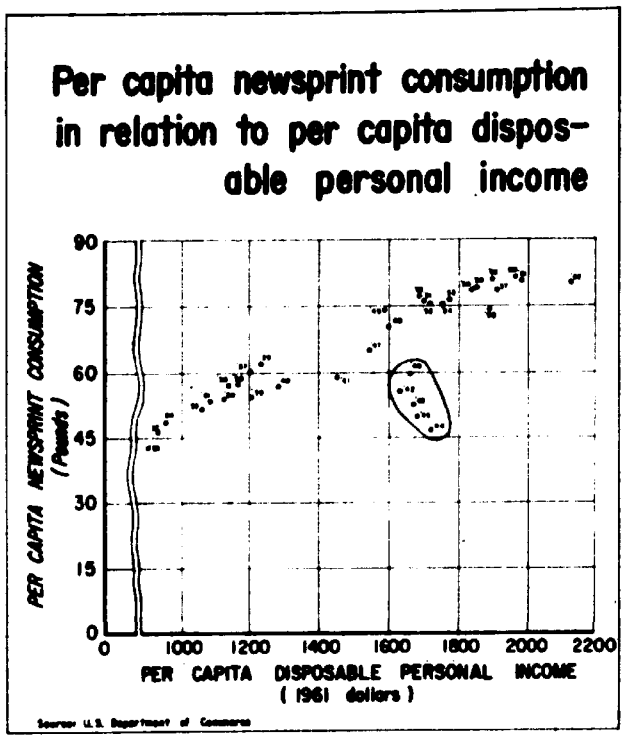


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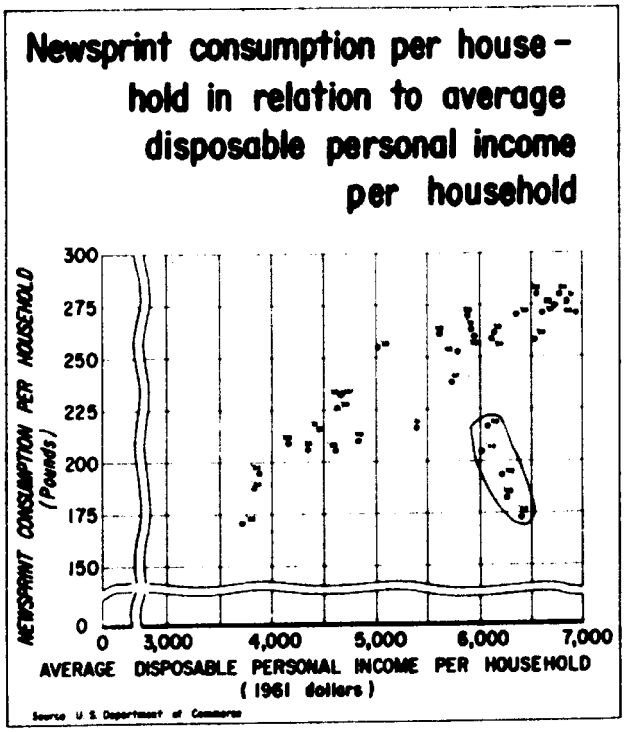


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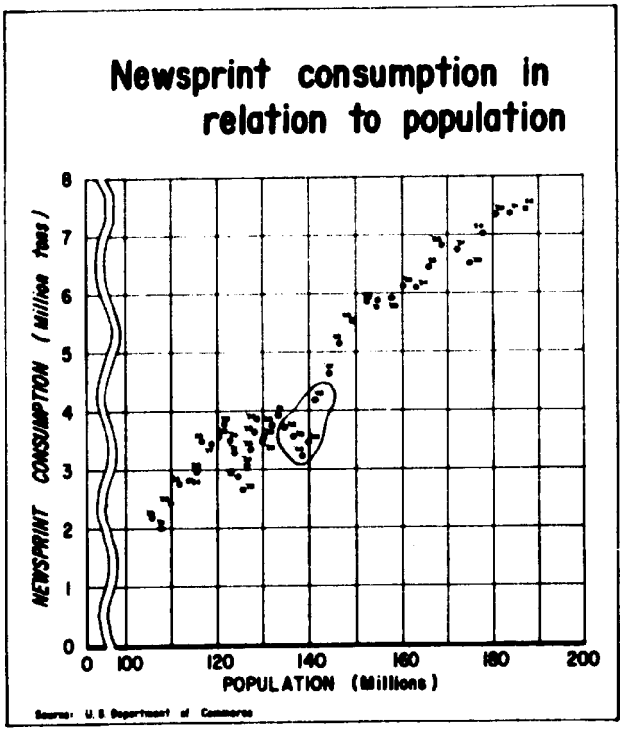


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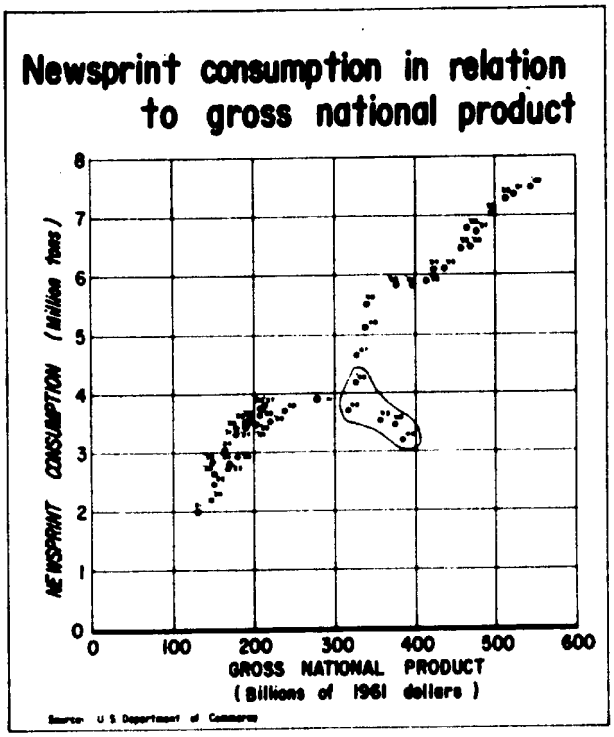


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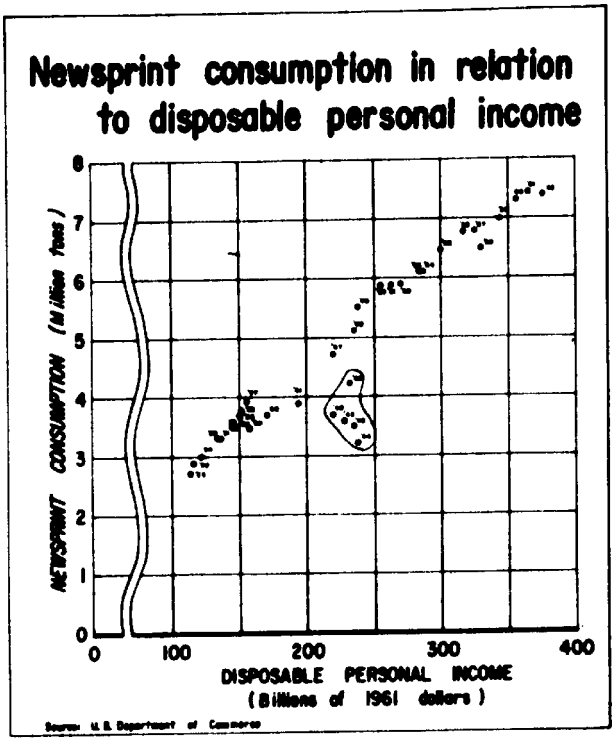


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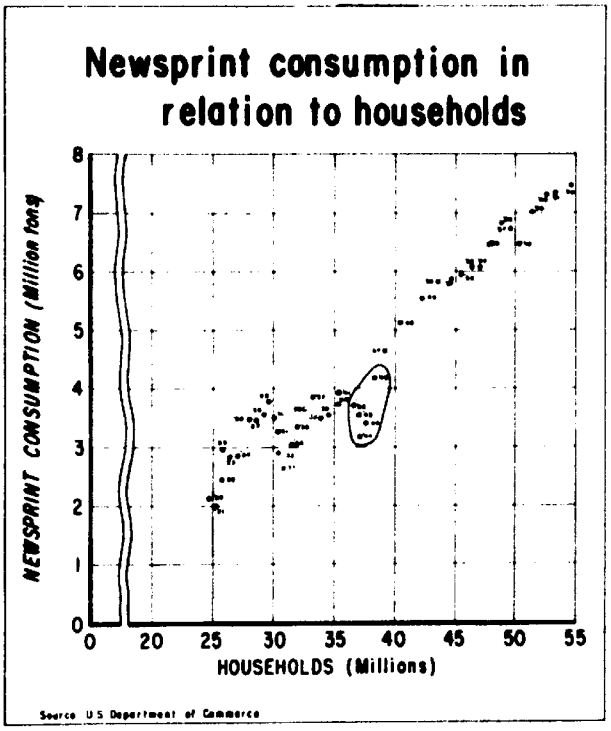


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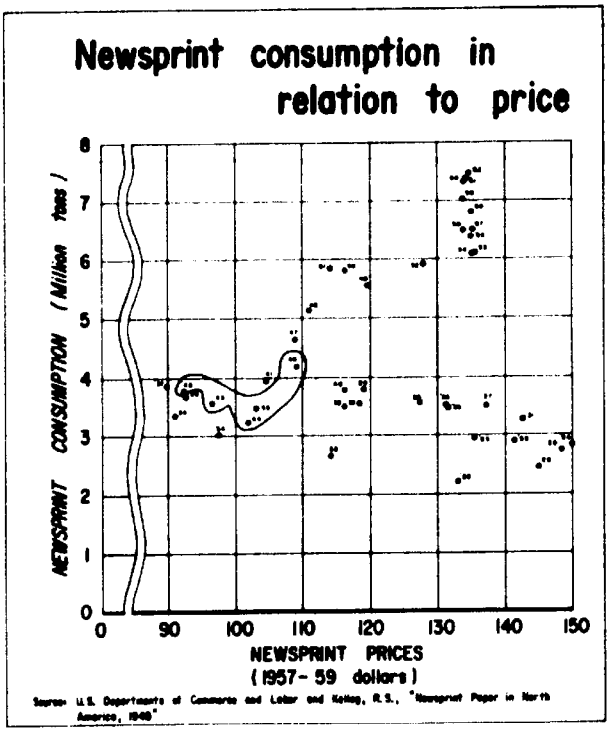


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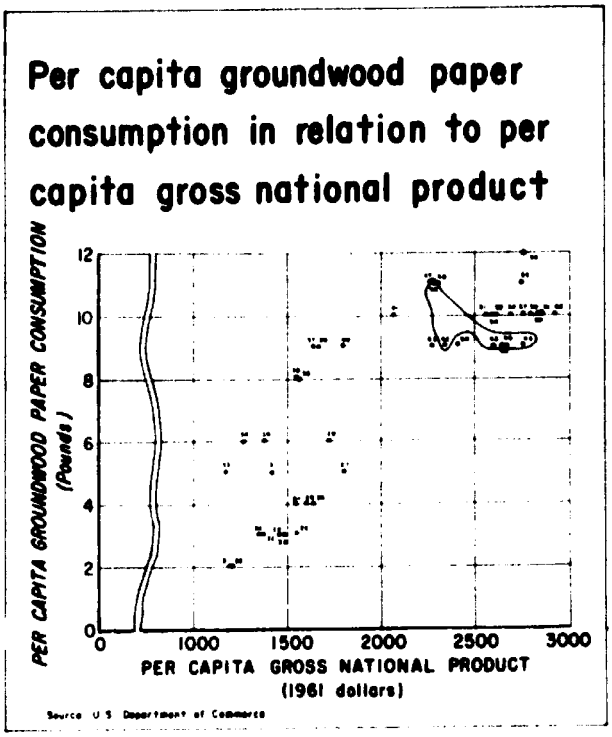


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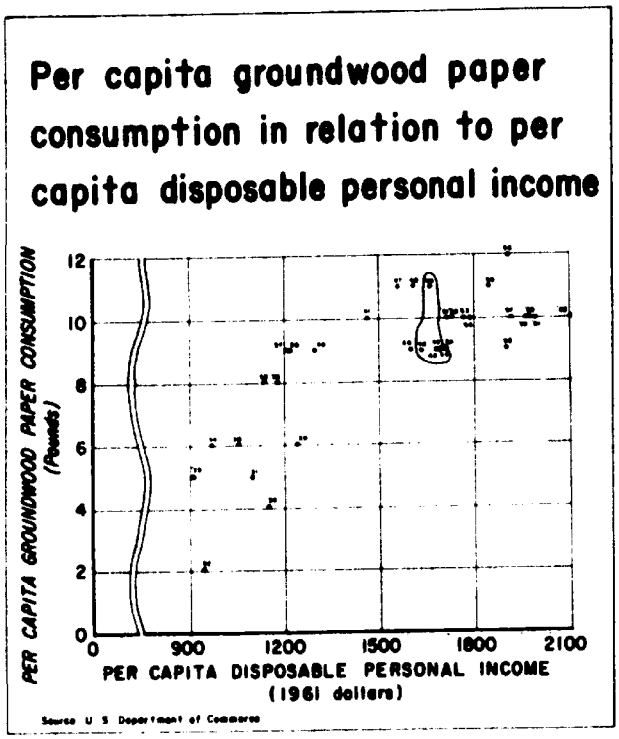


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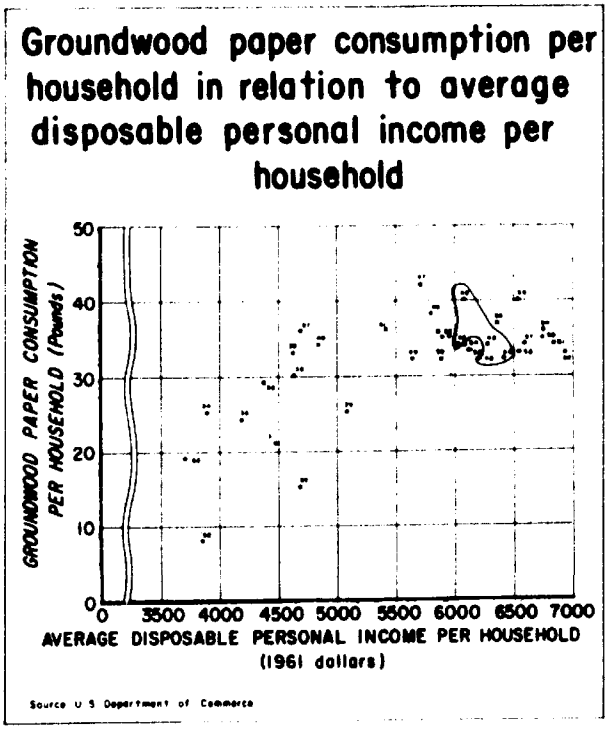


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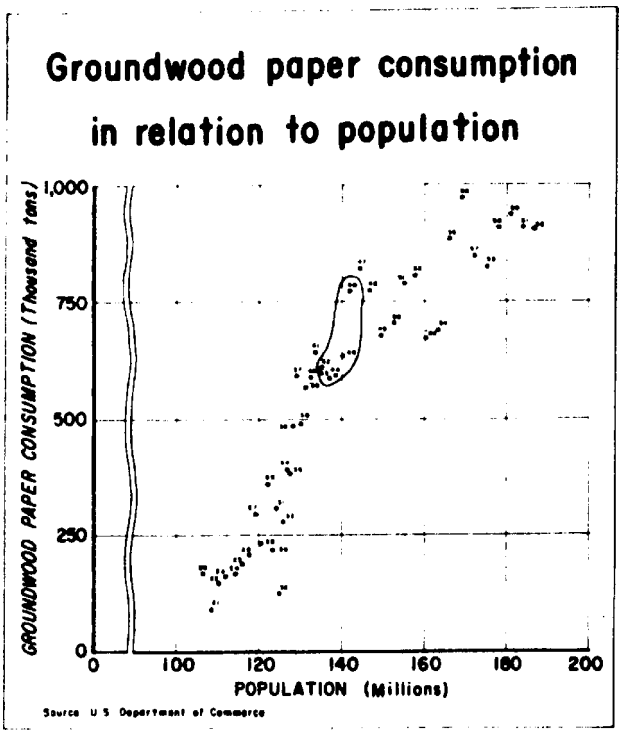


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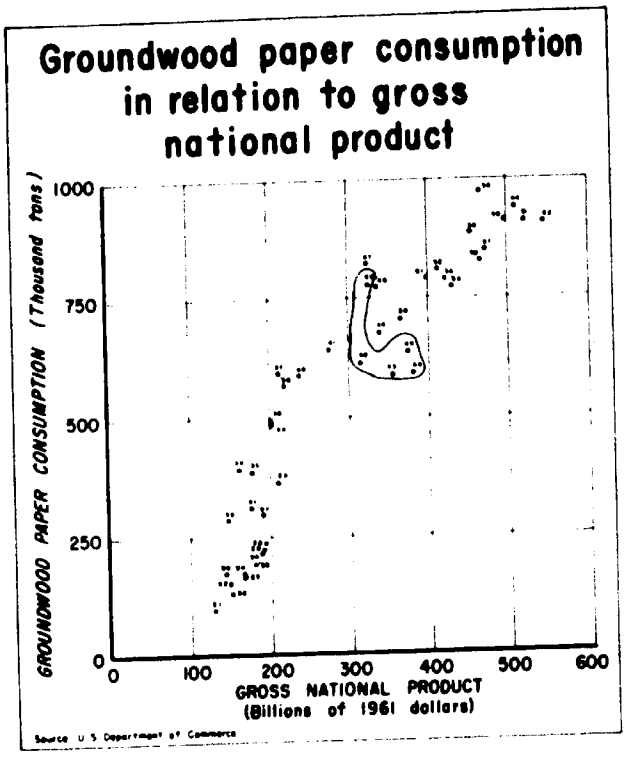


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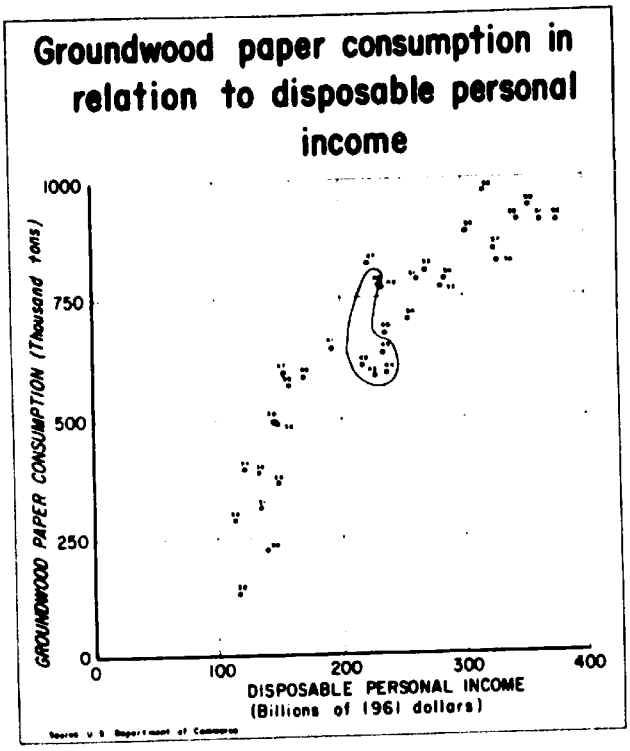


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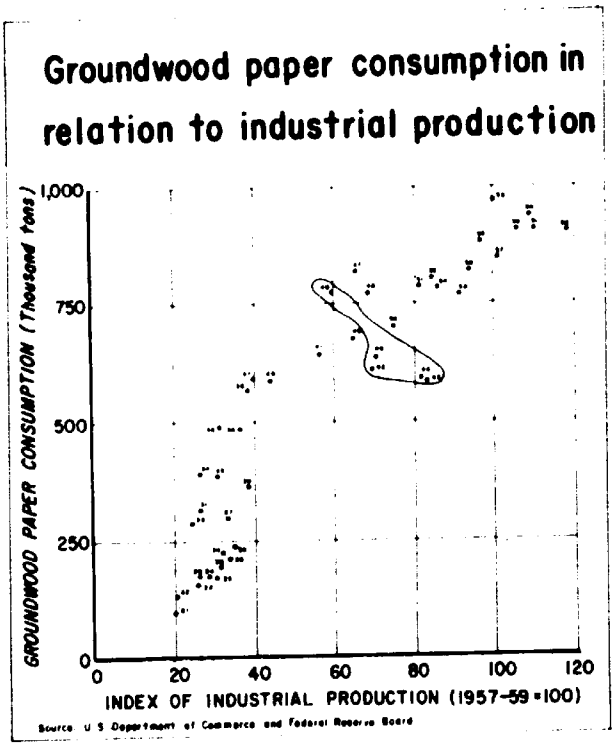


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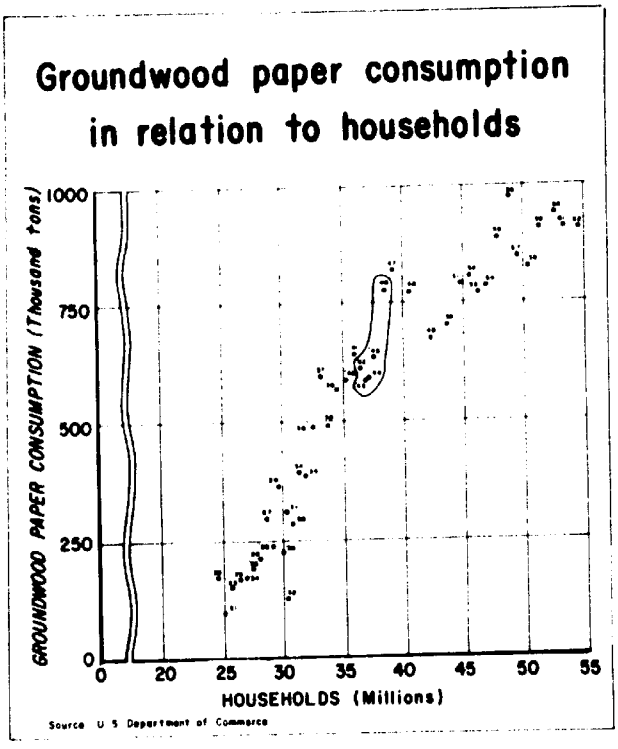


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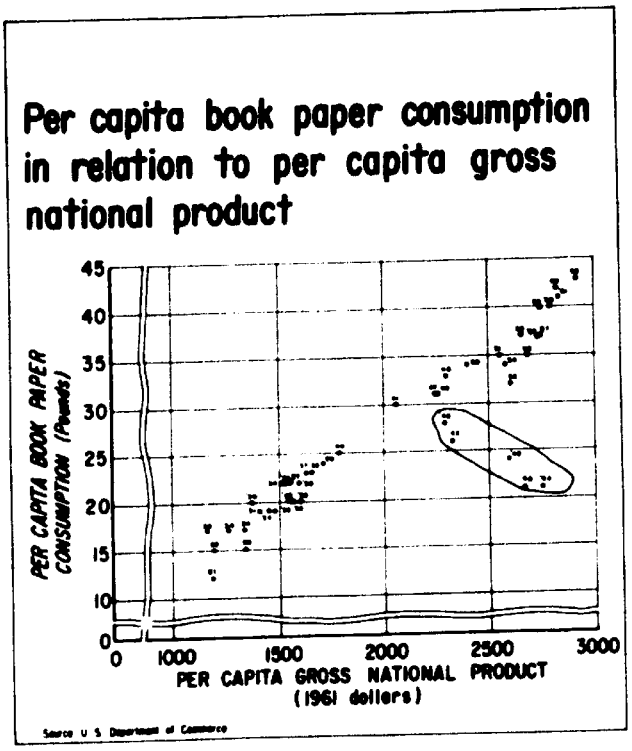


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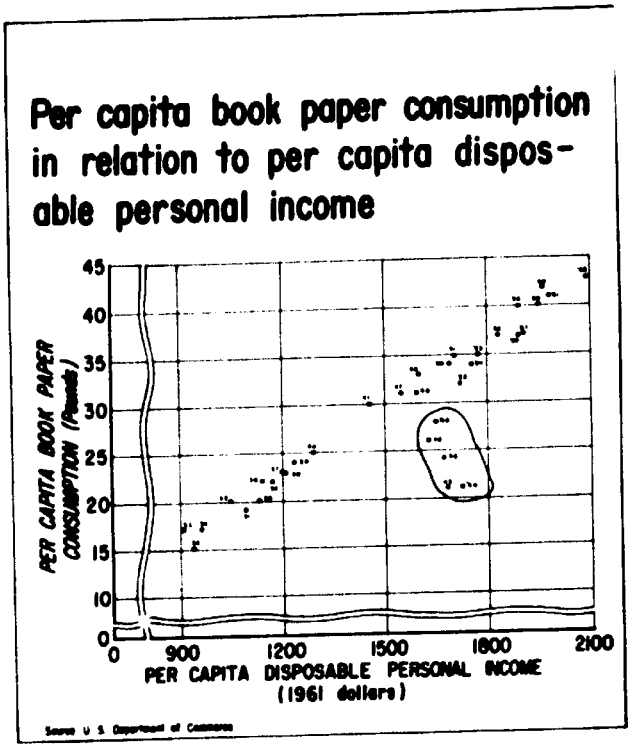


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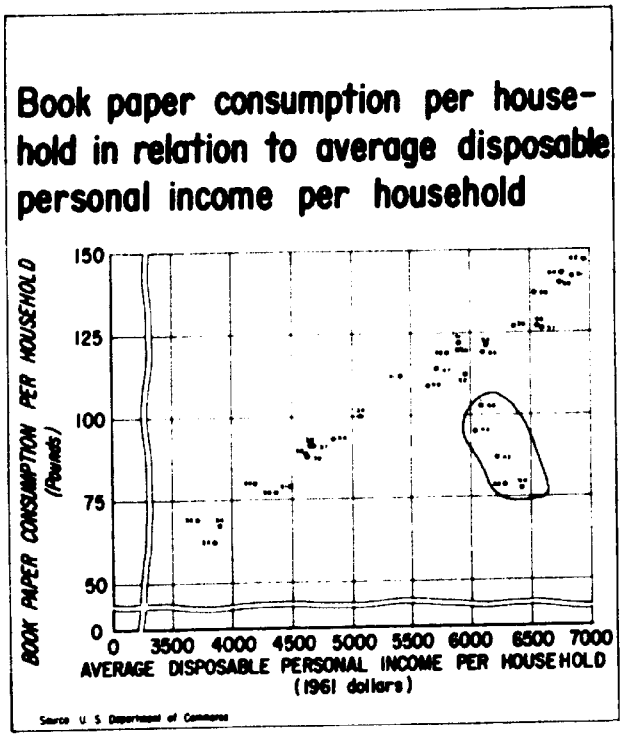


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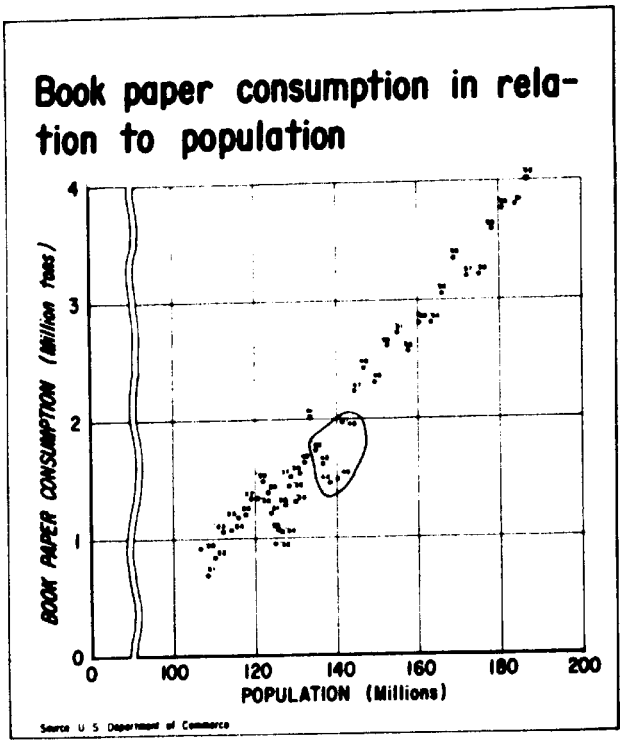


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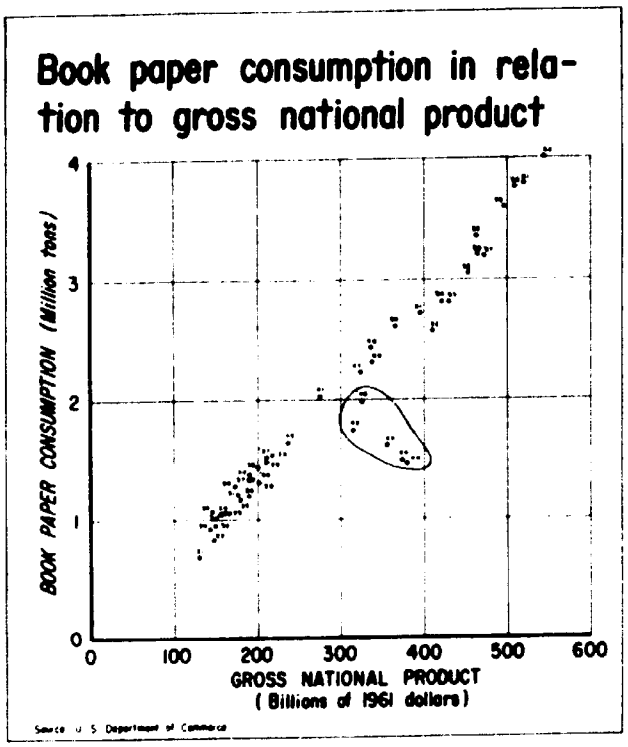


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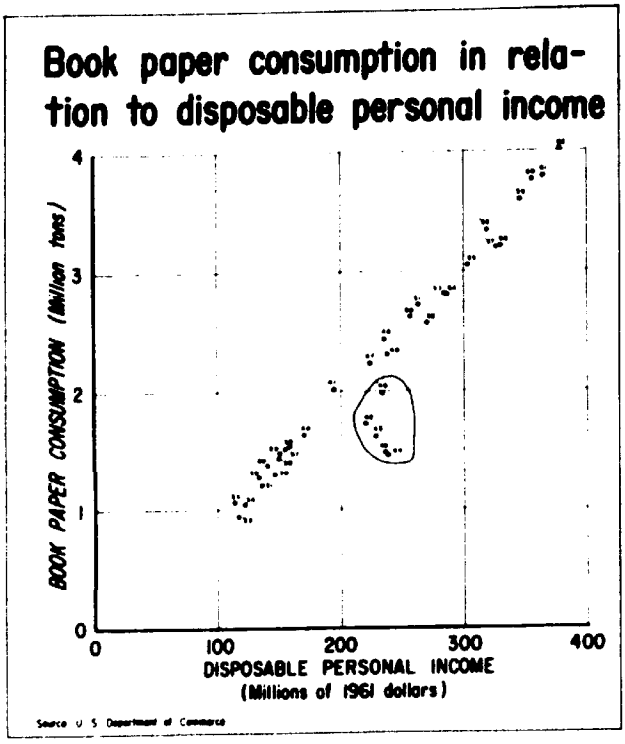


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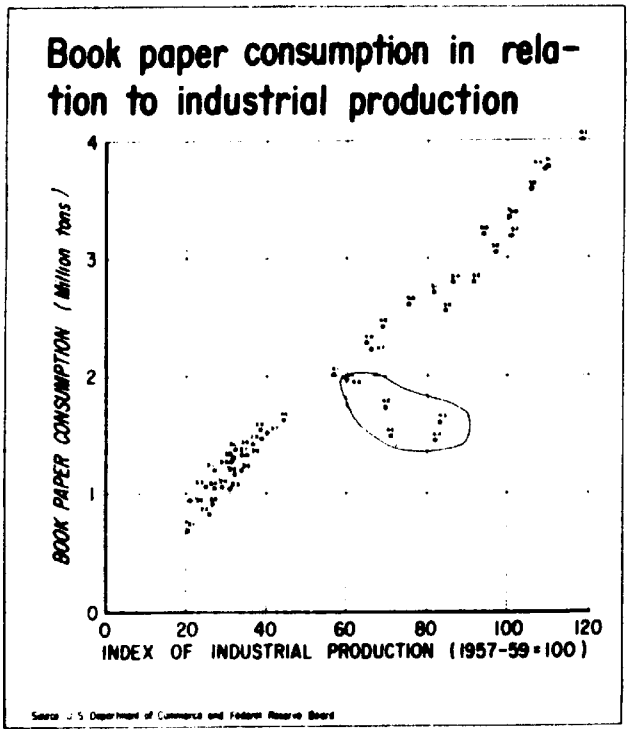


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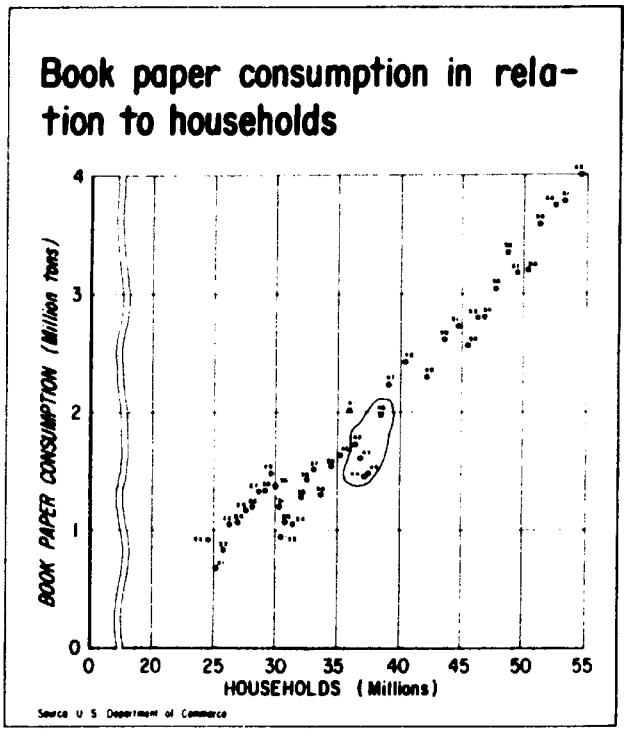


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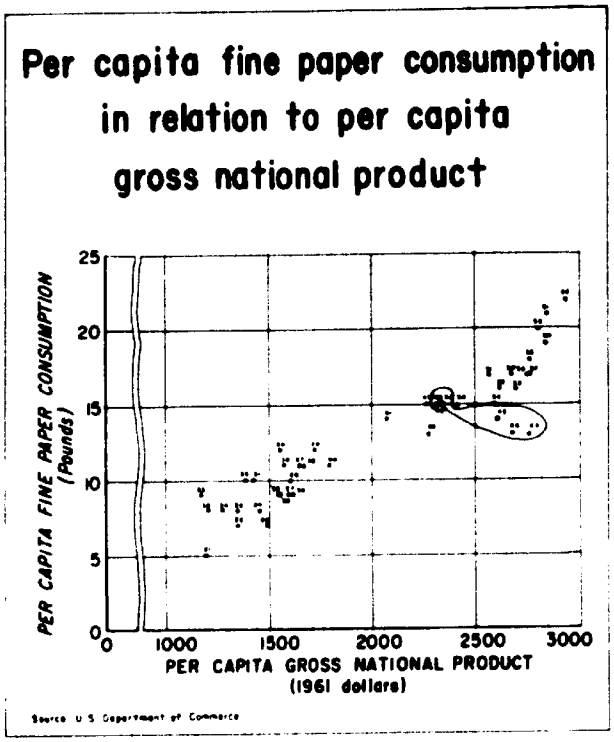


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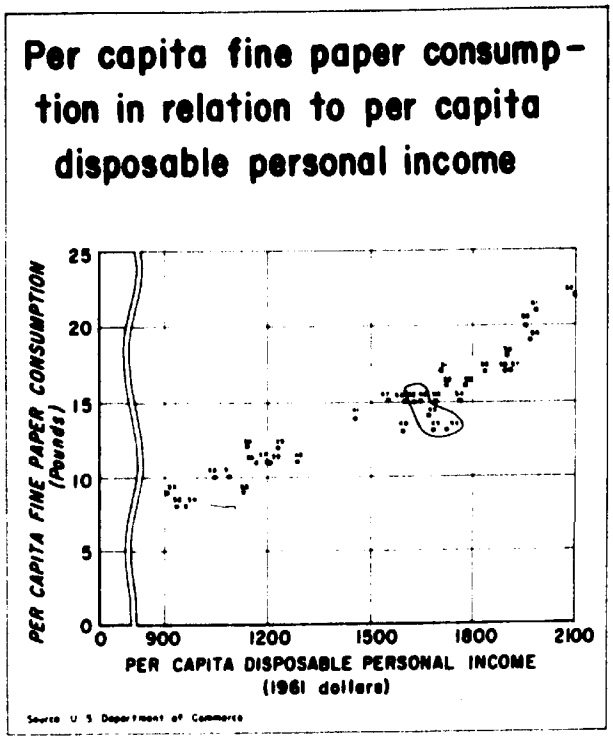


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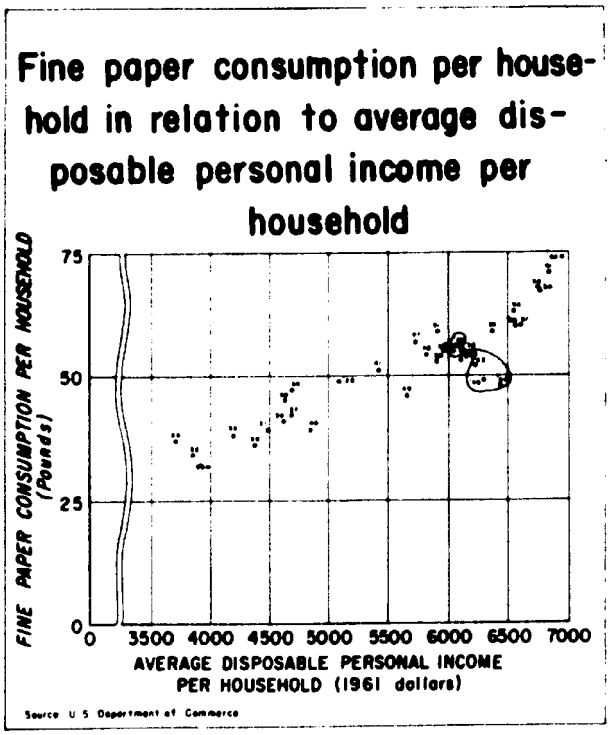


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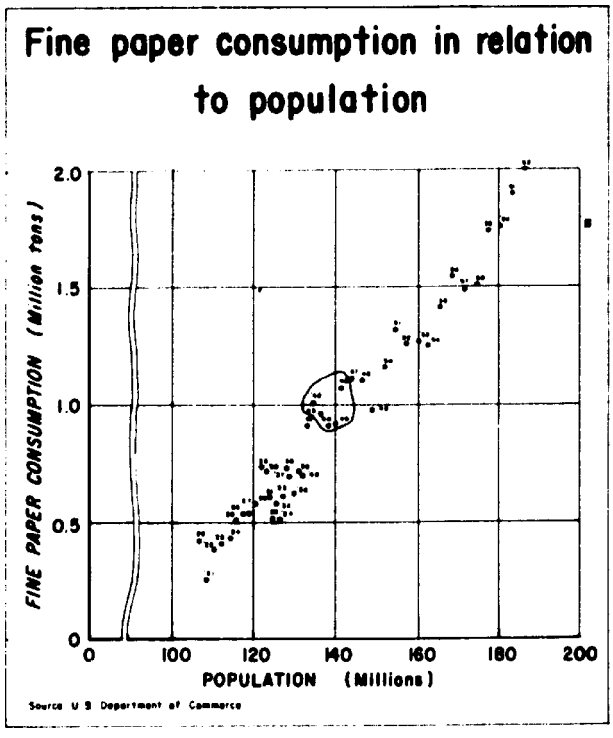


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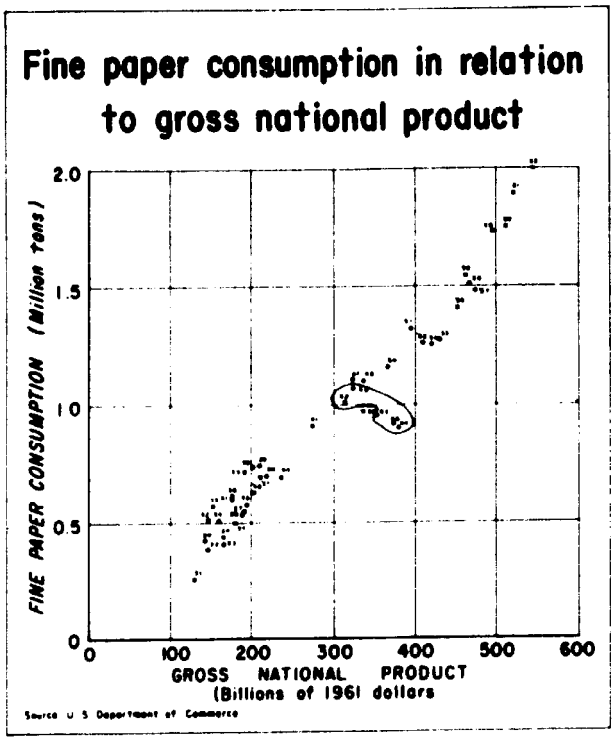


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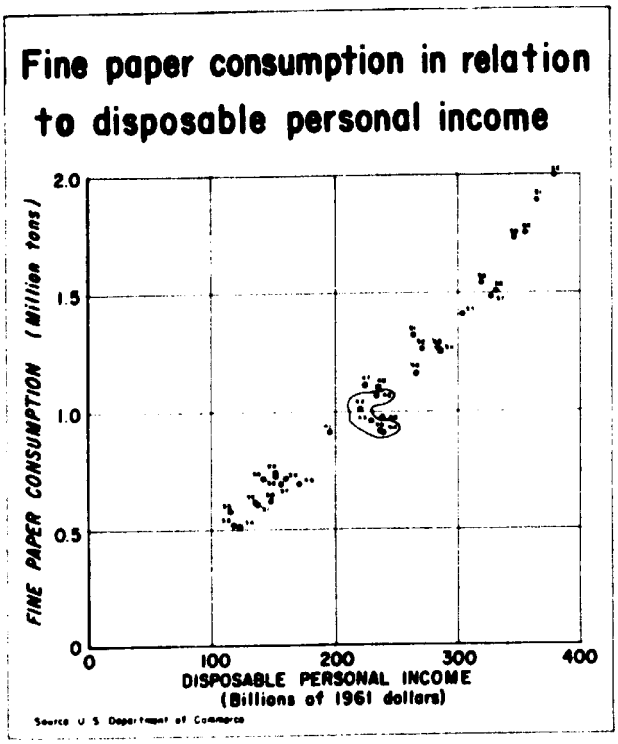


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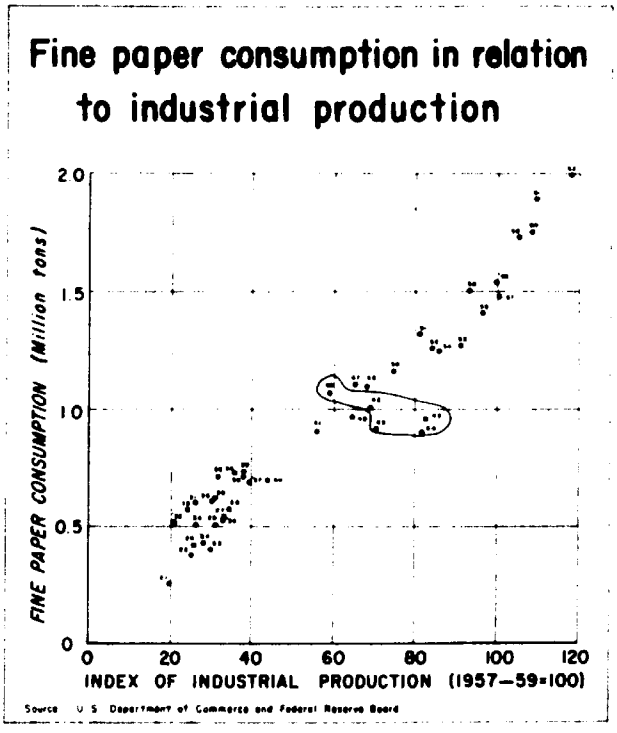


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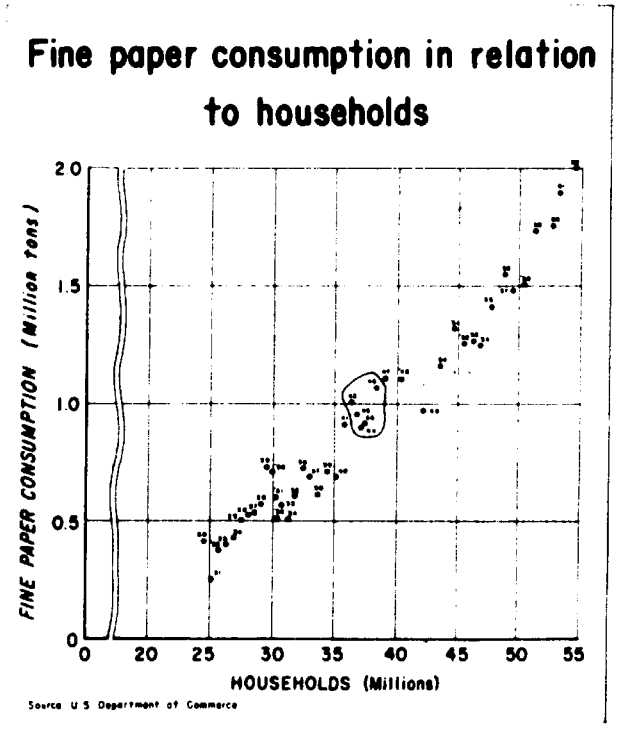


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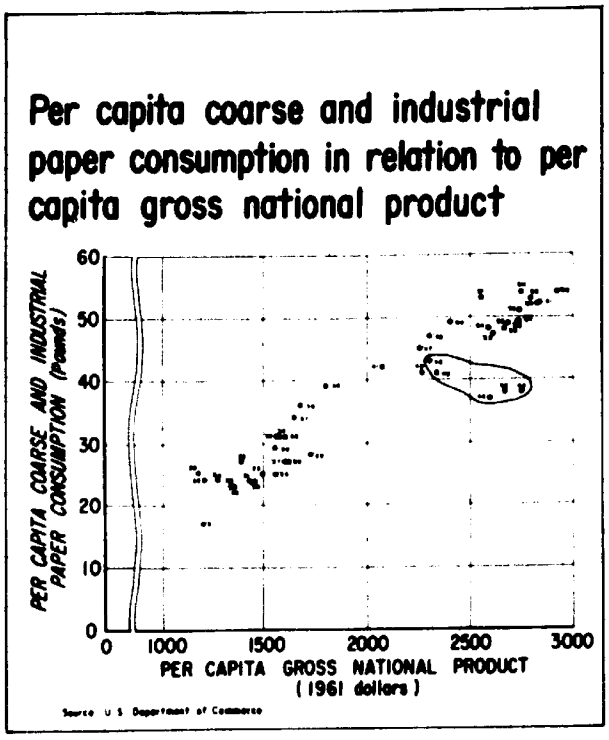


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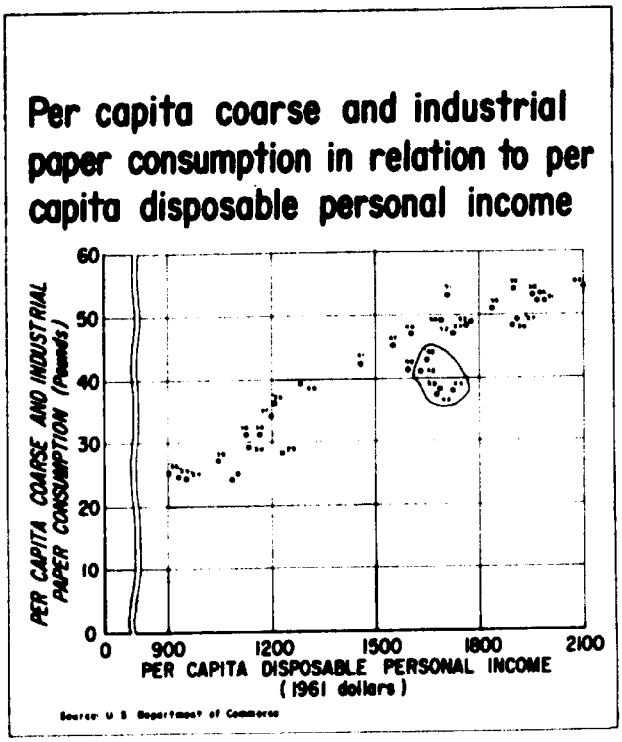


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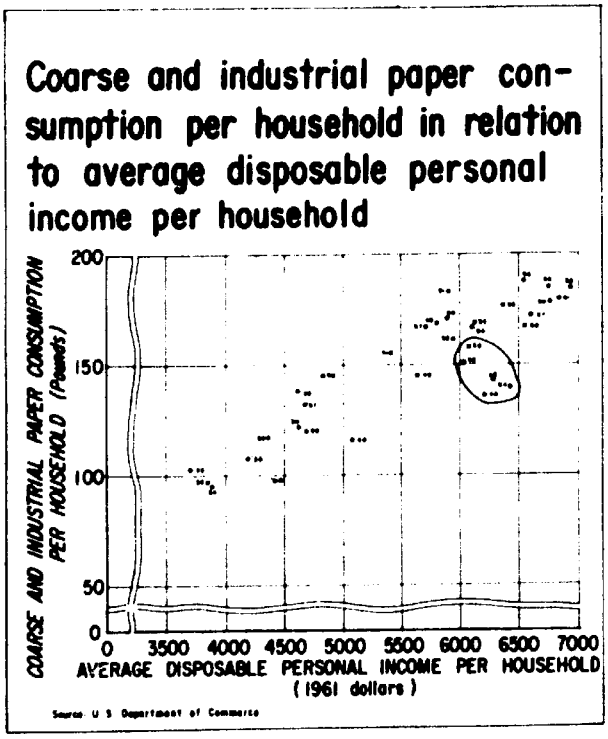


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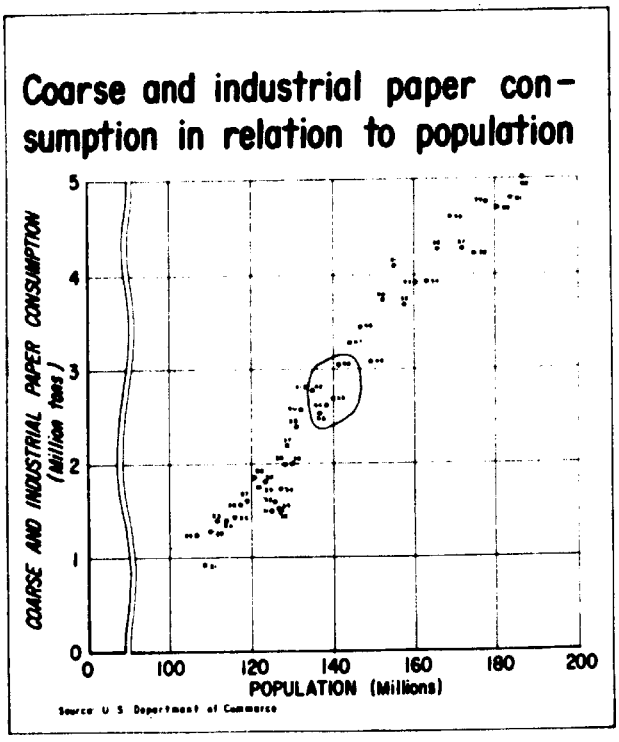


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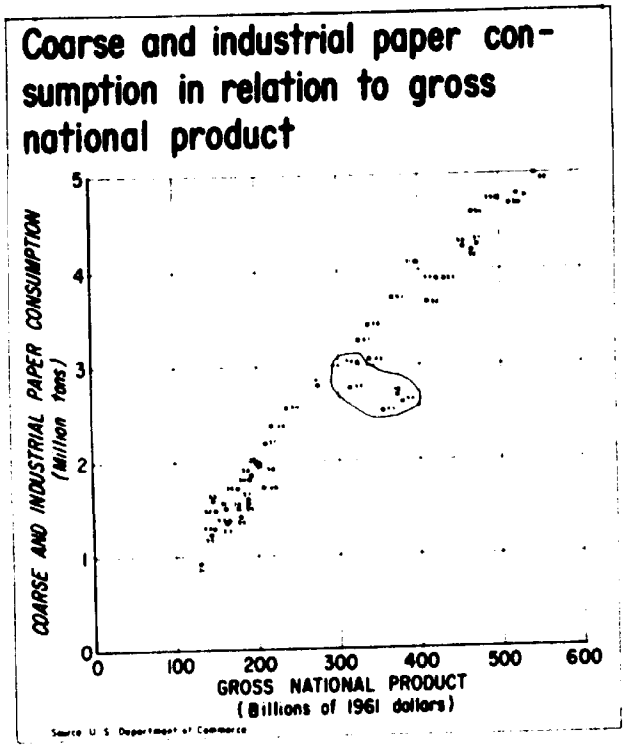


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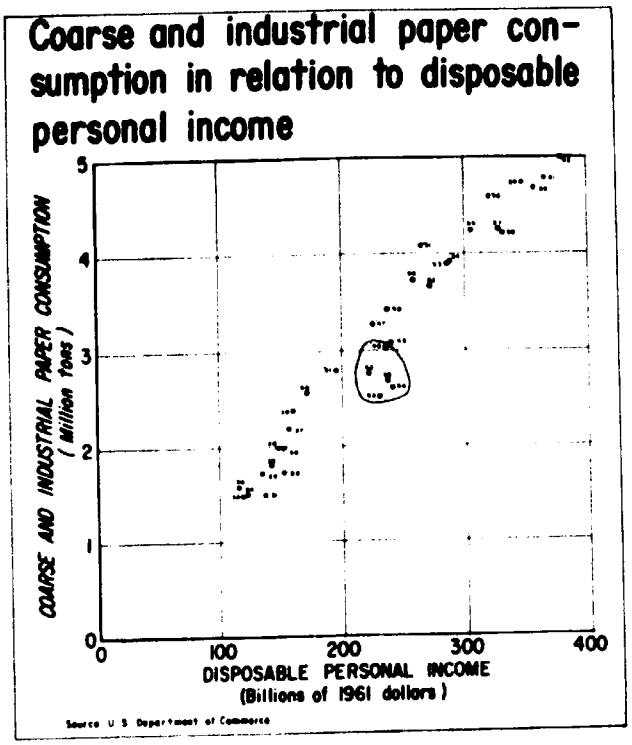


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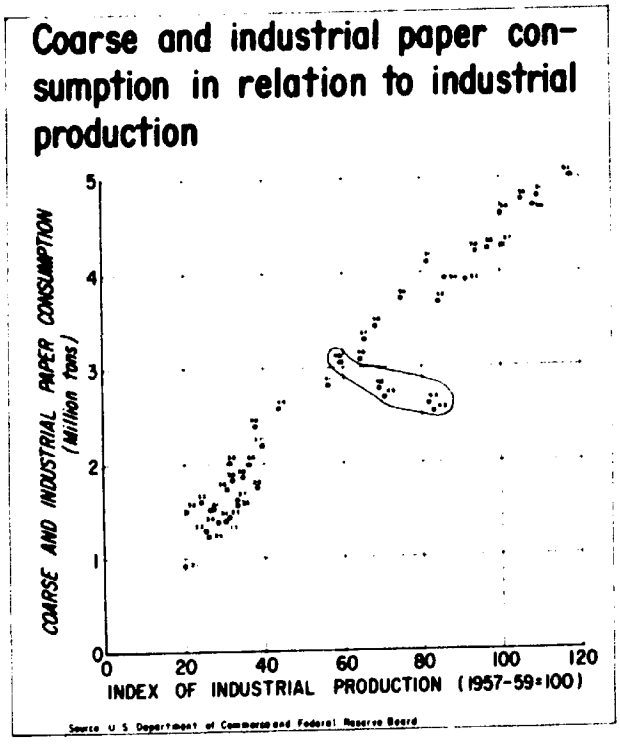


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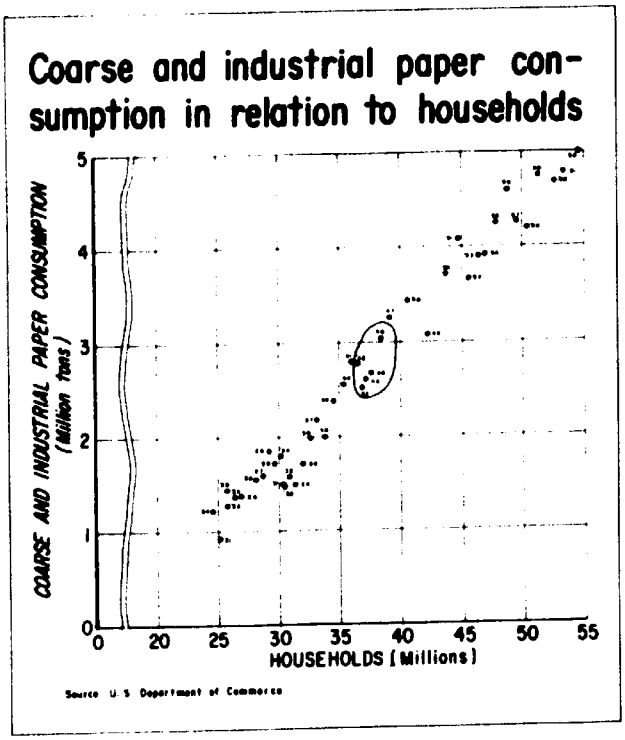


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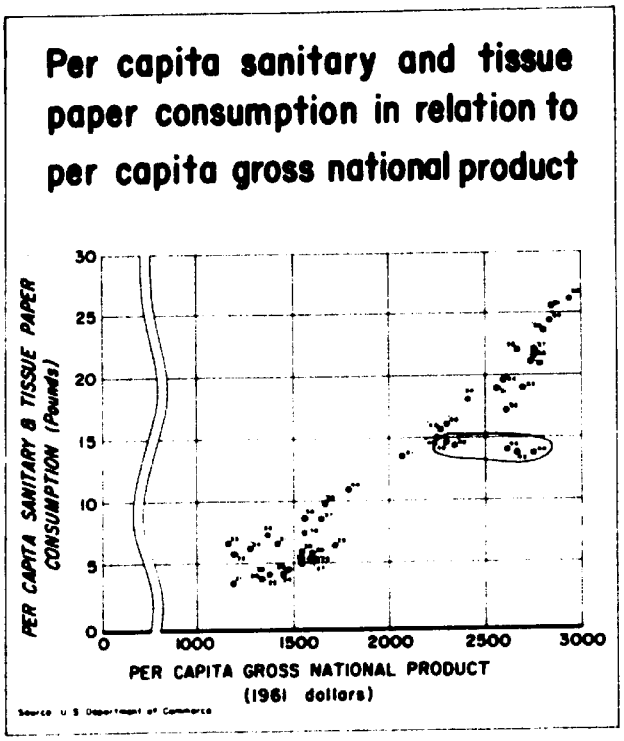


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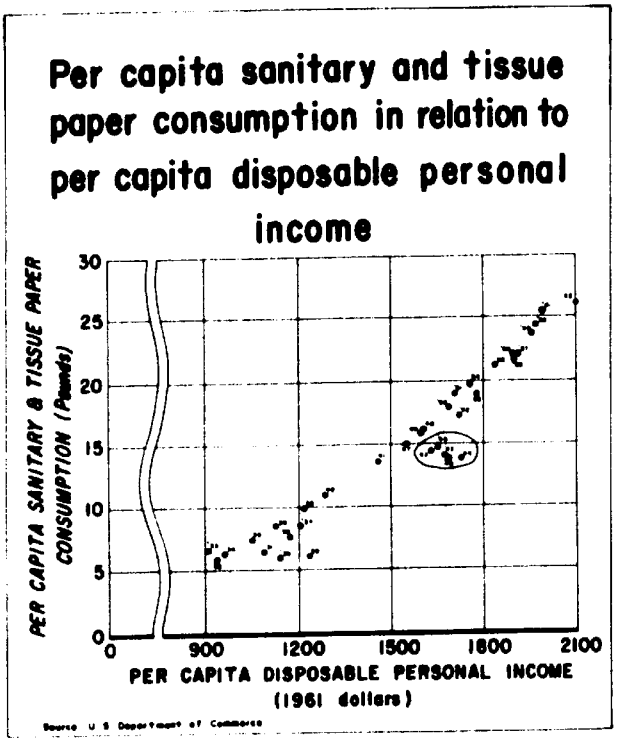


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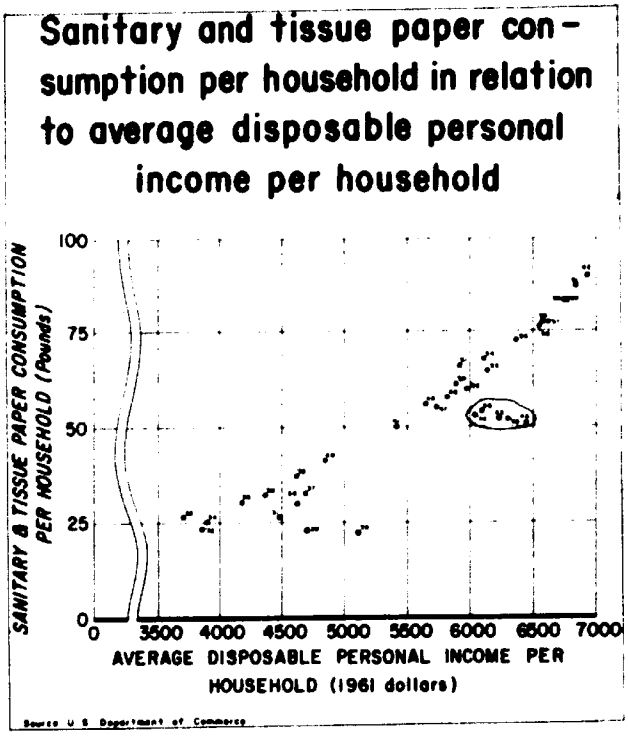


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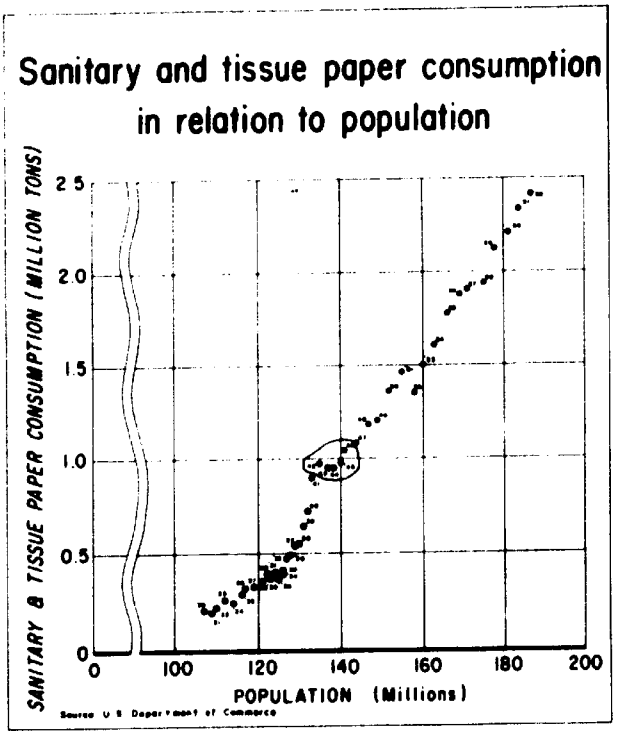


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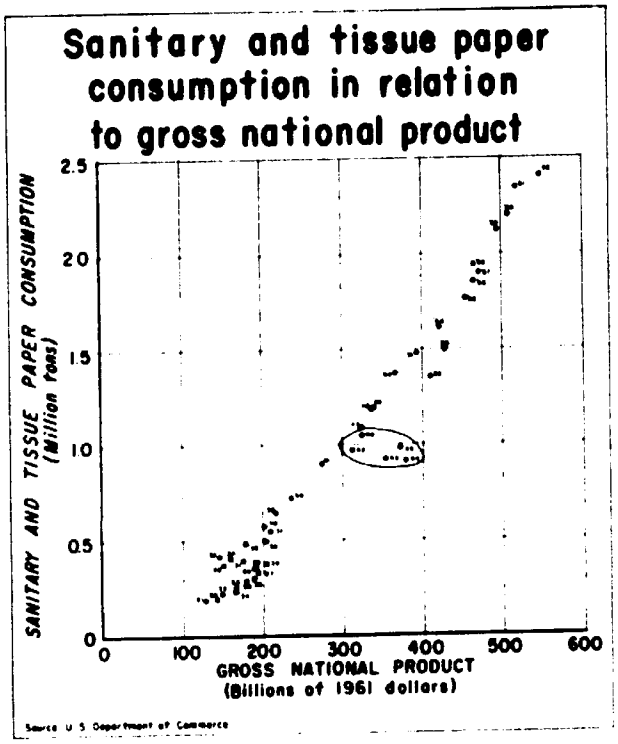


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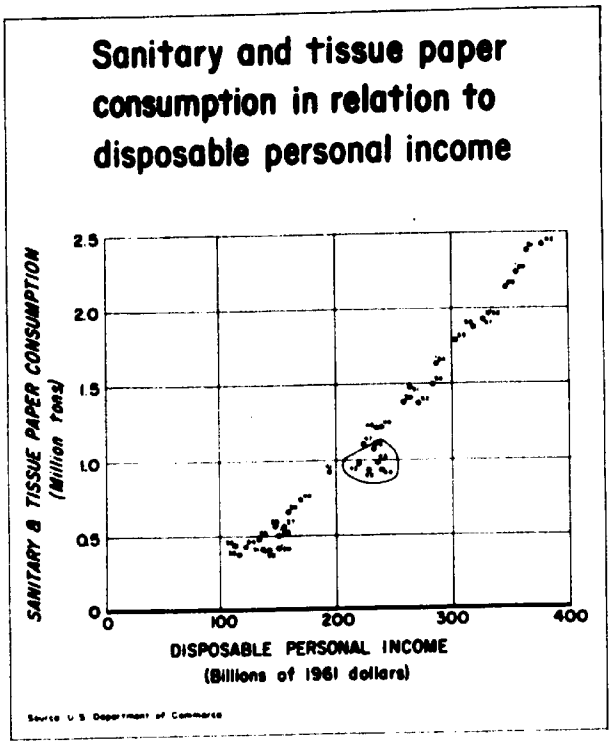


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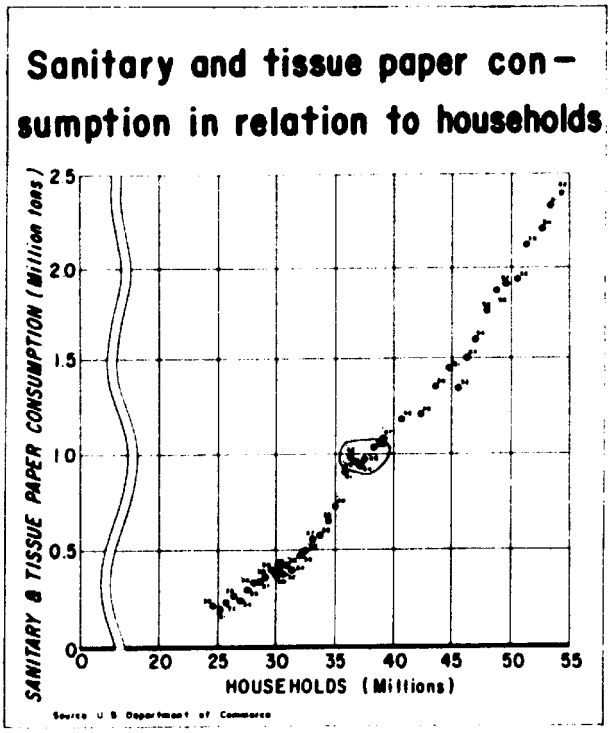


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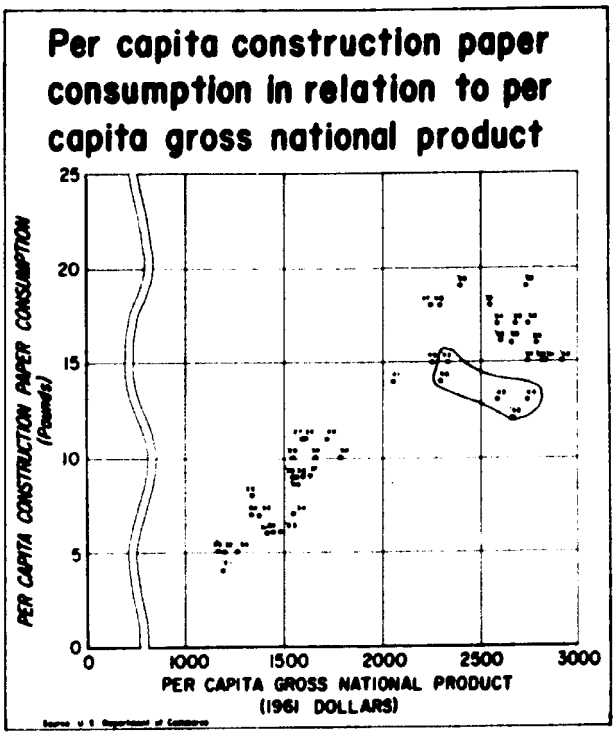


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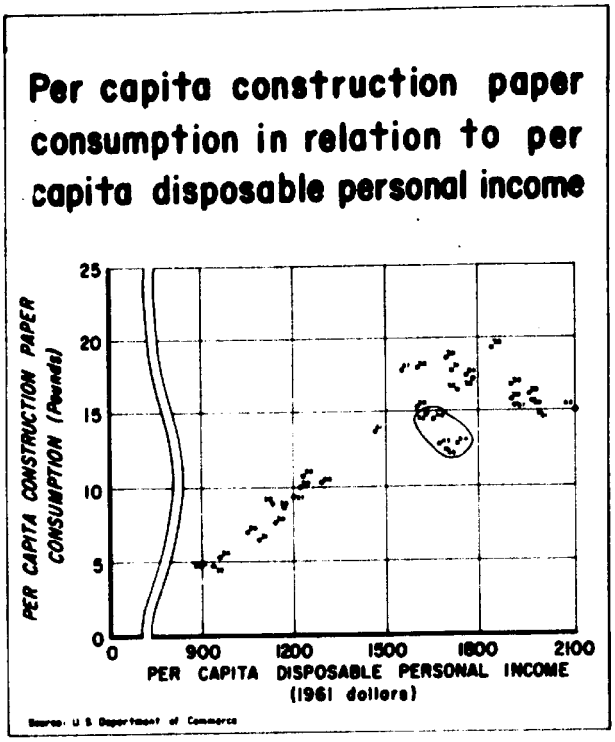


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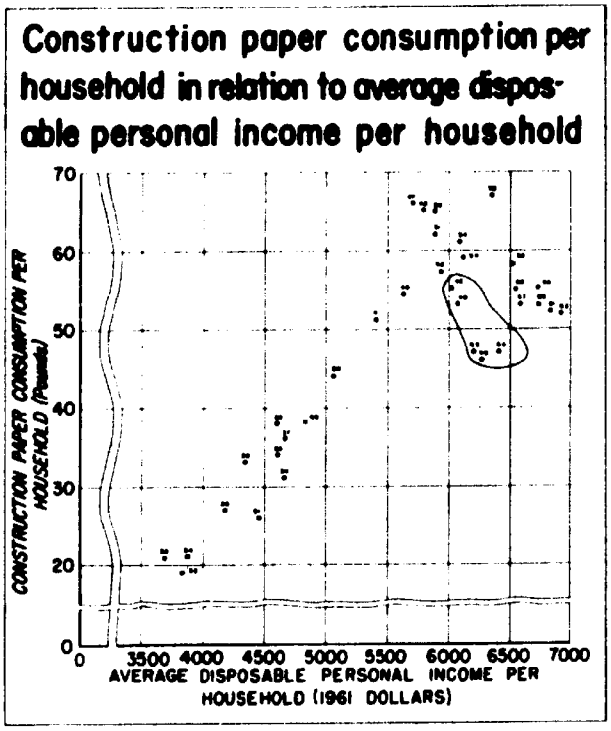


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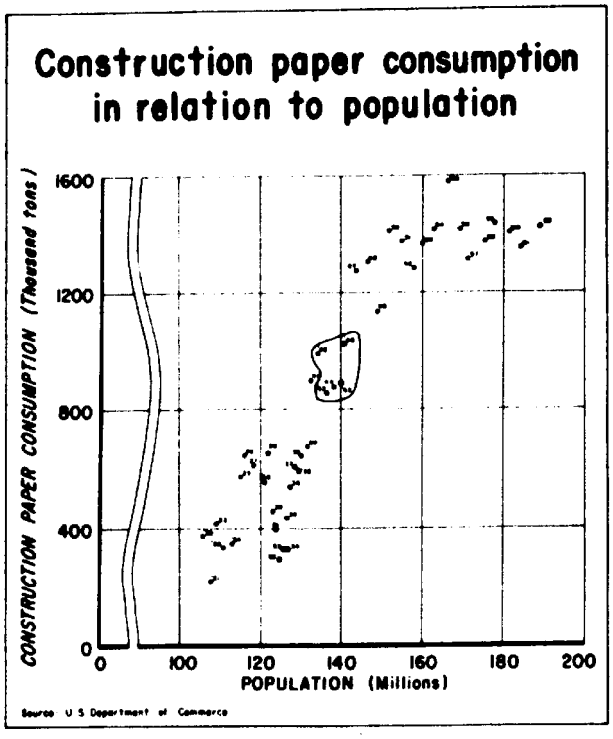


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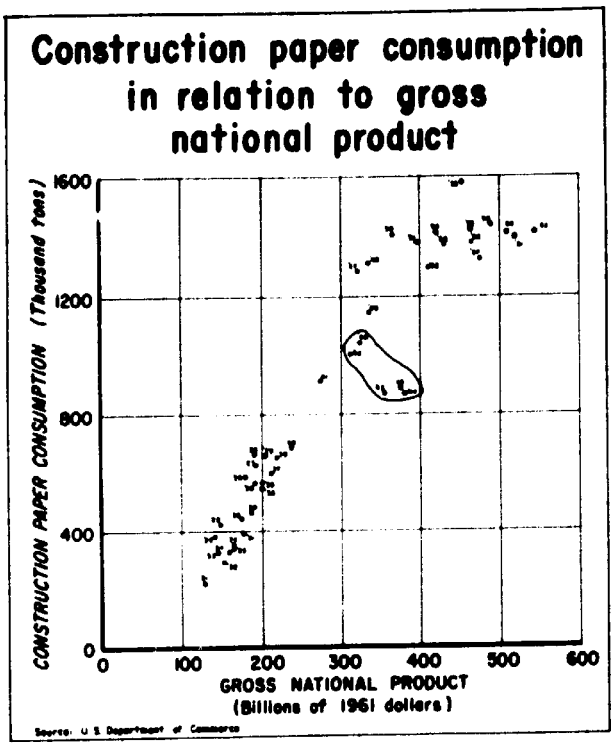


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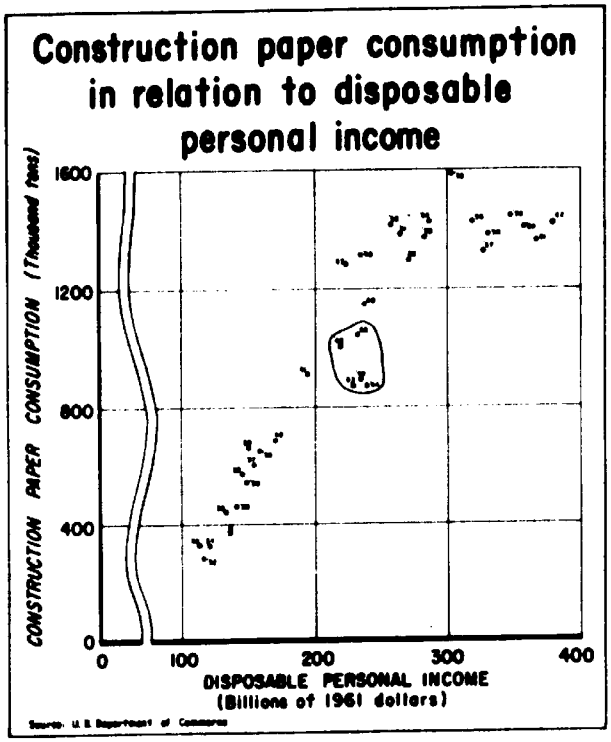


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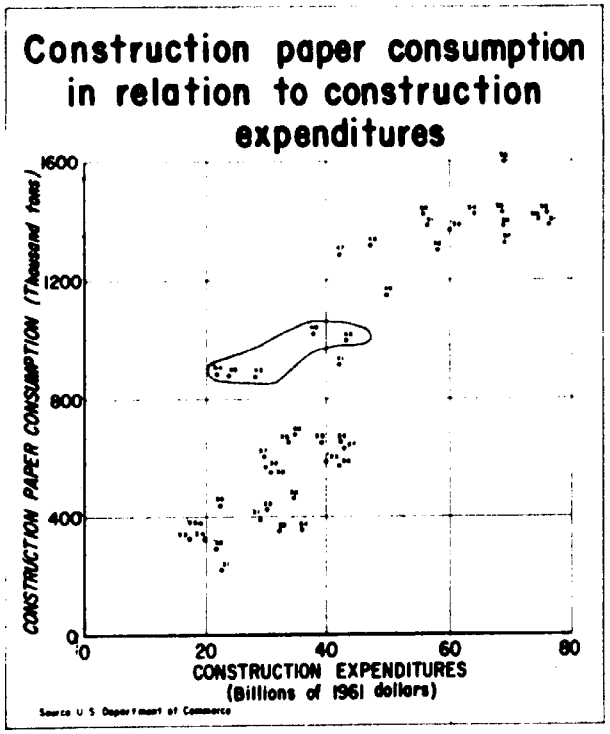


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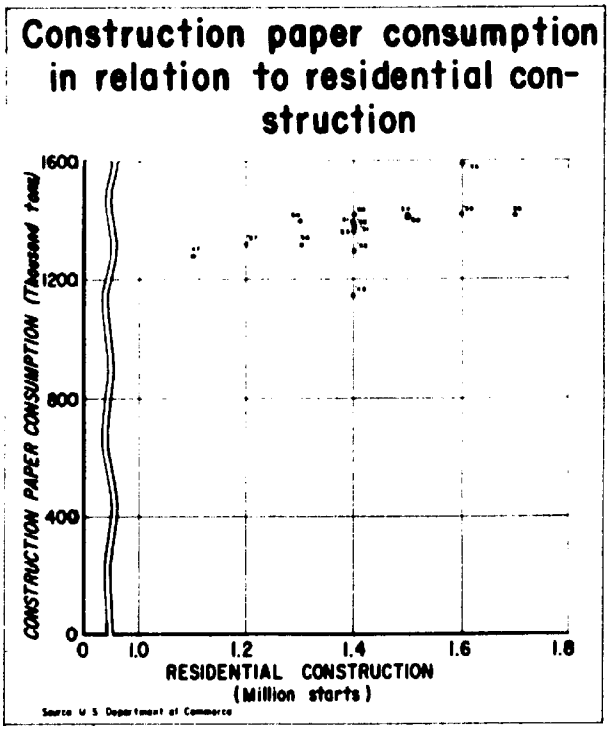


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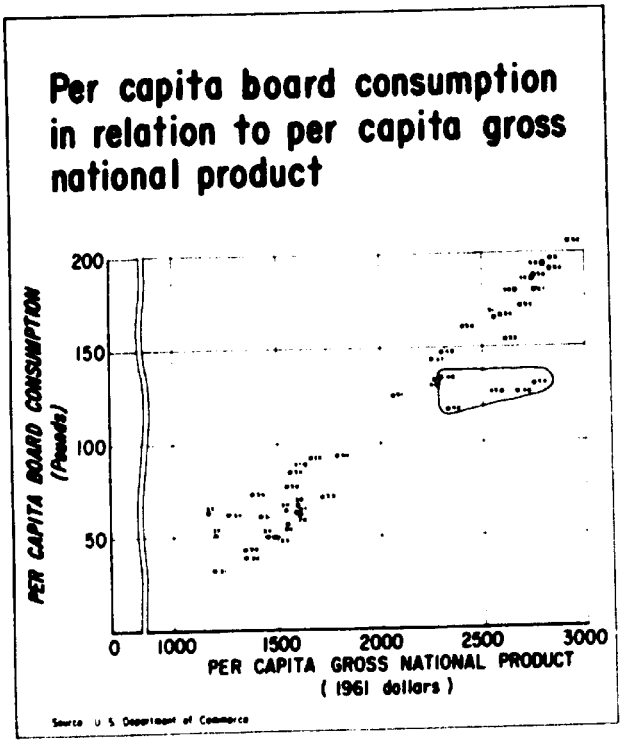


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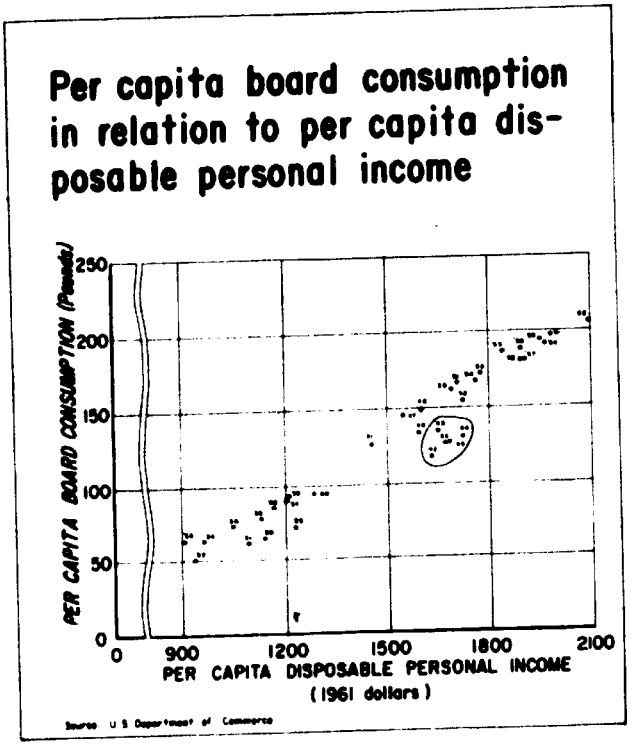


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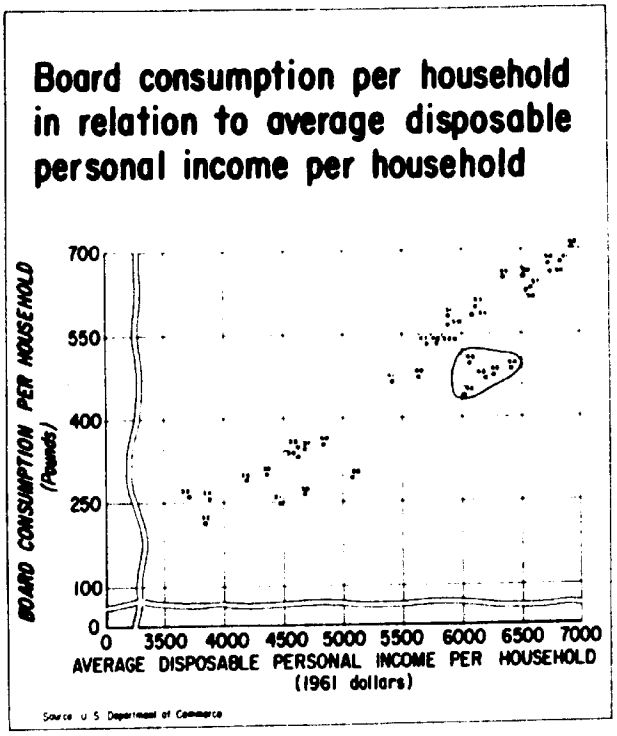


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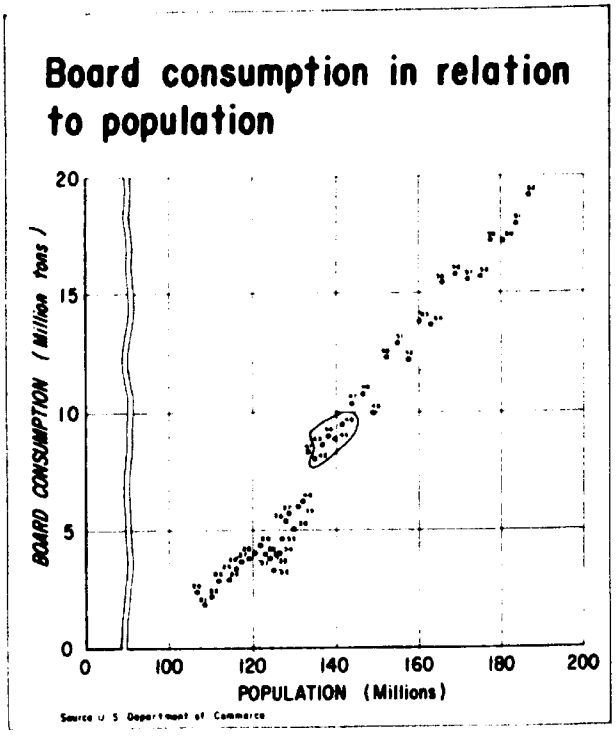


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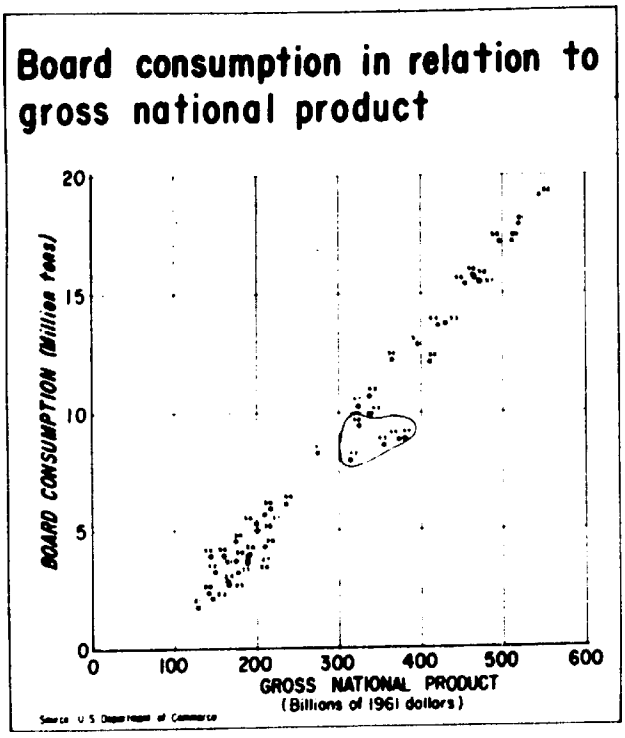


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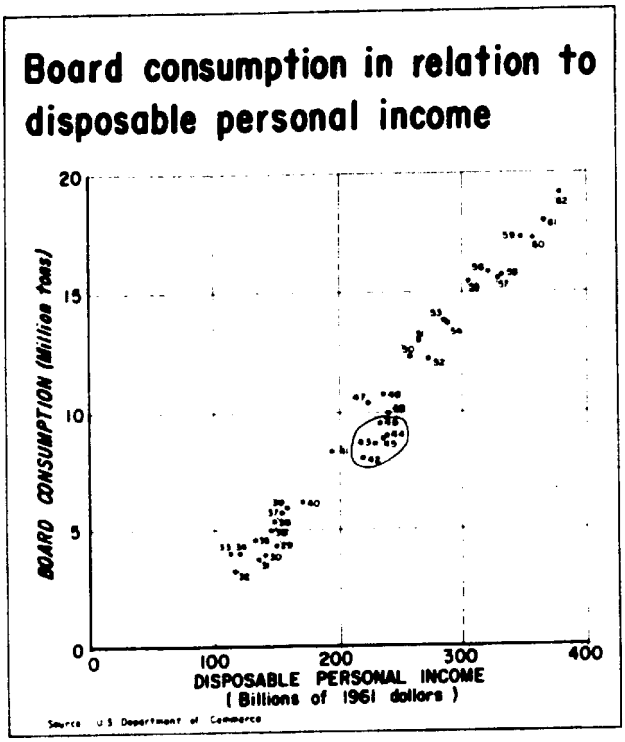


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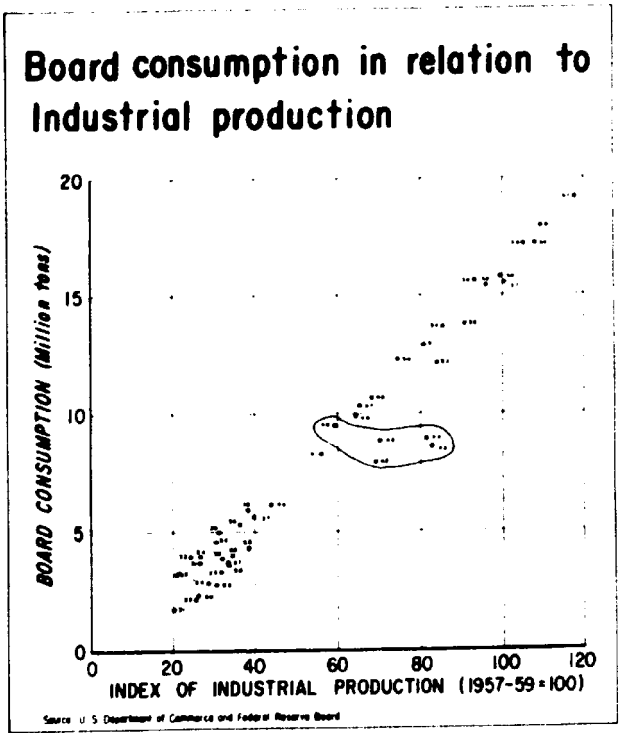


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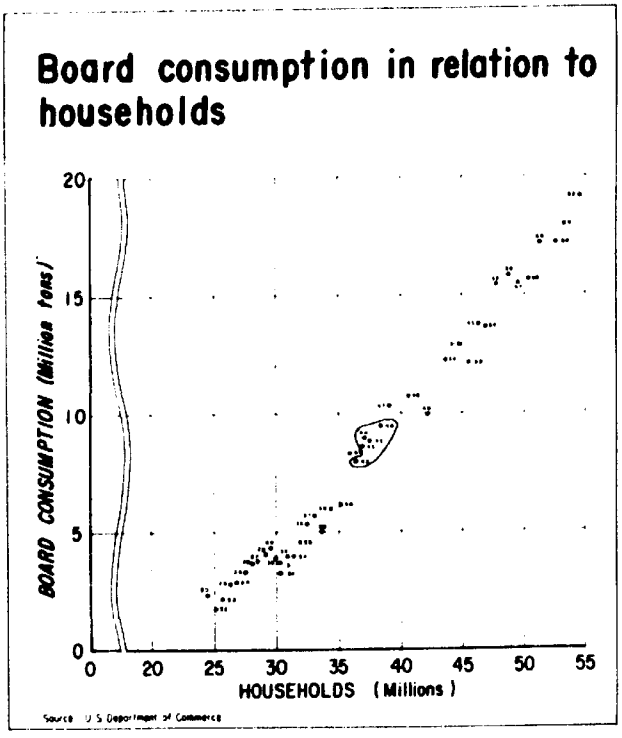


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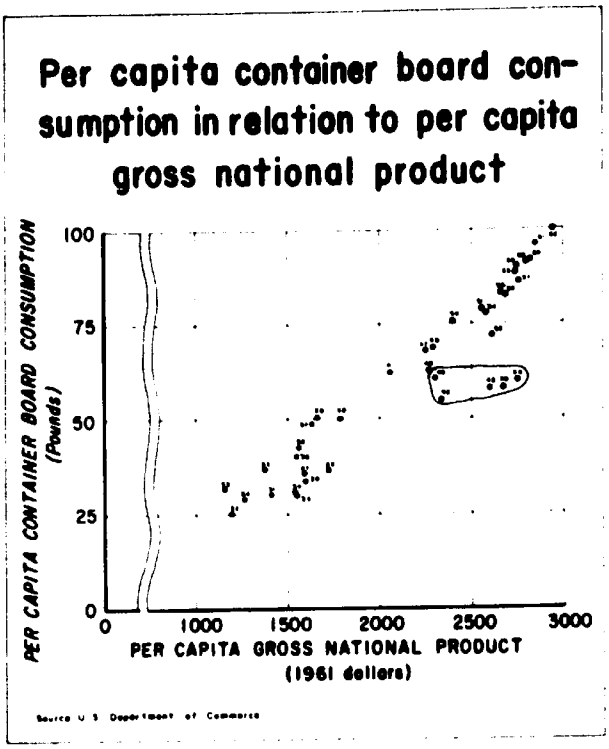


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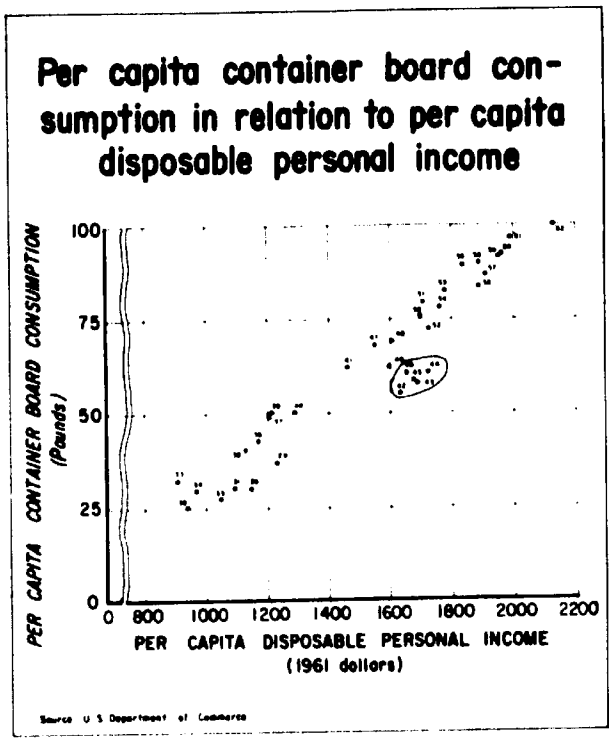


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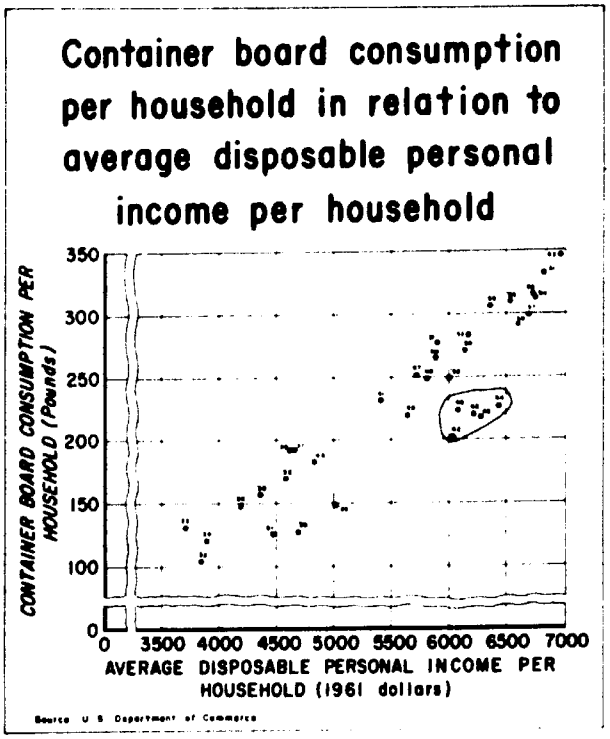


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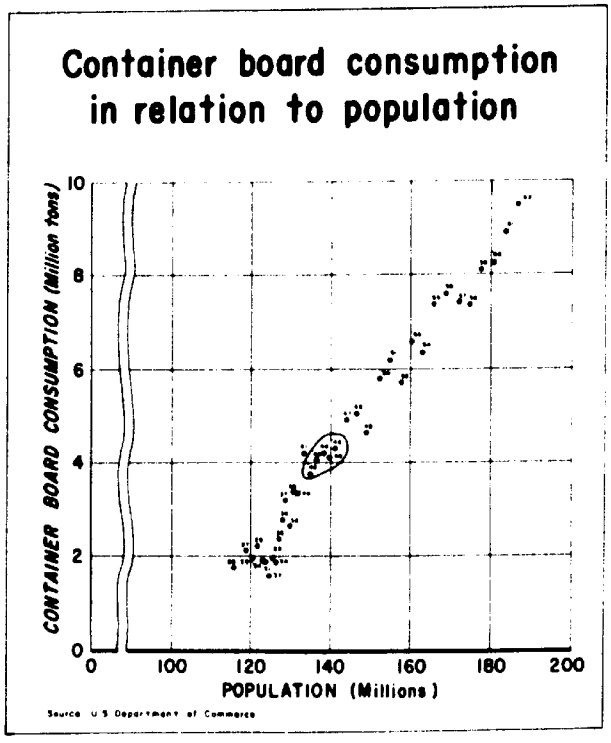


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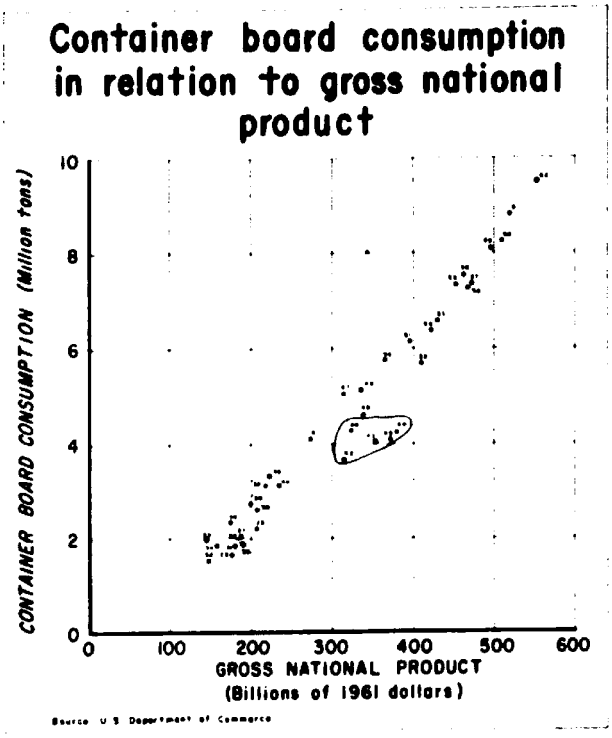


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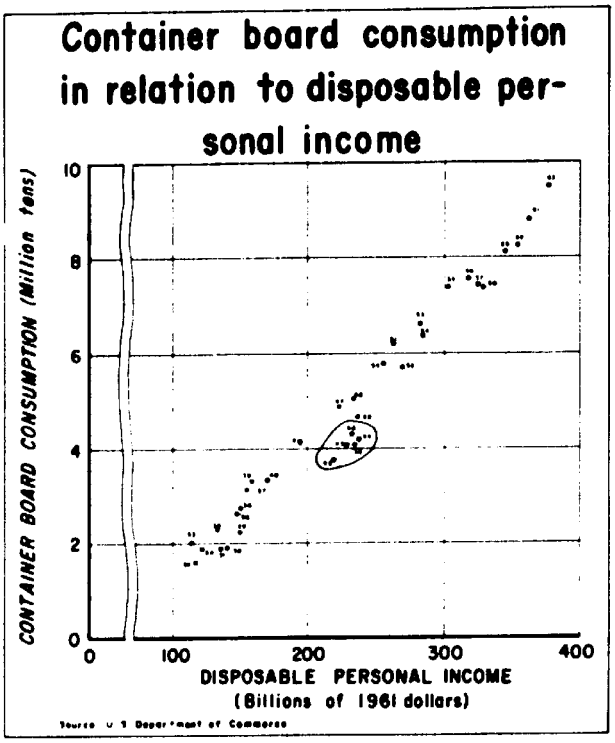


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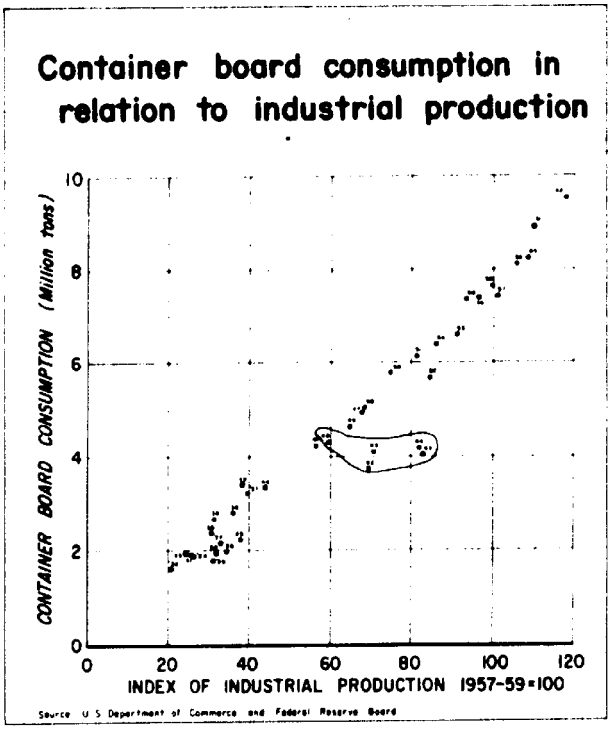


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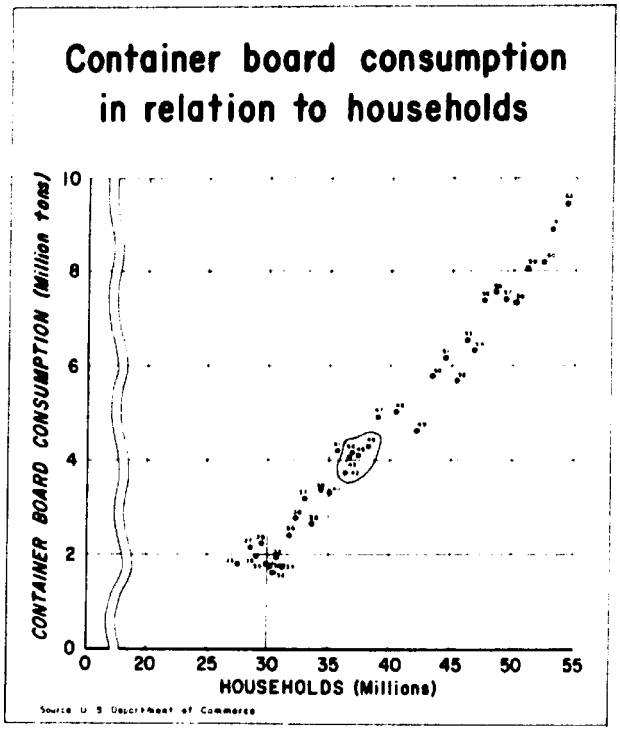


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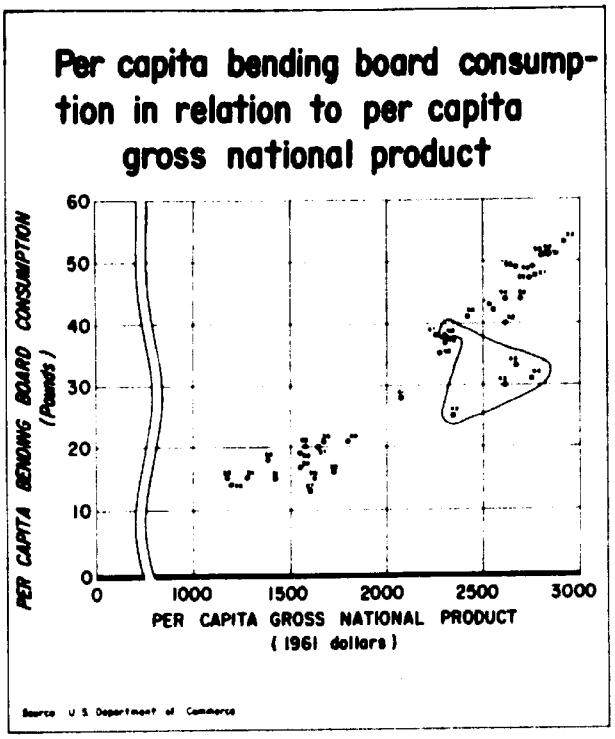


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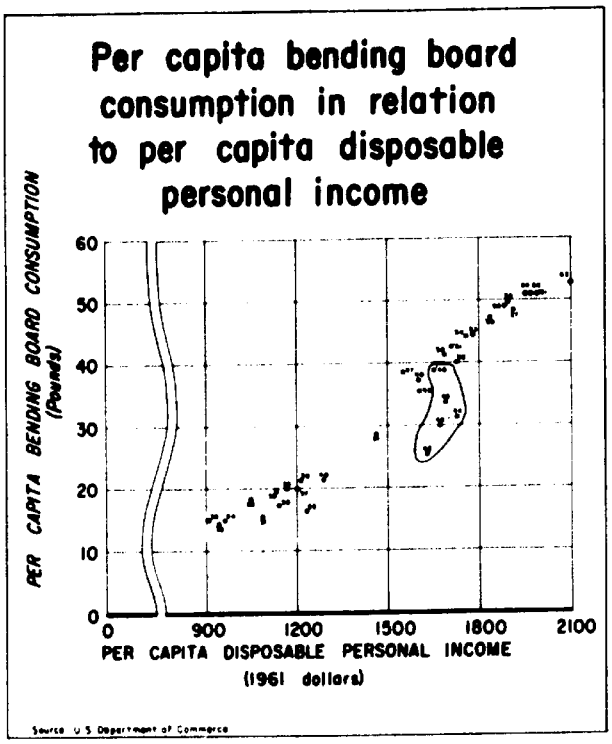


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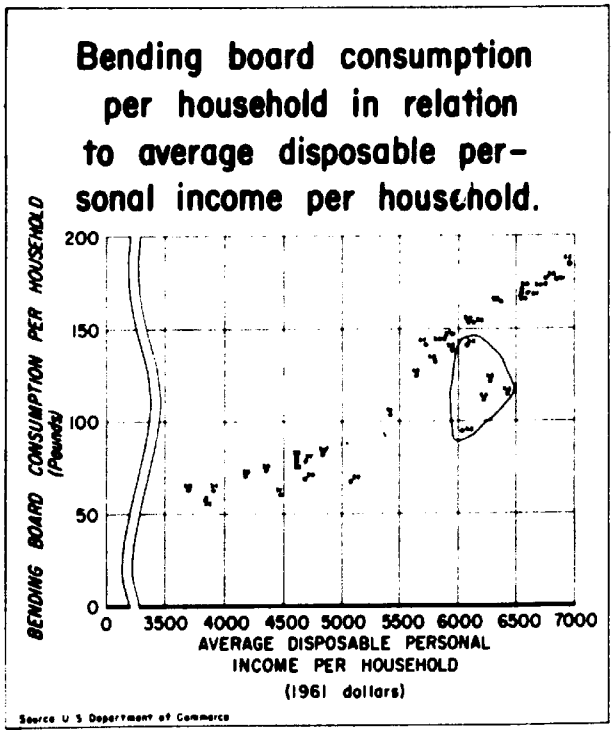


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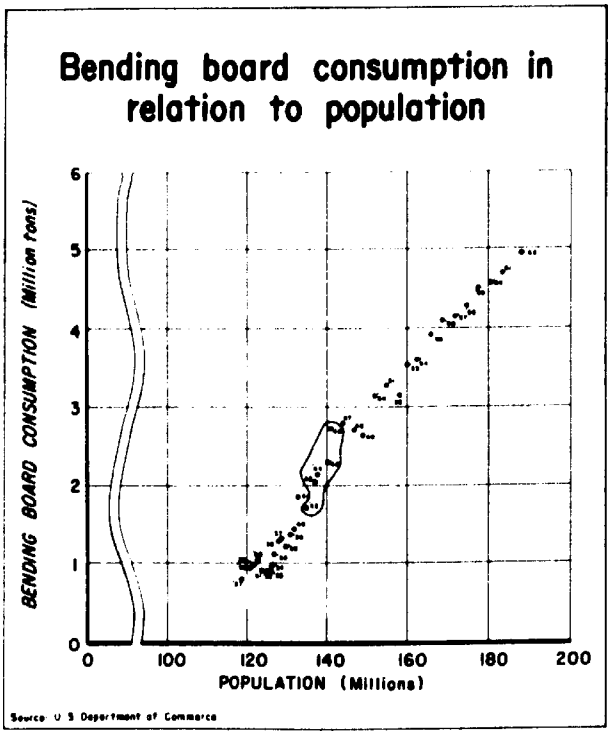


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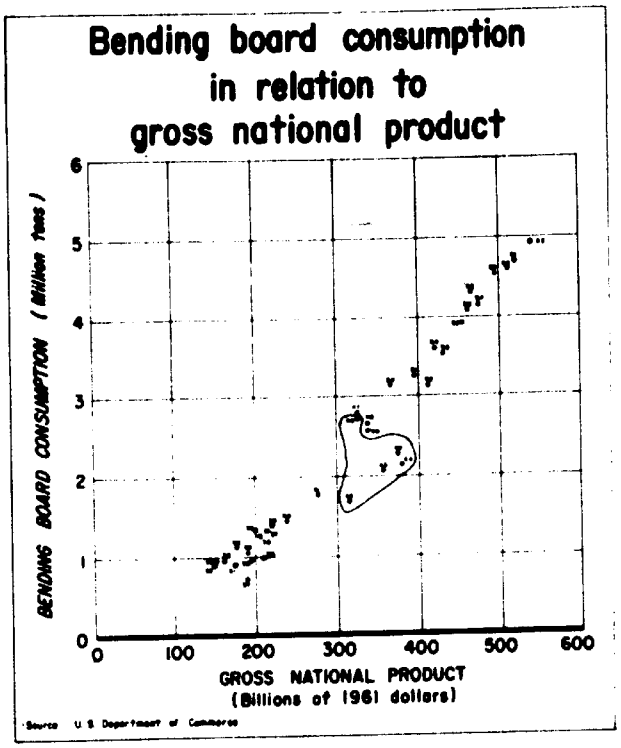


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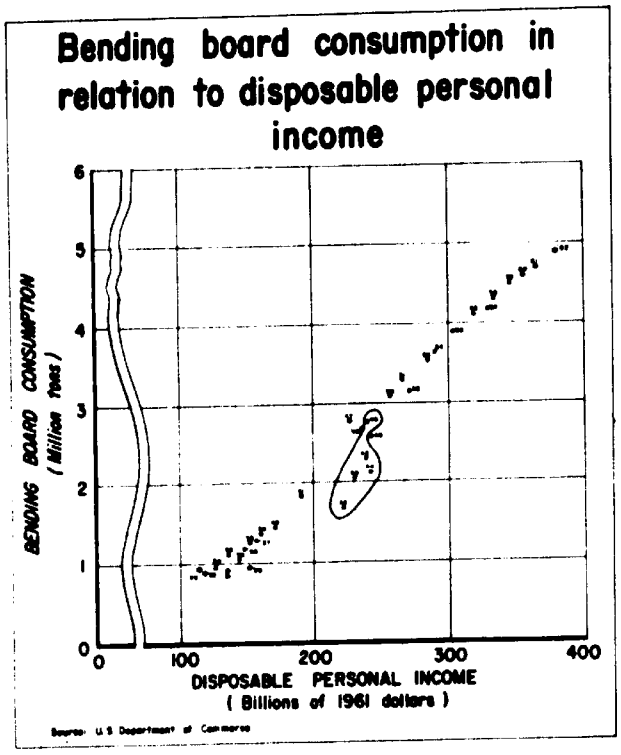


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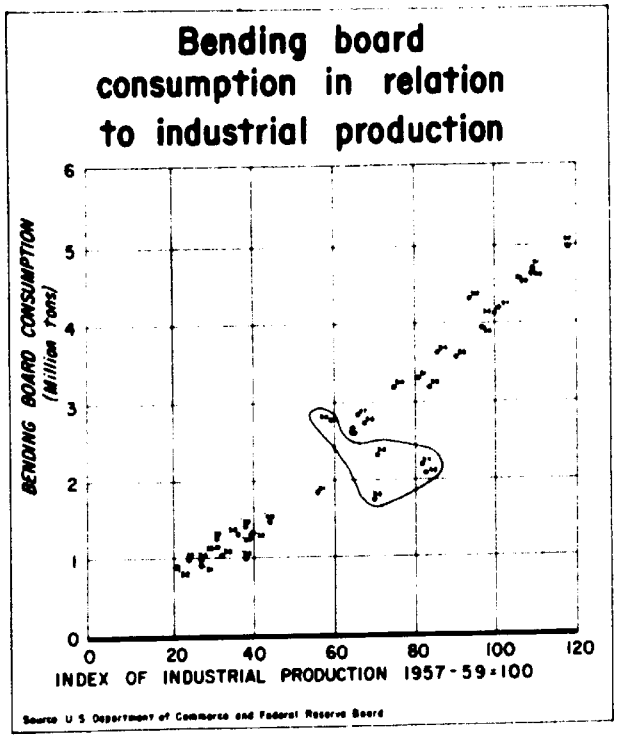


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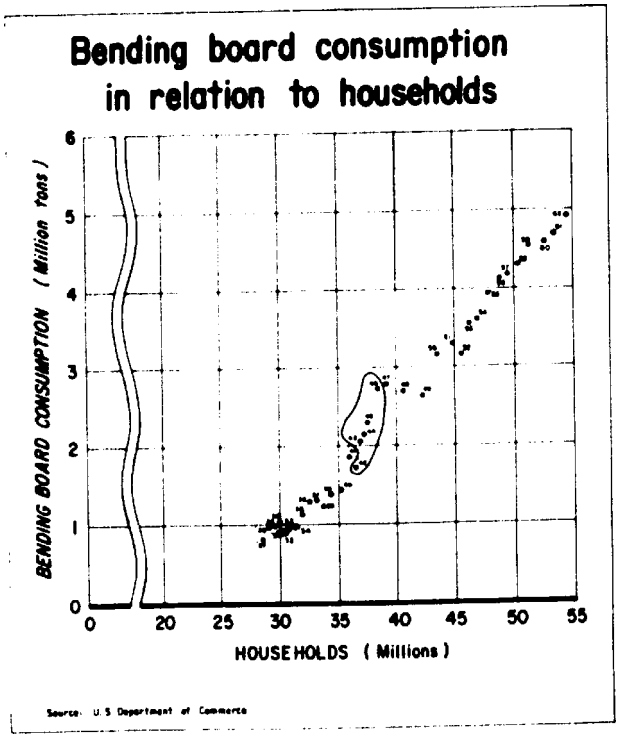


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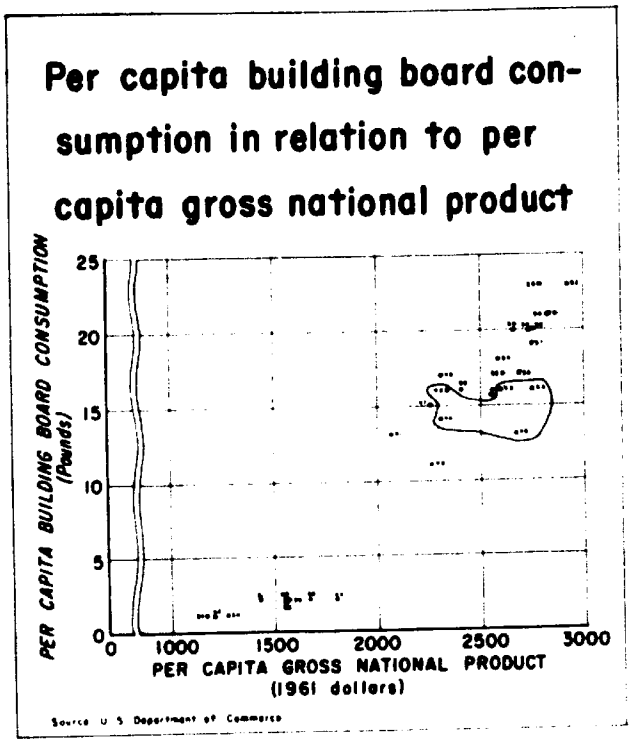


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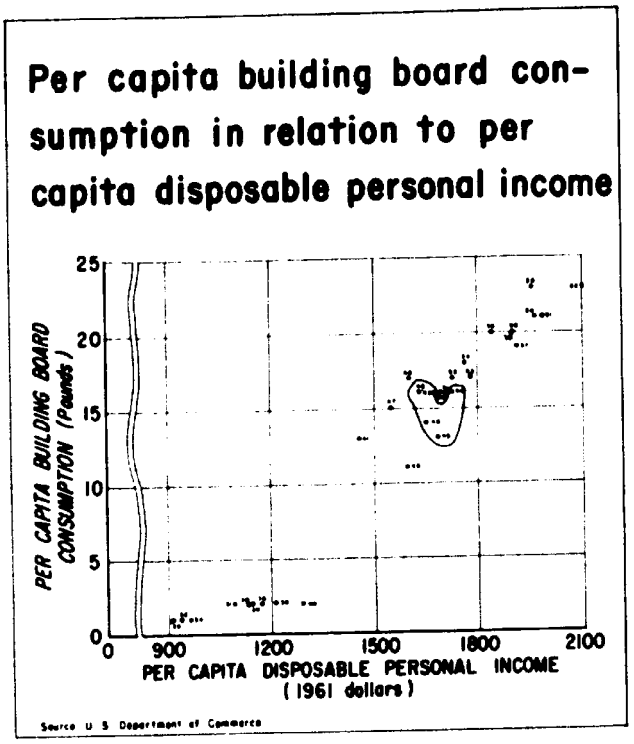


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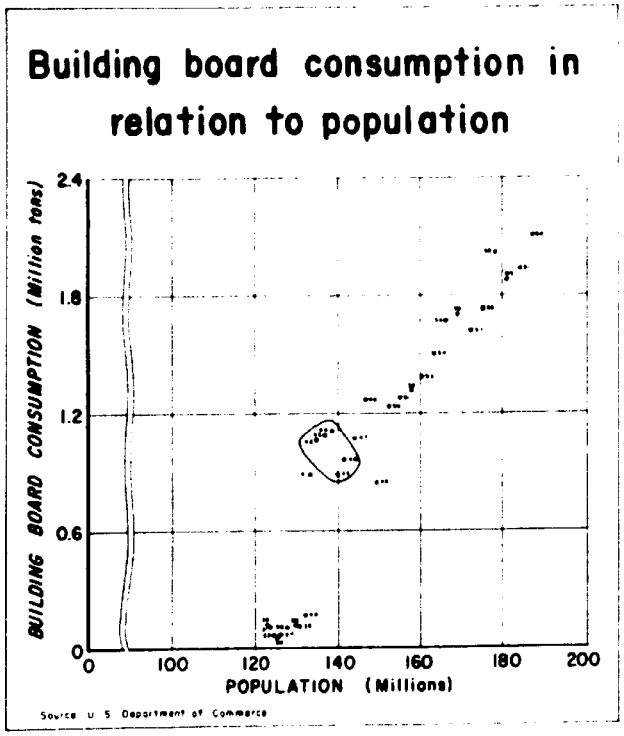


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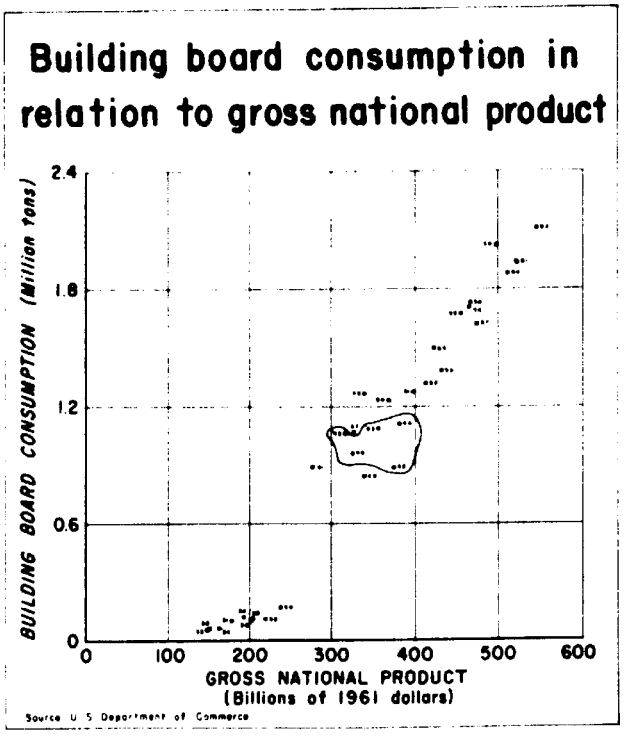


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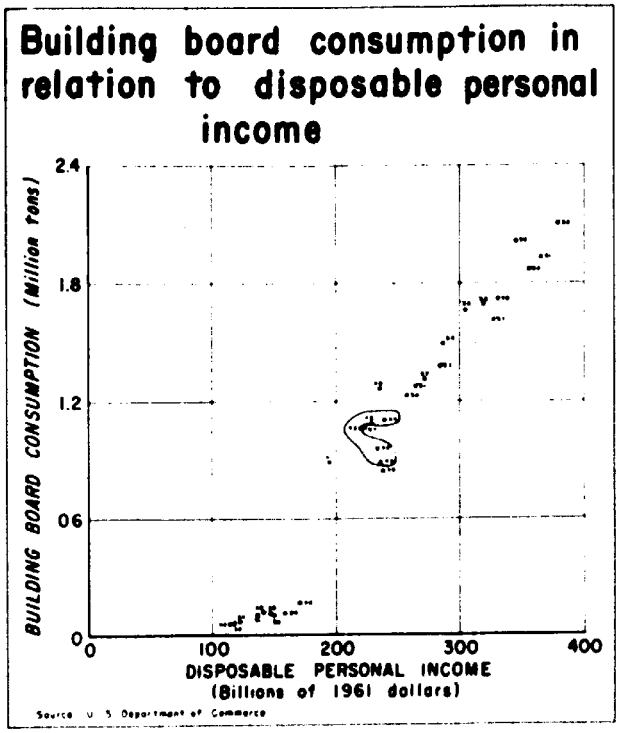


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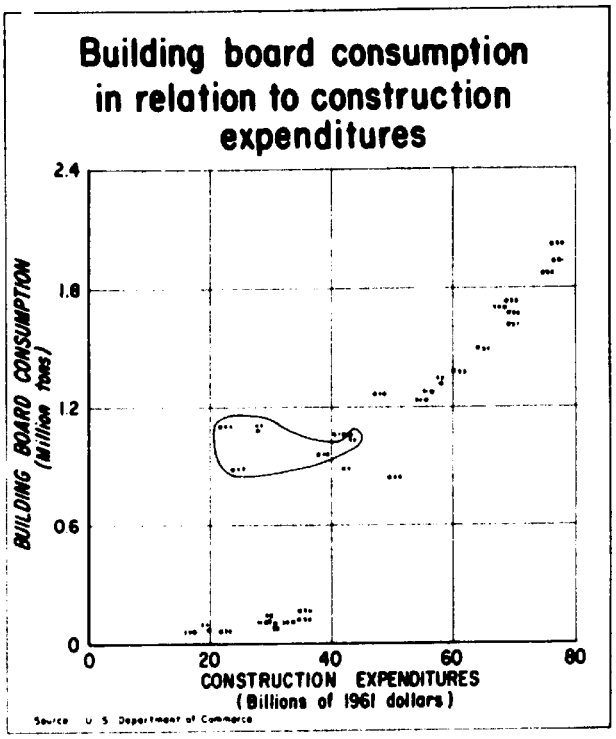


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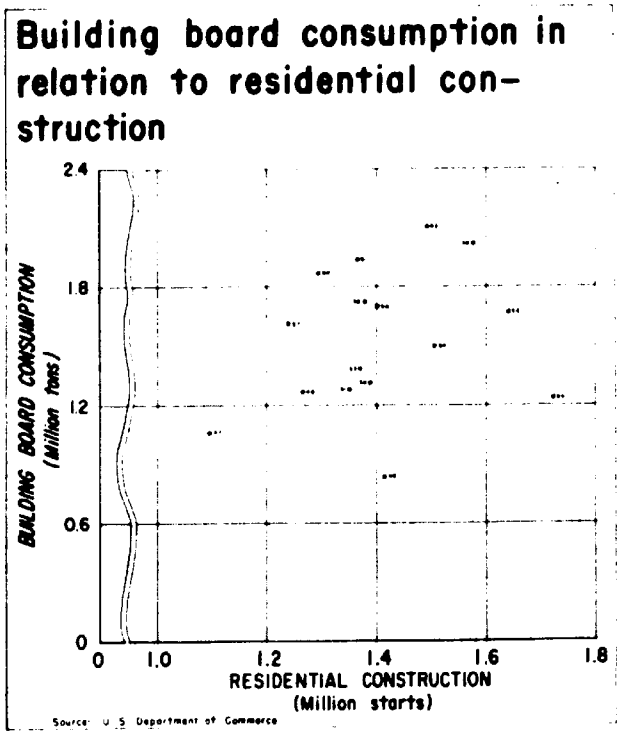


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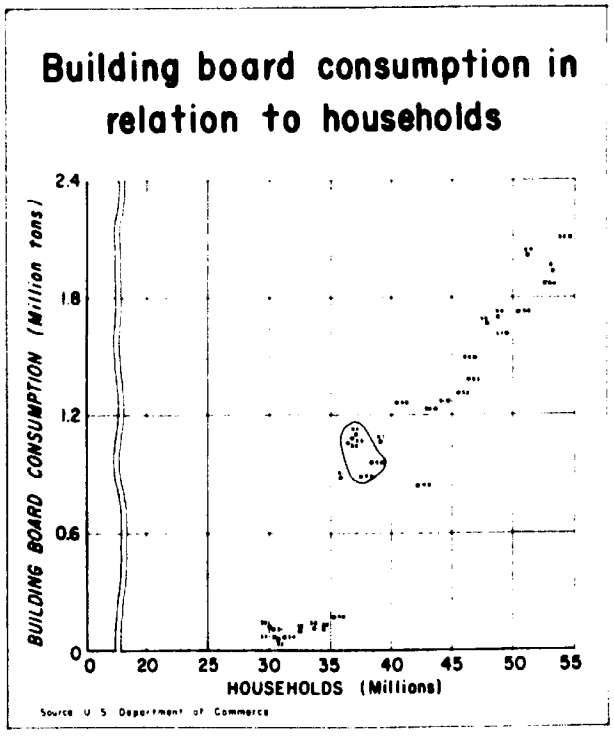


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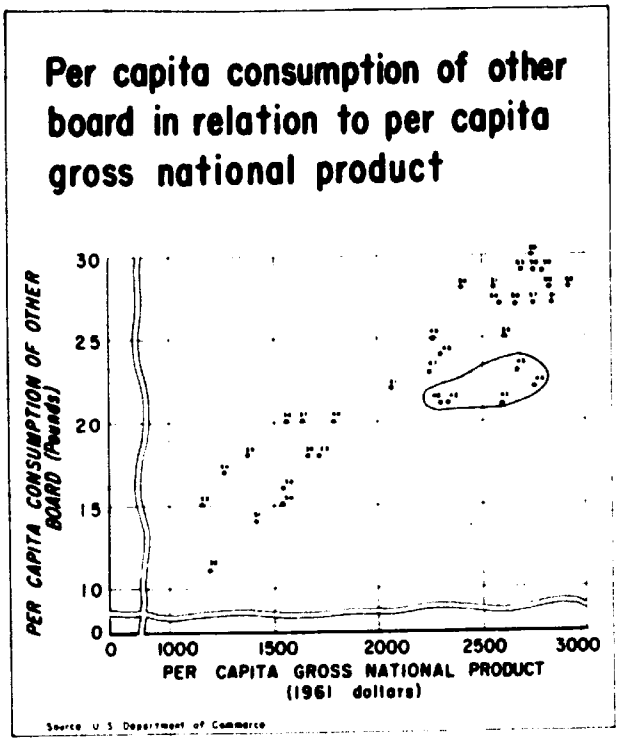


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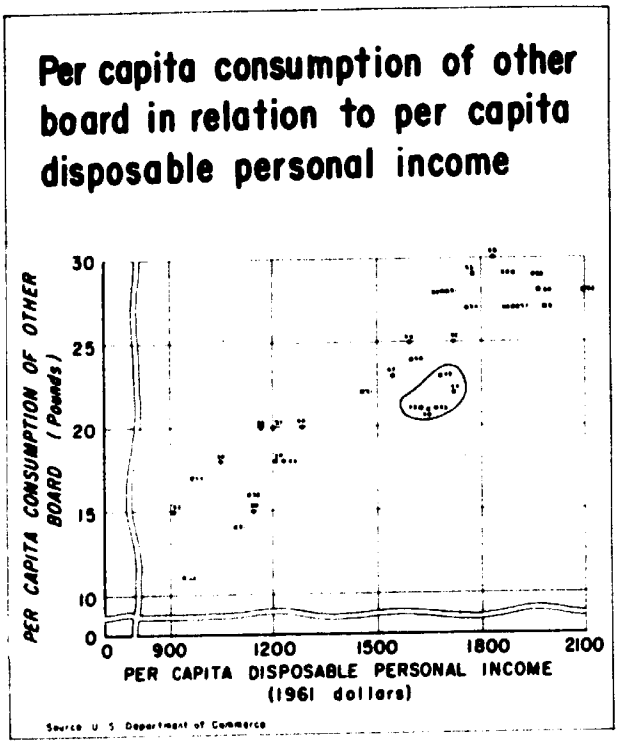


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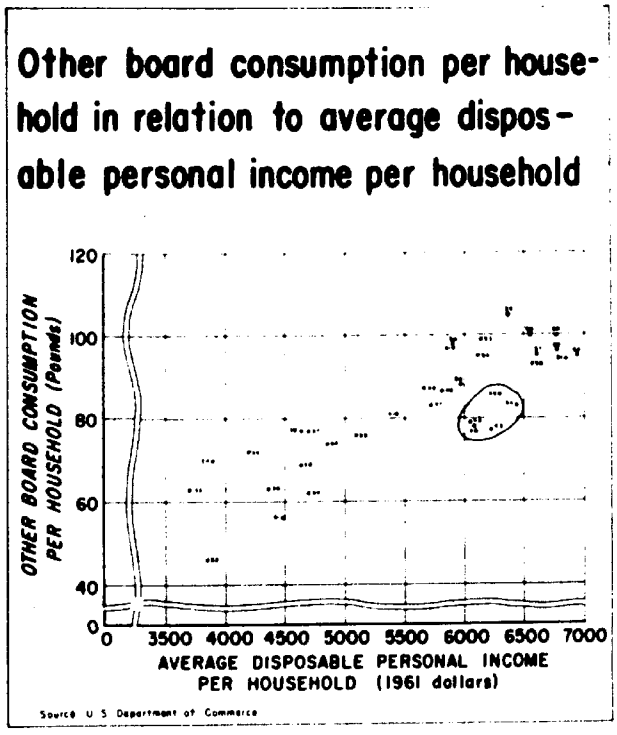


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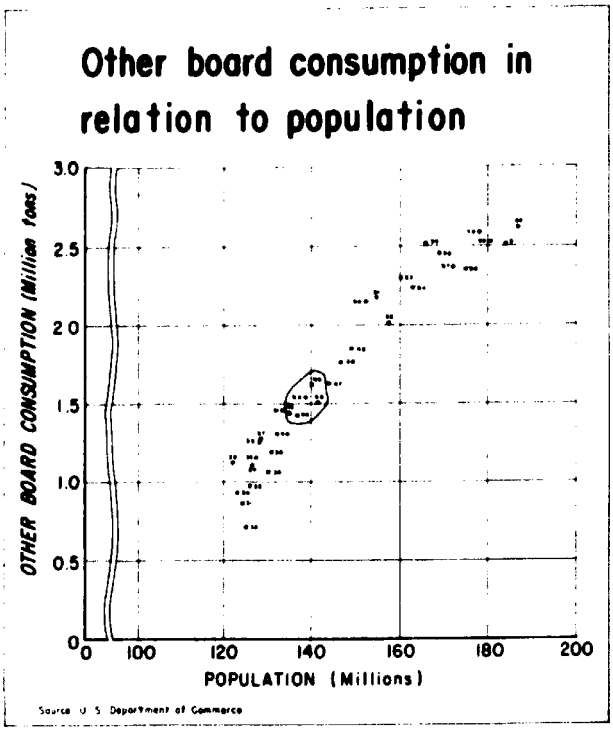


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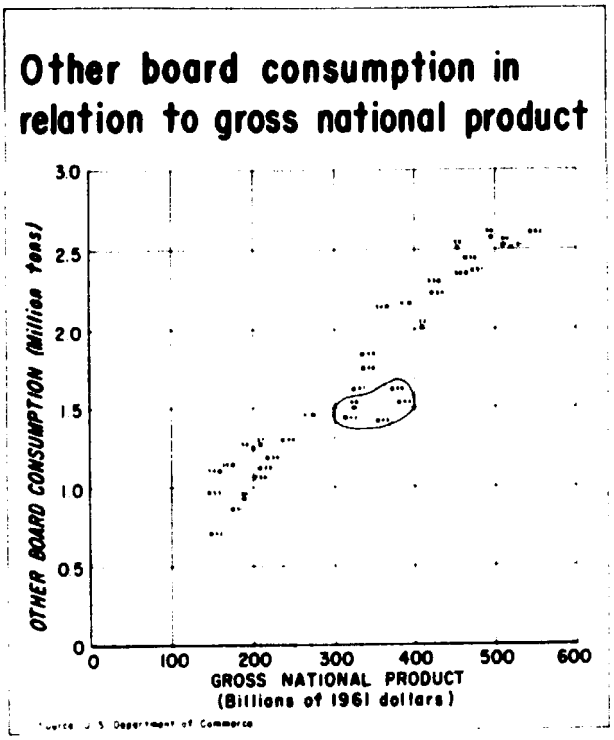


Figure 100.

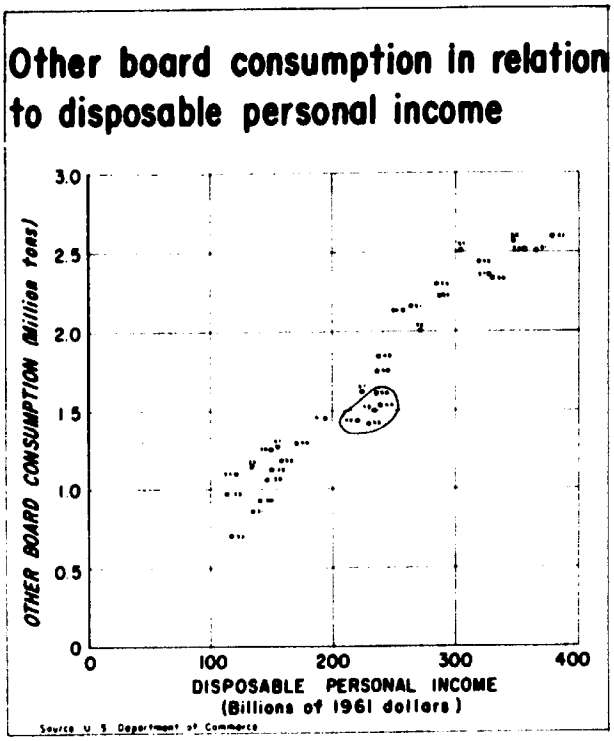


Figure 101.

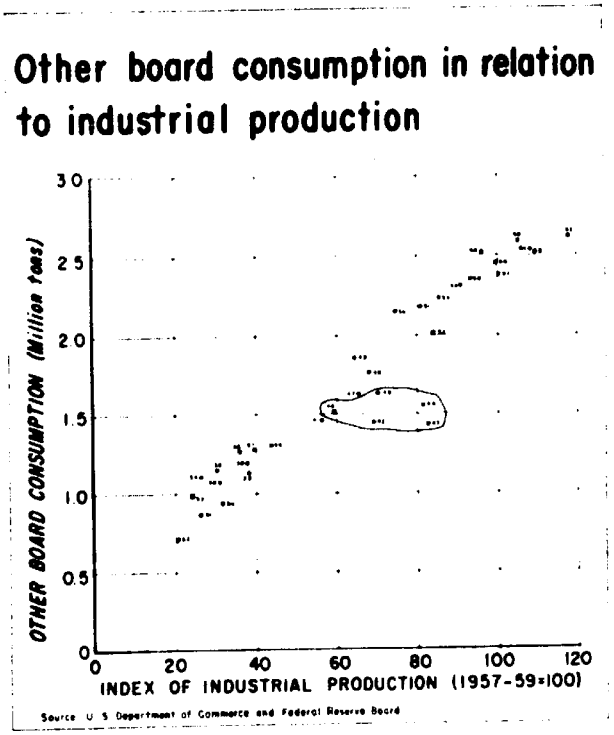


Figure 102.

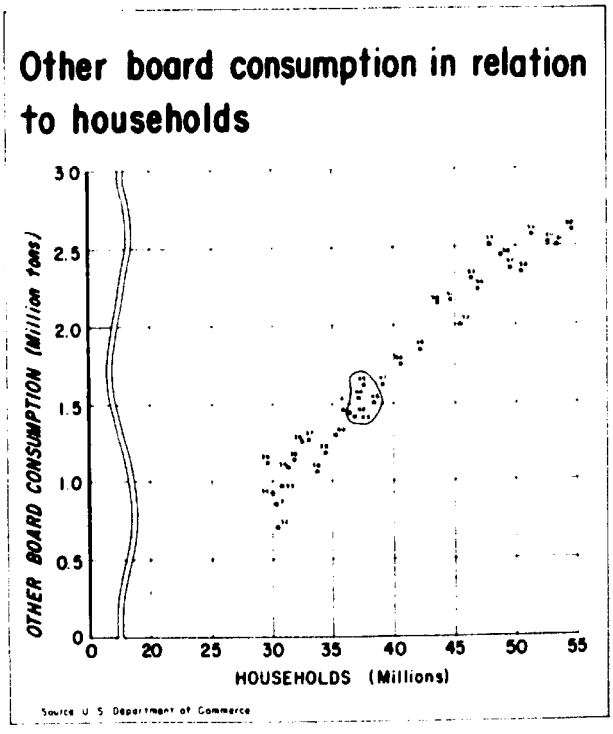


Figure 103.

APPENDIX B

STATISTICAL MEASURES OBTAINED FROM REGRESSION EQUATIONS TESTED FOR USE IN MAKING LONGRUN PROJECTIONS OF TRENDS IN DEMAND FOR MAJOR GRADES OF PAPER AND BOARD

Methodology Note

The projections of population and economic activity shown in table 16 of this Appendix, were used as the independent variables in making the projections of demand for paper and board shown in tables 1 through 15[1/]. The examples below illustrate the actual steps involved in making the projections. In these examples, per capita newsprint demand is the dependent variable. The period 1948-63 is used as the base time period and 1985 as the projection year. Because they are somewhat different, the calculations are carried through for each of the regression equations--$Y = a + b X$, $Y = a + b \log X$, and $\log Y = a + b \log X$.

(a) Projected per capita newsprint demand in 1985 obtained from use of the equation $Y = a + b X$ where:

Y = projected per capita newsprint demand in 1985.

a = 46.6191. The value of the a regression coefficient obtained when the equation $Y = a + b X$ is fitted to data showing per capita newsprint consumption and per capita gross national product in the 1948-63 period (see this Appendix, table 1).

b = 0.0114. The value of the b regression coefficient obtained when the equation $Y = a + b X$ is fitted to data showing per capita newsprint consumption and per capita gross national product in the 1948-63 period (see this Appendix, table 1).

X = $4520. The projected per capita gross national product in 1985 (see this Appendix, table 16).

[1/] Revised and higher projections of population and economic activity (see text table 8) were used in making the projections of demand for paper and board adopted in this study (see text tables 9 and 10).

Using the above values:

$Y = 46.6191 + 0.0114 \cdot 4520$

$= 46.6191 + 51.5280$

= 98.1471 pounds--the projected per capita newsprint demand in 1985.

(b) Projected per capita newsprint demand in 1985 obtained from use of the equation $Y = a + b \log X$ where:

Y = projected per capita newsprint consumption in 1985.

a = -157.3733. The value of the a regression coefficient obtained when the equation $Y = a + b \log X$ is fitted to data showing per capita newsprint consumption and the logarithms of per capita gross national product in the 1948-63 period (see this Appendix, table 1).

b = 68.6082. The value of the b regression coefficient obtained when the equation $Y = a + b \log X$ is fitted to data showing per capita newsprint consumption and the logarithms of per capita gross national product in the 1948-63 period (see this Appendix, table 1).

log X = 3.65514. The logarithm of the projected value ($4520) of per capita gross national product in 1985 (see this Appendix, table 16).

Using the above values:

$Y = -157.3733 + 68.6082 \cdot 3.65514$

$= 250.7726 + 157.3733$

= 92.3943 pounds--the projected per capita newsprint demand in 1985.

(c) Projected per capita newsprint demand in 1985 obtained from use of the equation $\log Y = a + b \log X$ where:

log Y = the logarithm of projected per capita newsprint consumption in 1985.

$\underline{a}$ = 0.5446. The value of the $\underline{a}$ regression coefficient obtained when the equation $\log Y = a + b \log X$ is fitted to the logarithms of per capita newsprint consumption and per capita gross national product in the 1948-63 period (see this Appendix, table 1).

$\underline{b}$ = 0.3919. The value of the $\underline{b}$ regression coefficient obtained when the equation $\log Y = a + b \log X$ is fitted to the logarithms of per capita newsprint consumption and per capita gross national product in the 1948-63 period (see this Appendix, table 1).

$\log X$ = 3.65514. The logarithm of the projected value ($4520) of per capita gross national product in 1985 (see this Appendix, table 16).

Using the above values:

$$\log Y = 0.5446 + 0.3919 \cdot 3.65514$$

$$= 0.5446 + 1.4324 = 1.9770$$

the antilog of 1.9770 = 94.84 pounds--the projected per capita newsprint demand in 1985.

The projection of total newsprint consumption in tons, for each of the above equations, was derived by multiplying the projected per capita consumption in pounds by projected population (see this Appendix table 16), and dividing by 2,000 (the conversion from pounds to tons).

The $\underline{a}$ and $\underline{b}$ coefficients shown above and in the following tables can be used with any given projection of population, gross national product, or the other related measures of economic activity. It should be noted that common logarithms have been used in all of the simple regression equations and natural logarithms in the multiple regression equations.

The calculated values of the dependent variables; the residuals, i.e., the difference between the actual and calculated values for the dependent variables; and the correlation coefficients between the

independent variables and the coefficients or indexes of partial correlation and determination for the multiple regressions are available in computer "print outs" on file in the Washington Office of the Forest Service.

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Table 1.--Statistical measures obtained from regression equations tested for use in forecasting demand for newsprint

Variables, time period, and mathematical function	Regression coefficients			Standard errors of estimate 1/	Standard errors of b coefficients 2/		Coefficient or index of correlation 1/	Coefficient or index of determination 3/	Degrees of freedom	F ratio, 1% point 4/	Projected demand							
											1975		1980		1985		1990	
	a	b	b_1			b_1					Per capita	Total	Per capita	Total	Per capita	Total	Per capita	Total
											Pounds	Thousand tons	Pounds	Thousand tons	Pounds	Thousand tons	Pounds	Thousand tons
Per capita newsprint consumption is a function of per capita disposable personal income																		
1929-61 6/																		
$Y = a + b X$	16.7233	0.0313	--	2.9352	0.0016	--	.972	.945	26	21.2	95.32	9,771	103.51	11,541	111.10	13,338	120.51	15,666
$Y = a + b \log X$ 2/	-274.3906	127.6865	--	2.3007	4.8362	--	.975	.951	26	12.3	99.64	10,213	93.32	10,472	97.84	11,790	102.29	13,295
$\log Y = a + b \log X$ 2/	-0.5420	0.749	--	0.0197	0.0360	--	.977	.954	26	21.2	96.52	9,930	103.17	11,260	107.7[illegible]	12,975	115.57	15,024
1947-61																		
$Y = a + b X$	11.[illegible]	0.[illegible]	--	2.5797	0.0068	--	.[illegible]	.[illegible]	13	9.2	91.17	9,452	98.39	10,662	102.5[illegible]	12,361	109.65	14,255
$Y = a + b \log X$ 2/	-256.[illegible]	122.[illegible]	--	2.5198	19.0000	--	.[illegible]	.[illegible]	13	5.[illegible]	89.31	9,256	93.38	11,412	97.[illegible]	11,731	101.33	13,173
$\log Y = a + b \log X$ 2/	0.[illegible]	0.[illegible]	--	.[illegible]	.[illegible]	--	.[illegible]	.[illegible]	13	9.2	90.[illegible]	9,[illegible]	95.[illegible]	10,703	100.[illegible]	12,164	106.87	13,893
1948-62																		
$Y = a + b X$	87.[illegible]	-[illegible]	--	2.[illegible]	.[illegible]	--	.[illegible]	.[illegible]	13	[illegible]	86.29	8,993	99.[illegible]	10,312	93.[illegible]	11,[illegible]	98.39	12,752
$Y = a + b \log X$ 2/	-166.[illegible]	80.[illegible]	--	1.[illegible]	14.[illegible]	--	.[illegible]	.632	13	[illegible]	85.17	[illegible],[illegible]	87.[illegible]	9,[illegible]	90.[illegible]	10,[illegible]	93.22	12,119
$\log Y = a + b \log X$ 2/	0.6[illegible]	0.[illegible]	--	.[illegible]	.[illegible]	--	.[illegible]	.[illegible]	13	[illegible]	85.67	8,906	90.[illegible]	9,[illegible]	91.[illegible]	11,[illegible]	95.20	12,376
Per capita newsprint consumption is a function of per capita gross national product																		
1920-61 6/																		
$Y = a + b X$	19.[illegible]	.[illegible]	--	3.[illegible]	.[illegible]	--	.[illegible]	.[illegible]	39	21.2	93.38	9,[illegible]	101.64	11,[illegible]	109.31	13,172	118.29	15,[illegible]
$Y = a + b \log X$ 2/	-260.[illegible]	98.[illegible]	--	3.[illegible]	.[illegible]	--	.[illegible]	.[illegible]	39	23.1	87.77	9,128	91.[illegible]	13,[illegible]	95.76	11,539	99.83	12,9[illegible]
$\log Y = a + b \log X$ 2/	-[illegible].5235	.[illegible]	--	.[illegible]	.[illegible]	--	.[illegible]	.[illegible]	39	19.3	92.62	9,632	99.31	11,[illegible]	106.55	12,719	113.90	14,[illegible]
1947-61																		
$Y = a + b X$	35.[illegible]	-[illegible]	--	[illegible]	.[illegible]	--	.[illegible]	.[illegible]	13	9.3	90.[illegible]	9,[illegible]	96.[illegible]	11,[illegible]	102.[illegible]	12,[illegible]	110.20	14,[illegible]
$Y = a + b \log X$ 2/	-[illegible].[illegible]	132.[illegible]	--	[illegible].[illegible]	[illegible].[illegible]	--	.[illegible]	.[illegible]	13	5.[illegible]	89.[illegible]	9,192	92.[illegible]	10,[illegible]	96.73	11,[illegible]	100.38	13,127
$\log Y = a + b \log X$ 2/	-[illegible].[illegible]	[illegible].[illegible]	--	.[illegible]	.[illegible]	--	.[illegible]	.[illegible]	13	9.2	89.[illegible]	9,[illegible]	94.24	10,619	100.50	12,[illegible]	106.53	13,845
1947-61																		
$Y = a + b X$	[illegible].[illegible]	[illegible].[illegible]	--	[illegible].[illegible]	.[illegible]	--	.[illegible]	.[illegible]	13	9.6	90.[illegible]	9,[illegible]	96.25	10,[illegible]	101.[illegible]	12,[illegible]	107.[illegible]	14,[illegible]
$Y = a + b \log X$ 2/	-[illegible].[illegible]	[illegible].[illegible]	--	[illegible].[illegible]	[illegible].[illegible]	--	.[illegible]	.[illegible]	13	5.[illegible]	87.[illegible]	9,[illegible]	91.75	10,230	95.[illegible]	11,[illegible]	99.[illegible]	12,[illegible]
$\log Y = a + b \log X$ 2/	-[illegible].[illegible]	[illegible].[illegible]	--	[illegible].[illegible]	.[illegible]	--	.[illegible]	.[illegible]	13	[illegible].[illegible]	90.[illegible]	9,[illegible]	93.[illegible]	10,[illegible]	96.[illegible]	11,[illegible]	100.43	13,[illegible]
1947-[illegible]																		
$Y = a + b X$	[illegible].[illegible]	[illegible].[illegible]	--	[illegible].[illegible]	.[illegible]	--	.[illegible]	.[illegible]	13	[illegible].[illegible]	87.71	9,[illegible]	92.93	10,[illegible]	98.[illegible]	11,[illegible]	104.25	13,[illegible]
$Y = a + b \log X$ 2/	-[illegible].[illegible]	[illegible].[illegible]	--	[illegible].[illegible]	[illegible].[illegible]	--	.[illegible]	.[illegible]	13	5.[illegible]	[illegible].[illegible]	[illegible],[illegible]	[illegible].[illegible]	[illegible].[illegible]	93.[illegible]	11,[illegible]	97.[illegible]	12,659
$\log Y = a + b \log X$ 2/	.[illegible]	[illegible]	--	.[illegible]	.[illegible]	--	.[illegible]	.[illegible]	13	[illegible].[illegible]	[illegible].[illegible]	[illegible],[illegible]	[illegible].[illegible]	[illegible].[illegible]	98.[illegible]	11,[illegible]	101.[illegible]	13,[illegible]
1940-61																		
$Y = a + b X$	[illegible].[illegible]	[illegible]	--	[illegible].[illegible]	[illegible].[illegible]	--	.[illegible]	.[illegible]	[illegible]	[illegible].[illegible]	[illegible].[illegible]	[illegible],[illegible]	[illegible].[illegible]	[illegible].[illegible]	98.52	11,631	101.[illegible]	13,[illegible]
$Y = a + b \log X$ 2/	-[illegible].[illegible]	[illegible].[illegible]	--	[illegible].[illegible]	[illegible].[illegible]	--	.[illegible]	.[illegible]	[illegible]	[illegible].[illegible]	[illegible].[illegible]	[illegible],[illegible]	[illegible].[illegible]	[illegible].[illegible]	91.[illegible]	11,[illegible]	95.[illegible]	12,357
$\log Y = a + b \log X$ 2/	.[illegible]	.[illegible]	--	.[illegible]	.[illegible]	--	.[illegible]	.[illegible]	[illegible]	[illegible].[illegible]	[illegible].[illegible]	[illegible],[illegible]	[illegible].[illegible]	[illegible].[illegible]	95.[illegible]	11,[illegible]	[illegible].[illegible]	12,[illegible]
1940-[illegible]																		
$Y = a + b X$	[illegible].[illegible]	[illegible].[illegible]	--	[illegible].[illegible]	[illegible].[illegible]	--	.[illegible]	.[illegible]	[illegible]	[illegible].[illegible]	[illegible].[illegible]	[illegible],[illegible]	[illegible].[illegible]	[illegible].[illegible]	[illegible].[illegible]	[illegible].[illegible]	[illegible].[illegible]	[illegible].[illegible]
$Y = a + b \log X$ 2/	[illegible].[illegible]	[illegible].[illegible]	--	[illegible].[illegible]	[illegible].[illegible]	--	.[illegible]	.[illegible]	[illegible]	[illegible].[illegible]	[illegible].[illegible]	[illegible],[illegible]	[illegible].[illegible]	[illegible].[illegible]	[illegible].[illegible]	[illegible].[illegible]	[illegible].[illegible]	[illegible].[illegible]
$\log Y = a + b \log X$ 2/	.[illegible]	.[illegible]	--	.[illegible]	.[illegible]	--	.[illegible]	.[illegible]	[illegible]	[illegible].[illegible]	[illegible].[illegible]	[illegible],[illegible]	[illegible].[illegible]	[illegible].[illegible]	[illegible].[illegible]	[illegible].[illegible]	[illegible].[illegible]	[illegible].[illegible]

Table 1.--Statistical measures obtained from regression equations tested for use in projecting demand for newsprint--Continued

Variables, time period, and mathematical function	Regression coefficients			Standard errors of estimate 1/	Standard errors of b coefficients 2/		Coefficient or index of correlation 1/	Coefficient or index of determination 1/	Degrees of freedom	F or t ratios 2/	Projected Demand							
											1970		1975		1980		1985	
	a	b	b_1		b	b_1					Per capita	Total	Per capita	Total	Per capita	Total	Per capita	Total
											Pounds	Thousand tons	Pounds	Thousand tons	Pounds	Thousand tons	Pounds	Thousand tons
1948-63																		
Y = a + b X	46.6191	0.0114	--	1.9570	0.0024	--	0.785	[illegible]	14	[illegible]	[illegible]	8,891	89.46	9,977	93.47	11,263	96.15	12,762
Y = a + b log X 1/	-157.8753	68.6082	--	1.9829	14.4180	--	0.786	[illegible]	14	[illegible]	84.51	9,786	87.84	9,746	90.38	10,952	92.89	12,379
log Y = a + b log X 1/	0.5446	0.3919	--	0.0111	0.0822	--	0.787	[illegible]	14	[illegible]	84.94	9,834	88.24	9,844	91.39	11,314	94.34	12,329
1949-61																		
Y = a + b X	48.8991	0.0107	--	1.8708	0.0032	--	0.706	0.499	11	3.3	85.39	9,861	[illegible]	[illegible]	92.96	11,190	97.26	12,644
Y = a + b log X 1/	-134.2166	61.7983	--	1.9072	14.4399	--	0.692	[illegible]	11	3.2	84.15	9,746	86.72	9,864	[illegible]	10,730	91.66	11,914
log Y = a + b log X 1/	0.7309	0.3468	--	0.0127	0.1389	--	[illegible]	[illegible]	11	3.2	84.36	9,773	87.28	[illegible]	90.[illegible]	10,745	93.01	12,092
1949-62																		
Y = a + b X	49.2455	0.0108	--	1.7920	0.0028	--	[illegible]	0.538	12	3.7	85.39	8,961	89.11	9,935	92.81	11,154	97.16	12,631
Y = a + b log X 1/	-134.5184	61.8869	--	1.8260	17.1362	--	0.722	0.521	12	3.6	84.11	9,747	86.74	9,672	89.13	10,740	91.69	11,920
log Y = a + b log X 1/	0.6996	0.3472	--	0.0132	0.1360	--	0.722	0.521	12	3.6	84.37	9,774	87.26	[illegible]	90.01	10,846	93.05	12,097
1949-63																		
Y = a + b X	52.8081	0.0092	--	1.7975	0.0025	--	0.714	0.509	13	3.7	84.18	8,755	[illegible]	[illegible]	90.62	10,980	94.39	12,271
Y = a + b log X 1/	-111.9161	55.2605	--	1.8098	15.2487	--	0.709	0.503	13	3.6	83.31	8,664	85.65	9,552	[illegible]	10,573	90.27	11,729
log Y = a + b log X 1/	0.6248	0.3105	--	0.0131	0.0954	--	0.710	0.504	13	3.6	83.50	8,684	86.04	9,596	88.44	11,063	91.14	11,848
Newsprint consumption per household is a function of average disposable personal income per household																		
1929-61 6/																		
Y = a + b X	83.6525	0.0291	--	11.1986	0.0021	--	0.934	[illegible]	28	13.4	2/ 316.45	9,869	2/ 336.82	11,366	2/ 357.19	13,127	2/ 383.38	15,239
Y = a + b log X 1/	-1070.4444	351.9787	--	10.5501	24.5936	--	0.942	0.887	28	14.3	2/ 303.36	9,430	2/ 316.15	10,671	2/ 328.01	12,054	2/ 341.99	13,994
log Y = a + b log X 1/	-0.0825	0.6605	--	0.0208	0.0479	--	0.938	0.880	28	13.8	2/ 313.00	9,781	2/ 330.80	11,104	2/ 348.20	12,796	2/ 369.80	14,700
1947-61																		
Y = a + b X	143.5507	0.0195	--	7.6660	0.0049	--	0.739	[illegible]	13	[illegible]	2/ 299.55	9,381	2/ 313.20	10,572	2/ 326.85	12,012	2/ 344.40	13,690
Y = a + b log X 1/	-801.0376	281.0913	--	7.6563	70.7971	--	0.740	0.548	13	[illegible]	2/ 298.[illegible]	9,252	2/ 306.33	10,339	2/ 315.77	11,605	2/ 328.94	12,996
log Y = a + b log X 1/	0.6636	0.4639	--	0.0129	0.1195	--	[illegible]	[illegible]	13	[illegible]	2/ [illegible]	9,312	2/ 309.83	10,456	2/ 321.15	11,802	2/ 335.10	13,320
Newsprint consumption is a function of population																		
1926-62 6/																		
Y = a + b X	-5119.8884	68.8671	--	333.7306	2.2573	--	0.981	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	91.81	10,237	95.24	11,477	98.35	12,756
Y = a + b log X 1/	-44043.0670	22694.4010	--	343.7794	777.4351	--	0.980	[illegible]	[illegible]	[illegible]	82.35	9,564	82.98	9,250	83.11	10,015	82.79	10,763
log Y = a + b log X 1/	-1.0467	2.1839	--	0.0426	0.0967	--	0.987	[illegible]	[illegible]	[illegible]	99.23	10,330	107.80	12,020	116.17	14,240	125.23	16,300
1948-62																		
Y = a + b X	-2448.7550	53.3206	--	101.[illegible]	1.3727	--	0.975	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	9,442	86.32	10,402	87.41	11,419
Y = a + b log X 1/	-35855.7150	20396.0990	--	150.[illegible]	1,[illegible]	--	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	9,342	80.75	9,730	80.02	10,402
log Y = a + b log X 1/	[illegible]	1.3950	--	[illegible]	[illegible]	--	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	86.93	[illegible]	89.21	10,750	91.92	11,950

Table 1.--Statistical measures obtained from regression equations tested for use in projecting demand for newsprint--Continued

Variables, time period, and mathematical function	Regression coefficients			Standard errors of estimate 1/	Standard errors of b coefficients 2/		Coefficient or index of correlation 3/	Coefficient or index of determination 4/	Degrees of freedom	F or t ratios 5/	Projected Demand							
											1970		1975		1980		1985	
	a	b	b_1		b	b_1					Per capita	Total	Per capita	Total	Per capita	Total	Per capita	Total
											Pounds	Thousand tons	Pounds	Thousand tons	Pounds	Thousand tons	Pounds	Thousand tons
Newsprint consumption is a function of gross national product																		
1920-62 6/																		
Y = a + b X	349.2199	12.3243	--	237.6041	0.2887	--	0.991	0.981	36	42.7	93.26	9,699	101.36	11,302	109.13	13,150	118.69	15,430
Y = a + b log X 7/	-15491.8370	8286.5087	--	249.6643	204.1828	--	0.990	0.979	36	40.6	78.88	8,135	78.39	8,740	77.44	9,332	76.52	9,948
log Y = a + b log X 7/	1.6830	0.8039	--	0.0294	0.0240	--	0.989	0.970	36	33.5	90.80	9,443	96.95	10,810	102.41	12,340	108.92	14,160
1948-62																		
Y = a + b X	1706.5412	10.6471	--	154.8253	0.6424	--	0.977	0.955	13	16.6	89.10	9,266	95.52	10,650	101.63	12,247	109.36	14,217
Y = a + b log X 7/	-22157.1170	10439.3810	--	177.4182	727.2239	--	0.970	0.941	13	14.4	82.77	8,608	84.04	9,371	83.95	10,116	83.78	10,892
log Y = a + b log X 7/	1.9083	0.7180	--	0.0115	0.0473	--	0.973	0.947	13	15.2	86.79	9,025	91.30	10,180	95.10	11,460	99.69	12,960
Newsprint consumption is a function of disposable personal income																		
1929-62 6/																		
Y = a + b X	873.2605	18.0775	--	203.1235	0.4415	--	0.992	0.985	27	40.9	99.31	9,912	103.49	11,539	110.76	13,387	120.75	15,697
Y = a + b log X 7/	-16179.1320	9108.3492	--	229.9488	252.3864	--	0.990	0.980	27	36.1	80.81	8,604	81.25	9,099	80.32	9,678	79.70	10,361
log Y = a + b log X 7/	1.7597	0.8241	--	0.0184	0.0202	--	0.992	0.985	27	40.8	92.65	9,636	99.10	11,090	104.32	12,570	111.46	14,490
1948-62																		
Y = a + b X	1894.7019	14.8756	--	137.9818	0.7961	--	0.982	0.964	13	18.7	89.74	9,333	95.70	10,671	100.90	12,159	108.41	14,093
Y = a + b log X 7/	-19085.8330	10291.2620	--	137.0369	946.8198	--	0.982	0.965	13	18.8	83.96	8,690	84.82	9,457	84.07	10,130	83.85	10,901
log Y = a + b log X 7/	2.0582	0.7048	--	0.0097	0.0366	--	0.981	0.963	13	18.3	87.76	9,129	92.02	10,260	95.10	11,460	99.54	12,940
Newsprint consumption is a function of households																		
1920-62 6/																		
Y = a + b X	-2020.5424	175.1406	--	310.3417	5.3977	--	0.983	0.967	36	32.4	85.83	8,926	87.90	9,801	90.06	10,852	91.56	11,903
Y = a + b log X 7/	-19019.4730	15100.3710	--	374.2908	565.6923	--	0.976	0.952	36	26.7	77.88	8,099	77.17	8,604	76.03	9,162	74.43	9,676
log Y = a + b log X 7/	1.3398	1.4661	--	0.0310	0.0604	--	0.971	0.942	36	24.3	90.30	9,391	94.26	10,510	98.84	11,910	102.79	13,363
1947-62																		
f = a + b X	-1897.5100	173.4198	--	154.5999	8.7148	--	0.983	0.966	14	19.9	85.97	8,941	87.96	9,808	90.03	10,849	91.45	11,869
f = a + b log X 7/	-24882.9840	18643.0660	--	146.7147	887.5798	--	0.985	0.969	14	21.0	82.67	8,598	82.70	9,221	82.24	9,910	81.12	10,546
log Y = a + b log X 7/	1.5762	1.3270	--	0.0114	0.0688	--	0.982	0.964	14	19.3	87.56	9,106	90.49	10,090	93.69	11,290	96.38	12,530
Newsprint consumption is a function of population and per capita gross national product																		
1920-61 6/																		
Y = a + b X + b_1 X_1	-3373.3533	37.4356	1.3409	212.5440	4.6603	0.1836	0.992	0.984	34	54.9	86.40	8,986	89.84	10,017	92.61	11,160	95.55	12,421
Y = a + b log X + b_1 log X_1 8/	-42133.2300	5987.5533	2271.6862	220.9658	584.1799	114.1799	0.991	0.983	34	53.8	79.86	8,305	80.21	8,943	79.75	9,610	79.08	10,281
log Y = a + b log X + b_1 log X_1 8/	-2.0707	1.1626	0.6215	0.0673	0.1780	0.0956	0.989	0.989	34	63.5	94.24	9,801	101.26	11,291	108.40	13,062	116.42	15,135

Table 1.--Statistical measures obtained from regression equations tested for use in projecting demand for newsprint--Continued

Variables, time period, and mathematical function	Regression coefficients			Standard errors of estimate 1/	Standard errors of b coefficients 2/		Coefficient or index of correlation 3/	Coefficient or index of determination 4/	Degrees of freedom	F or t ratios 5/	Projected Demand							
											1970		1975		1980		1985	
	a	b	b_1		b	b_1					Per capita	Total	Per capita	Total	Per capita	Total	Per capita	Total
											Pounds	Thousand tons	Pounds	Thousand tons	Pounds	Thousand tons	Pounds	Thousand tons
1947-61																		
$Y = a + b X + b_1 X_1$	-3646.4256	41.9881	1.1584	204.9843	10.6069	0.6995	0.970	0.941	12	3.3	86.89	9,037	90.34	10,073	93.23	11,234	96.20	12,506
$Y = a + b \log X + b_1 \log X_1$ 6/	-30867.9840	7741.0743	2170.5323	187.5490	1608.2999	1536.8931	0.975	0.950	12	2.2	83.71	8,706	84.83	9,458	85.08	10,252	84.96	11,045
$\log Y = a + b \log X + b_1 \log X_1$ 6/	-1.0625	1.1063	0.5889	0.0352	0.3017	0.2864	0.968	0.937	12	3.7	90.05	9,365	95.61	10,661	100.96	12,166	107.03	13,914
Newsprint consumption is a function of population and per capita disposable personal income:																		
1929-61 7/																		
$Y = a + b X + b_1 X_1$	-3433.2978	38.4817	8.4832	205.5310	6.9607	0.3728	0.998	0.984	25	25.5	87.88	9,139	91.33	10,183	93.98	11,325	97.18	12,633
$Y = a + b \log X + b_1 \log X_1$ 6/	-46089.9830	6710.6977	2421.2574	214.1188	844.6716	455.5019	0.991	0.982	25	29.4	82.48	8,578	83.11	9,267	82.91	9,991	82.94	10,730
$\log Y = a + b \log X + b_1 \log X_1$ 6/	-1.6165	0.7799	0.8510	0.0451	0.1780	0.0960	0.991	0.982	25	30.0	92.33	9,602	98.30	10,960	103.77	12,904	110.65	14,384
1947-61																		
$Y = a + b X + b_1 X_1$	-3875.1434	9.5815	4.8004	186.0414	21.6744	1.9121	0.975	0.951	12	0.1	90.37	9,398	96.94	10,986	97.84	11,790	108.02	13,863
$Y = a + b \log X + b_1 \log X_1$ 6/	-56664.1090	3697.4652	9911.9449	183.4985	3852.8690	3633.7885	0.976	0.952	12	1.0	85.28	8,869	86.67	9,664	86.67	10,444	86.79	11,283
$\log Y = a + b \log X + b_1 \log X_1$ 6/	-2.1704	0.3299	1.2315	0.0396	0.7674	0.7049	0.967	0.935	12	0.2	92.86	9,657	99.19	11,060	104.81	12,981	111.96	14,503
Newsprint consumption is a function of households and average disposable personal income per household:																		
1929-61 7/																		
$Y = a + b X + b_1 X_1$	-3089.2887	114.5728	0.6284	206.5561	15.0892	0.1241	0.992	0.983	25	26.2	87.61	9,111	90.75	10,119	93.29	11,242	96.08	12,490
$Y = a + b \log X + b_1 \log X_1$ 6/	-37653.0890	4908.6975	8862.7802	254.9103	648.9601	700.1771	0.987	0.975	25	17.4	80.52	8,374	80.64	8,991	79.93	9,631	79.05	10,278
$\log Y = a + b \log X + b_1 \log X_1$ 6/	-2.0983	0.7633	0.9032	0.0497	0.1220	0.1317	0.990	0.980	25	40.7	92.84	9,655	99.07	11,046	104.90	12,640	112.13	14,577
1947-61																		
$Y = a + b X + b_1 X_1$	-2464.3818	173.7387	0.0418	171.8100	36.2149	0.3747	0.979	0.958	12	0.01	86.82	9,029	89.03	9,927	91.27	10,998	98.91	12,078
$Y = a + b \log X + b_1 \log X_1$ 6/	-38390.6360	7317.9837	1201.6648	176.2735	1514.9649	2107.9053	0.978	0.956	12	0.4	83.39	8,668	83.70	9,332	83.39	10,049	82.96	10,733
$\log Y = a + b \log X + b_1 \log X_1$ 6/	4.1665	1.4806	-0.1023	0.0308	0.2649	0.3685	0.975	0.951	12	0.1	87.98	9,150	90.76	10,120	94.03	11,331	98.54	12,550

1/ A measure of the closeness with which values of a dependent variable can be estimated from the values of an independent variable(s).
2/ A measure of the closeness with which the true values of the regression coefficients can be estimated from the values in the sample.
3/ A measure of the degree of relationship between the dependent and independent variable(s).
4/ A measure of the percent of the variation in the values of the dependent variable that is associated with variation in values of the independent variable(s).
5/ A measure of the probability that the given values of b might have been obtained by chance from a population in which the true regression coefficient is zero.
6/ Excepting the war years 1942-46.
7/ Expressed in common logarithms.
8/ Expressed in natural logarithms.
9/ Pounds per household.

Table 2.--Statistical measures obtained from regression equations tested for use in projecting demand for groundwood paper

Variables, time period, and mathematical function	Regression coefficients			Standard errors of estimate [1]	Standard errors of b coefficients [2]		Coefficient or index of correlation [3]	Coefficient or index of determination [4]	Degrees of freedom	F or t ratios [5]	Projected Demand							
											1970		1975		1980		1985	
	a	b	b_1		b	b_1					Per capita	Total	Per capita	Total	Per capita	Total	Per capita	Total
											Pounds	Thousand tons	Pounds	Thousand tons	Pounds	Thousand tons	Pounds	Thousand tons
Per capita groundwood paper consumption is a function of per capita disposable personal income																		
1929-61 [6]																		
$Y = a + b X$	-0.2951	0.0058	--	1.3237	0.0007	--	0.852	0.725	26	8.3	13.62	1,416	14.46	1,864	16.29	1,983	17.95	2,334
$Y = a + b \log X$ [7]	-53.0877	19.4251	--	1.2242	2.1139	--	0.875	0.765	26	9.2	12.57	1,307	13.35	1,729	14.05	1,693	14.85	1,930
$\log Y = a + b \log X$ [7]	-3.0691	1.2550	--	0.1051	0.1315	--	0.865	0.648	26	9.5	14.90	1,550	16.71	1,963	18.56	2,236	20.91	2,718
1947-61																		
$Y = a + b X$	9.5401	0.0003	--	0.7350	0.0014	--	0.069	0.005	13	0.3	10.26	1,067	10.33	1,152	10.40	1,253	10.48	1,362
$Y = a + b \log X$ [7]	6.3556	1.1678	--	0.7356	5.5666	--	0.068	0.003	13	0.2	10.30	1,071	10.35	1,154	10.39	1,252	10.44	1,357
$\log Y = a + b \log X$ [7]	0.7978	0.0639	--	0.0312	0.2361	--	0.075	0.006	13	0.3	10.32	1,073	10.38	1,157	10.44	1,258	10.50	1,365
Per capita groundwood paper consumption is a function of per capita gross national product																		
1929-61 [6]																		
$Y = a + b X$	-1.9576	0.0047	--	1.5441	0.0004	--	0.872	0.761	35	10.6	14.07	1,403	15.71	1,752	17.36	2,092	19.29	2,508
$Y = a + b \log X$ [7]	-62.0776	21.1586	--	1.4722	1.8825	--	0.889	0.783	35	11.2	12.69	1,320	13.55	1,511	14.37	1,732	15.25	1,983
$\log Y = a + b \log X$ [7]	-4.1500	1.5129	--	0.1332	0.1703	--	0.832	0.693	35	8.9	15.06	1,629	18.15	2,024	20.77	2,503	23.99	3,117
1947-61																		
$Y = a + b X$	8.9788	0.0005	--	0.7306	0.0010	--	0.130	0.017	13	0.5	10.68	1,111	10.96	1,223	11.03	1,329	11.24	1,461
$Y = a + b \log X$ [7]	1.8717	2.4256	--	0.7315	5.5769	--	0.120	0.014	13	0.4	10.64	1,106	10.54	1,175	10.64	1,282	10.74	1,396
$\log Y = a + b \log X$ [7]	0.5930	0.1208	--	0.0310	0.2361	--	0.141	0.020	13	0.5	10.47	1,089	10.59	1,181	10.71	1,291	10.83	1,408
Groundwood paper consumption per household is a function of average disposable personal income per household																		
1929-61 [6]																		
$Y = a + b X$	-0.4474	0.0052	--	5.4335	0.0011	--	0.731	0.534	26	5.5	[2] 45.93	1,435	[2] 49.99	1,847	[2] 54.05	1,966	[2] 59.27	2,156
$Y = a + b \log X$ [7]	-234.0379	71.0493	--	5.2523	12.2337	--	0.751	0.564	26	5.8	[2] 43.27	1,352	[2] 45.36	1,676	[2] 48.25	1,773	[2] 51.07	2,030
$\log Y = a + b \log X$ [7]	-3.2654	1.1700	--	0.1132	0.2568	--	0.696	0.485	26	4.9	[2] 49.15	1,536	[2] 54.62	1,345	[2] 60.33	2,217	[2] 67.75	2,643
1947-61																		
$Y = a + b X$	36.1532	0.0002	--	1.9469	0.0013	--	-0.132	-0.021	13	-0.1	[2] 35.29	1,102	[2] 35.11	1,115	[2] 34.97	1,285	[2] 34.79	1,353
$Y = a + b \log X$ [7]	42.1549	-3.3283	--	1.9543	26.0000	--	-0.034	-0.001	13	-0.1	[2] 35.16	1,399	[2] 35.04	1,113	[2] 34.93	1,284	[2] 34.81	1,353
$\log Y = a + b \log X$ [7]	1.6003	-0.0134	--	0.0345	0.1192	--	-0.016	-0.0001	13	-0.06	[2] 35.32	1,104	[2] 35.28	1,121	[2] 35.25	1,295	[2] 35.20	1,299

Table 2.--Statistical measures obtained from regression equations tested for use in projecting demand for groundwood paper--Continued

Variables, time period, and mathematical function	Regression coefficients			Standard errors of estimate 1/	Standard errors of b coefficients 2/		Coefficient or index of correlation 3/	Coefficient or index of determination 4/	Degrees of freedom	F or t ratios 5/	Projected Demand							
											1970		1975		1980		1985	
	a	b	b_1		b	b_1					Per capita	Total	Per capita	Total	Per capita	Total	Per capita	Total
											Pounds	Thousand tons	Pounds	Thousand tons	Pounds	Thousand tons	Pounds	Thousand tons
Groundwood paper consumption is a function of population																		
1920-62 6/																		
$Y = a + b X$	-1038.0918	11.2608	--	106.7982	0.7317	--	0.932	0.868	36	15.4	12.54	1,304	13.21	1,473	13.91	1,676	14.54	1,890
$Y = a + b \log X$ 7/	-7519.2449	3765.0874	--	96.4418	217.8974	--	0.945	0.898	36	17.3	11.62	1,208	11.86	1,322	12.02	1,449	12.10	1,573
$\log Y = a + b \log X$ 7/	-5.1463	3.6415	--	0.1413	0.3191	--	0.885	0.783	36	11.4	18.96	1,972	22.79	2,541	27.98	3,371	34.18	4,444
1947-62																		
$Y = a + b X$	77.7426	4.5744	--	56.9853	1.0828	--	0.749	0.560	14	4.2	9.89	1,029	9.85	1,098	9.79	1,180	9.75	1,267
$Y = a + b \log X$ 7/	-3001.7832	1730.2099	--	57.0913	411.1761	--	0.747	0.558	14	4.2	9.70	1,009	9.52	1,061	9.29	1,120	9.05	1,177
$\log Y = a + b \log X$ 7/	0.8908	0.9149	--	0.0304	0.2189	--	0.745	0.555	14	4.2	10.29	1,027	9.82	1,095	9.75	1,175	9.59	1,260
Groundwood paper consumption is a function of gross national product																		
1920-62 6/																		
$Y = a + b X$	-38.3531	1.9876	--	109.4419	0.1329	--	0.988	0.861	36	15.0	13.20	1,373	14.63	1,631	16.01	1,929	17.67	2,297
$Y = a + b \log X$ 7/	-2772.6516	1370.0149	--	89.4592	72.9354	--	0.953	0.907	36	18.8	10.90	1,134	11.07	1,234	11.05	1,331	11.02	1,433
$\log Y = a + b \log X$ 7/	-0.5507	1.3230	--	0.1377	0.1123	--	0.891	0.794	36	11.8	16.01	1,665	18.65	2,080	21.45	2,385	24.95	3,244
1947-62																		
$Y = a + b X$	422.5408	0.9411	--	53.7235	0.2015	--	0.780	0.609	14	4.7	10.49	1,091	10.88	1,213	11.24	1,354	11.75	1,528
$Y = a + b \log X$ 7/	-1946.9463	903.4265	--	54.6979	199.3282	--	0.771	0.595	14	4.5	9.89	1,029	9.82	1,095	9.62	1,159	9.44	1,227
$\log Y = a + b \log X$ 7/	1.6551	0.4796	--	0.0290	0.1056	--	0.772	0.596	14	4.5	10.13	1,053	10.24	1,142	10.25	1,235	10.32	1,341
Groundwood paper consumption is a function of disposable personal income																		
1929-62 6/																		
$Y = a + b X$	63.4301	2.5360	--	99.2651	0.2157	--	0.915	0.837	27	11.8	12.80	1,331	13.99	1,560	15.05	1,813	16.48	2,143
$Y = a + b \log X$ 7/	-2429.2333	1320.1862	--	81.6712	99.6199	--	0.943	0.889	27	14.7	10.90	1,134	11.03	1,230	10.95	1,319	10.91	1,418
$\log Y = a + b \log X$ 7/	0.2387	1.0859	--	0.1116	0.1225	--	0.863	0.744	27	8.9	14.20	1,477	15.87	1,769	17.39	2,096	19.45	2,528
1947-62																		
$Y = a + b X$	443.6270	1.2990	--	55.0122	0.2894	--	0.766	0.590	14	4.5	10.51	1,093	10.85	1,210	11.12	1,340	11.61	1,509
$Y = a + b \log X$ 7/	-1331.4699	875.9829	--	55.5500	198.3958	--	0.763	0.582	14	4.4	9.93	1,033	9.82	1,095	9.59	1,155	9.39	1,221
$\log Y = a + b \log X$ 7/	1.7745	0.4630	--	0.0296	0.1057	--	0.760	0.578	14	4.4	10.16	1,057	10.23	1,141	10.18	1,227	10.22	1,329

Table 2.--Statistical measures obtained from regression equations tested for use in projecting demand for groundwood paper--Continued

Variables, time period, and mathematical function	Regression coefficients			Standard errors of estimate 2/	Standard errors of b coefficients 2/		Coefficient or index of correlation 1/	Coefficient or index of determination 1/	Degrees of freedom	F or t ratios 2/	Projected Demand							
											1970		1975		1980		1985	
	a	b	b_1		b	b_1					Per capita	Total	Per capita	Total	Per capita	Total	Per capita	Total
											Pounds	Thousand tons	Pounds	Thousand tons	Pounds	Thousand tons	Pounds	Thousand tons
Groundwood paper consumption is a function of industrial production																		
1920-62 3/																		
$Y = a + b X$	96.2188	8.4634	--	111.5844	0.5798	--	0.925	0.856	36	14.6	12.77	1,388	13.81	1,540	14.90	1,795	16.05	2,092
$Y = a + b \log X$ 1/	-1353.6402	1121.1321	--	91.2586	61.0128	--	0.951	0.904	36	18.4	10.44	1,086	10.41	1,161	10.27	1,235	10.12	1,315
$\log Y = a + b \log X$ 2/	0.9153	1.0852	--	0.1376	0.0920	--	0.891	0.795	36	11.8	14.44	1,502	15.93	1,776	17.50	2,109	19.25	2,502
1947-62																		
$Y = a + b X$	664.1186	4.0597	--	50.5846	0.7903	--	0.800	0.653	14	5.1	10.32	1,073	10.94	1,175	10.76	1,297	11.37	1,439
$Y = a + b \log X$ 1/	-744.4620	508.4984	--	51.4386	101.5113	--	0.801	0.642	14	5.0	9.76	1,015	9.59	1,069	9.34	1,125	9.08	1,180
$\log Y = a + b \log X$ 2/	2.0804	0.4296	--	0.0272	0.0854	--	0.803	0.644	14	5.0	9.96	1,036	9.93	1,177	9.83	1,185	9.75	1,267
Groundwood paper consumption is a function of households																		
1920-62 4/																		
$Y = a + b X$	-547.3113	29.3835	--	93.6437	1.6287	--	0.945	0.899	36	17.9	12.21	1,270	12.70	1,416	13.30	1,590	13.93	1,755
$Y = a + b \log X$ 1/	-3459.3872	2564.8199	--	80.2744	121.3245	--	0.962	0.925	36	21.1	11.03	1,147	11.04	1,232	11.01	1,327	10.85	1,415
$\log Y = a + b \log X$ 1/	-1.2565	2.5342	--	0.1259	0.1903	--	0.910	0.828	36	13.2	16.74	1,741	18.93	2,111	21.68	2,613	24.46	3,190
1947-62																		
$Y = a + b X$	216.8120	13.0036	--	59.8463	3.3726	--	0.718	0.515	14	3.9	9.30	1,030	9.88	1,095	9.73	1,173	9.62	1,251
$Y = a + b \log X$ 1/	-1470.8081	1376.4569	--	60.6973	367.2003	--	0.709	0.503	14	3.7	9.62	1,301	9.39	1,047	9.11	1,098	8.81	1,145
$\log Y = a + b \log X$ 2/	1.7025	0.7265	--	0.0323	0.1997	--	0.704	0.496	14	3.7	9.78	1,317	9.64	1,075	9.49	1,144	9.32	1,211
Groundwood paper consumption is a function of population and per capita gross national product																		
1920-61 5/																		
$Y = a + b X + b_1 X_1$	-797.4061	6.5435	0.2140	57.9857	2.1454	0.0648	0.964	0.930	34	6.6	12.43	1,093	13.15	1,466	13.77	1,659	14.39	1,871
$Y = a + b \log X + b_1 \log X_1$ 6/	-7402.7745	1053.9736	364.4584	47.8003	234.5537	124.9155	0.959	0.912	34	8.8	11.47	1,188	11.63	1,297	11.71	1,412	11.73	1,525
$\log Y = a + b \log X + b_1 \log X_1$ 6/	-11.7269	2.4079	0.7437	0.0319	0.3443	0.1834	0.992	0.984	34	31.1	19.39	1,911	21.89	2,441	26.20	3,157	31.43	4,066
1947-61																		
$Y = a + b X + b_1 X_1$	-51.6641	1.3763	0.2579	6.4294	3.1734	0.1977	0.748	0.574	12	0.2	10.43	1,090	10.75	1,199	10.88	1,311	11.06	1,440
$Y = a + b \log X + b_1 \log X_1$ 6/	-5011.7309	298.3914	549.1734	63.3346	343.6318	516.1156	0.739	0.547	12	0.3	11.06	1,048	10.07	1,123	9.92	1,195	9.77	1,270
$\log Y = a + b \log X + b_1 \log X_1$ 6/	-0.7275	0.2386	0.7914	0.0354	0.6272	0.6387	0.737	0.543	12	0.1	11.36	1,079	10.39	1,158	10.75	1,295	10.94	1,422

Table 7.--Statistical measures obtained from regression equations tested for use in projecting demand for groundwood paper--Continued

Variables, time period, and mathematical function	Regression coefficients			Standard errors of estimate [1]	Standard errors of b coefficients		Coefficient or index of correlation [2]	Coefficient or index of determination [3]	Degrees of freedom	F or t ratios [4]	Projected demand							
											1970		1975		1980		1985	
	a	b	b_1			b_1					Per capita	Total	Per capita	Total	Per capita	Total	Per capita	Total
											Pounds	Thousand tons	Pounds	Thousand tons	Pounds	Thousand tons	Pounds	Thousand tons
Groundwood paper consumption is a function of population and per capita disposable personal income																		
1929-61 [5]																		
$Y = a + b X + b_1 X_1$	-233.9903	+0.8204	.0673	35.4225	.1821	0.1004	.9935	0.8774	29	0.1	11.49	1,195	11.98	1,336	12.84	1,475	12.60	1,645
$Y = a + b \log X + b_1 \log X_1$ [6]	-6142.7679	2065.3414	98.1299	34.2699	332.3141	173.2459	.9942	0.8884	29	0.3	10.72	1,115	10.77	1,202	10.67	1,226	10.50	1,373
$\log Y = a + b \log X + b_1 \log X_1$ [7]	-5.2064	+0.6461	.1346	.0538	1.7013	0.5600	.9973	0.9945	29	0.4	12.41	1,291	13.43	1,486	13.91	1,676	14.89	1,936
1947-61																		
$Y = a + b X + b_1 X_1$	21.2620	-3.9462	0.9994	91.3431	.2464	0.6305	.7749	0.5975	12	2.3	13.99	1,143	13.39	1,275	13.69	1,385	11.85	1,542
$Y = a + b \log X + b_1 \log X_1$ [6]	-3991.3060	-1107.7352	1551.3737	91.5741	1071.4521	1199.5381	.7749	0.5986	12	2.3	13.62	1,134	10.73	1,146	10.50	1,365	10.44	1,357
$\log Y = a + b \log X + b_1 \log X_1$ [7]	-3.6108	-1.5177	2.8139	0.0755	1.5062	1.4959	.7749	0.6006	12	2.3	11.12	1,157	11.63	1,297	11.70	1,471	12.17	1,582
Groundwood paper consumption is a function of population and industrial production																		
1929-61 [5]																		
$Y = a + b X + b_1 X_1$	-684.4577	1.4268	3.3294	103.7552	.1942	1.1374	.9938	0.8877	34	2.1	13.00	1,359	12.92	1,552	14.31	1,785	15.72	2,043
$Y = a + b \log X + b_1 \log X_1$ [6]	-4431.1744	1931.8400	273.4375	93.0812	284.2243	77.1309	.9959	0.9920	34	9.9	11.26	1,176	11.62	1,271	11.42	1,376	11.38	1,479
$\log Y = a + b \log X + b_1 \log X_1$ [7]	-4.3365	1.7364	0.6282	0.0128	.0349	.0272	.9897	0.9795	34	3.2	17.72	1,843	20.59	2,251	24.22	2,695	28.34	3,645
1947-61																		
$Y = a + b X + b_1 X_1$	783.3116	-3.7756	7.5087	94.3395	4.0562	3.8628	.7217	0.5207	12	1.0	10.35	1,108	11.33	1,241	11.73	1,426	12.45	1,614
$Y = a + b \log X + b_1 \log X_1$ [6]	510.6758	-537.5439	614.617	96.5211	97.3174	89.4778	.7300	0.5329	12	0.7	9.69	1,037	9.73	1,064	9.46	1,143	9.20	1,192
$\log Y = a + b \log X + b_1 \log X_1$ [7]	7.3274	-0.8548	.5356	.0497	.0153	0.3523	.8301	0.6889	12	1.2	11.77	1,261	11.96	1,310	11.95	1,549	9.16	1,282
Groundwood paper consumption is a function of households and per capita disposable personal income																		
1929-61 [8]																		
$Y = a + b X + b_1 X_1$	-313.9564	1.0741	.0674	34.1858	.1958	0.1371	0.9939	0.9878	29	7.1	12.69	1,321	12.14	1,354	12.49	1,565	12.54	1,662
$Y = a + b \log X + b_1 \log X_1$	-4407.8121	416.1305	98.1956	81.4514	93.1579	208.0562	0.9945	0.9890	29	8.7	12.35	1,115	12.07	1,301	10.86	1,284	11.54	1,370
$\log Y = a + b \log X + b_1 \log X_1$ [7]	-5.2564	0.0944	1.1439	.1206	.0308	0.0458	.9971	0.9942	29	14.1	13.34	1,387	14.56	1,623	15.57	1,876	16.96	2,250
1947-61																		
$Y = a + b X + b_1 X_1$	-436.6248	+0.5329	1.0144	51.1021	1.4344	0.5702	.9870	0.9743	12	4.3	11.50	1,198	12.30	1,371	12.55	1,508	13.33	1,733
$Y = a + b \log X + b_1 \log X_1$ [6]	11365.7998	-1433.7005	2435.8473	55.1390	91.5941	955.0997	.9879	0.9760	12	5.2	10.85	1,129	11.13	1,241	11.36	1,322	11.10	1,443
$\log Y = a + b \log X + b_1 \log X_1$ [7]	-6.1097	-1.8117	3.0405	.1790	1.0410	1.1283	.9795	0.9595	12	3.3	11.43	1,189	12.25	1,366	12.54	1,511	13.46	1,750

1/ A measure of the closeness with which values of a dependent variable can be estimated from the values of an independent variable(s).
2/ A measure of the closeness with which the true values of the regression coefficients can be estimated from the values in the sample.
3/ A measure of the degree of relationship between the dependent and independent variable(s).
4/ A measure of the percent of the variation in the values of the dependent variable that is associated with variation in values of the independent variable(s).
5/ A measure of the probability that the given values of b might have been obtained by chance from a population in which the true regression coefficient is zero.
6/ Excepting the war years 1942-46.
7/ Expressed in common logarithms
8/ Expressed in natural logarithms.
9/ Pounds per household.

Table 1 - Statistical measures obtained from regression equations tested for use in projecting demand for book paper

Variables, time period, and mathematical function	Regression coefficients				Standard errors of estimate	Standard errors of b coefficients a/			Coefficient or index of correlation b/	Coefficient of index of determination c/	Degrees of freedom	F or t ratios d/	Projected Demand					
													1970		1975		1980	1985
	a	b	b_1	b_2		b	b_1	b_2					Per capita	Total	Per capita	Total	Per capita	Per capita
													Pounds	Thousand tons	Pounds	Thousand tons	Pounds	Pounds
Per capita book paper consumption is a function of per capita disposable personal income																		
1929-61 e/																		
$Y = a + b X$	-4.5089	0.0887	--	--	1.0867	0.0008	--	--	0.992	0.984	28	63.1	40.98	5,198	55.20	6,155	60.42	66.89	8,486
$Y = a + b \log X$ f/	-893.2584	73.5898	--	--	1.2301	2.1341	--	--	0.989	0.979	28	34.6	45.69	4,731	48.41	5,398	51.09	56.13	7,057
$\log Y = a + b \log X$ f/	-2.8987	1.1858	--	--	0.0157	0.0323	--	--	0.991	0.981	28	36.7	51.15	5,320	56.99	6,354	62.95	70.44	9,157
1947-61																		
$Y = a + b X$	-5.0430	0.0889	--	--	1.2011	0.0022	--	--	0.984	0.968	13	1[illegible].3	49.98	5,192	55.18	6,153	60.45	66.98	8,707
$Y = a + b \log X$ f/	-266.2077	22.9362	--	--	1.2683	9.4470	--	--	0.939	0.882	13	5.8	47.96	4,986	51.63	5,757	55.01	58.89	7,651
$\log Y = a + b \log X$ f/	-2.1076	1.1861	--	--	0.0143	0.1084	--	--	0.984	0.968	13	10.9	49.99	5,196	55.41	6,178	60.90	67.78	8,811
1947-62																		
$Y = a + b X$	-4.7559	0.0887	--	--	1.8511	0.0020	--	--	0.967	0.936	14	11.1	49.72	5,171	54.95	6,127	60.17	66.64	8,663
$Y = a + b \log X$ f/	-269.9323	24.0586	--	--	1.3339	8.8086	--	--	0.944	0.891	14	7.5	47.95	4,991	51.72	5,767	55.15	59.03	7,674
$\log Y = a + b \log X$ f/	-2.0951	1.1812	--	--	0.0195	0.1021	--	--	0.967	0.936	14	11.0	49.75	5,174	55.13	6,147	60.36	67.36	8,757
Per capita book paper consumption is a function of per capita gross national product																		
1929-61 e/																		
$Y = a + b X$	-8.0899	0.0847	--	--	1.3050	0.0009	--	--	0.985	0.971	35	94.2	48.10	5,002	53.24	5,936	58.39	64.41	8,373
$Y = a + b \log X$ f/	-188.1983	69.6658	--	--	1.5986	2.0981	--	--	0.984	0.967	35	32.2	43.79	4,554	46.57	5,193	49.11	51.88	6,747
$\log Y = a + b \log X$ f/	-2.1963	1.0999	--	--	0.0301	0.0385	--	--	0.979	0.959	35	28.6	48.31	5,087	54.46	6,072	60.06	66.68	8,668
1947-61																		
$Y = a + b X$	-1.4845	0.0839	--	--	1.6818	0.0028	--	--	0.956	0.784	13	8.9	48.37	5,030	53.69	5,986	59.01	65.84	8,561
$Y = a + b \log X$ f/	-262.8963	23.2845	--	--	1.7368	13.8415	--	--	0.878	0.771	13	6.6	46.39	4,825	50.11	5,587	53.49	57.11	7,428
$\log Y = a + b \log X$ f/	-2.0890	1.0898	--	--	0.0800	0.1587	--	--	0.869	0.790	13	7.0	48.00	4,992	53.26	5,930	58.58	64.84	8,429
Book paper consumption per household is a function of average disposable personal income per household																		
1929-61 e/																		
$Y = a + b X$	-24.5080	0.0851	--	--	3.8524	0.0007	--	--	0.988	0.976	28	32.3	2/ 168.29	5,259	2/ 185.16	6,249	2/ 208.03	2/ 223.72	8,899
$Y = a + b \log X$ f/	-972.5589	289.5268	--	--	4.0479	9.4361	--	--	0.987	0.973	28	29.9	2/ 157.43	4,920	2/ 167.98	5,669	2/ 177.71	2/ 189.21	7,501
$\log Y = a + b \log X$ f/	-2.6894	1.2685	--	--	0.0181	0.0422	--	--	0.986	0.972	28	29.9	2/ 172.80	5,400	2/ 192.10	6,483	2/ 211.80	2/ 237.70	9,469
1947-61																		
$Y = a + b X$	-24.8898	0.0841	--	--	4.0061	0.0026	--	--	0.933	0.871	13	9.4	2/ 167.97	5,249	2/ 184.84	6,236	2/ 201.71	2/ 223.40	8,880
$Y = a + b \log X$ f/	-1186.1288	395.7752	--	--	4.3755	37.6661	--	--	0.931	0.866	13	9.2	2/ 163.38	5,106	2/ 175.97	5,939	2/ 187.59	2/ 201.32	8,002
$\log Y = a + b \log X$ f/	-2.4126	1.1897	--	--	0.0138	0.1272	--	--	0.933	0.871	13	9.3	2/ 168.73	5,273	2/ 186.43	6,292	2/ 204.40	2/ 227.90	9,059

Table 3.--Statistical measures obtained from regression equations tested for use in projecting demand for book paper--Continued

Variables, time period, and mathematical function	Regression coefficients				Standard errors of estimate 1/	Standard errors of b coefficients 2/			Coefficient or index of correlation 3/	Coefficient or index of determination 4/	Degrees of freedom	F or t ratios 5/	Projected Demand							
													1970		1975		1980		1985	
	a	b	b_1	b_2		b	b_1	b_2					Per capita	Total	Per capita	Total	Per capita	Total	Per capita	Total
													Pounds	Thousand tons	Pounds	Thousand tons	Pounds	Thousand tons	Pounds	Thousand tons
Book paper consumption is a function of population																				
1929-62 6/																				
Y = a + b X	-3654.3278	40.3213	--	--	182.3257	1.2892	--	--	0.983	0.967	36	32.3	45.50	4,732	47.87	5,337	50.32	6,063	52.53	6,829
Y = a + b log X 7/	-26859.4790	13211.9970	--	--	213.1257	481.5289	--	--	0.977	0.954	36	27.4	41.75	4,342	42.52	4,741	43.05	5,187	43.25	5,622
log Y = a + b log X 7/	-2.9559	2.8982	--	--	0.0556	0.1257	--	--	0.987	0.936	36	23.1	55.62	5,785	63.48	7,078	73.58	8,866	84.96	11,045
1947-62																				
Y = a + b X	-3990.9900	40.0778	--	--	124.2515	2.3616	--	--	0.977	0.954	14	17.0	45.62	4,745	47.95	5,346	50.16	6,068	52.53	6,829
Y = a + b log X 7/	-30901.9410	15127.8160	--	--	133.6285	982.8025	--	--	0.973	0.946	14	15.7	43.86	4,564	45.04	5,088	45.91	5,532	46.38	6,030
log Y = a + b log X 7/	-1.3638	2.1827	--	--	0.0173	0.1245	--	--	0.978	0.956	14	17.5	47.73	4,964	51.83	5,779	56.01	6,846	62.15	8,080
Book paper consumption is a function of gross national product																				
1929-62 6/																				
Y = a + b X	-109.0084	7.2814	--	--	111.3593	0.1352	--	--	0.994	0.988	36	53.4	48.29	5,022	53.46	5,961	58.46	7,044	64.46	8,380
Y = a + b log X 7/	-9601.9960	4796.9735	--	--	183.8898	149.9239	--	--	0.981	0.966	36	32.0	39.17	4,074	39.69	4,425	39.96	4,767	39.42	5,124
log Y = a + b log X 7/	0.6583	1.0709	--	--	0.0996	0.0241	--	--	0.991	0.982	36	44.4	49.51	5,149	50.57	6,306	61.00	7,350	67.93	8,831
1947-62																				
Y = a + b X	-402.0791	7.8595	--	--	139.4677	0.5232	--	--	0.972	0.945	14	15.0	49.79	5,178	55.61	6,200	61.24	7,379	67.95	8,833
Y = a + b log X 7/	-16775.9060	7516.6632	--	--	170.5842	621.4179	--	--	0.955	0.913	14	12.1	44.77	4,656	46.66	5,205	47.64	5,741	48.47	6,301
log Y = a + b log X 7/	0.9912	1.0943	--	--	0.0809	0.0746	--	--	0.984	0.939	14	14.7	49.46	5,144	55.45	6,183	61.42	7,401	68.67	8,927
Book paper consumption is a function of disposable personal income																				
1929-62 6/																				
Y = a + b X	-228.3327	10.8648	--	--	87.3577	0.1599	--	--	0.996	0.992	27	57.2	50.10	5,210	59.50	6,138	60.37	7,274	66.82	8,627
Y = a + b log X 7/	-10374.7630	5430.1947	--	--	161.9218	177.6837	--	--	0.984	0.972	27	30.6	41.16	4,281	41.89	4,671	41.83	5,041	41.91	5,446
log Y = a + b log X 7/	0.7185	1.1162	--	--	0.0198	0.0217	--	--	0.995	0.990	27	51.6	51.69	5,376	58.03	6,470	63.96	7,707	71.91	9,348
1947-62																				
Y = a + b X	-324.9659	11.1792	--	--	102.0188	0.5367	--	--	0.984	0.969	14	20.8	50.62	5,265	56.24	6,271	61.32	7,389	68.02	8,842
Y = a + b log X 7/	-19563.0150	7582.2968	--	--	126.9334	453.3402	--	--	0.970	0.942	14	16.6	43.57	4,739	47.35	5,280	46.07	5,792	48.66	6,355
log Y = a + b log X 7/	0.7820	1.0893	--	--	0.0147	0.0524	--	--	0.984	0.969	14	20.8	50.69	5,272	56.63	6,314	62.14	7,486	69.52	9,037
Book paper consumption is a function of industrial production																				
1929-62 6/																				
Y = a + b X	234.8993	30.8762	--	--	120.3507	0.6254	--	--	0.993	0.985	36	49.4	46.79	4,866	50.57	5,638	54.47	6,564	58.81	7,645
Y = a + b log X 7/	-4608.9308	3910.4199	--	--	212.1373	141.8256	--	--	0.977	0.955	36	27.6	37.50	3,900	37.33	4,162	36.7.	4,431	36.15	4,699
log Y = a + b log X 7/	1.7691	0.8754	--	--	0.0343	0.0329	--	--	0.980	0.959	36	38.2	45.39	4,721	43.47	5,404	51.50	6,206	54.90	7,124

Table 3.--Statistical measures obtained from regression equations tested for use in projecting demand for book paper--Continued

Variables, time period, and mathematical function	Regression coefficients				Standard errors of estimate 1/	Standard errors of b coefficients			Coefficient of index of correlation 1/	Coefficient of index of determination 1/	Degrees of freedom	F or t ratios 2/	Projected Demand					
													1970		1975		1980	1985
	a	b	b_1	b_2		b	b_1	b_2					Per capita	Total	Per capita	Total	Per capita	Per capita
													Pounds	Thousand tons	Pounds	Thousand tons	Pounds	Pounds
1947-62																		
$Y = a + b X$	97.9453	32.6002	--	--	142.9511	2.2133	--	--	0.989	0.979	14	14.6	47.69	6,980	51.81	7,777	56.07	60.78
$Y = a + b \log X$ 1/	-9969.3390	6495.1736	--	--	176.2866	553.5203	--	--	0.952	0.907	14	11.7	43.06	6,478	44.04	6,910	44.42	44.98
$\log Y = a + b \log X$ 1/	1.6389	0.9405	--	--	0.0213	0.0667	--	--	0.987	0.974	14	14.1	46.62	6,868	50.85	9,604	53.97	58.02
Book paper consumption is a function of households																		
1920-62 3/																		
$Y = a + b X$	-1889.3754	108.3886	--	--	184.0738	3.2016	--	--	0.983	0.966	36	32.0	43.90	4,986	45.53	5,077	47.23	49.41
$Y = a + b \log X$ 1/	-11688.8930	8773.9789	--	--	283.3765	367.8323	--	--	0.970	0.940	36	23.9	39.14	4,071	39.14	4,364	38.91	38.37
$\log Y = a + b \log X$ 1/	0.8668	1.9488	--	--	0.0511	0.0773	--	--	0.973	0.946	36	25.2	49.13	5,112	53.86	5,999	58.19	64.89
1947-62																		
$Y = a + b X$	-6955.8189	117.9788	--	--	146.1677	8.8800	--	--	0.987	0.975	14	14.3	46.88	6,806	48.59	9,399	50.63	53.37
$Y = a + b \log X$ 1/	-17383.8888	12881.9889	--	--	169.6670	1008.2360	--	--	0.958	0.918	14	12.5	43.80	6,355	44.60	6,973	45.11	45.09
$\log Y = a + b \log X$ 1/	0.4368	1.8139	--	--	0.0826	0.1896	--	--	0.989	0.978	14	14.6	47.74	6,985	51.81	9,710	55.31	59.12
Book paper consumption is a function of population and per capita gross national product																		
1920-61 3/																		
$Y = a + b X + b_1 X_1$	-6586.3868	81.5198	0.7661	--	111.2647	2.4392	0.0961	--	0.993	0.987	38	65.4	43.67	4,942	46.04	5,133	48.04	50.69
$Y = a + b \log X + b_1 \log X_1$ 3/	-84606.1070	9341.7307	1387.6958	--	145.0882	383.8036	206.3053	--	0.984	0.977	38	43.7	39.78	4,137	40.37	4,501	40.90	40.47
$\log Y = a + b \log X + b_1 \log X_1$ 3/	-6.0190	1.8890	0.9681	--	0.0704	0.1868	0.1001	--	0.990	0.980	38	47.5	50.13	5,214	55.11	6,236	60.39	69.76
1947-61																		
$Y = a + b X + b_1 X_1$	-3398.4884	35.6876	0.1956	--	131.6387	6.8133	0.4836	--	0.970	0.942	12	0.2	45.17	4,698	47.54	5,301	49.89	52.68
$Y = a + b \log X + b_1 \log X_1$ 3/	-89696.8980	6318.0847	98.7706	--	139.0880	1158.6696	1899.8889	--	0.969	0.938	12	0.0	43.89	4,566	44.37	4,967	45.16	45.58
$\log Y = a + b \log X + b_1 \log X_1$ 3/	-3.7868	1.8781	0.8790	--	0.0807	0.1686	0.3330	--	0.975	0.951	12	0.8	47.71	4,962	50.13	5,612	57.21	68.79
Book paper consumption is a function of population and per capita disposable personal income																		
1920-61 3/																		
$Y = a + b X + b_1 X_1$	-8698.7385	19.1889	1.8098	--	108.4763	3.8711	0.1899	--	0.994	0.988	25	35.8	44.97	4,677	47.43	5,289	49.44	51.73
$Y = a + b \log X + b_1 \log X_1$ 3/	-87488.9880	3810.8845	1876.7259	--	185.9978	920.7380	870.8896	--	0.991	0.982	25	11.0	41.65	4,332	42.89	4,733	43.76	43.93
$\log Y = a + b \log X + b_1 \log X_1$ 3/	-5.3890	0.9949	1.3999	--	0.0810	0.1618	0.6873	--	0.998	0.992	25	12.2	48.62	5,057	53.58	5,974	58.21	64.88
1947-61																		
$Y = a + b X + b_1 X_1$	-3889.9030	15.6948	8.0985	--	119.6938	13.9577	1.8886	--	0.976	0.952	12	1.4	47.08	4,898	50.25	5,603	52.76	55.69
$Y = a + b \log X + b_1 \log X_1$ 3/	-35999.5210	3398.0986	880.6031	--	188.6017	8700.8861	8946.6978	--	0.972	0.944	12	1.3	44.38	4,615	45.84	5,111	46.97	47.83
$\log Y = a + b \log X + b_1 \log X_1$ 3/	-6.0985	0.6909	1.4314	--	0.0963	0.7614	0.7181	--	0.980	0.961	12	0.8	40.06	5,205	55.69	6,209	61.10	68.17

Table 3 - Statistical measures obtained from regression equations tested for use in projecting demand for book paper--Continued

Variables, time period, and mathematical function	Regression coefficients				Standard errors of estimate 1/	Standard errors of b coefficients 2/			Coefficient or index of correlation 1/	Coefficient or index of determination 2/	Degrees of freedom	F or t ratios 3/	Projected Demand					
													1970		1975		1980	1985
	a	b	b_1	b_2		a	b_1	b_2					Per capita	Total	Per capita	Total	Per capita	Per capita
													Pounds	Thousand tons	Pounds	Thousand tons	Pounds	Pounds
Book paper consumption is a function of households and average disposable personal income per household																		
1929-61 4/																		
$Y = a + b X + b_1 X_1$	-2487.9916	99.6488	0.4282	--	103.9429	7.9040	0.0665	--	.994	0.988	25	67.5	44.71	4,650	47.38	5,247	48.99	51.11	6,644
$Y = a + b \log X + b_1 \log X_1$ 3/	-23904.1410	2859.9150	1805.4253	--	144.1214	933.8044	377.7548	--	.985	.975	25	23.9	40.57	4,219	41.11	4,554	41.15	41.08	5,341
$\log Y = a + b \log X + b_1 \log X_1$ 4/	-7.8749	0.7373	1.4673	--	0.048	0.1393	0.117	--	0.998	0.991	25	55.0	50.58	5,258	57.09	6,366	63.89	71.38	9,279
1947-61																		
$Y = a + b X + b_1 X_1$	-3959.0170	33.5104	0.5360	--	130.1391	22.3725	0.2215	--	0.991	0.982	12	2.4	47.91	4,983	51.57	5,750	54.36	57.56	7,388
$Y = a + b \log X + b_1 \log X_1$ 3/	-48536.4950	1589.0982	5193.7045	--	122.8509	1321.4522	1421.2371	--	.979	0.959	12	2.6	45.31	4,712	47.26	5,269	48.19	49.28	6,406
$\log Y = a + b \log X + b_1 \log X_1$ 4/	-7.9071	0.7144	1.5128	--	0.0345	0.2002	0.1421	--	0.992	0.985	12	0.1	50.33	5,234	56.30	6,277	62.24	70.07	9,109
Book paper consumption is a function of population and industrial production																		
1929-61 4/																		
$Y = a + b X + b_1 X_1$	-1003.5373	12.7417	21.2097	--	97.1972	2.5593	2.1997	--	.995	0.990	30	20.0	46.42	4,828	49.75	5,550	53.24	56.92	7,400
$Y = a + b \log X + b_1 \log X_1$ 3/	-14807.6080	2607.9749	911.5413	--	131.1339	419.3698	126.3116	--	.990	0.981	30	62.9	39.47	4,105	39.75	4,432	39.71	39.46	5,133
$\log Y = a + b \log X + b_1 \log X_1$ 4/	0.7599	0.5628	0.6340	--	0.0365	0.2002	0.0612	--	.991	0.983	30	17.3	49.27	5,124	53.52	6,001	58.87	64.38	8,370
1947-61																		
$Y = a + b X + b_1 X_1$	-7144.5974	24.6514	12.3012	--	125.4141	5.3807	7.4511	--	.979	.958	12	4.7	44.99	4,681	48.91	5,453	51.93	55.36	7,165
$Y = a + b \log X + b_1 \log X_1$ 3/	-28890.6970	4882.2510	666.1497	--	124.7867	1580.3593	663.6436	--	.971	0.943	12	1.0	43.24	4,498	44.31	4,941	45.02	45.39	5,901
$\log Y = a + b \log X + b_1 \log X_1$ 4/	-0.6267	1.3837	0.3409	--	0.0372	0.4411	0.1183	--	.977	0.955	12	1.9	47.22	4,910	51.13	5,701	55.61	60.45	7,858
Book paper consumption is a function of population, per capita disposable personal income, and industrial production																		
1929-61 4/																		
$Y = a + b X + b_1 X_1 + b_2 X_2$	-1602.2660	13.1351	0.7772	11.9610	99.0992	4.7331	0.4592	0.7824	.997	.994	24	1.5	45.47	4,729	48.38	5,394	51.09	54.09	7,038
$Y = a + b \log X + b_1 \log X_1 + b_2 \log X_2$ 3/	-28768.9030	3721.4500	1033.7678	232.6951	128.9012	534.9446	876.9131	438.4673	.991	.982	24	2.1	41.44	4,308	42.12	4,698	42.39	42.51	5,526
$\log Y = a + b \log X + b_1 \log X_1 + b_2 \log X_2$ 4/	-1.0298	0.4142	0.7014	0.3686	0.0355	0.1476	0.0414	0.1213	.997	.994	24	7.2	46.65	4,852	50.55	5,636	54.32	58.85	7,651
1947-61																		
$Y = a + b X + b_1 X_1 + b_2 X_2$	-2706.9099	17.4094	1.2706	6.0225	123.6051	14.8274	2.0392	12.2601	.979	.959	11	2.1	46.50	4,836	49.30	5,571	52.76	55.85	7,261
$Y = a + b \log X + b_1 \log X_1 + b_2 \log X_2$ 3/	-32051.5220	3603.0627	2060.9414	771.7889	131.9881	2920.5277	1367.6552	1314.9678	.972	.945	11	2.1	44.07	4,584	45.42	5,064	46.13	46.70	6,071
$\log Y = a + b \log X + b_1 \log X_1 + b_2 \log X_2$ 4/	-4.1171	0.7655	1.0057	0.1484	0.0374	0.3162	0.1032	0.2584	.992	.984	11	3.1	49.15	5,115	54.29	6,052	59.36	65.68	8,539

Table 1.--Statistical measures obtained from regression equations tested for use in projecting demand for book paper. Continued

Variables, time period, and mathematical function	Regression coefficients				Standard errors of estimate 1/	Standard errors of b coefficients 2/			Coefficient of index of correlation 3/	Coefficient of index of determination 4/	Degrees of freedom	F or t ratios 5/	Projected Demand					
													1970		1975		1980	1985
	a	b	b_1	b_2		b	b_1	b_2					Per capita	Total	Per capita	Total	Per capita	Total	Per capita	Total
													Pounds	Thousand tons	Pounds	Thousand tons	Pounds	Thousand tons	Pounds	Thousand tons
Book paper consumption is a function of households, average disposable personal income per household, and industrial production																				
1929-61 6/																				
$Y = a + b X + b_1 X_1 + b_2 X_2$	-1414.8852	35.9132	0.2715	12.2805	99.7357	15.[illegible]327	0.1081	[illegible].5733	0.995	0.989	24	[illegible].1	45.15	4,636	47.38	5,348	50.91	6,092	53.44	6,987
$Y = a + b \log X + b_1 \log X_1 + b_2 \log X_2$ 7/	-30960.6790	9091.3689	2702.4920	-439.9822	144.2913	980.3654	432.0569	406.3478	0.989	0.977	24	1.2	41.80	4,306	42.18	4,703	42.37	5,105	42.51	5,586
$\log Y = a + b \log X + b_1 \log X_1$ 8/ $+ b_2 \log X_2$	-2.1773	0.4185	0.7896	0.3766	0.0337	0.1[illegible]2	0.1[illegible]6	0.[illegible]365	0.997	0.995	24	11.[illegible]	47.29	4,915	51.[illegible]6	5,749	55.76	6,719	60.80	7,917
1947-61																				
$Y = a + b X + b_1 X_1 + b_2 X_2$	-3646.4585	28.6288	0.8016	2.8019	110.3172	27.[illegible]937	0.2920	[illegible].7598	0.981	0.962	11	0.1	47.98	4,988	51.70	5,764	54.63	6,583	58.28	7,977
$Y = a + b \log X + b_1 \log X_1 + b_2 \log X_2$ 9/	-47766.6030	1493.4337	5104.1698	55.0028	124.0737	1402.[illegible]599	1711.4584	809.[illegible]958	0.978	0.952	11	0.01	45.26	4,707	47.20	5,263	46.12	5,799	49.20	6,396
$\log Y = a + b \log X + b_1 \log X_1$ 9/ $+ b_2 \log X_2$	-6.6838	0.9584	1.3613	0.1439	0.0354	0.[illegible]999	0.[illegible]479	0.[illegible]309	0.[illegible]83	0.966	11	0.4	49.97	5,197	55.73	6,214	61.44	7,404	68.98	8,999

1/ A measure of the closeness with which values of a dependent variable can be estimated from the values of an independent variable(s).
2/ A measure of the closeness with which the true values of the regression coefficients can be estimated from the values in the sample.
3/ A measure of the degree of relationship between the dependent and independent variable(s).
4/ A measure of the percent of the variation in the values of the dependent variable that is associated with variation in values of the independent variable(s).
5/ A measure of the probability that the given values of b might have been obtained by chance from a population in which the true regression coefficient is zero.
6/ Excepting the war years 1942-46.
7/ Expressed in common logarithms.
8/ Expressed in natural logarithms.
9/ Pounds per household.

Table 4.--Statistical measures obtained from regression equations tested for use in projecting demand for fine paper

Variables, time period, and mathematical function	Regression coefficients				Standard errors of estimate [1]	Standard errors of b coefficients [2]			Coefficient of index of correlation [3]	Coefficient of index of determination [4]	Degrees of freedom	F or t ratios [5]	Projected Demand							
													1960		1970		1975		1985	
	a	b	b_1	b_2		t	t_1	t_2					Per capita	Total	Per capita	Total	Per capita	Total	Per capita	Total
													Pounds	Thousand tons	Pounds	Thousand tons	Pounds	Thousand tons	Pounds	Thousand tons
Per capita fine paper consumption is a function of per capita disposable personal income																				
1929-61 [6]																				
$Y = a + b X$	-1.1042	0.0100	--	--	0.9021	0.0064	--	--	0.972	0.945	26	31.2	25.18	3,454	25.18	3,710	27.54	3,914	30.35	3,966
$Y = a + b \log X$ [7]	-68.0247	32.2287	--	--	1.1516	1.1514	--	--	0.961	0.924	26	27.7	24.14	3,317	24.17	3,562	25.61	3,638	26.71	3,491
$\log Y = a + b \log X$ [7]	-2.2405	1.3680	--	--	0.0292	0.0263	--	--	0.973	0.946	26	27.0	23.79	3,269	23.84	3,514	25.24	3,586	26.55	3,471
1947-61																				
$Y = a + b X$	-5.3243	0.0123	--	--	1.3016	0.0019	--	--	0.976	0.972	13	41.1	26.27	3,611	27.36	4,033	29.13	4,139	33.36	4,362
$Y = a + b \log X$ [7]	-145.1432	49.7981	--	--	1.0353	1.0345	--	--	0.957	0.917	13	23.1	23.13	3,180	24.11	3,555	25.32	3,597	29.02	3,793
$\log Y = a + b \log X$ [7]	-2.9714	1.2898	--	--	0.0266	0.0236	--	--	0.971	0.943	13	29.8	24.44	3,360	25.46	3,756	27.00	3,836	30.60	4,000
1947-62																				
$Y = a + b X$	-7.5136	0.0136	--	--	1.2676	0.0017	--	--	0.978	0.957	14	64.0	25.13	3,614	26.25	3,950	27.90	4,050	31.26	4,264
$Y = a + b \log X$ [7]	-164.6606	55.7896	--	--	1.1194	1.1185	--	--	0.958	0.918	14	24.9	23.59	3,392	24.54	3,693	25.94	3,764	29.47	4,019
$\log Y = a + b \log X$ [7]	-3.3309	1.3998	--	--	0.0276	0.0221	--	--	0.969	0.938	14	40.1	25.10	3,610	26.16	3,937	27.76	4,029	30.74	4,193
Per capita fine paper consumption is a function of per capita gross national product																				
1929-61 [6]																				
$Y = a + b X$	-1.2766	0.0070	--	--	1.2637	0.0034	--	--	0.955	0.913	26	20.7	22.74	3,269	23.26	3,500	24.78	3,595	26.36	3,595
$Y = a + b \log X$ [7]	-89.0084	30.9725	--	--	1.3408	1.3364	--	--	0.930	0.865	26	13.4	20.41	2,933	21.23	3,194	22.42	3,256	24.20	3,300
$\log Y = a + b \log X$ [7]	-2.6294	1.1289	--	--	0.0601	0.0568	--	--	0.949	0.901	26	15.7	22.04	3,167	22.95	3,453	24.22	3,519	25.94	3,538
1947-61																				
$Y = a + b X$	-4.9460	0.0083	--	--	1.1273	0.0015	--	--	0.961	0.923	13	29.7	23.38	3,359	24.38	3,668	25.97	3,774	29.67	4,047
$Y = a + b \log X$ [7]	-147.4286	48.0975	--	--	1.1579	8.8277	--	--	0.934	0.872	13	16.6	22.44	3,224	23.34	3,511	24.53	3,565	28.30	3,860
$\log Y = a + b \log X$ [7]	-3.0842	1.2613	--	--	0.0291	0.0214	--	--	0.944	0.891	13	19.7	23.53	3,380	24.46	3,680	25.75	3,743	29.57	4,034
Fine paper consumption per household is a function of average disposable personal income per household																				
1929-61 [6]																				
$Y = a + b X$	-6.4369	0.0105	--	--	1.2090	0.0008	--	--	0.957	0.916	26	16.7	[8] 27.54	3,954	[8] 28.44	4,083	[8] 29.26	4,200	[8] 32.24	4,628
$Y = a + b \log X$ [7]	-413.5998	126.4794	--	--	1.5206	8.2957	--	--	0.940	0.884	26	15.2	[8] 22.45	3,223	[8] 23.29	3,343	[8] 24.29	3,487	[8] 26.64	3,824
$\log Y = a + b \log X$ [7]	-2.4667	1.1198	--	--	0.0265	0.0664	--	--	0.957	0.916	26	16.6	[8] 27.44	3,939	[8] 28.36	4,070	[8] 29.20	4,192	[8] 32.30	4,637
1947-61																				
$Y = a + b X$	-86.5357	0.0136	--	--	1.1185	0.0022	--	--	0.971	0.943	13	36.9	[8] 28.28	3,772	[8] 31.10	4,147	3.39	[8] 33.40	4,453	[8] 114.30	4,610
$Y = a + b \log X$ [7]	-681.7038	195.1186	--	--	3.3679	31.1425	--	--	0.967	0.935	13	27.3	[8] 25.13	3,352	[8] 26.07	3,477	[8] 26.93	3,591	[8] 29.53	3,937
$\log Y = a + b \log X$ [7]	-3.7100	1.4431	--	--	0.0255	0.0234	--	--	0.982	0.963	13	51.1	[8] 27.74	3,699	[8] 28.63	3,817	[8] 29.53	3,937	[8] 32.57	4,343

Table [illegible]--Statistical measures obtained from regression equations tested for use in projecting demand for fine paper--continued

Variables, time period, and mathematical function	Regression coefficients				Standard errors of estimate [1]	Standard errors of b coefficients [1]			Coefficient of index of correlation [1]	Coefficient of index of determination [1]	Degrees of freedom	F or t ratio [1]	Projected Demand					
													1970		1975		1980	
	a	b	b_1	b_2		b	b_1	b_2					Per capita	Total	Per capita	Total	Per capita	Total
													Pounds	Thousand tons	Pounds	Thousand tons	Pounds	Thousand tons
Fine paper consumption is a function of population																		
1920-62 [2]																		
$Y = a + b X$	-1320.3001	19.6931	--	--	[illegible]	[illegible]	--	--	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	21.01	[illegible]	24.27	[illegible]
$Y = a + b \log X$ [1]	-12871.2150	2449.6543	--	--	[illegible]	[illegible]	--	--	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	20.87	2,274	20.90	2,791
$\log Y = a + b \log X$ [1]	-3.8354	3.3491	--	--	[illegible]	[illegible]	--	--	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	21.72	3,534	23.40	4,418
1947-62																		
$Y = a + b X$	3099.0813	21.3527	--	--	[illegible]	[illegible]	--	--	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	23.40	3,807	25.29	4,734
$Y = a + b \log X$ [2]	-10374.5270	5031.1956	--	--	[illegible]	[illegible]	[illegible]	--	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	22.30	2,449	23.85	3,022
$\log Y = a + b \log X$ [1]	-2.2463	2.4328	--	--	[illegible]	[illegible]	--	--	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	20.23	2,429	21.33	3,534
Fine paper consumption is a function of gross national product																		
1920-62 [2]																		
$Y = a + b X$	-31.8197	3.4901	--	--	[illegible]	[illegible]	--	--	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	23.34	2,759	27.99	3,373
$Y = a + b \log X$ [2]	-4639.3209	2304.7818	--	--	[illegible]	[illegible]	--	--	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	19.34	2,122	17.74	2,063
$\log Y = a + b \log X$ [1]	0.2418	1.1046	--	--	[illegible]	[illegible]	--	--	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	20.59	2,845	23.54	3,555
1947-62																		
$Y = a + b X$	-4695.9907	4.2018	--	--	[illegible]	[illegible]	--	--	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	21.01	3,229	31.15	3,754
$Y = a + b \log X$ [1]	-9102.0960	3996.6095	--	--	[illegible]	[illegible]	--	--	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	23.18	2,909	23.12	2,877
$\log Y = a + b \log X$ [1]	-0.0849	1.2261	--	--	[illegible]	[illegible]	--	--	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	21.46	3,183	43.14	3,734
Fine paper consumption is a function of disposable personal income																		
1929-62 [2]																		
$Y = a + b X$	-40.2021	5.1135	--	--	[illegible]	[illegible]	--	--	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	21.00	2,961	25.40	3,536
$Y = a + b \log X$ [1]	-4605.7915	2926.2532	--	--	[illegible]	[illegible]	--	--	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	19.68	2,144	19.03	2,366
$\log Y = a + b \log X$ [1]	0.5100	1.0642	--	--	[illegible]	[illegible]	--	--	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	20.19	2,820	21.02	3,044
1947-62																		
$Y = a + b X$	-357.5012	5.9520	--	--	[illegible]	[illegible]	--	--	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	20.69	3,154	21.44	3,743
$Y = a + b \log X$ [2]	-8434.2111	3773.1434	--	--	[illegible]	[illegible]	--	--	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	23.49	3,583	23.95	4,182
$\log Y = a + b \log X$ [1]	3.1533	1.2107	--	--	[illegible]	[illegible]	--	--	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	20.34	3,221	36.31	3,781
Fine paper consumption is a function of industrial production																		
1929-62 [2]																		
$Y = a + b X$	165.5632	14.0034	--	--	99.0731	[illegible]	--	--	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	21.33	[illegible]
$Y = a + b \log X$ [1]	-2055.6725	1734.7256	--	--	152.1992	[illegible]	--	--	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
$\log Y = a + b \log X$ [1]	1.6549	0.7633	--	--	0.0372	[illegible]	--	--	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Table 4.--Statistical measures obtained from regression equations tested for use in projecting demand for fine paper--Continued

Variables, time period, and mathematical function	Regression coefficients				Standard errors of estimate [1]	Standard errors of b coefficients [2]			Coefficient or index of correlation [1]	Coefficient or index of determination [1]	Degrees of freedom	F or t ratios [2]	Projected demand							
													1970		1975		1980		1985	
	a	b	b_1	b_2		b	b_1	b_2					Per capita	Total	Per capita	Total	Per capita	Total	Per capita	Total
													Pounds	Thousand tons	Pounds	Thousand tons	Pounds	Thousand tons	Pounds	Thousand tons
1947-62																				
$Y = a + b X$	-163.2149	17.5011	--	--	4.5631	1.6775	--	--	.9954	.9909	14	11.8	23.67	2,462	26.01	2,900	28.42	3,425	31.06	4,038
$Y = a + b \log X$ [2]	-5858.8935	3441.7390	--	--	111.2154	354.8870	--	--	.9933	.9870	14	9.7	21.16	2,201	23.60	2,631	22.14	2,668	28.33	2,903
$\log Y = a + b \log X$ [2]	1.0783	1.0593	--	--	0.0283	0.0000	--	--	.9954	.9910	14	11.9	23.25	2,418	25.53	2,947	27.93	3,366	30.60	3,978
Fine paper consumption is a function of households 3/																				
1929-62 3/																				
$Y = a + b X$	-985.9159	49.7396	--	--	101.1159	1.7567	--	--	.9775	.9557	32	28.3	20.99	2,183	21.81	2,438	22.66	2,730	23.54	3,068
$Y = a + b \log X$ [2]	-5712.3548	4852.0842	--	--	125.4752	144.1752	--	--	.9765	.9530	32	21.9	18.67	1,942	18.69	2,088	18.61	2,242	18.36	2,387
$\log Y = a + b \log X$ [2]	-0.2821	2.0469	--	--	0.0555	0.0076	--	--	.9771	.9549	32	26.8	24.02	2,498	26.32	2,988	28.69	3,451	31.45	4,089
1947-62																				
$Y = a + b X$	-1526.8437	62.1179	--	--	126.3429	5.4864	--	--	.9981	.9963	14	10.4	22.78	2,369	24.08	2,680	25.34	3,054	26.37	3,428
$Y = a + b \log X$ [2]	-9600.3160	6588.3847	--	--	217.5126	712.7529	--	--	.9827	.9656	14	9.2	21.46	2,232	21.99	2,452	22.37	2,695	22.66	2,920
$\log Y = a + b \log X$ [2]	-0.8094	2.0043	--	--	0.2236	0.1397	--	--	.9847	.9698	14	10.0	23.61	2,455	25.70	2,865	28.20	3,398	30.99	3,977
Fine paper consumption is a function of population and per capita gross national product																				
1929-61 3/																				
$Y = a + b X + b_1 X_1$	-1462.1471	13.8714	0.2264	--	74.4158	1.1414	0.0441	--	.9977	.9954	34	12.6	21.35	2,114	21.22	2,477	23.28	2,905	24.32	3,161
$Y = a + b \log X + b_1 \log X_1$ [2]	-11120.9998	2029.9148	430.2178	--	98.5701	23.2835	17.9464	--	.9971	.9941	34	13.5	21.14	1,991	19.49	2,172	19.63	2,365	19.68	2,550
$\log Y = a + b \log X + b_1 \log X_1$ [3]	-7.0834	2.0379	0.3997	--	0.1146	0.0144	0.0092	--	.9975	.9951	34	14.4	25.71	2,678	29.13	3,270	33.56	4,061	38.42	4,994
1947-61																				
$Y = a + b X + b_1 X_1$	-1907.3917	18.0990	0.1278	--	91.2711	4.7736	0.2681	--	.9967	.9934	32	9.2	22.04	2,296	23.35	2,808	24.71	2,978	25.95	3,374
$Y = a + b \log X + b_1 \log X_1$ [3]	-15504.6333	3096.9532	175.6211	--	84.3751	19.0454	15.4521	--	.9973	.9946	32	9.1	21.02	2,136	21.70	2,619	22.80	2,675	22.52	2,927
$\log Y = a + b \log X + b_1 \log X_1$ [3]	-6.3091	1.8497	0.5153	--	0.0674	0.0077	0.0048	--	.9966	.9932	32	10.8	23.67	2,462	26.83	2,987	29.99	3,565	33.16	4,312
Fine paper consumption is a function of population and per capita disposable personal income																				
1929-61 3/																				
$Y = a + b X + b_1 X_1$	-1444.1143	12.4458	0.4429	--	93.4728	1.9462	0.1466	--	.9977	.9954	25	9.6	21.31	2,216	22.47	2,509	23.50	2,932	24.57	3,195
$Y = a + b \log X + b_1 \log X_1$ [3]	-13993.5470	2149.9028	458.6057	--	94.3838	37.4523	29.3427	--	.9977	.9954	25	9.4	19.74	2,054	20.12	2,243	20.32	2,549	20.42	2,655
$\log Y = a + b \log X + b_1 \log X_1$ [3]	-5.7920	1.0259	1.0529	--	0.0750	0.0104	0.0067	--	.9976	.9952	25	14.0	22.48	2,338	25.33	2,824	27.73	3,341	30.69	3,990
1947-61																				
$Y = a + b X + b_1 X_1$	-1307.1717	14.3107	0.6062	--	91.3754	1.7031	0.0643	--	.9966	.9932	12	9.3	24.70	2,569	26.22	2,924	27.56	3,321	28.97	3,766
$Y = a + b \log X + b_1 \log X_1$ [3]	-16661.5970	3502.1563	639.5227	--	94.7431	2044.2548	173.2004	--	.9973	.9946	12	9.1	21.70	2,205	21.93	2,445	22.41	2,700	22.70	2,959
$\log Y = a + b \log X + b_1 \log X_1$ [3]	-7.6636	1.9809	1.1165	--	0.0671	1.6492	1.1358	--	.9982	.9965	12	11.0	24.52	2,550	27.01	3,079	30.30	3,711	34.34	4,530

Table [illegible] Statistical measures obtained for regression equations tested for use in projecting demand for fine paper [illegible] Ontario

Variables, time period and mathematical function	Regression coefficients				Standard errors of estimate S_e	Standard errors of coefficients			Coefficient or index of correlation r	Coefficient or index of determination r^2	Degrees of freedom	F or t ratios	Projected Demand							
	a	b	b_1										1961		1971		1981		1991	
													Per capita	Total	Per capita	Total	Per capita	Total	Per capita	Total
													Pounds	Thousand tons	Pounds	Thousand tons	Pounds	Thousand tons	Pounds	Thousand tons
Fine paper consumption is a function of population and industrial production																				
1920=1 =																				
$Y = a + b X + b_1 X_1$	-431.7414	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
$Y = a + b \log X + b_1 \log X_1 =$	-9952.9669	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
$\log Y = a + b \log X + b_1 \log X_1 =$	-1.5127	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1961=1																				
$Y = a + b X + b_1 X_1$	-2114.5375	13.7121	[illegible]		[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	25.51	[illegible]	26.3	[illegible]	25.4	3,111.9	27.66	3,541
$Y = a + b \log X + b_1 \log X_1 =$	-2140.4 +900	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	25.46	[illegible]	25.5	[illegible]	22.30	2,731	22.29	[illegible]
$\log Y = a + b \log X + b_1 \log X_1 =$	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	3,134	30.56	[illegible]
Fine paper consumption is a function of population, per capita disposable personal income, and industrial production																				
1920=1 =																				
$Y = a + b X + b_1 X_1 + b_2 X_2$	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]					[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	20.56	3,451
$Y = a + b \log X + b_1 \log X_1 + b_2 \log X_2$	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]					[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	2,433	20.25	2,030
$\log Y = a + b \log X + b_1 \log X_1 + b_2 \log X_2$	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]					[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	20.21	[illegible]
1961=1																				
$Y = a + b X + b_1 X_1 + b_2 X_2$	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]					[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	20.36	[illegible]
$Y = a + b \log X + b_1 \log X_1 + b_2 \log X_2$	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]					[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	2,191	10.33	2,329
$\log Y = a + b \log X + b_1 \log X_1 + b_2 \log X_2$	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]					[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Fine paper consumption is a function of households, average disposable personal income per household and industrial production																				
1961=1 =																				
$Y = a + b X + b_1 X_1 + b_2 X_2$	-256.6738	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]					[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	25.57	3,324
$Y = a + b X + b_1 \log X_1 + b_2 \log X_2$	-1730.1265	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]					[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	20.64	[illegible]
$\log Y = a + b \log X + b_1 \log X_1 + b_2 \log X_2$	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]					[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	20.30	3,434

Table - Statistical measures obtained from regression equations tested for use in projecting demand for fine paper [continued]

Variables, time period, and mathematical function	Regression coefficients				Standard errors of estimate 1/	Standard errors of coefficients			Coefficient of index of correlation 1/	Coefficient of index of determination 1/	Degrees of freedom	F or t ratios 2/	Projected Demand					
													1970		1975		1980	
	a	b	b_1	b_2		a	b_1	b_2					Per capita	Total	Per capita	Total	Per capita	Total
													Pounds	Thousand tons	Pounds	Thousand tons	Pounds	Thousand tons
1947-61																		
$Y = a + b X + b_1 X_1 + b_2 X_2$	-1300.2571	2.3277	0.4522	1.3774	55.3469	22.34	.0254	0.7770	-.959	.920	11	131	23.04	2,645	25.90	2,987	27.64	3,336
$Y = a + b \log X + b_1 \log X_1$ 3/ $+ b_2 \log X_2$	-23575.9300	278.4360	2566.6421	436.0374	49.1405	1075.4905	1[illegible]	0.8542	0.984	.933	11	71	22.93	2,691	23.36	2,569	23.99	2,843
$\log Y = a + b \log X + b_1 \log X_1$ 3/ $+ b_2 \log X_2$	-8.2857	-0.0930	1.3377	1.4634	0.0548	0.0[illegible]	0.[illegible]	0.0774	0.982	.[illegible]67	11	-	26.72	2,571	28.20	3,144	32.64	3,813

1/ A measure of the closeness with which values of a dependent variable can be estimated from the values of an independent variable(s)
A measure of the closeness with which the true values of the regression coefficients can be estimated from the values in the sample
A measure of the degree of relationship between the dependent and independent variable(s).
A measure of the percent of the variation in the values of the dependent variable that is associated with variation in values of the independent variable(s)
A measure of the probability that the given values of r might have been obtained by chance from a population in which the true regression coefficient is zero
2/ Excepting the war years 1942-46.
3/ Expressed in common logarithms.
Expressed in natural logarithms.
Pounds per household.

Table 5.--Statistical measures obtained from regression equations tested for use in projecting demand for coarse and industrial paper

Variables, time period, and mathematical function	Regression coefficients				Standard errors of estimate 1/	Standard errors of b coefficients 2/			Coefficient or index of correlation 3/	Coefficient or index of determination 4/	Degrees of freedom	F or t ratios 5/	Projected Demand							
													1970		1975		1980		1985	
	a	b	b_1	b_2		b	b_1	b_2					Per capita	Total	Per capita	Total	Per capita	Total	Per capita	Total
													Pounds	Thousand tons	Pounds	Thousand tons	Pounds	Thousand tons	Pounds	Thousand tons
Per capita coarse and industrial paper consumption is a function of per capita disposable personal income																				
1929-41 6/																				
Y = a + b X	-2.6973	0.0895	--	--	2.5636	0.0015	--	--	0.965	0.931	26	18.8	66.31	6,896	72.87	8,125	79.42	9,570	87.55	11,388
Y = a + b log X 7/	-459.2879	93.8519	--	--	2.6625	4.9977	--	--	0.970	0.941	26	20.3	60.96	6,340	64.66	7,210	68.06	8,801	71.91	9,368
log Y = a + b log X 7/	-1.8759	1.0903	--	--	0.0134	0.0578	--	--	0.965	0.932	26	18.9	67.64	7,055	74.73	8,335	81.92	9,870	90.85	11,811
1947-61																				
Y = a + b X	17.9496	0.0174	--	--	2.4801	0.0046	--	--	0.734	0.538	13	3.8	59.71	6,210	63.71	7,169	67.71	8,159	72.67	9,447
Y = a + b log X 7/	-183.2593	71.4727	--	--	2.4629	18.6369	--	--	0.739	0.531	13	3.8	58.34	6,067	61.18	6,888	63.78	7,685	66.73	8,675
log Y = a + b log X 7/	-0.4158	0.6478	--	--	0.0223	0.1688	--	--	0.729	0.531	13	3.8	59.42	6,180	63.09	7,030	66.96	8,020	70.80	9,204
Per capita coarse and industrial paper consumption is a function of per capita gross national product																				
1929-61 6/																				
Y = a + b X	-1.4068	0.0194	--	--	2.9359	0.0008	--	--	0.989	0.979	35	23.2	64.75	6,734	71.54	7,977	78.33	9,439	86.28	11,216
Y = a + b log X 7/	-468.3803	87.3803	--	--	2.9021	3.7111	--	--	0.970	0.940	35	23.5	60.34	6,275	64.05	7,142	67.42	8,124	71.03	9,234
log Y = a + b log X 7/	-1.9497	1.0865	--	--	0.0416	0.0532	--	--	0.979	0.980	35	20.0	65.77	6,840	72.98	8,137	80.86	9,671	88.82	11,547
1947-61																				
Y = a + b X	15.4888	0.0130	--	--	2.3193	0.0030	--	--	0.764	0.584	13	4.3	59.75	6,214	64.39	7,169	68.85	8,256	74.18	9,643
Y = a + b log X 7/	-389.1682	75.6454	--	--	2.3193	17.6409	--	--	0.769	0.588	13	4.3	58.34	6,067	61.39	6,841	64.87	7,765	67.39	8,761
log Y = a + b log X 7/	-0.6995	0.6883	--	--	0.0208	0.1588	--	--	0.769	0.591	13	4.3	59.20	6,157	63.31	7,059	67.38	8,112	71.86	9,342
1947-60																				
Y = a + b X	14.5444	0.0133	--	--	2.2843	0.0027	--	--	0.797	0.635	14	4.9	59.90	6,230	64.55	7,197	69.21	8,340	74.66	9,706
Y = a + b log X 7/	-358.2858	70.3387	--	--	2.2827	15.8177	--	--	0.798	0.637	14	5.0	58.53	6,087	61.89	6,896	64.88	7,818	68.12	8,856
log Y = a + b log X 7/	-0.7187	0.7088	--	--	0.0200	0.1427	--	--	0.799	0.638	14	5.0	59.61	6,199	63.89	7,184	68.05	8,200	72.80	9,464
Coarse and industrial paper consumption per household is a function of average disposable personal income per household																				
1929-61 6/																				
Y = a + b X	-10.4634	0.0890	--	--	10.8273	0.0021	--	--	0.938	0.880	26	13.8	2/ 221.54	6,923	2/ 241.84	8,162	2/ 262.14	9,634	2/ 288.24	11,498
Y = a + b log X 7/	-1158.4839	350.2995	--	--	10.4643	84.3936	--	--	0.942	0.888	26	14.4	2/ 208.77	6,524	2/ 221.53	7,477	2/ 233.30	8,577	2/ 247.21	9,827
log Y = a + b log X 7/	-1.9998	1.1047	--	--	0.0340	0.0794	--	--	0.939	0.882	26	13.9	2/ 224.85	7,027	2/ 246.70	8,326	2/ 268.70	9,875	2/ 297.30	11,818
1947-61																				
Y = a + b X	73.0619	0.0155	--	--	8.7339	0.0056	--	--	0.607	0.369	13	2.8	2/ 199.06	6,221	2/ 209.91	7,084	2/ 220.76	8,113	2/ 234.71	9,330
Y = a + b log X 7/	-679.6983	184.4078	--	--	8.6926	80.3797	--	--	0.612	0.375	13	2.8	2/ 274.25	8,570	2/ 283.15	9,596	2/ 291.37	10,708	2/ 301.07	11,968
log Y = a + b log X 7/	0.0815	0.9831	--	--	0.0286	0.2868	--	--	0.612	0.375	13	2.8	2/ 198.35	6,198	2/ 208.25	7,028	2/ 217.85	8,006	2/ 229.80	9,135

Table 5.--Statistical measures obtained from regression equations tested for use in projecting demand for coarse and industrial paper--Continued

Variables, time period, and mathematical function	Regression coefficients				Standard errors of estimate 1/	Standard errors of b coefficients 2/			Coefficient or index of correlation 3/	Coefficient or index of determination 4/	Degrees of freedom	F or t ratios 2/	Projected Demand					
													1970		1975		1980	1985
	a	b	b_1	b_2		b	b_1	b_2					Per capita	Total	Per capita	Total	Per capita	Per capita
													Pounds	Thousand tons	Pounds	Thousand tons	Pounds	Pounds
Coarse and industrial paper consumption is a function of population																		
1929-62 5/																		
Y = a + b X	-4673.4461	58.8958	--	--	361.5122	1.7918	--	--	0.980	0.960	36	29.5	60.71	6,114	63.73	7,106	66.86	69.70	9,061
Y = a + b log X 1/	-39563.9990	17428.9990	--	--	260.4679	986.4902	--	--	0.980	0.961	36	29.6	55.99	5,823	62.94	6,949	67.57	67.77	7,510
log Y = a + b log X 1/	-2.7436	2.8634	--	--	0.0594	0.1251	--	--	0.987	0.936	36	22.9	75.32	7,833	85.75	9,561	99.10	114.15	14,340
1947-62																		
Y = a + b X	-2488.4430	39.9816	--	--	210.8806	4.0085	--	--	0.958	0.878	14	10.0	55.95	5,819	57.56	6,413	59.23	60.73	7,895
Y = a + b log X 1/	-29832.3910	15132.4510	--	--	210.2398	1514.1616	--	--	0.957	0.877	14	10.0	54.29	5,646	54.74	6,103	54.88	54.71	7,112
log Y = a + b log X 1/	-0.0056	1.6310	--	--	0.0240	0.1728	--	--	0.930	0.864	14	9.4	57.30	5,959	59.97	6,676	62.88	65.95	8,574
Coarse and industrial paper consumption is a function of gross national product																		
1929-62 5/																		
Y = a + b X	-19.0336	9.4464	--	--	194.2353	0.2358	--	--	0.989	0.979	36	40.1	64.11	6,668	71.00	7,916	77.45	9.333	11,080
Y = a + b log X 1/	-12997.9930	6338.9908	--	--	201.0100	163.8619	--	--	0.988	0.977	36	38.7	52.65	5,476	53.26	5,939	53.04	6,391	52.79	6,863
log Y = a + b log X 1/	0.8682	1.0498	--	--	0.0408	0.0332	--	--	0.982	0.965	36	31.6	66.57	6,923	74.07	8,259	81.44	9,813	90.38	11,750
1947-62																		
Y = a + b X	595.4937	8.0906	--	--	174.8708	0.6960	--	--	0.957	0.915	14	12.3	60.68	6,311	66.24	7,358	71.00	8,566	77.36	10.055
Y = a + b log X 1/	-16383.4860	7778.0861	--	--	184.7693	673.3295	--	--	0.951	0.905	14	11.6	55.72	5,794	57.04	6,362	57.40	6,917	57.64	7,495
log Y = a + b log X 1/	1.3817	0.8496	--	--	0.0198	0.0722	--	--	0.953	0.907	14	11.7	59.64	6,204	64.16	7,154	68.20	8,219	73.08	9,500
Coarse and industrial paper consumption is a function of disposable personal income																		
1929-62 5/																		
Y = a + b X	-18.7735	13.6828	--	--	204.1320	0.4437	--	--	0.986	0.972	27	30.8	65.60	6,823	72.24	8,054	78.20	9,422	86.16	11,201
Y = a + b log X 1/	-13010.9990	6927.2687	--	--	193.3194	201.1609	--	--	0.989	0.978	27	34.4	54.64	5,685	55.44	6,183	55.20	6,654	55.20	7,174
log Y = a + b log X 1/	1.0129	1.0504	--	--	0.0328	0.0300	--	--	0.985	0.969	27	29.2	67.76	7,046	75.20	8,383	82.00	9,861	91.16	11,350
1947-62																		
Y = a + b X	743.5608	11.2200	--	--	186.0301	0.9786	--	--	0.951	0.904	14	11.5	61.08	6,354	66.04	7,363	70.40	8,485	76.48	9,944
Y = a + b log X 1/	-14717.3590	7617.4382	--	--	186.0260	664.3883	--	--	0.951	0.904	14	11.5	56.17	5,842	57.28	6,389	57.32	6,907	57.52	7,478
log Y = a + b log X 1/	1.5741	0.8236	--	--	0.0210	0.0750	--	--	0.947	0.896	14	11.0	60.24	6,267	64.40	7,181	67.80	8,170	72.44	9,417

Table 5.--Statistical measures obtained from regression equations tested for use in projecting demand for coarse and industrial paper--Continued

Variables, time period, and mathematical function	Regression coefficients				Standard errors of estimate 1/	Standard errors of b coefficients 2/			Coefficient of index of correlation 3/	Coefficient of index of determination 4/	Degrees of freedom	F or t ratios 5/	Projected Demand					
													1970		1975		1980		1985	
	a	b	b_1	b_2		b	b_1	b_2					Per capita	Total	Per capita	Total	Per capita	Total	Per capita	Total
													Pounds	Thousand tons	Pounds	Thousand tons	Pounds	Thousand tons	Pounds	Thousand tons
Coarse and industrial paper consumption is a function of industrial production																				
1920-62 6/																				
$Y = a + b X$	487.0895	40.3685	--	--	208.6884	1.0844	--	--	0.987	0.975	36	37.2	62.32	6,481	67.80	7,491	72.20	8,701	77.80	10,114
$Y = a + b \log X$ 7/	-9999.8703	5167.7830	--	--	844.8985	163.7277	--	--	0.982	0.965	36	31.6	50.44	5,246	50.16	5,598	49.36	5,947	48.48	6,301
$\log Y = a + b \log X$ 7/	1.9384	0.8762	--	--	0.0461	0.0308	--	--	0.977	0.955	36	27.8	61.04	6,348	64.96	7,243	68.80	8,285	73.00	9,451
1947-62																				
$Y = a + b X$	1038.8684	33.8660	--	--	134.6164	8.4136	--	--	0.986	0.934	14	14.0	58.76	6,111	62.40	6,957	66.16	7,973,	68.64	9,159
$Y = a + b \log X$ 7/	-9812.8830	6774.9851	--	--	164.2698	515.7862	--	--	0.962	0.985	14	13.1	54.16	5,631	54.96	6,084	54.36	6,550	53.96	7,014
$\log Y = a + b \log X$ 7/	2.1697	0.7378	--	--	0.0172	0.0539	--	--	0.965	0.930	14	13.7	57.32	5,960	59.88	6,677	62.28	7,505	64.84	8,489
Coarse and industrial paper consumption is a function of households																				
1920-62 6/																				
$Y = a + b X$	-8588.5884	135.1311	--	--	207.0866	3.6004	--	--	0.987	0.975	36	37.5	58.88	6,123	60.96	6,799	63.16	7,610	64.77	8,488
$Y = a + b \log X$ 7/	-19493.8600	13686.3830	--	--	842.4335	366.4071	--	--	0.983	0.966	36	31.9	52.84	5,496	52.77	5,884	52.42	6,317	51.65	6,715
$\log Y = a + b \log X$ 7/	0.3597	1.9469	--	--	0.0435	0.0657	--	--	0.980	0.960	36	29.5	67.28	6,998	72.80	8,119	79.48	9,577	85.79	11,153
1947-62																				
$Y = a + b X$	-1588.1660	138.3884	--	--	889.5749	11.8145	--	--	0.957	0.878	14	10.0	56.71	5,898	58.88	6,591	59.77	7,202	60.87	7,913
$Y = a + b \log X$ 7/	-17489.3880	12662.0888	--	--	815.9311	1306.4394	--	--	0.933	0.870	14	9.7	54.36	5,654	54.50	6,077	54.32	6,545	53.67	6,977
$\log Y = a + b \log X$ 7/	1.3193	1.3706	--	--	0.0839	0.1847	--	--	0.930	0.865	14	9.5	57.90	5,980	59.60	6,645	61.98	7,468	63.97	8,316
Coarse and industrial paper consumption is a function of population and per capita gross national product																				
1920-61 6/																				
$Y = a + b X + b_1 X_1$	-3183.0754	16.4595	1.1101	--	168.4625	3.9688	0.1403	--	0.992	0.984	34	98.6	58.71	6,106	61.80	6,891	64.36	7,796	67.03	8,714
$Y = a + b \log X + b_1 \log X_1$ 8/	-38835.8880	8462.8460	1809.8405	--	169.3051	448.0309	240.7833	--	0.991	0.983	34	58.2	53.84	5,599	54.57	6,085	54.70	6,591	54.62	7,100
$\log Y = a + b \log X + b_1 \log X_1$ 8/	-5.7386	1.2306	0.7877	--	0.0287	0.2452	0.1318	--	0.983	0.966	34	36.8	70.00	7,280	78.48	8,750	87.88	10,990	98.77	12,840
1947-61																				
$Y = a + b X + b_1 X_1$	-8598.8580	17.0795	1.4799	--	195.7086	10.1899	0.6898	--	0.941	0.885	12	3.1	57.38	5,967	60.38	6,732	62.65	7,549	65.16	8,472
$Y = a + b \log X + b_1 \log X_1$ 8/	-38388.3880	3888.6666	1388.6388	--	208.4133	1735.7669	1647.9882	--	0.936	0.877	12	3.4	54.85	5,704	56.05	6,250	56.36	6,792	56.53	7,349
$\log Y = a + b \log X + b_1 \log X_1$ 8/	-8.9735	0.9287	1.0738	--	0.0586	0.4336	0.4116	--	0.938	0.880	12	1.8	58.85	6,120	63.32	7,060	67.30	8,110	72.08	9,370

Table 4.--Statistical measures obtained from regression equations tested for use in projecting demand for coarse and industrial paper--Continued

Variables, time period, and mathematical function	Regression coefficients				Standard errors of estimate 1/	Standard errors of b coefficients 2/			Coefficient of index of correlation 1/	Coefficient of index of determination 1/	Degrees of freedom	F or t ratios 2/	Projected Demand							
													1970		1975		1980		1985	
	a	b	b_1	b_2		b	b_1	b_2					Per capita	Total	Per capita	Total	Per capita	Total	Per capita	Total
													Pounds	Thousand tons	Pounds	Thousand tons	Pounds	Thousand tons	Pounds	Thousand tons
Course and industrial paper consumption is a function of population and per capita disposable personal income																				
1949-61 3/																				
$Y = a + bX + b_1 X_1$	-2812.2887	17.3487	2.2333	--	182.0136	5.8100	0.3302	--	0.989	0.978	25	9.3	59.19	6,156	60.15	6,930	64.36	7,756	67.09	8,788
$Y = a + b \log X + b_1 \log X_1$ 3/	-34706.2680	4898.8871	2253.7837	--	179.9256	709.7938	382.7615	--	0.989	0.978	25	35.1	59.88	5,793	56.04	6,268	58.19	6,771	56.23	7,350
$\log Y = a + b \log X + b_1 \log X_1$ 3/	-4.5269	0.7108	1.2278	--	0.0803	0.3168	0.1708	--	0.981	0.986	25	5.2	65.38	6,888	71.75	8,888	77.76	9,370	85.46	11,130
1957-61																				
$Y = a + bX + b_1 X_1$	-8990.9980	-26.2735	5.8134	--	169.3980	19.7352	1.7410	--	0.996	0.914	12	1.9	61.30	6,386	69.88	7,330	68.07	5,205	72.01	9,361
$Y = a + b \log X + b_1 \log X_1$ 3/	-51126.0470	-4631.9038	10516.9290	--	178.8582	3755.3971	3541.9569	--	0.951	0.904	12	1.6	57.78	6,089	58.68	6,668	58.51	7,171	60.14	7,818
$\log Y = a + b \log X + b_1 \log X_1$ 3/	-6.2589	-1.5152	2.9733	--	0.4060	0.9868	0.9115	--	0.949	0.901	12	2.7	63.89	6,680	70.80	7,880	76.36	8,960	82.23	10,690
Course and industrial paper consumption is a function of population and industrial production																				
1949-61 3/																				
$Y = a + bX + b_1 X_1$	-1467.3766	19.1759	26.4904	--	185.2677	5.9072	4.1738	--	0.990	0.979	36	12.5	62.45	6,495	66.77	7,445	71.86	8,589	75.97	9,876
$Y = a + b \log X + b_1 \log X_1$ 3/	-19581.0330	1351.0532	1234.0860	--	152.4631	479.9753	140.0938	--	0.993	0.986	36	38.3	63.16	6,569	64.05	6,982	66.55	5,368	66.75	5,817
$\log Y = a + b \log X + b_1 \log X_1$ 3/	-0.1483	1.1963	0.5267	--	0.0891	0.2806	0.0819	--	0.994	0.988	36	18.7	68.34	7,160	79.70	8,460	83.57	10,070	98.50	12,089
1957-61																				
$Y = a + bX + b_1 X_1$	1191.5794	-1.2561	34.3856	--	172.1283	12.5452	10.6514	--	0.994	0.981	12	0.01	58.46	6,080	62.06	6,980	65.79	7,988	70.05	9,107
$Y = a + b \log X + b_1 \log X_1$ 3/	-8781.0610	2.2092	2863.0361	--	171.4083	2034.0338	376.0591	--	0.995	0.912	12	0.0	53.62	5,576	53.97	6,068	53.70	6,471	53.25	6,983
$\log Y = a + b \log X + b_1 \log X_1$ 3/	5.8727	-0.2552	0.0320	--	0.0428	0.5027	0.2166	--	0.957	0.916	12	0.3	56.54	5,860	58.98	6,570	60.91	7,340	63.15	8,230
Course and industrial paper consumption is a function of households and industrial production																				
1949-61 3/																				
$Y = a + bX + b_1 X_1$	-985.9092	67.7109	20.7444	--	182.0817	13.2122	3.9720	--	0.994	0.988	36	27.0	61.13	6,358	64.71	7,215	68.44	8,243	72.12	9,376
$Y = a + b \log X + b_1 \log X_1$ 3/	-10865.0080	2555.1081	1138.4610	--	153.0735	387.5351	153.3105	--	0.993	0.986	36	55.6	58.78	5,385	51.63	5,757	50.68	6,155	50.27	6,535
$\log Y = a + b \log X + b_1 \log X_1$ 3/	2.3797	1.0665	0.4078	--	0.0755	0.1715	0.0756	--	0.989	0.977	36	29.9	65.96	6,860	71.12	7,929	76.89	9,360	82.99	10,737
1957-61																				
$Y = a + bX + b_1 X_1$	1267.8005	-8.6186	35.6875	--	171.8867	40.0967	11.2961	--	0.995	0.911	12	0.1	58.48	6,082	62.16	6,931	65.98	7,930	70.37	9,148
$Y = a + b \log X + b_1 \log X_1$ 3/	-7982.0830	-988.6880	1118.9501	--	170.5774	1842.9337	987.0250	--	0.995	0.912	12	0.1	53.53	5,567	53.89	6,008	53.61	6,460	53.17	6,912
$\log Y = a + b \log X + b_1 \log X_1$ 3/	5.4187	-0.2377	0.8471	--	0.0423	0.4365	0.2395	--	0.957	0.916	12	0.3	56.63	5,890	59.10	6,590	61.84	7,380	63.68	8,278

Table 5.--Statistical measures obtained from regression equations tested for use in projecting demand for course and industrial paper--Continued

Variables, time period and mathematical function	Regression coefficients				Standard errors of estimate 1/	Standard errors of b coefficients 2/			Coefficient or index of correlation 3/	Coefficient or index of determination 4/	Degrees of freedom	F or t ratios 5/	Projected Demand							
													1970		1975		1980		1985	
	a	b	b_1	b_2		b	b_1	b_2					Per capita	Total	Per capita	Total	Per capita	Total	Per capita	Total
													Pounds	Thousand tons	Pounds	Thousand tons	Pounds	Thousand tons	Pounds	Thousand tons
Course and industrial paper consumption is a function of population, per capita disposable personal income, and industrial production																				
1929-61 6/																				
$Y = a + b X + b_1 X_1 + b_2 X_2$	-881.9860	6.6739	1.1207	20.3533	175.4936	8.4131	0.7276	11.9680	0.990	0.980	24	0.7	60.09	6,249	63.82	7,116	67.25	8,164	71.25	9,466
$Y = a + b \log X + b_1 \log X_1 + b_2 \log X_2$ 7/	-18811.0600	3771.8041	-388.7069	1362.7896	164.4530	683.0158	1117.0900	999.8375	0.991	0.982	24	0.1	53.76	5,588	58.12	6,034	59.07	6,515	53.72	6,394
$\log Y = a + b \log X + b_1 \log X_1 + b_2 \log X_2$ 8/	3.6582	0.4431	-0.1017	0.7016	0.0703	0.2588	0.4779	0.2395	0.987	0.975	24	0.05	60.46	6,290	64.82	7,160	68.28	8,280	72.31	9,609
1947-61																				
$Y = a + b X + b_1 X_1 + b_2 X_2$	-343.6251	-21.0693	3.4689	18.0628	168.1938	80.1739	2.7708	16.6088	0.980	0.988	11	1.2	60.65	6,308	64.95	7,248	68.07	8,208	72.48	9,628
$Y = a + b \log X + b_1 \log X_1 + b_2 \log X_2$ 7/	-26907.3850	-3167.9096	5107.4039	1885.7189	171.3400	3735.8781	5048.9468	1304.0019	0.959	0.919	11	0.8	55.62	5,785	56.71	6,383	56.46	6,803	56.59	7,519
$\log Y = a + b \log X + b_1 \log X_1 + b_2 \log X_2$ 8/	1.3586	-1.0645	1.3886	0.9831	0.0688	0.9803	1.8439	0.3813	0.981	0.963	11	1.2	59.68	6,200	63.59	7,090	66.31	7,990	70.31	9,328

1/ A measure of the closeness with which values of a dependent variable can be estimated from the values of an independent variable(s).
2/ A measure of the closeness with which the true values of the regression coefficients can be estimated from the values in the sample.
3/ A measure of the degree of relationship between the dependent and independent variable(s).
4/ A measure of the percent of the variation in the values of the dependent variable that is associated with variation in values of the independent variable(s).
5/ A measure of the probability that the given values of b might have been obtained by chance from a population in which the true regression coefficient is zero.
6/ Excepting the war years 1942-46.
7/ Expressed in common logarithms.
8/ Expressed in natural logarithms.
9/ Pounds per household.

Table 6.--Statistical measures obtained from regression equations tested for use in projecting demand for sanitary and tissue paper

Variables, time period, and mathematical function	Regression coefficients			Standard errors of estimate 1/	Standard errors of b coefficients 2/		Coefficient or index of correlation 3/	Coefficient or index of determination 4/	Degrees of freedom	F or t ratios 5/	Projected Demand							
											1970		1975		1980		1985	
	a	b	b_1		b	b_1					Per capita	Total	Per capita	Total	Per capita	Total	Per capita	Total
											Pounds	Thousand tons	Pounds	Thousand tons	Pounds	Thousand tons	Pounds	Thousand tons
Per capita sanitary and tissue paper consumption is a function of per capita disposable personal income																		
1959-61 6/																		
Y = a + b X	-13.0941	0.0184	--	1.2690	0.0007	--	0.983	0.967	26	27.4	31.07	3,232	35.30	3,936	39.53	4,763	44.77	5,320
Y = a + b log X 7/	-172.0086	58.9792	--	1.7589	3.0373	--	0.983	0.967	26	19.4	27.35	2,844	29.70	3,312	31.84	3,837	34.28	4,456
log Y = a + b log X 7/	-5.3083	2.0886	--	0.0552	0.0954	--	0.972	0.946	26	21.3	35.38	3,680	42.60	4,750	50.90	6,085	61.24	7,961
1947-61																		
Y = a + b X	-19.4388	0.0880	--	0.6287	0.0012	--	0.982	0.965	13	18.8	33.37	3,470	38.43	4,285	43.49	5,241	49.76	6,469
Y = a + b log X 7/	-270.5894	89.3335	--	0.6881	5.2077	--	0.979	0.958	13	17.2	31.44	3,270	34.99	3,901	38.24	4,608	41.93	5,451
log Y = a + b log X 7/	-5.1497	1.9819	--	0.0131	0.0994	--	0.984	0.968	13	19.9	35.44	3,686	42.49	4,738	50.18	6,047	60.96	7,873
1947-62																		
Y = a + b X	-17.0880	0.0806	--	0.6952	0.0011	--	0.981	0.962	14	18.7	32.42	3,372	37.16	4,143	41.89	5,048	47.76	6,209
Y = a + b log X 7/	-299.8038	85.8455	--	0.6951	4.5904	--	0.981	0.961	14	18.7	30.97	3,221	34.38	3,833	37.51	4,520	41.05	5,336
log Y = a + b log X 7/	-4.7653	1.8634	--	0.0153	0.1009	--	0.980	0.960	14	18.5	34.15	3,552	40.50	4,516	47.35	5,706	56.52	7,348
1947-63																		
Y = a + b X	18.0804	0.0212	--	0.7234	0.0011	--	0.982	0.964	15	20.0	32.80	3,411	37.68	4,201	42.55	5,127	48.59	6,317
Y = a + b log X 7/	-268.9397	88.8969	--	0.7460	4.5887	--	0.981	0.962	15	19.4	31.42	3,268	34.95	3,897	38.18	4,601	41.85	5,440
log Y = a + b log X 7/	-4.8665	1.8947	--	0.0152	0.0933	--	0.982	0.965	15	20.3	34.52	3,590	41.05	4,577	48.12	5,798	57.60	7,488
1948-61																		
Y = a + b X	-19.3981	0.0220	--	0.6799	0.0014	--	0.976	0.952	12	15.4	33.41	3,475	38.47	4,289	43.53	5,245	49.80	6,474
Y = a + b log X 7/	-273.4707	90.2324	--	0.7199	6.2216	--	0.973	0.946	12	14.5	31.53	3,279	35.12	3,916	38.41	4,628	42.13	5,477
log Y = a + b log X 7/	-5.0881	1.9631	--	0.0148	0.1280	--	0.975	0.951	12	15.3	35.29	3,670	42.23	4,709	49.79	6,000	59.99	7,799
1948-62																		
Y = a + b X	-20.4249	0.0226	--	0.6810	0.0013	--	0.979	0.958	13	17.3	33.02	3,517	39.01	4,350	44.21	5,327	50.65	6,534
Y = a + b log X 7/	-283.9035	93.3312	--	0.7365	5.8539	--	0.975	0.951	13	15.9	31.98	3,326	35.69	3,979	39.08	4,709	42.93	5,531
log Y = a + b log X 7/	-5.1882	1.9940	--	0.0144	0.1148	--	0.979	0.959	13	17.4	35.64	3,707	42.78	4,770	50.56	6,092	61.11	7,944
1948-63																		
Y = a + b X	-18.2788	0.0213	--	0.7477	0.0012	--	0.978	0.957	14	17.6	32.94	3,415	37.74	4,808	42.64	5,139	48.71	6,332
Y = a + b log X 7/	-273.8778	90.3612	--	0.7608	5.2167	--	0.977	0.955	14	17.3	31.56	3,282	35.15	3,919	38.44	4,632	42.17	5,482
log Y = a + b log X 7/	-4.8375	1.8858	--	0.0157	0.1076	--	0.978	0.956	14	17.5	33.43	3,477	40.92	4,563	47.92	5,774	57.32	7,452
1949-61																		
Y = a + b X	-19.7297	0.0222	--	0.7082	0.0017	--	0.970	0.942	11	13.3	33.35	3,439	38.66	4,311	43.76	5,273	50.09	6,512
Y = a + b log X 7/	-277.8647	91.5741	--	0.7464	7.2598	--	0.967	0.935	11	12.6	31.52	3,295	35.32	3,938	38.65	4,657	42.41	5,516
log Y = a + b log X 7/	-5.0916	1.9641	--	0.0155	0.1504	--	0.969	0.939	11	13.1	35.29	3,669	42.22	4,708	49.79	6,000	59.99	7,799

Table 6.--Statistical measures obtained from regression equations tested for use in projecting demand for sanitary and tissue paper--Continued

Variables, time period, and mathematical function	Regression coefficients			Standard errors of estimate 1/	Standard errors of b coefficients 2/		Coefficient or index of correlation 3/	Coefficient or index of determination 4/	Degrees of freedom	F or t ratios 2/	Projected Demand							
											1970		1975		1980		1985	
	a	b	b_1		b	b_1					Per capita	Total	Per capita	Total	Per capita	Total	Per capita	Total
											Pounds	Thousand tons	Pounds	Thousand tons	Pounds	Thousand tons	Pounds	Thousand tons
1949-62																		
$Y = a + b X$	-16.9988	0.0806	--	0.7554	0.0015	--	0.971	0.943	12	14.1	32.44	3,374	37.18	4,146	41.98	5,051	47.79	6,213
$Y = a + b \log X$ 1/	-865.0448	87.6274	--	0.7470	6.1247	--	0.972	0.945	12	14.3	31.19	3,240	34.64	3,862	37.83	4,999	41.44	5,387
$\log Y = a + b \log X$ 1/	-4.6663	1.8352	--	0.0165	0.1351	--	0.969	0.939	12	13.6	33.91	3,527	40.10	4,471	46.76	5,635	55.65	7,234
1949-63																		
$Y = a + b X$	-18.3485	0.0834	--	0.7758	0.0014	--	0.974	0.949	13	15.6	33.08	3,434	37.94	4,250	42.85	5,169	48.96	6,365
$Y = a + b \log X$ 1/	-876.8788	88.8742	--	0.7855	5.9392	--	0.974	0.948	13	15.4	31.65	3,298	35.28	3,954	38.60	4,651	42.36	5,507
$\log Y = a + b \log X$ 1/	-4.8036	1.8795	--	0.0163	0.1289	--	0.973	0.947	13	15.3	34.36	3,573	40.79	4,948	47.73	5,731	57.04	7,415
Per capita sanitary and tissue paper consumption is a function of per capita gross national product																		
1950-61 6/																		
$Y = a + b X$	-11.7070	0.0181	--	1.7370	0.0009	--	0.972	0.945	35	20.4	29.95	3,073	33.79	3,768	38.08	4,581	42.98	5,587
$Y = a + b \log X$ 1/	-168.4008	53.2988	--	2.2128	2.8688	--	0.954	0.910	35	18.8	25.87	2,690	28.13	3,136	30.19	3,638	32.39	4,211
$\log Y = a + b \log X$ 1/	-5.7311	2.0947	--	0.0959	0.1286	--	0.943	0.889	35	16.8	33.70	3,505	41.19	4,595	49.47	5,961	60.13	7,817
1947-61																		
$Y = a + b X$	-17.6847	0.0184	--	1.9486	0.0018	--	0.915	0.838	13	8.2	31.48	3,274	36.52	4,183	41.96	5,008	47.46	6,170
$Y = a + b \log X$ 1/	-869.8034	83.5286	--	1.3995	10.6698	--	0.908	0.825	13	7.8	29.88	3,108	33.43	3,727	36.66	4,418	40.11	5,214
$\log Y = a + b \log X$ 1/	-5.1006	1.8733	--	0.0854	0.2162	--	0.923	0.853	13	8.7	32.91	3,423	39.52	4,406	46.69	5,626	55.80	7,254
Sanitary and tissue paper consumption per household is a function of average disposable personal income per household																		
1950-61 6/																		
$Y = a + b X$	-64.0004	0.0813	--	5.8398	0.0011	--	0.965	0.931	35	18.8	2/ 106.40	3,385	2/ 121.31	4,094	2/ 136.28	5,006	2/ 155.39	6,177
$Y = a + b \log X$ 1/	-889.1108	251.3085	--	7.0495	16.4333	--	0.949	0.900	35	15.3	2/ 95.75	2,992	2/ 104.90	3,540	2/ 113.35	4,166	2/ 123.33	4,902
$\log Y = a + b \log X$ 1/	-6.9986	2.3856	--	0.0698	0.1534	--	0.948	0.898	35	15.2	2/ 119.77	3,793	2/ 149.96	4,913	2/ 178.30	6,406	2/ 213.65	8,572
1947-61																		
$Y = a + b X$	-83.1309	0.0845	--	2.0389	0.0013	--	0.952	0.864	13	10.7	2/ 112.87	3,587	2/ 130.02	4,388	2/ 147.17	5,408	2/ 169.22	6,726
$Y = a + b \log X$ 1/	-1864.3934	351.6100	--	2.1010	19.4274	--	0.951	0.962	13	10.1	2/ 108.04	3,376	2/ 120.85	4,079	2/ 132.67	4,876	2/ 146.63	5,829
$\log Y = a + b \log X$ 1/	-6.9034	2.1987	--	0.0134	0.1242	--	0.980	0.960	13	17.7	2/ 119.75	3,742	2/ 144.00	4,860	2/ 170.73	6,274	2/ 208.75	8,298
Sanitary and tissue paper consumption is a function of population																		
1950-62 6/																		
$Y = a + b X$	-3191.1955	29.5760	--	95.8287	0.6965	--	0.991	0.982	36	45.0	28.47	2,961	30.53	3,404	32.67	3,937	34.61	4,499
$Y = a + b \log X$ 1/	-19736.3830	9675.1749	--	131.9457	298.1136	--	0.983	0.967	36	32.5	25.68	2,671	26.58	2,964	27.30	3,290	27.76	3,609
$\log Y = a + b \log X$ 1/	-7.5751	4.8673	--	0.0642	0.1452	--	0.984	0.969	36	33.5	49.04	5,100	64.20	7,158	86.68	10,445	116.23	15,110

Table 6.--Statistical measures obtained from regression equations tested for use in projecting demand for sanitary and tissue paper--Continued

Variables, time period, and mathematical function	Regression coefficients			Standard errors of estimate 1/	Standard errors of b coefficients 2/		Coefficient or index of correlation 3/	Coefficient or index of determination 4/	Degrees of freedom	F or t ratios 5/	Projected Demand							
											1970		1975		1980		1985	
	a	b	b_1		b	b_1					Per capita	Total	Per capita	Total	Per capita	Total	Per capita	Total
											Pounds	Thousand tons	Pounds	Thousand tons	Pounds	Thousand tons	Pounds	Thousand tons
1947-62																		
Y = a + b X	-3384.0851	30.8309	--	54.0338	1.0271	--	0.992	0.985	14	30.0	29.12	3,029	31.31	3,491	33.58	4,046	35.63	4,632
Y = a + b log X 1/	-24188.0000	11653.3610	--	61.8572	445.5002	--	0.990	0.980	14	26.2	27.80	2,891	29.09	3,244	30.18	3,637	30.93	4,021
log Y = a + b log X 1/	-3.5842	3.0425	--	0.0147	0.1058	--	0.992	0.983	14	28.8	32.47	3,377	37.43	4,174	43.87	5,286	51.22	6,698
Sanitary and tissue paper consumption is a function of gross national product																		
1950-62 6/																		
Y = a + b X	-971.0498	5.8400	--	96.3065	0.1169	--	0.991	0.982	36	44.9	30.28	3,149	34.36	3,831	38.32	4,617	42.97	5,586
Y = a + b log X 1/	-7380.8697	3846.9693	--	174.2896	142.0936	--	0.971	0.942	36	24.3	23.53	2,447	24.80	2,698	24.43	2,944	24.62	3,201
log Y = a + b log X 1/	-1.3677	1.7416	--	0.0793	0.0646	--	0.976	0.953	36	26.9	38.12	3,964	47.64	5,312	58.69	7,072	73.32	9,531
1947-62																		
Y = a + b X	-812.4462	6.0036	--	88.8620	0.3334	--	0.979	0.959	14	18.0	32.21	3,350	37.05	4,131	41.75	5,031	47.25	6,142
Y = a + b log X 1/	-13469.7990	5736.3914	--	111.7807	407.1283	--	0.967	0.935	14	14.1	26.41	2,955	30.27	3,375	33.42	3,786	38.42	4,815
log Y = a + b log X 1/	-0.7307	1.5881	--	0.0884	0.0816	--	0.980	0.961	14	18.6	34.07	3,543	41.08	4,574	48.76	5,875	58.69	7,625
Sanitary and tissue paper consumption is a function of disposable personal income																		
1950-62 6/																		
Y = a + b X	-654.8692	7.8948	--	69.6435	0.1514	--	0.995	0.990	27	52.2	31.66	3,293	35.90	4,003	39.78	4,793	44.76	5,819
Y = a + b log X 1/	-7961.7881	3915.8814	--	147.7416	168.1805	--	0.978	0.956	27	24.2	25.07	2,607	25.90	2,888	26.18	3,155	26.58	3,448
log Y = a + b log X 1/	-0.9715	1.6946	--	0.0477	0.0585	--	0.987	0.975	27	32.4	38.48	4,002	47.51	5,297	57.31	6,906	71.17	9,258
1947-62																		
Y = a + b X	-856.7383	8.9900	--	46.3605	0.1739	--	0.994	0.989	14	35.1	32.87	3,418	37.56	4,188	41.85	5,043	47.34	6,154
Y = a + b log X 1/	-12548.9730	5768.3048	--	87.0497	338.4453	--	0.988	0.976	14	24.1	29.04	3,020	30.81	3,435	31.76	3,827	32.76	4,259
log Y = a + b log X 1/	-0.5198	1.5130	--	0.0188	0.0149	--	0.994	0.989	14	35.3	35.21	3,662	42.20	4,705	49.49	5,963	59.59	7,741
Sanitary and tissue paper consumption is a function of households																		
1950-62 6/																		
Y = a + b X	-1890.8209	74.9995	--	101.8980	1.7858	--	0.990	0.980	36	42.4	27.26	2,837	28.81	3,212	30.39	3,662	31.63	4,112
Y = a + b log X 1/	-9051.9730	6416.4686	--	161.6511	844.8897	--	0.975	0.950	36	26.3	23.76	2,471	24.09	2,686	24.26	2,923	24.17	3,148
log Y = a + b log X 1/	-2.2854	3.2898	--	0.0378	0.0371	--	0.995	0.989	36	57.6	40.24	4,185	48.35	5,391	59.20	7,134	71.03	9,234
1947-62																		
Y = a + b X	-2585.9103	90.5819	--	80.1006	4.5196	--	0.983	0.966	14	20.1	29.57	3,075	31.64	3,528	33.79	4,072	35.50	4,615
Y = a + b log X 1/	-14436.1520	9644.7212	--	96.3796	583.0680	--	0.975	0.951	14	16.5	27.74	2,885	28.76	3,207	29.58	3,564	29.94	3,892
log Y = a + b log X 1/	-1.0347	2.5416	--	0.0189	0.1141	--	0.986	0.973	14	22.3	32.56	3,386	36.93	4,118	42.44	5,114	48.02	6,242

Table 6.--Statistical measures obtained from regression equations tested for use in projecting demand for sanitary and tissue paper--Continued

Variables, time period, and mathematical function	Regression coefficients			Standard errors of estimate 1/	Standard errors of b coefficients 2/		Coefficient or index of correlation 3/	Coefficient or index of determination 4/	Degrees of freedom	F or t ratios 5/	Projected Demand							
											1970		1975		1980		1985	
	a	b	b_1		b	b_1					Per capita	Total	Per capita	Total	Per capita	Total	Per capita	Total
											Pounds	Thousand tons	Pounds	Thousand tons	Pounds	Thousand tons	Pounds	Thousand tons
Sanitary and tissue paper consumption is a function of population and per capita gross national product																		
1929-61 6/																		
$Y = a + b X + b_1 X_1$	-8763.9827	22.3814	0.2912	80.0449	1.7751	0.0691	0.993	0.987	34	15.3	27.74	2,385	29.79	3,322	31.76	3,827	33.63	4,372
$Y = a + b \log X + b_1 \log X_1$ 8/	-19035.0380	1305.9787	488.5160	119.1020	315.1967	169.9490	0.986	0.971	34	8.6	24.86	2,585	25.68	2,863	26.25	3,163	26.62	3,460
$\log Y = a + b \log X + b_1 \log X_1$ 8/	-17.8410	3.8602	0.6316	0.1308	0.3461	0.1359	0.988	0.976	34	11.9	47.29	4,919	61.38	6,844	81.08	9,770	106.92	13,900
1947-61																		
$Y = a + b X + b_1 X_1$	-3309.9983	11.0805	-0.0453	58.4301	1.3284	0.1860	0.990	0.981	12	0.1	26.86	3,001	30.95	3,451	33.15	3,995	35.13	4,567
$Y = a + b \log X + b_1 \log X_1$ 8/	-28753.7390	5373.8863	-378.3682	65.4012	960.8388	532.4510	0.988	0.976	12	0.5	27.49	2,859	28.67	3,197	29.71	3,580	30.40	3,952
$\log Y = a + b \log X + b_1 \log X_1$ 8/	-9.0203	2.8308	0.2522	0.0378	0.3245	0.3081	0.989	0.979	12	0.7	32.99	3,431	38.41	4,283	49.29	5,457	53.33	6,933
Sanitary and tissue paper consumption is a function of population and per capita disposable personal income																		
1929-61 6/																		
$Y = a + b X + b_1 X_1$	-3142.5133	24.8848	0.4095	52.1237	1.6636	0.0946	0.997	0.994	25	19.5	29.00	3,016	31.25	3,484	33.41	4,086	35.90	4,615
$Y = a + b \log X + b_1 \log X_1$ 8/	-21900.9480	4135.9461	333.5364	68.8507	271.6071	146.4682	0.995	0.990	25	5.4	26.64	2,771	27.70	3,089	28.53	3,438	29.11	3,784
$\log Y = a + b \log X + b_1 \log X_1$ 8/	-14.6849	2.4190	1.3008	0.1105	0.4357	0.2350	0.987	0.975	25	31.9	40.74	4,237	50.74	5,658	63.07	7,600	79.46	10,330
1947-61																		
$Y = a + b X + b_1 X_1$	-3301.2490	24.6411	0.5169	56.7429	6.6107	0.5832	0.991	0.982	12	0.9	29.47	3,065	31.97	3,953	34.16	4,116	36.39	4,732
$Y = a + b \log X + b_1 \log X_1$ 8/	-24737.1340	4583.3159	406.3109	66.4998	1391.2796	1116.8648	0.987	0.975	12	0.1	27.78	2,889	29.10	3,245	30.17	3,635	30.93	4,021
$\log Y = a + b \log X + b_1 \log X_1$ 8/	-11.1176	1.6990	1.3149	0.0338	0.7103	0.6699	0.991	0.983	12	4.2	34.49	3,587	40.84	4,554	48.14	5,801	57.52	7,477
Sanitary and tissue paper consumption is a function of households and average disposable personal income per household																		
1929-61 6/																		
$Y = a + b X + b_1 X_1$	-2166.1157	70.2693	0.0865	71.4678	5.2208	0.0429	0.995	0.989	25	4.2	28.05	2,917	29.86	3,329	31.63	3,811	33.16	4,311
$Y = a + b \log X + b_1 \log X_1$ 8/	-12520.5740	2694.5552	368.1531	105.5958	268.6639	290.0461	0.978	0.976	25	1.7	24.92	2,592	25.50	2,843	25.84	3,114	25.94	3,372
$\log Y = a + b \log X + b_1 \log X_1$ 8/	-8.6674	2.6474	0.6723	0.0861	0.2191	0.2366	0.992	0.985	25	8.4	39.56	4,114	47.86	5,336	58.44	7,042	70.91	9,218
1947-61																		
$Y = a + b X + b_1 X_1$	-3467.3188	48.1778	0.5041	56.1641	11.8389	0.1225	0.991	0.982	12	13.8	30.79	3,202	33.77	3,765	36.27	4,371	38.06	4,978
$Y = a + b \log X + b_1 \log X_1$ 8/	-13698.2330	1840.3004	3236.0079	67.6838	581.7443	809.4325	0.987	0.974	12	10.8	28.83	2,998	30.99	3,411	31.69	3,819	32.76	4,259
$\log Y = a + b \log X + b_1 \log X_1$ 8/	-12.0370	1.4193	1.9984	0.0318	0.2732	0.3901	0.992	0.985	12	19.2	34.90	3,630	41.93	4,631	49.08	5,914	58.85	7,690

1/ A measure of the closeness with which values of a dependent variable can be estimated from the values of an independent variable(s).
2/ A measure of the closeness with which the true values of the regression coefficients can be estimated from the va ues in the sample.
3/ A measure of the degree of relationship between the dependent and independent variable(s).
4/ A measure of the percent of the variation in the values of the dependent variable that is associated with variation in values of the independent variable(s).
5/ A measure of the probability that the given values of b might have been obtained by chance from a population in which the true regression coefficient is zero.
6/ Excepting the war years 1942-46.
7/ Expressed in common logarithms.
8/ Expressed in natural logarithms.
9/ Pounds per household.

Table 7.--Statistical measures obtained from regression equations tested for use in projecting demand for construction paper

Variables, time period, and mathematical function	Regression coefficients			Standard errors of estimate 1/	Standard errors of b coefficients 1/		Coefficient or index of correlation 1/	Coefficient or index of determination 1/	Degrees of freedom	F or t ratios 2/	Projected Demand							
											1970		1975		1980		1985	
	a	b	b_1		b	b_1					Per capita	Total	Per capita	Total	Per capita	Total	Per capita	Total
											Pounds	Thousand tons	Pounds	Thousand tons	Pounds	Thousand tons	Pounds	Thousand tons
Per capita construction paper consumption is a function of per capita disposable personal income																		
1929-61 3/																		
Y = a + b X	-4.8349	0.0119	--	2.0548	0.0011	--	0.906	0.820	26	10.9	23.73	2,468	26.46	2,990	29.20	3,519	32.99	4,237
Y = a + b log X 1/	-112.4443	39.6585	--	1.7941	3.0981	--	0.909	0.863	26	12.8	21.61	2,247	23.19	2,586	24.63	2,968	26.27	3,415
log Y = a + b log X 1/	-4.0853	1.6139	--	0.0688	0.1188	--	0.936	0.877	26	13.6	26.85	2,792	31.13	3,471	35.64	4,293	41.54	5,400
1947-61																		
Y = a + b X	24.6753	-0.0044	--	1.1747	0.0022	--	-0.488	-0.238	13	-2.0	14.12	1,468	13.10	1,461	12.09	1,457	10.84	1,409
Y = a + b log X 1/	73.3768	-17.3976	--	1.1890	8.9680	--	-0.474	-0.225	13	-1.9	14.57	1,515	13.88	1,548	13.24	1,595	12.53	1,629
log Y = a + b log X 1/	2.6587	-0.4533	--	0.0303	0.2295	--	-0.481	-0.231	13	-2.0	14.65	1,524	14.05	1,567	13.53	1,630	12.96	1,685
Per capita construction paper consumption is a function of per capita gross national product																		
1929-61 3/																		
Y = a + b X	-3.1658	0.0096	--	1.7475	0.0005	--	0.958	0.869	35	15.2	22.75	2,366	25.41	2,833	28.07	3,388	31.19	4,099
Y = a + b log X 1/	-101.8858	36.7860	--	1.5136	1.9355	--	0.950	0.902	35	17.9	20.74	2,157	22.22	2,478	23.56	2,839	24.99	3,284
log Y = a + b log X 1/	-3.6488	1.4835	--	0.0690	0.0882	--	0.939	0.882	35	16.1	25.06	2,606	28.80	3,211	32.69	3,939	37.43	4,866
1947-61																		
Y = a + b X	22.8869	-0.0083	--	1.2585	0.0016	--	-0.366	-0.134	13	-1.4	15.00	1,560	14.80	1,583	13.39	1,613	12.65	1,619
Y = a + b log X 1/	61.6958	-13.0796	--	1.2587	9.9864	--	-0.354	-0.125	13	-1.4	15.85	1,586	14.70	1,639	14.19	1,709	13.69	1,774
log Y = a + b log X 1/	2.3930	-0.3400	--	0.0323	0.2468	--	-0.358	-0.128	13	-1.4	15.27	1,588	14.77	1,647	14.33	1,727	13.88	1,804
Construction paper consumption per household is a function of average disposable personal income per household																		
1929-61 3/																		
Y = a + b X	-63.7268	0.0133	--	7.3690	0.0015	--	0.872	0.760	25	9.1	2/80.68	2,501	2/89.99	3,037	2/99.30	3,689	2/111.27	4,483
Y = a + b log X 1/	-588.9888	169.6680	--	6.9887	16.1376	--	0.894	0.799	25	10.2	2/75.45	2,338	2/81.48	2,748	2/86.96	3,199	2/93.45	3,715
log Y = a + b log X 1/	-5.3407	1.8881	--	0.0698	0.1668	--	0.910	0.828	25	11.2	2/91.85	2,858	2/106.36	3,986	2/122.70	4,909	2/144.90	5,788
1947-61																		
Y = a + b X	108.0873	-0.0073	--	4.8739	0.0027	--	-0.595	-0.354	13	-2.7	2/49.65	1,427	2/40.58	1,368	2/35.43	1,302	2/28.86	1,147
Y = a + b log X 1/	448.7782	-102.7997	--	4.8593	39.3878	--	-0.586	-0.344	13	-2.6	2/47.58	1,486	2/43.80	1,478	2/40.58	1,488	2/36.86	1,441
log Y = a + b log X 1/	4.6668	-0.7631	--	0.0511	0.8973	--	-0.993	-0.352	13	-2.7	2/48.35	1,511	2/45.35	1,531	2/42.75	1,572	2/39.87	1,595
Construction paper consumption is a function of population																		
1930-62 3/																		
Y = a + b X	-1575.2562	17.4365	--	189.8982	1.3011	--	0.913	0.833	36	13.4	19.73	2,052	20.74	2,313	21.80	2,627	22.75	2,958
Y = a + b log X 1/	-11931.9460	5793.1010	--	182.6024	412.5696	--	0.920	0.845	36	14.0	18.24	1,897	18.58	2,072	18.81	2,267	18.91	2,458
log Y = a + b log X 1/	-3.8696	3.1483	--	0.1227	0.2773	--	0.884	0.782	36	11.4	25.78	2,681	29.95	3,339	35.38	4,263	41.65	5,414

Table 7.--Statistical measures obtained from regression equations tested for use in projecting demand for construction paper--Continued

Variables, time period, and mathematical function	Regression coefficients			Standard errors of estimate 1/	Standard errors of b coefficients 1/		Coefficient or index of correlation 1/	Coefficient or index of determination 1/	Degrees of freedom	F or t ratios 2/	Projected Demand							
											1970		1975		1980		1985	
	a	b	b_1		b	b_1					Per capita	Total	Per capita	Total	Per capita	Total	Per capita	Total
											Pounds	Thousand tons	Pounds	Thousand tons	Pounds	Thousand tons	Pounds	Thousand tons
1947-62																		
Y = a + b X	862.1528	3.0829	--	97.8314	1.6695	--	0.843	0.196	14	1.8	14.43	1,903	13.90	1,550	13.32	1,605	12.80	1,664
Y = a + b log X 2/	-1290.4685	1200.8977	--	87.2200	628.1649	--	0.455	0.207	14	1.9	14.36	1,893	13.72	1,530	13.03	1,570	12.38	1,610
log Y = a + b log X 2/	2.2548	0.3977	--	0.0278	0.2003	--	0.469	0.220	14	2.0	14.44	1,902	13.85	1,544	13.22	1,593	12.62	1,641
Construction paper consumption is a function of gross national product																		
1930-62 3/																		
Y = a + b X	-70.0334	3.2254	--	141.0185	0.1712	--	0.953	0.908	35	18.8	21.34	2,280	23.67	2,639	25.98	3,123	28.71	3,720
Y = a + b log X 2/	-4492.1376	2216.9863	--	102.7930	83.7982	--	0.975	0.951	35	35.5	17.99	1,889	17.86	1,991	17.83	2,149	17.80	2,314
log Y = a + b log X 2/	-0.1075	1.2312	--	0.0752	0.0613	--	0.958	0.918	35	20.1	24.32	2,589	27.90	3,111	31.99	3,807	36.17	4,702
1947-62																		
Y = a + b X	1066.6716	0.6983	--	84.3711	0.3165	--	0.508	0.258	14	2.2	15.01	1,962	14.83	1,653	14.59	1,758	14.52	1,887
Y = a + b log X 2/	-497.8578	709.5123	--	82.9706	302.3911	--	0.531	0.282	14	2.3	14.66	1,525	14.14	1,577	13.51	1,628	12.92	1,680
log Y = a + b log X 2/	2.5192	0.2342	--	0.0284	0.0962	--	0.546	0.298	14	2.4	14.79	1,536	14.35	1,600	13.80	1,663	13.32	1,731
Construction paper consumption is a function of disposable personal income																		
1929-62 3/																		
Y = a + b X	-108.9232	4.7802	--	173.2851	0.3766	--	0.925	0.856	27	12.7	21.93	2,281	24.31	2,711	26.46	3,189	29.32	3,811
Y = a + b log X 2/	-4852.7232	2508.0218	--	125.3755	137.5776	--	0.962	0.925	27	18.2	18.42	1,916	18.81	2,097	18.81	2,267	18.88	2,455
log Y = a + b log X 2/	-0.1904	1.3430	--	0.0785	0.0862	--	0.949	0.900	27	15.6	26.13	2,718	30.46	3,396	34.77	4,190	40.63	5,282
1947-62																		
Y = a + b X	1103.7304	0.8920	--	86.8298	0.4568	--	0.463	0.214	14	2.0	14.90	1,550	14.62	1,630	14.27	1,719	14.12	1,835
Y = a + b log X 2/	-212.5451	640.8857	-	85.4005	305.0059	--	0.490	0.240	14	2.1	14.59	1,517	14.02	1,563	13.34	1,607	12.73	1,655
log Y = a + b log X 2/	2.6122	0.2120	--	0.0272	0.0971	--	0.504	0.254	14	2.2	14.70	1,529	14.21	1,584	13.59	1,637	13.06	1,698
Construction paper consumption is a function of construction expenditures																		
1930-61 3/																		
Y = a + b X	-171.5812	23.2670	--	183.6892	1.7046	--	0.918	0.842	35	13.7	20.29	2,109	21.42	2,388	22.71	2,737	23.74	3,086
Y = a + b log X 2/	-2710.1738	2217.7522	--	196.1242	175.8013	--	0.905	0.820	35	12.6	16.40	1,706	16.30	1,817	16.10	1,940	15.76	2,049
log Y = a + b log X 2/	0.8283	1.2656	--	0.1081	0.0969	--	0.911	0.830	35	13.1	21.45	2,231	23.16	2,582	25.19	3,035	26.95	3,503
1947-61																		
Y = a + b X	1052.0733	5.0619	--	83.4564	2.0631	--	0.563	0.317	13	2.5	14.88	1,548	14.43	1,609	13.98	1,685	13.55	1,761
Y = a + b log X 2/	116.0542	699.9044	--	82.7628	277.9622	--	0.573	0.328	13	2.5	14.52	1,510	13.86	1,545	13.15	1,584	12.45	1,618
log Y = a + b log X 2/	2.7277	0.2277	--	0.0284	0.0887	--	0.580	0.336	13	2.6	14.59	1,517	13.97	1,558	13.31	1,604	12.66	1,646

Table 7.--Statistical measures obtained from regression equations tested for use in projecting demand for construction paper--Continued

Variables, time period, and mathematical function	Regression coefficients			Standard errors of estimate 1/	Standard errors of b coefficients 2/		Coefficient or index of correlation 1/	Coefficient or index of determination 1/	Degrees of freedom	F or t ratios 2/	Projected Demand							
											1970		1975		1980		1985	
	a	b	b_1		b	b_1					Per capita	Total	Per capita	Total	Per capita	Total	Per capita	Total
											Pounds	Thousand tons	Pounds	Thousand tons	Pounds	Thousand tons	Pounds	Thousand tons
Construction paper consumption is a function of residential construction starts																		
1947-62																		
$Y = a + b X$	891.5288	0.3408	--	80.8894	0.1329	--	0.965	0.319	14	2.6	13.90	1,446	13.40	1,494	12.82	1,345	12.30	1,299
$Y = a + b \log X$ 1/	-2058.9031	1081.8459	--	81.4558	452.6652	--	0.956	0.309	14	2.5	13.87	1,442	13.28	1,481	12.60	1,319	11.98	1,257
$\log Y = a + b \log X$ 1/	2.0844	0.3342	--	0.0866	0.1414	--	0.934	0.289	14	2.4	13.84	1,439	13.26	1,479	12.61	1,320	12.00	1,261
Construction paper consumption is a function of households																		
1950-62 6/																		
$Y = a + b X$	-881.6395	45.8840	--	168.3080	8.9876	--	0.938	0.869	36	15.4	19.87	2,004	20.00	2,230	20.76	2,581	21.38	2,772
$Y = a + b \log X$ 1/	-2874.7095	3939.9897	--	165.0158	869.4062	--	0.935	0.874	36	15.8	17.31	1,800	17.33	1,932	17.24	2,078	17.02	2,212
$\log Y = a + b \log X$ 1/	-0.4811	2.1351	--	0.1119	0.1692	--	0.905	0.818	36	12.7	23.01	2,394	25.35	2,826	28.17	3,395	30.94	4,022
1947-62																		
$Y = a + b X$	980.8947	9.5156	--	86.9575	4.9010	--	0.461	0.212	14	1.9	14.57	1,515	14.08	1,563	13.44	1,620	12.90	1,677
$Y = a + b \log X$ 1/	-389.3761	1048.9881	--	86.2901	588.0894	--	0.473	0.224	14	2.0	14.41	1,499	13.76	1,534	13.05	1,573	12.38	1,609
$\log Y = a + b \log X$ 1/	2.9367	0.3462	--	0.0275	0.1665	--	0.486	0.236	14	2.1	14.50	1,508	13.89	1,549	13.24	1,595	12.61	1,639
Construction paper consumption is a function of population and per capita gross national product																		
1950-61 6/																		
$Y = a + b X + b_1 X_1$	-507.1873	-1.5387	0.8341	93.1740	2.0479	0.0805	0.980	0.960	34	0.9	19.40	2,018	20.51	2,287	21.18	2,592	22.04	2,865
$Y = a + b \log X + b_1 \log X_1$ 8/	-10659.4389	388.5387	1331.8990	98.6849	239.9888	188.9888	0.981	0.962	34	1.6	17.11	1,779	17.31	1,930	17.28	2,072	17.08	2,222
$\log Y = a + b \log X + b_1 \log X_1$ 8/	-7.3861	-0.3768	2.1020	0.1385	0.3568	0.1369	0.974	0.948	34	1.1	21.15	2,200	25.61	2,632	29.58	3,082	33.14	3,498
1947-61																		
$Y = a + b X + b_1 X_1$	702.4504	-4.6478	0.9476	83.9068	4.3439	0.8780	0.603	0.364	12	1.2	15.41	1,603	15.47	1,785	15.21	1,833	15.15	1,989
$Y = a + b \log X + b_1 \log X_1$ 8/	-9772.1537	-885.9601	1443.0489	82.5936	707.8815	672.0130	0.638	0.384	12	1.5	14.99	1,559	14.73	1,642	14.16	1,706	13.70	1,798
$\log Y = a + b \log X + b_1 \log X_1$ 8/	1.9739	-0.6172	1.0668	0.0813	0.5855	0.4589	0.615	0.378	12	1.5	15.08	1,568	14.95	1,667	14.50	1,707	14.19	1,895
Construction paper consumption is a function of population and per capita disposable personal income																		
1950-61 6/																		
$Y = a + b X + b_1 X_1$	-272.1549	-7.9793	1.6278	108.7058	3.4699	0.1972	0.972	0.945	25	5.5	18.99	1,975	20.00	2,230	20.41	2,460	21.33	2,773
$Y = a + b \log X + b_1 \log X_1$ 8/	-11888.9940	-28.3898	1706.0838	109.1253	430.4778	252.1416	0.972	0.945	25	0.0	17.67	1,838	17.87	1,992	17.70	2,133	17.64	2,293
$\log Y = a + b \log X + b_1 \log X_1$ 8/	-6.6875	-1.4842	2.8641	0.1088	0.4298	0.2514	0.982	0.965	25	12.4	20.87	2,170	22.81	2,543	23.91	2,881	25.00	3,250

Table 7.--Statistical measures obtained from regression equations tested for use in projecting demand for construction paper--Continued

Variables, time period, and mathematical function	Regression coefficients			Standard errors of estimate 1/	Standard errors of b coefficients 2/		Coefficient or index of correlation 3/	Coefficient or index of determination 4/	Degrees of freedom	F or t ratios 5/	Projected Demand							
											1970		1975		1980		1985	
	a	b	b_1		b	b_1					Per capita	Total	Per capita	Total	Per capita	Total	Per capita	Total
											Pounds	Thousand tons	Pounds	Thousand tons	Pounds	Thousand tons	Pounds	Thousand tons
1947-61																		
$Y = a + b X + b_1 X_1$	861.3180	-16.1475	1.7560	83.7894	9.7617	0.8612	0.605	0.365	12	3.0	16.51	1,717	16.89	1,879	16.93	1,992	16.82	2,186
$Y = a + b \log X + b_1 \log X_1$ 6/	-9368.2310	-3817.9785	3621.6809	81.5128	1711.4936	1614.1758	0.632	0.399	12	3.8	15.90	1,654	15.79	1,761	15.86	1,815	16.73	1,919
$\log Y = a + b \log X + b_1 \log X_1$ 6/	-0.7676	-2.4858	2.7190	0.0601	1.8625	1.1907	0.633	0.401	12	4.0	16.20	1,685	16.37	1,825	15.75	1,898	15.72	2,044
Construction paper consumption is a function of households and per capita disposable personal income																		
1929-61 7/																		
$Y = a + b X + b_1 X_1$	-689.8160	-16.7176	1.5138	119.9183	11.4996	0.2586	0.968	0.938	25	1.7	19.53	2,031	20.68	2,306	21.29	2,566	22.18	2,989
$Y = a + b \log X + b_1 \log X_1$ 6/	-16858.5170	895.5360	1508.3880	168.0930	346.4907	276.0064	0.973	0.946	25	0.5	17.88	1,860	18.08	2,016	17.99	2,163	17.89	2,385
$\log Y = a + b \log X + b_1 \log X_1$ 6/	-10.0981	-0.7689	2.6995	0.1233	0.3993	0.3149	0.977	0.959	25	3.9	22.78	2,369	25.63	2,858	27.86	3,357	31.54	4,109
1947-61																		
$Y = a + b X + b_1 X_1$	989.5082	-58.3812	1.4809	87.5800	11.4186	0.9375	0.954	0.307	12	1.6	16.05	1,669	16.30	1,818	16.00	1,988	16.31	2,189
$Y = a + b \log X + b_1 \log X_1$ 6/	-7921.7937	-909.9516	1648.2698	91.0627	1358.2683	1959.4516	0.901	0.251	12	0.5	15.30	1,591	15.00	1,672	14.38	1,733	13.98	1,818
$\log Y = a + b \log X + b_1 \log X_1$ 6/	0.4438	-0.7857	1.2778	0.0573	1.0011	1.1498	0.900	0.250	12	0.6	15.48	1,610	15.35	1,711	14.86	1,791	14.73	1,916
Construction paper consumption is a function of population and construction expenditures																		
1929-60 7/																		
$Y = a + b X + b_1 X_1$	-1079.8005	10.0547	0.6125	156.4083	2.6772	0.0054	0.948	0.887	33	13.8	21.51	2,257	22.75	2,537	24.12	2,906	25.85	3,484
$Y = a + b \log X + b_1 \log X_1$ 6/	-12137.3430	1646.4985	479.1494	138.8006	298.9546	96.4780	0.959	0.912	33	25.4	18.82	1,957	19.06	2,125	19.18	2,311	19.13	2,487
$\log Y = a + b \log X + b_1 \log X_1$ 6/	-9.6496	1.6659	0.7859	0.0507	0.1968	0.1471	0.958	0.880	33	17.0	27.88	2,898	31.75	3,540	35.79	4,433	40.11	5,404
1947-60																		
$Y = a + b X + b_1 X_1$	8825.8439	-17.1488	0.8886	75.6388	7.5717	0.0086	0.728	0.585	11	5.6	14.25	1,480	13.61	1,518	13.10	1,578	12.47	1,681
$Y = a + b \log X + b_1 \log X_1$ 6/	-986.6818	-2138.3519	1365.8839	79.1493	1183.6695	451.9518	0.693	0.480	11	4.0	13.38	1,390	12.36	1,378	11.89	1,361	10.84	1,334
$\log Y = a + b \log X + b_1 \log X_1$ 6/	5.7499	-1.3881	0.8868	0.0688	0.8985	0.3429	0.672	0.451	11	3.4	13.40	1,394	12.39	1,388	11.94	1,367	10.39	1,339
Construction paper consumption is a function of population and residential construction (number of starts)																		
1947-61																		
$Y = a + b X + b_1 X_1$	460.8057	2.9450	0.3042	89.6489	1.6941	0.1304	0.642	0.412	12	3.4	15.09	1,569	14.85	1,696	14.56	1,735	14.39	1,850
$Y = a + b \log X + b_1 \log X_1$ 6/	-3958.8958	457.0872	410.7389	82.3512	281.6978	189.6916	0.688	0.387	12	2.9	14.86	1,545	14.44	1,610	13.93	1,679	13.44	1,747
$\log Y = a + b \log X + b_1 \log X_1$ 6/	3.4175	0.3354	0.2892	0.0648	0.2129	0.1434	0.699	0.358	12	2.7	14.90	1,550	14.37	1,625	14.17	1,707	13.78	1,788

1/ A measure of the closeness with which values of a dependent variable can be estimated from the values of an independent variable(s).
2/ A measure of the closeness with which the true values of the regression coefficients can be estimated from the values in the sample.
3/ A measure of the degree of relationship between the dependent and independent variable(s).
4/ A measure of the percent of the variation in the values of the dependent variable that is associated with variation in values of the independent variable(s).
5/ A measure of the probability that the given values of b might have been obtained by chance from a population in which the true regression coefficient is zero.
6/ Excepting the war years 1942-46.
7/ Expressed in common logarithms.
8/ Expressed in natural logarithms.
9/ Pounds per household.

Table 8.--Statistical measures obtained from regression equations tested for use in projecting demand for container board

Variables, time period, and mathematical function	Regression coefficients				Standard errors of estimate 1/	Standard errors of b coefficients 2/			Coefficient of index of correlation 1/	Coefficient of index of determination 1/	Degrees of freedom	F or t ratios 2/	Projected Demand					
													1970		1975		1980	1985
	a	b	b_1	b_2		b	b_1	b_2					Per capita	Total	Per capita	Total	Per capita	Total	Per capita	Total
													Pounds	Thousand tons	Pounds	Thousand tons	Pounds	Thousand tons	Pounds	Thousand tons
Per capita container board consumption is a function of per capita disposable personal income																				
1939-61 3/																				
Y = a + b X	-31.4870	0.0587	--	--	4.8963	0.0023	--	--	0.983	0.967	21	27.5	119.05	12,361	133.47	14,882	147.90	17,922	165.76	21,949
Y = a + b log X 4/	-378.1581	208.9600	--	--	5.0833	8.7779	--	--	0.977	0.955	21	23.1	126.90	11,076	114.55	12,772	121.98	14,698	130.28	16,936
log Y = a + b log X 4/	-3.8714	1.9818	--	--	0.0427	0.0737	--	--	0.973	0.947	21	21.6	128.60	13,374	148.76	16,987	170.00	20,485	197.75	25,708
1947-61																				
Y = a + b X	-37.2582	0.0659	--	--	3.3629	0.0062	--	--	0.986	0.971	13	10.6	120.98	12,576	136.08	15,173	151.84	18,888	170.02	22,103
Y = a + b log X 4/	-732.7086	268.6300	--	--	3.3661	25.4741	--	--	0.986	0.895	13	10.5	115.32	11,993	125.00	14,049	135.78	16,361	146.86	19,090
log Y = a + b log X 4/	-2.9121	1.4811	--	--	0.0193	0.1463	--	--	0.968	0.888	13	10.1	124.25	12,982	142.30	15,866	161.10	19,413	183.45	24,109
1947-62																				
Y = a + b X	-36.8748	0.0646	--	--	3.3105	0.0053	--	--	0.987	0.989	14	12.3	120.17	12,498	135.02	15,055	149.88	18,061	168.29	21,898
Y = a + b log X 4/	-793.6481	268.9893	--	--	3.2993	21.7381	--	--	0.987	0.916	14	12.3	115.45	12,007	126.14	14,065	135.93	16,380	147.03	19,118
log Y = a + b log X 4/	-2.7984	1.4443	--	--	0.0191	0.1262	--	--	0.991	0.983	14	13.4	122.90	12,782	140.30	15,643	158.33	19,079	181.63	23,612
1947-63																				
Y = a + b X	-37.9992	0.0664	--	--	3.4110	0.0050	--	--	0.988	0.921	15	13.3	121.36	12,621	136.03	15,234	151.90	18,304	170.83	22,208
Y = a + b log X 4/	-828.8730	277.9900	--	--	3.4397	21.1961	--	--	0.959	0.920	15	13.1	116.79	12,146	127.04	14,254	137.96	16,624	149.43	19,486
log Y = a + b log X 4/	-2.8796	1.4714	--	--	0.0191	0.1173	--	--	0.955	0.913	15	12.5	124.10	12,906	142.00	15,933	160.67	19,361	184.75	24,018
1948-61																				
Y = a + b X	-42.5035	0.0687	--	--	3.4430	0.0072	--	--	0.980	0.961	12	9.5	122.38	12,728	138.15	15,407	153.98	18,555	173.56	22,563
Y = a + b log X 4/	-842.8797	283.9600	--	--	3.9630	29.1388	--	--	0.982	0.964	12	9.8	117.03	12,171	128.32	14,308	138.66	16,709	150.37	19,548
log Y = a + b log X 4/	-3.1736	1.5612	--	--	0.0196	0.1698	--	--	0.978	0.956	12	9.2	126.86	13,193	146.37	16,320	166.83	20,103	193.50	25,155
1948-62																				
Y = a + b X	-47.6686	0.0717	--	--	3.4461	0.0066	--	--	0.989	0.979	13	10.9	124.39	12,937	140.98	15,708	157.37	18,963	177.81	23,115
Y = a + b log X 4/	-887.9660	297.9056	--	--	3.4300	27.2829	--	--	0.990	0.980	13	10.9	119.32	12,378	130.96	14,591	141.71	17,076	153.99	20,019
log Y = a + b log X 4/	-3.3142	1.6046	--	--	0.0192	0.1525	--	--	0.988	0.976	13	10.5	128.73	13,348	149.10	16,625	170.60	20,557	198.69	25,835
1948-63																				
Y = a + b X	-42.4254	0.0687	--	--	3.4135	0.0055	--	--	0.987	0.973	14	12.4	122.45	12,733	138.26	15,416	154.06	18,964	173.64	22,573
Y = a + b log X 4/	-867.6493	291.6303	--	--	3.3512	22.9756	--	--	0.979	0.958	14	12.7	118.12	12,284	129.71	14,463	140.33	16,310	152.36	19,807
log Y = a + b log X 4/	-3.2030	1.5332	--	--	0.0190	0.1502	--	--	0.983	0.966	14	11.9	125.75	13,079	144.70	16,134	164.55	19,826	190.36	24,747
1949-61																				
Y = a + b X	-45.3355	0.0702	--	--	3.5731	0.0084	--	--	0.985	0.970	11	8.4	123.14	12,807	139.29	15,531	155.44	18,731	175.44	22,807
Y = a + b log X 4/	-871.3132	292.6609	--	--	3.4685	33.7353	--	--	0.974	0.872	11	9.7	117.95	12,267	129.56	14,448	140.23	16,898	152.31	19,800
log Y = a + b log X 4/	-3.3207	1.6061	--	--	0.0203	0.1971	--	--	0.968	0.938	11	8.1	126.32	13,145	148.63	16,572	170.07	20,493	198.05	25,747

Table 8.--Statistical measures obtained from regression equations tested for use in projecting demand for container board--Continued

Variables, time period, and mathematical function	Regression coefficients				Standard errors of estimate 1/	Standard errors of b coefficients 2/			Coefficient or index of correlation 1/	Coefficient or index of determination 1/	Degrees of freedom	F or t ratios 2/	Projected Demand					
													1970		1975		1980	1985
	a	b	b_1	b_2		b	b_1	b_2					Per capita	Total	Per capita	Total	Per capita	Per capita
													Pounds	Thousand tons	Pounds	Thousand tons	Pounds	Pounds
1949-62																		
Y = a + b X	-99.1603	0.0668	--	--	3.9000	0.0068	--	--	0.984	0.891	12	9.9	121.16	12,601	136.52	15,888	151.89	170.93
Y = a + b log X 1/	-846.7843	889.1106	--	--	3.3468	27.4396	--	--	0.989	0.900	12	10.4	116.95	12,163	128.28	14,922	138.66	150.42
log Y = a + b log X 1/	-3.0361	1.5189	--	--	0.0800	0.1640	--	--	0.937	0.877	12	9.3	120.93	12,993	143.60	16,011	163.10	188.35
1949-63																		
Y = a + b X	-44.3080	0.0697	--	--	3.5285	0.0062	--	--	0.959	0.906	13	11.2	122.98	12,790	139.01	15,550	155.04	174.90
Y = a + b log X 1/	-890.4098	898.5787	--	--	3.4847	25.8953	--	--	0.958	0.911	13	11.5	118.77	12,352	130.64	14,966	141.51	153.83
log Y = a + b log X 1/	-3.1715	1.5602	--	--	0.0196	0.1479	--	--	0.946	0.895	13	10.6	126.57	13,163	146.00	16,879	166.40	193.00
Per capita container board consumption is a function of per capita gross national product																		
1949-61 3/																		
Y = a + b X	-19.7238	0.0387	--	--	4.5427	0.0015	--	--	0.981	0.963	26	26.0	112.24	11,673	125.79	14,086	139.33	155.20
Y = a + b log X 1/	-508.5362	172.5366	--	--	5.6591	5.3711	--	--	0.971	0.942	26	20.6	100.99	10,503	108.31	12,077	114.98	122.11
log Y = a + b log X 1/	-2.7903	1.3635	--	--	0.0427	0.0632	--	--	0.971	0.947	26	21.6	116.58	12,124	133.20	14,852	150.40	171.80
1947-61																		
Y = a + b X	-38.9845	0.0460	--	--	3.6125	0.0047	--	--	0.938	0.880	13	9.7	117.38	12,260	133.38	14,939	150.08	168.94
Y = a + b log X 1/	-830.3659	266.8927	--	--	3.7393	28.5081	--	--	0.933	0.871	13	9.4	112.50	11,700	123.83	13,807	134.14	145.16
log Y = a + b log X 1/	-3.1631	1.4843	--	--	0.0201	0.1533	--	--	0.937	0.878	13	9.7	120.40	12,522	139.20	15,521	158.83	182.90
Container board consumption per household is a function of aver. ge disposable personal income per household																		
1949-61 3/																		
Y = a + b X	-156.4307	0.0700	--	--	19.5809	0.0035	--	--	0.[illegible]	0.929	26	19.5	2/ 403.57	12,012	2/ 452.57	15,274	2/ 501.57	2/ 564.57
Y = a + b log X 1/	-2884.5198	933.8859	--	--	21.5064	50.1387	--	--	0.[illegible]	0.916	26	18.6	2/ 370.21	11,369	2/ 400.59	13,520	2/ 426.62	2/ 461.73
log Y = a + b log X 1/	-4.2870	1.7739	--	--	0.0500	0.1165	--	--	0.[illegible]	0.[illegible]	25	15.2	2/ 433.29	13,535	2/ 502.70	16,966	2/ 576.60	2/ 689.90
1947-61																		
Y = a + b X	-157.1368	0.0704	--	--	11.6136	0.0075	--	--	0.[illegible]	0.[illegible]72	13	9.4	2/ 406.36	12,369	2/ 455.34	15,368	2/ 504.02	2/ 567.90
Y = a + b log X 1/	-3966.0023	1014.1900	--	--	11.3811	109.2592	--	--	0.[illegible]	0.[illegible]77	13	9.6	2/ 392.47	12,269	2/ 429.42	14,493	2/ 463.51	2/ 503.75
log Y = a + b log X 1/	-3.5863	1.5903	--	--	0.0193	0.1774	--	--	0.[illegible]	0.[illegible]82	13	9.9	2/ 417.62	13,056	2/ 477.20	16,106	2/ 539.80	2/ 624.20
Container board consumption is a function of population																		
1929-62 3/																		
Y = a + b X	-11846.2560	113.1177	--	--	405.2068	3.5517	--	--	[illegible]	[illegible]974	27	31.8	112.31	11,[illegible]60	119.97	13,377	127.91	135.09
Y = a + b log X 1/	-79026.7600	39116.3810	--	--	373.0564	1145.7752	--	--	[illegible]	[illegible]971	27	34.1	104.[illegible]	10,[illegible]65	107.[illegible]	12,027	110.76	112.58
log Y = a + b log X 1/	-4.5369	3.7925	--	--	0.3714	0.2160	--	--	[illegible]	[illegible]919	27	17.6	144.[illegible]	16,307	180.[illegible]	20,945	232.24	297.[illegible]

Table 8.--Statistical measures obtained from regression equations tested for use in projecting demand for container board--Continued

Variables, time period, and mathematical function	Regression coefficients				Standard errors of estimate 1/	Standard errors of b coefficients 2/			Coefficient or index of correlation 1/	Coefficient or index of determination 1/	Degrees of freedom	F or t ratios 1/	Projected Demand					
													1970		1975		1980	1985
	a	b	b_1	b_2		b	b_1	b_2					Per capita	Total	Per capita	Total	Per capita / Total	Per capita / Total
													Pounds	Thousand tons	Pounds	Thousand tons	Pounds	Pounds
1947-62																		
Y = a + b X	-10113.0780	188.7871	--	--	349.6643	6.6865	--	--	0.972	0.945	14	15.5	108.32	11,855	114.85	12,806	121.63	14,697	137.77	16,630
Y = a + b log X 1/	-79380.7880	18881.6150	--	--	359.2803	2987.5637	--	--	0.970	0.942	14	15.0	103.95	10,809	107.69	11,985	110.34	13,898	112.13	14,577
log Y = a + b log X 1/	-1.7591	2.5803	--	--	0.0843	0.1758	--	--	0.988	0.977	14	14.6	126.44	12,110	129.82	14,630	134.64	17,990	143.42	21,245
Container board consumption is a function of gross national product																				
1929-62 6/																				
Y = a + b X	-1138.3668	18.4193	--	--	316.9897	0.4498	--	--	0.994	0.988	27	41.0	114.76	11,937	128.53	14,331	141.85	17,095	197.69	20,300
Y = a + b log X 1/	-85481.7960	18866.8860	--	--	552.0936	968.1708	--	--	0.976	0.952	27	29.1	98.63	9,634	98.71	10,360	99.14	11,464	99.43	12,406
log Y = a + b log X 1/	0.4958	1.2880	--	--	0.0416	0.0813	--	--	0.986	0.973	27	31.0	128.86	12,777	142.11	15,845	162.27	19,585	187.31	24,350
1947-62																				
Y = a + b X	-2074.8721	80.4735	--	--	288.8295	1.0835	--	--	0.981	0.962	14	18.9	119.89	12,462	135.63	15,125	150.99	18,196	169.09	21,982
Y = a + b log X 1/	-44990.8770	19680.9980	--	--	357.2811	1301.9909	--	--	0.971	0.942	14	15.1	106.96	11,126	112.65	12,561	119.09	13,969	118.68	15,429
log Y = a + b log X 1/	0.4298	1.8910	--	--	0.0193	0.0709	--	--	0.980	0.960	14	18.3	128.96	12,7[illegible]	142.47	15,889	163.01	19,643	188.46	24,500
Container board consumption is a function of disposable personal income																				
1929-62 6/																				
Y = a + b X	-1998.6965	28.2885	--	--	291.1712	0.6328	--	--	0.993	0.987	27	44.6	120.40	12,522	135.09	15,062	148.42	17,965	169.81	21,555
Y = a + b log X 1/	-27971.7890	14109.1510	--	--	457.9138	502.4798	--	--	0.983	0.967	27	28.1	97.14	10,148	99.78	11,123	100.27	12,082	101.08	13,140
log Y = a + b log X 1/	0.3344	1.4136	--	--	0.0426	0.0467	--	--	0.986	0.971	27	30.2	135.74	14,117	159.36	17,835	184.69	22,255	218.50	28,405
1947-62																				
Y = a + b X	-1751.0108	28.7119	--	--	288.3436	1.5169	--	--	0.981	0.962	14	18.9	121.20	12,605	136.28	15,159	149.88	18,060	167.64	21,795
Y = a + b log X 1/	-41106.4990	19408.3710	--	--	318.6491	1138.3490	--	--	0.977	0.954	14	17.1	108.62	11,296	113.64	12,671	116.11	13,991	118.82	15,446
log Y = a + b log X 1/	0.7038	1.2637	--	--	0.0199	0.0710	--	--	0.979	0.958	14	17.8	129.16	13,017	143.88	16,043	162.30	19,557	187.08	24,320
Container board consumption is a function of industrial production																				
1929-62 6/																				
Y = a + b X	-172.2853	77.6839	--	--	298.5435	1.7620	--	--	0.993	0.[illegible]	27	44.[illegible]	110.15	11,[illegible]	120.35	13,422	130.73	15,753	142.09	18,472
Y = a + b log X 1/	-12732.8130	10036.2800	--	--	629.4833	499.3113	--	--	0.[illegible]	0.[illegible]	27	20.1	87.57	9,[illegible]107	87.70	9,779	86.[illegible]	10,469	85.82	11,156
log Y = a + b log X 1/	1.8279	1.0245	--	--	0.0377	0.0299	--	--	0.[illegible]	0.[illegible]	27	34.3	139.71	11,610	119.35	13,363	130.40	15,713	142.05	18,466
1947-62																				
Y = a + b X	-911.7008	85.5134	--	--	266.3516	4.1617	--	--	0.[illegible]	0.[illegible]	14	20.5	114.57	11,915	126.04	14,053	137.92	16,619	150.86	19,612
Y = a + b log X 1/	-26313.2780	16999.3690	--	--	342.9304	1375.2662	--	--	0.[illegible]73	0.[illegible]47	14	15.[illegible]	102.[illegible]	1[illegible]679	105.[illegible]	11,817	107.[illegible]	12,985	108.84	14,149
log Y = a + b log X 1/	1.6467	1.1173	--	--	0.0171	0.0[illegible]	--	--	0.[illegible]	0.[illegible]	14	20.[illegible]	115.[illegible]	12,[illegible]	127.51	14,217	140.[illegible]	16,967	155.66	20,235

Table 8.--Statistical measures obtained from regression equations tested for use in projecting demand for container board--Continued

Variables, time period, and mathematical function	Regression coefficients				Standard errors of estimate 1/	Standard errors of b coefficients 2/			Coefficient or index of correlation 1/	Coefficient or index of determination 1/	Degrees of freedom	F or t ratios 2/	Projected Demand					
													1970		1975		1980		1985	
	a	b	b_1	b_2		b	b_1	b_2					Per capita	Total	Per capit.	Total	Per capit.	Total	Per capita	Total
													Pounds	Thousand tons	Pounds	Thousand tons	Pounds	Thousand tons	Pounds	Thousand tons
Container board consumption is a function of households																				
1929-62 6/																				
$Y = a + b X$	-6848.3570	289.7986	--	--	367.3370	7.7711	--	--	0.990	0.981	27	37.3	100.29	11,261	113.99	12,710	119.91	14,449	134.52	16,187
$Y = a + b \log X$ 7/	-37819.9350	26720.9530	--	--	410.0193	549.2219	--	--	0.987	0.973	27	23.5	97.77	10,168	99.20	11,061	99.99	12,049	99.69	12,960
$\log Y = a + b \log X$ 7/	-0.6101	2.6906	--	--	0.0511	0.1058	--	--	0.979	0.959	27	25.1	135.96	14,140	155.52	17,340	180.13	21,730	205.61	26,755
1947-62																				
$Y = a + b X$	-7514.9640	303.2789	--	--	378.9991	21.3933	--	--	0.987	0.935	14	14.2	110.00	11,440	116.20	12,996	122.62	14,776	127.66	16,996
$Y = a + b \log X$ 7/	-47286.0780	32312.6460	--	--	416.1354	2517.4989	--	--	0.982	0.982	14	12.8	103.58	10,804	106.57	11,883	108.54	13,079	109.08	14,150
$\log Y = a + b \log X$ 7/	0.8981	2.1084	--	--	0.0458	0.1558	--	--	0.986	0.989	14	13.5	116.81	12,168	126.16	14,290	141.91	17,100	155.19	20,175
Container board consumption is a function of population and per capita gross national product																				
1929-61 6/																				
$Y = a + b X + b_1 X_1$	-8914.4720	70.8388	1.9465	--	281.7551	7.7644	0.2722	--	0.993	0.987	29	33.6	106.67	11,094	113.97	12,697	120.45	14,514	126.88	16,494
$Y = a + b \log X + b_1 \log X_1$ 8/	-73513.9470	12361.9460	2129.3988	--	309.0651	1087.4620	503.0340	--	0.992	0.984	29	19.6	94.37	9,753	97.33	10,852	99.59	12,001	101.09	13,142
$\log Y = a + b \log X + b_1 \log X_1$ 8/	-8.1244	1.9420	1.1521	--	0.1305	0.3538	0.1619	--	0.985	0.970	29	19.3	125.63	13,066	146.02	16,281	168.74	20,333	196.18	25,503
1947-61																				
$Y = a + b X + b_1 X_1$	-9849.7550	69.1541	2.2498	--	303.9682	15.7125	0.9764	--	0.976	0.953	12	9.7	109.96	11,173	117.83	13,138	125.29	15,098	132.76	17,259
$Y = a + b \log X + b_1 \log X_1$ 9/	-90139.2110	11581.6830	4806.5004	--	327.8958	2811.8267	2069.4995	--	0.974	0.965	12	5.5	103.06	10,791	108.13	12,057	111.07	13,384	113.23	14,720
$\log Y = a + b \log X + b_1 \log X_1$ 8/	-7.2952	1.6398	1.1121	--	0.0659	0.4198	0.3201	--	0.976	0.950	12	7.6	120.50	12,532	139.91	15,600	158.24	19,068	181.86	23,642
Container board consumption is a function of population and per capita disposable personal income																				
1929-61 6/																				
$Y = a + b X + b_1 X_1$	-8277.4670	63.1372	2.9057	--	281.4008	5.9850	0.5136	--	0.993	0.987	29	33.7	106.37	11,270	115.60	12,889	121.97	14,697	128.68	16,729
$Y = a + b \log X + b_1 \log X_1$ 10/	-76515.2960	11796.1000	2821.3484	--	326.0809	1207.2926	651.3508	--	0.992	0.984	29	19.5	100.06	10,606	103.01	11,486	104.89	12,636	106.16	13,801
$\log Y = a + b \log X + b_1 \log X_1$ 9/	-8.7408	1.2734	1.4711	--	0.1290	0.4141	0.2233	--	0.983	0.967	29	9.9	132.71	13,402	154.30	17,260	178.83	21,949	210.19	27,325
1947-61																				
$Y = a + b X + b_1 X_1$	-9155.2630	3.5043	8.5045	--	275.3413	32.0776	2.8499	--	0.988	0.961	12	0.01	115.23	11,988	125.50	13,993	132.88	16,012	142.33	18,503
$Y = a + b \log X + b_1 \log X_1$ 8/	-108625.4400	1409.7228	14169.4900	--	306.4295	6433.7354	6066.0915	--	0.970	0.952	12	0.01	107.53	11,183	112.81	12,578	115.15	13,976	117.92	15,329
$\log Y = a + b \log X + b_1 \log X_1$ 8/	-10.5115	-0.6731	3.0006	--	0.0451	0.3472	0.2933	--	0.977	0.957	12	0.5	130.54	13,607	151.77	17,185	174.34	21,008	204.99	26,649
Container board consumption is a function of population and industrial production																				
1929-61 6/																				
$Y = a + b X + b_1 X_1$	-3934.1344	36.4120	52.4955	--	260.7545	10.6276	7.1507	--	0.994	0.988	29	12.2	110.71	11,514	119.93	13,372	129.49	15,003	139.68	16,132
$Y = a + b \log X + b_1 \log X_1$ --	-55502.9270	1331.3570	1503.3330	--	275.3608	1143.4360	293.5782	--	0.994	0.987	29	30.2	95.17	10,209	100.54	11,213	102.12	12,306	102.93	13,321
$\log Y = a + b \log X + b_1 \log X_1$ 9/	0.9600	0.4416	0.8145	--	0.0825	0.3624	0.0879	--	0.990	0.980	29	0.3	120.17	12,899	134.74	15,324	151.60	18,266	170.95	22,111

Table 6.--Statistical measures obtained from regression equations tested for use in projecting demand for container board, estimated

Variables, time period, and mathematical function	Regression coefficients				Standard errors of estimate 1/	Standard errors of b coefficients 2/			Coefficient of index of correlation 1/	Coefficient of index of determination 1/	Degrees of freedom	F or t ratios 2/	Projected Demand					
													1965		1970		1980	
	a	b	b_1	b_2		b	b_1	b_2					Per capita	Total	Per capita	Total	Per capita	Total
													Pounds	Thousand tons	Pounds	Thousand tons	Pounds	Thousand tons
1947-61																		
$Y = a + b X + b_1 X_1$	-3653.3042	31.9935	57.2496	--	26.1895	10.5223	15.3554	--	.9856	.9714	12	5.4	111.44	11,532	121.38	11,646	131.25	15,792
$Y = a + b \log X + b_1 \log X_1$ 3/	-49415.3146	9336.6235	4861.2154	--	25.1731	3293.8638	1342.1577	--	.9861	.9724	12	5.4	111.13	11,496	125.17	11,720	107.24	12,922
log $Y = a + b \log X + b_1 \log X_1$ 4/	2.0237	0.9521	0.3242	--	.1353	.0563	.0197	--	.9896	.9793	12	5.4	124.03	12,832	140.44	14,321	142.66	17,180
Container board consumption is a function of population, per capita disposable personal income, and industrial production																		
1929-61 5/																		
$Y = a + b X + b_1 X_1 + b_2 X_2$	-8162.7180	37.2649	2.1042	49.7212	24.7638	11.7711	1.7150	16.7591	.9889	.9779	28	5.34	121.4	11,947	131.4	13,342	129.32	15,547
$Y = a + b \log X + b_1 \log X_1 + b_2 \log X_2$	-49997.9620	10361.9820	-1519.9824	2441.2662	27.1773	11.4453	1.5718	15.4453	.9886	.9774	28	5	120.4	11,847	130.4	13,238	131.40	15,871
log $Y = a + b \log X + b_1 \log X_1 + b_2 \log X_2$	4.1278	1.1205	-0.5916	1.0668	.0251	.0428	.0148	.0572	.9884	.9770	28	5.34	121.4	11,947	130.11	14,507	146.27	17,909
1947-61																		
$Y = a + b X + b_1 X_1 + b_2 X_2$	-8875.1933	18.2513	1.7519	44.2648	25.2867	8.3428	1.2111	14.2214	.9917	.9835	12	5.4	111.44	11,532	121.38	11,646	132.25	15,792
$Y = a + b \log X + b_1 \log X_1 + b_2 \log X_2$	-55928.0577	11036.7281	3.2016.6736	3231.6436	25.1864	3.2.2.7864	3.2.4.4.7	3.2.3.4.6	.9911	.9823	12	5.4	111.13	11,496	125.17	11,720	107.24	12,922
log $Y = a + b \log X + b_1 \log X_1 + b_2 \log X_2$	-2.7443	1.3233	1.2207	1.3614	.1338	.1446	.1341	.1511	.9911	.9823	12	5.4	124.03	12,832	140.44	14,321	142.66	17,180
Container board consumption is a function of households, average disposable personal income per household, and industrial production																		
1929-61 5/																		
$Y = a + b X + b_1 X_1 + b_2 X_2$	-2694.1443	1241.4423	1.1.5.4	1.1.7.4	24.1761	1.1.1.1	1.1.4.1	1.1.2.1	.9911	.9823	28	5.34	121.4	11,947	131.4	13,342	129.32	15,547
$Y = a + b \log X + b_1 \log X_1 + b_2 \log X_2$	-49834.7643	10.5.1.4.3	1.1.1.1.3	1.1.1.1.3	1.1.1.1	1.1.1.1	1.1.1.1	1.1.1.1	.9911	.9823	28	5	120.4	11,847	130.4	13,238	131.40	15,871
log $Y = a + b \log X + b_1 \log X_1 + b_2 \log X_2$	0.2022	1.7533	1.1.1.1	1.1.1.1	1.1.1	1.1.1	1.1.1	1.1.1	.9911	.9823	28	5.34	121.4	11,947	130.11	14,507	146.27	17,909
1947-61																		
$Y = a + b X + b_1 X_1 + b_2 X_2$	-6836.5142	1.1.4.41	1.1.1.1	1.1.1.1	1.1.1.1	1.1.1	1.1.1	1.1.1	1.1.1	1.1.1	1.1.1	1.1.1	1.1.1	1.1.1	1.1.1	1.1.1	1.1.1	1.1.1
$Y = a + b \log X + b_1 \log X_1 + b_2 \log X_2$	-36674.3264	1115.1.5.4	1.1.1.1.1	1.1.1.1.1	1.1.1.1	1.1.1.1	1.1.1.1	1.1.1.1	1.1.1	1.1.1	1.1.1	1.1.1	1.1.1	1.1.1	1.1.1	1.1.1	1.1.1	1.1.1
log $Y = a + b \log X + b_1 \log X_1 + b_2 \log X_2$	1.1.1.7	1.1.1.7	1.1.1.1	1.1.1	1.1.1.1	1.1.1	1.1.1.1	1.1.1.1	1.1.1	1.1.1	1.1.1	1.1.1	1.1.1	1.1.1	1.1.1	1.1.1	1.1.1	1.1.1

1/ A measure of the closeness with which values of a dependent variable can be estimated from the values of an independent variable(s).
2/ A measure of the closeness with which the true values of the regression coefficients can be estimated from the values in the sample.
3/ A measure of the degree of relationship between the dependent and independent variable(s).
4/ A measure of the percent of the variation in the values of the dependent variable that is associated with variation in the values of the independent variable(s).
5/ A measure of the probability that the given values of b might have been obtained by chance from a population in which the true value of b was zero.
6/ Extrapolation not permitted.
7/ Expressed in common logarithms.
8/ Expressed in natural logarithms.
9/ Pounds per household.

Table 9.--Statistical measures obtained from regression equations tested for use in projection demand for bonding board

Variables, time period, and mathematical function	Regression coefficients				Standard errors of estimate 1/	Standard errors of b coefficients 2/			Coefficient or index of correlation 3/	Coefficient or index of determination 4/	Degrees of freedom	F or t ratios 5/	Projected Demand							
													1970		1975		1980		1985	
	a	b	b_1	b_2		b	b_1	b_2					Per capita	Total	Per capita	Total	Per capita	Total	Per capita	Total
													Pounds	Thousand tons	Pounds	Thousand tons	Pounds	Thousand tons	Pounds	Thousand tons
Per capita bonding board consumption is a function of per capita disposable personal income																				
1929-61 6/																				
Y = a + b X	-38.9018	0.0388	--	--	2.4389	0.0013	--	--	0.985	0.971	26	29.9	67.18	6,987	73.96	8,470	84.75	10,212	95.64	12,433
Y = a + b log X 7/	-345.9005	188.9680	--	--	3.3662	5.8126	--	--	0.972	0.945	26	21.1	68.41	7,115	73.28	8,171	77.74	9,368	82.80	10,764
log Y = a + b log X 7/	-4.3335	1.8352	--	--	0.0427	0.2737	--	--	0.980	0.960	26	26.9	74.07	7,703	87.60	9,767	108.20	12,315	121.62	15,811
1947-61																				
Y = a + b X	-21.1813	0.0366	--	--	1.3207	0.0038	--	--	0.973	0.947	13	15.2	66.66	6,933	75.08	8,371	83.49	10,060	93.93	12,211
Y = a + b log X 7/	-440.9999	189.1986	--	--	1.5847	10.0251	--	--	0.972	0.945	13	14.9	63.59	6,613	69.52	7,751	76.95	9,271	81.10	10,543
log Y = a + b log X 7/	-3.8067	1.4919	--	--	0.0149	0.1095	--	--	0.987	0.935	13	13.6	68.58	7,132	79.62	8,766	89.11	10,738	100.58	13,335
1947-62																				
Y = a + b X	-15.9889	0.0337	--	--	1.4300	0.0023	--	--	0.989	0.979	14	14.6	64.26	6,756	72.71	8,107	80.46	9,695	90.06	11,708
Y = a + b log X 7/	-418.7383	180.9865	--	--	1.3766	9.0921	--	--	0.972	0.945	14	15.5	62.48	6,648	68.07	7,590	73.19	8,819	78.99	10,269
log Y = a + b log X 7/	-2.9410	1.3793	--	--	0.0149	0.0996	--	--	0.986	0.933	14	14.0	66.27	6,938	75.20	9,389	84.41	10,171	95.23	12,510
Per capita bonding board consumption is a function of per capita gross national product																				
1929-61 6/																				
Y = a + b X	-17.2814	0.0235	--	--	2.7359	0.0009	--	--	0.982	0.964	26	26.2	62.89	6,538	71.38	7,985	79.80	9,556	88.34	11,562
Y = a + b log X 7/	-311.7089	104.0608	--	--	3.5426	5.6841	--	--	0.963	0.928	26	18.3	55.32	5,816	60.34	6,728	64.36	7,755	66.66	8,926
log Y = a + b log X 7/	-3.7175	1.5873	--	--	0.0457	0.0676	--	--	0.977	0.954	26	23.2	65.46	6,862	76.90	8,574	88.41	10,653	102.62	13,341
1947-61																				
Y = a + b X	-20.0194	0.0248	--	--	2.0804	0.0028	--	--	0.933	0.871	13	9.4	64.35	6,713	73.23	8,165	81.91	9,870	92.08	11,970
Y = a + b log X 7/	-445.8783	143.6160	--	--	2.0833	15.9833	--	--	0.909	0.863	13	9.0	61.45	6,408	67.58	7,535	73.13	8,812	79.06	10,278
log Y = a + b log X 7/	-3.3103	1.4513	--	--	0.0803	0.1946	--	--	0.934	0.871	13	9.4	64.54	6,821	75.98	8,427	86.00	10,363	98.72	12,934
Bonding board consumption per household is a function of average disposable personal income per household																				
1929-61 7/																				
Y = a + b X	-120.4064	0.0437	--	--	11.1933	0.0022	--	--	0.969	0.980	26	20.1	2/ 229.13	7,162	2/ 259.79	8,768	2/ 290.37	10,671	2/ 329.70	13,106
Y = a + b log X 7/	-1810.0141	516.9886	--	--	13.4158	31.2738	--	--	0.956	0.913	26	16.5	2/ 207.44	6,484	2/ 226.32	7,638	2/ 243.69	8,996	2/ 264.22	10,503
log Y = a + b log X 7/	-5.7568	2.0898	--	--	0.0510	0.1180	--	--	0.960	0.922	26	17.6	2/ 251.13	7,848	2/ 299.20	10,098	2/ 351.70	12,985	2/ 425.80	16,926
1947-61																				
Y = a + b X	-93.6036	0.0399	--	--	4.4277	0.0029	--	--	0.968	0.936	13	14.0	2/ 225.60	7,050	2/ 253.53	8,557	2/ 281.46	10,344	2/ 317.37	12,615
Y = a + b log X 7/	-2023.4888	574.2204	--	--	4.2715	39.4986	--	--	0.971	0.942	13	14.5	2/ 217.74	6,804	2/ 238.66	8,055	2/ 257.96	9,480	2/ 280.77	11,161
log Y = a + b log X 7/	-3.9973	1.6303	--	--	0.0139	0.1290	--	--	0.962	0.925	13	12.6	2/ 232.25	7,256	2/ 266.60	8,998	2/ 302.10	11,102	2/ 350.60	13,936

Table 9.—Statistical measures obtained from regression equations tested for use in projecting demand for feeding beef—Continued

Variables, time period, and mathematical function	Regression coefficients				Standard errors of estimate 1/	Standard errors of b coefficients 2/			Coefficient or index of correlation 3/	Coefficient or index of determination 4/	Degrees of freedom	F or t ratios 5/	Projected Demand					
													1970		1975		1980	
	a	b	b_1	b_2		b	b_1	b_2					Per capita	Total	Per capita	Total	Per capita	Total
													Pounds	Thousand tons	Pounds	Thousand tons	Pounds	Thousand tons
Feeding beef consumption is a function of population																		
1959-60 6/																		
$Y = a + b X$	-7377.9895	65.9954	--	--	167.1825	1.4848	--	--	0.995	0.987	27	49.1	68.97	6,949	67.61	7,539	72.41	8,786
$Y = a + b \log X$ 7/	-46866.0940	6833.9910	--	--	135.8699	411.1848	--	--	0.996	0.991	27	55.5	58.31	6,064	60.97	6,794	68.34	7,584
$\log Y = a + b \log X$ 7/	-5.8979	4.8363	--	--	0.0680	0.1977	--	--	0.994	0.990	27	22.6	98.87	9,996	115.61	12,890	148.63	17,910
1967-68																		
$Y = a + b X$	-5977.3826	59.9868	--	--	181.8985	2.3046	--	--	0.988	0.977	14	26.3	59.85	6,162	68.80	7,008	66.46	8,089
$Y = a + b \log X$ 7/	-43819.1970	63197.8930	--	--	188.6308	885.1981	--	--	0.988	0.976	14	26.0	56.89	5,917	58.82	6,998	60.36	7,873
$\log Y = a + b \log X$ 7/	-8.0078	8.5348	--	--	0.0177	0.1896	--	--	0.982	0.965	14	19.7	63.87	6,642	70.96	7,982	79.82	9,619
Feeding beef consumption is a function of gross national product																		
1959-60 6/																		
$Y = a + b X$	-913.7630	10.6930	--	--	199.1873	0.8299	--	--	0.994	0.988	27	67.3	64.23	6,680	72.38	8,070	80.28	9,674
$Y = a + b \log X$ 7/	-19586.3690	7337.9860	--	--	323.3418	321.0444	--	--	0.975	0.951	27	22.9	51.31	5,336	52.66	5,872	53.07	6,395
$\log Y = a + b \log X$ 7/	-0.1607	1.1183	--	--	0.0589	0.0986	--	--	0.990	0.980	27	36.6	70.64	7,347	83.97	9,315	97.51	11,750
1967-68																		
$Y = a + b X$	-1036.8447	11.0081	--	--	139.3643	0.5228	--	--	0.989	0.979	14	21.0	65.14	6,775	73.99	8,205	81.78	9,855
$Y = a + b \log X$ 7/	-84178.3300	10603.6760	--	--	170.3604	680.8811	--	--	0.977	0.954	14	17.1	58.29	6,062	61.31	6,796	63.00	7,588
$\log Y = a + b \log X$ 7/	0.8144	1.8785	--	--	0.0177	0.0849	--	--	0.982	0.965	14	19.7	66.92	6,960	77.31	8,680	88.19	10,627
Feeding beef consumption is a function of disposable personal income																		
1959-60 6/																		
$Y = a + b X$	-8497.8991	80.1894	--	--	460.4366	1.2889	--	--	0.984	0.968	27	15.6	72.76	7,567	86.12	9,579	98.54	11,398
$Y = a + b \log X$ 7/	-84868.4630	11830.7880	--	--	521.6907	829.8915	--	--	0.934	0.872	27	13.6	58.62	6,097	61.94	6,906	63.66	7,671
$\log Y = a + b \log X$ 7/	-1.7485	2.1309	--	--	0.0998	0.1583	--	--	0.933	0.870	27	13.5	96.54	10,040	128.10	14,283	165.48	19,940
1967-68																		
$Y = a + b X$	-986.6943	15.1340	--	--	110.4378	0.5813	--	--	0.994	0.988	14	26.0	65.19	6,780	73.38	8,142	80.13	9,656
$Y = a + b \log X$ 7/	-81644.8070	10876.0000	--	--	109.7109	391.8303	--	--	0.990	0.980	14	28.2	58.56	6,090	61.25	6,799	62.47	7,528
$\log Y = a + b \log X$ 7/	0.9888	1.8315	--	--	0.0153	0.0946	--	--	0.986	0.973	14	22.1	67.45	7,015	77.13	8,600	86.54	10,428
Feeding beef consumption is a function of industrial production																		
1959-60 6/																		
$Y = a + b X$	-943.1523	44.9699	--	--	189.4730	1.1095	--	--	0.992	0.984	27	40.5	61.96	6,408	67.51	7,527	73.66	8,876
$Y = a + b \log X$ 7/	-7371.5380	5705.5335	--	--	393.3389	3...8122	--	--	0.963	0.927	27	18.6	48.25	5,018	48.48	5,406	48.16	5,803
$\log Y = a + b \log X$ 7/	1.3661	1.1885	--	--	0.0468	0.0971	--	--	0.986	0.971	27	30.3	61.91	6,439	68.65	7,654	75.86	9,141

Table 9.--Statistical measures obtained from regression equations tested for use in projecting demand for bunker boats--Continued

Variables, time period, and mathematical function	Regression coefficients				Standard errors of estimate 1/	Standard errors of b coefficients 2/			Coefficient or index of correlation 3/	Coefficient or index of determination 4/	Degrees of freedom	F or t ratios 5/	Projected Demand					
													1970		1975		1980	1985
	a	b	b_1	b_2		b	b_1	b_2					Per capita	Total	Per capita	Total	Per capita	Per capita
													Pounds	Thousand tons	Pounds	Thousand tons	Pounds	Pounds
1947-61																		
$Y = a + b X$	-371.9849	43.5099	--	--	166.7183	8.6066	--	--	0.978	0.956	14	17.5	68.06	6,958	68.09	7,988	79.33	81.15	10,990
$Y = a + b \log X$ 1/	-13948.1970	5876.5313	--	--	198.1316	603.2710	--	--	0.970	0.942	14	15.0	59.80	5,889	57.50	6,811	58.38	58.89	7,696
$\log Y = a + b \log X$ 1/	1.4368	1.0883	--	--	0.0198	0.0680	--	--	0.978	0.957	14	17.6	68.38	6,987	68.84	7,696	79.70	83.35	10,899
Bunker board consumption is a function of households																		
1939-60 6/																		
$Y = a + b X$	-4483.8970	168.6686	--	--	195.3634	3.8760	--	--	0.984	0.969	27	48.9	60.38	6,888	69.48	7,138	67.63	70.46	9,160
$Y = a + b \log X$ 1/	-88853.1850	19341.0980	--	--	895.3609	489.3375	--	--	0.980	0.960	27	38.5	54.39	5,687	53.39	6,196	55.88	56.01	7,281
$\log Y = a + b \log X$ 1/	-1.3688	2.9448	--	--	0.0400	0.0899	--	--	0.989	0.979	27	33.5	79.78	8,881	83.87	10,888	118.98	139.94	18,880
1947-60																		
$Y = a + b X$	-4087.3051	169.3863	--	--	168.9364	9.1639	--	--	0.979	0.958	14	17.9	68.87	6,887	69.48	7,858	68.89	69.95	9,041
$Y = a + b \log X$ 1/	-85995.6980	17339.3830	--	--	188.7999	1105.6489	--	--	0.973	0.947	14	13.9	55.78	5,889	58.88	6,658	58.85	59.52	7,738
$\log Y = a + b \log X$ 1/	0.0618	2.0980	--	--	0.0816	0.1304	--	--	0.978	0.958	14	16.1	69.88	6,884	70.68	7,866	77.48	84.58	10,999
Bunker board consumption is a function of population and per capita gross national product																		
1939-61 6/																		
$Y = a + b X + b_1 X_1$	-6013.3301	48.4303	0.6719	--	107.2988	2.9491	0.1037	--	0.997	0.994	25	43.7	61.07	6,351	65.99	7,313	69.88	73.97	9,616
$Y = a + b \log X + b_1 \log X_1$ 6/	-84987.0940	8341.8843	775.2136	--	119.4234	426.1739	194.3492	--	0.997	0.993	25	16.5	56.77	5,904	58.83	6,960	60.39	61.42	7,984
$\log Y = a + b \log X + b_1 \log X_1$ 6/	-11.9064	2.3049	1.0097	--	0.0767	0.2698	0.1262	--	0.993	0.986	25	66.1	78.69	8,180	99.07	10,600	115.09	139.88	18,188
1947-61																		
$Y = a + b X + b_1 X_1$	-9519.1087	47.1053	0.9708	--	188.7083	6.6620	0.4142	--	0.992	0.972	12	2.1	59.86	6,889	63.86	7,138	67.70	71.60	9,308
$Y = a + b \log X + b_1 \log X_1$ 6/	-89507.3170	8808.0963	990.9931	--	139.9600	1196.7773	1136.2004	--	0.984	0.967	12	0.8	57.05	5,933	59.80	6,681	60.80	61.86	8,042
$\log Y = a + b \log X + b_1 \log X_1$ 6/	-6.7613	1.9189	0.6982	--	0.0419	0.3591	0.3409	--	0.981	0.963	12	4.0	69.98	6,886	76.95	8,297	89.38	97.41	12,663
Bunker board consumption is a function of population and per capita disposable personal income																		
1939-61 6/																		
$Y = a + b X + b_1 X_1$	-6008.9459	45.3712	1.2906	--	138.8963	3.4761	0.1974	--	0.997	0.994	25	41.7	61.83	6,430	66.35	7,388	70.96	74.78	9,721
$Y = a + b \log X + b_1 \log X_1$ 6/	-49295.6190	8056.6716	1051.7787	--	116.4903	459.3818	247.7286	--	0.997	0.993	25	15.7	57.05	5,933	59.11	6,598	60.61	61.66	8,016
$\log Y = a + b \log X + b_1 \log X_1$ 6/	-12.0688	2.1017	1.2733	--	0.0834	0.3288	0.1773	--	0.991	0.983	25	62.3	52.69	8,600	100.30	11,184	128.98	149.17	19,398
1947-61																		
$Y = a + b X + b_1 X_1$	-9317.2175	22.6281	2.9494	--	111.0166	12.9333	1.1412	--	0.998	0.979	12	3.3	62.19	6,468	67.14	7,486	71.13	75.71	9,842
$Y = a + b \log X + b_1 \log X_1$ 6/	-93846.3720	3901.6829	5026.3978	--	123.8665	2600.7929	2452.9074	--	0.987	0.974	12	2.4	58.66	6,101	61.27	6,832	62.71	64.08	8,330
$\log Y = a + b \log X + b_1 \log X_1$ 6/	-9.4469	0.3170	2.1396	--	0.0364	0.7643	0.7205	--	0.986	0.972	12	3.2	70.23	7,304	81.45	9,082	92.42	107.52	13,977

Table 9.--Statistical measures obtained from regression equations tested for use in projection demand for bunding board--Continued

Variables, time period, and mathematical function	Regression coefficients				Standard errors of estimate 1/	Standard errors of t coefficients 2/			Coefficient of rank correlation 3/	Coefficient of index of determination 4/	Degrees of freedom	F or t ratios 5/	Projected Demand							
													1970		1975		1980		1985	
	a	b	b_1	b_2		b	b_1	b_2					Per capita	Total	Per capita	Total	Per capita	Total	Per capita	Total
													Pounds	Thousand tons	Pounds	Thousand tons	Pounds	Thousand tons	Pounds	Thousand tons
Bunding board consumption is a function of population and industrial production																				
1939-61 6/																				
$Y = a + b X + b_1 X_1$	-4186.0893	36.1431	20.9609	--	105.4393	4.6455	3.1461	--	0.977	0.995	25	46.2	62.87	6,938	68.80	7,606	73.72	8,883	79.26	10,3??
$Y = a + b \log X + b_1 \log X_1$ 8/	-38961.0090	7890.9907	942.5054	--	113.9345	471.1237	121.8657	--	0.977	0.994	25	20.7	56.60	5,876	58.38	6,309	59.81	7,207	60.70	7,8?1
$\log Y = a + b \log X + b_1 \log X_1$ 8/	-4.1486	1.8839	0.6777	--	0.0715	0.2970	0.0766	--	0.994	0.987	25	39.2	76.54	7,960	89.98	10,033	106.79	12,866	126.48	15,4??
1947-61																				
$Y = a + b X + b_1 X_1$	-3781.3148	36.7883	16.1628	--	116.1991	5.6737	7.1904	--	0.989	0.977	12	5.5	60.53	6,895	65.03	7,251	69.69	8,398	74.33	9,663
$Y = a + b \log X + b_1 \log X_1$ 8/	-36578.1810	6489.8362	1227.8459	--	126.1304	1477.1951	645.0949	--	0.987	0.971	12	3.9	56.67	5,898	58.97	6,531	59.96	7,225	60.52	7,906
$\log Y = a + b \log X + b_1 \log X_1$ 8/	-1.1008	1.9461	0.5437	--	0.0968	0.4371	0.1891	--	0.988	0.971	12	9.0	68.33	6,680	71.65	7,989	80.28	9,666	89.72	11,663
Bunding board consumption is a function of households, average disposable personal income per household, and industrial production																				
1939-61 6/																				
$Y = a + b X + b_1 X_1 + b_2 X_2$	-2999.9030	104.9036	0.0658	15.2122	130.5870	25.5174	0.1418	3.6264	0.998	0.993	24	3.2	60.98	6,380	65.37	7,289	69.86	8,618	74.13	9,637
$Y = a + b \log X + b_1 \log X_1 + b_2 \log X_2$ 9/	-41717.3860	6598.2320	2757.1461	-910.4818	153.3081	659.3280	130.9910	414.5903	0.994	0.994	24	3.2	55.62	5,784	57.25	6,383	58.21	7,214	58.75	7,641
$\log Y = a + b \log X + b_1 \log X_1 + b_2 \log X_2$ 8/	0.5144	1.6808	-0.1474	0.5570	0.3008	0.2328	0.0427	0.1095	0.994	0.991	24	3.2	72.72	7,561	83.08	9,263	99.78	11,541	109.11	14,188
1947-61																				
$Y = a + b X + b_1 X_1 + b_2 X_2$	-5717.9977	47.2586	1.0917	4.0629	97.1026	24.3581	1.2972	7.7135	0.993	0.988	11	3.3	63.26	6,579	68.89	7,681	73.45	8,851	78.92	10,259
$Y = a + b \log X + b_1 \log X_1 + b_2 \log X_2$ 9/	-64360.6830	2311.0943	6599.3856	331.8846	105.4251	1192.0372	145.2041	545.2197	0.991	0.983	11	2.3	59.32	6,169	62.34	6,951	63.99	7,713	65.75	8,543
$\log Y = a + b \log X + b_1 \log X_1 + b_2 \log X_2$ 8/	-8.1814	0.4989	1.4961	0.3093	0.0328	0.3638	0.0465	0.2033	0.990	0.979	11	2.1	68.90	7,166	79.42	8,?99	90.80	10,893	104.91	13,638

1/ A measure of the closeness with which values of a dependent variable can be estimated from the values of an independent varia e(s).
2/ A measure of the closeness with which the true values of the regression coefficients can be estimated from the values in the ample.
3/ A measure of the degree of relationship between the dependent and independent variable(s).
4/ A measure of the percent of the variation in the values of the dependent variable that is associated with variation in values f the independent variable(s).
5/ A measure of the probability that the given values of b might have been obtained by chance from a population in which the tr regression coefficient is zero.
6/ Excepting the war years 1942-46.
7/ Expressed in common logarithms.
8/ Expressed in natural logarithms.
9/ Pounds per household.

Table 10.--Statistical measures obtained from regression equations tested for use in projecting demand for special food board

Variables, time period, and mathematical function	Regression coefficients		Standard errors of estimate 1/	Standard errors of b coefficients 2/	Coefficient or index of correlation 3/	Coefficient or index of determination 4/	Degrees of freedom	F or t ratios 5/	Projected Demand					
									1970		1975		1980	1985
	a	b		b					Per capita	Total	Per capita	Total	Per capita	Per capita
									Pounds	Thousand tons	Pounds	Thousand tons	Pounds	Pounds
Per capita special food board consumption is a function of per capita disposable personal income														
1947-61														
Y = a + b X	-34.9217	0.0262	0.6223	0.0012	0.988	0.975	13	22.7	27.96	2,908	33.98	3,789	40.01	47.48
Y = a + b log X 6/	-335.6674	106.9854	0.6034	4.5665	0.988	0.977	13	23.4	25.76	2,679	30.01	3,346	33.91	38.32
log Y = a + b log X 6/	-12.9387	4.3038	0.0345	0.2613	0.977	0.954	13	16.5	40.65	4,228	60.27	6,720	86.46	130.13
Per capita special food board consumption is a function of per capita gross national product														
1947-61														
Y = a + b X	-34.5551	0.0179	1.1513	0.0015	0.957	0.916	13	11.9	26.48	2,754	32.75	3,632	39.01	46.35
Y = a + b log X 6/	-342.7435	103.9156	1.1954	9.1137	0.953	0.909	13	11.4	24.36	2,533	28.77	3,208	32.79	37.08
log Y = a + b log X 6/	-13.6191	4.2985	0.0402	0.3065	0.969	0.938	13	14.0	36.85	3,832	56.09	6,254	82.23	123.73
Special food board consumption per household is a function of average disposable personal income per household														
1947-61														
Y = a + b X	-145.5782	0.0301	3.1402	0.002	0.972	0.945	13	14.9	1/95.22	2,976	1/116.29	3,925	1/137.36	1/164.45
Y = a + b log X 6/	-1601.9118	433.2658	2.9607	27.37	0.975	0.951	13	15.8	1/89.16	2,786	1/104.95	3,542	1/119.51	1/136.71
log Y = a + b log X 6/	-16.8160	4.8540	0.0495	0.455	0.947	0.896	13	10.6	1/134.77	4,212	1/202.50	6,834	1/294.85	1/459.50
Special food board consumption is a function of population														
1947-62														
Y = a + b X	-3732.9085	28.9606	62.3829	1.1	0.988	0.977	14	24.4	22.03	2,291	24.44	2,725	26.95	29.21
Y = a + b log X 6/	-23334.4790	11001.3500	55.0666	396.	0.991	0.982	14	27.7	20.84	2,167	22.42	2,500	23.83	24.87
log Y = a + b log X 6/	-8.4444	5.1570	0.0476	0.3	0.970	0.942	14	15.0	31.11	3,235	41.55	4,633	57.38	78.72

Table 10.--Statistical measures obtained from regression equations tested for use in projecting demand for special food board--Continued

Variables, time period, and mathematical function	Regression coefficients		Standard errors of estimate 1/	Standard errors of b coefficients 2/	Coefficient or index of correlation 3/	Coefficient or index of determination 4/	Degrees of freedom	F or t ratios 5/	Projected Demand					
									1970		1975		1980		1985	
	a	b		b					Per capita	Total	Per capita	Total	Per capita	Total	Per capita	Total
									Pounds	Thousand tons	Pounds	Thousand tons	Pounds	Thousand tons	Pounds	Thousand tons
Special food board consumption is a function of gross national product																
1947-62																
$Y = a + b X$	-1444.6908	5.7163	62.0738	0.2329	0.989	0.977	14	24.5	25.13	2,614	30.11	3,357	34.97	4,214	40.55	5,272
$Y = a + b \log X$ 6/	-13519.5680	5537.5929	69.0099	251.4687	0.986	0.972	14	22.0	21.63	2,250	23.80	2,654	25.30	3,049	26.62	3,461
$\log Y = a + b \log X$ 6/	-4.0049	2.6535	0.0319	0.1163	0.987	0.974	14	22.8	34.98	3,638	50.99	5,685	72.95	8,791	106.55	13,852
Special food board consumption is a function of disposable personal income																
1947-62																
$Y = a + b X$	-1359.3086	8.0328	56.1319	0.2953	0.991	0.981	14	27.2	25.55	2,657	30.31	3,380	34.71	4,183	40.22	5,288
$Y = a + b \log X$ 6/	-12471.5600	5471.0988	45.6048	168.8765	0.994	0.988	14	33.6	22.07	2,295	24.11	2,688	25.39	3,060	26.69	3,470
$\log Y = a + b \log X$ 6/	-3.3879	2.5790	0.0405	0.1448	0.979	0.958	14	17.8	35.95	3,739	51.39	5,730	71.20	8,580	103.00	13,399
Special food board consumption is a function of industrial production																
1947-62																
$Y = a + b X$	-1090.1742	23.5457	86.3658	1.3493	0.978	0.956	14	17.4	23.48	2,442	27.17	3,030	31.01	3,737	35.08	4,561
$Y = a + b \log X$ 6/	-8156.5755	4717.7174	91.8999	368.5551	0.975	0.950	14	16.3	20.29	2,110	21.75	2,425	22.82	2,750	23.64	3,073
$\log Y = a + b \log X$ 6/	-1.4282	2.2620	0.0486	0.1339	0.976	0.953	14	16.9	30.00	3,120	39.66	4,422	52.48	6,324	69.48	9,033

1/ A measure of the closeness with which values of a dependent variable can be estimated from the values of an independent variable(s).
2/ A measure of the closeness with which the true values of the regression coefficients can be estimated from the values in the sample.
3/ A measure of the degree of relationship between the dependent and independent variable(s).
4/ A measure of the percent of the variation in the values of the dependent variable that is associated with variation in values of the independent variable(s).
5/ A measure of the probability that given values of b might have been obtained by chance from a population in which the true regression coefficient is zero.
6/ Expressed in common logarithms.
7/ Pounds per household.

Table 11.--Statistical measures obtained from regression equations tested for use in projecting demand for building board

Variables, time period, and mathematical function	Regression coefficients			Standard errors of estimate 1/	Standard errors of b coefficients 2/		Coefficient or index of correlation 3/	Coefficient or index of determination 4/	Degrees of freedom	F or t ratios 5/	Projected Demand							
											1970		1975		1980		1985	
	a	b	b_1		b	b_1					Per capita	Total	Per capita	Total	Per capita	Total	Per capita	Total
											Pounds	Thousand tons	Pounds	Thousand tons	Pounds	Thousand tons	Pounds	Thousand tons
Per capita building board consumption is a function of per capita disposable personal income																		
1930-61 6/																		
$Y = a + b X$	-22.8964	0.0226	--	1.9674	0.0011	--	0.974	0.949	25	21.5	31.34	3,259	36.54	4,074	41.74	5,030	48.18	6,263
$Y = a + b \log X$ 7/	-218.3334	72.5217	--	2.3620	4.1066	--	0.962	0.926	25	17.7	26.81	2.788	29.69	3.310	32.33	3.896	35.32	4.592
$\log Y = a + b \log X$ 7/	-14.7141	4.9017	--	0.1267	0.2205	--	0.976	0.952	25	22.2	71.57	7.443	112.10	12,499	169.05	20.371	269.30	35 009
1947-61																		
$Y = a + b X$	-13.8086	0.0175	--	1.4505	0.0027	--	0.874	0.764	13	6.5	28.80	2,995	32.82	3.659	36.85	4,480	41.83	5.438
$Y = a + b \log X$ 7/	-213.8098	71.0823	--	1.4541	11.0046	--	0.873	0.763	13	6.5	26.47	2.753	29.29	3.866	32.88	3,842	36.81	4.525
$\log Y = a + b \log X$ 7/	-4.6168	1.8045	--	0.0419	0.3175	--	0.844	0.713	13	5.7	30.40	3,162	35.85	3.997	41.71	5.086	49.51	6.436
Per capita building board consumption is a function of per capita gross national product																		
1929-61 6/																		
$Y = a + b X$	-19.0815	0.0141	--	2.0183	0.0007	--	0.973	0.946	26	21.3	29.00	3,016	33.93	3,783	38.87	4,684	44.65	5,805
$Y = a + b \log X$ 7/	-195.4968	62.3441	--	2.5993	3.8449	--	0.954	0.910	26	16.2	24.79	2,578	27.44	3,060	29.84	3.596	32.42	4.215
$\log Y = a + b \log X$ 7/	-13.1992	4.2849	--	0.1199	0.1773	--	0.978	0.956	26	23.8	53.25	5.538	80.47	8,972	117.20	14.123	175.15	22.770
1947-61																		
$Y = a + b X$	-13.1432	0.0120	--	1.5632	0.0020	--	0.852	0.725	13	5.9	27.78	2,889	31.98	3,566	36.18	4,360	41.10	5.343
$Y = a + b \log X$ 7/	-219.9085	69.9848	--	1.5788	12.0369	--	0.849	0.720	13	5.8	26.32	2.737	29.27	3.264	31.96	3.851	34.83	4 528
$\log Y = a + b \log X$ 7/	-4.8982	1.8011	--	0.0429	0.3270	--	0.837	0.700	13	5.5	29.15	3,032	34.76	3.876	40.80	4,916	48.43	6.296
1947-62																		
$Y = a + b X$	-15.4882	0.0128	--	1.5776	0.0019	--	0.874	0.764	14	6.7	28.22	2.935	32.70	3.646	37.18	4,480	42.43	5.516
$Y = a + b \log X$ 7/	-238.7738	75.8445	--	1.6071	11.4469	--	0.869	0.755	14	6.6	27.05	2,813	30.24	3.372	33.15	3.995	36.26	4.714
$\log Y = a + b \log X$ 7/	-5.2540	1.9054	--	0.0430	0.3064	--	0.897	0.734	14	6.2	30.01	3,121	36.16	4.032	42.84	5.162	51.35	6.676
Building board consumption per household is a function of average disposable personal income per household																		
1930-61 6/																		
$Y = a + b X$	-113.6375	0.0880	--	7.8074	0.0015	--	0.965	0.931	25	18.4	8/ 110.36	3,449	8/ 129.98	4.386	8/ 149.56	5.498	8/ 177.56	6 969
$Y = a + b \log X$ 7/	-1199.9806	332.2242	--	8.8294	20.6090	--	0.955	0.912	25	16.1	8/ 96.78	3.024	8/ 108.88	3.675	8/ 120.05	4 412	8/ 134.63	5.284
$\log Y = a + b \log X$ 7/	-21.5859	6.1531	--	0.1400	0.3269	--	0.967	0.934	25	18.8	8/ 269.30	8.416	8/ 451.20	15,228	8/ 726.50	26 699	8/ 1.353.00	53.105
1947-61																		
$Y = a + b X$	-60.7237	0.0196	--	4.8598	0.0031	--	0.869	0.756	13	6.3	8/ 97.68	3.053	8/ 111.54	3.764	8/ 125.40	4,608	8/ 145.20	5.699
$Y = a + b \log X$ 7/	-1023.8444	286.4733	--	4.7857	44.2526	--	0.874	0.763	13	6.5	8/ 94.29	2.947	8/ 104.72	3.534	8/ 114.35	4.202	8/ 126.93	4 982
$\log Y = a + b \log X$ 7/	-6.0880	2.0776	--	0.0399	0.3690	--	0.842	0.709	13	5.6	8/ 105.00	3.281	8/ 124.93	4.218	8/ 146.77	5.394	8/ 181.05	7 108

Table 11.--Statistical measures obtained from regression equations tested for use in projecting demand for building board--Continued

Variables, time period, and mathematical function	Regression coefficients			Standard errors of estimate 1/	Standard errors of b coefficients 2		Coefficient or index of correlation 3	Coefficient or index of determination 4	Degrees of freedom	F or t ratios 5	Projected Demand							
											1970		1975		1980		1985	
	a	b	b_1		b	b_1					Per capita	Total	Per capita	Total	Per capita	Total	Per capita	Total
											Pounds	Thousand tons	Pounds	Thousand tons	Pounds	Thousand tons	Pounds	Thousand tons
Building board consumption is a function of population																		
1930-62 6/																		
Y = a + b X	-4167.6614	34.2950	--	184.7264	1.6656	--	0.971	0.942	28	20 6	28 52	2,966	31.21	3,480	34.00	4,097	36.53	4,749
Y = a + b log X 7/	-24962.8800	11943.6670	--	167.7780	524.0425	--	0.976	0.952	28	22 8	26.18	2.723	27.66	3,084	28.94	3,487	29.85	3,881
log Y = a + b log X 7/	-16.9804	9.0400	--	0.2536	0 7920	--	0.913	0.834	28	11 4	104.21	10.836	182.38	20,335	340.50	41,030	686.62	81,460
1947-62																		
Y = a + b X	-2597.7039	25.0859	--	119.5965	2.2695	--	0.947	0.897	14	11.0	25.08	2,608	26.76	2,984	28.50	3,434	30.08	3,910
Y = a + b log X 7/	-19461.7840	9473.3341	--	180.4757	867.6749	--	0.946	0.895	14	10.9	24.02	2,498	24.97	2.784	25.76	3.104	26.28	3,416
log Y = a + b log X 7/	-3.0848	2.7968	--	0.0443	0.3194	--	0.920	0.845	14	8.8	27.63	2,874	31.31	3,491	35.99	4,337	41.25	5.363
Building board consumption is a function of gross national product																		
1930-62 6/																		
Y = a + b X	-903.8824	5.5969	--	135.7736	0.1956	--	0.984	0.969	26	28.4	29.25	3.042	33.77	3.765	38 16	4.598	43.28	5.626
Y = a + b log X 7/	-8967.9465	3829.9159	--	180.2369	181.2206	--	0.972	0.945	26	21.1	22.63	2.353	23.61	2 632	24.12	2.906	24.94	3.190
log Y = a + b log X 7/	-5.0164	3.1084	--	0.1425	0.1833	--	0.973	0.948	26	21 7	64.90	6.750	102.00	11.373	157.13	18.937	247.85	32.220
1947-62																		
Y = a + b X	-629.1239	4.9609	--	114.8865	0.4308	--	0.951	0.905	14	11.5	27.82	2.893	31.73	3.538	35.54	4 282	40.00	5.200
Y = a + b log X 7/	-11053.5990	4778.4883	--	185.6389	490.5386	--	0.943	0.889	14	10.6	24.72	2,571	26.19	2,980	27.06	3,261	27.82	3.616
log Y = a + b log X 7/	-0.6077	1.4395	--	0.0407	0.1482	--	0.933	0.870	14	9.7	29.39	3.057	34.90	3,991	40.88	4,926	48.46	6,300
Building board consumption is a function of construction expenditures																		
1930-61 6/																		
Y = a + b X	-839.5864	36.7038	--	179.2761	1.8141	--	0.971	0.942	25	20.2	26.51	2.757	28 68	3.198	31.10	3.748	33.07	4,299
Y = a + b log X 7/	-4803.9710	3487.6422	--	847.9333	245.3336	--	0.943	0.890	25	14.2	20.59	2,141	20.77	2.316	20.82	2.509	20.62	2.681
log Y = a + b log X 7/	-2.1866	2.9291	--	0.1863	0.1843	--	0.954	0.910	25	15.9	48.86	5.081	63.91	7.126	88.01	10.605	111.08	14,440
1947-61																		
Y = a + b X	-323.7280	29.1053	--	123.0852	3.0412	--	0.936	0.876	13	9.6	24.32	2.529	25.81	2.878	25.70	3.314	26.85	3.751
Y = a + b log X 7/	-5420.9669	3864.9241	--	141.0743	473.8040	--	0.915	0.837	13	8.2	21.88	2.275	22.14	2 4c9	22.27	2,684	22.11	2,874
log Y = a + b log X 7/	1.0429	1.1851	--	0.0478	0.1605	--	0.899	0.807	13	7.4	24.31	2,528	26.00	2.899	27.98	3.372	29.68	3 858

Table 11.--Statistical measures obtained from regression equations tested for use in projecting demand for building board--Continued

Variables, time period, and mathematical function	Regression coefficients			Standard errors of estimate 1/	Standard errors of b coefficients 2/		Coefficient or index of correlation 3/	Coefficient or index of determination 4/	Degrees of freedom	F or t ratios 5/	Projected Demand							
											1970		1975		1980		1985	
	a	b	b_1		b	b_1					Per capita	Total	Per capita	Total	Per capita	Total	Per capita	Total
											Pounds	Thousand tons	Pounds	Thousand tons	Pounds	Thousand tons	Pounds	Thousand tons
Building board consumption is a function of residential construction starts																		
1947-62																		
$Y = a + b X$	793.9941	0.5287	--	361.7703	0.5947	--	0.229	0.052	14	0.9	15.83	1,646	15.42	1.719	14.92	1.798	14.47	1,861
$Y = a + b \log X$ 1/	-4305.6614	1894.8807	--	359.7112	1911.1328	--	0.251	0.063	14	1.0	15.89	1,653	15.42	1.719	14.80	1.784	14.22	1.849
$\log Y = a + b \log X$ 1/	1.4526	0.5467	--	0.1095	0.9816	--	0.244	0.059	14	0.9	15.55	1,617	15.17	1,692	14.68	1.769	14.22	1.848
Building board consumption is a function of disposable personal income																		
1930-62 6/																		
$Y = a + b X$	-1037.1949	8.9009	--	143.0897	0.1160	--	0.983	0.965	26	26.9	30.69	3,213	35.68	3.978	40.07	4,826	45.65	5.934
$Y = a + b \log X$ 1/	-9020.3476	4866.1211	--	161.8939	180.3099	--	0.978	0.956	26	23.7	23.98	2,494	25.11	2,800	25.65	3.091	26.23	3.410
$\log Y = a + b \log X$ 1/	-5.8860	3.4141	--	0.1582	0.1762	--	0.967	0.935	26	19.4	81.70	8,497	133.90	14 930	211.41	25,475	353.23	45,920
1947-62																		
$Y = a + b X$	-599.0699	6.9848	--	110.3311	0.5804	--	0.955	0.912	14	12.0	28.20	2,933	31.95	3.562	35.35	4,260	39.75	5 168
$Y = a + b \log X$ 1/	-10152.3810	4789.2754	--	113.3674	404.8893	--	0.952	0.907	14	11.7	25 12	2.612	26.48	2,952	27.16	3,273	27.61	3,628
$\log Y = a + b \log X$ 1/	-0.2991	1.4054	--	0.0410	0.1463	--	0.939	0.868	14	9.6	29.92	3,112	35.30	3.936	40.71	4 905	48.09	6.252
Building board consumption is a function of households																		
1930-62 6/																		
$Y = a + b X$	-8673.5772	88.3865	--	168.5734	3.8947	--	0.976	0.952	26	22.7	27.38	2,847	29.49	3.268	31.68	3,818	32.77	4,260
$Y = a + b \log X$ 1/	-18892.6810	8817.3904	--	170.0140	365.5984	--	0.975	0.951	26	22 5	24.28	2,525	25.10	2,799	25.75	3,103	25.68	3.336
$\log Y = a + b \log X$ 1/	-7.6008	6.4163	--	0.8099	0.4514	--	0.981	0.896	26	14.2	80.48	8,370	122.99	13.713	196.56	23,685	277.92	36,130
1947-62																		
$Y = a + b X$	-1988.5980	72.9520	--	135.8289	7.6569	--	0.931	0.866	14	9.5	25.37	2,638	26.92	3,002	28.55	3,440	29.27	3,805
$Y = a + b \log X$ 1/	-11470.4340	7770.2699	--	142.3496	861.1726	--	0.924	0.853	14	9.0	23.88	2,484	24.61	2.744	25.15	3.031	25.02	3.253
$\log Y = a + b \log X$ 1/	-0.6834	2.3087	--	0.0487	0.2946	--	0.902	0.814	14	7.8	27 45	2,855	30.97	3,409	34.42	4,148	37.13	4,827
Building board consumption is a function of population and per capita gross national product																		
1929-61 6/																		
$Y = a + b X + b_1 X_1$	-3192.1739	19.9619	0.5389	129.2376	3.5856	0.1275	0.985	0.971	23	18 6	26.90	2.798	29.47	3 296	31 82	3,834	34.11	4 434
$Y = a + b \log X + b_1 \log X_1$ 8/	-23092.1740	3820.7762	649 4270	135.6406	482.9915	225.9879	0.984	0.968	23	8 n	24 84	2 583	26 13	2 913	27 11	3.267	27 84	3.619
$\log Y = a + b \log X + b_1 \log X_1$ 8/	-29.4712	1.2299	3.8708	0.2692	0.9583	0.4468	0.981	0 963	23	1 7	51 21	5.328	75.96	8.470	109 13	13.150	160 46	20.860
1947-61																		
$Y = a + b X + b_1 X_1$	-2624.8607	18.3179	0.4313	127.0781	6.5755	0.4085	0.996	0.977	12	1.1	25 54	2.656	27 64	3.362	29.5e	3.562	31.44	4.087
$Y = a + b \log X + b_1 \log X_1$ 8/	-21934.4270	3146.4750	940.8755	133.2167	1142.9814	1084.5575	0 996	0 992	1.	3 [illegible]	24 17	2 514	25 34	2.825	26.17	3.153	26.78	3 481
$\log Y = a + b \log X + b_1 \log X_1$ 8/	-13 0578	1.6378	1.3360	0.1396	0 4162	0.4696	0 992	0.984	12	3 [illegible]	29 18	3 035	34 52	3 849	40 53	4.844	47 94	[illegible] 232

Table 11.--Statistical measures obtained from regression equations tested for use in projecting demand for building board--Continued

Variables, time period, and mathematical function	Regression coefficients			Standard errors of estimate 1/	Standard errors of b coefficients 2/		Coefficient of index of correlation 3/	Coefficient of index of determination 4/	Degrees of freedom	F or t ratios 5/	Projected Demand							
											1970		1975		1980		1985	
	a	b	b_1		b	b_1					Per capita	Total	Per capita	Total	Per capita	Total	Per capita	Total
											Pounds	Thousand tons	Pounds	Thousand tons	Pounds	Thousand tons	Pounds	Thousand tons
Building board consumption is a function of population and construction expenditures																		
1949-60 6/																		
$Y = a + b X + b_1 X_1$	-3805.7455	83.7638	0.0127	153.8352	5.5184	0.0060	0.978	0.957	22	4.7	28.67	2,982	31.30	3,490	34.10	4,109	36.95	4,751
$Y = a + b \log X + b_1 \log X_1$ 6/	-85511.1950	4167.8853	341.1451	144.5770	511.6538	159.1781	0.981	0.962	22	4.8	25.50	2,652	26.74	2,982	27.79	3,349	28.49	3,704
$\log Y = a + b \log X + b_1 \log X_1$ 6/	-32.1651	3.6488	1.8867	0.4095	1.4493	0.4509	0.956	0.914	22	6.6	77.43	8,053	115.80	12,912	180.98	21,808	276.09	35,632
1947-60																		
$Y = a + b X + b_1 X_1$	-1564.0839	13.3704	0.0140	132.0686	13.8880	0.0149	0.987	0.860	11	1.0	24.89	2,589	26.53	2,958	28.88	3,408	29.78	3,872
$Y = a + b \log X + b_1 \log X_1$ 6/	-18967.3950	3097.3531	484.7288	141.6985	2011.0945	808.8513	0.916	0.839	11	0.3	23.52	2,446	24.31	2,711	24.95	3,006	25.30	3,289
$\log Y = a + b \log X + b_1 \log X_1$ 6/	-6.8364	1.9590	0.9688	0.1179	1.6738	0.6738	0.889	0.790	11	0.8	26.59	2.765	29.48	3.287	32.75	3,966	36.77	4,780
Building board consumption is a function of population and residential construction (number of starts)																		
1947-61																		
$Y = a + b X + b_1 X_1$	-8685.0853	84.4895	0.1844	130.9851	2.6855	0.2117	0.932	0.869	12	0.4	25.12	2.612	26.87	2.996	28.68	3,456	30.32	3.941
$Y = a + b \log X + b_1 \log X_1$ 6/	-19848.4690	4086.0106	114.9584	136.5729	467.1070	314.5884	0.926	0.858	12	0.1	23.95	2.491	24.94	2.781	25.74	3,102	26.28	3.417
$\log Y = a + b \log X + b_1 \log X_1$ 6/	-7.6642	2.8076	0.0889	0.1163	0.3979	0.2680	0.895	0.801	12	0.1	28.07	2,919	32.07	3,576	37.16	4,478	42.93	5,581
Building board consumption is a function of households and per capita disposable personal income																		
1949-61 6/																		
$Y = a + b X + b_1 X_1$	-3401.7481	48.9232	0.8839	142.4554	14.3049	0.5240	0.982	0.965	23	7.8	26.70	2,777	28.98	3,285	30.89	3,722	32.45	4,219
$Y = a + b \log X + b_1 \log X_1$ 6/	-13840.5890	2597.9976	718.1101	162.0148	525.4781	419.1537	0.977	0.954	23	3.0	23.50	2,444	24.30	2.709	24.90	3,000	24.83	3,288
$\log Y = a + b \log X + b_1 \log X_1$ 6/	-29.9698	0.9780	4.6706	0.2772	0.8957	0.7172	0.980	0.960	23	0.4	62.07	6,455	92.80	10,347	133.44	16,079	200.25	26,032
1947-61																		
$Y = a + b X + b_1 X_1$	-8727.2335	-45.7999	3.9516	115.7935	41.5321	1.2996	0.948	0.898	12	1.3	28.21	2,934	31.59	3.522	33.73	4,064	37.28	4,847
$Y = a + b \log X + b_1 \log X_1$ 6/	-33698.1040	-1337.1872	5380.5207	184.0482	1844.7953	2118.8802	0.940	0.883	12	0.6	25.87	2,690	27.62	3.080	28.36	3,417	29.54	3,840
$\log Y = a + b \log X + b_1 \log X_1$ 6/	-19.0679	-1.2705	4.1710	0.1006	1.4955	1.7177	0.923	0.851	12	0.8	33.05	3,437	40.94	4,565	48.22	5,811	61.11	7,944
Building board consumption is a function of population and per capita disposable personal income																		
1949-61 6/																		
$Y = a + b X + b_1 X_1$	-3202.9576	17.8022	0.9841	131.9579	4.2633	0.2445	0.985	0.970	23	16.9	27.52	2,862	30.09	3.355	32.38	3.902	34.78	4.521
$Y = a + b \log X + b_1 \log X_1$ 6/	-23394.1910	3629.8641	851.9017	135.3087	539.4477	239.3681	0.984	0.968	23	8.8	25.11	2.611	26.39	2,942	27.34	3.295	28.06	3.651
$\log Y = a + b \log X + b_1 \log X_1$ 6/	-31.4000	0.2630	4.9789	0.2794	1.1138	0.6057	0.980	0.960	23	0.1	61.03	6 347	91 43	10.194	131.07	15.794	198.91	25.858

Table 11.--Statistical measures obtained from regression equations tested for use in projecting demand for building board--Continued

Variables, time period, and mathematical function	Regression coefficients			Standard errors of estimate 1/	Standard errors of b coefficients 2/		Coefficient or index of correlation 3/	Coefficient or index of determination 4/	Degrees of freedom	F or t ratios 5/	Projected Demand							
											1970		1975		1980		1985	
	a	b	b_1		b	b_1					Per capita	Total	Per capita	Total	Per capita	Total	Per capita	Total
											Pounds	Thousand tons	Pounds	Thousand tons	Pounds	Thousand tons	Pounds	Thousand tons
1947-61																		
$Y = a + b X + b_1 X_1$	-8482.0870	3.1841	1.9274	121.2627	14.1275	1.2403	0.982	0.888	12	0.1	26.98	2,806	29.57	3,897	31.52	3,798	33.90	4,407
$Y = a + b \log X + b_1 \log X_1$ 6/	-87028.8330	252.3081	3636.4462	126.6870	2660.0144	2908.7614	0.937	0.878	12	0.01	25.86	2,627	26.70	2,977	27.40	3,302	28.21	3,667
$\log Y = a + b \log X + b_1 \log X_1$ 6/	-15.9618	-1.8510	1.9017	0.1021	2.1438	2.0819	0.980	0.847	12	0.4	32.60	3,390	39.83	4,461	45.47	5,479	56.65	7,364

1/ A measure of the closeness with which values of a dependent variable can be estimated from the values of an independent variable(s).
2/ A measure of the closeness with which the true values of the regression coefficients can be estimated from the values in the sample.
3/ A measure of the degree of relationship between the dependent and independent variable(s).
4/ A measure of the percent of the variation in the values of the dependent variable that is associated with variation in values of the independent variable(s).
5/ A measure of the probability that the given values of b might have been obtained by chance from a population in which the true regression coefficient is zero.
6/ Excepting the war years 1942-46.
7/ Expressed in common logarithms.
8/ Expressed in natural logarithms.
9/ Pounds per household.

Table 12.--Statistical measures obtained from regression equations tested for use in projecting demand for other board 1/

Variables, time period, and mathematical function	Regression coefficients				Standard error of estimate 2/	Standard errors of b coefficients 3/			Coefficient of index of correlation 4/	Coefficient of index of determination 5/	Degrees of freedom	F test ratio 6/	Projected Demand					
													1970		1975		1980	1985
	a	b	b_1	b_2		a	b_1	b_2					Per capita	Total	Per capita	Total	Per capita	Total	Per capita	Total
													Pounds	Thousand tons	Pounds	Thousand tons	Pounds	Thousand tons	Pounds	Thousand tons
Per capita other board consumption is a function of per capita disposable personal income																				
1930-61 1/																				
$Y = a + b X$	0.3901	0.0136	--	--	1.9356	0.0016	--	--	0.970	0.902	29	15.2	30.18	4,031	32.47	4,733	34.09	5,554	36.39	6,577
$Y = a + b \log X$ 8/	-139.4525	51.2520	--	--	1.9054	3.8213	--	--	0.971	0.905	29	15.9	33.91	3,529	35.96	4,010	38.03	4,559	39.95	5,194
$\log Y = a + b \log X$ 8/	-2.0635	1.0763	--	--	0.0476	0.0796	--	--	0.968	0.880	29	13.5	37.52	3,928	41.40	4,616	45.31	5,460	50.19	6,525
1947-61																				
$Y = a + b X$	6.2430	0.0118	--	--	1.1884	0.0038	--	--	0.739	0.546	13	9.6	34.56	3,994	37.28	4,157	39.99	4,819	43.35	5,636
$Y = a + b \log X$ 8/	-132.3143	49.1128	--	--	1.1664	12.0421	--	--	0.754	0.569	13	9.1	33.10	3,827	35.65	3,975	37.84	4,512	39.46	5,130
$\log Y = a + b \log X$ 8/	-1.2035	0.6118	--	--	0.0252	0.1908	--	--	0.763	0.582	13	9.3	34.76	3,611	37.39	4,169	40.03	4,824	43.24	5,621
Per capita other board consumption is a function of per capita gross national product																				
1929-61 1/																				
$Y = a + b X$	1.4322	0.0100	--	--	1.9050	0.0006	--	--	0.953	0.907	29	15.9	35.33	3,695	39.03	4,352	42.53	5,125	46.03	6,062
$Y = a + b \log X$ 8/	-125.2421	44.6741	--	--	2.0031	2.9041	--	--	0.947	0.897	29	15.1	32.46	3,395	34.40	3,845	36.20	4,362	38.05	4,947
$\log Y = a + b \log X$ 8/	-1.7747	0.9402	--	--	0.0464	0.0687	--	--	0.947	0.898	29	13.7	35.02	3,663	38.61	4,305	41.98	5,059	45.91	5,968
1947-61																				
$Y = a + b X$	4.1667	0.0085	--	--	1.4548	0.0019	--	--	0.893	0.628	13	6.1	34.52	3,990	37.03	4,196	40.75	4,912	44.39	5,771
$Y = a + b \log X$ 8/	-151.5130	52.4073	--	--	1.4344	12.9359	--	--	0.799	0.639	13	6.8	33.61	3,695	35.93	3,995	37.86	4,502	40.02	5,203
$\log Y = a + b \log X$ 8/	-1.5138	0.8641	--	--	0.0231	0.1 [illegible]	--	--	0.806	0.650	13	[illegible]	34.58	3,996	37.63	4,196	40.64	4,897	44.12	5,736
Other board consumption per household is a function of average disposable personal income per household																				
1930-61 1/																				
$Y = a + b X$	1.4446	0.0146	--	--	7.4256	0.0014	--	--	0.901	0.810	29	16.3	10/ 120.00	3,770	10/ 131.00	4,624	10/ 141.51	5,200	10/ 154.92	6,156
$Y = a + b \log X$ 8/	-586.3891	179.4036	--	--	7.2560	17.0345	--	--	0.905	0.819	29	10.5	10/ 113.90	3,599	10/ 120.44	4,065	10/ 126.46	4,647	10/ 133.59	5,310
$\log Y = a + b \log X$ 8/	-1.9036	1.0220	--	--	0.0466	0.1092	--	--	0.902	0.778	29	9.4	10/ 121.73	3,804	10/ 132.62	4,476	10/ 143.90	5,274	10/ 157.57	6,263
1947-61																				
$Y = a + b X$	43.3931	0.0082	--	--	5.0052	0.0033	--	--	0.573	0.329	13	2.5	10/ 106.99	3,406	10/ 114.73	3,872	10/ 120.47	4,427	10/ 127.85	5,082
$Y = a + b \log X$ 8/	-362.6099	120.5325	--	--	5.0150	46.3726	--	--	0.585	0.342	13	2.6	10/ 107.84	3,370	10/ 112.23	3,788	10/ 116.29	4,274	10/ 121.07	4,813
$\log Y = a + b \log X$ 8/	-0.1878	0.5702	--	--	0.0232	0.2141	--	--	0.594	0.353	13	2.7	10/ 109.00	3,404	10/ 114.42	3,862	10/ 119.60	4,399	10/ 125.96	5,006
Other board consumption is a function of population																				
1929-62 1/																				
$Y = a + b I$	-2464.8618	28.3119	--	--	157.3366	1.3791	--	--	0.969	0.940	27	20.1	32.92	3,624	34.52	3,849	36.17	4,356	37.66	4,896
$Y = a + b \log X$ 8/	-19595.2240	9843.7455	--	--	131.7932	415.3628	--	--	0.978	0.953	27	23.1	30.95	3,223	31.58	3,541	31.98	3,853	32.13	4,177
$\log Y = a + b \log X$ 8/	-2.4684	2.6197	--	--	0.0264	0.1 [illegible]	--	--	0.967	0.897	27	15.4	36.65	4,020	43.20	4,824	49.07	5,913	55.40	7,213

Table 12.--Statistical measures obtained from regression equations tested for use in projecting demand for other meats 1/--Continued

Variables, time period, and mathematical function	Regression coefficients				Standard errors of estimate 2/	Standard errors of b coefficients 3/		Coefficient or index of correlation 4/	Coefficient or index of determination 5/	Degrees of freedom	F or t ratios 6/	Projected Demand							
												1970		1975		1980		1985	
	a	b	b_1	b_2		t	b_1	b_2				Per capita	Total	Per capita	Total	Per capita	Total	Per capita	Total
												Pounds	Thousand tons	Pounds	Thousand tons	Pounds	Thousand tons	Pounds	Thousand tons
1947-62																			
Y = a + b X	-1804.8759	80.8555	--	--	125.5031	2.3056	--	--	0.914	0.845	14	6.7	[illegible]	3,134	30.91	3,44	31.72	3,822	32.45	4,218
Y = a + b log X 8/	-15451.3780	7981.7805	--	--	110.1520	954.3830	--	--	0.927	0.862	14	9.4	29.34	3,054	29.52	3,292	29.65	3,501	29.82	3,824
log Y = a + b log X 8/	-0.2533	1.6239	--	--	0.0259	0.1866	--	--	0.919	0.844	14	8..	31.19	3,24[illegible]	32.57	3,632	34.19	4,120	35.85	4,660
Other beard consumption is a function of gross national product																				
1959-62 1/																				
Y = a + b X	198.8308	4.6605	--	--	109.[illegible]30	0.1555	--	--	0.969	0.971	[illegible]	30.0	33.73	3,908	36.90	4,11[illegible]	39.94	4,813	43.65	5,075
Y = a + b log X 8/	-6300.8085	3840.3233	--	--	129.2[illegible]9[illegible]	278.3[illegible]11	--	--	0.979	0.959	2[illegible]	25.2	28.25	2,938	28.46	3,17[illegible]	26.27	3,408	26.05	3,647
log Y = a + b log X 8/	1.0127	0.8893	--	--	0.0386	0.0304	--	--	0.9[illegible]8	0.952	[illegible]	23.1	33.11	3,443	35.64	3,998	38.35	4,821	41.37	5,378
1947-62																				
Y = a + b X	303.6902	4.2541	--	--	99.[illegible]30	0.3[illegible]0	--	--	0.9[illegible]0	0.903	14	11.4	32.73	3,404	35.46	3,957	38.13	4,595	41.40	5,382
Y = a + b log X 8/	-8769.2800	4178.7965	--	--	86.[illegible]401	362.1[illegible]3	--	--	0.961	0.923	14	13.0	30.25	3,146	30.95	3,451	31.11	3,749	31.23	4,060
log Y = a + b log X 8/	1.0954	0.8443	--	--	0.0191	0.0[illegible]9	--	--	0.9[illegible]	0.912	14	12.1	32.67	3,398	35.16	3,923	37.46	4,514	40.19	5,225
Other beard consumption is a function of disposable personal income																				
1959-62 1/																				
Y = a + b X	94.6617	7.0970	--	--	12.[illegible]691	0.2[illegible]70	--	--	0.9[illegible]0	0.961	2[illegible]	25.[illegible]	35.03	3,643	36.[illegible]0	4,20[illegible]	41.43	4,992	45.69	5,914
Y = a + b log X 8/	-6635.0840	3589.1510	--	--	122.2370	134.1330	--	--	0.98[illegible]	0.964	27	26.[illegible]	29.3[illegible]	3,052	29.69	3,310	29.69	3,554	29.41	3,823
log Y = a + b log X 8/	0.9331	0.9756	--	--	0.0[illegible]0[illegible]	0.0[illegible]0	--	--	0.97[illegible]	0.946	2[illegible]	21.[illegible]	35.41	3,683	38.[illegible]8	4,326	41.[illegible]5	5,043	44.21	5,966
1947-62																				
Y = a + b X	498.3877	5.8272	--	--	118.7100	0.6245	--	--	0.928	0.862	14	9.3	32.[illegible]7	3,40[illegible]	35.25	3,930	37.45	4,513	40.55	5,271
Y = a + b log X 8/	-7717.2700	4086.9709	--	--	104.[illegible]016	372.7966	--	--	0.9[illegible]4	0.893	14	10.[illegible]	30.[illegible]6	3,157	30.91	3,446	30.87	3,720	30.94	4,022
log Y = a + b log X 8/	1.3172	0.8210	--	--	0.0230	0.0[illegible]2[illegible]	--	--	0.9[illegible]5	0.[illegible]	14	10.0	35.[illegible]2	3,813	35.0[illegible]	3,909	36.[illegible]6	4,445	39.40	5,122
Other beard consumption is a function of industrial production																				
1959-62 1/																				
Y = a + b X	441.4917	19.6880	--	--	99.[illegible]646	0.5[illegible]60	--	--	0.9[illegible]	0.9[illegible]	2[illegible]	32.9	32.[illegible]4	3,395	34.[illegible]0	3,83[illegible]	37.16	4,479	39.75	5,16[illegible]
Y = a + b log X 8/	-2[illegible]12.2652	2583.6574	--	--	133.252[illegible]	105.[illegible]33	--	--	0.97[illegible]	0.9[illegible]	2[illegible]	24.[illegible]	2[illegible].[illegible]8	2,[illegible]10	26.[illegible]5	2,963	26.23	3,161	25.67	3,33[illegible]
log Y = a + b log X 8/	1.9531	0.7132	--	--	0.0310	0.0[illegible]4[illegible]	--	--	0.96[illegible]	0.9[illegible]	27	29.0	30.[illegible]	3,200	32.03	3,571	33.16	3,990	34.42	4,474
1947-62																				
Y = a + b X	630.[illegible]361	17.707[illegible]	--	--	99.8751	[illegible].[illegible]03	--	--	0.9[illegible]	0.9[illegible]	14	11.3	31.[illegible]2	3,28[illegible]	33.[illegible]9	3,[illegible]30	35.[illegible]0	4,261	37.55	4,[illegible]02
Y = a + b log X 8/	-[illegible]79.9553	3597.4102	--	--	89.3[illegible]	280.[illegible]1[illegible]	--	--	[illegible].[illegible]40	0.[illegible]2[illegible]	14	12.[illegible]	29.31	3,[illegible]80	29.[illegible]0	3,[illegible]29	29.34	3,53[illegible]	29.10	3,7[illegible]3
log Y = a + b log X 8/	1.913[illegible]	0.1340	--	--	0.0[illegible]00	0.0[illegible]2[illegible]	--	--	0.9[illegible]4	0.90	14	11.[illegible]	31.19	3,244	32.[illegible]5	3,[illegible]32	33.85	4,[illegible]09	35.22	4,[illegible]59

Table 18.--Statistical measures obtained from regression equations tested for use in projecting demand for other board 1/--Continued

Variables, time period, and mathematical function	Regression coefficients				Standard errors of estimate 2/	Standard errors of t coefficients 3/			Coefficient or index of correlation 4/	Coefficient or index of determination 5/	Degrees of freedom	F or t ratios 6/	Projected Demand					
													1970		1975		1980	1985
	a	b	b_1	b_2		b	b_1	b_2					Per capita	Total	Per capita	Total	Per capita	Per capita	Total
													Pounds	Thousand tons	Pounds	Thousand tons	Pounds	Pounds	Thousand tons
Other board consumption is a function of households																			
1929-62 7/																			
$Y = a + b X$	-1239.8697	73.1731	--	--	122.[illegible]	2.7405	--	--	0.982	0.964	27	26.7	32.07	3,333	33.17	3,699	34.34	35.21	4,577
$Y = a + b \log X$ 8/	-9186.8100	6788.5865	--	--	115.2633	238.7335	--	--	0.983	0.966	27	28.4	29.47	3,064	29.52	3,292	29.40	29.04	3,775
$\log Y = a + b \log X$ 8/	0.2785	1.8312	--	--	0.0446	0.0[illegible]	--	--	0.967	0.935	27	19.8	35.49	3,691	36.11	4,249	41.22	44.12	5,737
1947-62																			
$Y = a + b X$	-756.5486	63.2225	--	--	101.3017	6.[illegible]	--	--	0.940	0.883	14	10.3	30.72	3,197	31.49	3,511	32.26	32.85	4,270
$Y = a + b \log X$ 8/	-9819.3140	6846.2500	--	--	101.2482	612.[illegible]	--	--	0.[illegible]	0.899	14	[illegible]	29.90	3,075	29.64	3,305	29.53	29.16	3,791
$\log Y = a + b \log X$ 8/	0.9974	1.4032	--	--	0.0824	0.[illegible]	--	--	[illegible]	0.893	14	[illegible]	31.03	3,252	32.09	3,667	34.29	35.46	4,613
Other board consumption is a function of population and per capita gross national product																			
1929-61 7/																			
$Y = a + b X + b_1 X_1$	-1538.4512	13.4069	0.9987	--	126.9905	3.[illegible]	[illegible]	--	0.981	0.962	45	[illegible]	31.61	3,306	33.38	3,720	34.03	34.93	4,673
$Y = a + b \log X + b_1 \log X_1$ 9/	-18486.3990	2602.2614	811.2448	--	126.2046	[illegible]	[illegible]	--	0.981	0.963	45	[illegible]	30.12	3,138	30.53	3,404	30.66	30.65	3,984
$\log Y = a + b \log X + b_1 \log X_1$ 9/	-4.9578	1.1864	0.7900	--	0.1292	[illegible]	[illegible]	--	[illegible]	0.933	45	[illegible]	35.04	[illegible]	38.35	4,278	41.74	45.63	5,932
1947-61																			
$Y = a + b X + b_1 X_1$	-1486.1212	6.3042	1.0204	--	107.0313	5.[illegible]	[illegible]	--	[illegible]	0.962	12	[illegible]	33.04	3,133	33.96	3,786	35.34	36.93	4,801
$Y = a + b \log X + b_1 \log X_1$ 9/	-23902.8520	1234.1731	2433.8586	--	102.1562	876.[illegible]	[illegible]	--	[illegible]	0.961	12	[illegible]	30.61	3,103	31.44	3,505	31.69	31.88	4,144
$\log Y = a + b \log X + b_1 \log X_1$ 9/	-4.6823	0.4394	1.2895	--	[illegible]	[illegible]	[illegible]	--	[illegible]	[illegible]	12	[illegible]	33.42	3,478	36.46	4,065	39.13	42.42	5,514
Other board consumption is a function of population and per capita disposable personal income																			
1929-61 7/																			
$Y = a + b X + b_1 X_1$	-1580.7225	[illegible]	[illegible]	--	[illegible]	[illegible]	[illegible]	--	0.979	0.959	45	[illegible]	[illegible]	[illegible]	34.11	3,803	35.32	36.77	4,780
$Y = a + b \log X + b_1 \log X_1$ 9/	-18902.3400	2669.1271	1009.6981	--	130.1833	[illegible]	[illegible]	--	[illegible]	[illegible]	45	13.[illegible]	30.90	3,170	30.94	3,450	31.05	31.07	4,039
$\log Y = a + b \log X + b_1 \log X_1$ 9/	-5.0222	1.0978	0.9788	--	[illegible]	[illegible]	[illegible]	--	[illegible]	[illegible]	45	[illegible]	[illegible]	[illegible]	40.09	4,470	43.72	48.15	6,256
1947-61																			
$Y = a + b X + b_1 X_1$	-1178.2571	-16.4651	3.4922	--	[illegible]	[illegible]	[illegible]	--	[illegible]	[illegible]	12	[illegible]	32.[illegible]	3,[illegible]	37.00	4,125	[illegible]	[illegible]	[illegible]
$Y = a + b \log X + b_1 \log X_1$ 9/	-20965.4990	-2660.7089	5971.1191	--	101.[illegible]	2130.6322	2009.[illegible]	--	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	33.1[illegible]	3,700	[illegible]	[illegible]	[illegible]
$\log Y = a + b \log X + b_1 \log X_1$ 9/	-7.9947	-1.5557	3.1401	--	[illegible]	[illegible]	[illegible]	--	[illegible]	[illegible]	12	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Other board consumption is a function of population and industrial production																			
1929-61 7/																			
$Y = a + b X + b_1 X_1$	267.6026	1.1508	19.1362	--	120.[illegible]	[illegible]	[illegible]	--	[illegible]	[illegible]	45	[illegible]	33.[illegible]	[illegible]	35.[illegible]	[illegible]	36.[illegible]	40.[illegible]	5,[illegible]
$Y = a + b \log X + b_1 \log X_1$ 9/	-11396.9780	2121.1021	622.0912	--	115.[illegible]	[illegible]	[illegible]	--	[illegible]	[illegible]	45	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	29.[illegible]	29.[illegible]	3,[illegible]
$\log Y = a + b \log X + b_1 \log X_1$ 9/	2.3163	0.5224	0.6064	--	[illegible]	[illegible]	[illegible]	--	[illegible]	[illegible]	45	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	40.02	5,[illegible]

Table 12.--Statistical measures obtained from regression equations tested for use in projecting demand for other board 1/--Continued

Variables, time period, and mathematical function	Regression coefficients				Standard errors of estimate 2/	Standard errors of b coefficients 3/			Coefficient or index of correlation 4/	Coefficient or index of determination 5/	Degrees of freedom	F or t ratios 6/	Projected Demand							
													1970		1975		1980		1985	
	a	b	b_1	b_2		b	b_1	b_2					Per capita	Total	Per capita	Total	Per capita	Total	Per capita	Total
													Pounds	Thousand tons	Pounds	Thousand tons	Pounds	Thousand tons	Pounds	Thousand tons
1947-61																				
$Y = a + b X + b_1 X_1$	540.7126	0.4140	18.1826	--	113.0106	0.4357	0.9933	--	0.938	0.879	12	0.0	32.25	3,354	34.22	3,819	36.25	4,368	38.55	5,012
$Y = a + b \log X + b_1 \log X_1$ 2/	-6179.7861	304.0726	1441.5348	--	106.129	2759.7854	342.8011	--	0.945	0.893	12	0.1	29.74	3,093	29.97	3,342	29.88	3,600	29.66	3,856
$\log Y = a + b \log X + b_1 \log X_1$ 2/	4.0891	0.0689	0.7190	--	0.0551	0.0139	0.2210	--	0.935	0.874	12	0.02	31.00	3,315	33.43	3,727	34.98	4,205	36.47	4,741
Other board consumption is a function of population, per capita disposable personal income and industrial production																				
1929-61 7/																				
$Y = a + b X + b_1 X_1 + b_2 X_2$	326.1009	1.0072	-0.0317	20.1051	123.1844	5.3054	0.5107	0.4307	0.983	0.966	24	0.0	33.41	3,473	35.75	3,986	38.17	4,600	40.88	5,314
$Y = a + b \log X + b_1 \log X_1$ 2/ $+ b_2 \log X_2$	-1773.8974	2108.7379	-1771.1643	1466.5245	99.4994	413.2461	674.8756	338.7195	0.989	0.978	24	7.2	29.38	3,055	29.29	3,266	29.15	3,513	28.74	3,736
1947-61																				
$Y = a + b X + b_1 X_1 + b_2 X_2$	-859.0152	-17.6143	3.1628	3.3001	132.8069	12.3390	1.0944	10.2031	0.953	0.908	11	0.1	34.26	3,563	36.85	4,109	38.32	4,618	40.77	5,300
$Y = a + b \log X + b_1 \log X_1$ 2/ $+ b_2 \log X_2$	-30335.7640	-2147.5340	4078.7564	661.0656	102.7823	2240.2450	3028.1397	782.0639	0.953	0.909	11	1.0	31.35	3,260	32.12	3,582	32.07	3,865	32.26	4,194
Other board consumption is a function of households, average disposable personal income per household, and industrial production																				
1929-61 7/																				
$Y = a + b X + b_1 X_1 + b_2 X_2$	548.2468	14.8020	-0.1425	21.0139	114.4393	1.9378	0.1240	1.7424	0.985	0.971	24	0.	33.54	3,488	35.78	3,989	38.25	4,609	40.81	5,305
$Y = a + b \log X + b_1 \log X_1$ 2/ $+ b_2 \log X_2$	1570.9495	1609.0870	-1110.9928	933.6203	102.6204	364.3093	592.3319	287.5734	0.9	0.9	24	3.	26.13	2,720	27.30	3,120	27.38	3,299	26.70	3,471
1947-61																				
$Y = a + b X + b_1 X_1 + b_2 X_2$	910.5164	33.5378	-0.2801	16.7725	109.3412	27.3495	0.2694	8.0321	0.9	0.896	11	1.0	31.50	3,262	32.94	3,673	34.70	4,181	36.28	4,717
$Y = a + b \log X + b_1 \log X_1$ 2/ $+ b_2 \log X_2$	-5.1752	1458.0503	-1014.0473	1226.4160	103.6815	1172.2080	1430.1979	670.8381	0.952	0.907	11	0.9	29.30	3,036	29.35	3,272	29.15	3,512	28.67	3,727

1/ Includes asphalting, special paperboard, cardboard, wet machine board and other similar grades of board.
2/ A measure of the closeness with which values of a dependent variable can be estimated from the values of an independent variable(s).
3/ A measure of the closeness with which the true values of the regression coefficients can be estimated from the values in the sample.
4/ A measure of the degree of relationship between the dependent and independent variable(s).
5/ A measure of the percent of the variation in the values of the dependent variable that is associated with variation in values of the independent variable(s).
6/ A measure of the probability that the given values of b might have been obtained by chance from a population in which the true regression coefficient is zero.
7/ Excepting the war years 1942-46.
8/ Expressed in common logarithms.
9/ Expressed in natural logarithms.
10/ Pounds per household.

Table 41 - Statistical measures obtained from regression equations tested for use in projecting demand for paper

Variables, time period, and mathematical function	Regression coefficients			Standard error of estimate	Standard errors of coefficients 2/		Coefficient or index of correlation	Coefficient or index of determination	Degrees of freedom	F or t ratio 2/	Projected Demand							
											1/		1975		1980		1985	
	a	b	b_1		b	b_1					Per capita	Total	Per capita	Total	Per capita	Total	Per capita	Total
											Pounds	Thousand tons	Pounds	Thousand tons	Pounds	Thousand tons	Pounds	Thousand tons
Per capita paper consumption is a function of per capita disposable personal income																		
1929-41 4/																		
Y = a + b X	-8.0931	0.1298	--	5.6143	[illegible]	--	.991	0.981	26	[illegible]	332.79	31,512	332.79	37,106	368.66	43,693	399.54	51,960
Y = a + b log X 3/	-1149.5761	422.3575	--	5.3865	[illegible]	--	.992	0.985	26	[illegible]	279.05	26,920	298.85	33,876	330.26	37,385	367.66	42,598
log Y = a + b log X 3/	-1.1247	1.3666	--	0.0160	.079	--	.991	.983	26	[illegible]	327.25	31,994	338.06	37,648	370.61	44,698	410.61	53,379
1947-61																		
Y = a + b X	52.8036	0.0983	--	8.3[illegible]	[illegible]	--	.814	0.659	1	5.1	293.16	29,469	305.87	34,080	327.62	39,478	355.07	46,159
Y = a + b log X 3/	-1052.9999	392.4253	--	6.3567	[illegible]	--	.855	0.837	13	7.2	279.[illegible]	26,517	290.81	32,425	305.15	36,774	321.11	41,770
log Y = a + b log X 3/	0.1480	1.7684	--	0.0126	.1978	--	.916	.838	13	7.2	281.43	29,269	301.95	33,667	322.03	38,809	346.36	45,029
Per capita paper consumption is a function of per capita gross national product																		
1929-41 4/																		
Y = a + b X	-1.7531	0.0870	--	3.3063	.1028	--	.[illegible]	.970	15	13.[illegible]	298.45	30,672	325.37	36,279	355.92	42,876	391.49	50,894
Y = a + b log X 3/	-1180.6554	390.2869	--	5.5870	11.3643	--	.[illegible]	.971	15	14.[illegible]	270.16	27,757	279.70	31,187	301.77	36,363	317.89	41,326
log Y = a + b log X 3/	-1.1861	1.3365	--	0.0313	.1400	--	.[illegible]	.978	15	25.[illegible]	292.15	30,397	332.72	36,875	362.74	43,710	400.32	52,042
1947-61																		
Y = a + b X	49.6034	0.0873	--	6.6627	.1067	--	.8[illegible]	.822	13	[illegible]	279.10	29,328	302.63	33,745	328.28	39,314	355.80	45,994
Y = a + b log X 3/	-1107.9982	390.3598	--	6.7304	51.[illegible]	--	.902	0.814	13	[illegible]	271.[illegible]	28,191	287.62	32,270	302.68	36,473	318.51	41,445
log Y = a + b log X 3/	-0.2867	0.7666	--	0.0136	.1899	--	.[illegible]	0.822	13	[illegible]	276.[illegible]	28,784	297.99	33,288	318.99	38,438	343.01	44,591
Paper consumption per household is a function of average disposable personal income per household																		
1929-61 4/																		
Y = a + b X	-48.7296	0.1332	--	24.0145	1.3067	--	.[illegible]	0.[illegible]	26	28.[illegible]	1,016.[illegible]	31,777	1,[illegible].[illegible]	37,466	1,203.35	44,221	1,323.23	52,998
Y = a + b log X 3/	-5303.5829	1603.7943	--	22.7622	42.7334	--	.[illegible]	.[illegible]	26	15.[illegible]	796.[illegible]	24,844	1,014.[illegible]	34,241	1,068.85	39,266	1,132.19	45,305
log Y = a + b log X 3/	-1.2736	1.3982	--	0.0157	.0147	--	.[illegible]	.[illegible]	26	89.[illegible]	1,029.[illegible]	32,154	1,129.[illegible]	38,112	1,229.33	45,178	1,359.33	54,033
1947-61																		
Y = a + b X	222.2523	0.0900	--	21.5536	.2139	--	.[illegible]	.[illegible]	13	[illegible]	721.[illegible]	25,552	1,[illegible].99	33,986	1,070.13	39,327	1,151.31	45,765
Y = a + b log X 3/	-4136.1282	1297.0581	--	21.[illegible]	139.[illegible]	--	.[illegible]	.[illegible]	13	[illegible]	926.[illegible]	29,351	973.63	32,960	1,017.21	37,382	1,068.76	42,483
log Y = a + b log X 3/	0.1654	0.7197	--	[illegible]	[illegible]	--	.[illegible]	.[illegible]	13	[illegible]	932.[illegible]	29,533	998.92	33,666	1,054.20	38,738	1,125.67	44,745

Table .3 - Statistical measures obtained from regression equations tested for use in projecting demand for paper - Continued

Variables, time period, and mathematical function	Regression coefficients			Standard errors of estimate [1]	Standard errors of b coefficients [2]		Coefficient or index of correlation [3]	Coefficient or index of determination [4]	Degrees of freedom	F or t ratios [5]	Projected Demand							
											1970		1975		1980		1985	
	a	b	b_1		b	b_1					Per capita	Total	Per capita	Total	Per capita	Total	Per capita	Total
											Pounds	Thousand tons	Pounds	Thousand tons	Pounds	Thousand tons	Pounds	Thousand tons
Paper consumption is a function of population and per capita gross national product																		
1930-61 [6]																		
$Y = a + b X + b_1 X_1$	-14631.9850	126.2647	4.7623	349.3166	[illegible]	[illegible]	0.998	0.995	34	203.1	266.64	27,939	282.96	31,506	298.22	35,453	306.25	39,813
$Y = a + b \log X + b_1 \log X_1$ [8]	-168799.3600	20873.5040	5302.3577	513.9031	1358.2567	731.1237	0.996	0.992	34	123.7	245.99	25,783	249.26	27,752	249.73	30,093	249.29	32,408
$\log Y = a + b \log X + b_1 \log X_1$ [9]	-3.8956	1.4400	0.8111	0.0677	0.1791	0.0283	0.990	0.981	34	66.5	314.27	32,663	349.86	39,309	389.96	46,990	435.98	56,625
1947-61																		
$Y = a + b X + b_1 X_1$	-14187.0800	140.9454	1.6622	587.8806	8.6343	1.5823	0.977	0.954	12	4.1	266.13	27,673	278.69	31,074	289.57	34,863	300.36	39,073
$Y = a + b \log X + b_1 \log X_1$ [8]	-167887.6000	25146.1890	7323.7134	612.6532	5293.3736	4966.3634	0.975	0.951	12	2.1	255.35	26,556	260.30	29,024	268.46	31,627	283.33	36,853
$\log Y = a + b \log X + b_1 \log X_1$ [9]	-0.8072	1.2005	0.9729	0.0317	0.0729	0.0491	0.977	0.955	12	5.1	276.96	28,807	294.82	32,872	315.12	37,969	339.93	41,981
Paper consumption is a function of population and per capita disposable personal income																		
1929-61 [6]																		
$Y = a + b X + b_1 X_1$	-14027.9790	97.4757	9.2134	403.4462	12.5771	1.7119	0.997	0.993	29	53.8	272.93	28,374	286.60	31,996	297.35	35,831	310.08	40,111
$Y = a + b \log X + b_1 \log X_1$ [8]	-160951.6800	21340.7150	4922.6655	436.3756	1792.6542	382.6434	0.997	0.993	29	87.2	254.12	26,428	258.07	28,775	259.08	31,219	259.53	33,739
$\log Y = a + b \log X + b_1 \log X_1$ [9]	-2.7766	0.6556	1.2350	0.0338	0.1254	0.0214	0.997	0.994	29	95.5	295.99	30,791	323.56	36,077	349.81	42,104	382.78	49,761
1947-61																		
$Y = a + b X + b_1 X_1$	-12920.5480	14.9048	10.1783	497.1380	47.2645	7.1101	0.994	0.987	12	2.1	275.12	28,631	298.51	33,271	305.83	36,853	321.08	41,740
$Y = a + b \log X + b_1 \log X_1$ [8]	-201112.3900	34407.5328	29642.7200	590.5328	2359.4550	1093.2705	0.996	0.992	12	3.4	262.01	27,256	269.54	30,056	270.76	32,627	272.87	35,473
$\log Y = a + b \log X + b_1 \log X_1$ [9]	-3.0382	-0.1407	1.8120	0.0270	0.1064	0.0342	0.994	0.987	12	2.1	284.21	29,571	316.16	35,241	336.78	40,582	366.86	47,698
Paper consumption is a function of households and average disposable personal income per household																		
1929-61 [6]																		
$Y = a + b X + b_1 X_1$	-13598.3130	389.9464	2.2055	448.4927	28.0731	2.2642	0.997	0.994	29	64.8	273.04	28,417	286.20	31,911	297.04	35,794	308.61	40,119
$Y = a + b \log X + b_1 \log X_1$ [8]	-138061.7800	17303.0130	9612.0320	525.7793	1338.4522	1144.7153	0.995	0.991	29	46.2	249.14	25,921	251.55	28,046	251.13	30,267	250.02	32,503
$\log Y = a + b \log X + b_1 \log X_1$ [9]	-3.7768	0.9931	1.1355	0.0393	0.0966	0.0273	0.998	0.995	29	96.5	307.38	31,984	338.99	377.97	371.45	44,760	411.58	53,506
1947-61																		
$Y = a + b X + b_1 X_1$	-14918.1880	864.7308	3.3611	522.4411	110.1197	1.1344	0.993	0.986	12	6.4	274.11	28,516	288.73	32,193	299.87	36,134	313.44	40,747
$Y = a + b \log X + b_1 \log X_1$ [8]	-209686.6800	28535.9670	2009A.0850	550.1218	4726.4421	657A.1715	0.990	0.980	12	2.9	251.17	27,153	267.38	29,313	269.24	32,444	271.32	35,272
$\log Y = a + b \log X + b_1 \log X_1$ [9]	-1.6816	0.7795	0.9727	0.0298	0.0943	0.0361	0.992	0.984	12	4.2	291.29	29,25	322.22	33,698	322.22	34,825	346.99	45,109

[1] A measure of the closeness with which values of a dependent variable can be estimated from the values of an independent variable(s).
[2] A measure of the closeness with which the true values of the regression coefficients can be estimated from the values in the sample.
[3] A measure of the degree of relationship between the dependent and independent variable(s).
[4] A measure of the percent of the variation in the values of the dependent variable that is associated with variation in values of the independent variable(s).
[5] A measure of the probability that the given values of b might have been obtained by chance from a population in which the true regression coefficient is zero
[6] Excepting the war years 1942-46.
[7] Expressed in common logarithms.
[8] Expressed in natural logarithms.
[9] Pounds per household.

Table 14 - Statistical measures obtained from regression equations tested for use in projecting demand for board

Variables, time period, and mathematical function	Regression coefficients			Standard errors of estimate 1/	Standard errors of b coefficients 2/		Coefficient or index of correlation 3/	Coefficient or index of determination 4/	Degrees of freedom	F or t ratios 5/	Projected Demand							
											1970		1975		1980		1985	
	a	b	b_1		b	b_1					Per capita	Total	Per capita	Total	Per capita	Total	Per capita	Total
											Pounds	Thousand tons	Pounds	Thousand tons	Pounds	Thousand tons	Pounds	Thousand tons
Per capita board consumption is a function of per capita disposable personal income																		
1929-61 6/																		
Y = a + b X	-80.4401	0.1394	--	8.2152	0.0044	--	0.986	0.975	26	32.0	294.12	26,426	286.18	31,909	318.24	38,348	357.97	46,536
Y = a + b log X 7/	-1895.0706	449.4982	--	10.7940	18.9700	--	0.979	0.958	26	28.2	256.33	23,535	284.20	27,288	260.96	31,397	279.10	36,283
log Y = a + b log X 7/	-3.3749	1.7217	--	0.0393	0.0678	--	0.980	0.961	26	25.4	278.90	28,964	286.00	34,369	276.60	45,380	283.60	57,668
1947-61																		
Y = a + b X	-69.4814	0.1316	--	5.9728	0.0111	--	0.997	0.916	13	11.9	250.42	26,044	280.69	31,897	310.95	37,469	348.46	45,300
Y = a + b log X 7/	-1576.5137	537.1969	--	5.8656	44.5416	--	0.996	0.915	13	12.1	239.32	24,899	260.68	29,066	280.24	33,769	302.40	39,312
log Y = a + b log X 7/	-2.3904	1.4081	--	0.0165	0.1249	--	0.952	0.907	13	11.3	256.50	26,686	291.90	32,547	328.90	39,584	375.90	48,815
Per capita board consumption is a function of per capita gross national product																		
1929-61 6/																		
Y = a + b X	-73.3604	0.0932	--	13.5570	0.0031	--	0.981	0.963	35	30.1	264.47	25,425	277.09	30,996	309.71	37,320	347.92	45,230
Y = a + b log X 7/	-1242.4452	413.0015	--	13.7141	17.5369	--	0.979	0.961	35	23.6	216.59	22,525	234.12	26,104	250.08	30,135	267.14	34,728
log Y = a + b log X 7/	-3.7288	1.7438	--	0.0738	0.3905	--	0.956	0.914	35	19.3	270.15	28,356	320.30	35,713	374.10	45,079	441.60	57,408
1947-61																		
Y = a + b X	-60.3629	0.0916	--	6.7253	0.0086	--	0.985	0.893	13	10.6	244.27	25,404	276.33	30,811	308.39	37,161	345.95	44,974
Y = a + b log X 7/	-1649.4581	531.8961	--	6.9193	32.7587	--	0.982	0.887	13	10.1	233.46	24,280	256.03	28,547	276.98	33,328	298.55	38,812
log Y = a + b log X 7/	-2.5706	1.4097	--	0.0179	0.1364	--	0.984	0.891	13	10.3	248.55	25,849	285.10	31,789	323.15	38,940	369.30	48,009
Board consumption per household is a function of average disposable personal income per household																		
1929-61 6/																		
Y = a + b X	-336.9650	0.1577	--	38.4611	0.0079	--	0.972	0.945	26	21.1	8/ 864.73	27,023	8/ 975.12	32,910	8/ 1,085.51	39,892	8/ 1,227.44	48,791
Y = a + b log X 7/	-6527.3015	1876.5177	--	44.5358	123.8185	--	0.982	0.926	25	18.1	8/ 788.61	24,644	8/ 896.88	28,920	8/ 919.90	33,806	8/ 998.34	39,585
log Y = a + b log X 7/	-4.5998	1.9398	--	0.0863	0.1080	--	0.982	0.925	26	18.0	8/ 941.70	29,428	8/ 1,108.00	37,395	8/ 1,287.30	47,308	8/ 1,537.00	61,096
1947-61																		
Y = a + b X	-421.7270	0.1409	--	21.2648	0.0137	--	0.984	0.968	13	10.3	8/ 842.12	26,318	8/ 940.53	31,743	8/ 1,038.88	38,179	8/ 1,165.33	46,322
Y = a + b log X 7/	-7093 6287	2085.3868	--	20.5984	190.4346	--	0.987	0.897	13	10.6	8/ 815.58	25,487	8/ 889.40	30,017	8/ 957.51	35,156	8/ 1,037.98	41,260
log Y = a + b log X 7/	-2.9864	1.9072	--	0.0168	0.1551	--	0.938	0.879	13	9.7	8/ 863.00	26,988	8/ 980.00	33,075	8/ 1,101.28	40,472	8/ 1,264.25	50,254

Table 14.--Statistical measures obtained from regression equations tested for use in projecting demand for board--Continued

Variables, time period, and mathematical function	Regression coefficients			Standard errors of estimate 1/	Standard errors of b coefficients 2/		Coefficient or index of correlation 3/	Coefficient or index of determination 4/	Degrees of freedom	F or t ratios 5/	Projected Demand							
											1970		1975		1980		1985	
	a	b	b_1		b	b_1					Per capita	Total	Per capita	Total	Per capita	Total	Per capita	Total
											Pounds	Thousand tons	Pounds	Thousand tons	Pounds	Thousand tons	Pounds	Thousand tons
Board consumption is a function of population and per capita gross national product																		
1929-61 6/																		
$Y = a + b X + b_1 X_1$	-18979.6090	141.7584	3.6192	491.7057	10.0138	0.3944	0.997	0.993	30	86.7	283.54	23,248	298.95	26,641	352.77	30,459	366.43	34,636
$Y = a + b \log X + b_1 \log X_1$ 8/	-139512.9100	20016.8430	6488.3143	833.4506	2205.6794	1185.4604	0.988	0.97	30	30.9	195.86	20,307	200.30	22,338	203.04	24,466	204.63	26,602
$\log Y = a + b \log X + b_1 \log X_1$ 8/	-11.8906	2.7965	0.8636	0.1206	0.3191	0.1714	0.986	0.971	30	35.1	331.23	34,448	407.30	45,414	504.12	60,747	649.25	81,283
1947-61																		
$Y = a + b X + b_1 X_1$	-19487.4900	136.9037	4.8815	547.4133	28.3942	1.7617	0.981	0.962	12	6.4	286.81	23,988	343.41	27,140	398.12	31,103	372.77	35,460
$Y = a + b \log X + b_1 \log X_1$ 8/	-174370.3300	11986.3770	16480.7800	1071.7219	9190.4082	8722.2143	0.909	0.826	12	1.7	202.38	21,047	210.39	23,458	214.27	25,819	217.38	28,299
$\log Y = a + b \log X + b_1 \log X_1$ 8/	-5.8134	1.3989	1.0454	0.0847	0.3833	0.3639	0.977	0.954	12	8.9	247.32	25,721	281.61	31,400	318.83	38,419	362.93	47,181
Board consumption is a function of population and per capita disposable personal income																		
1929-61 6/																		
$Y = a + b X + b_1 X_1$	-19693.1860	137.5578	6.2652	473.3150	15.1089	0.8586	0.996	0.992	29	55.4	230.34	23,955	246.27	27,499	280.38	31,376	273.20	35,776
$Y = a + b \log X + b_1 \log X_1$ 8/	-151905.4000	21547.7770	7408.6993	846.9582	1341.1428	1501.7617	0.986	0.972	29	17.6	203.56	21,170	209.41	23,389	212.80	25,642	215.24	27,981
$\log Y = a + b \log X + b_1 \log X_1$ 8/	-9.0487	1.5053	1.4963	0.0915	0.3680	0.1952	0.986	0.977	29	18.0	291.85	30,352	349.40	38,512	405.85	48,905	484.26	62,996
1947-61																		
$Y = a + b X + b_1 X_1$	-18140.1830	10.7850	16.7930	468.9209	54.6306	4.3194	0.986	0.972	12	0.04	234.67	24,406	254.98	28,430	269.60	32,487	288.89	37,478
$Y = a + b \log X + b_1 \log X_1$ 8/	-298008.6600	-36416.2360	61069.1370	833.7137	17905.3700	14909.9850	0.946	0.895	12	4.7	220.51	22,933	233.06	25,986	254.68	28,879	260.90	31,317
$\log Y = a + b \log X + b_1 \log X_1$ 8/	-9.1521	-0.6922	2.9660	0.0398	0.8138	0.7675	0.982	0.965	12	0.8	268.78	27,993	313.39	34,943	358.38	42,462	410.81	53,405
Board consumption is a function of households and average disposable personal income per household																		
1929-61 6/																		
$Y = a + b X + b_1 X_1$	-19988.1540	465.5152	1.3180	489.9683	35.7929	0.2944	0.996	0.991	29	20.8	227.41	23,651	241.26	26,901	254.07	30,616	266.12	34,996
$Y = a + b \log X + b_1 \log X_1$ 8/	-109036.1700	18285.1710	6035.5480	563.5417	2197.6843	2372.7643	0.985	0.971	29	6.7	197.80	20,571	201.61	22,479	203.31	24,499	203.70	26,481
$\log Y = a + b \log X + b_1 \log X_1$ 8/	-6.7202	1.9112	1.0187	0.0840	0.2141	0.2325	0.990	0.980	29	20.0	289.34	30,891	349.53	38,973	411.83	49,625	486.63	63,262
1947-61																		
$Y = a + b X + b_1 X_1$	-21480.4250	201.0374	4.1844	476.9604	100.5149	1.0401	0.966	0.933	12	4.3	236.15	24,960	255.55	28,494	270.78	32,629	289.24	37,601
$Y = a + b \log X + b_1 \log X_1$ 8/	-221246.6600	6024.7263	24248.1720	1041.9039	9298.3140	9297.5692	0.907	0.823	12	0.5	207.60	21,590	216.03	24,087	219.73	26,477	223.36	29,167
$\log Y = a + b \log X + b_1 \log X_1$ 8/	-7.8553	0.8953	1.5982	0.0429	0.3695	0.3127	0.979	0.958	12	6.4	256.59	26,681	293.07	32,677	331.39	39,932	381.04	49,535

1/ A measure of the closeness with which values of a dependent variable can be estimated from the values of an independent variable(s).
2/ A measure of the closeness with which the true values of the regression coefficients can be estimated from the values in the sample.
3/ A measure of the degree of relationship between the dependent and independent variable(s).
4/ A measure of the percent of the variation in the values of the dependent variable that is associated with variation in values of the independent variable(s).
5/ A measure of the probability that the given values of b might have been obtained by chance from a population in which the true regression coefficient is zero.
6/ Excepting the war years 1942-46.
7/ Expressed in common logarithms.
8/ Expressed in natural logarithms.
9/ Pounds per household.

Table 13.--Statistical measures obtained from regression equations tested for use in projecting demand for paper and board

Variables, time period, and mathematical function	Regression coefficients a	Regression coefficients b	Standard errors of estimate 1/	Standard errors of b coefficients 2/ b	Coefficient or index of correlation 3/	Coefficient or index of determination 4/	Degrees of freedom	F or t ratios 5/	Projected Demand 1970 Per capita	1970 Total	1975 Per capita	1975 Total	1980 Per capita	1980 Total	1985 Per capita	1985 Total
									Pounds	Thousand tons	Pounds	Thousand tons	Pounds	Thousand tons	Pounds	Thousand tons
Per capita paper and board consumption is a function of per capita disposable personal income																
1929-61 6/																
Y = a + b X	-98.4802	0.2690	12.7790	0.0068	0.992	0.984	26	39.7	557.11	57,939	618.98	69,016	680.85	82,042	757.52	96,473
Y = a + b log X 7/	-2642.6243	871.8493	15.4914	26.7508	0.988	0.976	26	32.6	504.41	52,459	539.07	60,106	570.81	68,783	606.77	79,380
log Y = a + b log X 7/	-1.7101	1.3233	0.0214	0.0370	0.990	0.980	26	35.8	579.30	55,515	653.90	72,910	730.60	88,037	828.60	107,715
1947-61																
Y = a + b X	-13.1603	0.2279	11.5336	0.0214	0.987	0.897	13	10.6	533.80	55,515	586.22	65,364	638.63	76,955	703.59	91,467
Y = a + b log X 7/	-2629.0819	929.9925	11.4170	50.4024	0.98.	0.899	13	1..	514.49	53,507	551.46	61,488	585.32	70,531	623.68	81,079
log Y = a + b log X 7/	-0.7909	1.0413	0.0131	0.0990	0.986	0.895	13	10.5	535.7.	55,713	589.30	65,707	643.00	77,482	709.90	92,287
Per capita paper and board consumption is a function of per capita gross national product																
1920-61 6/																
Y = a + b X	-75.0938	0.1803	15.2591	0.0052	0.986	0.972	35	34.6	539.73	56,132	602.83	67,216	665.94	80,246	739.86	96,182
Y = a + b log X 7/	-2351.1148	803.2953	21.5121	27.5088	0.980	0.961	35	29.2	486.73	50,620	520.92	58,071	551.27	66,500	585.04	76,055
log Y = a + b log X 7/	-1.0486	1.3214	0.0425	0.0543	0.991	0.983	35	24.0	960.90	98,334	637.10	71,037	715.40	86,206	809.50	105,235
1947-61																
Y = a + b X	-18.4698	0.1509	18.5634	0.0164	0.937	0.878	13	9.7	523.33	54,432	577.94	64,557	634.61	76,471	699.76	90,969
Y = a + b log X 7/	-2753.3678	922.1903	12.9034	38.3748	0.933	0.871	13	9.4	504.50	52,468	543.64	60,616	579.28	69,803	617.37	80,253
log Y = a + b log X 7/	-0.9511	1.0387	0.0141	0.1077	0.937	0.877	13	9.6	522.90	54,382	578.79	64,525	634.80	76,493	700.70	91,091
Paper and board consumption per household is a function of average disposable personal income per household																
1929-61 6/																
Y = a + b X	-442.8652	0.2904	55.0872	0.0107	0.983	0.966	26	27.2	8/ 1,980.33	58,766	8/ 2,083.61	70,322	9/ 2,286.89	84,343	9/ 2,548.25	101,303
Y = a + b log X 7/	-11812.3600	3473.2656	60.9614	142.1..	0.979	0.958	26	24.4	8/ 1,744.11	54,503	9/ 1,870.64	63,134	8/ 1,987.36	73,036	8/ 2,125.30	84,481
log Y = a + b log X 7/	-2.2741	1.4255	0.0240	0.0555	0.981	0.962	26	25.5	8/ 1,949.00	60,906	8/ 2,196.50	74,132	9/ 2,452.50	90,129	8/ 2,794.00	111,062
1947-61																
Y = a + b X	-43.0666	0.2281	40.4009	0.0280	0.925	0.855	13	8.8	8/ 1,751.73	55,679	9/ 1,941.40	65,522	8/ 2,101.27	77,214	9/ 2,306.36	91,678
Y = a + b log X 7/	-11087.7790	3266.3405	39.7223	367.3000	0.928	0.860	13	8.9	8/ 1,737.93	54,310	8/ 1,857.64	62,695	9/ 1,968.09	72,327	8/ 2,098.53	83,419
log Y = a + b log X 7/	-0.8220	1.0441	0.0131	0.1212	0.922	0.851	13	.0	9/ 1,72. .00	55,775	9/ 1,961.00	66,104	9/ 2,116.00	77,763	8/ 2,328.00	92,53.

1/ A measure of the closeness with which values of a dependent variable can be estimated from the values of an independent variable(s).
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3/ A measure of the degree of relationship between the dependent and independent variable(s).
4/ A measure of the percent of the variation in the values of the dependent variable that is associated with variation in values of the independent variable(s).
5/ A measure of the probability that the given values of b might have been obtained by chance from a population in which the true regression coefficient is zero.
6/ Excepting the war years 1942-46.
7/ Expressed in common logarithms.
8/ Pounds per household.
9/ Pounds per household.

Table 16.--Measures of population and economic growth, 1920-85

Year	Population	Households	Gross national product (1961 prices)		Disposable personal income (1961 prices)		Index of industrial production	Construction expenditures (1961 prices)	Number of housing starts
			Total	Per capita	Total	Per capita			
	Millions	Millions	Billion dollars	Dollars	Billion dollars	Dollars	(1957-59=100)	Billion dollars	Thousands
1920	106.5	24.5	142.8	1,340	--	--	26.2	19.1	--
1925	115.8	27.5	179.5	1,550	--	--	31.5	39.8	--
1930	123.1	30.0	191.7	1,560	144.4	1,170	32.0	34.3	--
1935	127.3	31.9	177.4	1,390	136.9	1,080	30.7	22.4	--
1940	132.1	34.9	237.6	1,800	172.8	1,310	43.9	34.5	--
1945	139.9	37.5	371.7	2,660	238.7	1,710	70.5	23.8	--
1950	152.3	43.6	371.6	2,440	259.4	1,700	74.9	61.8	1,726
1955	165.9	47.9	458.1	2,760	308.3	1,860	96.6	72.4	1,643
1960	180.7	52.8	510.2	2,820	353.4	1,960	108.7	73.9	1,296
1961	183.8	53.5	520.1	2,830	364.4	1,980	109.8	75.2	1,365
1962	186.7	54.7	554.3	2,970	381.9	2,050	118.3	78.3	1,492
1963	189.4	55.2	575.3	3,040	395.4	2,090	124.3	79.9	1,641
1964 [1]	192.1	56.0	604.1	3,140	422.4	2,200	132.0	82.4	1,591
PROJECTIONS									
1970	208	62.5	710	3,410	500	2,400	150	98	1,630
1975	223	67.5	840	3,770	590	2,650	175	110	1,770
1980	241	73.5	990	4,110	690	2,860	205	125	1,920
1985	260	79.5	1,175	4,520	820	3,150	240	140	2,080

[1] Preliminary.

Sources: Population, U.S. Department of Commerce, Bureau of the Census, Current Population Reports: Population Estimates, No. 302 (1965).

Households, U.S. Department of Commerce, Bureau of the Census, Historical Statistics of the United States, Colonial Times to 1957 (Washington: U.S. Government Printing Office, 1960) and Current Population Reports: Population Characteristics, No. 140 (1965).

Gross national product, derived from data published by the U.S. Congress, Joint Committee on the Economic Report, Potential Economic Growth of the United States During the Next Decade, 83d Cong., 2d Sess., 1954 and the U.S. Department of Commerce, Office of Business Economics, op. cit., Vol. 45, No. 8 (1965).

Disposable personal income, derived from data published by the U.S. Department of Commerce, Office of Business Economics, ibid.

Index of industrial production, Board of Governors of the Federal Reserve System, Industrial Production 1957-59 Base, and the Council of Economic Advisors, Economic Indicators (Monthly).

Value of new construction, derived from data published by the U.S. Departments of Labor and Commerce, Construction Volume and Costs 1915-1956: Construction Review (Washington: U.S. Government Printing Office, 1958) and the U.S. Department of Commerce, Bureau of the Census, Construction Reports: Construction Activity, C30 (Monthly).

Housing starts, U.S. Department of Commerce, Bureau of the Census, Construction Reports: Housing Starts, C20 (Monthly), and U.S. Department of Agriculture, Forest Service.

Projections, U.S. Department of Agriculture, Forest Service.

APPENDIX C

BASIC STATISTICS ON PRICES, POPULATION, AND ECONOMIC ACTIVITY

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Table 1.--Wholesale price indexes of paper in the United States, 1926-64

(1957-59 - 100)

Year	All paper		All paper except newsprint		Newsprint		Printing paper		Book paper[1]		Writing paper	
	Actual	Relative[2]	Actual	Relative[2]	Actual	Relative[2]	Actual	Relative[2]	Actual	Relative[2]	Actual	Relative[2]
1926	49.5	90.3	--	--	54.0	98.5	--	--	--	--	--	--
1927	45.2	86.4	--	--	54.0	103.3	--	--	--	--	--	--
1928	44.8	84.5	--	--	50.9	96.0	--	--	--	--	--	--
1929	44.0	84.5	--	--	46.7	89.6	--	--	--	--	--	--
1930	43.9	92.8	--	--	46.7	98.7	--	--	--	--	--	--
1931	42.5	106.5	--	--	42.9	107.5	--	--	--	--	--	--
1932	39.8	111.8	--	--	38.2	107.3	--	--	--	--	--	--
1933	37.9	105.0	--	--	31.1	86.1	--	--	--	--	--	--
1934	39.6	96.6	--	--	30.1	73.4	--	--	--	--	--	--
1935	39.8	90.9	--	--	30.1	68.7	--	--	--	--	--	--
1936	40.0	90.5	--	--	30.9	69.9	--	--	--	--	--	--
1937	42.5	90.0	--	--	32.0	67.8	--	--	--	--	--	--
1938	43.3	100.7	--	--	37.6	87.4	--	--	--	--	--	--
1939	42.3	100.2	--	--	37.6	89.1	--	--	--	--	--	--
1940	44.3	103.0	--	--	37.6	87.4	--	--	--	--	--	--
1941	46.5	97.3	--	--	37.6	78.7	--	--	--	--	--	--
1942	47.7	88.3	--	--	37.6	69.6	--	--	--	--	--	--
1943	49.0	86.7	--	--	41.1	72.7	--	--	--	--	--	--
1944	50.0	87.9	--	--	43.7	76.8	--	--	--	--	--	--
1945	50.5	87.2	--	--	45.4	78.4	--	--	--	--	--	--
1946	55.2	83.5	--	--	54.3	82.1	--	--	--	--	--	--
1947	65.5	80.7	65.3	80.4	65.9	81.2	73.9	91.0	63.3	78.0	68.4	84.2
1948	72.1	82.0	71.9	81.8	72.7	82.7	77.6	88.3	67.7	77.0	72.5	82.5
1949	72.9	87.3	72.0	86.2	75.2	90.1	78.2	93.7	70.7	84.7	71.9	86.1
1950	74.7	86.1	74.3	85.6	75.7	87.2	78.6	90.6	73.0	84.1	78.4	90.3
1951	83.6	86.5	83.9	86.8	82.3	85.1	84.7	87.6	80.6	83.4	88.7	91.7
1952	87.0	92.6	86.0	91.5	89.6	95.3	89.6	95.3	84.6	90.0	90.1	95.5
1953	88.1	95.0	86.2	93.0	93.5	100.9	89.6	96.7	85.6	92.3	90.1	97.2
1954	88.9	95.7	87.1	93.8	93.6	100.8	89.6	96.4	86.3	92.9	87.6	94.3
1955	91.1	97.7	90.1	96.7	93.8	100.6	91.0	97.6	89.5	96.0	92.7	99.5
1956	96.4	100.2	96.2	100.0	96.9	100.7	93.8	97.5	95.4	99.2	96.0	99.8
1957	99.6	100.6	99.6	100.6	99.6	100.6	98.4	99.4	98.4	99.4	99.0	100.0
1958	99.8	99.4	99.7	99.3	100.2	99.8	100.0	99.6	99.7	99.3	100.4	100.0
1959	100.6	100.0	100.7	100.1	100.2	99.6	101.6	101.0	101.9	101.3	100.6	100.0
1960	102.0	101.3	102.7	102.0	100.2	99.5	102.6	101.9	105.5	104.8	101.7	101.0
1961	102.2	101.9	102.9	102.6	100.2	99.9	101.4	101.1	106.1	105.8	101.8	101.5
1962	102.6	102.0	103.4	102.8	100.2	99.6	101.4	100.8	107.6	107.0	103.0	102.4
1963	102.4	102.1	103.2	102.9	100.2	99.9	101.4	101.1	107.4	107.1	104.2	103.9
1964	103.6	103.1	104.9	104.4	100.1	99.6	101.4	100.9	109.4	108.9	106.3	105.8

[1] Book paper, A grade.
[2] Obtained by dividing the actual price index by the all commodity wholesale price index.

Source: U.S. Department of Labor, Bureau of Labor Statistics, Wholesale Prices and Price Indexes, (Monthly).

Table 2.--Wholesale price indexes of board in the United States, 1926-64

(1957-59 = 100)

Year	All board		Container board		Folding boxboard		Building paper and board	
	Actual	Relative[1]	Actual	Relative[1]	Actual	Relative[1]	Actual	Relative[1]
1926	36.9	67.3	--	--	--	--	--	--
1927	38.8	74.2	--	--	--	--	--	--
1928	35.8	67.5	--	--	--	--	--	--
1929	32.7	62.8	--	--	--	--	--	--
1930	27.4	57.9	--	--	--	--	--	--
1931	23.2	58.1	--	--	--	--	--	--
1932	23.1	64.9	--	--	--	--	--	--
1933	30.3	83.9	--	--	--	--	--	--
1934	34.8	84.9	--	--	--	--	--	--
1935	30.4	69.4	--	--	--	--	--	--
1936	30.5	69.0	--	--	--	--	--	--
1937	35.9	76.1	--	--	--	--	--	--
1938	30.4	70.7	--	--	--	--	--	--
1939	31.3	74.2	--	--	--	--	--	--
1940	35.7	83.0	--	--	--	--	--	--
1941	40.1	83.9	--	--	--	--	--	--
1942	41.2	76.3	--	--	--	--	--	--
1943	44.5	78.8	--	--	--	--	--	--
1944	45.5	80.0	--	--	--	--	--	--
1945	47.4	81.9	--	--	--	--	--	--
1946	52.1	78.8	--	--	--	--	--	--
1947	72.9	89.8	79.5	97.9	61.9	76.2	64.7	79.7
1948	74.9	85.2	80.1	91.1	65.4	74.4	71.6	81.5
1949	72.6	86.9	80.4	96.3	63.2	75.7	72.5	86.8
1950	77.1	88.8	82.2	94.7	69.6	80.2	74.9	86.3
1951	96.8	100.1	94.3	97.5	95.2	98.4	78.9	81.6
1952	93.6	99.6	92.5	98.4	91.9	97.8	80.3	85.4
1953	91.3	98.5	93.7	101.1	88.9	95.9	84.5	91.2
1954	91.4	98.4	95.9	103.2	87.8	94.5	88.9	95.7
1955	93.3	100.1	95.9	102.9	91.5	98.2	91.1	97.7
1956	99.0	102.9	98.9	102.8	98.4	102.3	95.3	99.1
1957	100.1	101.1	100.0	101.0	99.9	100.9	98.5	99.5
1958	100.0	99.6	100.0	99.6	100.1	99.7	99.7	99.3
1959	99.9	99.3	100.0	99.4	100.0	99.4	101.8	101.2
1960	99.4	98.7	99.6	98.9	99.3	98.6	101.4	100.7
1961	92.5	92.2	91.2	90.9	93.9	93.6	100.8	100.5
1962	93.1	92.5	92.4	91.8	93.6	93.0	97.2	96.6
1963	94.7	94.4	94.6	94.3	94.0	93.7	96.2	95.9
1964	96.4	95.9	97.5	97.0	93.6	93.1	94.2	93.7

[1] Obtained by dividing the actual price index by the all commodity wholesale price index.

Source: See source note table one

Table 3.--Wholesale price indexes of wood pulp in the United States, 1926-64

(1957-59 = 100)

Year	Wood pulp		Bleached sulfite		Unbleached sulfate		Groundwood		Bleached soda	
	Actual	Relative[1]	Actual	Relative[1]	Actual	Relative[1]	Actual	Relative[1]	Actual	Relative[1]
1926	37.5	68.4	--	--	--	--	--	--	--	--
1927	34.7	66.3	--	--	--	--	--	--	--	--
1928	33.3	62.8	--	--	--	--	--	--	--	--
1929	33.2	63.7	--	--	--	--	--	--	--	--
1930	32.4	68.5	--	--	--	--	--	--	--	--
1931	30.1	75.4	--	--	--	--	--	--	--	--
1932	24.1	67.7	--	--	--	--	--	--	--	--
1933	24.5	67.9	--	--	--	--	--	--	--	--
1934	29.4	71.7	--	--	--	--	--	--	--	--
1935	27.1	61.9	--	--	--	--	--	--	--	--
1936	28.2	63.8	--	--	--	--	--	--	--	--
1937	43.7	92.6	--	--	--	--	--	--	--	--
1938	32.1	74.7	--	--	--	--	--	--	--	--
1939	27.6	65.4	--	--	--	--	--	--	--	--
1940	42.1	97.9	--	--	--	--	--	--	--	--
1941	46.5	97.3	--	--	--	--	--	--	--	--
1942	48.3	89.4	--	--	--	--	--	--	--	--
1943	48.3	85.5	--	--	--	--	--	--	--	--
1944	52.2	91.7	--	--	--	--	--	--	--	--
1945	52.7	91.0	--	--	--	--	--	--	--	--
1946	58.3	88.2	--	--	--	--	--	--	--	--
1947	79.4	97.8	79.0	97.3	80.9	99.6	91.2	112.3	79.9	98.4
1948	89.1	101.4	84.8	96.5	92.7	105.5	95.6	108.8	88.5	100.7
1949	80.6	96.5	80.4	96.3	73.5	88.0	82.0	98.2	81.6	97.7
1950	79.4	91.5	79.8	91.9	72.9	84.0	80.3	92.5	80.5	92.7
1951	95.0	98.2	91.1	94.2	99.4	102.8	109.5	113.2	94.1	97.3
1952	92.6	98.5	91.1	96.9	90.6	96.4	105.9	112.7	94.1	100.1
1953	90.6	97.7	91.1	98.3	80.2	86.5	98.6	106.4	94.1	101.5
1954	91.1	98.1	91.1	98.1	84.3	90.7	94.3	101.5	94.1	101.3
1955	93.8	100.6	93.6	100.4	94.5	101.4	91.4	98.1	95.3	102.3
1956	97.8	101.7	97.6	101.5	99.2	103.1	100.0	104.0	97.5	101.4
1957	98.7	99.7	98.4	99.4	100.0	101.0	100.0	101.0	98.3	99.3
1958	100.7	100.3	100.8	100.4	100.0	99.6	100.0	99.6	100.8	100.4
1959	100.7	100.1	100.8	100.2	100.0	99.4	100.0	99.4	100.8	100.2
1960	100.2	99.5	100.0	99.3	100.0	99.3	100.0	99.3	100.1	99.4
1961	95.0	94.7	91.0	90.7	100.0	99.7	100.0	99.7	89.9	89.6
1962	93.2	92.6	90.2	89.7	98.8	98.2	100.0	99.4	87.7	87.2
1963	91.7	91.4	88.2	87.9	98.1	97.8	100.0	99.7	82.5	82.3
1964	96.1	95.6	92.8	92.3	102.9	102.4	100.0	99.5	36.1	85.7

[1] Obtained by dividing the actual price index by the all commodity wholesale price index.

Source: See source note table one.

Table 4.--Pulpwood prices in the United States, by selected species, 1940-64

(Dollars per standard cord, including bark)

Year	Wisconsin				Southeast				Midsouth					
	Roundwood												Plant byproducts	
	Spruce		Aspen		Southern pine		Hardwoods		Southern pine		Hardwoods		Southern pine	
	Current dollars	1957-59 dollars	Current dollars	1957-59 dollars	Current dollars	1957-59 dollars	Current dollars	1957-59 dollars	Current dollars	1957-59 dollars	Current dollars	1957-59 dollars	Current dollars	1957-59 dollars
1940	9.00	20.95	4.25	9.90	4.20	9.75	--	--	4.00	9.30	--	--	--	--
1941	10.50	21.95	4.75	9.95	4.60	9.60	--	--	4.90	10.25	--	--	--	--
1942	12.25	22.70	6.90	12.80	6.00	11.10	--	--	6.10	11.30	--	--	--	--
1943	14.75	26.10	8.75	15.50	7.20	12.75	--	--	7.40	13.10	--	--	--	--
1944	15.00	26.35	9.00	15.80	8.20	14.40	--	--	8.55	15.05	--	--	--	--
1945	15.00	25.90	9.60	16.60	8.40	14.50	--	--	9.00	15.55	--	--	--	--
1946	16.50	24.95	10.00	15.15	10.10	15.30	--	--	10.05	15.20	--	--	--	--
1947	23.75	29.25	11.50	14.15	11.00	13.55	--	--	11.20	13.80	10.15	12.50	--	--
1948	22.25	25.30	12.00	13.65	11.70	13.30	--	--	11.90	13.55	10.05	11.45	--	--
1949	18.50	22.15	9.25	11.10	11.00	13.15	--	--	11.55	13.85	9.35	11.20	--	--
1950	19.50	22.45	9.50	10.95	11.90	13.70	--	--	12.15	14.00	10.65	12.25	--	--
1951	22.50	23.25	10.50	10.85	13.80	14.25	--	--	14.25	14.75	13.00	13.45	--	--
1952	25.00	26.60	12.25	13.05	13.90	14.80	--	--	14.30	15.20	12.90	13.70	--	--
1953	23.25	25.10	12.00	12.95	13.90	15.00	--	--	14.25	15.35	12.80	13.80	--	--
1954	24.25	26.10	12.50	13.45	14.00	15.05	--	--	14.30	15.40	12.85	13.85	--	--
1955	24.75	26.55	11.50	12.35	14.40	15.45	--	--	14.60	15.65	12.90	13.85	--	--
1956	26.00	27.05	12.25	12.75	15.40	16.00	--	--	15.65	16.25	13.50	14.05	--	--
1957	26.00	26.25	11.75	11.85	15.50	15.65	13.35	13.50	15.30	15.45	13.35	13.50	14.25	14.40
1958	26.25	26.15	12.00	11.95	15.50	15.45	13.45	13.40	15.30	15.25	13.10	13.05	14.30	14.25
1959	26.25	26.10	11.50	11.45	16.00	15.90	13.70	13.60	15.70	15.60	13.10	13.00	14.30	14.20
1960	26.75	26.55	12.00	11.90	16.45	16.35	13.60	13.50	16.05	15.95	13.10	13.00	14.40	14.30
1961	27.25	27.15	13.00	12.95	16.55	16.50	13.50	13.45	15.85	15.80	13.05	13.00	14.50	14.45
1962	27.25	27.10	12.75	12.65	16.55	16.45	13.40	13.30	15.80	15.70	13.20	13.10	14.60	14.50
1963 1/	25.75	25.65	13.75	13.70	16.55	16.50	13.45	13.40	15.75	15.70	13.10	13.05	14.40	14.35
1964 1/	--	--	--	--	17.00	16.90	13.60	13.55	15.90	15.80	13.15	13.10	14.30	14.25

1/ Preliminary

Sources: Current dollars, University of Wisconsin, Extension Service College of Agriculture, Wisconsin Forest Products Price Review, U. S. Department of Agriculture, U. S. Forest Service Research Note: Pulpwood Price Trends in the Midsouth (Annual) and U. S. Forest Service Research Note: Pulpwood Prices in the Southeast (Annual). 1957-59 dollars derived by dividing the price in current dollars by the Wholesale Price Index (1957-59=100) of all commodities published by the U. S. Department of Labor, Bureau of Labor Statistics, op. cit.

Table 5.--Measures of population and economic growth, 1920-64

Year	Population	Households	Gross national product (1961 prices)		Disposable personal income (1961 prices)		Index of industrial production	Construction expenditures (1961 prices)	Number of housing starts
			Total	Per capita	Total	Per capita			
	Millions	Millions	Billion dollars	Dollars	Billion dollars	Dollars	(1957-59=100)	Billion dollars	Thousands
1920	106.5	24.5	142.8	1,340	--	--	26.2	19.1	--
1921	108.5	25.1	129.4	1,190	--	--	20.1	22.6	--
1922	110.1	25.7	148.1	1,350	--	--	25.6	30.1	--
1923	112.0	26.3	166.2	1,480	--	--	30.5	32.0	--
1924	114.1	26.9	165.7	1,450	--	--	28.6	35.8	--
1925	115.8	27.5	179.5	1,550	--	--	31.5	39.8	--
1926	117.4	28.1	189.3	1,610	--	--	33.4	42.1	--
1927	119.0	28.6	189.8	1,590	--	--	33.3	42.7	--
1928	120.5	29.1	192.7	1,600	--	--	34.6	41.9	--
1929	121.8	29.6	212.9	1,750	156.4	1,280	38.4	39.1	--
1930	123.1	30.0	191.7	1,560	144.4	1,170	32.0	34.3	--
1931	124.0	30.3	177.0	1,430	138.9	1,120	26.5	29.0	--
1932	124.8	30.4	150.7	1,210	119.6	960	20.7	21.6	--
1933	125.6	30.8	148.0	1,180	116.5	930	24.4	17.4	--
1934	126.4	31.3	161.4	1,280	125.1	990	26.6	19.7	--
1935	127.3	31.9	177.4	1,390	136.9	1,080	30.7	22.4	--
1936	128.1	32.5	201.9	1,580	154.2	1,200	36.3	30.5	--
1937	128.8	33.1	212.6	1,650	159.1	1,240	39.7	29.7	--
1938	129.8	33.7	201.9	1,560	149.2	1,150	31.4	29.7	--
1939	130.9	34.4	219.0	1,670	162.0	1,240	38.3	33.6	--
1940	132.1	34.9	237.6	1,800	172.8	1,310	43.9	34.5	--
1941	133.4	35.9	275.8	2,070	197.7	1,480	56.4	42.0	--
1942	134.9	36.4	311.5	2,310	221.7	1,640	69.3	43.0	--
1943	136.7	36.8	352.7	2,580	231.5	1,690	82.9	28.0	--
1944	138.4	37.1	377.9	2,730	240.6	1,740	81.7	21.7	--
1945	139.9	37.5	371.7	2,660	238.7	1,710	70.5	23.8	--
1946	141.4	38.4	327.0	2,310	235.8	1,670	59.5	41.9	--
1947	144.1	39.1	324.1	2,250	226.5	1,570	65.7	46.9	--
1948	146.6	40.5	338.6	2,310	238.8	1,630	68.4	52.6	1,265
1949	149.2	42.2	339.0	2,270	239.8	1,610	64.7	55.3	1,415
1950	152.3	43.6	371.6	2,440	259.4	1,700	74.9	61.8	1,726
1951	154.9	44.7	401.0	2,590	265.7	1,720	81.3	61.2	1,352
1952	157.6	45.5	413.2	2,620	273.6	1,740	84.3	62.0	1,392
1953	160.2	46.3	431.8	2,700	286.2	1,790	91.3	63.9	1,372
1954	163.0	46.9	425.7	2,610	289.2	1,770	85.8	66.8	1,507
1955	165.9	47.9	458.1	2,760	308.3	1,860	96.6	72.4	1,643
1956	168.9	48.9	466.6	2,760	321.3	1,900	99.9	71.0	1,405
1957	172.0	49.7	473.3	2,750	328.1	1,910	100.7	71.1	1,240
1958	174.9	50.5	467.8	2,670	331.2	1,890	93.7	70.9	1,380
1959	177.8	51.4	497.8	2,800	346.0	1,950	105.6	76.1	1,554
1960	180.7	52.8	510.2	2,820	353.4	1,960	108.7	73.9	1,296
1961	183.8	53.5	520.1	2,830	364.4	1,980	109.8	75.2	1,365
1962	186.7	54.7	554.3	2,970	381.9	2,050	118.3	78.3	1,492
1963	189.4	55.2	575.3	3,040	395.4	2,090	124.3	79.9	1,641
1964 1/	192.1	56.0	604.1	3,140	422.4	2,200	132.0	82.4	1,591

1/ Preliminary.

Sources: Population, U.S. Department of Commerce, Bureau of the Census, Current Population Reports: Population Estimates, Series P-25, No. 311 (1965).

Households, U.S. Department of Commerce, Bureau of the Census, Historical Statistics of the United States, Colonial Times to 1957 (Washington: U.S. Government Printing Office, 1960) and Current Population Reports: Population Characteristics, Series P-20, No. 140 (1965).

Gross national product, derived from data published by the U.S. Congress, Joint Committee on the Economic Report, Potential Economic Growth of the United States During the Next Decade, 89th Cong., 2d Sess., 1964 and the U.S. Department of Commerce, Office of Business Economics, Survey of Current Business, Vol. 45, No. 8 (1965).

Disposable personal income, derived from data published by the U.S. Department of Commerce, Office of Business Economics, ibid.

Index of industrial production, Board of Governors of the Federal Reserve System, Industrial Production 1957-59 Base, and the Council of Economic Advisors, Economic Indicators (Monthly).

Value of new construction, derived from data published by the U.S. Departments of Labor and Commerce, Construction Volume and Costs 1915-1956: Construction Review (Washington: U.S. Government Printing Office, 1959) and the U.S. Department of Commerce, Bureau of the Census, Construction Reports: Construction Activity, C30 (Monthly).

Housing starts, U.S. Department of Commerce, Bureau of the Census, Construction Reports: Housing Starts, C20, (Monthly) and U.S. Department of Agriculture, Forest Service.

APPENDIX D

BASIC STATISTICS ON PRODUCTION, TRADE, AND CONSUMPTION OF MAJOR GRADES OF PAPER AND BOARD

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Table 1.--Paper and board production, imports, exports, and consumption in the United States, 1920-64[1/]

Year	U.S. production	Imports	Exports	Apparent consumption[2/]	Per capita consumption
	Thousand tons	Thousand tons	Thousand tons	Thousand tons	Pounds
1920	7,185	778	219	7,744	145
1921	5,333	819	91	6,061	112
1922	6,875	1,099	96	7,878	143
1923	7,871	1,423	86	9,208	164
1924	7,930	1,459	91	9,298	163
1925	9,002	1,528	92	10,437	180
1926	9,794	1,930	117	11,607	198
1927	10,002	2,065	113	11,954	201
1928	10,403	2,222	136	12,489	207
1929	11,140	2,485	179	13,421	220
1930	10,169	2,326	160	12,340	201
1931	9,382	2,105	124	11,400	184
1932	7,998	1,827	85	9,803	157
1933	9,190	1,828	98	10,869	173
1934	9,187	2,250	127	11,201	177
1935	10,479	2,438	139	12,820	201
1936	11,976	2,832	137	14,652	229
1937	12,837	3,401	177	15,653	243
1938	11,381	2,336	156	13,951	215
1939	13,510	2,683	198	15,982	244
1940	14,484	2,812	490	16,770	254
1941	17,762	3,056	399	20,386	306
1942	17,084	3,036	264	19,731	293
1943	17,036	2,717	255	19,644	287
1944	17,183	2,574	254	19,540	282
1945	17,371	2,751	396	19,827	283
1946	19,278	3,622	305	22,550	319
1947	21,114	4,116	352	24,775	344
1948	21,897	4,575	295	26,070	356
1949	20,315	4,746	295	24,781	332
1950	24,375	4,998	297	29,108	382
1951	26,047	5,139	528	30,530	394
1952	24,418	5,173	499	28,971	368
1953	26,605	5,215	383	31,520	394
1954	26,876	5,182	591	31,516	387
1955	30,178	5,463	736	34,979	422
1956	31,441	5,844	669	36,386	431
1957	30,666	5,438	751	35,280	410
1958	30,823	5,120	728	35,248	403
1959	34,036	5,579	793	38,793	436
1960	34,444	5,715	897	39,295	435
1961	35,698	5,754	1,042	40,461	440
1962	37,543	5,821	1,001	42,345	454
1963	39,231	5,762	1,149	43,913	464
1964 3/	41,748	6,356	1,496	46,567	485

1/ Data may not add to total because of rounding.
2/ Includes changes in newsprint stocks beginning in 1929.
3/ Preliminary.

Sources: American Paper and Pulp Association, The Statistics of Paper (Annual) 1960 and 1965 Supplement and Monthly Statistical Summary No. 3 (New York: American Paper and Pulp Association). U.S. Department of Commerce, Bureau of the Census, Current Industrial Reports: Pulp, Paper and Board Series M26A (Annual). U.S. Department of Commerce, Business and Defense Services Administration, Quarterly Industry Report: Pulp, Paper and Board. U.S. Department of Agriculture, Forest Service.

Table 2.--Paper production, imports, exports, and consumption in the United States, 1920-64[1/]

Year	U.S. production	Imports	Exports	Apparent consumption[2/]	Per capita consumption
	Thousand tons	Thousand tons	Thousand tons	Thousand tons	Pounds
1920	4,872	735	158	5,448	102
1921	3,594	799	66	4,327	80
1922	4,719	1,066	67	5,717	104
1923	5,078	1,372	52	6,397	114
1924	5,080	1,404	50	6,435	113
1925	5,715	1,476	60	7,131	123
1926	6,144	1,875	63	7,956	136
1927	6,228	2,016	57	8,188	138
1928	6,342	2,184	70	8,455	140
1929	6,776	2,445	93	9,101	149
1930	6,191	2,297	76	8,416	137
1931	5,604	2,085	55	7,671	124
1932	4,755	1,809	41	6,587	106
1933	5,182	1,810	49	6,893	110
1934	5,173	2,229	75	7,219	114
1935	5,855	2,413	77	8,234	129
1936	6,598	2,799	71	9,308	145
1937	7,109	3,363	98	9,969	155
1938	6,340	2,309	71	8,970	138
1939	7,484	2,654	97	10,029	153
1940	8,105	2,791	254	10,606	161
1941	9,362	3,019	264	12,084	181
1942	9,115	2,961	161	11,790	175
1943	8,415	2,663	182	11,043	162
1944	8,220	2,522	180	10,599	153
1945	8,457	2,700	255	11,004	157
1946	9,773	3,580	217	13,091	185
1947	10,705	4,057	214	14,445	200
1948	11,119	4,500	161	15,350	209
1949	10,350	4,676	181	14,859	199
1950	12,064	4,913	175	16,833	221
1951	13,010	5,025	277	17,630	228
1952	12,197	5,090	326	16,839	214
1953	12,739	5,091	189	17,724	221
1954	13,077	5,073	326	17,873	219
1955	14,503	5,259	414	19,422	234
1956	15,419	5,688	340	20,537	243
1957	14,909	5,308	387	19,757	230
1958	14,987	4,986	346	19,560	224
1959	16,506	5,392	329	21,540	242
1960	16,309	5,574	361	22,055	244
1961	224	5,605	405	22,474	245
1962	...966	5,632	349	23,231	249
1963	18,752	5,537	382	23,976	253
1964 [3]	19,714	6,117	432	25,359	264

[1/] Data may not add to total because or rounding.
[2/] Includes changes in newsprint stocks beginning in 1929.
[3/] Preliminary.

Sources: See source note table one.

Table 3.--Newsprint production, imports, exports, and consumption in the United States, 1920-64[1/]

Year	U.S. production	Imports into the United States[2/]			U.S. exports	Consumption[3/]	Production as a percent of consumption	Per capita consumption
		Total	From Canada[4/]	From Europe				
	Thousand tons	Thousand tons	Thousand tons	Thousand tons	Thousand tons	Thousand tons	Percent	Pounds
1920	1,512	730	680	51	46	2,196	68.9	41
1921	1,237	793	657	135	17	2,013	61.5	37
1922	1,448	1,029	896	133	26	2,451	59.1	45
1923	1,521	1,309	1,108	200	16	2,814	54.1	50
1924	1,481	1,357	1,201	156	17	2,821	52.5	49
1925	1,563	1,448	1,315	133	23	2,989	52.3	52
1926	1,684	1,851	1,751	100	19	3,516	47.9	60
1927	1,517	1,987	1,865	122	12	3,492	43.4	59
1928	1,415	2,157	2,041	116	11	3,561	39.7	59
1929	1,409	2,423	2,327	96	19	3,787	37.2	62
1930	1,226	2,280	2,145	134	10	3,501	35.0	57
1931	1,203	2,067	1,916	151	10	3,298	36.5	53
1932	1,047	1,792	1,647	145	8	2,895	36.2	46
1933	928	1,794	1,640	153	11	2,660	34.9	42
1934	990	2,210	2,063	147	23	3,068	32.3	49
1935	948	2,383	2,186	197	22	3,351	28.3	53
1936	938	2,752	2,509	242	15	3,657	25.6	57
1937	976	3,317	3,023	294	17	3,868	25.2	60
1938	832	2,275	2,031	243	6	3,492	23.8	54
1939	954	2,615	2,305	310	13	3,543	26.9	54
1940	1,056	2,763	2,729	34	44	3,739	28.2	57
1941	1,044	2,982	2,979	3	70	3,923	26.6	59
1942	967	2,921	2,920	2	42	3,722	26.0	55
1943	811	2,637	2,637	--	35	3,559	22.8	52
1944	721	2,491	2,491	--	31	3,218	22.4	47
1945	725	2,669	2,669	--	44	3,452	21.0	49
1946	773	3,492	3,479	13	28	4,192	18.4	59
1947	833	3,958	3,828	129	28	4,660	17.9	65
1948	876	4,396	4,127	268	28	5,137	17.1	70
1949	918	4,640	4,382	257	39	5,533	16.6	74
1950	1,013	4,863	4,690	173	44	5,863	17.3	77
1951	1,109	4,963	4,756	207	71	5,872	18.9	76
1952	1,109	5,033	4,850	183	105	5,915	18.7	75
1953	1,069	5,006	4,843	163	47	6,111	17.5	76
1954	1,202	4,995	4,867	128	140	6,106	19.7	75
1955	1,459	5,165	5,019	146	207	6,491	22.5	78
1956	1,620	5,569	5,258	311	152	6,807	23.8	81
1957	1,807	5,218	5,063	155	174	6,778	26.7	79
1958	1,726	4,883	4,774	109	127	6,515	26.5	75
1959	1,924	5,255	5,127	128	120	7,030	27.4	79
1960	2,004	5,450	5,289	161	135	7,353	27.3	81
1961	2,054	5,485	5,330	155	182	7,408	27.7	81
1962	2,105	5,487	5,301	186	110	7,464	28.2	80
1963	2,213	5,393	5,227	166	118	7,557	29.3	80
1964 5/	2,296	5,954	5,693	262	118	8,093	28.4	84

1/ Data may not add to totals because of rounding.

2/ Imports from Canada and Europe for the years 1920-49 from the Newsprint Service Bureau, World Production and Distribution of Newsprint Paper 1959-1960 (New York: Newsprint Service Bureau, 1962).

3/ Includes changes in stocks beginning in 1929.

4/ Includes Newfoundland.

5/ Preliminary.

Sources: See source note table one.

Table 4.--Groundwood paper production and consumption in the United States, 1920-64

Year	U.S. production	Apparent consumption	Per capita consumption
	Thousand tons	Thousand tons	Pounds
1920	170	170	3
1921	92	92	2
1922	150	150	3
1923	166	166	3
1924	170	170	3
1925	189	189	3
1926	209	209	4
1927	296	296	5
1928	235	235	4
1929	363	363	6
1930	221	221	4
1931	311	311	5
1932	125	125	2
1933	285	285	5
1934	391	391	6
1935	384	384	6
1936	487	487	8
1937	596	596	9
1938	490	490	8
1939	568	568	9
1940	588	588	9
1941	643	643	10
1942	610	610	9
1943	586	586	9
1944	593	593	9
1945	636	636	9
1946	776	776	11
1947	821	821	11
1948	772	772	11
1949	675	675	9
1950	705	705	9
1951	790	790	10
1952	806	806	10
1953	771	771	10
1954	788	788	10
1955	886	886	11
1956	972	972	12
1957	846	846	10
1958	824	824	9
1959	909	909	10
1960	938	938	10
1961	907	907	10
1962	910	910	10
1963	956	956	10
1964 1/	952	952	10

1/ Preliminary.

NOTE: Imports and exports of groundwood paper are included with imports and exports of book paper shown in table 5.

Sources: See source note table one.

Table 5.--Book paper production, imports, exports, and consumption in the United States, 1920-64[1]

Year	U.S. production			Imports[2]			Exports[3]			Apparent consumption			Per capita consumption		
	Total	Coated	Uncoated	Total	Coated	Uncoated	Total	Coated	Uncoated	Total	Coated	Uncoated	Total	Coated	Uncoated
	Thousand tons	Thousand tons	Thousand tons	Thousand tons	Thousand tons	Thousand tons	Thousand tons	Thousand tons	Thousand tons	Thousand tons	Thousand tons	Thousand tons	Pounds	Pounds	Pounds
1920	955	--	--	2	--	2	48	--	48	910	--	--	17	--	--
1921	694	--	--	1	--	1	20	--	20	675	--	--	12	--	--
1922	838	--	--	3	--	3	15	--	15	826	--	--	15	--	--
1923	1,049	--	--	8	--	8	13	--	13	1,044	--	--	19	--	--
1924	1,050	--	--	13	--	13	9	--	9	1,054	--	--	19	--	--
1925	1,163	--	--	8	--	8	9	--	9	1,162	--	--	20	--	--
1926	1,193	--	--	8	--	8	9	--	9	1,192	--	--	20	--	--
1927	1,329	--	--	5	--	5	8	--	8	1,326	--	--	22	--	--
1928	1,334	--	--	4	--	4	12	--	12	1,326	--	--	22	--	--
1929	1,491	--	--	2	--	2	19	--	19	1,474	--	--	24	--	--
1930	1,383	--	--	1	--	1	16	--	16	1,368	--	--	22	--	--
1931	1,203	--	--	2	--	2	10	--	10	1,195	--	--	19	--	--
1932	941	--	--	2	--	2	7	--	7	935	--	--	15	--	--
1933	1,074	--	--	2	--	2	9	--	9	1,067	--	--	17	--	--
1934	1,050	--	--	4	--	4	8	--	8	1,046	--	--	17	--	--
1935	1,276	--	--	6	--	6	10	--	10	1,272	--	--	20	--	--
1936	1,427	--	--	11	--	11	9	--	9	1,429	--	--	22	--	--
1937	1,510	--	--	15	--	15	15	--	15	1,510	--	--	23	--	--
1938	1,296	--	--	10	--	10	9	--	9	1,297	--	--	20	--	--
1939	1,535	--	--	13	--	13	15	--	15	1,533	--	--	23	--	--
1940	1,655	--	--	17	--	17	43	--	43	1,629	--	--	25	--	--
1941	2,026	--	--	28	--	28	41	--	41	2,013	--	--	30	--	--
1942	1,716	--	--	28	--	28	21	--	21	1,723	--	--	26	--	--
1943	1,603	--	--	23	--	23	22	--	22	1,604	--	--	24	--	--
1944	1,443	--	--	27	--	27	22	--	22	1,448	--	--	21	--	--
1945	1,501	334	1,167	30	--	[illegible]	49	--	[illegible]	1,481	334	1,147	21	5	16
1946	1,933	486	1,447	38	--	[illegible]	44	--	44	1,970	486	1,483	27	7	20
1947	2,209	627	1,582	34	--	[illegible]	54	--	54	2,225	627	1,601	30	9	22
1948	2,078	508	1,570	33	--	[illegible]	44	--	44	2,418	508	1,709	33	11	23
1949	2,301	867	1,413	28	--	28	33	--	33	2,249	550	1,409	31	12	19
1950	2,630	1,050	1,580	35	--	35	59	13	46	2,606	1,037	1,569	34	13	21
1951	2,723	1,113	1,610	47	--	47	51	13	38	2,719	1,099	1,654	35	14	21
1952	2,570	1,076	1,494	43	--	43	62	19	43	2,556	1,079	1,477	33	14	19
1953	2,735	1,132	1,603	41	--	41	57	16	41	2,800	1,132	1,668	35	15	20
1954	2,799	1,222	1,577	36	--	36	41	17	24	2,794	1,305	1,539	34	15	19
1955	3,052	1,312	1,740	43	--	43	50	22	28	3,045	1,290	1,755	37	16	21
1956	3,332	1,512	1,820	60	--	60	45	23	22	3,348	1,489	1,859	40	18	22
1957	3,197	1,537	1,660	46	--	46	47	23	24	3,180	1,514	1,666	37	18	19
1958	3,213	1,559	1,654	41	--	41	52	24	28	3,202	1,534	1,667	37	18	19
1959	3,600	1,706	1,894	45	--	45	57	26	31	3,588	1,680	1,908	40	19	21
1960	3,764	1,875	1,887	46	--	46	55	26	29	3,753	1,849	1,904	42	21	21
1961	3,794	2,140	1,654	42	--	42	48	22	27	3,785	2,119	1,667	41	23	18
1962	4,028	2,269	1,760	49	--	49	49	24	24	4,028	2,244	1,784	43	24	19
1963	4,284	2,401	1,886	54	--	54	53	27	26	4,288	2,374	1,914	45	25	20
1964 [3]	4,610	2,620	1,990	83	--	[illegible]	68	27	32	4,625	2,584	2,042	48	27	21

[1] Data may not add to totals because of rounding.
[2] Includes groundwood paper.
[3] Preliminary.

Sources: See source note table one.

Table 6.--Fine paper production, imports, exports, and consumption in the United States, 1920-64[1/]

Year	U.S. production	Imports	Exports	Apparent consumption	Per capita consumption
	Thousand tons	Thousand tons	Thousand tons	Thousand tons	Pounds
1920	415	--	27	387	7
1921	247	--	13	234	4
1922	383	1	6	378	7
1923	398	9	5	402	7
1924	422	8	3	427	8
1925	498	8	3	503	9
1926	527	7	7	528	9
1927	535	11	8	537	9
1928	578	9	15	572	10
1929	737	10	16	731	12
1930	713	10	13	711	12
1931	593	13	9	597	10
1932	511	10	8	514	8
1933	571	9	8	573	9
1934	507	9	11	505	8
1935	614	9	14	609	10
1936	730	10	14	725	11
1937	700	10	20	690	11
1938	620	9	16	613	9
1939	723	10	21	712	11
1940	736	8	53	691	11
1941	950	3	46	906	14
1942	1,043	1	38	1,007	15
1943	1,011	2/	58	953	14
1944	967	2/	68	900	13
1945	1,001	2/	86	916	13
1946	1,146	1	81	1,065	15
1947	1,172	2	68	1,105	15
1948	1,141	2	45	1,097	15
1949	1,012	1	44	969	13
1950	1,197	1	39	1,160	15
1951	1,366	1	48	1,320	17
1952	1,296	1	40	1,257	16
1953	1,299	3	34	1,268	16
1954	1,285	2	41	1,246	15
1955	1,450	2	42	1,410	17
1956	1,575	2	34	1,543	18
1957	1,516	4	39	1,481	17
1958	1,535	4	33	1,506	17
1959	1,759	6	32	1,733	20
1960	1,776	7	34	1,749	19
1961	1,924	6	34	1,896	21
1962	2,054	9	32	2,030	22
1963	2,104	7	30	2,080	22
1964 3/	2,210	13	33	2,190	23

1/ Data may not add to total because of rounding.
2/ Less than 500 tons.
3/ Preliminary.

Sources: See source note table one.

Table 7.--Coarse and industrial paper[1] production, imports, exports, and consumption in the United States, 1920-64[2]

Year	U.S. production	Imports	Exports	Apparent consumption	Per capita consumption
	Thousand tons	Thousand tons	Thousand tons	Thousand tons	Pounds
1920	1,250	2	32	1,220	23
1921	920	6	14	912	17
1922	1,263	33	17	1,279	23
1923	1,348	44	14	1,378	25
1924	1,365	24	15	1,374	24
1925	1,439	10	17	1,432	25
1926	1,571	7	19	1,559	27
1927	1,610	12	19	1,603	27
1928	1,865	13	22	1,856	31
1929	1,736	9	25	1,719	28
1930	1,826	5	26	1,805	29
1931	1,510	3	18	1,495	24
1932	1,486	5	12	1,478	24
1933	1,594	5	15	1,584	25
1934	1,518	5	26	1,497	24
1935	1,727	14	24	1,717	27
1936	1,985	26	26	1,986	31
1937	2,191	19	29	2,181	34
1938	1,995	15	27	1,982	31
1939	2,397	15	33	2,379	36
1940	2,653	4	96	2,561	39
1941	2,869	5	82	2,792	42
1942	2,794	10	45	2,759	41
1943	2,558	1	46	2,513	37
1944	2,650	2	42	2,610	38
1945	2,730	1	51	2,680	38
1946	3,080	7	49	3,038	43
1947	3,293	23	46	3,270	45
1948	3,442	19	31	3,429	47
1949	3,099	6	39	3,065	41
1950	3,758	11	50	3,719	49
1951	4,163	11	89	4,086	53
1952	3,752	10	101	3,661	47
1953	3,939	35	67	3,907	49
1954	3,962	36	88	3,911	48
1955	4,297	43	97	4,243	51
1956	4,631	51	89	4,593	54
1957	4,314	43	104	4,253	50
1958	4,255	55	109	4,201	48
1959	4,751	83	92	4,742	53
1960	4,717	68	111	4,675	52
1961	4,841	67	115	4,793	52
1962	5,026	83	135	4,974	53
1963	5,162	75	157	5,080	54
1964 3/	5,367	64	182	5,249	55

1/ Includes wrapping, shipping sack, bag, converting, special industrial, absorbent, and other similar grades of paper.

2/ Data may not add to total because of rounding.

3/ Preliminary.

Table 8.--Sanitary and tissue paper production, imports, exports, and consumption in the United States, 1920-64[1]

Year	U.S. production	Imports	Exports	Apparent consumption	Per capita consumption
	Thousand tons	Thousand tons	Thousand tons	Thousand tons	Pounds
1920	195	--	5	190	4
1921	186	--	2	184	3
1922	215	--	1	214	4
1923	251	--	2	249	4
1924	242	--	1	241	4
1925	281	--	2	279	5
1926	310	--	2	308	5
1927	316	--	2	314	5
1928	348	--	2	346	6
1929	380	--	2	378	6
1930	353	--	2	351	6
1931	388	--	1	387	6
1932	352	--	2	350	6
1933	401	--	2	399	6
1934	390	2/	2	388	6
1935	466	2/	2	463	7
1936	480	2/	3	478	8
1937	526	2/	5	521	8
1938	535	2/	6	529	8
1939	648	2/	6	642	10
1940	734	2/	13	721	11
1941	913	2/	14	899	14
1942	982	2/	8	974	14
1943	969	2/	12	957	14
1944	965	2/	11	954	14
1945	981	2/	10	971	14
1946	1,044	2/	7	1,037	15
1947	1,089	2/	8	1,080	15
1948	1,188	2/	5	1,183	16
1949	1,196	1	10	1,186	16
1950	1,365	2/	7	1,358	18
1951	1,473	2/	7	1,466	19
1952	1,357	2/	5	1,352	17
1953	1,505	1	6	1,500	19
1954	1,612	2	7	1,607	20
1955	1,761	1	7	1,755	21
1956	1,860	3	10	1,853	22
1957	1,912	2	12	1,902	22
1958	1,945	2	14	1,933	22
1959	2,128	2	14	2,116	24
1960	2,201	3	13	2,191	24
1961	2,312	3	10	2,305	25
1962	2,414	4	12	2,406	26
1963	2,576	6	16	2,566	27
1964 3/	2,745	2/	22	2,723	28

1/ Data may not add to total because of rounding.
2/ Less than 500 tons.
3/ Preliminary.

Sources: See source note table one.

Table 9.--Construction paper production, imports, exports, and consumption in the United States, 1920-64[1/]

Year	U.S. production	Imports	Exports	Apparent consumption	Per capita consumption
	Thousand tons	Thousand tons	Thousand tons	Thousand tons	Pounds
1920	375	--	--	375	7
1921	217	--	--	217	4
1922	422	1	3	419	8
1923	345	1	2	344	6
1924	350	1	4	348	6
1925	582	1	6	577	10
1926	650	1	6	645	11
1927	626	1	6	620	10
1928	566	1	7	560	9
1929	659	1	11	649	11
1930	469	1	9	460	8
1931	395	1	8	388	6
1932	294	2/	3	290	5
1933	328	2/	4	325	5
1934	328	1	4	325	5
1935	441	1	4	437	7
1936	550	1	4	546	9
1937	608	1	7	602	9
1938	570	1	8	564	9
1939	659	1	7	653	10
1940	682	1	6	677	10
1941	918	1	10	909	14
1942	1,001	1	7	995	15
1943	878	1	8	871	13
1944	881	1	6	876	13
1945	883	1	16	868	12
1946	1,022	1	9	1,014	14
1947	1,289	1	9	1,281	18
1948	1,321	2/	8	1,314	18
1949	1,151	2/	9	1,143	15
1950	1,425	2	8	1,419	19
1951	1,386	2	10	1,378	18
1952	1,299	2	8	1,293	16
1953	1,371	4	9	1,366	17
1954	1,428	2	10	1,420	17
1955	1,598	5	10	1,593	19
1956	1,428	2	10	1,420	17
1957	1,329	1	12	1,318	15
1958	1,389	1	11	1,379	16
1959	1,435	1	14	1,422	16
1960	1,410	1	14	1,397	16
1961	1,391	1	16	1,377	15
1962	1,429	1	11	1,419	15
1963	1,453	3	7	1,448	15
1964 3/	1,534	3	9	1,527	16

1/ Data may not add to total because of rounding.
2/ Less than 500 tons.
3/ Preliminary.

Sources: See source note table one.

Table 10.--Board production, imports, exports, and consumption in the United States, 1920-64[1/]

Year	U.S. production	Imports	Exports	Apparent consumption	Per capita consumption
	Thousand tons	Thousand tons	Thousand tons	Thousand tons	Pounds
1920	2,313	43	61	2,296	43
1921	1,740	20	26	1,734	32
1922	2,156	34	28	2,162	39
1923	2,793	52	34	2,811	50
1924	2,850	54	41	2,863	50
1925	3,287	52	32	3,306	57
1926	3,650	55	55	3,651	62
1927	3,774	48	56	3,766	63
1928	4,062	37	65	4,034	67
1929	4,365	41	86	4,320	71
1930	3,979	29	84	3,924	64
1931	3,778	20	69	3,729	60
1932	3,243	17	44	3,216	52
1933	4,008	18	49	3,977	63
1934	4,014	20	52	3,982	63
1935	4,624	25	62	4,586	72
1936	5,378	33	66	5,344	83
1937	5,728	38	83	5,684	88
1938	5,041	26	85	4,982	77
1939	6,025	28	101	5,953	91
1940	6,379	21	236	6,163	93
1941	8,400	37	135	8,302	125
1942	7,969	75	103	7,941	118
1943	8,620	54	73	8,601	126
1944	8,963	52	73	8,941	129
1945	8,914	51	141	8,823	126
1946	9,504	42	88	9,459	134
1947	10,409	59	138	10,329	143
1948	10,779	75	134	10,720	146
1949	9,965	70	114	9,922	133
1950	12,312	85	122	12,275	161
1951	13,036	114	251	12,900	167
1952	12,221	84	174	12,131	154
1953	13,865	124	194	13,796	172
1954	13,799	109	264	13,644	167
1955	15,675	204	322	15,557	188
1956	16,023	157	329	15,851	188
1957	15,757	130	364	15,523	181
1958	15,937	133	382	15,688	179
1959	17,530	188	463	17,255	194
1960	17,635	141	536	17,240	191
1961	18,474	149	636	17,987	196
1962	19,577	189	652	19,114	205
1963	20,478	225	767	19,937	211
1964 2/	22,034	239	1,064	21,208	221

1/ Data may not add to total because of rounding.
2/ Preliminary.

Sources: See source note table one.

Table 11.--Container board production, imports, exports, and consumption in the United States, 1925-64[1/]

Year	U.S. production	Imports[2/]	Exports[3/]	Apparent consumption	Per capita consumption
	Thousand tons	Thousand tons	Thousand tons	Thousand tons	Pounds
1925	1,777	--	--	--	--
1926	--	--	--	--	--
1927	2,100	--	--	--	--
1928	1,985	--	--	--	--
1929	2,256	--	--	--	--
1930	1,916	--	--	--	--
1931	1,904	--	--	--	--
1932	1,593	--	--	--	--
1933	2,021	--	--	--	--
1934	1,882	--	--	--	--
1935	2,358	--	--	--	--
1936	2,756	--	--	--	--
1937	3,168	2	35	3,135	49
1938	2,631	4/	42	2,590	40
1939	3,361	4/	57	3,305	51
1940	3,435	4/	152	3,283	50
1941	4,184	4/	64	4,120	62
1942	3,755	39	59	3,735	55
1943	4,088	4	38	4,054	59
1944	4,228	4/	43	4,186	61
1945	4,131	--	74	4,057	58
1946	4,315	4/	37	4,278	61
1947	4,944	2	60	4,886	68
1948	5,079	1	62	5,017	68
1949	4,680	4/	55	4,625	62
1950	5,830	4/	60	5,771	76
1951	6,323	3	135	6,191	80
1952	5,766	5	93	5,678	72
1953	6,653	34	110	6,576	82
1954	6,488	22	170	6,340	78
1955	7,551	18	213	7,356	89
1956	7,763	12	213	7,562	90
1957	7,631	18	255	7,394	86
1958	7,579	19	267	7,331	84
1959	8,441	17	350	8,108	91
1960	8,637	10	406	8,240	91
1961	9,251	10	468	8,794	96
1962	9,925	19	489	9,454	101
1963	10,425	21	599	9,846	104
1964 5/	11,420	8	872	10,556	110

1/ Data may not add to total because of rounding.
2/ Includes small quantities of boxboard.
3/ Includes exports of boxboard (bending and nonbending) for the years 1937-49.
4/ Less than 500 tons.
5/ Preliminary.

Sources: See source note table one.

Table 12.--Bending board production and consumption in the United States, 1929-64 [1/]

Year	U.S. production			Apparent consumption			Per capita consumption		
	Total	Special food board	Folding boxboard [2/]	Total	Special food board	Folding boxboard [2/]	Total	Special food board	Folding boxboard [2/]
	Thousand tons	Thousand tons	Thousand tons	Thousand tons	Thousand tons	Thousand tons	Pounds	Pounds	Pounds
1929	991	--	--	991	--	--	16	--	--
1930	1,013	--	--	1,013	--	--	17	--	--
1931	906	--	--	906	--	--	15	--	--
1932	837	--	--	837	--	--	14	--	--
1933	958	--	--	958	--	--	15	--	--
1934	966	--	--	966	--	--	15	--	--
1935	1,121	--	--	1,121	--	--	17	--	--
1936	1,272	--	--	1,272	--	--	19	--	--
1937	1,289	--	--	1,289	--	--	19	--	--
1938	1,221	--	--	1,221	--	--	18	--	--
1939	1,360	--	--	1,360	--	--	1	--	--
1940	1,416	--	--	1,416	--	--	21	--	--
1941	1,842	--	--	1,842	--	--	27	--	--
1942	1,712	305	1,387	1,712	305	1,397	25	5	21
1943	2,047	385	1,662	2,047	385	1,662	30	6	24
1944	2,116	387	1,730	2,116	387	1,730	31	6	25
1945	2,270	374	1,896	2,270	374	1,896	32	5	27
1946	2,708	434	2,274	2,708	434	2,274	38	6	32
1947	2,758	460	2,298	2,758	460	2,298	38	6	32
1948	2,672	443	2,228	2,672	443	2,228	37	6	30
1949	2,613	516	2,097	2,613	516	2,097	35	7	28
1950	3,135	656	2,479	3,135	656	2,479	41	9	33
1951	3,272	773	2,499	3,272	773	2,499	42	10	32
1952	3,144	799	2,345	3,144	799	2,345	40	10	30
1953	3,544	954	2,590	3,544	954	2,590	44	12	32
1954	3,580	1,001	2,579	3,580	1,001	2,579	44	12	32
1955	3,929	1,154	2,775	3,929	1,154	2,775	47	14	34
1956	4,112	1,290	2,822	4,112	1,290	2,822	49	15	33
1957	4,149	1,281	2,868	4,149	1,281	2,868	48	15	33
1958	4,275	1,350	2,925	4,275	1,350	2,925	49	15	34
1959	4,534	1,447	3,087	4,534	1,447	3,087	51	16	35
1960	4,598	1,466	3,132	4,598	1,466	3,132	51	16	35
1961	4,738	1,596	3,141	4,738	1,596	3,141	52	17	34
1962	5,028	1,727	3,301	5,028	1,727	3,301	54	19	35
1963	5,142	1,737	3,405	5,142	1,737	3,405	54	18	36
1964 [3/]	5,398	1,848	3,550	5,398	1,848	3,550	56	19	37

[1/] Data may not add to totals because of rounding.
[2/] Includes other bending board.
[3/] Preliminary.

NOTE: Imports included in container board. Exports included in container board 1937-49, in other board 1950-64.

Sources: See source note table one.

Table 13.--Building board production, imports, exports, and consumption in the United States, 1925-64 1/

Year	U.S. production			Imports			Exports			Apparent consumption			Per capita consumption		
	Total	Insulating board	Hardboard	Total	Insulating board	Hardboard	Total	Insulating board	Hardboard	Total	Insulating board	Hardboard	Total	Insulating board	Hardboard
	Thousand tons	Thousand tons	Thousand tons	Thousand tons	Thousand tons	Thousand tons	Thousand tons	Thousand tons	Thousand tons	Thousand tons	Thousand tons	Thousand tons	Pounds	Pounds	Pounds
1925	51	--	--	36	--	--	5	--	--	83	--	--	1	--	--
1926	70	--	--	35	--	--	4	--	--	102	--	--	2	--	--
1927	71	--	--	30	--	--	20	--	--	81	--	--	1	--	--
1928	81	--	--	26	--	--	27	--	--	80	--	--	1	--	--
1929	143	--	--	29	--	--	35	--	--	137	--	--	2	--	--
1930	124	--	--	21	--	--	37	--	--	108	--	--	2	--	--
1931	112	--	--	17	--	--	22	--	--	107	--	--	2	--	--
1932	62	--	--	16	--	--	13	--	--	65	--	--	1	--	--
1933	58	--	--	6	--	--	16	--	--	47	--	--	1	--	--
1934	68	--	--	9	--	--	18	--	--	59	--	--	1	--	--
1935	80	--	--	8	--	--	23	--	--	65	--	--	1	--	--
1936	98	--	--	17	--	--	27	--	--	88	--	--	1	--	--
1937	110	--	--	19	--	--	31	27	4	98	--	--	2	--	--
1938	118	--	--	15	--	--	24	--	--	109	--	--	2	--	--
1939	115	--	--	16	4	12	28	20	8	102	--	--	2	--	--
1940	179	--	--	10	--	--	27	--	--	163	--	--	2	--	--
1941	629	--	--	24	3	21	29	15	15	623	--	--	9	--	--
1942	877	--	--	25	--	--	19	--	--	882	--	--	13	--	--
1943	887	--	--	30	2	28	10	7	3	907	--	--	13	--	--
1944	918	637	281	30	--	--	13	--	--	936	--	--	14	--	--
1945	906	646	260	29	1	28	45	26	19	890	621	269	13	9	4
1946	976	--	--	28	--	--	27	--	--	977	--	--	14	--	--
1947	1,072	771	302	33	1	32	41	28	13	1,064	744	320	15	10	4
1948	1,270	906	365	31	2/	30	36	18	18	1,266	888	377	17	12	5
1949	839	622	217	22	2/	22	25	19	6	837	604	233	11	8	3
1950	1,221	838	383	31	3	27	23	16	8	1,228	826	402	16	11	5
1951	1,266	918	348	33	3	30	25	20	5	1,274	901	373	16	12	5
1952	1,309	899	410	27	4	23	25	17	8	1,311	886	425	17	11	5
1953	1,374	951	423	26	5	20	21	17	4	1,379	939	440	17	12	5
1954	1,473	1,008	465	45	4	42	23	18	5	1,495	993	502	18	12	6
1955	1,630	1,100	530	64	9	55	26	20	6	1,668	1,089	579	20	13	7
1956	1,642	1,102	540	86	11	76	29	22	7	1,699	1,091	609	20	13	7
1957	1,558	989	569	78	6	72	26	20	7	1,610	975	634	19	11	7
1958	1,666	1,057	609	79	9	70	20	14	6	1,725	1,052	673	20	12	8
1959	1,905	1,171	734	133	15	117	20	14	6	2,018	1,172	845	23	13	10
1960	1,784	1,098	686	106	12	94	20	14	6	1,869	1,096	774	21	12	9
1961	1,845	1,084	762	110	9	100	22	16	6	1,933	1,077	856	21	12	9
1962	1,945	1,080	865	143	15	128	22	16	6	2,066	1,079	987	22	12	11
1963	2,098	1,139	959	183	22	161	27	19	8	2,255	1,142	1,113	24	12	12
1964 3/	2,263	1,215	1,048	219	29	190	30	19	11	2,452	1,225	1,227	26	13	13

1/ Data may not add to totals because of rounding.
2/ Less than 500 tons.
3/ Preliminary.

Sources: See source note table one.

Table 14.--Other board[1] production, imports, exports, and consumption in the United States, 1927-64[2]

Year	U.S. production	Imports[3]	Exports[4]	Apparent consumption	Per capita consumption
	Thousand tons	Thousand tons	Thousand tons	Thousand tons	Pounds
1927	806	--	--	--	--
1928	1,049	--	--	--	--
1929	975	--	--	--	--
1930	928	--	--	--	--
1931	856	--	--	--	--
1932	701	--	--	--	--
1933	971	--	--	--	--
1934	1,097	--	--	--	--
1935	1,065	--	--	--	--
1936	1,251	--	--	--	--
1937	1,162	17	17	1,162	18
1938	1,070	11	20	1,062	16
1939	1,190	12	16	1,185	18
1940	1,348	10	57	1,302	20
1941	1,746	13	42	1,716	26
1942	1,625	12	25	1,612	24
1943	1,599	20	26	1,593	23
1944	1,700	21	17	1,704	25
1945	1,607	22	22	1,606	23
1946	1,506	14	24	1,495	21
1947	1,635	24	37	1,621	23
1948	1,758	44	36	1,766	24
1949	1,834	48	34	1,848	25
1950	2,125	54	39	2,141	28
1951	2,176	78	91	2,164	28
1952	2,001	52	56	1,998	25
1953	2,294	65	62	2,297	29
1954	2,259	41	71	2,229	27
1955	2,565	123	82	2,606	31
1956	2,506	58	87	2,477	29
1957	2,420	34	83	2,371	28
1958	2,417	35	95	2,357	27
1959	2,649	38	93	2,594	29
1960	2,617	25	109	2,533	28
1961	2,640	29	147	2,523	28
1962	2,679	27	141	2,566	28
1963	2,813	21	141	2,694	28
1964 5/	2,953	12	162	2,803	29

1/ Includes nonbending, special paperboard, cardboard, wet machine board, and other similar grades of board.

2/ Data may not add to total because of rounding.

3/ Imports of nonbending board included in container board.

4/ Includes exports of bending board for the years 1950-64.

5/ Preliminary.

Sources: See source note table one.

Table 18.--Apparent consumption of paper and board in the United States by grade, 1919-44 1/

(Thousand tons)

Year	Total paper and board	Paper							Board				
		Total paper	Newsprint 2/	Groundwood	Book papers 3/	Fine paper	Coarse and industrial paper	Sanitary and tissue paper	Construction paper	Total board	Container board	Bending board 4/	Building board	Other board 5/
1919	7,744	5,446	2,196	170	910	367	1,220	190	393	2,298	--	--	--	--
1921	6,061	4,327	1,913	92	675	284	922	184	217	1,734	--	--	--	--
1922	7,856	5,717	2,441	159	928	378	1,379	214	419	2,139	--	--	--	--
1923	9,208	6,897	2,914	196	1,044	470	1,779	349	344	2,311	--	--	--	--
1924	9,298	6,935	2,821	170	1,154	470	1,974	241	348	2,363	--	--	--	--
1925	10,437	7,131	2,989	148	1,161	553	1,432	279	577	3,306	--	--	93	--
1926	11,637	7,956	3,516	200	1,192	596	1,559	308	745	3,681	--	--	102	--
1927	11,954	8,184	3,492	208	1,328	627	1,603	314	670	3,770	--	--	81	--
1928	12,489	8,455	3,561	235	1,328	622	1,356	346	560	4,034	--	--	80	--
1929	13,421	9,101	3,787	363	1,474	731	1,719	378	649	4,320	--	991	137	--
1930	12,340	8,416	3,501	221	1,368	711	1,805	351	460	3,924	--	1,013	108	--
1931	11,400	7,671	3,298	311	1,195	597	1,495	387	388	3,729	--	906	107	--
1932	9,883	6,587	2,895	115	935	514	1,478	350	290	3,296	--	887	65	--
1933	10,569	6,893	2,660	285	1,067	573	1,584	399	325	3,677	--	958	47	--
1934	11,201	7,219	3,068	391	1,046	505	1,497	388	325	3,982	--	966	59	--
1935	12,820	8,234	3,351	384	1,272	609	1,717	463	437	4,586	--	1,121	65	--
1936	14,652	9,308	3,657	487	1,429	725	1,966	478	546	5,344	--	1,272	86	--
1937	15,653	9,969	3,868	596	1,510	800	2,181	521	602	5,684	3,135	1,289	98	1,162
1938	13,951	8,970	3,492	490	1,297	613	1,982	529	564	4,982	2,590	1,221	109	1,062
1939	15,962	10,029	3,543	568	1,533	712	2,379	642	653	5,953	3,305	1,360	102	1,185
1940	16,770	10,606	3,739	588	1,629	691	2,561	721	677	6,163	3,283	1,416	163	1,302
1941	20,386	12,384	3,923	643	2,013	806	2,792	899	909	8,002	4,120	1,842	623	1,716
1942	19,731	11,790	3,722	610	1,723	1,007	2,759	974	995	7,941	3,735	1,712	882	1,612
1943	19,644	11,043	3,559	586	1,604	953	2,513	957	871	8,601	4,054	2,047	907	1,593
1944	19,540	10,599	3,218	593	1,448	900	2,610	954	876	8,941	4,186	2,116	936	1,704
1945	19,827	11,004	3,452	636	1,481	916	2,680	971	868	8,823	4,057	2,270	890	1,606
1946	22,550	13,091	4,192	776	1,970	1,265	3,035	1,037	1,014	9,459	4,278	2,708	977	1,495
1947	24,775	14,445	4,660	821	2,228	1,536	3,270	1,080	1,281	10,329	4,856	2,758	1,064	1,621
1948	26,070	15,156	5,137	772	2,419	1,567	3,435	1,183	1,314	10,720	5,017	2,672	1,266	1,766
1949	24,781	14,459	4,833	675	2,289	1,447	3,065	1,186	1,143	9,922	4,625	2,613	837	1,848
1950	29,103	16,833	5,063	705	2,608	1,550	3,719	1,358	1,419	12,275	5,771	3,135	1,228	2,141
1951	30,530	17,630	5,078	700	2,719	1,703	3,906	1,466	1,558	12,900	6,191	3,270	1,274	2,164
1952	28,971	16,639	5,315	826	2,556	1,651	3,661	1,352	1,299	12,331	5,974	3,144	1,311	1,998
1953	31,606	17,934	5,111	771	2,830	1,863	3,907	1,500	1,366	13,672	6,676	3,644	1,379	2,297
1954	31,626	17,979	4,836	744	2,744	1,946	3,911	1,607	1,447	13,646	6,748	3,558	1,495	2,229
1955	34,979	19,402	5,491	886	3,046	2,041	4,143	1,755	1,940	15,577	7,456	3,920	1,668	2,606
1956	36,886	20,537	5,437	878	3,342	2,184	4,609	1,853	2,034	16,351	7,502	4,111	1,695	2,477
1957	35,041	19,670	5,287	846	3,196	2,082	4,153	1,908	1,798	15,371	7,134	4,149	1,618	2,371
1958	35,648	19,967	5,515	834	3,202	2,059	4,201	1,933	1,823	15,681	7,121	4,279	1,725	2,357
1959	38,723	22,129	5,930	909	3,560	2,243	4,742	2,115	2,630	16,594	8,034	4,634	2,325	2,594
1960	39,035	22,466	5,963	926	3,593	2,243	4,575	2,191	2,975	16,569	8,040	4,594	1,869	2,533
1961	41,401	23,678	6,126	923	3,779	2,337	4,793	2,305	3,415	17,723	8,774	4,735	1,933	2,583
1962	42,345	24,281	6,264	931	3,915	2,418	4,974	2,406	3,573	18,064	8,954	5,128	2,066	2,566
1963	43,013	24,779	6,414	956	4,018	2,500	5,100	2,468	3,723	18,234	9,037	5,142	2,255	2,694
1964 6/	44,567	25,964	6,540	982	4,214	2,641	5,349	2,723	3,855	18,603	9,256	5,398	2,457	2,903

1/ Data may not add to totals because of rounding.
2/ Includes changes in stocks for the years 1920-44.
3/ Includes machine-coated paper.
4/ Includes special food board.
5/ Includes nonbending, special papertoard, cardboard, wet machine board, and other similar grades of board.
6/ Preliminary.

Sources: See source note table one.

Year	Total paper and board	Total paper	Newsprint[2]	Groundwood book paper[3]	Fine paper	Coarse and industrial paper	Sanitary and tissue paper	Construction paper	Total board	Container board	Bending board[4]	Building board	Other board[5]
1920	146	103	41	7	7	13	4	1	43	--	--	--	--
1921	118	80	37	5	5	12	3	1	38	--	--	--	--
1922	143	104	45	7	7	13	4	1	39	--	--	--	--
1923	164	114	50	8	8	15	4	1	50	--	--	--	--
1924	163	113	49	8	8	14	4	1	50	--	--	--	--
1925	180	123	52	9	10	25	5	10	57	--	--	1	--
1926	198	136	60	11	10	27	5	11	62	--	--	2	--
1927	201	138	59	9	9	27	5	10	63	--	--	1	--
1928	207	140	59	11	10	31	6	9	67	--	--	1	--
1929	220	149	62	8	14	28	6	11	71	--	16	3	--
1930	201	137	57	4	12	29	6	8	64	--	17	3	--
1931	184	134	53	5	10	24	6	6	50	--	15	2	--
1932	157	106	46	2	8	24	6	5	52	--	14	1	--
1933	173	110	42	5	9	25	6	5	63	--	15	1	--
1934	177	114	49	6	8	24	6	5	63	--	15	1	--
1935	201	129	53	6	10	27	7	7	72	--	18	1	--
1936	229	145	57	8	12	31	8	9	83	--	20	1	--
1937	243	155	60	9	13	34	8	9	88	49	20	2	18
1938	215	138	54	8	10	31	8	9	77	40	19	2	16
1939	244	153	54	9	13	36	10	10	91	51	21	2	18
1940	254	161	57	9	15	39	11	10	93	50	21	2	20
1941	306	181	59	10	14	42	14	14	125	62	28	9	26
1942	293	175	55	9	14	41	14	15	118	55	25	13	24
1943	287	162	52	8	14	37	14	13	126	59	30	13	23
1944	282	153	47	9	13	38	14	13	129	61	31	14	25
1945	283	157	49	9	13	38	14	12	126	58	32	13	23
1946	319	185	59	11	15	43	15	14	134	61	38	14	21
1947	344	200	65	11	15	45	15	18	143	68	38	15	23
1948	356	209	70	11	15	47	16	18	186	68	37	17	24
1949	332	199	74	9	13	41	16	15	133	62	35	11	25
1950	382	221	77	9	15	49	18	19	161	76	41	16	28
1951	394	228	76	10	17	53	19	18	167	80	42	16	28
1952	368	214	75	10	16	47	17	16	154	72	40	17	25
1953	394	221	76	10	16	49	19	17	172	82	44	17	29
1954	387	219	75	10	15	48	20	17	167	78	44	18	27
1955	422	234	78	11	17	51	21	19	188	89	47	20	31
1956	431	243	81	12	18	54	22	17	188	90	49	20	29
1957	410	230	79	10	17	50	22	15	181	86	48	19	28
1958	403	224	75	9	17	48	22	16	179	84	49	20	27
1959	436	242	79	10	20	53	24	16	194	91	51	23	29
1960	435	244	81	10	19	52	24	16	191	91	51	21	28
1961	440	245	81	10	21	52	25	15	196	96	52	21	28
1962	454	249	80	10	22	53	26	15	205	101	54	22	28
1963	464	253	80	10	22	54	27	15	211	104	54	24	28
1964 6/	485	264	84	10	23	55	28	16	221	110	56	26	29

1/ Data may not add to totals because of rounding.
2/ Includes changes in stock for the years 1929-64.
3/ Includes machine-coated paper.
4/ Includes special food board.
5/ Includes nonbending, special paperboard, cardboard, wet machine board, and other similar grades of board.
6/ Preliminary.

Sources: Derived from data published by the American Paper and Pulp Association, The Statistics of Paper and Monthly Statistical Summary; U.S. Department of Commerce, Bureau of the Census. Current Industrial Reports: Pulp, Paper and Board; and U.S. Department of Commerce, Business and Defense Services Administration, op. cit.

Table 17.--Imports of paper and board into the United States by selected grade, 1920-64 [1]

(Thousand tons)

Year	Total paper and board	Paper						Board			
		Total paper	Newsprint	Book paper [2]	Fine paper	Coarse and industrial paper	Other paper	Total board	Container board [3]	Building board	Other board
1920	778	735	730	2	--	2	--	43	--	--	--
1921	819	799	793	1	--	6	--	20	--	--	--
1922	1,099	1,066	1,029	3	1	33	1	34	--	--	--
1923	1,423	1,372	1,309	8	9	44	1	52	--	--	--
1924	1,459	1,404	1,357	13	8	24	1	54	--	--	-
1925	1,528	1,476	1,448	8	8	10	1	52	--	36	-
1926	1,930	1,875	1,851	8	7	7	1	55	--	35	-
1927	2,065	2,016	1,987	5	11	12	1	48	--	30	-
1928	2,222	2,184	2,157	4	9	13	1	37	--	26	
1929	2,485	2,445	2,423	2	10	9	1	41	--	29	--
1930	2,326	2,297	2,280	1	10	5	1	29	--	21	--
1931	2,105	2,085	2,067	2	13	3	1	20	--	17	-
1932	1,827	1,809	1,792	2	10	5	[4]	17	--	16	
1933	1,828	1,810	1,794	2	9	5	[4]	18	--	6	--
1934	2,250	2,229	2,210	4	9	5	1	20	--	9	--
1935	2,438	2,413	2,383	6	9	14	1	25	--	8	--
1936	2,832	2,799	2,752	11	10	26	1	33	--	17	--
1937	3,401	3,363	3,317	15	10	19	1	38	2	19	-
1938	2,336	2,309	2,275	10	9	15	1	26	[4]	15	-
1939	2,683	2,654	2,615	13	10	15	1	28	[4]	16	-
1940	2,812	2,791	2,763	17	8	4	1	21	[4]	10	-
1941	3,056	3,019	2,982	28	3	5	1	37	[4]	24	-
1942	3,036	2,961	2,921	28	1	10	1	75	39	25	-
1943	2,717	2,663	2,637	23	[4]	1	1	54	4	30	-
1944	2,574	2,522	2,491	27	[4]	2	1	52	[4]	30	-
1945	2,751	2,700	2,669	30	4	1	1	51	--	29	-
1946	3,662	3,580	3,492	80	1	7	1	82	4	28	-
1947	4,116	4,057	3,958	74	2	23	1	59	2	33	-
1948	4,575	4,500	4,396	83	2	19	1	75	1	31	-
1949	4,746	4,676	4,640	28	1	6	2	70	[4]	22	-
1950	4,998	4,913	4,863	35	1	11	3	85	[4]	31	-
1951	5,139	5,035	4,963	47	1	11	2	114	3	33	-
1952	5,173	5,090	5,033	43	1	10	2	84	5	27	-
1953	5,215	5,091	5,006	41	3	35	4	124	34	26	-
1954	5,182	5,073	4,995	36	2	36	4	109	22	45	-
1955	5,463	5,259	5,165	43	2	43	6	204	18	64	-
1956	5,844	5,688	5,569	60	2	51	5	157	12	86	-
1957	5,438	5,308	5,218	40	4	43	3	130	18	78	-
1958	5,120	4,986	4,883	41	4	55	3	133	19	79	-
1959	5,579	5,392	5,255	45	6	83	3	188	17	133	-
1960	5,715	5,574	5,450	46	7	68	4	141	10	106	-
1961	5,754	5,605	5,485	42	6	67	4	149	10	110	-
1962	5,821	5,632	5,487	49	9	83	5	189	19	143	-
1963	5,762	5,537	5,393	54	7	75	9	225	21	183	-
1964 [5]	6,356	6,117	5,954	83	13	64	3	239	8	210	-

[1] Data may not add to totals because of rounding.
[2] Includes groundwood paper.
[3] Includes small quantities of boxboard.
[4] Less than 500 tons.
[5] Preliminary.

Sources: See source note table one.

Table 18.--Imports of paper and board into the United States, by selected grade and major region of origin, 1964[1]

(Thousand tons)

Region	Total paper and board	Paper						Board			
		Total	Newsprint	Book paper	Fine paper	Coarse and industrial paper	Other paper	Total	Container board	Building board	Other board
Canada	5,843	5,783	5,643	28	2	10	3	60	--	54	6
Latin America	5	2	2	--	--	--	--	3	--	5	--
Western Europe	494	334	260	7	13	54	2	160	8	146	6
Eastern Europe	3	2	2	--	--	2	--	3	--	3	--
Africa	6	2	--	--	2	--	--	6	--	6	--
Near and Middle East	1	--	--	--	--	--	--	1	--	1	--
Far East	1	2	2	2	2	2/	2	1	--	1	2
Oceania	2	2	2	--	--	2/	--	2	--	2	--
Total	6,356	6,117	5,954	33	13	64	3	239	8	219	12

1/ Data may not add to totals because of rounding.
2/ Less than 500 tons.

NOTE: Regions are as follows: Latin America: Argentina, Bahamas, Bermuda, Bolivia, Brazil, British Guiana, British Honduras, British West Indies, Canal Zone, Chile, Colombia, Costa Rica, Cuba, Dominican Republic, Ecuador, El Salvador, Falkland Islands, French Guiana, French West Indies, Guatemala, Haiti, Honduras, Jamaica, Mexico, Netherlands Antilles, Nicaragua, Panama, Paraguay, Peru, Surinam, Trinidad and Tobago, Uruguay, Venezuela. Western Europe: Austria, Azores, Belgium, Cyprus, Denmark, Finland, France, Gibraltar, Greece, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom, West Germany. Eastern Europe: Albania, Bulgaria, Czechoslovakia, East Germany, Hungary, Poland, Rumania, U.S.S.R., Yugoslavia. Africa: Algeria, Angola and Cabinda, Basutoland, Bechuanaland, Burundi, Cameroon, Canary Islands, Central African Republic, Chad, Congo (Brazzaville), Congo (Leopoldville), Dahomey, Ethiopia, French Somaliland, Gabon, Gambia, Ghana, Guinea, Ivory Coast, Kenya, Liberia, Libya, Madeira Islands, Malagasy Republic, Malawi, Mauritius and Dependencies, Morocco, Mozambique, Niger, Nigeria, Portuguese Guinea, Republic of South Africa, Rhodesia, Rwanda, Senegal, Seychelles and Dependencies, Sierra Leone, Somali Republic, Spanish Africa, Sudan, Swaziland, Tanganyika and Zanzibar, Togo, Tunisia, Uganda, United Arab Republic, Upper Volta, Zambia. Near and Middle East: Bahrain, Federation of South Arabia, Iran, Iraq, Israel, Jordan, Kuwait, Lebanon, Saudi Arabia, Syrian Arab Republic, Turkey, Yemen. Far East: Afghanistan, Brunei, Burma, Cambodia, Ceylon, China Mainland, Hong Kong, India, Indonesia, Japan, Laos, Macao and Timor, Malaysia, Nepal, North Korea, North Vietnam, Outer Mongolia, Pakistan, Philippines, Republic of Korea, Republic of Vietnam, Taiwan, Thailand. Oceania: Australia, Fiji, New Zealand. Country designations based on information published by the U.S. Department of Commerce, Bureau of the Census in Schedule C.--Classification of Country Designations Used in Compiling the United States Foreign Trade Statistics. (January 1, 1965 edition).

Source: U.S. Department of Commerce, Bureau of the Census, U.S. Imports for Consumption and General Imports (Washington: U.S. Government Printing Office, 1964, Annual).

Table 19.--Exports of paper and board from the United States, by selected grade, 1920-64 1/

(Thousand tons)

Year	Total paper and board	Paper						Board			
		Total paper	Newsprint	Book paper 2/	Fine paper	Coarse and industrial paper	Other paper	Total board	Container board 3/	Building board	Other board
1920	219	158	46	48	27	32	5	61	--	--	--
1921	91	66	17	20	13	14	2	26	--	--	--
1922	96	67	26	15	6	20	5	28	--	--	--
1923	86	52	16	13	5	14	4	34	--	--	--
1924	91	50	17	9	3	15	5	41	--	--	--
1925	92	60	23	9	3	17	8	32	--	5	--
1926	117	63	19	9	7	19	8	55	--	4	--
1927	113	57	12	8	8	19	9	56	--	20	--
1928	136	70	11	12	15	22	10	65	--	27	--
1929	179	93	19	19	16	25	14	86	--	35	--
1930	160	76	10	16	13	26	12	84	--	[illegible]	--
1931	124	55	10	10	9	18	9	69	--	[illegible]	--
1932	85	41	8	7	8	12	5	44	--	13	--
1933	98	49	11	9	8	15	6	49	--	18	--
1934	127	75	23	8	11	26	6	52	--	18	--
1935	139	77	22	10	14	24	7	62	--	23	--
1936	137	71	15	9	14	26	7	66	--	27	--
1937	177	94	17	15	20	29	13	83	35	31	17
1938	156	71	6	9	16	27	13	85	42	24	20
1939	198	97	13	15	21	33	13	101	57	29	16
1940	490	254	44	43	53	96	19	236	152	27	57
1941	399	264	70	41	46	82	24	135	64	39	[illegible]
1942	264	161	42	21	38	45	15	103	59	19	[illegible]
1943	255	182	35	22	58	46	20	73	38	10	[illegible]
1944	254	180	31	22	68	42	17	73	43	13	17
1945	396	255	44	49	86	51	26	141	74	45	[illegible]
1946	305	217	28	44	81	49	16	88	37	[illegible]	[illegible]
1947	352	214	28	54	68	46	17	138	60	41	37
1948	295	161	28	44	45	31	13	134	62	36	[illegible]
1949	295	181	39	40	44	39	19	114	55	[illegible]	[illegible]
1950	297	175	44	27	39	50	16	122	60	[illegible]	[illegible]
1951	528	277	71	52	48	89	17	251	135	[illegible]	[illegible]
1952	499	326	105	66	40	101	13	174	93	[illegible]	[illegible]
1953	383	189	47	27	34	67	15	194	110	21	[illegible]
1954	591	326	140	41	41	88	17	264	170	23	71
1955	736	414	207	50	42	97	17	322	213	[illegible]	[illegible]
1956	669	340	152	45	34	89	20	329	213	[illegible]	[illegible]
1957	751	387	174	47	39	104	24	364	255	[illegible]	[illegible]
1958	728	346	127	52	33	109	25	382	267	[illegible]	[illegible]
1959	793	329	120	57	32	92	28	463	350	[illegible]	[illegible]
1960	897	361	135	55	34	111	27	536	406	[illegible]	109
1961	1,042	405	182	48	34	115	26	636	468	[illegible]	141
1962	1,001	349	110	48	32	135	23	652	489	[illegible]	141
1963 4/	1,149	382	118	53	30	157	24	767	599	27	141
1964 4/	1,496	432	118	68	33	182	31	1,064	872	30	[illegible]

1/ Data may not add to totals because of rounding.
2/ Includes groundwood paper.
3/ Includes exports of boxboard (bending and nonbending) for the years 1937-49.
4/ Preliminary.

Sources: See source note table one.

Table 20.--Exports of paper and board from the United States, by selected grade and major region of destination, 1964

(Thousand tons)

Region	Total paper and board	Paper						Board			
		Total	Newsprint	Book paper	Fine paper	Coarse and industrial paper	Other paper	Total	Container board	Building board	Other board
Canada	144	61	2	12	10	27	10	83	31	10	42
Latin America	392	138	66	21	8	33	10	254	195	4	55
Western Europe	634	86	4	20	6	55	1	548	505	13	30
Eastern Europe	8	6	--	1/	--	6	--	2	2	--	--
Africa	80	45	10	5	2	22	6	35	26	1	8
Near and Middle East	51	14	1/	1/	1	11	2	37	35	1	1
Far East	160	66	33	6	4	22	1	94	77	1	16
Oceania	27	16	3	4	2	6	1	11	1	1/	10
Total	1,496	432	118	68	33	182	31	1,064	872	30	162

1/ Less than 500 tons.

NOTE: See table 18 for definition of regions.

Source: U.S. Department of Commerce, Bureau of the Census, U.S. Exports FT 410 (Washington: U.S. Government Printing Office, 1964, Annual).

APPENDIX E

BASIC STATISTICS ON PRODUCTION, TRADE, AND CONSUMPTION OF WOOD PULP BY TYPE

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Table 1.--Wood pulp production, imports, exports, and consumption in the United States, 1920-64[1]

Year	U.S. production	Imports	Exports	Apparent consumption	Per capita consumption
	Thousand tons	Thousand tons	Thousand tons	Thousand tons	Pounds
1920	3,822	906	32	4,696	88
1921	2,876	697	28	3,544	65
1922	3,522	1,259	25	4,756	86
1923	3,789	1,383	23	5,149	92
1924	3,723	1,523	32	5,214	91
1925	3,962	1,664	38	5,588	97
1926	4,395	1,731	34	6,092	104
1927	4,313	1,676	32	5,957	100
1928	4,511	1,755	33	6,232	103
1929	4,863	1,881	54	6,690	110
1930	4,630	1,830	48	6,412	104
1931	4,409	1,596	53	5,952	96
1932	3,760	1,482	48	5,194	83
1933	4,276	1,942	79	6,139	98
1934	4,436	1,806	143	6,099	97
1935	4,926	1,933	172	6,687	105
1936	5,695	2,278	193	7,779	121
1937	6,573	2,395	323	8,645	134
1938	5,934	1,710	140	7,503	116
1939	6,993	2,026	140	8,880	136
1940	8,960	1,225	481	9,703	147
1941	10,375	1,158	329	11,205	168
1942	10,783	1,237	378	11,642	173
1943	9,680	1,306	301	10,685	156
1944	10,108	1,072	218	10,962	158
1945	10,167	1,754	135	11,786	168
1946	10,607	1,805	39	12,373	175
1947	11,946	2,322	130	14,138	196
1948	12,872	2,176	94	14,955	204
1949	12,207	1,763	122	13,848	186
1950	14,849	2,385	96	17,138	225
1951	16,524	2,361	202	18,683	241
1952	16,473	1,937	212	18,198	231
1953	17,537	2,158	162	19,533	244
1954	18,256	2,051	442	19,865	244
1955	20,740	2,214	631	22,323	269
1956	22,131	2,332	525	23,938	283
1957	21,800	2,101	622	23,278	271
1958	21,796	2,105	515	23,385	267
1959	24,383	2,431	653	26,162	294
1960	25,316	2,389	1,142	26,563	294
1961	26,523	2,467	1,178	27,812	303
1962	27,908	2,789	1,186	29,511	316
1963	30,121	2,775	1,422	31,474	332
1964 [2]	32,429	2,942	1,580	33,791	352

[1] Data may not add to total because of rounding.
[2] Preliminary.

NOTE: Total wood pulp production data prior to 1940 contains wood pulp not shown separately by type.

Sources: United States Pulp Producers Association, Inc., Wood Pulp Statistics (New York: United States Pulp Producers Association, Inc., 1965, Annual). U.S. Department of Commerce, Bureau of the Census, Current Industrial Reports: Pulp, Paper, and Board Series M26A (Annual). U.S. Department of Commerce, Business and Defense Services Administration Quarterly Industry Report: Pulp, Paper, and Board. U.S. Department of Agriculture, Forest Service.

Table 2.--Dissolving and special alpha pulp[1/] production, imports, exports, and consumption in the United States, 1935-64[2/]

Year	U.S. production[3/]	Imports[4/]	Exports[5/]	Apparent consumption	Per capita consumption
	Thousand tons	Thousand tons	Thousand tons	Thousand tons	Pounds
1935	190	--	--	--	--
1936	308	--	--	--	--
1937	354	92	--	--	--
1938	228	65	--	--	--
1939	193	88	48	233	4
1940	6/ 327	114	115	326	5
1941	6/ 261	121	34	348	5
1942	6/ 404	134	29	509	8
1943	6/ 390	129	23	497	7
1944	6/ 447	133	11	569	8
1945	6/ 383	146	13	516	7
1946	6/ 317	202	8	510	7
1947	407	249	11	645	9
1948	420	235	18	637	9
1949	374	154	25	503	7
1950	479	239	28	690	9
1951	616	231	31	816	11
1952	706	223	65	863	11
1953	677	256	69	864	11
1954	760	230	153	838	10
1955	983	223	194	1,013	12
1956	941	193	197	937	11
1957	1,011	138	250	899	10
1958	929	141	223	847	10
1959	1,100	186	287	999	11
1960	1,138	232	408	962	11
1961	1,195	196	435	956	11
1962	1,267	275	480	1,062	11
1963	1,371	261	524	1,109	12
1964[7/]	1,457	274	581	1,150	12

[1/] Includes a number of highly purified grades of wood pulp obtained from the sulfite and sulfate pulping processes.

[2/] Data may not add to total because of rounding.

[3/] Includes sulfate dissolving pulp for the years 1950-64.

[4/] Includes sulfate dissolving pulp for the years 1955-64.

[5/] Includes sulfate dissolving pulp for the years 1952-64.

[6/] Type data estimated from Census combined data by the United States Pulp Producers Association, Inc.

[7/] Preliminary.

Sources: See source note table one.

Table 3.--Sulfite pulp (paper grades) production, imports, exports, and consumption in the United States, 1920-64[1]

Year	U.S. production[2]	Imports[3]	Exports[4]	Apparent consumption	Per capita consumption
	Thousand tons	Thousand tons	Thousand tons	Thousand tons	Pounds
1920	1,586	473	--	--	--
1921	1,142	328	--	--	--
1922	1,374	712	18	2,068	38
1923	1,411	798	16	2,193	39
1924	1,337	934	23	2,248	39
1925	1,403	970	25	2,348	41
1926	1,558	1,035	23	2,569	44
1927	1,553	1,036	27	2,562	43
1928	1,559	1,062	25	2,596	43
1929	1,689	1,160	44	2,805	46
1930	1,567	1,106	35	2,638	43
1931	1,418	963	50	2,331	38
1932	1,146	917	46	2,017	32
1933	1,328	1,169	77	2,419	39
1934	1,446	1,074	139	2,380	38
1935	1,390	1,122	166	2,346	37
1936	1,514	1,299	188	2,626	41
1937	1,787	1,340	313	2,814	44
1938	1,378	959	124	2,213	34
1939	1,753	1,047	64	2,736	42
1940	2,281	612	175	2,719	41
1941	2,658	632	157	3,133	47
1942	2,527	700	177	3,050	45
1943	2,046	751	135	2,662	39
1944	1,939	588	85	2,442	35
1945	1,977	900	44	2,833	41
1946	2,160	841	24	2,977	42
1947	2,389	1,020	97	3,311	46
1948	2,392	998	67	3,322	45
1949	2,162	724	59	2,827	39
1950	2,370	930	51	3,249	43
1951	2,525	906	87	3,344	43
1952	2,365	708	58	3,015	38
1953	2,323	714	49	2,987	37
1954	2,383	628	109	2,902	36
1955	2,555	730	118	3,167	38
1956	2,686	797	90	3,394	40
1957	2,575	666	113	3,128	36
1958	2,381	631	66	2,946	34
1959	2,479	633	81	3,031	34
1960	2,578	631	146	3,063	34
1961	2,574	650	150	3,074	34
1962	2,565	678	202	3,040	33
1963	2,689	636	248	3,077	32
1964[5]	2,685	699	272	3,112	32

[1] Data may not add to total because of rounding.
[2] Includes dissolving and special alpha pulps for some years prior to [illegible].
[3] Includes dissolving and special alpha pulps for some years prior to [illegible].
[4] Includes dissolving and special alpha pulps for some years prior to [illegible].
[5] Preliminary.

Sources: See source note table one.

Table 4.--Sulfate pulp (paper grades) production, imports, exports, and consumption in the United States, 1920-64[1/]

Year	U.S. production[2/]	Imports[3/]	Exports[4/]	Apparent consumption	Per capita consumption
	Thousand tons	Thousand tons	Thousand tons	Thousand tons	Pounds
1920	189	200	--	389	7
1921	138	178	--	316	6
1922	244	330	--	574	10
1923	312	279	--	591	11
1924	303	342	--	645	11
1925	410	362	--	772	13
1926	520	393	--	913	16
1927	603	394	--	997	17
1928	774	443	--	1,218	20
1929	911	447	--	1,358	22
1930	950	422	--	1,372	22
1931	1,033	419	--	1,453	23
1932	1,029	374	--	1,403	22
1933	1,259	558	--	1,818	29
1934	1,246	536	--	1,782	28
1935	1,468	611	--	2,079	33
1936	1,795	738	--	2,533	40
1937	2,139	734	--	2,873	45
1938	2,443	518	--	2,961	46
1939	2,963	654	--	3,602	55
1940	3,748	308	177	3,879	59
1941	4,527	176	129	4,573	69
1942	4,738	150	168	4,720	70
1943	4,236	152	137	4,251	62
1944	4,549	146	112	4,582	66
1945	4,472	452	66	4,858	69
1946	4,588	478	5	5,060	72
1947	5,357	709	20	6,046	84
1948	6,014	614	7	6,621	90
1949	5,977	640	37	6,581	88
1950	7,501	891	14	8,378	110
1951	8,572	857	81	9,348	121
1952	8,569	727	87	9,208	117
1953	9,445	883	42	10,285	128
1954	9,812	907	174	10,545	129
1955	11,289	954	310	11,933	144
1956	12,131	1,014	231	12,914	153
1957	11,935	1,017	255	12,697	146
1958	12,316	1,094	222	13,189	151
1959	13,829	1,347	281	14,895	168
1960	14,590	1,221	584	15,227	169
1961	15,422	1,271	587	16,106	175
1962	16,301	1,474	500	17,275	185
1963	17,941	1,502	644	18,800	197
1964[5/]	20,006	1,584	725	20,865	217

[1/] Data may not add to total because of rounding.
[2/] Includes sulfate dissolving pulp prior to 1950.
[3/] Includes sulfate dissolving pulp prior to 1955.
[4/] Includes sulfate dissolving pulp prior to 1952.
[5/] Preliminary.

Sources: See source note table one.

Table 5.--Soda pulp production, imports, exports, and consumption in the United States, 1920-64[1]

Year	U.S. production	Imports	Exports	Apparent consumption	Per capita consumption
	Thousand tons	Thousand tons	Thousand tons	Thousand tons	Pounds
1920	463	--	--	--	--
1921	301	--	--	--	--
1922	420	1	4	417	8
1923	445	6	3	448	8
1924	441	--	2	439	8
1925	473	--	3	470	8
1926	497	--	3	495	8
1927	487	--	2	485	8
1928	489	--	3	486	8
1929	521	--	2	519	9
1930	474	2	2	474	8
1931	374	3	1	376	6
1932	[2] 291	2	1	291	5
1933	[2] 388	4	1	391	6
1934	[2] 354	7	2	361	6
1935	[2] 418	9	2	425	7
1936	[2] 479	13	5	487	8
1937	508	10	8	510	8
1938	395	9	3	402	6
1939	442	9	4	447	7
1940	532	11	10	533	8
1941	480	16	2	494	7
1942	462	18	3	477	7
1943	419	20	5	434	6
1944	413	16	11	419	6
1945	430	21	10	441	6
1946	476	20	--	496	7
1947	492	21	1	512	7
1948	510	25	1	534	7
1949	492	27	--	519	7
1950	522	34	--	556	7
1951	446	33	1	479	6
1952	425	28	--	453	6
1953	428	36	--	464	6
1954	430	38	[2] 2	466	6
1955	440	41	[2] 5	477	6
1956	479	43	[2] 2	519	6
1957	426	37	[2] 1	464	5
1958	429	27	[2] 1	455	5
1959	461	28	[2] 1	507	5
1960	420	32	[2] 1	450	5
1961	436	28	[2] 2	463	5
1962	425	25	[2] 1	449	5
1963	390	27	[2] 1	417	4
1964[3]	350	28	[2] 1	378	4

[1] Data may not add to total because of rounding.

[2] Type data for the years 1933-36 and 1954-64 estimated from Census combined data by the United States Pulp Producers Association, Inc.

[3] Preliminary.

Sources: See source note table one.

Table 6.--Groundwood pulp production, imports, and consumption in the United States, 1920-64[1]

Year	U.S. production[2]	Imports	Apparent consumption[2]	Per capita consumption
	Thousand tons	Thousand tons	Thousand tons	Pounds
1920	1,584	233	1,817	34
1921	1,260	191	1,450	27
1922	1,484	216	1,700	31
1923	1,568	300	1,868	33
1924	1,643	246	1,889	33
1925	1,612	331	1,943	34
1926	1,764	304	2,068	35
1927	1,610	246	1,856	31
1928	1,611	249	1,860	31
1929	1,638	273	1,911	31
1930	1,560	299	1,859	30
1931	1,449	211	1,660	27
1932	1,203	188	1,392	22
1933	1,198	210	1,408	22
1934	1,297	189	1,486	24
1935	1,356	190	1,546	24
1936	1,476	228	1,703	27
1937	1,601	218	1,819	28
1938	1,333	159	1,492	23
1939	1,445	228	1,673	26
1940	1,633	171	1,804	27
1941	1,886	198	2,084	31
1942	1,870	220	2,090	31
1943	1,767	236	2,003	29
1944	1,769	177	1,946	28
1945	1,827	223	2,049	29
1946	1,951	250	2,202	31
1947	2,050	309	2,359	33
1948	2,175	291	2,466	34
1949	1,960	209	2,169	29
1950	2,216	281	2,496	33
1951	2,474	318	2,792	36
1952	2,321	242	2,563	33
1953	2,343	259	2,602	32
1954	2,485	237	2,722	33
1955	2,729	254	2,983	36
1956	3,041	271	3,312	39
1957	3,089	228	3,317	39
1958	2,890	199	3,089	35
1959	3,230	229	3,458	39
1960	3,292	262	3,554	39
1961	3,208	310	3,518	38
1962	3,397	328	3,726	40
1963	3,468	339	3,807	40
1964[3]	3,596	348	3,944	41

[1] Data may not add to total because of rounding.
[2] Includes exploded wood pulp for the years 1920-44.
[3] Preliminary.

NOTE: Exports of groundwood pulp included with exports of dissolving or exploded pulp shown in table 8.

Sources: See source note table one.

Table 7.--Semichemical pulp production and consumption in the United States, 1929-64

Year	U.S. production	Apparent consumption	Per capita consumption
	Thousand tons	Thousand tons	Pounds
1929	40	40	1
1930	30	30	1
1931	87	87	1
1932	67	67	1
1933	1/ 70	70	1
1934	1/ 57	57	1
1935	1/ 67	67	1
1936	1/ 79	79	1
1937	133	133	2
1938	119	119	2
1939	152	152	2
1940	1/ 165	165	3
1941	1/ 200	200	3
1942	1/ 210	210	3
1943	1/ 231	231	3
1944	1/ 285	285	4
1945	1/ 295	295	4
1946	1/ 320	320	5
1947	444	444	6
1948	478	478	7
1949	506	506	7
1950	686	686	9
1951	803	803	10
1952	829	829	11
1953	1,029	1,029	13
1954	1,198	1,198	15
1955	1,408	1,408	17
1956	1,547	1,547	18
1957	1,583	1,583	18
1958	1,622	1,622	19
1959	1,924	1,924	22
1960	1,991	1,991	22
1961	2,352	2,352	26
1962	2,543	2,543	27
1963	2,629	2,629	28
1964 2/	2,712	2,712	28

1/ Type data for the years 1933-36 and 1940-46 estimated from Census combined data by the United States Pulp Producers Association, Inc.

2/ Preliminary.

NOTE: Imports and exports of semichemical pulp are included with imports and exports of defibrated or exploded pulp shown in table 8.

Sources: See source note table one.

Table 8.--Defibrated or exploded pulp (includes screenings) production, imports, exports, and consumption in the United States, 1940-64 [1/]

Year	U.S. production	Imports [2/]	Exports [3/ 4/]	Apparent consumption	Per capita consumption
	Thousand tons	Thousand tons	Thousand tons	Thousand tons	Pounds
1940	274	8	4	278	4
1941	363	15	7	371	6
1942	573	14	1	586	9
1943	591	17	1	607	9
1944	706	12	--	718	10
1945	783	12	2	793	11
1946	795	15	1	809	11
1947	808	14	2	819	11
1948	885	13	1	896	12
1949	735	9	1	743	10
1950	1,076	10	3	1,083	14
1951	1,088	15	2	1,101	14
1952	1,258	8	1	1,265	16
1953	1,293	11	2	1,303	16
1954	1,189	11	4	1,196	15
1955	1,335	12	4	1,342	16
1956	1,306	15	6	1,316	16
1957	1,180	15	3	1,191	14
1958	1,228	13	4	1,237	14
1959	1,340	10	3	1,347	15
1960	1,307	12	3	1,316	15
1961	1,335	12	4	1,343	15
1962	1,411	9	3	1,416	15
1963	1,632	9	5	1,636	17
1964 [5/]	1,621	9	1	1,629	17

1/ Data may not add to total because of rounding.
2/ Includes chemical and mechanical screenings.
3/ Includes screenings and miscellaneous wood pulp.
4/ Type data for the years 1954-64 estimated from Census combined data by the United States Pulp Producers Association, Inc.
5/ Preliminary.

Sources: See source note table one.

Table 9.--Apparent consumption of wood pulp in the United States by type, 1920-64[1/]

(Thousand tons)

Year	Total wood pulp	Dissolving[2/]	Sulfite	Sulfate	Soda	Groundwood	Semichemical	Defibrated or exploded[3/]
1920	4,606	--	--	389	--	1,817	--	--
1921	3,544	--	--	316	--	1,450	--	--
1922	4,756	--	2,068	574	417	1,700	--	--
1923	5,149	--	2,193	591	448	1,868	--	--
1924	5,214	--	2,248	645	439	1,889	--	--
1925	5,588	--	2,348	772	470	1,943	--	--
1926	6,092	--	2,569	913	495	2,068	--	--
1927	5,957	--	2,562	907	485	1,856	--	--
1928	6,218	--	2,566	1,215	486	1,860	--	--
1929	6,600	--	2,609	1,358	510	1,911	40	--
1930	6,412	--	2,638	1,372	474	1,859	30	--
1931	5,958	--	2,331	1,453	376	1,665	87	--
1932	5,194	--	2,017	1,403	291	1,392	67	--
1933	6,139	--	2,419	1,818	391	1,408	70	--
1934	6,090	--	2,380	1,782	361	1,486	57	--
1935	6,687	--	2,346	2,079	425	1,546	67	--
1936	7,779	--	2,626	2,533	487	1,703	79	--
1937	8,645	--	2,814	2,873	510	1,819	133	--
1938	7,503	--	2,213	2,961	402	1,492	119	--
1939	8,880	233	2,736	3,602	447	1,673	152	--
1940	9,703	326	2,719	3,879	533	1,804	169	276
1941	11,205	348	3,133	4,573	494	2,084	205	371
1942	11,642	509	3,050	4,720	477	2,090	210	586
1943	10,685	497	2,662	4,251	434	2,003	231	607
1944	10,962	569	2,442	4,582	419	1,946	285	718
1945	11,786	516	2,933	4,858	441	2,049	295	793
1946	12,373	510	2,977	5,060	496	2,202	320	809
1947	14,136	645	3,311	6,046	512	2,359	444	819
1948	14,955	637	3,322	6,621	534	2,466	478	896
1949	13,848	503	2,827	6,581	519	2,169	506	743
1950	17,138	690	3,249	8,378	556	2,496	686	1,083
1951	18,683	816	3,344	9,348	479	2,792	803	1,101
1952	18,196	863	3,015	9,208	453	2,563	829	1,265
1953	19,533	864	2,987	10,285	464	2,602	1,029	1,303
1954	19,865	838	2,902	10,545	466	2,722	1,198	1,196
1955	22,325	1,013	3,167	11,933	477	2,983	1,458	1,343
1956	23,938	937	3,394	12,914	519	3,312	1,547	1,316
1957	23,278	899	3,128	12,697	464	3,317	1,553	1,191
1958	23,385	847	2,946	13,189	455	3,089	1,622	1,237
1959	26,162	999	3,031	14,895	507	3,456	1,924	1,347
1960	26,563	962	3,063	15,227	450	3,554	1,991	1,316
1961	27,612	956	3,074	16,106	463	3,518	2,352	1,343
1962	29,911	1,062	3,040	17,275	449	3,726	2,943	1,416
1963	31,474	1,109	3,077	18,800	417	3,807	2,629	1,636
1964[4/]	33,791	1,156	3,112	20,865	379	3,944	2,711	1,624

[1/] Data may not add to total because of rounding.
[2/] Includes special alpha pulp.
[3/] Includes chemical and mechanical screenings.
[4/] Preliminary.

NOTE: Total wood pulp consumption data prior to 1961 exclude wood pulp not shown separately by type.

Sources: See source note table one.

Table 10.--Apparent per capita consumption of wood pulp by type in the United States, 1920-64[1/]

(Pounds)

Year	Total wood pulp	Dissolving[2/]	Sulfite	Sulfate	Soda	Groundwood	Semichemical	Defibrated or exploded[3/]
1920	88	--	--	7	--	34	--	--
1921	65	--	--	6	--	27	--	--
1922	86	--	38	10	8	31	--	--
1923	92	--	39	11	8	33	--	--
1924	91	--	39	11	8	33	--	--
1925	97	--	41	13	8	34	--	--
1926	104	--	44	16	8	35	--	--
1927	100	--	43	17	8	31	--	--
1928	103	--	43	20	8	31	--	--
1929	110	--	46	22	9	31	1	--
1930	104	--	43	22	8	30	1	--
1931	96	--	38	23	6	27	1	--
1932	83	--	32	22	5	22	1	--
1933	98	--	39	29	6	22	1	--
1934	97	--	38	28	6	24	1	--
1935	105	--	37	33	7	24	1	--
1936	121	--	41	40	8	27	1	--
1937	134	--	44	45	8	28	2	--
1938	116	--	34	46	6	23	2	--
1939	136	4	42	55	7	26	2	--
1940	147	5	41	59	8	27	3	4
1941	168	5	47	69	7	31	3	6
1942	173	8	45	70	7	31	3	9
1943	156	7	39	62	6	29	3	9
1944	158	8	35	66	6	28	4	10
1945	168	7	41	69	6	29	4	11
1946	175	7	42	72	7	31	5	11
1947	196	9	46	84	7	33	6	11
1948	204	9	45	90	7	34	7	12
1949	186	7	38	88	7	29	7	10
1950	225	9	43	110	7	33	9	14
1951	241	11	43	121	6	36	10	14
1952	231	11	38	117	6	33	11	16
1953	244	11	37	128	6	32	13	16
1954	244	10	36	129	6	33	15	15
1955	269	12	38	144	6	36	17	16
1956	283	11	40	153	6	39	18	16
1957	271	10	36	148	5	39	18	14
1958	267	10	34	151	5	35	19	14
1959	294	11	34	168	6	39	22	15
1960	294	11	34	169	5	39	22	15
1961	303	10	34	175	5	38	26	15
1962	316	11	33	185	5	40	27	15
1963[4/]	332	12	32	199	4	40	28	17
1964[4/]	352	12	32	217	4	41	28	17

[1/] Data may not add to total because of rounding.
[2/] Includes special alpha pulps.
[3/] Includes chemical and mechanical screenings.
[4/] Preliminary.

NOTE: Total wood pulp consumption data prior to 1940 contains wood pulp not shown separately by type.

Sources: Derived from data published by the United States Pulp Producers Association, Inc., op. cit.; U.S. Department of Commerce, Bureau of the Census, Current Industrial Reports: Pulp, Paper and Board; and U.S. Department of Commerce, Business and Defense Services Administration, op. cit.

U.S. imports and exports of wood pulp by the United States, by selected type, 1920-64[1]

(In tons and 1 net)

Year	Imports							Exports						
	Total wood pulp	Dissolving[2]	Sulfite[3]	Sulfate[4]	Soda	Groundwood	All other[5]	Total wood pulp	Dissolving[6]	Sulfite[7]	Sulfate[8]	Soda[9]	All other[10]	[11]
1920	900	--	473	300	--	73	-	5	--	--	--	-	-	
1921	697	--	396	178	--	121	--	12	--	--	--	--	-	
1922	1,169	-	711	340	1	117	--	36	--	18	--	-	-	
1923	1,383	--	738	479	6	160	--	42	--	16	--	-	-	
1924	1,543	--	934	349	--	166	--	66	--	25	--	2	-	
1925	1,664	--	970	362	--	331	--	64	--	25	--	3	-	
1926	1,731	--	1,035	393	--	304	--	34	--	23	--	-	-	
1927	1,678	--	1,036	394	--	246	--	50	--	47	-	2	-	
1928	1,755	--	1,092	443	--	220	--	33	--	25	--	3	-	
1929	1,881	--	1,160	447	--	273	-	64	--	44	--	1	-	
1930	1,830	--	1,106	422	2	296	-	46	--	16	--	-	14	
1931	1,596	--	963	410	3	211	--	53	--	32	--	1	-	
1932	1,482	--	917	374	2	188	--	68	--	66	--	1	1	
1933	1,342	--	1,169	558	4	10	--	78	-	47	--	-	-	
1934	1,809	--	1,374	536	7	149	--	143	-	139	--	-	-	
1935	1,933	--	1,122	611	9	190	--	170	--	166	--	-	-	
1936	2,079	--	1,499	738	13	829	--	193	--	138	--	1	-	
1937	2,395	91	1,540	734	10	19	--	323	-	313	--	-	-	
1938	1,710	65	959	518	4	164	--	146	--	144	-	1	-	
1939	2,004	65	1,047	654	3	235	--	134	41	64	-	-	-	
1940	2,205	114	612	308	11	171	9	211	116	175	17	12	-	
1941	2,159	111	632	176	16	147	57	320	34	157	129	-	-	
1942	1,237	134	700	150	18	140	34	174	29	121	24	-	-	
1943	1,336	129	751	152	20	176	37	191	23	135	31	2	-	
1944	1,271	119	588	146	16	177	11	124	11	95	11	11	16	
1945	1,754	148	900	452	21	223	10	116	14	44	2	10	-	
1946	1,805	102	941	478	20	250	15	49	4	24	6	-	-	
1947	2,327	249	1,020	709	31	305	14	106	11	47	28	1	-	
1948	2,178	215	968	614	25	291	13	84	16	52	-	-	-	
1949	1,763	194	724	640	27	159	9	120	15	46	37	-	-	
1950	2,385	210	930	891	34	281	10	96	14	51	14	-	3	
1951	2,361	181	906	957	33	318	15	102	11	47	31	1	-	
1952	1,937	141	709	727	28	262	5	111	15	50	31	-	-	
1953	2,159	196	714	883	36	309	11	102	10	45	47	-	-	
1954	2,051	230	628	907	35	237	11	442	164	109	164	-	-	
1955	2,214	223	730	954	41	294	11	431	184	118	110	1	4	
1956	2,332	143	797	1,014	43	271	15	526	175	80	91	-	-	
1957	2,101	148	666	1,017	37	206	15	623	154	114	255	1	-	
1958	2,105	141	631	1,094	37	199	13	415	133	66	222	1	-	
1959	2,431	136	633	1,347	38	229	10	653	177	81	341	1	-	
1960	2,399	132	631	1,221	32	362	12	1,140	630	166	324	1	19	
1961	2,467	136	650	1,271	28	310	12	1,114	545	150	367	-	52	
1962	2,789	225	678	1,474	25	359	7	1,179	435	202	500	1	41	
1963	2,775	261	636	1,502	29	339	4	1,428	524	246	644	1	13	
1964 [12]	2,942	274	699	1,584	28	344	13	1,582	541	317	695	1	27	

[1] Data may not add to totals because of rounding.
[2] Includes sulfate dissolving pulp for the years 1955-64.
[3] Includes dissolving and special alpha pulps for some years prior to 1937.
[4] Includes sulfate dissolving pulp prior to 1955.
[5] Includes imports of semichemical, defibrated or exploded, screenings, etc.
[6] Includes sulfate dissolving pulp for the years 1952-64.
[7] Includes dissolving and special alpha pulps for some years prior to 1937.
[8] Includes sulfate dissolving pulp prior to 1952.
[9] Type data for the years 1954-64 estimated from Census combined data by the United States Pulp Producers Association, Inc.
[10] Includes exports of groundwood, semichemical, defibrated or exploded, screenings, etc.
[11] Less than 500 tons.
[12] Preliminary.

NOTE: Data prior to 1940 may not add to totals because of the inclusion in the totals of wood pulp not shown separately by type.

Sources: See source note table one.

Table 1.--Imports of wood pulp into the United States, by type and [illegible]

Thousand tons

Region	Total	Dissolving and special alpha	Soda	Sulfate	Sulfite	Semi-chemical	Mechanical	Defibrated, exploded and screenings
Canada	2,702	274	293	1,419	28	342	--	5
Latin America	2/	--	--	2/	--	2/	--	--
Western Europe	230	1	54	164	--	6	--	4
Eastern Europe	2/	--	--	2/	--	--	--	--
Africa	10	10	2/	2/	--	--	--	2/
Near and Middle East	2/	--	--	--	2/	--	--	--
Far East	2/	--	--	2/	--	--	--	2/
Oceania	--	--	--	--	--	--	--	--
Total	2,942	274	293	1,584	28	348	--	9

1/ Data may not add to totals because of rounding.
2/ Less than 500 tons.

NOTE: Regions are as follows: Latin America: Argentina, Bahamas, Bermuda, Bolivia, Brazil, British Guiana, British Honduras, British West Indies, Canal Zone, Chile, Colombia, Costa Rica, Cuba, Dominican Republic, Ecuador, El Salvador, Falkland Islands, French Guiana, French West Indies, Guatemala, Haiti, Honduras, Jamaica, Mexico, Netherlands Antilles, Nicaragua, Panama, Paraguay, Peru, Surinam, Trinidad and Tobago, Uruguay, Venezuela. Western Europe: Austria, Azores, Belgium, Cyprus, Denmark, Finland, France, Gibraltar, Greece, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom, West Germany. Eastern Europe: Albania, Bulgaria, Czechoslovakia, East Germany, Hungary, Poland, Rumania, U.S.S.R., Yugoslavia. Africa: Algeria, Angola and Cabinda, Basutoland, Bechuanaland, Burundi, Cameroon, Canary Islands, Central African Republic, Chad, Congo (Brazzaville), Congo (Leopoldville), Dahomey, Ethiopia, French Somaliland, Gabon, Gambia, Ghana, Guinea, Ivory Coast, Kenya, Liberia, Libya, Madeira Islands, Malagasy Republic, Malawi, Mauritius and Dependencies, Morocco, Mozambique, Niger, Nigeria, Portuguese Guinea, Republic of South Africa, Rhodesia, Rwanda, Senegal, Seychelles and Dependencies, Sierra Leone, Somali Republic, Spanish Africa, Sudan, Swaziland, Tanganyika and Zanzibar, Togo, Tunisia, Uganda, United Arab Republic, Upper Volta, Zambia. Near and Middle East: Bahrain, Federation of South Arabia, Iran, Iraq, Israel, Jordan, Kuwait, Lebanon, Saudi Arabia, Syrian Arab Republic, Turkey, Yemen. Far East: Afghanistan, Brunei, Burma, Cambodia, Ceylon, China Mainland, Hong Kong, India, Indonesia, Japan, Laos, Macao and Timor, Malaysia, Nepal, North Korea, North Vietnam, Outer Mongolia, Pakistan, Philippines, Republic of Korea, Republic of Vietnam, Taiwan, Thailand. Oceania: Australia, Fiji, New Zealand. Country designations based on information published by the U.S. Department of Commerce, Bureau of the Census in Schedule C.--Classification of Country Designations Used in Compiling the United States Foreign Trade Statistics. (January 1, 1965 edition).

Source: United States Pulp Producers Association Inc., op. cit.

Table 13.--Exports of wood pulp from the United States, by type and major region of destination, 1964 [1/]

(Thousand tons)

Region	Total	Dissolving and special alpha	Sulfite	Sulfate	All other [2/]
Canada	62	13	39	10	1
Latin America	205	56	35	114	[3/]
Western Europe	719	248	71	400	[3/]
Eastern Europe	15	12	3	[3/]	--
Africa	22	4	[3/]	17	--
Near and Middle East	8	[3/]	3	4	--
Far East	517	239	106	171	1
Oceania	32	10	15	7	--
Total	1,580	581	272	725	2

[1/] Data may not add to totals because of rounding.
[2/] Includes exports of soda, semichemical, defibrated or exploded, screenings, etc.
[3/] Less than 500 tons.

NOTE: See table 12 for definition of regions.

Source: United States Pulp Producers Association, Inc., op. cit.

APPENDIX F

BASIC STATISTICS ON THE USE OF FIBROUS MATERIAL (INCLUDING WOOD PULP BY TYPE) IN THE MANUFACTURE OF THE MAJOR GRADES OF PAPER AND BOARD

Note: Includes graphs showing historical trends in the use of fibrous materials and wood pulp per ton of paper and board manufactured with extrapolations to 1985.

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Table 1.--Fibrous materials consumed in the manufacture of paper and board in the United States, by type of material, specified years 1919-1964[1/]

Year	Consumption of fibrous materials				Consumption of fibrous materials per ton of paper and board produced			
	Total	Wood pulp	Waste paper	Other	Total	Wood pulp	Waste paper	Other
	Thousand tons	Thousand tons	Thousand tons	Thousand tons	Tons	Tons	Tons	Tons
1919	6,622	4,020	1,854	748	1.110	0.674	0.311	0.125
1929	11,575	6,289	3,842	1,443	1.039	.565	.345	.129
1935	10,999	6,443	3,587	969	1.050	.615	.342	.092
1939	14,177	8,650	4,366	1,161	1.049	.640	.323	.086
1940	15,493	9,782	4,668	1,044	1.070	.675	.322	.072
1941	18,856	11,364	6,075	1,419	1.062	.640	.342	.080
1942	17,858	11,038	5,495	1,325	1.045	.646	.322	.078
1943	18,199	10,635	6,368	1,196	1.068	.624	.374	.070
1944	18,747	10,503	6,859	1,385	1.091	.611	.399	.081
1945	18,969	10,825	6,800	1,344	1.092	.623	.391	.077
1946	20,752	12,092	7,278	1,382	1.077	.627	.378	[illegible]
1947	22,788	13,253	8,009	1,526	1.079	.628	.379	[illegible]
1948	23,411	14,375	7,585	1,452	1.069	.657	.346	.066
1949	21,451	13,636	6,600	1,215	1.056	.671	.325	.060
1950	25,904	16,509	7,956	1,439	1.062	.677	.326	.059
1951	28,265	17,737	9,071	1,457	1.085	.681	.348	.056
1952	26,378	17,286	7,881	1,211	1.080	.708	.323	.050
1953	28,469	18,684	8,531	1,255	1.072	.703	.321	.047
1954	28,045	18,989	7,857	1,200	1.044	.707	.292	.045
1955	31,835	21,454	9,041	1,340	1.056	.711	.300	.045
1956	33,386	22,998	8,836	1,551	1.052	.730	.282	.040
1957	32,058	22,459	8,493	1,105	1.045	.732	.277	.036
1958	32,157	22,483	8,671	1,003	1.043	.729	.281	.033
1959	35,549	25,155	9,414	979	1.045	.740	.277	.028
1960	35,703	25,700	9,032	971	1.036	.746	.262	.028
1961	36,595	26,683	9,018	894	1.025	.747	.253	.025
1962	38,636	28,598	9,075	963	1.029	.762	.242	.025
1963	41,117	30,220	9,613	1,285	1.048	.770	.245	.033
1964 [2/]	42,478	32,031	9,493	954	1.018	.767	.227	.023

[1/] Data may not add to totals because of rounding.
[2/] Preliminary.

Sources: 1919-62, United States Pulp Producers Association, Inc., Wood Pulp Statistics (New York: United States Pulp Producers Association, Inc., 1965, Annual). 1963-64, U.S. Department of Commerce, Bureau of the Census, Current Industrial Reports: Pulp, Paper and Board, Series M26A (Annual), and U.S. Department of Agriculture, Forest Service.

Table 2.--Wood pulp consumed in the manufacture of paper and board in the United States, by type of pulp, specified years 1919-1964[1/]

Year	Consumption of wood pulp							Consumption of wood pulp per ton of paper and board produced						
	Total	Sulfite[2/]	Sulfate	Soda	Ground-wood	Semi-chemical	Other[3/]	Total	Sulfite[2/]	Sulfate	Soda	Ground-wood	Semi-chemical	Other[3/]
	Thousand tons	Thousand tons	Thousand tons	Thousand tons	Thousand tons	Thousand tons	Thousand tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons
1919	4,020	1,617	266	326	1,575	--	--	0.674	0.271	0.045	0.066	0.281	--	--
1929	6,289	2,551	1,312	508	[illegible]	--	--	.565	.229	.118	.047	.167	--	--
1935	6,442	2,368	1,976	--	1,537	--	--	.615	.226	.189	--	.147	--	--
1939	8,650	2,913	3,354	--	1,749	--	--	.640	.216	.248	--	.129	--	--
1940	9,782	2,907	3,965	530	2,139	--	--	.675	.201	.274	.037	.148	--	--
1941	11,364	3,348	4,614	515	2,317	--	--	.640	.186	.260	.029	.130	--	--
1942	11,038	3,079	4,633	469	2,040	--	--	.646	.180	.271	.027	.119	--	--
1943	10,635	2,892	4,430	456	1,987	--	--	.624	.170	.260	.027	.117	--	--
1944	10,502	2,519	4,588	418	1,961	--	--	.611	.147	.267	.024	.114	--	--
1945	10,325	2,583	4,680	440	2,035	--	--	.623	.149	.269	.025	.117	--	--
1946	12,092	3,144	5,141	492	2,138	--	--	.627	.163	.267	.026	.113	--	--
1947	13,253	3,229	5,860	500	2,329	--	--	.628	.153	.279	.025	.110	--	--
1948	14,375	3,333	6,663	521	2,432	485	890	.657	.152	.304	.024	.113	0.022	0.041
1949	13,636	2,996	6,678	506	2,184	525	760	.673	.147	.329	.026	.108	.025	.037
1950	16,509	3,276	8,381	559	2,483	635	1,134	.677	.134	.344	.023	.102	.026	.046
1951	17,737	3,240	9,309	484	2,752	804	1,148	.681	.124	.357	.019	.106	.031	.044
1952	17,388	2,971	9,136	461	2,552	826	1,338	.708	.122	.374	.019	.105	.034	.055
1953	18,684	3,012	10,293	495	2,528	1,022	1,342	.703	.113	.387	.018	.095	.038	.050
1954	18,989	2,953	10,510	466	2,710	1,136	1,212	.707	.110	.391	.017	.101	.042	.045
1955	21,454	3,229	11,998	491	2,935	1,407	1,394	.711	.107	.398	.016	.097	.047	.046
1956	22,998	3,397	12,861	530	3,231	1,571	1,389	.730	.108	.410	.017	.103	.050	.044
1957	22,459	3,170	12,768	480	3,215	1,576	1,251	.732	.103	.416	.016	.105	.051	.041
1958	22,483	2,982	13,110	470	3,056	1,530	1,335	.729	.097	.425	.015	.099	.050	.043
1959	25,155	3,025	14,874	519	3,370	1,924	1,443	.740	.089	.437	.015	.099	.057	.042
1960	25,790	3,111	15,336	458	3,430	1,994	1,371	.746	.090	.445	.013	.100	.058	.040
1961	26,681	3,050	16,093	450	3,331	2,356	1,404	.747	.085	.451	.013	.093	.066	.039
1962	28,594	3,152	17,357	464	3,548	2,517	1,561	.762	.084	.462	.012	.095	.067	.042
1963	30,220	3,139	18,700	413	3,590	2,681	1,697	.770	.080	.477	.011	.092	.068	.043
1964 4/	32,031	3,155	20,392	432	3,691	2,689	1,672	.767	.076	.488	.010	.088	.064	.040

1/ Data may not add to totals because of rounding.
2/ Includes dissolving pulp for the years 1919-48.
3/ Includes small quantities of dissolving and special alpha pulps beginning in 1949.
4/ Preliminary.

NOTE. Data prior to 1948 may not add to totals because of the inclusion in the totals of wood pulps not shown separately by type.

Sources: 1919-62, derived from data published by the United States Pulp Producers Association, Inc., op. cit. 1963-64, derived from data published by the U.S. Department of Commerce, Bureau of the Census, Current Industrial Reports: Pulp, Paper and Board.

Table 3.--Fibrous materials consumed in the manufacture of paper and board in the United States, by type of material, specified years, 1943-63[1]

Type of material	1943-44[2]	1947	1954	1958	1963
CONSUMPTION OF FIBROUS MATERIALS--THOUSAND TONS					
Wood pulp:					
Sulfite	2,594	3,229	3,092	3,214	3,139
Sulfate	4,528	5,860	10,429	13,120	18,700
Groundwood	1,746	2,361	2,710	3,233	3,590
Semichemical	--	--	1,138	1,194	2,681
Other	1,572	1,835	1,619	1,772	2,109
Total	10,440	13,285	18,989	22,533	30,220
Other fibrous materials:					
Waste paper	6,590	8,009	7,857	8,666	9,551
Other	1,448	1,493	1,200	1,142	1,285
Total	8,038	9,502	9,056	9,808	10,836
Total	18,478	22,788	28,045	32,342	41,056
PRODUCTION OF PAPER AND BOARD--THOUSAND TONS					
Total	17,327	21,114	26,876	30,707	39,231
CONSUMPTION OF FIBROUS MATERIALS PER TON OF PAPER AND BOARD PRODUCED--TONS					
Wood pulp:					
Sulfite	0.15	0.15	0.12	0.10	0.08
Sulfate	.26	.28	.39	.43	.48
Groundwood	.10	.11	.10	.11	.09
Semichemical	--	--	.04	.04	.07
Other	.09	.09	.06	.06	.05
Total	.60	.63	.71	.73	.77
Other fibrous materials:					
Waste paper	.38	.38	.29	.28	.24
Other	.08	.07	.04	.04	.03
Total	.46	.45	.34	.32	.28
Total	1.07	1.08	1.04	1.05	1.05

[1] Data may not add to totals because of rounding.
[2] October 1, 1943 to September 30, 1944.

Sources: 1943-44, War Production Board, Forest Products Bureau, Memorandum No. WPBI-2622 (Washington: unpublished, 1944). 1947, 1954, and 1958, U.S. Department of Commerce, Bureau of the Census, Census of Manufactures: 1947: 1954: 1958 MC-26 A (Washington: U.S. Government Printing Office). 1963, U.S. Department of Commerce, Bureau of the Census, Current Industrial Reports: Pulp, Paper and Board, 1963.

Table 4.--Fibrous materials consumed in the manufacture of paper in the United States, by type of material, specified years, 1943-63[1/]

Type of material	1943-44[2/]	1947	1954	1958	1963
CONSUMPTION OF FIBROUS MATERIALS--THOUSAND TONS					
Wood pulp:					
Sulfite	2,362	2,988	2,815	2,976	--
Sulfate	2,304	3,259	5,284	6,280	--
Groundwood	1,414	1,734	2,090	2,661	2,935
Semichemical	--	--	123	165	--
Other	620	875	878	776	--
Total	6,699	8,856	11,189	12,857	--
Other fibrous materials:					
Waste paper	1,158	1,627	1,584	1,985	2,191
Other	664	719	495	513	--
Total	1,822	2,346	2,078	2,498	--
Total	8,522	11,201	13,267	15,355	19,426
PRODUCTION OF PAPER--THOUSAND TONS					
Total	8,421	10,705	13,077	14,963	18,752
CONSUMPTION OF FIBROUS MATERIALS PER TON OF PAPER PRODUCED--TONS					
Wood pulp:					
Sulfite	0.28	0.28	0.22	0.20	--
Sulfate	.27	.30	.40	.42	--
Groundwood	.17	.16	.16	.18	0.16
Semichemical	--	--	.01	.01	--
Other	.07	.08	.07	.05	--
Total	.80	.83	.86	.86	--
Other fibrous materials:					
Waste paper	.14	.15	.12	.13	.12
Other	.08	.07	.04	.03	--
Total	.22	.22	.16	.17	--
Total	1.01	1.05	1.01	1.03	1.04

[1/] Data may not add to totals because of rounding.
[2/] October 1, 1943 to September 30, 1944.

Sources: See source note table three.

Table 5.--Fibrous materials consumed in the manufacture of newsprint in the United States, by type of material, specified years, 1943-63[1/]

Type of material	1943-44[2/]	1947	1954	1958	1963
CONSUMPTION OF FIBROUS MATERIALS--THOUSAND TONS					
Wood pulp:					
Sulfite	96	--	130	243	--
Sulfate	10	--	111	208	--
Groundwood	660	--	1,054	1,461	1,564
Semichemical	--	--	--	5	--
Other	--	--	--		--
Total	765	--	1,295	1,918	--
Other fibrous materials:					
Waste paper	1	--	--	--	31
Other	--	--	--	--	--
Total	1	--	6	8	--
Total	767	--	1,301	1,925	2,252
PRODUCTION OF NEWSPRINT--THOUSAND TONS					
Total	731	833	1,202	1,731	2,213
CONSUMPTION OF FIBROUS MATERIALS PER TON OF NEWSPRINT PRODUCED--TONS					
Wood pulp:					
Sulfite	0.13	--	0.11	0.14	--
Sulfate	.01	--	.09	.12	--
Groundwood	.90	--	.88	.84	0.71
Semichemical	--	--	--	3/	--
Other	--	--	--		--
Total	1.05	--	1.08	1.11	--
Other fibrous materials:					
Waste paper	3/	--	--	--	--
Other	--	--	--	--	--
Total	3/	--	3/	3/	.01
Total	1.05	--	1.08	1.11	1.02

1/ Data may not add to totals because of rounding.
2/ October 1, 1943 to September 30, 1944.
3/ Less than 0.005 ton.

Sources: See source note table three.

Table 6.--Fibrous materials consumed in the manufacture of groundwood paper in the United States, by type of material, specified years, 1943-63[1/]

Type of material	1943-44[2/]	1947	1954	1958	1963
CONSUMPTION OF FIBROUS MATERIALS--THOUSAND TONS					
Wood pulp:					
Sulfite	177	--	209	187	176
Sulfate	1	--	52	62	--
Groundwood	375	--	501	559	636
Semichemical	--	--	--	15	--
Other	1	--	--	--	--
Total	553	--	763	823	--
Other fibrous materials:					
Waste paper	41	--	37	47	44
Other	2	--	--	--	--
Total	44	--	37	47	--
Total	597	--	800	870	966
PRODUCTION OF GROUNDWOOD PAPER--THOUSAND TONS					
Total	607	821	788	806	956
CONSUMPTION OF FIBROUS MATERIALS PER TON OF GROUNDWOOD PAPER PRODUCED--TONS					
Wood pulp:					
Sulfite	0.29	--	0.27	0.23	0.18
Sulfate	3/	--	.07	.08	--
Groundwood	.62	--	.64	.69	.67
Semichemical	--	--	--	.02	--
Other	3/	--	--	--	--
Total	.91	--	.97	1.02	--
Other fibrous materials:					
Waste paper	.07	--	.05	.06	.05
Other	3/	--	--	--	--
Total	.07	--	.05	.06	--
Total	.98	--	1.02	1.08	1.01

1/ Data may not add to totals because of rounding.
2/ October 1, 1943 to September 30, 1944.
3/ Less than 0.005 ton.

Sources: See source note table three.

Table 7.--Fibrous materials consumed in the manufacture of book paper in the United States, by type of material, specified years, 1943-63[1/]

Type of material	1943-44[2/]	1947	1954	1958	1963
CONSUMPTION OF FIBROUS MATERIALS--THOUSAND TONS					
Wood pulp:					
Sulfite	382	--	678	722	587
Sulfate	212	--	837	931	1,913
Groundwood	95	--	268	336	464
Semichemical	--	--	57	47	89
Other	281	--	309	319	--
Total	970	--	2,148	2,355	--
Other fibrous materials:					
Waste paper	358	--	419	481	462
Other	2	--	18	29	--
Total	359	--	437	510	--
Total	1,329	--	2,585	2,865	3,780
PRODUCTION OF BOOK PAPER--THOUSAND TONS					
Total	1,568	2,208	2,799	3,245	4,288
CONSUMPTION OF FIBROUS MATERIALS PER TON OF BOOK PAPER PRODUCED--TONS					
Wood pulp:					
Sulfite	0.24	--	0.24	0.22	0.14
Sulfate	.14	--	.30	.29	.45
Groundwood	.06	--	.10	.10	.11
Semichemical	--	--	.02	.01	.02
Other	.18	--	.11	.10	--
Total	.62	--	.77	.73	--
Other fibrous materials:					
Waste paper	.23	--	.15	.15	.11
Other	3/	--	.01	.01	--
Total	.23	--	.16	.16	--
Total	.85	--	.92	.88	.88

1/ Data may not add to totals because of rounding.
2/ October 1, 1943 to September 30, 1944.
3/ Less than 0.005 ton.

Sources: See source note table three.

Table 8.--Fibrous materials consumed in the manufacture of fine paper in the United States, by type of material, specified years, 1943-63[1/]

Type of material	1943-44[2/]	1947	1954	1958	1963
CONSUMPTION OF FIBROUS MATERIALS--THOUSAND TONS					
Wood pulp:					
Sulfite	535	--	549	597	561
Sulfate	129	--	490	580	955
Groundwood	7	--	3	6	11
Semichemical	--	--	17	55	134
Other	89	--	109	122	157
Total	759	--	1,169	1,361	1,817
Other fibrous materials:					
Waste paper	111	--	60	103	101
Other	150	--	125	133	196
Total	261	--	186	236	297
Total	1,020	--	1,355	1,597	2,114
PRODUCTION OF FINE PAPER--THOUSAND TONS					
Total	1,023	1,172	1,285	1,556	2,104
CONSUMPTION OF FIBROUS MATERIALS PER TON OF FINE PAPER PRODUCED--TONS					
Wood pulp:					
Sulfite	0.52	--	0.43	0.38	0.27
Sulfate	.13	--	.38	.37	.45
Groundwood	.01	--	3/	3/	.01
Semichemical	--	--	.01	.04	.06
Other	.09	--	.08	.08	.07
Total	.74	--	.91	.87	.86
Other fibrous materials:					
Waste paper	.11	--	.05	.07	.05
Other	.15	--	.10	.09	.09
Total	.26	--	.14	.15	.14
Total	1.00	--	1.05	1.03	1.00

1/ Data may not add to totals because of rounding.
2/ October 1, 1943 to September 30, 1944.
3/ Less than 0.005 ton.

Sources: See source note table three.

Table 9.--Fibrous materials consumed in the manufacture of coarse and industrial paper in the United States, by type of material, specified years, 1943-63[1]

Type of material	1943-44[2]	1947[3]	1954	1958	1963
CONSUMPTION OF FIBROUS MATERIALS--THOUSAND TONS					
Wood pulp:					
Sulfite	568	551	453	409	303
Sulfate	1,872	2,545	3,350	3,749	4,789
Groundwood	55	46	15	16	13
Semichemical	--	--	11	13	--
Other	62	59	74	79	--
Total	2,557	3,201	3,903	4,267	5,212
Other fibrous materials:					
Waste paper	139	176	--	--	296
Other	64	35	--	--	241
Total	204	211	177	314	537
Total	2,761	3,413	4,079	4,581	5,749
PRODUCTION OF COARSE AND INDUSTRIAL PAPER--THOUSAND TONS					
Total	2,637	3,193	3,962	4,285	5,162
CONSUMPTION OF FIBROUS MATERIALS PER TON OF COARSE AND INDUSTRIAL PAPER PRODUCED--TONS					
Wood pulp:					
Sulfite	0.22	0.17	0.11	0.10	0.06
Sulfate	.71	.80	.85	.87	.93
Groundwood	.02	.01	4/	4/	4/
Semichemical	--	--	4/	4/	--
Other	.02	.02	.02	.02	--
Total	.97	1.00	.99	1.00	1.01
Other fibrous materials:					
Waste paper	.05	.06	--	--	.06
Other	.02	.01	--	--	.05
Total	.08	.07	.04	.07	.10
Total	1.05	1.07	1.03	1.07	1.11

1/ Data may not add to totals because of rounding.
2/ October 1, 1943 to September 30, 1944.
3/ Excludes absorbent paper.
4/ Less than 0.005 ton.

Sources: See source note table three.

Table 10.--Fibrous materials consumed in the manufacture of sanitary and tissue paper, by type of material, specified years, 1943-63[1/]

Type of material	1943-44[2/]	1947	1954	1958	1963
CONSUMPTION OF FIBROUS MATERIALS--THOUSAND TONS					
Wood pulp:					
Sulfite	604	673	780	813	1,112
Sulfate	78	132	443	680	924
Groundwood	222	212	212	265	216
Semichemical	--	--	--	--	--
Other	24	7	17	14	54
Total	929	1,024	1,452	1,773	--
Other fibrous materials:					
Waste paper	117	157	252	--	465
Other	1	1	5	--	--
Total	118	157	257	299	--
Total	1,047	1,182	1,709	2,072	2,909
PRODUCTION OF SANITARY AND TISSUE PAPER--THOUSAND TONS					
Total	973	1,089	1,612	1,925	2,576
CONSUMPTION OF FIBROUS MATERIALS PER TON OF SANITARY AND TISSUE PAPER PRODUCED--TONS					
Wood pulp:					
Sulfite	0.62	0.62	0.48	0.42	0.43
Sulfate	.08	.12	.27	.35	.36
Groundwood	.23	.19	.13	.14	.08
Semichemical	--	--	--	--	--
Other	.02	.01	.01	.01	.02
Total	.95	.94	.90	.92	--
Other fibrous materials:					
Waste paper	.12	.14	.16	--	.18
Other	3/	3/	3/	--	--
Total	.12	.14	.16	.16	--
Total	1.08	1.09	1.06	1.08	1.13

1/ Data may not add to totals because of rounding.
2/ October 1, 1943 to September 30, 1944.
3/ Less than 0.005 ton.

Sources: See source note table three.

Table 11.--Fibrous materials consumed in the manufacture of construction paper in the United States, by type of material, specified years, 1943-63[1/]

Type of material	1943-44[2/]	1947	1954	1958	1963
CONSUMPTION OF FIBROUS MATERIALS--THOUSAND TONS					
Wood pulp:					
Sulfite	2	1	15	4	--
Sulfate	2	6	1	70	--
Groundwood	--	46	37	16	32
Semichemical	--	--	38	30	--
Other	162	311	368	241	448
Total	166	365	458	361	517
Other fibrous materials:					
Waste paper	391	616	684	780	7[illegible]3
Other	445	459	295	303	346
Total	836	1,075	979	1,084	1,1[illegible]
Total	1,002	1,440	1,437	1,444	1,6[illegible]5
PRODUCTION OF CONSTRUCTION PAPER--THOUSAND TONS					
Total	882	1,289	1,428	1,415	1,4[illegible]3
CONSUMPTION OF FIBROUS MATERIALS PER TON OF CONSTRUCTION PAPER PRODUCED--TONS					
Wood Pulp:					
Sulfite	3/	3/	0.01	3/	--
Sulfate	3/	3/	3/	0.05	--
Groundwood	--	0.04	.03	.01	[illegible]
Semichemical	--	--	.03	.02	--
Other	0.18	.24	.26	.17	--
Total	.19	.28	.32	.26	.3[illegible]
Other fibrous materials:					
Waste paper	.44	48	.48	.55	.5
Other	.50	.36	.21	.21	.2[illegible]
Total	.95	.83	.69	.77	.7[illegible]
Total	1.14	1.12	1.01	1.02	1.[illegible]

1/ Data may not add to totals because of rounding.
2/ October 1, 1943 to September 30, 1944.
3/ Less than 0.005 ton.

Sources: See source note table three.

Table 12.--Fibrous materials consumed in the manufacture of board in the United States, by type of material, specified years, 1943-63[1/]

Type of material	1943-44[2/]	1947	1954	1958	1963
CONSUMPTION OF FIBROUS MATERIALS--THOUSAND TONS					
Wood pulp:					
Sulfite	232	241	278	239	--
Sulfate	2,223	2,601	5,146	6,840	--
Groundwood	333	628	621	572	654
Semichemical	--	--	1,015	1,029	--
Other	952	960	742	997	--
Total	3,741	4,430	7,801	9,677	--
Other fibrous materials:					
Waste paper	5,432	6,382	6,273	6,681	7,360
Other	783	774	705	629	--
Total	6,215	7,156	6,978	7,310	--
Total	9,956	11,586	14,779	16,987	21,630
PRODUCTION OF BOARD--THOUSAND TONS					
Total	8,906	10,409	13,799	15,741	20,478
CONSUMPTION OF FIBROUS MATERIALS PER TON OF BOARD PRODUCED--TONS					
Wood pulp:					
Sulfite	0.03	0.02	0.02	0.02	--
Sulfate	.25	.25	.37	.43	--
Groundwood	.04	.06	.05	.04	0.03
Semichemical	--	--	.07	.07	--
Other	.11	.09	.05	.06	--
Total	.42	.43	.57	.61	--
Other fibrous materials:					
Waste paper	.61	.61	.45	.42	.36
Other	.09	.07	.05	.04	--
Total	.70	.69	.51	.46	--
Total	1.12	1.11	1.07	1.08	1.06

[1/] Data may not add to totals because of rounding.
[2/] October 1, 1943 to September 30, 1944.

Sources: See source note table three.

Table 13.--Fibrous materials consumed in the manufacture of container board in the United States, by type of material, specified years, 1943-63[1/]

Type of material	1943-44[2/]	1947	1954	1958	1963
CONSUMPTION OF FIBROUS MATERIALS--THOUSAND TONS					
Wood pulp:					
Sulfite	5	4	8	17	34
Sulfate	1,929	2,236	4,078	5,160	7,085
Groundwood	90	51	31	3	39
Semichemical	--	--	944	789	1,996
Other	300	453	53	34	88
Total	2,324	2,744	5,114	6,004	9,243
Other fibrous materials:					
Waste paper	1,894	2,320	1,522	1,809	2,198
Other	519	489	246	149	21
Total	2,412	2,809	1,768	1,958	2,219
Total	4,736	5,554	6,882	7,962	11,461
PRODUCTION OF CONTAINER BOARD--THOUSAND TONS					
Total	4,188	4,944	6,488	7,441	10,425
CONSUMPTION OF FIBROUS MATERIALS PER TON OF CONTAINER BOARD PRODUCED--TONS					
Wood pulp:					
Sulfite	3/	3/	3/	3/	3/
Sulfate	0.46	0.45	0.63	0.69	0.68
Groundwood	.02	.01	3/	3/	3/
Semichemical	--	--	.15	.11	.19
Other	.07	.09	.01	3/	.01
Total	.55	.56	.79	.81	.89
Other fibrous materials:					
Waste paper	.45	.47	.23	.24	.21
Other	.12	10	.04	.02	3/
Total	.58	.57	.27	.26	.21
Total	1.13	1.12	1.06	1.07	1.10

1/ Data may not add to totals because of rounding.
2/ October 1, 1943 to September 30, 1944.
3/ Less than 0.005 ton.

Sources: See source note table three.

Table 14.--Fibrous materials consumed in the manufacture of bending board in the United States, by type of material, specified years, 1943 63[1/]

Type of material	1943-44[2/]	1947	1954	1958	1963
CONSUMPTION OF FIBROUS MATERIALS--THOUSAND TONS					
Wood pulp:					
Sulfite	199	207	--	200	124
Sulfate	204	301	--	1,424	--
Groundwood	82	116	--	68	65
Semichemical	--	--	--	9	--
Other	27	25	--	47	--
Total	512	649	--	1,748	--
Other fibrous materials:					
Waste paper	1,765	2,317	--	2,688	3,591
Other	8	12	--	4	--
Total	1,773	2,329	--	2,692	--
Total	2,285	2,979	--	4,440	--
PRODUCTION OF BENDING BOARD--THOUSAND TONS					
Total	2,082	2,758	3,580	4,206	4,902
CONSUMPTION OF FIBROUS MATERIALS PER TON OF BENDING BOARD PRODUCED--TONS					
Wood pulp:					
Sulfite	0.10	0.08	--	0.05	0.03
Sulfate	.10	.11	--	.34	--
Groundwood	.04	.04	--	.02	.01
Semichemical	--	--	--	3/	--
Other	.01	.01	--	.01	--
Total	.25	.24	--	.42	--
Other fibrous materials:					
Waste paper	.85	.84	--	64	73
Other	3/	3/	--	3/	--
Total	.85	.84	--	.64	--
Total	1.10	1.08	--	1.06	--

1/ Data may not add to totals because of rounding.
2/ October 1, 1943 to September 30, 1944.
3/ Less than 0.005 ton.

Sources: See source note table three.

Table 15.--Fibrous materials consumed in the manufacture of building board in the United States, by type of material, specified years, 1943-63[1]

Type of material	1943-44[2]	1947	1954	1958	1963
CONSUMPTION OF FIBROUS MATERIALS--THOUSAND TONS					
Wood pulp:					
Sulfite	6	--	--	--	--
Sulfate	2	--	--	--	--
Groundwood	115	402	474	443	530
Semichemical	--	--	55	56	246
Other	595	459	641	846	997
Total	717	861	1,170	1,345	1,808
Other fibrous materials:					
Waste paper	327	134	142	231	97
Other	200	218	403	459	267
Total	526	352	545	690	364
Total	1,243	1,213	1,716	2,035	2,172
PRODUCTION OF BUILDING BOARD--THOUSAND TONS					
Total	1,136	1,072	1,473	1,682	2,098
CONSUMPTION OF FIBROUS MATERIALS PER TON OF BUILDING BOARD PRODUCED--TONS					
Wood pulp:					
Sulfite	0.01	--	--	--	--
Sulfate	3/	--	--	--	--
Groundwood	.10	0.38	0.32	0.26	0.25
Semichemical	--	--	.04	.03	.12
Other	.52	.43	.44	.50	.48
Total	.63	.80	.79	.80	.86
Other fibrous materials:					
Waste paper	.29	.13	.10	.14	.05
Other	.18	.20	.27	.27	.13
Total	.46	.33	.37	.41	.17
Total	1.09	1.13	1.16	1.21	1.04

1/ Data may not add to totals because of rounding.
2/ October 1, 1943 to September 30, 1944.
3/ Less than 0.005 ton.

Sources: See source note table three.

Table 16.--Fibrous materials consumed in the manufacture of other board in the United States, by type of material, specified years, 1943-63[1]

Type of material	1943-44[2]	1947	1954	1958	1963
CONSUMPTION OF FIBROUS MATERIALS--THOUSAND TONS					
Wood pulp:					
Sulfite	23	30	--	21	--
Sulfate	88	63	--	256	--
Groundwood	46	58	--	58	--
Semichemical	--	--	--	175	--
Other	30	23	--	70	--
Total	187	175	--	580	--
Other fibrous materials:					
Waste paper	1,447	1,611	--	1,952	1,474
Other	57	55	--	18	33
Total	1,504	1,666	--	1,970	1,507
Total	1,691	1,841	--	2,550	1,857
PRODUCTION OF OTHER BOARD--THOUSAND TONS					
Total	1,500	1,635	2,259	2,412	3,053
CONSUMPTION OF FIBROUS MATERIALS PER TON OF OTHER BOARD PRODUCED -TONS					
Wood pulp:					
Sulfite	0.02	0.02	-	0.01	--
Sulfate	.06	.04	--	.11	--
Groundwood	.03	.04	--	.02	--
Semichemical	--	--	--	.07	--
Other	.02	.01	--	.03	--
Total	.12	.11	-	.24	--
Other fibrous materials:					
Waste paper	.96	.99	--	.81	0.48
Other	.04	.03	--	.01	.01
Total	1.00	1.02	--	.82	.49
Total	1.13	1.13	--	1.06	--

[1] Data may not add to totals because of rounding.
[2] October 1, 1943 to September 30, 1944.

Sources: See source note table three.

Consumption of fibrous materials in the domestic manufacture of paper and board

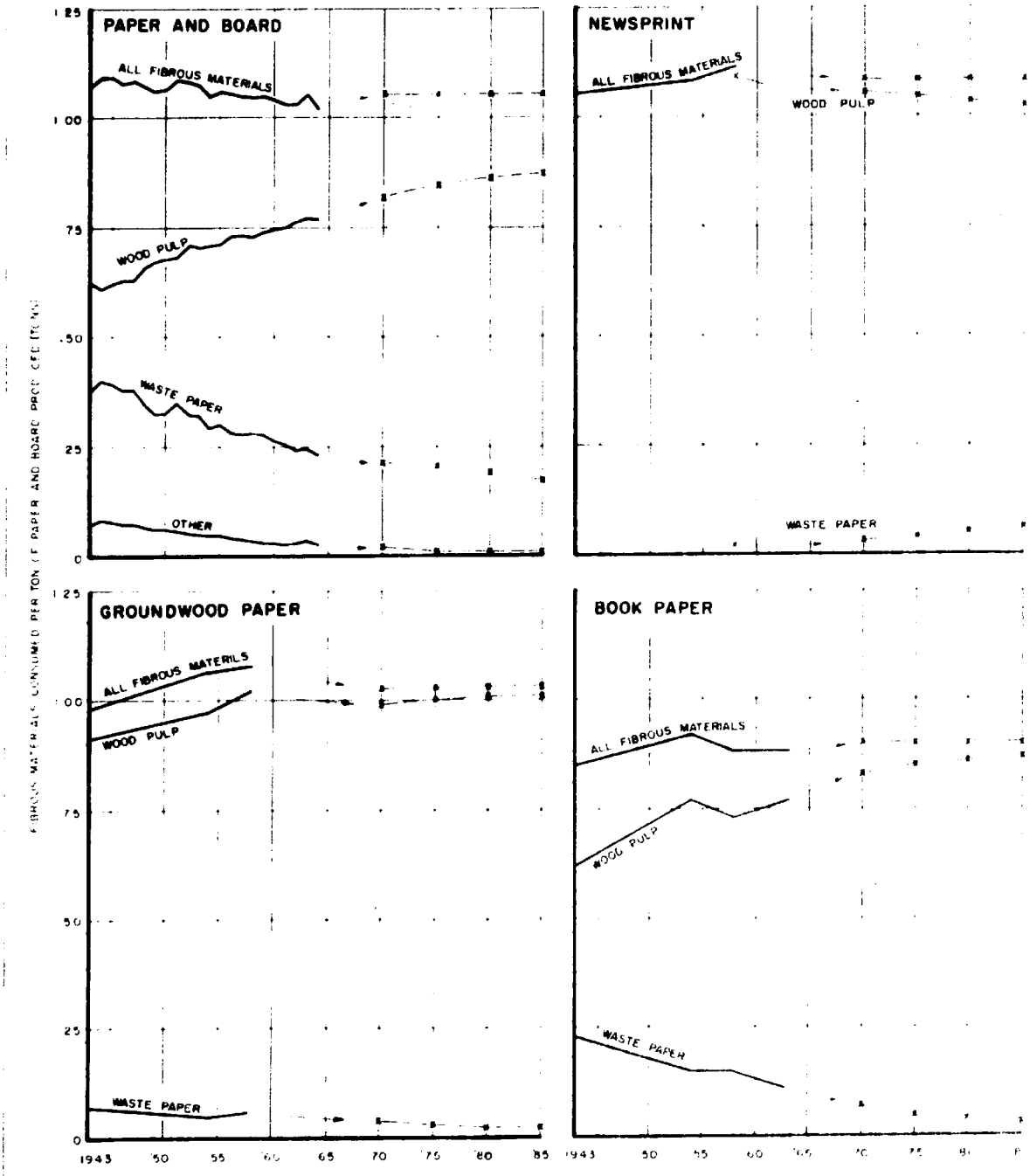


Figure 1

Consumption of fibrous materials in the domestic manufacture of paper

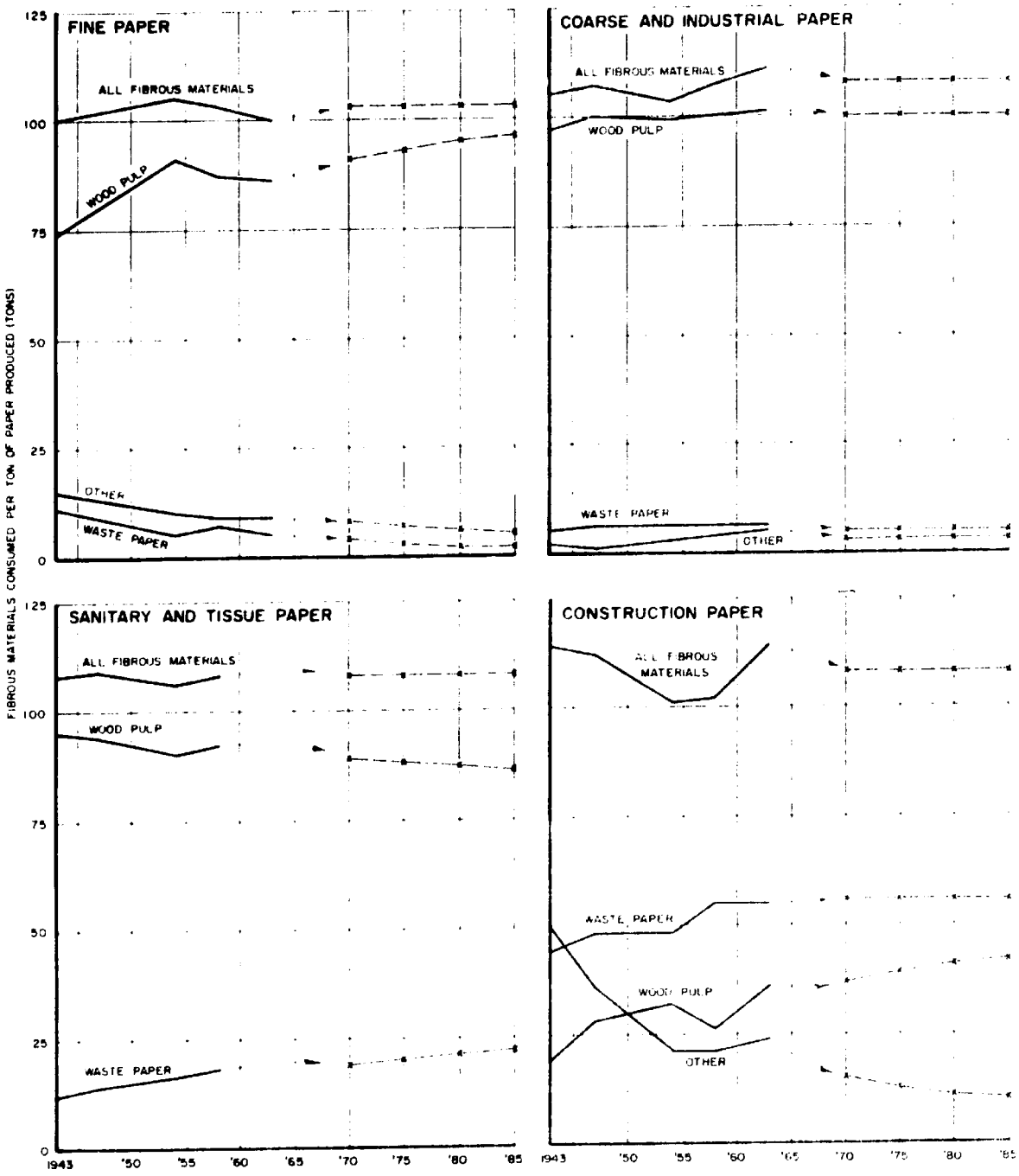


Figure 2

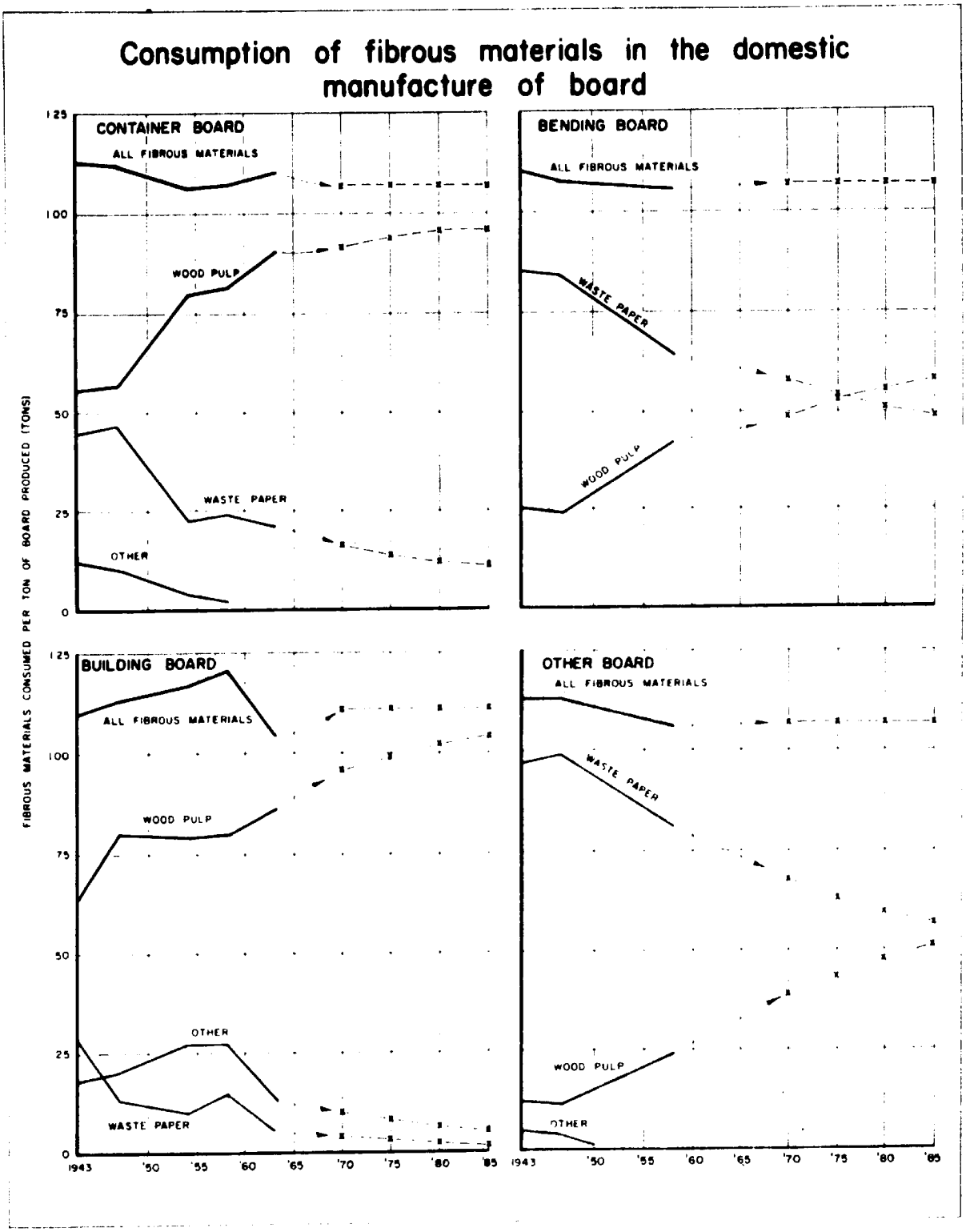

Consumption of fibrous materials in the domestic manufacture of board
CONTAINER BOARD
ALL FIBROUS MATERIALS
WOOD PULP
WASTE PAPER
OTHER
BENDING BOARD
ALL FIBROUS MATERIALS
WASTE PAPER
WOOD PULP
BUILDING BOARD
ALL FIBROUS MATERIALS
WOOD PULP
OTHER
WASTE PAPER
OTHER BOARD
ALL FIBROUS MATERIALS
WASTE PAPER
WOOD PULP
OTHER
FIBROUS MATERIALS CONSUMED PER TON OF BOARD PRODUCED (TONS)
0
25
50
75
100
125
1943
'50
'55
'60
'65
'70
'75
'80
'85

Figure 3

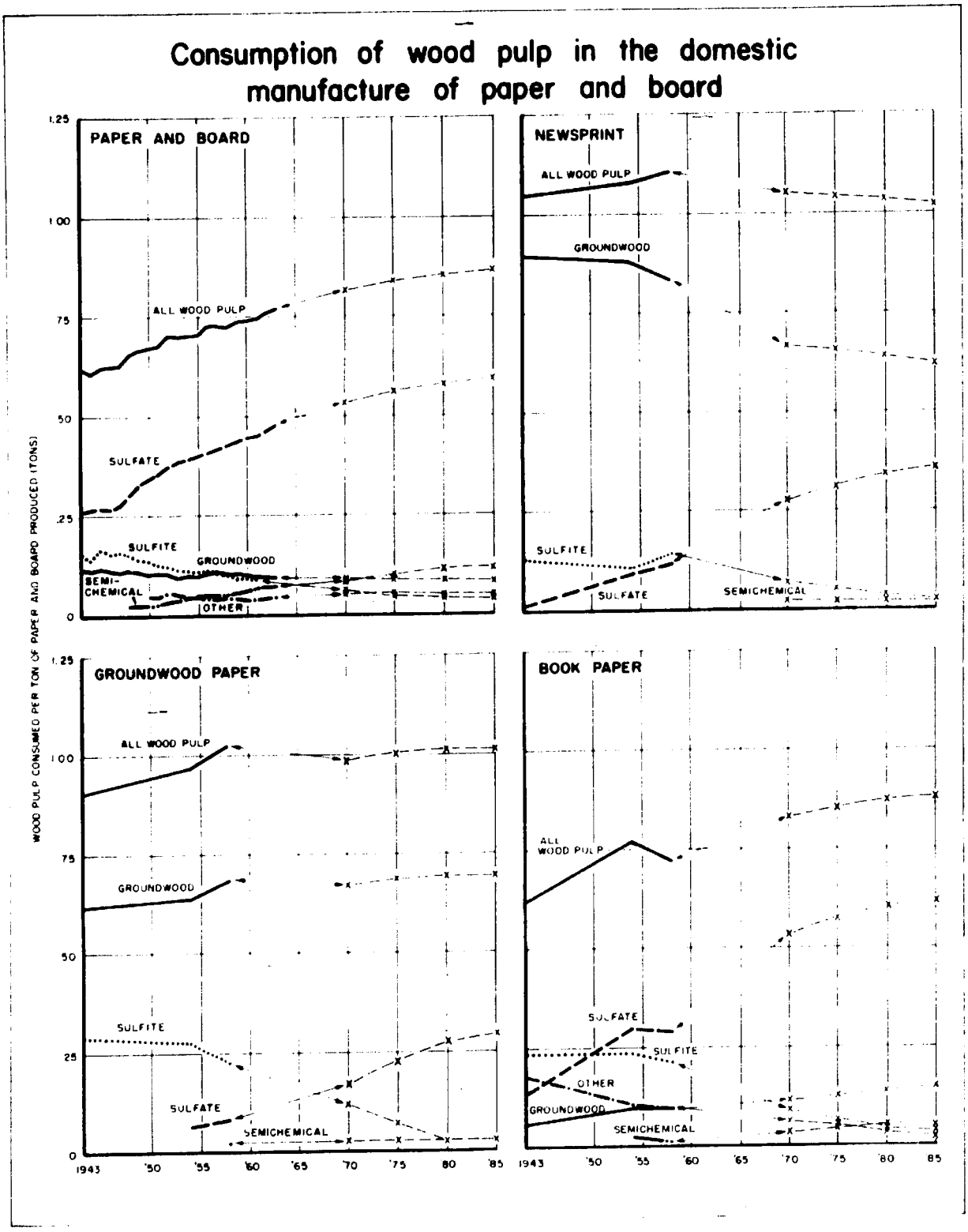

Consumption of wood pulp in the domestic manufacture of paper and board
PAPER AND BOARD
ALL WOOD PULP
SULFATE
SULFITE
GROUNDWOOD
SEMI-CHEMICAL
OTHER
NEWSPRINT
ALL WOOD PULP
GROUNDWOOD
SULFITE
SULFATE
SEMICHEMICAL
GROUNDWOOD PAPER
ALL WOOD PULP
GROUNDWOOD
SULFITE
SULFATE
SEMICHEMICAL
BOOK PAPER
ALL WOOD PULP
SULFATE
SULFITE
OTHER
GROUNDWOOD
SEMICHEMICAL
WOOD PULP CONSUMED PER TON OF PAPER AND BOARD PRODUCED (TONS)
1.25
1.00
.75
.50
.25
0
1943
'50
'55
'60
'65
'70
'75
'80
'85

Figure 4

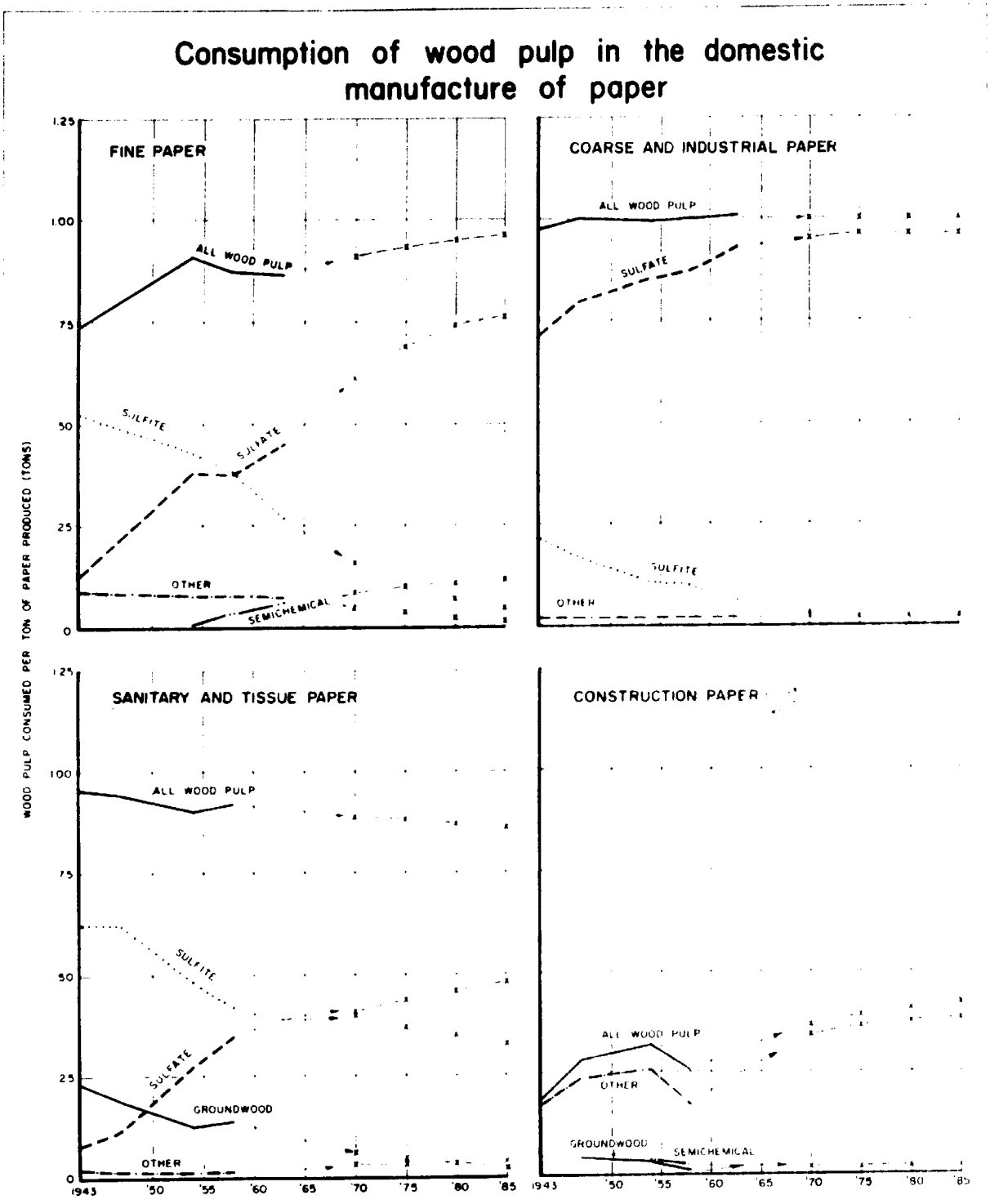

Consumption of wood pulp in the domestic manufacture of paper
FINE PAPER
ALL WOOD PULP
SULFITE
SULFATE
OTHER
SEMICHEMICAL
COARSE AND INDUSTRIAL PAPER
ALL WOOD PULP
SULFATE
SULFITE
OTHER
SANITARY AND TISSUE PAPER
ALL WOOD PULP
SULFITE
SULFATE
GROUNDWOOD
OTHER
CONSTRUCTION PAPER
ALL WOOD PULP
OTHER
GROUNDWOOD
SEMICHEMICAL
WOOD PULP CONSUMED PER TON OF PAPER PRODUCED (TONS)
1.25
1.00
.75
.50
.25
0
1943
'50
'55
'60
'65
'70
'75
'80
'85

Figure 5

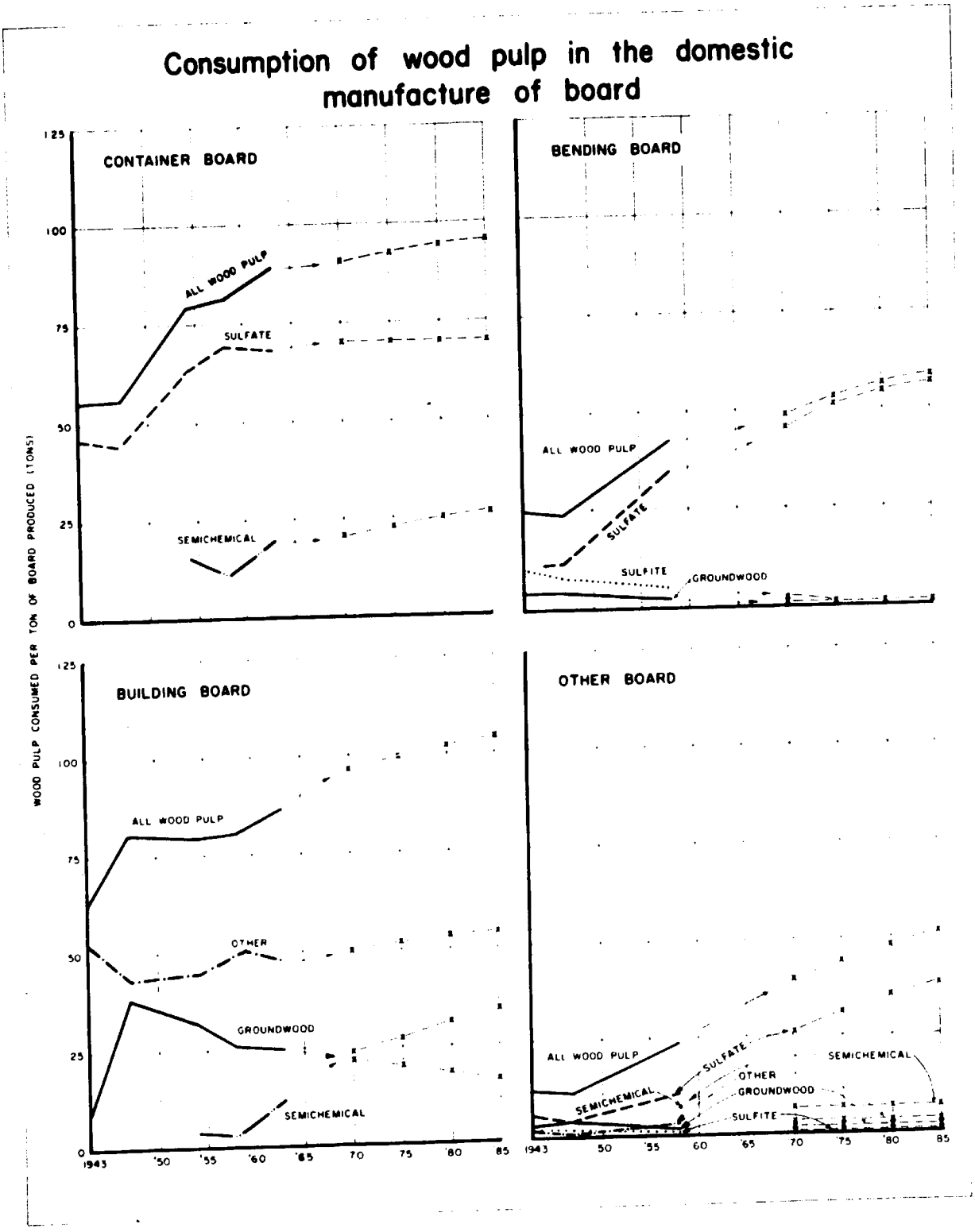

Consumption of wood pulp in the domestic manufacture of board
CONTAINER BOARD
ALL WOOD PULP
SULFATE
SEMICHEMICAL
BENDING BOARD
ALL WOOD PULP
SULFATE
SULFITE
GROUNDWOOD
BUILDING BOARD
ALL WOOD PULP
OTHER
GROUNDWOOD
SEMICHEMICAL
OTHER BOARD
ALL WOOD PULP
SULFATE
SEMICHEMICAL
OTHER
GROUNDWOOD
SULFITE
SEMICHEMICAL
WOOD PULP CONSUMED PER TON OF BOARD PRODUCED (TONS)
0
25
50
75
100
125
1943
'50
'55
'60
'65
70
75
'80
85

Figure 6

APPENDIX G

BASIC STATISTICS ON PRODUCTION, TRADE, AND CONSUMPTION OF PULPWOOD

Note: Includes graphs showing historical trends in the use of pulpwood per ton of wood pulp manufactured with extrapolations to 1985.

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Table 1.--Pulpwood consumption, production, net imports, and the equivalent wood volumes of the net imports of paper, board, and wood pulp in the United States, 1920-64 1/

(Thousand cords)

Year	Total consumption	Consumption in U.S. mills						Net imports of paper, board, and wood pulp (pulpwood equivalent)
		Total	U.S. production				Net pulpwood imports	
			Total	Roundwood		Chipped residues		
				Total	Softwoods	Hardwoods		
1920	8,240	6,114	4,873	4,703	4,157	546	170	1,241	2,126
1921	6,621	4,557	3,476	3,409	3,068	341	67	1,082	2,064
1922	9,022	5,549	4,537	4,449	3,955	494	88	1,012	3,473
1923	9,957	5,873	4,539	4,435	3,947	488	104	1,334	4,084
1924	10,194	5,768	4,517	4,398	3,875	523	119	1,251	4,426
1925	10,778	6,094	4,624	4,468	3,963	505	156	1,470	4,684
1926	12,106	6,766	5,403	5,222	4,679	543	181	1,363	5,340
1927	12,206	6,751	5,213	4,927	4,351	576	286	1,538	5,455
1928	12,928	7,160	5,641	5,185	4,620	565	456	1,519	5,787
1929	13,898	7,645	6,347	5,786	5,080	706	561	1,298	6,253
1930	13,188	7,196	5,744	5,148	4,479	669	596	1,452	5,992
1931	12,075	6,723	5,782	5,224	4,702	522	558	941	5,352
1932	10,487	5,633	5,013	4,572	4,129	443	441	620	4,474
1933	12,241	6,582	5,869	5,389	4,726	663	480	712	5,181
1934	12,549	6,797	5,838	5,602	4,947	655	236	959	5,795
1935	13,810	7,628	6,620	6,327	5,561	766	293	1,008	6,135
1936	15,966	8,716	7,527	7,197	6,189	1,008	330	1,189	7,257
1937	18,286	10,394	8,895	8,368	7,364	1,004	527	1,499	7,890
1938	14,902	9,194	7,953	7,760	6,961	799	193	1,241	5,772
1939	17,387	10,816	9,736	9,461	8,543	918	275	1,081	6,975
1940	18,026	13,743	12,369	12,142	10,819	1,323	227	1,374	4,283
1941	21,451	16,580	14,176	13,984	12,446	1,538	192	1,560	4,871
1942	22,259	17,275	14,907	14,753	13,056	1,697	154	1,660	4,994
1943	20,455	15,645	13,580	13,463	11,847	1,616	117	1,355	4,810
1944	21,150	16,758	15,349	15,149	13,180	1,969	200	1,351	4,392
1945	22,795	16,912	15,254	14,851	12,772	2,079	403	1,523	5,883
1946	25,127	17,818	16,966	16,378	14,020	2,359	588	1,675	7,309
1947	28,318	19,714	18,543	17,744	15,313	2,431	771	1,750	8,604
1948	30,297	21,189	20,226	19,061	16,697	2,364	965	1,982	9,108
1949	28,464	19,945	17,619	16,486	14,326	2,160	1,133	1,411	8,519
1950	33,659	23,627	20,716	19,466	16,679	2,787	1,250	1,385	10,939
1951	36,158	26,522	25,128	23,718	20,069	3,649	1,410	2,407	9,637
1952	35,404	26,461	25,045	23,477	20,002	3,475	1,568	2,108	8,943
1953	37,774	28,141	26,322	24,787	20,707	4,080	1,535	1,941	9,633
1954	38,056	29,436	26,972	25,471	20,945	4,526	1,501	1,562	8,620
1955	41,989	33,356	30,948	28,598	23,363	5,234	2,350	1,704	8,633
1956	45,448	35,749	35,196	32,146	26,212	5,934	3,050	1,762	8,699
1957	44,241	35,746	34,422	30,676	24,601	6,075	3,746	1,666	8,495
1958	43,592	35,248	33,239	28,090	22,445	5,646	5,149	1,260	8,344
1959	47,895	38,691	36,716	30,583	23,380	7,202	6,134	1,055	8,204
1960	48,730	40,485	40,012	33,468	25,454	8,014	6,944	1,156	8,718
1961	50,316	42,191	40,272	32,118	23,997	8,121	8,155	1,162	8,129
1962	52,855	44,070	42,772	33,811	24,866	8,945	8,961	1,292	8,789
1963	54,610	46,435	44,708	34,471	25,044	9,426	10,237	1,543	8,175
1964 2/	58,306	49,711	48,477	37,289	27,209	10,080	11,188	1,391	8,829

1/ Data may not add to totals because of changes in inventories, rounding, and statistical discrepancies in imports.
2/ Preliminary.

Sources: U.S. Department of Commerce, Bureau of the Census, Current Industrial Reports: Pulp, Paper and Board Series M26A (Annual); United States Imports of Merchandise for Consumption FT 110 (Washington: U.S. Government Printing Office, Annual); United States Exports of Domestic and Foreign Merchandise FT 410 (Washington: U.S. Government Printing Office, Annual). American Paper and Pulp Association, Monthly Statistical Summary No. 3 (New York: American Pulp and Paper Association). American Pulpwood Association, Pulpwood Statistics (New York: American Pulpwood Association, Annual). U.S. Department of Agriculture, Forest Service.

Table 2.--Pulpwood [illegible] manufacture of [illegible] in the United States [illegible] produced, 1947-64[1]

Pulping process	1947			1954			1958			1963			1964		
	Pulpwood consumption		Wood pulp production	Pulpwood consumption		Wood pulp production	Pulpwood consumption		Wood pulp production	Pulpwood consumption		Wood pulp production	Pulpwood consumption		Wood pulp production
	Total	Per ton of pulp produced		Total	Per ton of pulp produced		Total	Per ton of pulp produced		Total	Per ton of pulp produced		Total	Per ton of pulp produced	
	Thousand cords	Cords	Thousand tons	Thousand cords	Cords	Thousand tons	Thousand cords	Cords	Thousand tons	Thousand cords	Cords	Thousand tons	Thousand cords	Cords	Thousand tons
Dissolving and special alpha	5,610	2.01	2,796	1,590	2.09	760	1,727	1.86	929	3,040	2.22	1,371	3,196	2.19	1,457
Sulfite				4,674	1.96	2,383	4,683	1.97	2,381	[2] 6,635	[2] 2.15	[2] 3,080	[2] 6,232	[2/] 2.05	[2/] 3,036
Sulfate	9,489	1.77	5,357	17,664	1.80	9,812	21,193	1.72	12,316	28,644	1.60	17,941	32,327	1.62	20,006
Soda	957	1.95	492	919	1.90	430	572	1.33	429	[3]	[3/]	[3/]	[3/]	[3/]	[3/]
Groundwood	2,009	.98	2,050	2,546	1.02	2,485	2,640	.91	2,890	3,753	1.08	3,468	3,606	1.00	3,596
Semichemical	1,281	1.02	1,252	1,353	1.13	1,198	1,564	.96	1,622	2,900	1.10	2,629	2,831	1.04	2,712
Defibrated and exploded[4]				1,033	.87	1,189	966	.79	1,228	1,464	.90	1,632	1,517	.94	1,621
Total	19,345	1.62	11,946	29,679	1.63	18,256	[2/] 35,144	1.61	21,796	46,435	1.54	30,121	49,711	1.53	32,429

[1/] Data may not add to totals because of rounding.
[2/] Preliminary.
[3/] Soda included in sulfite.
[4/] Includes chemical and mechanical screenings.
[5/] Includes 1,799 thousand cords not reported by pulping process.

Sources: U.S. Department of Commerce, Bureau of the Census, Census of Manufactures: 1947, 1954; 1958 MC-26A (Washington: U.S. Government Printing Office); Current Industrial Reports: Pulp, Paper and Board. U.S. Department of Agriculture, Forest Service.

[illegible] consumed in the manufacture of wood pulp in the United States, by type of pulp produced, 1920-62

Year	Total			Sulfite			Sulfate 2/			Soda			Groundwood			Semichemical		
	Pulpwood consumption		Wood pulp production	Pulpwood consumption		Wood pulp production	Pulpwood consumption		Wood pulp production	Pulpwood consumption		Wood pulp production	Pulpwood consumption		Wood pulp production	Pulpwood consumption		Wood pulp production
	Total	Per ton of pulp produced		Total	Per ton of pulp produced		Total	Per ton of pulp produced		Total	Per ton of pulp produced		Total	Per ton of pulp produced		Total	Per ton of pulp produced	
	Thousand cords	Cords	Thousand tons	Thousand cords	Cords	Thousand tons	Thousand cords	Cords	Thousand tons	Thousand cords	Cords	Thousand tons	Thousand cords	Cords	Thousand tons	Thousand cords	Cords	Thousand tons
1920	6,114	1.60	3,822	3,202	2.02	1,586	397	2.10	189	924	2.00	463	1,591	1.00	1,584	--	--	--
1921	4,557	1.58	2,876	2,368	2.07	1,142	292	2.12	138	610	2.03	301	1,287	1.02	1,260	--	--	--
1922	5,549	1.58	3,522	2,765	2.01	1,374	503	2.06	244	787	1.87	420	1,494	1.01	1,484	--	--	--
1923	5,873	1.55	3,789	2,864	2.03	1,411	605	1.94	312	836	1.88	445	1,568	1.00	1,568	--	--	--
1924	5,768	1.55	3,723	2,691	2.01	1,337	626	2.07	303	807	1.83	441	1,644	1.00	1,643	--	--	--
1925	6,094	1.54	3,962	2,848	2.03	1,403	810	1.98	410	865	1.83	473	1,571	.97	1,612	--	--	--
1926	6,766	1.54	4,395	3,144	2.02	1,558	996	1.92	520	901	1.81	497	1,726	.98	1,764	--	--	--
1927	6,751	1.57	4,313	3,095	1.99	1,553	1,177	1.95	603	901	1.85	487	1,566	.97	1,610	12	1.00	12
1928	7,160	1.59	4,511	3,197	2.05	1,559	1,435	1.85	774	928	1.90	489	1,559	.97	1,611	41	1.37	30
1929	7,645	1.57	4,863	3,402	2.01	1,689	1,701	1.87	911	925	1.78	521	1,560	.95	1,638	57	1.43	40
1930	7,196	1.55	4,630	3,135	2.00	1,567	1,693	1.78	950	850	1.79	474	1,468	.94	1,560	50	1.67	30
1931	6,723	1.52	4,409	2,782	1.96	1,418	1,771	1.71	1,033	686	1.83	374	1,371	.95	1,449	113	1.30	87
1932	5,633	1.50	3,760	2,151	1.88	1,146	1,709	1.66	1,029	528	1.81	291	1,144	.95	1,203	101	1.51	67
1933	6,582	1.54	4,276	2,568	1.93	1,328	2,118	1.68	1,259	665	1.71	388	1,110	.93	1,198	120	1.71	70
1934	6,797	1.53	4,436	2,839	1.96	1,446	2,024	1.62	1,246	631	1.78	354	1,203	.93	1,297	99	1.74	57
1935	7,628	1.55	4,926	3,112	1.97	1,580	2,426	1.65	1,468	709	1.70	418	1,266	.93	1,356	114	1.70	67
1936	8,716	1.53	5,695	3,484	1.91	1,822	2,940	1.64	1,795	796	1.66	479	1,366	.93	1,476	130	1.65	79
1937	10,394	1.58	6,573	4,318	2.02	2,140	3,562	1.67	2,139	893	1.76	508	1,480	.92	1,601	142	1.07	133
1938	9,194	1.55	5,934	3,090	1.92	1,606	4,026	1.65	2,443	718	1.82	395	1,219	.91	1,333	141	1.18	119
1939	10,816	1.55	6,993	3,689	1.90	1,946	4,859	1.64	2,963	764	1.73	442	1,316	.91	1,445	188	1.24	152
1940	13,743	1.53	8,960	4,966	1.90	2,608	5,975	1.59	3,748	979	1.84	532	1,609	.99	1,633	214	1.30	165
1941	16,580	1.60	10,375	5,546	1.90	2,919	7,197	1.59	4,527	883	1.84	480	--	--	--	--	--	--
1942	17,275	1.60	10,783	5,568	1.90	2,930	7,534	1.59	4,738	850	1.84	462	--	--	--	--	--	--
1943	15,645	1.62	9,680	4,629	1.90	2,437	6,735	1.59	4,236	771	1.84	419	--	--	--	--	--	--
1944	16,758	1.66	10,108	4,796	2.01	2,386	8,051	1.77	4,549	805	1.95	413	--	--	--	--	--	--
1945	16,912	1.66	10,167	4,743	2.01	2,360	7,915	1.77	4,472	838	1.94	430	--	--	--	--	--	--
1946	17,818	1.68	10,607	4,978	2.01	2,476	8,121	1.77	4,588	929	1.95	476	--	--	--	--	--	--
1947	19,714	1.65	11,946	5,610	2.01	2,796	9,489	1.77	5,357	957	1.95	492	--	--	--	--	--	--
1948	21,183	1.65	12,872	5,651	2.01	2,811	10,644	1.77	6,014	994	1.95	510	--	--	--	--	--	--
1949	19,945	1.63	12,207	5,098	2.01	2,536	10,580	1.77	5,977	960	1.95	492	--	--	--	--	--	--
1950	23,627	1.59	14,849	5,716	2.01	2,844	13,288	1.77	7,506	1,018	1.95	522	--	--	--	--	--	--
1951	26,522	1.61	16,524	6,081	1.98	3,066	15,586	1.80	8,647	852	1.91	446	--	--	--	--	--	--
1952	26,461	1.61	16,473	5,863	1.99	2,952	15,672	1.80	8,687	813	1.91	425	--	--	--	--	--	--
1953	28,141	1.60	17,537	5,678	1.98	2,861	17,301	1.81	9,584	817	1.91	428	--	--	--	--	--	--
1954	29,436	1.62	18,256	5,998	1.99	3,016	18,025	1.81	9,985	819	1.90	430	--	--	--	--	--	--
1955	33,356	1.61	20,740	6,463	1.99	3,251	20,922	1.81	11,577	841	1.91	440	--	--	--	--	--	--
1956	35,749	1.62	22,131	6,640	1.99	3,344	22,421	1.81	12,411	914	1.91	479	--	--	--	--	--	--
1957	35,746	1.64	21,800	6,317	2.02	3,131	21,826	1.76	12,390	724	1.69	428	--	--	--	--	--	--
1958	35,248	1.62	21,796	5,776	2.01	2,867	22,463	1.76	12,760	725	1.69	429	--	--	--	--	--	--
1959	38,691	1.59	24,383	6,168	2.02	3,051	25,293	1.76	14,357	812	1.69	481	--	--	--	--	--	--
1960	40,485	1.60	25,316	6,644	2.03	3,272	26,421	1.76	15,034	709	1.69	420	--	--	--	--	--	--
1961	42,191	1.59	26,523	6,717	2.03	3,303	27,921	1.76	15,888	737	1.69	436	--	--	--	--	--	--
1962	44,070	1.58	27,908	6,832	2.04	3,350	29,485	1.76	16,782	718	1.69	425	--	--	--	--	--	--

1/ Data may not add to totals because of rounding and the inclusion in the totals of pulpwood and wood pulp not shown separately by pulping process.
2/ Includes dissolving and special alpha pulps.

Sources: U.S. Department of Commerce, Bureau of the Census, Current Industrial Reports: Pulp, Paper and Board. United States Pulp Producers Association, Inc., Wood Pulp Statistics (New York: United States Pulp Producers Association, Inc., 1963, Annual). U.S. Department of Agriculture, Forest Service.

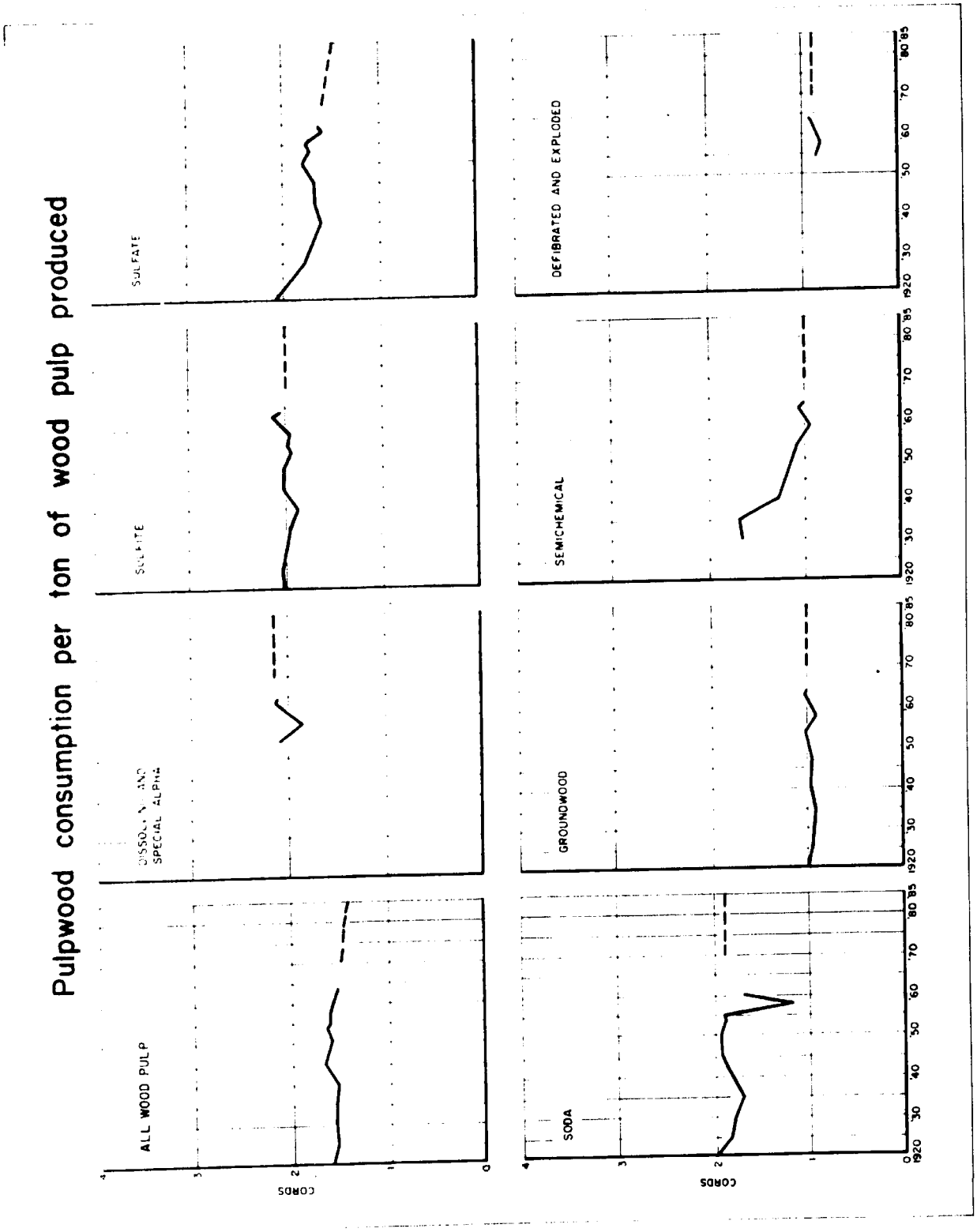

Pulpwood consumption per ton of wood pulp produced
ALL WOOD PULP
SULFATE
SULFITE
GROUNDWOOD
SEMICHEMICAL
DEFIBRATED AND EXPLODED
SODA
CORDS
1920
30
40
50
60
70
80
85

Figure 1

APPENDIX H

DEFINITION OF TERMS

NOTE: All definitions of grades of paper and board and wood pulp shown in this Appendix were taken from or based upon definitions in The Dictionary of Paper (New York: American Paper and Pulp Association, 2nd edition, 1951 and 3rd edition, 1965). Definitions of statistical terms were taken from or based upon material in Methods of Correlation and Regression Analysis, Ezekiel and Fox.

DEFINITIONS

Bending board: Includes (a) Folding boxboard. A paperboard used for the manufacture of collapsible or folding cartons. It is made of wood pulp, waste papers, or a combination of these and may be unlined, single vat lined, or coated. It is made in thicknesses of 0.013 to 0.052 of an inch and in weights from 60 to 180 pounds per 1,000 square feet. It possesses bending qualities and usually has a finish to permit printing or lithographing colored designs. This group includes such products as bending chipboard, clay-coated boxboard, mist gray suit board, single manila-lined chip, solid (or filled) newsboard, and white patent-coated news. (b) Special food board. A general term applied to paperboards used in the packaging of milk, frozen foods, other similar foods, and as containers for hot and cold drinks. Includes milk container stock; cup stock; ice cream and food pail stock; plate, dish, and tray stock; frozen food container stock; and other similar boards.

Board. (See paperboard). In addition to the grades classified by the Bureau of the Census as paperboard, the term as used in this study includes wet machine board and building board.

Book paper. A general term used to define a class or group of papers having in common physical characteristics that, in general, are most suitable for the graphic arts, exclusive of newsprint. These physical characteristics are varied to meet the requirements of the type of impress employed and the objective use of the article produced.

Building board. A general term describing paperboard used by the building trades. Insulating boards such as building board, roof insulation board, interior board, shingle backer, sheathing board and wallboard and hardboards are the principal items.

Chipboard. A paperboard used for many purposes that may or may not have specifications of strength, color, or other characteristics. It is normally made from paper stock with a relatively low density in thicknesses of 0.006 of an inch and up. Lightweight grades are made on both the fourdrinier and cylinder machines, the heavier weights on cylinder machines only. It may be a filled sheet or a solid sheet. (a) Combination chipboard has paper stock as a base or center and is vat lined on one or both sides with a different grade or stock--usually of a higher grade and possessing a smoother and better appearing surface. News grade of mechanical pulp, blank news, etc., are used for the vat liner. (b) Solid chipboard is unlined and is made of paper stock throughout.

Chips. A small piece of wood produced by a chipper in a form suitable for processing into wood pulp.

Coarse paper. A term applied to various grades of paper used for industrial purposes as opposed to grades used for cultural purposes. They can be bleached or unbleached, usually range from a basis weight of 18 pounds or more (24 x 36--500), and frequently are colored or printed or both. Grades falling under this classification include

wrapping papers, bag papers, gummed tapes, building papers, heavy duty envelopes, towels, etc. See also industrial paper.

Coated book paper. A paper used in the manufacture of magazines, books, pamphlets, folders, and brochures where the use of fine halftone illustrations is necessary. The materials used and the process of manufacture of the base paper are the same as for uncoated book paper. It is well sized and possesses good tearing strength. The base paper is coated with white mineral pigment mixed with adhesive such as casein, starch, latex, resin, or glue either on the paper machine as a part of the process of manufacture or as a separate operation after manufacture of the base paper. Waxes or soaps may also be added to the coating mixtures to add to the finish and feel of the paper. The mineral pigments used include clay, satin white, barium sulfate, calcium carbonate, calcium sulfite, and titanium dioxide, which may be applied as such or as mixtures.

Coefficient of autocorrelation. A measure of the correlation between each item of a series and an item of the same series which follows next in time. A coefficient of autocorrelation that differs significantly from zero means that the basic conditions of simple sampling have probably not been met.

Coefficient of correlation. A measure of the relationship between two variables when the relationship is linear.

Coefficient of determination. A measure of the percent of change in the values of the dependent variable which is associated with changes in the values of the independent variable when the relationship is linear.

Coefficient of multiple correlation. A measure of the relationship between a dependent variable and two or more independent variables when the relationship is linear.

Coefficient of multiple determination. A measure of the percent of change in the values of the dependent variable which is associated with changes in the values of two or more independent variables when the relationship is linear.

Coefficient of partial correlation. A measure of the extent to which an independent variable explains changes in the dependent variable after all other independent variables are taken into account. Ezekiel and Fox define it as follows: 1/ "The coefficient of partial correlation may be defined as a measure of the extent to which that part of the variation in the dependent variable which was not explained by the other independent factors can be explained by the addition of a new factor."

Coefficient or index of partial correlation. A measure of the extent to which an independent variable explains changes in the dependent variable after all other independent variables in the regression equations are taken into account.

1/ Ezekiel and Fox, op. cit., p. 193.

Construction paper (building paper). A general term applied to a class of paper used in general construction work. These papers are generally produced from strong fibers (rags, wool, screenings, and unbleached kraft pulp). They are used in building construction for sheathing and under flooring and may be converted to such products as roofing, sheathing, and tarred or asphalt-coated vapor barrier.

Container board. A general term designating: (1) solid fibre or corrugated combined board used in the manufacture of shipping containers and related products; (2) the component materials used in the fabrication of corrugated board and solid fibre combined board, i.e., linerboard, corrugating medium, and chipboard.

Correlation model. The correlation model requires strictly random samples from normal bivariate or multivariate universes. In contrast, the regression model has no requirement concerning the universe--if indeed a "natural" underlying universe exists at all.

Cover papers. A term applied to a great variety of papers used for the outside covers of catalogs, brochures, and booklets to enhance the appearance and to provide protection from handling, and for other printed matter in which substantial weight or bulk is important.

Defibrated pulp. A pulp produced mechanically by means of a machine known as a Defibrator. In this process, wood chips are continuously fed into a steam-heated chamber and the mechanical separation of the fibers then takes place at elevated temperatures. Hardwoods or softwoods may be used in the manufacturing process. The yield is high, ranging from 90 to 95 percent on a bonedry basis. The resulting pulp is homogeneous and free and has good felting properties. Defibrated pulps are used principally in the manufacture of hardboard, insulating board, and roofing felt.

Exploded pulp. A pulp produced from almost any kind of wood by subjecting the chips to a very high steam pressure for a short time, usually less than a minute. Sudden release of the pressure produces a violent internal explosion in the cell spaces of the wood, tearing the fibers apart and reactivating the lignin so that it can form a new bond with the fibers. The resulting pulp is brown in color and is used in the manufacture of a hard board suitable for use as a building and insulating material and as a substitute for metals or lumber in the manufacture of a wide range of industrial products.

Fine paper. A general term including writing, bristols, cover, text, and thin papers. Most fine paper is made from chemical pulp, largely sulfite and bleached sulfate although rag pulps are used in producing certain specialty grades such as bond, currency, ledger, and map.

Folding boxboard. A paperboard used for the manufacture of collapsible or folding cartons. It is made of wood pulp, waste papers, or a combination of these and may be unlined, single vat lined, or coated. It is made in thicknesses of 0.013 to 0.052 of an inch and in weights from 60 to 80 pounds per 1,000 square feet. It possesses bending

qualities and usually has a finish to permit printing or lithographing colored designs. This group includes such products as bending chipboard, clay-coated boxboard, mist gray suit board, single manila-lined chip, solid (or filled) newsboard, and white patent-coated news.

Furnish. The mixture of various materials that are blended in the stock suspension from which paper or board is made. The chief constituents are the fibrous material (pulp), sizing materials, wetstrength or other additives, fillers and dyes.

Groundwood paper. A general term applied to a variety of papers made with substantial proportions of mechanical wood pulp together with chemical wood pulps, and used mainly for printing and converting purposes.

Groundwood pulp. The pulp is produced by taking short logs after they have been barked and cleaned and pressing these logs sideways against a revolving natural or artificial pulpstone, thereby reducing them to a fibrous mass of short fibers which discolors in time on exposure to light and air. The wood is almost always softwoods, although in certain instances hardwoods are used. Freedom from pitch is desirable. Groundwood pulp is used in papers where permanence and strength are of minor importance, but where absorbency, bulk, opacity and compressibility are the chief characteristics desired.

Hardboard. A board manufactured from wood or other lignocellulose fibers, refined or partly refined and felted into a panel having a density range of over 26 pounds per cubic foot under carefully controlled optimum combinations of consolidating pressure, heat, and moisture so that the board produced has a characteristic natural ligneous bond.

Income elasticity of demand. The percentage change in quantity demanded resulting from a 1 percent change in income when other factors such as prices are held constant.

Index of correlation. A measure of the relationship between two variables when the relationship is curvilinear.

Index of determination. A measure of the percent of change in the values of the dependent variable which is associated with changes in the values of the independent variable when the relationship is curvilinear.

Index of multiple correlation. A measure of the relationship between a dependent variable and two or more independent variables when the relationship is curvilinear.

Index of multiple determination. A measure of the percent of change in the values of the dependent variables which is associated with changes in the values of two or more independent variables when the relationship is curvilinear.

Industrial paper. A general term including cable paper, tabulating card stock, tag stock, blotting paper, filter paper, and other special industrial and absorbent papers used for industrial purposes.

Insulation board (insulating board). A type of board composed of some fibrous material, such as wood or other vegetable fiber, sized throughout, and felted or pressed together in such a way as to contain a large quantity of entrapped or "dead" air and having a density of 26 pounds or less per cubic foot. It is made either by cementing together several thin layers or forming a nonlaminated layer of the required thickness. It is used in plain or decorative finishes for interior walls and ceilings in thicknesses of 0.5 and 1 inch (in some cases up to 3 inches) and also as a water-repellent finish for house sheathing.

Newsprint. A generic term used to describe paper of the type generally used in the publication of newspapers. The furnish is largely mechanical wood pulp, with some chemical wood pulp. The paper is machine finished and slack sized, and it has little or no mineral loading. It is made in basis weights varying from 30 to 35 pounds (24 x 36--500), the great preponderance being 32 pounds. The term includes standard newsprint and also paper generally similar to it and used for the same purpose but which may exceed to slight degrees the limitations of weight, finish, sizing, and ash applicable to standard newsprint. It does not include printing papers of types generally used for purposes other than newspapers even though such papers may to some extent be used by newspapers.

Paper. (1) General term. The name for all kinds of matted or felted sheets of fiber (usually vegetable but sometimes mineral, animal or synthetic), formed on a fine wire screen from a water suspension. Paper derives its name from papyrus, a sheet made by pasting together thin sections of an Egyptian reed (Cyperus papyrus) and used in ancient times as a writing material. (2) Specific term. One of the two broad subdivisions of paper (general term), the other being board. The distinction between paper and board is not sharp but, generally speaking, paper is lighter in basis weight, thinner, and more flexible than board. Its largest uses are for printing, writing, wrapping, and sanitary purposes, although it is also employed for a very wide variety of other uses.

Paperboard. One of the two broad subdivisions of paper (general term), the other being paper (specific term). The distinction between paperboard and paper is not sharp but broadly speaking, paperboard is heavier in basis weight, thicker, and more rigid than paper. In general, all sheets 12 points (0.012 inch) or more in thickness are classified as paperboard. There are a number of exceptions based upon traditional nomenclature. For example, blotting paper, felts, and drawing paper in excess of 12 points are classified as paper while corrugating medium, chipboard, and linerboard less than 12 points are classified as paperboard. Paperboard is made from a wide variety of furnishes on a number of types of machines, principally cylinder and fourdrinier. The broad classes are: (1) container board, which is used for corrugated cartons, (2) boxboard which is further divided into (a) folding boxboard, (b) special food board, (c) setup boxboard, and (3) all other special types such as automobile board, building board, tube board, etc.

Pulpwood. The wood used in the manufacture of wood pulp.

Regression model. A model in which the values of the independent variable or variables are selected by the analyst as typical, with no requirement that the distributions of the variables in the sample be representative of those in the universe--if indeed a "natural" underlying universe exists at all. This is in contrast to the correlation model which requires strictly random samples from normal bivariate or multivariate universes.

Sanitary and tissue paper. A general term indicating a class of papers of characteristic gauzy texture and in some cases fairly transparent, made in weights lighter than 18 pounds (24 x 36--500). In addition to sanitary tissues, they include wrapping tissue, waxing tissue stock, twisting tissue stock, fruit and vegetable wrapping tissue stock, and crepe wadding. They are made on any type of paper machine and from any type of pulp or in some cases from waste paper. They may be glazed or unglazed and are used for a wide variety of purposes.

Screenings. Screenings are produced from the coarse fibers, fiber bundles, shives, partially cooked chips, and other materials removed from unbleached wood pulp in the screening operation. After separation by screening, it is the usual practice for the pulp mill partially to defiber this material by mechanical means, such as a jordan or other refiner, before running it into laps or sheets. Screenings are used principally in the manufacture of coarse grades of paper and paperboard, such as mill wrapper, and as a substitute for chipboard, corrugating material, and insulation board. Screenings are produced in all the chemical pulping processes, but normally only the screenings from the sulfate, and acid and neutral sulfite processes are used commercially. Groundwood screenings are occasionally refined and admixed with virgin stock and may be used in the coarsest grades of board.

Semichemical pulp. Semichemical pulp is so called because only a part of the ligneous portion of the wood is removed during cooking, and consequently, high yields are obtained from this process. The term "semichemical" indicates a relatively mild degree of cooking, such as a quick-cook sulfite or sulfate cook, and is not specific to any of the chemical pulping processes. After cooking, the softened chips are mechanically disintegrated by a suitable type of refiner. Although some semichemical pulp is now being bleached by the peroxide method for use in the manufacture of printing papers, this type of pulp is chiefly used in the unbleached state, and is characterized by a relatively low color (dependent upon the wood used) and yields a sheet of paper or board which has a dense formation and a high degree of stiffness and rigidity.

Setup boxboard. A general term for paperboard used in making boxes in rigid form as contrasted with a folding or collapsible box. It may be a solid or combination board depending on the style of box; it ranges in thickness from 0.016 to 0.065 of an inch and weighs 60 to 206 pounds per 1,000 square feet. Stiffness, rigidity, and resistance to abuse are essential qualities.

Soda pulp. The term used for the pulp in which the active cooking agent is caustic soda, the digestion taking place at fairly high temperatures. Soda pulp is made principally from broadleaf woods, such as aspen, birch, maple, gum, and tulip poplar. When bleached it reaches a fairly white color. In general, owing to the natural shortness of the fiber (1 to 1.5 mm.) it possesses very little physical strength but imparts the desirable properties of smoothness, bulk, opacity, and uniform formation for printing requirements. Some soda pulp is also made from coniferous woods. This pulp is soft in texture and is stronger than that produced from broadleaf woods.

Special food board. A general term applied to paperboards used in the packaging of milk, frozen foods, other similar foods, and as containers for hot and cold drinks. Includes milk container stock; cup stock; ice cream and food pail stock; plate, dish, and tray stock; frozen food container stock; and other similar boards.

Standard error of estimate. A measure of the closeness with which values of a dependent variable can be estimated from the values of independent variables. According to Ezekiel and Fox: 2/ "The standard error of estimate can be used to indicate the probable reliability of a series of estimates of the values of the dependent variable for new observations when only the values of the independent variable are known, but only where it is definitely known that the new cases are drawn at random from exactly the same universe--as were the observations from which the relation was determined. In case they do not represent exactly the same conditions--as if, for example, they represent a different period of time--then the standard error of estimate has meaning only with respect to the scatter of the residuals around the regression line for the cases used in determining the relationship. The standard error of estimate is stated in the same unit as the original independent variable. Where the dependent variable is in pounds the standard error of estimate will be in pounds, where it is in tons the standard error will be in tons, and where it is in logarithms the standard error will be in logarithms."

Standard error of forecast. The standard error applicable to estimates of the most probable values of the dependent variable calculated from new observations of the independent variable.

Sulfate pulp. A term commonly used for all grades of pulp cooked by the process in which the make-up chemical is essentially sodium sulfate. Originally, sulfate pulps were used for the most part in the manufacture of various grades of paper and paperboard where physical strength was of primary importance. However, increasing amounts of sulfate pulps are being used for absorbent tissues and wadding and for chemical conversion grades. Although the stronger grades are made from softwoods, very large quantities of hardwood kraft pulps are produced.

Sulfite pulp. Sulfite pulp is used either in the bleached or unbleached state in nearly all classes of papers, and bleached sulfite pulp is used in the manufacture of rayon and cellulose esters and ethers.

2/ Ezekiel and Fox, ibid.

Although some bleached sulfite is made from hardwoods, it is manufactured usually from coniferous woods of low resin content, such as spruce, balsam, fir and hemlock, by dissolution of the ligneous material (lignin) with calcium bisulphite cooking acid. Dolomite limes, containing a fair percentage of magnesium along with the calcium, are sometimes used when it is economical to do so. A great deal of work is being done at the present time both experimentally and commercially, on the use of soluble bases such as sodium, ammonium, and magnesium, in connection with the utilization or burning of the waste liquor to avoid stream pollution.

t-ratio. A measure of the probability that the given value of b might have been obtained by chance from a population in which the true regression coefficient is zero.

Tests of significance--t-test and F-test. Tests to determine the probability of a difference between measures being due to chance.

Text papers. A paper of fine quality and texture for printing. Text papers are manufactured in white and colors, from bleached chemical wood pulp or cotton fiber content furnishes with a deckled or plain edge, and are sometimes watermarked. Designed for advertising printing, the principal use of text papers is for booklets, brochures, fine books, announcements, annual reports, menus, folders, and the like.

Thin papers. Any lightweight paper. The term is usually applied to such papers as Bible, carbonizing, cigarette, condenser, manifold, and like papers, but not to facial or toilet tissue.

Uncoated book paper. An uncoated paper used in the manufacture of printed material such as magazines, books, pamphlets, folders, and brochures or converted products such as envelopes, tablets, adding machine paper, box lining, trading stamps, etc. The furnishes used are generally various combinations of bleached chemical wood pulps.

Wet machine board. Certain types of boards manufactured on a wet machine which are dried and finished; among these are binders, book, coaster, counter, dobby, electrical pressboard, filter friction, fuller, genuine pressboard, heeling, innersole, leather, matrix, middlesole, panel, shank, shoe, and trunk fibreboard.

Wood pulp. Wood pulp is pulp manufactured either by mechanical or chemical means or both from softwood or hardwood trees. It is used as part or all of the fiber composition in practically every type of paper and constitutes approximately 90 percent of the virgin pulp fiber used by the world's paper and board industry. In addition to its use by the paper and board industry, bleached and purified chemical wood pulp is widely employed for rayon and other products involving a chemical conversion of the cellulose fiber.

Writing papers. A paper suitable for pen and ink, pencil, typewriter, or printing. It is made in a wide range of qualities from chemical and mechanical wood and rag pulp, or mixtures of rag and

chemical pulp or chemical and mechanical pulp. It is made in basis weights of 13 to 24 pounds (17 x 22--500). The most significant class property is good writing and ruling surface. For some uses, good strength and erasability are also necessary.

BIBLIOGRAPHY

American Paper and Pulp Association. The Dictionary of Paper. New York: American Paper and Pulp Association, 1965.

_____. Monthly Statistical Summary. New York: American Paper and Pulp Association, Monthly.

_____. The Statistics of Paper. New York: American Paper and Pulp Association, 1960 and subsequent annual supplements.

American Pulpwood Association. Pulpwood Statistics. New York: American Pulpwood Association, Annual.

Anderson, R. L. "The Problems of Autocorrelation in Regression Analysis." Journal of the American Statistical Association, Vol. 49, No. 265 (1954) 113-129.

Arthur D. Little, Inc. Ohio River Basin Comprehensive Survey, Appendix B, Projective Economic Study. Cambridge: Arthur D. Little, Inc., 1964.

Board of Governors of the Federal Reserve System. Industrial Production 1957-59 Base, Washington.

Boulding, Kenneth E. Economic Analysis. New York: Harper & Brothers, 1948.

Cochrane, D., and Orcutt, G. H. "Application of Least Squares Regression to Relationships Containing Auto-Correlated Error Terms." Journal of the American Statistical Association, Vol. 44, No. 254 (1949) 32-61.

Colm, Gerhard. "Economic Projections: Tools of Economic Analysis and Decision Making." American Economic Review, Vol. 48, No. 2 (1958) 178-187.

Council of Economic Advisors. Economic Indicators. Washington: U.S. Government Printing Office, Monthly.

_____. Economic Report of the President. Washington: U.S. Government Printing Office, Annual.

Cramer, Harold. The Elements of Probability Theory and Some of its Applications. New York: John Wiley and Sons, 1955.

Crom, Richard J., and Maki, Wilburn R. "Adjusting Dynamic Models to Improve Their Predictive Ability." Journal of Farm Economics, Vol. 47, No. 4 (1965) 963-972.

Daly, Rex F. "Long-Run Economic Projections: A Review and Appraisal." Agricultural Economics Research, Vol. 15, No. 4 (1963) 113-121.

Denison, Edward F. The Sources of Economic Growth in the United States and the Alternatives Before Us. New York: Committee for Economic Development, 1962.

Duesenberry, James S. Business Cycles and Economic Growth. New York: McGraw-Hill Book Company, Inc., 1958.

Eberhardt, L. E. "Characteristics and Uses of Various High Yield Pulps." Paper Trade Journal, Vol. 145, No. 15 (1961) 49-50, 52-53, 56.

BIBLIOGRAPHY--Continued

Ezekiel, Mordecai. "Statistical Analysis and the Laws of Price." Quarterly Journal of Economics, Vol. 42, No. 1 (1927) 199-227.

Ezekiel, Mordecai, and Fox, Karl A. Methods of Correlation and Regression Analysis. New York: John Wiley and Sons, 1959.

Ferber, Robert. Statistical Techniques in Market Research. New York: McGraw-Hill Book Company, Inc., 1949.

Fisher, Joseph L., and Potter, Neal. World Prospects for Natural Resources, Some Projections of Demand and Indicators of Supply to the Year 2000. Baltimore: Johns Hopkins Press, 1964.

Foote, Richard J. "A Comparison of Single and Simultaneous Equation Techniques." Journal of Farm Economics, Vol. 37, No. 5 (1955) 975-990.

_____. Analytical Tools for Studying Demand and Price Structures. U.S. Dept. of Agriculture Handbook No. 146. Washington: U.S. Government Printing Office, 1958.

Foote, Richard J., and Fox, Karl A. Analytical Tools for Measuring Demand. U.S. Dept. of Agriculture Handbook No. 64. Washington: U.S. Government Printing Office, 1954.

Fox, Karl A. The Analysis of Demand for Farm Products. U.S. Dept. of Agriculture Technical Bulletin No. 1081. Washington: U.S. Government Printing Office, 1953.

Friedman, Joan, and Foote, Richard J. Computational Methods for Handling Systems of Simultaneous Equations. U.S. Dept. of Agriculture Handbook No. 94. Washington: U.S. Government Printing Office, 1957.

Goldberger, Arthur S. Econometric Theory. New York: John Wiley & Sons, Inc., 1964.

Goldman, Morriss R., Marimout, Martin L., and Vaccara, Beatrice N. "The Interindustry Structure of the United States, A Report on the 1958 Input-Output Study." Survey of Current Business, U.S. Dept. of Commerce, Office of Business Economics, Vol. 44, No. 11 (1964) 10-29.

Gregory, G. Robinson. "A Statistical Investigation of Factors Affecting the Market for Hardwood Flooring." Forest Science, Vol. 6, No. 2 (1960) 123-134.

_____. "An Analysis of Forest Production Goal Methodology." Journal of Forestry, Vol. 53, No. 4 (1955) 247-252.

_____. "Forest Growth Goals in a Private Enterprise Economy." Journal of Forestry, Vol. 53, No. 11 (1955) 816-821.

Guthrie, John A. The Economics of Pulp and Paper. Pullman: State College of Washington Press, 1950.

_____. Western Forest Industry, An Economic Outlook. Baltimore: Johns Hopkins Press, 1961.

BIBLIOGRAPHY--Continued

Guthrie, John A., and Iulo, William. Some Economic Aspects of the Pulp and Paper Industry With Particular Reference to Washington and Oregon. Pullman: Washington State University, 1963.

Hansen, Wilmer E. "Du Pont's Developments in Fiber Technology for the Paper Industry." Paper Trade Journal, Vol. 143, No. 24 (1959) 66-70.

Holland, I. Irving. Some Factors Affecting the Consumption of Lumber in the United States, With Emphasis on Demand. Unpublished Ph.D Dissertation, Berkeley: University of California, 1955.

Janes, Raymond L. "A Survey of Modern Methods of Wood Pulp Manufacture." Paper Trade Journal, Vol. 142, No. 8 (1958) 44-51.

Jensen, Chester E. Algebraic Description of Forms in Space. U.S. Dept. of Agriculture, Forest Service. Columbus: Central States Forest Experiment Station, 1964.

Kendall, M. G. "Regression, Structure, and Functional Relationship." Biometrika, Vol. 38, No. 1 (1951) 11-25.

Knowles, James W., and Warden, Charles B., Jr. The Potential Economic Growth in the United States (86th Cong., 2d Sess., Study Paper No. 20, Joint Economic Committee). Washington: U.S. Government Printing Office, 1960.

Ladd, George W. "Effects of Shocks and Errors in Estimation: An Empirical Comparison." Journal of Farm Economics, Vol. 38, No. 2 (1956) 485-495.

Lambert, J. E. "High Yield Sulphite Pulping--What Has Been Accomplished and Where is it Going." Paper Trade Journal, Vol. 144, No. 43 (1960) 36-43.

Leontief, Wassily W. The Structure of the American Economy. Cambridge: Harvard University Press, 1941.

Lindley, D. V. "Regression Lines and the Linear Functional Relationships." Journal of the Royal Statistical Society (Supplement) Vol. 9, No. 2 (1947) 218-244.

Minard, G. M. "Sulphite Pulp: Obsolescence or Maturity?" Pulp and Paper Magazine of Canada, Vol. 65, No. C (1964) 79-82.

National Bureau of Economic Research. Long-Range Economic Projection, Studies in Income and Wealth, Vol. 16. Princeton: Princeton University Press, 1954.

Nelson, Richard R. "Aggregate Production Functions and Medium-Range Growth Projections" The American Economic Review, Vol. 54 (1964) 575-606.

Newsprint Association of Canada. Newsprint Data: 1965. Montreal: Newsprint Association of Canada, 1965.

BIBLIOGRAPHY--Continued

Outdoor Recreation Resources Review Commission Staff, National Planning Association, and U.S. Department of Labor, Bureau of Labor Statistics. Projections to the Years 1976 and 2000: Economic Growth, Population, Labor Force, Leisure, and Transportation, ORRRC Study Report No. 23. Washington: U.S. Government Printing Office, 1962.

Resources for the Future, Inc. Resources in America's Future, Patterns of Requirements and Availabilities, 1960-2000. Baltimore: Johns Hopkins Press, 1963.

Richardson, S. D. Forestry in Communist China. Baltimore: The Johns Hopkins Press, 1966.

Riihinen, Paivio. "Sales of Newsprint in Finland, 1949-50, Models for Short Term Forecasting." Acta Forestalia Finnica 74. Helsinki, 1962.

Schultz, Henry. The Theory and Measurement of Demand. Chicago: University of Chicago Press, 1938.

Schupack, Mark B. "The Predictive Accuracy of Empirical Demand Analyses." Economic Journal, Vol. 72, No. 287 (1962) 550-575.

Sherwood, Peter W. "Non-Woven Fabrics: New Market for the Paper Industry." Pulp and Paper Magazine of Canada, Vol. 62, No. 11 (1961) 77-83.

Slatin, Benjamin. "Long-Term Forecasts for the Pulp, Paper and Paperboard Industry." Paper Trade Journal, Vol. 147, No. 50 (1963) 36-43.

Snedecor, George W. Statistical Methods. Ames: Iowa State College Press, 1956.

Stanford Research Institute. America's Demand for Wood, 1929-1975. Stanford: Stanford Research Institute, 1954.

Thiesmeyer, Lincoln R. "Revolutionary Trends in Pulp and Paper Manufacture." Pulp and Paper Magazine of Canada, Vol. 62, No. 3 (1961) 61-64.

Udell, Jon G. 1975 U.S. Newsprint Consumption. New York: American Newspaper Publishers Association, 1965.

United Nations, Food and Agriculture Organization. European Timber Trends and Prospects, A New Appraisal, 1950-1975. New York, 1964.

_____. Latin American Timber Trends and Prospects. New York, 1963.

_____. Pulp and Paper Prospects in Asia and the Far East. Bangkok, 1962.

_____. Pulp and Paper Prospects in Latin America. New York, 1955.

_____. Pulp and Paper Prospects in Western Europe. Rome, 1963.

BIBLIOGRAPHY--Continued

_____. Timber Trends and Prospects in the Asia-Pacific Region. Geneva, 1961.

_____. World Pulp and Paper Resources and Prospects. New York, 1954.

U.S. Congress, Joint Committee on the Economic Report. Potential Economic Growth of the United States During the Next Decade, 83d Cong., 2d Sess., 1954.

U.S. Department of Agriculture, Forest Service. Timber Resources for America's Future. Forest Resource Report No. 14. Washington: U.S. Government Printing Office, 1958.

_____. Timber Trends in the United States. Forest Resource Report No. 17. Washington: U.S. Government Printing Office, 1965.

U.S. Department of Commerce, Bureau of the Census. Census of Manufactures: 1947; 1954; 1958. Washington: U.S. Government Printing Office.

_____. Construction Reports: Construction Activity, C30, Monthly.

_____. Construction Reports: Housing Starts, C20, Monthly.

_____. Current Industrial Reports: Pulp, Paper and Board, Series M26A, Monthly and Annual.

_____. Current Population Reports: Population Characteristics, Series P-20.

_____. Current Population Reports: Population Estimates, Series P-25.

_____. Historical Statistics of the United States, Colonial Times to 1957. Washington: U.S. Government Printing Office, 1960.

_____. "Interim Revised Projections of the Number of Households and Families: 1965 to 1980." Current Population Reports: Population Characteristics, Series P-20, No. 123, 1963.

_____. "Projections of the Population of the United States by Age and Sex: 1964 to 1985 With Extensions to 2010." Current Population Reports: Population Estimates, Series P-25, No. 286, 1964.

_____. United States Exports of Domestic and Foreign Merchandise, FT 410. Washington: U.S. Government Printing Office, Annual.

_____. United States Imports of Merchandise for Consumption, FT 110. Washington: U.S. Government Printing Office, Annual.

U.S. Department of Commerce, Office of Business Economics. Survey of Current Business, Monthly.

U.S. Department of Labor, Bureau of Labor Statistics. Wholesale Prices and Price Indexes, Monthly.

U.S. Departments of Labor and Commerce. Construction Volume and Costs 1915-1956: Construction Review. Washington: U.S. Government Printing Office, 1958.

BIBLIOGRAPHY--Continued

U.S. House of Representatives, Committee on Interstate and Foreign Commerce. Pulp, Paper and Board Supply-Demand, Union Calendar No. 292, House Report No. 693, 88th Cong., 1st Sess., 1963.

U.S. Senate, Senate Select Committee on National Water Resources. "Population Projections and Economic Assumptions." Water Resources Activities in the United States, Committee Print No. 5, 86th Cong., 2d Sess., 1960.

U.S. Pulp Producers Association, Inc. Wood Pulp Statistics. New York: U.S. Pulp Producers Association, Inc., Annual.

Vaux, Henry J., and Zivnuska, John A. "Forest Production Goals: A Critical Analysis." Land Economics, Vol. 28, No. 4 (1952) 318-327.

Waugh, Albert E. Elements of Statistical Method. New York: McGraw-Hill Book Company, Inc., 1943.

Waugh, Frederick V. Graphic Analysis in Agricultural Economics. U.S. Dept. of Agriculture Handbook No. 128. Washington: U.S. Government Printing Office, 1957.

Waugh, Frederick V., and Been, R. O. "Some Observations About the Validity of Multiple Regressions." The Statistical Journal, Vol. 2, No. 1 (1939) 6-14.

Williams, E. J. Regression Analysis. New York: John Wiley & Sons, Inc., 1959.

Wilson, Albert W. "Scandinavia Improves in World Competition." Pulp and Paper, Vol. 39, No. 40 (1965) 36-40, 44.

Wold, Herman, and Jureen, Lars. Demand Analysis, A Study in Econometrics. New York: John Wiley and Sons., Inc., 1953.

Zivnuska, John A. The Forest Resources of the United States in a World Economy: A Problem Analysis. Berkeley: University of California, School of Forestry, 1965.

_____. "The Future of Wood in a Competitive Market." Forest Industries, Vol. 90, No. 11 (1963) 40-41, 101, 104, 106.

_____. "Production Costs and Growth Goals." Proceedings of the Fifth World Forestry Congress, Vol. 2 (1962) 1075-1078. Washington: National Publishing Company.