ESTIMATES OF INCOME ELASTICITY FROM CONSUMER PANEL DATA

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By

Jerry Glenn West

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Submitted to the School for Advanced Graduate Studies of
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AN ABSTRACT

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ABSTRACT

This study was designed to measure the changes in expenditure for food at home which resulted with increases in income. The data were provided by the Michigan State University consumer panel. Actual changes in expenditure and income were used as contrasted to the usual methods which involve the assumption that differences in consumption between income groups represent the change that would actually occur as incomes are increased.

The panel families were divided into income groups, using both family and per capita income as the criteria for placing families in income groups. Annual family expenditure and per meal expenditure were used as the measures of food consumption and were compared with family income and per capita income. Income elasticities were computed for total food and seven major food groups.

Estimates of income elasticities were derived by dividing the percentage change in expenditure by the percentage change in income. The percentage change in expenditure was obtained by dividing the average change in expenditure during 1951-1955 by the average expenditure of all families in the income group during the years 1951, 1952, 1953, and 1954. The percentage change in income was obtained in the same manner.

The income elasticities derived for total food on a per capita basis were .28 for families receiving less than $1100 per capita income,

.18 for those with per capita income of $1100-1900, and .09 for families receiving more than $1900. An even greater difference between income groups was obtained when family income and expenditure were used. The estimates obtained were .26, .10, and -.02 for the lower, middle, and upper family income groups, respectively.

Results from this analysis provide income elasticities which are lower than estimates from cross-sectional data. The actual changes in the lower income groups were approximately the same as obtained from time series data. Part of the difference between the estimates in this study and estimates from cross-sectional data may be attributed to lags in expenditure changes that are included in estimates from cross-sectional data but not in the estimates obtained here. This was further verified by the comparison of the actual changes in food expenditure with differences between income groups at a point in time.

Estimates of income elasticity were obtained for the following food groups: dairy products; fats and oils; fruit; vegetables; meat; bakery and cereal products; and sugar, sweets, and candy. The same procedure was used to estimate the elasticities for the food groups as was used for total food. The results indicated that vegetables, and fats and oils are food groups with low or negative income elasticities. Dairy products and meat evidenced small but positive income elasticities. The elasticities obtained for fruit; bakery and cereal products; and sugar, sweets, and candy were relatively high compared with elasticities for the other food groups.

An examination of changes in expenditure by individual families indicated that factors other than income were also important. In one

phase of the analysis, per capita measures of income and expenditure were used to eliminate the effect of differences due to family size. Expenditure for meals away from home and experience of the homemaker were found to be important but the effects of these variables were not eliminated by the procedures used in this study. Other factors such as changes in age-distribution, holdings of liquid assets, debt position, relative prices of food items, and occupation of the homemaker should also be considered in future attempts to measure income elasticities. This is also true of efforts to use estimates of income elasticities to forecast the changes in food consumption with changes in income.

TABLE OF CONTENTS

LIST OF TABLES

CHAPTER I

INTRODUCTION

Purpose of Study

Many studies have been made of the effects of changes in different variables on the consumption of food. One of the primary objectives in this study is to trace the effects of changes in income on the expenditures for food at home. This study is different from earlier research in that the expenditures by a particular group of families are examined before and after changes in income.

In the past the estimated effects of changes in income have been based on the assumption that once individuals experience a change in income they immediately assume the pattern of food expenditures of the income class they are entering. This study was designed to provide some information about the reliability of this assumption.

The data from the Michigan State University consumer panel provide information on expenditures of the same families over a period of years.[1] It was possible, using this data, to compare the purchase patterns of the same families before and after changes in income. The expenditure patterns of families experiencing increases in income are examined in

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[1]The organization and operation of the M.S.U. consumer panel is under the direction of Dr. G. G. Quackenbush and Dr. J. D. Shaffer.

this study to see if they actually increased their food expenditures. Likewise, the data on families whose income decreased are studied to see if their expenditures decreased as might be hypothesized.

A second objective of this study is to examine changes in expenditures for the major food groups following changes in income. An attempt is made to obtain information as to what effects changes in income have on expenditures for specific food groups. Most of the research carried on in the past has indicated a sizeable difference in the changes in expenditure for the various food groups which result with changes in income. These same reports also indicate a difference in food pattern changes between income groups. Specifically, families with lower income might react differently and increase their expenditure for a different food group than families with higher incomes.

The data used in this study provide information on expenditures for seven major food groups and permit an examination of changes in expenditure patterns. It is possible to compare purchases of specific food groups before and after changes in income in the same manner as was indicated for all food.

The third objective is to relate changes in total food expenditure to changes in expenditure for the major food groups. This part of the work is an effort to combine the information obtained as a result of the first two objectives. From an agricultural policy standpoint it is very important to know how increased or decreased total food expenditures by particular families are related to changes in their expenditures for specific food groups.

As one phase of this objective an attempt is made to compare actual changes in expenditures for total food and major food groups with the differences found between income groups during a period of time. A study of these families in comparison with a cross-section of average family expenditures during a particular year should indicate whether or not it is reasonable to assume that income is the sole limitation on expenditure. This type of examination also should indicate the degree to which patterns of tastes and preferences for major food groups vary with changes in income.

The fourth and final objective is to point out some of the problems involved in the use of the concept of income elasticity. The results obtained will furnish a basis for evaluating such appraisals of the consumption potential for food with increases in income.

A study of the families experiencing changes in income provides indications of other factors influencing changes in food expenditure. Along with current income, changes in such variables as family size, meals eaten away from home, number of wage earners, and continuous increase or decrease in income are considered.

Policy Implications with Specific Reference to Demand Expansion

The increasing importance of agricultural surpluses in recent years has led to many proposals for attacking this problem. One suggestion involves the expansion of demand for agricultural products. In the case of food, this would mean eating the surpluses. The types of proposals to accomplish this objective have varied. Proposed programs

include direct distribution of food to needy families, school lunch programs, food stamp plans, dissemination of nutrition information, and outright cash subsidies to low income families. These programs have been outlined and examined in a number of publications.[2] The task of analyzing these various proposals and evaluating the effects is currently underway at the University of Minnesota under the direction of Professor Willard W. Cochrane. This study is concerned with only one small aspect of this problem.

As indicated above, granting of cash subsidies to low-income families is one of the proposed ways of expanding the demand for food. Estimated changes in the demand for food as a result of such grants are based on estimates of income elasticity. Income elasticity may be defined as a measure which "compares the relative change, or percentage change, in quantity (or expenditure) associated with the corresponding relative change, or percentage change, in income."[3] This measure provides an indication of the change in demand for food which will result from a given change in income. Estimates of income

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[2]U.S.D.A., What Peace Can Mean to American Farmers: Agricultural Policy, Miscellaneous Publication 589 (December, 1945); U.S.D.A., What Peace Can Mean to American Farmers: Post-War Agriculture and Employment, Miscellaneous Publication 56a (May, 1945); Willard W. Cochrane, High Level Food Consumption in the United States, U.S.D.A., Miscellaneous Publication 581 (December, 1945); Rainier Schickele, "National Food Policy and Surplus Production," Journal of Farm Economics, XXIX, No. 4 (November, 1947); John D. Black and Maxine Kiefer, Future Food and Agriculture Policy (New York: McGraw-Hill Book Company, Inc. 1948); Vernon L. Sorenson, "Food Consumption Subsidies For Low Income Families," Policy For Commercial Agriculture...Its Relation to Economic Growth and Stability, Hearings, Joint Economic Committee of the Congress of the United States (Washington: U.S. Government Printing Office, November, 1957).

[3]Willard W. Cochrane and Carolyn Shaw Bell, The Economics of Consumption (New York: McGraw-Hill Book Company, Inc., 1956), p. 215.

elasticity are available for all food, food groups, and specific food items. In demand expansion projects these estimates are used to assess the change in demand which will be effected by increases in income.

The information obtained in this study should prove useful in evaluating the income elasticity estimates used in demand expansion projects. Data on actual changes in expenditure for all food and specific food groups is available from families who experienced increases in income. The results indicate whether or not expenditure patterns actually change as hypothesized according to the income elasticity estimates used.

If the results obtained here do not always agree with estimates of income elasticity, it is possible to point out some of the other factors which must be examined and adjusted for in using the estimates. A study of individual families discloses some of the variables affecting expenditure for food. Such factors must be considered if estimates used in demand expansion projects are to be reliable.

CHAPTER II

THEORY AND THE MEASUREMENT OF INCOME ELASTICITIES

Theoretical Aspects Involved

The theory of consumer demand serves as the theoretical basis for this study. Demand is referred to in the schedule sense. The schedule shows the relation between the price of a commodity and the total quantity of that commodity which an individual (or group) will buy at each price, all other things remaining the same.[1] In most discussions of the demand for a product the relationship between quantities taken and price is analyzed on the assumption of some given level of a buyer's total purchasing power. Purchasing power or income is one of the other things assumed to remain the same.

Variables assumed constant are the principal influences responsible for shifts in the final demand schedule or curve. These influences may be classified into five groups: (1) conditions which affect the desires of consumers for commodities, such as changing styles, advertising and living customs; (2) changes in the quantities available and prices of competing or substitute products; (3) changes in the composition and prices of all other items in the budget; (4) changes in the

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[1]Kenneth E. Boulding, Economic Analysis, 3rd ed. (New York: Harper and Brothers, 1955), p. 54.

number and characteristics of the population; and (5) changes in the purchasing power of consumers.[2]

The last of these influences is the one considered here. A change in income results in a shift in the demand curve or schedule. The concept of income elasticity is used to measure the importance of this shift. As indicated earlier, income elasticity measures the percentage change in quantity demanded which results from a given change in money income, other quantities, prices, and the like being held constant.

Some of the important developments in the study of demand should be indicated at this point. Working from these developments it will be possible to examine some of the problems in measurement of income elasticity. Economic theory states that the economy can be described by a large number of relationships of which demand relationships are only one kind. The analyst is faced with a general equilibrium model and in principle the prediction of any variable involves solution of this entire model. However, partial equilibrium analysis has been used as a simplification necessary to make economic theory a useful tool.

Prior to 1943, practically all statistical demand analysis was carried on with a partial equilibrium model and single-equation methods were used. This is no indication of inadequacy on the part of demand analysts because the identification problem was clearly stated by Elmer Working in 1927.[3] Professor Working pointed out that price-quantity

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[2]F. L. Thomsen, "Measuring Changes in the Demand for Farm Products," Journal of Farm Economics, XXI (February, 1939), pp. 132-142.

[3]Elmer J. Working, "What Do Statistical 'Demand Curves' Show?" Quarterly Journal of Economics, XLI (February, 1927), pp. 218-223.

observations were points of intersection of simultaneous demand and supply curves and that, in general, the least squares regression of price upon quantity was an uninterpretable combination of demand and supply coefficients, depending on the relative magnitudes of the shift in each curve and the correlation (if any) between them. However, no sound method of separating demand and supply curves in the truly simultaneous case was suggested until Haavelmo's paper of 1943.[4] Haavelmo demonstrated a method whereby supply and demand relationships might be untangled and thereby obtain a reliable estimate of the equation for each. There was a movement on the part of some to discard the least squares or single equation approach as useless in attempting to estimate demand relations following the proposal of the "systems of equations" approach. However, others have shown that both methods are useful under varying conditions.

Karl Fox, in a series of studies of the demand for farm products, has shown that under certain conditions the single-equation approach can be used to approximate the demand function within the framework of simultaneous - equation theory.[5] Questions which must be considered are:

(1) Is the supply of the given commodity affected by current price?

(2) Is consumption of a given commodity significantly affected by current price or by the demand for export or storage?

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[4]Trygve Haavelmo, "The Statistical Implications of a System of Simultaneous Equations," Econometrica, XI (January, 1943), pp. 1-12.

[5]Karl A. Fox, The Analysis of Demand for Farm Products, U. S. Department of Agriculture Technical Bulletin No. 1081 (Washington: U. S. Government Printing Office, 1953), pp. 9-14.

(3) Is consumer income significantly affected by changes in price or consumption of the given commodity?

(4) Is the supply of any competing commodity affected by the current price of the given commodity?

(5) Is more than one major domestic outlet available for the given commodity?

If each of these five questions can be answered in the negative, a statistical demand function fitted by least squares should approximate the structural equation.

Recent developments in methodology have added a great deal to the store of knowledge concerning errors of estimating procedures. However, little is known about errors in data due to observation. This is one weakness which must be considered in evaluating results. The multiple equation approach does not help here and in fact makes the appraisal of the results of such errors especially difficult.

This problem, of errors in data due to observation, is very important in the measurement of income elasticity. Reliable estimates of income and consumption are quite difficult to obtain. It also is difficult to obtain information on variables related to income and consumption such as price of the commodity or group of commodities considered, prices of competing commodities, prices of other consumer goods and services, liquid assets held by the family, fixed commitments, and various family characteristics. Regardless of the measure of consumption chosen there are many weaknesses in the data, especially when a high level of aggregation is used. The same statement can also be made with regard to measures of income.

The range of income elasticities obtained for agricultural products is quite broad. Of course, much of this variation is to be expected with the different measures of consumption and income used. Procedures used in deflating either consumption, income, or both for changes in the price level have also led to differences in the estimates obtained.

The differences in the estimates obtained are not necessarily weaknesses. They may simply reflect differences of purpose in deriving the estimates or different judgments with regard to theoretical restrictions, statistical techniques, and relevant data. On the other hand, some of the differences are due to a disregard of problems inherent in the data or technique used for measurement. An examination of some of the types of studies made in the past indicates the differences in data and techniques used and some of the problems of measurement.

Studies of Income Elasticity

The examination of changes in consumer behavior with changes in income goes back many years. Probably the first and most famous of all statistical analyses of family budgets was made by Engel in 1857.[6] The 153 Belgian families included in Engel's study were classified into three social-economic groups: families dependent upon public assistance, families just able to live without such assistance, and families in comfortable circumstances. On the basis of this research Engel proposed his law of consumption which states "the poorer a family, the greater the proportion of its total expenditure that must be devoted to the provision of food."

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[6]George J. Stigler, "The Early History of Empirical Studies of Consumer Behavior," Journal of Political Economy, LXII (April, 1954).

Since Engel's time a large number of empirical studies of consumer behavior have been conducted. In order to understand the results of these works it is necessary to consider the different techniques and data used. Two methods have been used to provide estimates of income elasticities. One method involves the analysis of budget or cross-sectional data. This method makes use of the assumption that a family in a particular income group would spend an increase in income in such a way as to have the same consumption pattern as families already in the group. A second method makes use of market data with observations on income and consumption over a period of time. The extent of changes in demand for a product using time series data can be estimated either through regression techniques or by considering the relative percentages of income spent for the product.

The results obtained using these two methods have also varied with the type of income elasticity being considered.[7] Two different concepts of consumption are used in arriving at these estimates. Some studies are based on expenditures as the measure of consumption whereas others use a quantity measure. Estimates have also been made using variations of these measures such as adjusting quantity purchased for price and quality changes.

Income elasticities also may be computed for food at different levels in the marketing process. The effects of changes in value relations for food from the farm to the retail level result in quite different estimates of income elasticity. This has been especially

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[7]Theodore W. Schultz, The Economic Organization of Agriculture, (New York: McGraw-Hill Book Company, Inc., 1953), p. 55.

true during recent years with the innovations made in processing, transportation, and distribution of farm foods.

Time series studies. A large group of income elasticity estimations make use of time series data. These data provide information on income and food consumption over a period of time. In most cases these are annual observations but it is possible to use periods of shorter length.

Estimates of income elasticities from time series data have been derived using both the least squares single equation technique and the multiple equation approach. Kuznets appraises the results obtained using different methods of estimation.[8] His conclusion is that it appears possible to obtain sensible results with either the least squares single equation or the multiple equation approach.

In analyses making use of the least squares regression technique the results have varied with the dependent variable used. In many of the studies, consumption is used as the dependent variable with price taken as the independent variable, even though a very logical argument can be given for making price the dependent variable. The reason for the procedure is that consumption can be assumed predetermined because of its relation to production while such is not necessarily the case for price. In spite of the argument that price should be used as the dependent variable, there has as yet been no basis established for saying the true elasticities will be closer to those obtained for

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[8]G. M. Kuznets, "Measurement of Market Demand with Particular Reference to Consumer Demand for Food," Journal of Farm Economics, XXXV (December, 1953), p. 882.

price endogeneous.[9]

A number of weaknesses may be found in the single equation approach to estimation of demand relations. Among these weaknesses are the problem of identification, possible effects of multicollinearity, and interdependence of successive observations.[10] These problems are lessened by the use of the simultaneous equation approach.

Other problems are common to both the single and multiple equation approaches. The assumption is made that the social structure has remained stable over the period from which data is used. The validity of geographic and commodity aggregation is also a problem which must be recognized.

Once the demand equation is obtained from time series data the procedure for obtaining income elasticity varies with the form in which the equation is expressed. If the variables are expressed in logarithms the income elasticity may be read directly from the equation, otherwise some manipulation of the coefficients is required.

Cross-sectional or budget studies. This method of estimating income elasticities is based upon the assumption that low income groups will consume the same combination of food in the same quantity as higher income groups if their incomes increase to the higher level. The data are taken from family budgets which indicate family expenditure and income at a particular point in time. Information of this type, from

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[9]Marshall Kaplan, On Estimating Demand Parameters With Special Reference to Food, The University of Chicago Office of Agricultural Economics Research Paper No. 5415 (September 24, 1954).

[10]Kuznets, op. cit., p. 884.

a cross-section of the population being considered, permits the estimation of income elasticities.

Examples of this type of data are the results obtained by the United States Department of Agriculture in its nationwide surveys of food consumption in 1936, 1942, 1948 and 1955.[11] An earlier survey of this type was conducted in Minneapolis in 1934 with approximately 2200 families contacted.[12] Another more recent survey is that conducted by the Bureau of Labor Statistics.[13] These data are from the Bureau's Survey of Consumer Expenditures in 1950 which involved 91 representative cities. This survey had as its objective the revision of expenditure weights in the Consumer Price Index and hence information was obtained on expenditure for all types of items, including food.

Such surveys are designed to obtain information on various socio-economic variables as well as expenditures. Once this information is obtained it is possible to examine the relationship between two variables such as income and expenditure. In order to isolate the change in expenditure attributable to one variable, the effects of other variables must be accounted for unless they can be assumed negligible.

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[11]Agricultural Research Service and Agricultural Marketing Service, U. S. Department of Agriculture, Food Consumption of Households in the United States, Report No. 1 (December, 1956), p. 1.

[12]Warren C. Waite and Rex W. Cox, A Study of the Consumption of Dairy Products in Minneapolis, 1934, University of Minnesota Agricultural Experiment Station Bulletin 311 (St. Paul: October, 1934).

[13]Bureau of Labor Statistics, U. S. Department of Labor and Wharton School of Finance and Commerce, University of Pennsylvania, Study of Consumer Expenditures, Income and Savings, Vol. 3 (University of Pennsylvania, 1956).

Factors which are considered important in the determination of income elasticities are family size, age-distribution of family members, occupation of family members, and education of homemaker. Much of the variation in the results obtained from cross-sectional data may be attributed to the influence of these variables.

The income elasticities may be estimated from such data using either regression or arc elasticity techniques. In those cases where regression techniques are used the regression line is fitted to the budget data for the cross-section of the population.[14] It is then possible to obtain the income elasticity from the regression equation. Arc elasticities may be computed by dividing the families into groups according to income and determining the relationship between expenditures at the different income levels.[15]

Estimates of income elasticities from cross-sectional data are subject to some of the same shortcomings as those from time series data. The data are taken at a specific time and are therefore representative of the social structure at that time. Differences in the rural-urban distribution of the population, income distribution, asset holdings, and availability of other consumer goods from one survey to another may result in different income elasticities.

A question relating to one of the main assumptions must also be considered. Can consumption at the higher income levels be used to

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[14]Marguerite C. Burk, "Changes in the Demand for Food From 1941 to 1950," Journal of Farm Economics, XXXIII, No. 3 (August, 1951), p. 285.

[15]W. C. Waite and H. C. Trelogan, Agricultural Market Prices, 2nd ed. (New York: John Wiley and Sons Inc., 1951), p. 41.

measure what foods people would like to consume? Do families experiencing increases in income immediately adjust their expenditure pattern to that of families already in that income bracket? Different families are involved at the various levels of income and it is difficult to say what their tastes and preferences will be as they change levels.[16]

Other studies. Although most of the research concerned with income elasticity may be classified into one of the two types discussed above, there have been a few studies which do not fit into either group. As an alternative to this type of classification it is possible to indicate the specific sets of data which are typical of the kinds of data available.[17] Studies which do not fit into either of these classifications are primarily those in which an effort has been made to use budget data with an extension of the time dimension.

Consumer panel studies are an effort to obtain this type of data. Information is obtained on family expenditures over time. This cross-section information obtained through time permits the examination of food expenditures with changes in socio-economic variables. Shifts in expenditure patterns and consumption rates may be observed.

Some of the same techniques may be used to analyze this type of data as those already discussed. The information may be treated as time series data by using average values for the variables. In those cases where only a few years are involved the data may be broken down into observations for weeks or months. It is also possible to treat

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[16]Kuznets, op. cit., p. 894.

[17]Marguerite C. Burk, "Studies of the Consumption of Food and Their Uses," Journal of Farm Economics, XXXVIII, No. 5 (December, 1956), p. 1737.

the information as cross-sectional data and analyze the observations as described above. The results provide an indication of changes in relationships between the periods of analysis.

This study and its relationship to others. The research on income elasticity described briefly above indicate the variation in procedures used. This is not another of the same type but rather an attempt to use the information from consumer panel data to evaluate these estimates. Whereas studies of income elasticity are designed to provide estimates of changes in expenditure with changes in income this study involves an examination of actual changes in expenditure for food following changes in income.

Families cooperating in the Michigan State consumer panel have experienced changes in income during the period under study. Some of these same families have also had changes in expenditure for meals at home, family size, number of family wage earners, asset holdings, debts, and expenditure for meals away from home. This effort is restricted to that of determining the actual change in expenditure attributable to a change in income.

To what extent do families change their expenditure patterns as their incomes change? Studies of income elasticity indicate an immediate change to conform with patterns of families in the income group they are joining. This study should provide information about the reality of this assumption.

CHAPTER III

ANALYTICAL PROCEDURE

Data Used in This Study

The data used in this study were provided by families cooperating in the Michigan State University consumer panel. This panel has operated since February, 1951 with between 200 and 275 families reporting each week since late 1951. A weekly diary, for use in reporting, is provided to these families by the Department of Agricultural Economics.

Lansing, Michigan is the area from which the panel families are sampled. The initial sample was drawn so as to be representative of a Michigan city of approximately 100,000 population. An effort has been made to operate the panel in such a way as to keep it representative of a changing and not fully cooperative population.[1] In establishing the panel, four factors were used as controls.[2] These factors were: (1) income, (2) education of the homemaker, (3) age of the homemaker, and (4) number of persons in the household.

Panel families furnish information on quantity, price, and expenditure for each item purchased for home consumption during the week.

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[1]James D. Shaffer, "A Plan for Sampling a Changing Population Over Time," Journal of Farm Economics, XXXVI, No. 1 (February, 1954), p. 160.

[2]Ibid., p. 158.

Expenditure for and number of meals away from home are also reported each week. Each family also reports the number of persons in the family during the week, guest meals served in the home, and income received.

Families report their purchases of approximately 500 items. This includes all food products that can be purchased for use at home. Expenditure for soft drinks and alcoholic beverages are reported and are included in tabulation of total food expenditures.

The information received in the form of completed diaries was edited, coded, and punched on IBM cards before this study was started. Summation and tabulation of purchases of major food groups and total food had also been completed.

Data were also tabulated on number of weeks during each year individual families reported, number of meals eaten at home during the year, and number of persons in each family by weeks consecutively. A statement of yearly income was also obtained at the end of each year.

A personal interview was conducted with each family at the end of the year in order to obtain greater accuracy in the estimates of annual income. During the interviews, the stated yearly income was compared with the sum of weekly reports of income. In those cases where the two figures were comparable, or where the needed adjustment was evident, the family income was accepted as an observation.

Only those families furnishing reliable estimates of income were included in this study. This involved 53 families in 1951, 96 in 1952, 120 in 1953, 121 in 1954, and 103 in 1955. From these 493 observations it was possible to obtain 360 observations of change in income, i.e. families who cooperated two years consecutively during the period 1951 to 1955.

Families were divided into two groups according to whether they experienced increases or decreases in income. This was done using both family income and per capita income. On the basis of per capita income there were 250 families having increases in income. Using family income as the criteria, there were 229 families experiencing increases in income.

Certain adjustments were made in the data for use in this study. The total expenditure, for families reporting fewer than 52 weeks during the year, was adjusted for the number of weeks reporting. This was done by multiplying the average weekly expenditure by 52. Per meal expenditure for all food and for the major food groups was obtained by dividing the annual expenditure by the number of meals served at home during the year.

Both income and expenditure were expressed in current dollars since no great change in the price level had taken place during the years under study. Both the level of income and price level of food had increased slightly. The change in average income for panel families is indicated in Table 1. As shown in Table 1 there has been an increase in both family and per capita income. This change has taken place over the five year period with increases every year except 1954 when family income increased slightly but per capita income decreased slightly. The number of families experiencing increases and decreases in income each year is shown in Appendix Tables VI and VII. The increase in average total expenditure for food was only six percent over the five year period with small increases occurring every year except 1954.

TABLE I

COMPARISON OF ANNUAL DISPOSABLE INCOME, M.S.U. CONSUMER PANEL SELECTED FAMILIES, 1951-1955

Year	Total income of families ($ yearly)	Number of families represented	Average income per family ($ yearly)	Percentage increases from previous year
1951	223,164	53	4210.64	
1952	436,426	96	4546.10	7.97
1953	596,128	120	4967.73	9.27
1954	606,402	121	5011.59	.88
1955	576,802	103	5600.02	11.74

	Total income of families ($ yearly)	Number of persons represented*	Average income per person ($ yearly)	Percentage increases from previous year
1951	223,164	146	1528.52	
1952	436,426	274	1592.80	4.21
1953	596,128	349	1708.10	7.24
1954	606,402	356	1703.38	-.28
1955	576,802	319	1808.16	6.15

*These figures were rounded off to the nearest whole person.

Since the data used in this study were all obtained in one city, no adjustment was needed for location. Attempts to apply these results to another area would require some sort of adjustment. Adjustment for family size in one phase of the study was made by using average per meal expenditure per person. The importance of this adjustment will be evident in the comparison of results.

Attempts have been made to check the reliability of the consumer panel data. One method has been to compare prices reported by the panel with Bureau of Labor Statistics price series for Detroit.[3] Results obtained from these comparisons indicate a close relationship between panel prices and Detroit Bureau of Labor Statistics prices. Another method used was that of comparing the distribution of panel member's expenditure for major food groups with regions of the United States and the total United States. The results obtained here were also judged satisfactory.[4]

Method of Analysis

Since this study is concerned with changes in food expenditure with changes in income, only the data from families cooperating in the panel during two years consecutively were used. Change in income and expenditure for each family was computed. Many of the families provided more than one observation of change as they were in the panel during

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[3]Gerald G. Quackenbush, "Demand Analysis From the M.S.C. Consumer Panel," Journal of Farm Economics, XXXVI, No. 3 (August, 1954), p. 418; and Harold M. Riley, "Some Measurements of Consumer Demand for Meats," (unpublished Ph. D. dissertation, Department of Agricultural Economics, Michigan State University, 1954), p. 91.

[4]Quackenbush, op. cit., p. 419.

the entire period 1951 to 1955 inclusive. Each observed change, e.g. from 1951 to 1952, was taken as one observation. The data provided four observations on families reporting all five years.

For purposes of analysis, the families were divided into income groups. The analysis was carried out using both family and per capita income as the basis for placing the families in groups. Over the five year period, the earliest year, of the two years for which change was being computed, was used in placing families in income groups.

Two different concepts of food expenditure were used. Changes in expenditure were computed using per meal expenditure and adjusted annual family expenditure. Where the term per meal expenditure is used here, it has reference to the expenditure per meal per capita. Adjusted annual family expenditure has reference to the total annual expenditure for food at home adjusted for the number of weeks the family reported.

In order to determine whether or not families experiencing increases in income assumed a pattern of increased food expenditure, the average changes in expenditure and income for each income group were calculated. Average income and expenditure were also determined for each group. It was then possible to come up with a measurement of the relative change in expenditure associated with a given change in income. Expressed in a formula this would be:

$$\text{Measure} = \frac{\dfrac{\text{Average change in expenditure}}{\text{Average expenditure during base years}}}{\dfrac{\text{Average change in income}}{\text{Average income during base years}}}$$

The measure derived through the use of this formula is an "income elasticity" since it measures the relative change in expenditure

associated with the relative change in income, other things remaining the same. This measure is arrived at a little differently though from the usual income elasticities. The actual change in expenditure is used here and the estimates derived are closer to the true definition than is ordinarily the case, assuming no change in other relevant variables.

Simple regressions were run for all the income groups with change in expenditure taken as the dependent variable and change in income as the independent variable. In all cases the regression coefficient was found to be negative and not significantly different from zero. This would indicate the size of the change in income had very little effect on the change in expenditure for food. This led to the use of the method described above.

The elasticity measured here is an arc elasticity since the formula is $\frac{\Delta E}{\Delta I} \cdot \frac{I}{E}$ whereas the formula for point elasticity is $\frac{dE}{dI} \cdot \frac{I}{E}$. This measure is referred to as arc elasticity because it measures the relative response of expenditure to income over an arc or segment of the income-consumption schedule. The concept of arc elasticity is somewhat less precise than that of point elasticity. Arc elasticity is less precise because it is based upon the assumption that the response or change in expenditure or quantity demanded to the income change is the same over the entire income range. However, this assumption should be valid in this study since the elasticities are computed for income groups and not the entire income range. The changes in income were not too great as the greatest average change in any of the income groups was fifteen percent. An arc or segment of this length

should not weaken the analysis too much since any policy decision with regard to subsidizing income as part of a demand expansion program would involve changes at least this large.

Families experiencing increases in income were examined separately from those having decreases in income. By doing this it was possible to see if families adjusted their expenditure patterns following decreases in income in the same way as they did with increases in income.

The same procedure was used for the major food groups as that used for total food. An attempt was also made to trace the effects of an increase in income on expenditure for food groups when the family did not increase their total food expenditure.

Income elasticities obtained using actual changes in expenditures were compared with income elasticities obtained by the method ordinarily used with cross-sectional data. The panel data for the period 1951-1955 were used for the computation of cross-sectional elasticities. This comparison was made in order to show the differences in results which are obtainable using various procedures.

Limitations of Data and Procedure Followed

Representativeness of data. The data used in this study are representative only of an urban population of approximately 100,000. As indicated earlier, the panel was designed to be representative of a Michigan city of this size. Realizing this fact, the geographic limitations of the data are apparent. The results obtained using these data provide useful information about this segment of the population and will have some applicability to urban populations in other areas.

Some information about the city of Lansing will aid in an evaluation of the usefulness of results obtained. Lansing has a high proportion of its labor force employed in manufacturing compared with other cities in the United States. This proportion is low though compared with other urban centers in Michigan. The per cent non-white and the number of persons per household are low compared to both urban Michigan and the United States.[5]

The average income in Lansing is high compared to the figure for urban Michigan and the urban United States. An indication of differences in income distribution is shown in Table II. During 1954 over half of the consumer panel families were in the $4000-6000 range and there were relatively fewer in the less than $4000 income class. Since the work here was with income groups this disparity is not so serious.

Other characteristics of the Lansing population which should be examined before attempting to apply panel results outside Lansing are age-distribution of the population, opportunities for employment, and per cent unemployed.

Errors in reporting. Possible errors in reporting of purchases and income must be recognized as a limitation of the data used. The type of error involved here might be one of three types. These are: (1) failure to report, (2) making an error in reporting by entering the purchase under the wrong heading, or (3) failing to report the actual expenditure or quantity purchased.

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[5]Riley, op. cit., p. 61.

TABLE II

INCOME DISTRIBUTION OF THE LANSING PANEL COMPARED WITH SEGMENTS OF THE NORTH CENTRAL REGION POPULATION, 1954

Characteristics	Lansing Panel	North Central		
		Urban	Rural Non-Farm	Farm
Percent of families with income less than $4000	21	29	48	61
Percent of families with incomes $4000-6000	53	37	32	25
Percent of families with incomes over $6000	26	34	20	14

Source: "Food Consumption in the North Central Region," The National Food Situation, Agricultural Marketing Service, U. S. Department of Agriculture, May, 1957, p. 40.

Weekly reports are submitted so the memory bias should not be too serious. The incentive payment is such that families are encouraged to report every week which also tends to reduce the error caused by failure to report purchases. Listing of the numerous food items in the diary also helps to prevent omission of purchases in the report.

Errors caused by reporting purchases under the wrong heading are not likely to be any problem in this study since only the major food groups and total food are used. Failure to report the actual expenditure or quantity purchased must be recognized as a limitation of the data but cooperators are urged to enter their purchases in the diary soon after purchase to prevent this type of error.

The annual personal interview with panel members is designed to check for and eliminate errors in reporting of income. In those cases where annual income could not be reconciled with the weekly reports, the family was not included in this study. As one check on this type of error, changes in income of panel members may be compared with changes in the national estimates of disposable income. Results from these comparisons have been satisfactory with changes in income of panel members tending to parallel national changes.[6] The careful selection of families should tend to reduce errors in reporting of income.

Limitations of procedure. The procedure followed in estimating income elasticity is subject to the same limitations as any arc

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[6]Quackenbush, op. cit., p. 417; and Hsin Fu Wang, "Some Relationships of Meals Eaten Away from Home to Family Characteristics," (unpublished Master's thesis, Department of Agricultural Economics, Michigan State University, 1957), pp. 22-24.

elasticity. An elasticity is assumed to be the same over the entire segment of the schedule for which the elasticity is computed. The seriousness of this limitation depends on the range involved in the arc or segment. The percentage changes in both expenditure and income are relatively small in all of the income elasticities computed here. This is in contrast to many arc elasticities which are computed between income groups.

Another limitation of the procedure used here is the fact that the changes are averages or arithmetic means of the changes over the five years with changes computed from one year to the next. Since averages are used the results are subject to being severely affected by extreme values. An examination of the data and results indicates the extreme values are of no great consequence in this analysis. This would not be true though if the analysis was performed using data covering only two years. The combination of results over the five-year period tends to reduce the effects of the extremes and the average approaches the typical change in expenditure and income.

The income elasticities computed in this study are for particular income groups and if other groups are used the elasticity would differ. However, the same is true of point elasticities, i.e. a different elasticity exists for each point, and when an elasticity is given, it must be recognized as being for a certain income and expenditure.

The procedure used in this study is subject to the same limitation as many other methods, that being the lack of control of other variables which affect food consumption in addition to income. Such variables as family size, urbanization, seasonal variation in food consumption,

expenditure for meals eaten away from home, home production and food received as gifts or pay, and price level changes affect a family's expenditure for food at home. Changes in these variables are very likely to cause changes in food expenditure. This makes it difficult to determine the change attributable to a change in income. The degree to which some of these variables changed could be determined, while for others it could not.

The data used in this study provide information on changes in family size, changes in food received as gifts or pay, changes in home production, and changes in expenditure for meals eaten away from home. Since all the families in the sample were urban families, the changes in home production and food received as gifts or pay were relatively unimportant. Changes in family size and expenditure for meals eaten away from home were apparent in many cases and must be recognized.

In many surveys the size of the sample precludes a two-way classification of families by income and another variable such as family size. This is also the case in this study. Adjustments for family size may be made by calculation of averages per person, calculation of averages per adult-male equivalent, or adjustment of the average food expense for all households in each income class to that for a standard size family.[7] Calculation of averages per person was used in this study as an approach to this problem.

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[7]Faith Clark, et al. Food Consumption of Urban Families in the United States with an Appraisal of Methods of Analysis, Home Economics Research Branch, U. S. Department of Agriculture, Agriculture Information Bulletin No. 132 (Washington: U. S. Government Printing Office, 1954), p. 36.

A detailed examination was made of the data pertaining to families whose expenditures decreased when income increased. Changes in family size, changes in expenditure for meals away from home, and changes in income during previous years appeared to explain some of these results. However, it was impossible to measure the effects of these variables with the procedure used in this study.

CHAPTER IV

CHANGES IN TOTAL FOOD EXPENDITURE

Measures of Income and Expenditure Used

Measures of income. Family income and per capita income were both used as measures of income in this study. This was done in order to obtain information on differences in results forthcoming with various measures of income. Income groups were composed of different families when the two measures were used for grouping.

Grouping by per capita income has been used in some studies to eliminate the effect of differences in family size. This grouping tends to place many of the large families with several children into the lower income groups while placing small families in upper income classes. The ranking of families which results will depend on size and composition of the families as well as on their income.

Per capita income was obtained by dividing annual family income by the average number of persons in the family during the year. In the case of individual foods, where adults consume less than children or where children consume less than adults, grouping according to per capita income may not be satisfactory. However, these differences in consumption are not so likely to appear for major food groups.

An appraisal of the various methods of adjusting for differences in family size indicates the use of per capita income may be quite

satisfactory.[1] Since larger families spend less per person for food than small families, the classification by per capita income results in a steeper income-expenditure curve than does classification by family income. The curve tends to have the same slope as that for family expenditures adjusted for family size by means of calculating averages per adult-male equivalent.[2] The elasticities computed using the two measures of income, family and per capita income, should indicate the differences in changes in expenditure associated with varying family size.

It should be pointed out that differences in family size between income groups may be of importance in two ways. Income groups composed of larger families, on the average, may react differently with changes in income. Secondly, income groups composed of larger families tend to have more families with changes in family size during a given period. These considerations led to the use of both family income and per capita income as the criteria for dividing families into groups.

Measures of expenditure. Two measures of food expenditure also were used in the analysis of changes in food consumption. Adjusted annual expenditure and per meal expenditure were used. Annual expenditure for food was used along with data on family income while per meal expenditure was used with changes in per capita income.

As indicated earlier it was necessary to adjust data on annual expenditures for number of weeks reporting. Since the change in

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[1]Clark, et al., op. cit., p. 38.

[2]Ibid.

expenditure is the relevant variable, it was necessary to adjust the expenditure data so as to eliminate differences in number of weeks families reported during the two consecutive years used in calculating the change. This made it possible to include many observations of change which would otherwise have been excluded. In most cases the adjustment, if needed at all, was for only a few weeks and hence the adjustment should not bias the results.

Per meal expenditure was obtained by dividing reported annual expenditure by the number of meals served during the weeks reported. No adjustment was required since the expenditure data covered the same period as the information on number of meals served.

It was believed desirable to use family expenditure as one of the measures for two reasons. In the first place, it was desired as a check on the other method which might tend to over-compensate for differences in family size. The second reason was, that for some of the food groups, per meal expenditures were very small and it was difficult to determine the significance of a change in expenditure.

Examination of differences in per meal expenditures for the three income groups, when families were classified according to family income, indicated no significant difference between income groups.[3] Over the five year period, the average per meal expenditure was less for the middle income group than for the lower income group. When the families were classified into groups according to per capita income the per meal

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[3]The computed chi-square value was not even significant at the .50 (fifty per cent) level.

expenditure varied more directly with income. This also served as a basis for reasoning that per meal expenditures should be used for analyzing differences between groups based on per capita income and annual family expenditures used for analyzing differences between groups based on family income.

Expenditure as a measure of consumption. Estimates of income elasticities for food have been derived using various measures of consumption. Such measures as food nutrients obtained, quantity consumed as indicated by an index, food expenditures, or some combination of quantity and prices are used. There are good arguments favoring the use of all these measures. The final decision depends upon the objectives of the study and the data available.

A number of studies have been designed to measure the effects of a change in income on the dietary levels of a group of families. Food nutrients consumed is the relevant measure of consumption in these cases. Neither expenditure nor quantity would serve the purpose here because it is conceivable that both could increase without any improvement taking place in dietary levels of the families involved. Undesirable food habits or the underconsumption of protective types of food, stemming from inadequate knowledge, may not be corrected with increases in income.

The quantity of food consumed also has been used as a measure of consumption. This has been especially true where the analyst was not interested in the quality of the product involved or the marketing services attached to the product. In fact, the separation of changes in quantity from changes in quality or marketing services is one argument

for using a quantity measure. If there are no significant aspects of quality to be reflected back to the farmer in the form of higher farm values, it is advantageous to use quantity as the measure since it does not include returns to those performing marketing services. The degree to which this is true varies with the food group involved.

Expenditure for a particular food or food group has also been used as a measure of consumption. For many purposes it is desirable to have quantity and quality of food combined in a measure. This type of measure supplies an indication of changes in consumption of agricultural resources in the form of quantity and quality plus other resources used in the production of marketing services.

In the interpretation of quantity and expenditure elasticities it is necessary to recognize the different questions answered by the two variants. It is argued that expenditure measures the demand from the viewpoint of purchasing power; and therefore for the purpose of economic analysis, expenditure is the relevant measure of consumption.[4] The quantity elasticity provides more information on the physical satisfaction of demand and answers some questions about the nourishment level and standard of living.

The desirability of expenditure as a measure, compared with quantity, depends on the food group being considered. For some foods and food groups they are practically equal while in other cases there is a tendency for quantity data to give a lower elasticity. The quantity

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[4]Herman Wold and Lars Jureen, Demand Analysis (New York: John Wiley and Sons, Inc., 1953), p. 220.

elasticity tends to be lower for foods that are marketed in different qualities and prices. For livestock products; fruits and vegetables; and fats and oils, the expenditure elasticities more nearly reflect demands upon agriculture.[5] It is true the expenditure elasticities reflect increased marketing services in some cases, but they also reflect increased payments to farmers for higher quality.

A high degree of aggregation of food products into food groups and total food makes it difficult to measure the quantities consumed. A problem of combining such things as weight and number exist for many food groups. The higher the degree of aggregation the more serious this problem becomes.

The arguments given above favor the use of expenditure as the measure of consumption for total food and five of the seven major food groups analyzed in this study. The two exceptions are bakery and cereal products, and sugar, sweets, and candy. The difference between expenditure and quantity coefficients for these two groups is attributable primarily to payment for marketing services. Quantity data for these two groups is available for only one of the years included in the study so the decision was made to use expenditure as the measure of consumption of total food and all the major food groups.

Another reason for using expenditure is the usual scarcity of data on expenditures for food groups but which are available here. Estimates of expenditure elasticity have been obtained but in most cases

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[5]Karl A. Fox, "Factors Affecting Farm Income, Farm Prices, and Food Consumption," Agricultural Economics Research, III, No. 3 (Washington: U. S. Government Printing Office, 1951), pp. 80-81.

it was necessary to build up estimates from information concerning price and quantity.[6] Most of the estimates obtained by researchers in the United States Department of Agriculture have been of this nature.

Expenditures of panel families for total food was available for five years, 1951 to 1955. Data on expenditures for the major food groups was available for four years, 1952 to 1955. Expenditure data for the major food groups was available for parts of 1951 but because of possible bias due to seasonality of purchases this data was not used. Seasonality of purchases in the case of total food was not believed to be serious so the additional year was used in order to increase the number of observations. From this data it was possible to compute changes in expenditure for all food and the major food groups.

Income Groups

Grouping by family and per capita income. The families furnishing reliable reports of income received were classified into groups according to the two different concepts of income. The groups used for family income were: (1) less than $4,000, (2) $4000-6000, and (3) greater than $6000. The per capita income groups used were: (1) less than $1100, (2) $1100-1900, and (3) greater than $1900.

Before grouping the families according to income, the families were separated into two categories according to whether or not the families experienced increases or decreases in income. This was done

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[6]Marguerite C. Burk, "Problems in the Analysis of Food Consumption," Agricultural Economics Research, VI, No. 1 (Washington: U. S. Government Printing Office, 1954), p. 14.

so as to be able to test the hypothesis that families experiencing decreases in income adjust their expenditure patterns more slowly than do families with increases in income. It was also deemed desirable to examine families with increases in income separately since information is often desired on what happens to expenditure patterns as incomes are increased.

Families experiencing increases in income were divided into income groups and the same procedure was followed for families having decreases in income. The different groups were then analyzed separately to determine the change in expenditure. Since the major interest in this study is in changes in food expenditure with increases in income, most of the work was with families in this category.

The base year, or the first year of two being considered, was used for placing families in income groups. For instance, if the changes in expenditure and income between 1952 and 1953 were being considered, the income during 1952 served as the basis for classifying the families into groups. This made it possible for a family to be included in different income groups during the different periods for which change was being computed. It was necessary to follow this procedure because with increases in income the grouping during any one year was not representative of the five year period. A family would be expected to change its expenditure pattern with repeated increases in income which moved it from one income group to another.

The use of income groups was an effort to reduce the range of incomes covered by an estimate of income elasticity. Constant elasticities must be interpreted as average values, and in principle they are

valid only for the range of incomes covered by the data employed.[7] The use of three income groups reduced the number of observations available for use in computing income elasticities but this reduction of the range covered was considered more important.

Another reason for grouping families into income groups was the need for information about differences in income elasticity between income groups. In many cases the relevant consideration is not the overall income elasticity but rather that of a particular group.

Reasons for using the particular groups. The income groups were established so as to have a fairly large number of families in each group throughout the five year period. The considerations were the same for establishing both family and per capita income groups. It was impossible to divide the families into as small classes as might be desired because of the limited number of observations.

The increase in average income, of the panel families experiencing increases, made it impossible to have an equal number of families in each income group. A grouping which would have resulted in an equal distribution in 1951 would have had practically no families in the lower income group during 1954. The number of families in the middle and upper income groups increased while the number of families in the lower income group decreased. This change in the distribution of families is mainly attributable to the fact that families were separated earlier into those having increases and those having decreases and only those in one category are being considered here. The distribution of

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[7]Wold and Jureen, op. cit., p. 258.

families in either of these categories would of necessity change over a period of years.

The groups used in this study will not necessarily coincide with breakdowns used in other studies or areas of research. However, the primary objective in using income groups was not to estimate precise income elasticities for a particular group but rather to provide an indication of differences to be expected between income groups or segments of the population.

Research on food consumption carried out by the Agricultural Research Service and the Agricultural Marketing Service of the United States Department of Agriculture has involved a much finer breakdown of families into income groups. It was possible to do this for regions of the United States and for the entire United States since their sample was much larger than the one used here. Although the groups are not the same, the results may be compared by aggregation of groups in the studies with a more detailed breakdown. For example, the United States Department of Agriculture uses four groups for those families with less than $4000 family income, whereas only one was used here. It is possible to compare the results by combining the four groups into one.

Even though an effort was made to divide the families into groups of approximately the same size it was impossible to do so and have a group which could be termed a low income group. Because of the relatively few families in the city of Lansing with low incomes, the lower income group is much smaller than the other two. The end result is a somewhat arbitrary grouping of families but one which has a fairly

large number in each group throughout the five year period and which should provide indications of differences between income levels.

Income groups considered in demand expansion. The income groups considered in efforts to expand the demand for farm products vary with the program. In some cases only those families at the lower levels of income are considered while in others the total population up to a relatively high income is considered. A maximum is usually selected beyond which it is believed increases in income have very little effect on the demand for food.

Available data show that total food expenditure and total food consumption increase with income. Further, the proportion of any increase in income expended on food is greater at low levels of income than at high levels. Thus, it has been argued that augmenting the purchasing power of low-income people is one certain way of reducing the under-consumption of food.[8] It is argued then, in the case of cash grants, the total increase in participants' consumption will be greatest if families are selected for high income elasticity of demand. For foods this usually means selecting those families with low incomes.[9]

Proposals for expanding the demand for food generally have been in terms of subsidizing the consumption of the lower income groups with no clear delineation made of the groups involved. In other studies, estimates and proposals have been based on the results obtained from

[8]Cochrane, op. cit., p. 34.

[9]Herman M. Southworth, "The Economics of Public Measures to Subsidize Food Consumption," Journal of Farm Economics, XXVII (February, 1945), p. 38.

increasing the incomes of families from one level to another, with levels defined as less than $1000, $1000-2000, $3000-4000, etc. Action programs require that definite specifications be made of the levels of income involved and hence it is essential that some definite grouping be used in assessing the effects of a proposal.

A recent report published by the United States Department of Agriculture analyzed programs of three different scopes. The limited scope program involved only those families already receiving some type of relief. The medium scope program included all families receiving incomes of less than $2500 and single individuals receiving less than $1000. The maximum scope program included all families whose incomes were not high enough for 40 per cent of their income to provide a low cost adequate diet food plan developed by the Department of Agriculture.[10]

The income groups used in making estimates of the effect of demand expansion programs have varied so much that it would be impossible to obtain groups which are comparable in all cases. The alternative is to use groups which will portray differences between the different levels even though there may be a slight variation from other definitions of income groups.

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[10]U. S. Department of Agriculture, An Analysis of Food Stamp Plans, a supplemental report developed in the U. S. Department of Agriculture pursuant to Public Law 540, 84th Congress, transmitted to the President of the Senate and the Speaker of the House of Representatives, January 3, 1957 (Washington: U. S. Government Printing Office, 1957).

Results of Analysis

Estimated income elasticities. Income elasticities were estimated using actual changes in expenditure with increases in income. The elasticities were obtained using average changes in expenditure and income for the families in each income group. The estimated elasticities provide an indication of changes in expenditures which result from increases in income in different income groups. The differences in elasticities between groups are also indicated.

Those income elasticities estimated for family income groups involved the actual change in adjusted annual family expenditures for food served at home. Changes in per meal expenditure were used to estimate changes in food expenditure in different per capita income groups. Much of the difference in results may be attributed to the concepts of income and expenditure used.

The results obtained by the procedure outlined earlier are presented in Table III. These are simple arc elasticities which were computed by dividing the percentage change in expenditure by the percentage change in income. The changes in expenditure by individual families were averaged and then divided by the average expenditure during the base years to derive the percentage change in expenditure. The same procedure was followed in computing the percentage change in income. These income elasticities are for expenditures for meals served at home and only those families receiving increases in income were included. There were 250 families who experienced increases in per capita income and 229 families with increases in family income.

TABLE III

ESTIMATED INCOME ELASTICITIES FOR TOTAL FOOD FOR THE DIFFERENT INCOME GROUPS USING ONLY FAMILIES WHO HAD INCREASES IN INCOME

Income Group	Number of Families	Income Elasticity
Family Income		
Less than $4000	65	.26
$4000-6000	111	.10
Greater than $6000	53	-.02
Per Capita Income		
Less than $1100	71	.28
$1100-1900	111	.18
Greater than $1900	68	.09

Source: M.S.U. consumer panel data. The data are presented in Appendix Tables I and II.

The elasticities obtained for the lower, middle, and upper family income groups were .26, .10, and -.02 respectively. An elasticity of .26, for the families with less than $4000 annual income, indicates these families would spend approximately .26 per cent more for food with a one per cent increase in income. The percentage grows progressively smaller for the middle and upper income groups. In fact, those families with income of greater than $6000 showed a slight decrease in their average expenditure. These estimates indicate that very little increase in annual expenditure for food served at home could be expected to result from increasing the incomes of families with an annual family income greater than $4000.

When families were grouped according to per capita income the estimates of income elasticity differed only slightly. The lower income group, those with per capita income less than $1100, had approximately the same elasticity as the lower income group based on family income. An elasticity of .28 was derived for this group. The elasticities obtained for the middle and upper per capita groups were .18 and .09 respectively. Use of per meal expenditure as the measure of consumption led to these higher values. Even though the total food expenditure did not increase in some cases, the decrease in number of meals served at home led to higher per meal expenditures. This decrease in number of meals served at home is attributable to the increased number and expenditure for meals eaten away from home.

The differences in elasticities obtained for the per capita income groups emphasize the importance of considering the level of income when

using income elasticities. Families in the various income groups reacted quite differently when their incomes increased.

The elasticities obtained in this analysis are lower than most estimates obtained from cross-sectional surveys of urban populations. Schultz reports income elasticities computed for food based on food expenditures from such surveys as ranging from .28 to .68.[11] The elasticities referred to by Schultz were obtained in research conducted by Fox and Tobin.[12] The estimates reported by Fox were based on surveys of urban households in the United States during 1948. The estimates from cross-sectional data are presented in Table IV so that comparisons may be made with the estimates obtained in this study.

Estimates of income elasticity based on time series data are given in Table V. A number of different methods were used in estimating the elasticities. This table provides an indication of the differences obtainable when different measures of consumption and income, time periods, and procedures are used.

The income elasticity estimated for the income group with less than $4000 annual family income was .26. This is the highest estimate for the groups classified according to family income, yet it is lower than any of the elasticities obtained from cross-sectional data, as reported by Schultz. However, this value is well within the range of estimates derived from time series data as shown in Table V. Income

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[11]Schultz, op. cit., p. 60.

[12]Fox, op. cit., p. 81 and James Tobin, "A Statistical Demand Function for Food in the United States," Journal of the Royal Statistical Society, CXIII, Part 2, (1950).

TABLE IV

ESTIMATES OF INCOME ELASTICITIES REPORTED FOR TOTAL FOOD USING CROSS-SECTIONAL DATA FROM URBAN FAMILIES

Study and Data Used	Period	Income Elasticity
Tobin:[a]		
Total Family Food Expenditure	1918	.57
Expenditure	1927-1928	.68
Expenditure	1935-1936	.61
Expenditure	1941	.65
Fox:[b]		
Per Family Expenditure:		
All Food	1948	.51
Food at Home	1948	.40
Per Capita Expenditure:		
All Food	1948	.42
Food at Home	1948	.29
Per 21 Meals at Home:		
All Food	1948	.28

Source: (a) James Tobin, "A Statistical Demand Function for Food in the United States," Journal of the Royal Statistical Society, CXIII (London, 1950).

(b) Karl A. Fox, "Factors Affecting Farm Income, Farm Prices, and Food Consumption," Agricultural Economics Research," III, No. 3 (Washington: U. S. Government Printing Office, 1951), pp. 80-81.

TABLE V

ESTIMATES OF INCOME ELASTICITIES REPORTED FOR TOTAL FOOD USING TIME SERIES DATA

Study and Procedure	Period	Dependent Variable	Income Elasticity (current)	(lagged)
Burk:[a]				
Least squares (Log.)	1922-41	Consumption	.24	
		Price	.30	
Girshick and Haavelmo:[b]				
Limited information	1922-41		.24	.05
Least squares				
Actual data	1922-41	Consumption	.27	.06
	1922-41	Price	.33	.07
Logarithms	1922-41	Consumption	.28	.05
	1922-41	Price	.34	.05
Linear in first differences of Logarithms	1922-41	Consumption	.26	.01
	1922-41	Price	.37	.02
Tobin:[c]				
Least squares (Log.)	1913-41	Price	.45*	.11
	1913-41	Price	.27	

*This estimate was made subject to the restriction that current plus lagged equal .56.

Source: (a) Marguerite C. Burk, "Changes in the Demand for Food from 1941 to 1950, Journal of Farm Economics, XXXIII (August, 1951).

(b) M. A. Girshick and Trygve Haavelmo, "Statistical Analysis of the Demand for Food: Examples of Simultaneous Estimation of Structural Equations," Econometrica XV (April, 1947).

(c) James Tobin, "A Statistical Demand Function for Food in the United States," Journal of the Royal Statistical Society," CXIII(London, 1950).

elasticities obtained from the data provided by the middle and upper family income groups were much lower. The elasticity for families with incomes greater than $6000 was -.02, which indicates very little if any increase in expenditure can be expected as families in this group receive increases in income.

Results obtained for the per capita income groups were also lower than estimates derived from cross-sectional data (Tables III and IV). The elasticity estimate for the lowest per capita income group was within the range of estimates from time series data (Tables III and V).

These results support the hypothesis that families at lower levels of income spend a larger percentage of an increase in income for food than do families at higher levels of income. Indications are also provided that the change in expenditures for food which result with increases in income are not as great as estimates of income elasticities from cross-sectional data would suggest. The possibility of lags in expenditures may account for part of this difference. The relatively high average income received by consumer panel families compared with that of all urban families also accounts for some of the difference in results. This explains why the results for the low income groups approach those obtained using time series data.

The higher income elasticities obtained for the income groups of less than $4000 family income and less than $1100 per capita income indicate that higher income elasticities may be associated with either a low family income or low per capita income. Small families with a low family income react to increases in income in the same way as larger families whose family income is higher but who have a low per capita

income. A need exists for considering both types of families when estimating the potential expenditure effects from income subsidies.

The elasticities computed using the actual changes in expenditure were much lower than estimates obtained from the same data by computing arc elasticities for differences between groups. The latter method is the one most generally used with cross-sectional data. The cross-sectional data used in the computation of these elasticities are presented in Appendix Table II. Average per meal expenditure and average per capita income for the period 1951-1955 were used. These data were converted to logarithms and reduced to zero mean. With the data in logarithms, the percentage changes in expenditure and income were obtained by subtracting the value for the lower income group from that of the next higher income group. The elasticities were then derived by dividing the percentage change in expenditure by the percentage change in income.

The elasticities were .34 between the lower and middle income groups and .35 between the middle and upper income groups. A comparison of these estimates with those derived using the actual changes indicates that estimates obtained from cross-sectional data may be too high, especially for the higher income groups. If the actual change in expenditure is this high it occurs over a much longer period than one year. This comparison is more meaningful than comparisons with estimates from other cross-sectional data since the problems of non-comparable income groups, different average levels of income, and differences in social, cultural, and institutional factors are avoided.

Lags in consumption changes. Families experiencing increases in income do not immediately assume new patterns of comsumption. Estimates from cross-sectional data include the immediate changes plus the lagged reaction. The results obtained from this study include the immediate change, or the change taking place over a one year period, plus the lagged reaction to changes in income which occurred in earlier years.

A number of difficulties arise when an attempt is made to separate the immediate and delayed reaction to changes in income. In many cases, families have repeated increases in income. With this situation it is impossible to determine the exact change in expenditure attributable to the change in income in a given year. Other families have an increase in income one year and a decrease the next year which makes it difficult to ascertain which change in income is influencing the family's pattern of consumption. Other factors which cause difficulty in estimating the current and lagged effects are adjustments in expenditure resulting from increased experience of the homemaker, retirement, income expectations, changes in debt position, and changes in various family characteristics.

The problem of repeated increases in income is apparent in the consumer panel data. Of the 133 families who were in the panel at least two years consecutively during the five year period, 51 families received increases in income each year they cooperated. Many of these families had four consecutive increases in income. The elasticities obtained in this analysis are based on the assumption that the immediate change in expenditure is the most important and no attempt is made to estimate the lagged effects.

Estimates of lagged income elasticities from time series data were presented in Table V. These results were reported by Tobin, and Girshick and Haavelmo. The values ranged from .01 to .11 with a mean of .05. These results indicate the lagged effects of changes in income are relatively unimportant. However, such lags must be recognized with the realization that the total effects of changes in income are not realized in one year.

Other factors affecting food expenditure. A number of factors other than current income influence a family's expenditure for food at home. Information about some of these factors is available in the consumer panel data while very little, or nothing, is known about others. Such factors as family size, age-distribution of family members, holdings of liquid assets, availability of consumer credit, occupation of the household head, employment of the homemaker, and education of the homemaker or head of the household are important.

These factors are important in this analysis in two ways. First, if there was a change in any of the factors, the change in expenditure may be partly attributable to these factors having changed and not just to the change in income. These factors might also be important if the change in expenditure with a change in income is related to the level of one of the factors. For example, if older homemakers are less likely to change their expenditures for food at home with a change in income then the age-distribution of homemakers should be considered.

An attempt was made in this study to account for differences in family size by using per capita expenditure for food. Other factors such as age-distribution of family members and education of the

homemaker and head of the household did not change enough to have any significance for changes in food consumption.

An examination of families who decreased their total food expenditure for meals served at home with increases in income indicated changes in family size, food expenditure for meals away from home, and income in previous years were important causal factors. A gradual adjustment of food expenditures downward also seemed important in some cases. This adjustment may be attributed to either increased experience of the homemaker, the changing of consumption patterns following retirement, or changes in the occupation of the homemaker.

Changes in family size were important for two reasons. An increased family size made it possible to achieve "economies of scale" in food preparation in some families. The addition of a baby or small child also decreased per meal expenditure since a small child does not require as much of most foods as an adult.

It was impossible to measure family holdings of liquid assets, debt position, and availability of consumer credit. However, the effects of these factors were not believed to be great during the years covered by this study. Such was not the case during the years immediately following World War II.[13]

Expenditure for meals eaten away from home. A family's expenditure for meals eaten away from home tends to increase as its income increases. These expenditures were not included in total food expenditure as used

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[13]Burk, "Studies of the Consumption of Food...," p. 1740.

in this study. The expenditure data included only meals served at home. It is apparent that many of the families increased their expenditure for food away from home while decreasing their annual expenditure for food served at home. Per meal expenditure for food served at home is also affected by expenditure for meals away since it is usually the more costly meals, lunch and dinner, which are eaten away from home.

Analyses of expenditure for food eaten away from home have shown a high income elasticity for these meals. These expenditures for food eaten away from home include expenditure for the services attached to the food. Schultz estimated the income elasticity of demand for services in food eaten away from home to be 1.25.[14] Fox obtained an income elasticity of expenditures for meals eaten away from home of 1.12 on a per family basis, and 1.14 on a per capita basis.[15] As indicated by these elasticities, the demand for services increases faster than the demand for food itself, when income increases.

A study of consumer panel families' expenditure for food eaten away from home also indicated a relatively high income elasticity for these expenditures.[16] Wang derived an income-expenditure elasticity from a cross-sectional analysis of 1.74 on a per family basis and 1.41 on a per capita basis. An income elasticity of .80 was obtained from a time series study of 4-week averages of 13-week moving average data on expenditures per week for meals eaten away from home.

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[14]Schultz, op. cit., p. 45.

[15]Fox, "Factors Affecting Farm Income, Farm Prices, and Food Consumption," p. 81.

[16]Wang, op. cit., p. 99.

Increased expenditures for meals eaten away from home explain why many of the families with increases in income decreased their annual expenditure for food served at home. Of the 82 families who decreased their expenditure for food at home as their per capita income increased, 40 increased their expenditure for food away from home. It is highly conceivable that many families who increased their expenditure for food served at home also increased their expenditure for meals away from home. The total effect of an increase in income on expenditure for food includes both the change in expenditure for food served at home and that eaten away from home. The decision to exclude food expenditure away from home in analyzing changes in expenditure for food with changes in income tends to result in lower income elasticities of demand for food. This should be recognized in evaluating the results.

Families with large increases in income. Income elasticities were computed for the families in each income group who received substantial increases in income. Changes of $150 or more in per capita income and $500 or more in family income were taken to be substantial changes. Of the 250 families receiving increases in per capita income, 121 received increases exceeding $150. Of the 229 families with increases in family income during the five year period, 109 had increases of equal to or greater than $500.

Income elasticities of .23, .21, and -.08 were obtained for the lower, middle, and upper family income groups respectively. The elasticities were .20, .21, and .04 for the per capita income groups of less than $1100, $1100-1900, and greater than $1900 respectively.

There does not appear to be any significant difference between the elasticities obtained using the different measures of income and expenditure.

These results for families with substantial increases in income differ slightly from the results obtained when all families with increases in income were used. The estimates of elasticity for the lower income groups were not quite as high and the estimates for the middle income groups were higher. The results for the higher income groups were about the same.

An examination of changes in expenditure patterns, as incomes change by substantial amounts, indicates the elasticities for the lower and middle income groups are approximately the same. This was not the case when elasticities were computed for all families disregarding the size of increase in income. The relative change in expenditure for food with a change in income decreases as the change in income increases at the lower income levels. At the middle income levels this relative change increases. These results indicate that the size of the change in income should be considered when estimating income elasticities. Small percentage changes in income are more effective at the lower income levels. In order to bring about a change in expenditure at higher levels it is necessary to increase the size of the change in income.

Changes in expenditure with decreases in income. The families with decreases in income were divided into family income groups in the same way as those families who received increases in income.

Income elasticities were also computed for these families. An attempt was made to determine whether or not adjustments differed with increases and decreases in income.

The elasticities obtained were .38, .05, and -.43 for the lower, middle, and upper family income groups respectively. The income elasticity of .38 for those families with incomes less than $4000 is contrary to the hypothesis that consumption habits persist in the short-run despite decreases in income. These families reacted to decreases in income immediately. The reaction was even greater than that exhibited by families in the same income group who had increases in income. At the higher income levels the families' expenditures for food served at home were apparently not affected by decreases in income. In fact, the higher income group of families increased their expenditure for food at home as evidenced by the negative elasticity. Part of this increase in expenditure for food at home replaced food expenditure for meals away from home. Of the 20 families in the family income group receiving more than $6000 family income, 15 decreased their expenditure for meals away from home.

These results indicated an even greater difference between income groups in reaction to changes in income than was demonstrated in the analysis of families who received increases in income. However, a limitation was imposed upon the analysis of families with decreases in income by the number of observations available. For example, there were only twenty families with income greater than $6000 whose income decreased, and there were only eighty-five families in all three income

groups. Despite this limitation, the results do indicate a considerable difference between income groups and an immediate reaction to decreases in income among families in the lower income levels.

CHAPTER V

CHANGES IN EXPENDITURES FOR SPECIFIC FOOD GROUPS

Food Groups Used

The food groups used in this analysis were dairy products; fats and oils; total fruit; total vegetables; meat; sugar, sweets, and candy; and bakery and cereal products. Consumer panel data provide information on changes in expenditure for each of these food groups during the period 1952-1955. Data obtained during 1951 were for only part of the year. In order to prevent bias due to seasonality of expenditure for specific groups, the data for 1951 were not included in the analysis.

Dairy products include fresh, canned, and dried milk; cream; ice cream; and cheese. Butter is not included. The fats and oils group includes butter and other fats such as oleomargarine, lard, and various types of shortening. Among the oils included are cooking oils, mayonnaise, salad dressing, and sandwich spreads.

The group of total fruits includes all types and forms of fruit purchases. This is true of citrus, berries, and other fruits whether purchased in the form of fresh, frozen, canned, dried, or in jams and jellies. The total vegetable group includes green leafy vegetables, green and yellow vegetables, and all other vegetables. For each of these, the expenditures for all the different forms are included.

Meat includes pork, beef, lamb-mutton, veal, other meat and meat mixtures; poultry and poultry products; fish and sea food, and mixtures which are chiefly fish. Bakery and cereal products include bread, rolls, and cakes; cookies, doughnuts, and pies; mixes, flour, and corn meal; crackers; spaghetti, macaroni, etc.; breakfast cereal; and appetizers such as crackerjacks and pop corn. The sugar, sweets, and candy group includes sugar; syrup and honey; candy and sweets; and prepared dessert mixes.

These groups are the same groups used in tabulating the purchases reported by families cooperating in the consumer panel. Since the data on expenditures for each of these groups were already tabulated when this study was begun, this was one reason for using these particular groups. Tabulations of expenditures for more detailed groups were available but the use of such groups would have required more time and resources than were available for this study.

Another reason for using these particular groups was the fact that these are practically the same groups being used in the demand expansion analysis underway at the University of Minnesota. Since one objective of this study is to obtain income elasticities to use in evaluating their estimates, it was deemed desirable to use the same food groups.

The groups used here involve a high degree of aggregation. This means the income elasticity obtained is a weighted average of the elasticities of several food items. Some people have argued this aggregation leads to meaningless results. However, there is a difference in the quantity of agricultural resources used to produce these

food groups and there are also differences in the extent to which the food groups are in surplus production. These two reasons alone are adequate justification for examining the changes in expenditure patterns which result with increases in income. Even though a high degree of aggregation is involved in the use of these food groups, there is considerable difference in the effects which a change in income has on the expenditure for the various groups. Empirical estimates of income elasticity derived for these groups have indicated that some of the groups are quite sensitive to changes in income while others are not. This study was designed to show which groups were and which groups were not affected by actual changes in income.

An important effect of increased incomes is the adjustment between commodities. The aggregation of commodities and specific food products into food groups tends to cover up part of this adjustment but it is possible to relate the overall change in total food expenditures to changes in expenditures for food groups. The food groups used in this analysis are such that some of the adjustment which takes place in consumption patterns becomes obvious as those families are examined who received increases in income.

Procedures Used With Food Groups

The same procedure was followed for the food groups as that used for total food. The same income groups were used. Since 1951 data were not used it was necessary to compute the percentage change in income for those families in each income group during the period 1952-1955. The average change in income during the periods 1952-1953,

1953-1954, and 1954-1955 was computed for each income group. The percentage change in income was obtained by dividing the average change in income by the average income for each group, using the base years 1952, 1953, and 1954 to compute the average income.

The average change in per capita income and average per capita income were used to derive the percentage change in income for per capita income groups. The average change in family income and average family income were used in computing the percentage change in family income. Just as in the case of the total food analysis, per meal expenditure for food groups was used in estimating changes in food group expenditure for per capita income groups. Annual family expenditures were used to estimate changes in expenditure with changes in income in the family income groups.

Using the percentage changes in expenditure and income at each income level, income elasticities were computed for each of the food groups. These are arc elasticities which indicate the relative changes in expenditure for specific food groups with changes in income in each income group.

All families do not react to changes in income in the same way. Even for a particular income group, the income elasticity will be an average of the varying reactions to changes in income. An effort was made in the work here to determine the extent to which family response varied. Within each income group the number of families increasing and decreasing their expenditure was calculated.

The number of families increasing and decreasing their expenditures with increases in income was not expected to provide a precise measure

of food groups with high income elasticity. Such a procedure does not take into account the size of the increase in either income or expenditure. It is possible for the number of increases and decreases to be about the same while showing a large income elasticity. This results when the decreases tend to be small and the increases large.

This procedure of obtaining the number of families who increased and decreased their expenditures as their incomes increased indicates the degree to which an income elasticity is representative of all the families within an income group. In those cases where a large fraction of the families respond in the same way the results tend to lend support to the income elasticities obtained.

An attempt was made to determine the effect of family size on changes in expenditure for specific food groups. For some food groups, differences in family size led to varying reactions to changes in income. Within each income group, family size was examined to see if any expenditure effect was apparent. The average family size was calculated for those families who increased their expenditure and for those who decreased their expenditure.

This procedure was followed for each food group to see if, within an income group, there was any difference in family size between those families increasing their expenditure and those decreasing their expenditure. Such information is needed in evaluating income elasticities for a particular food group. It also helps in reaching a decision as to the need for adjusting for family size.

Income Elasticities of Food Groups

General. Income elasticities were computed for each food group. A separate elasticity was calculated for each per capita and family income group. The elasticities obtained are presented in Tables VI and VII. Table VI includes the elasticities by family income groups while Table VII gives the elasticities by groups classified according to per capita income. An income elasticity was computed for all families to show the differences in results when income groups are used as opposed to placing all the families in one group. This also indicates the effect reactions of one income group can have on the elasticity of all families.

Dairy products. The average change in per meal expenditure for dairy products in each of the per capita income groups was positive but relatively small. The only income groups indicating a positive income elasticity of any magnitude were the per capita income group of $1100-1900 and the family income group of less than $4000. Both of these income groups showed an income elasticity of .24. The higher family income groups showed a negative income elasticity as income increased. These elasticities computed from the actual changes in expenditure for dairy products indicate increases in income had very little effect on the expenditure for dairy products.

Two considerations are important in evaluating these results. First, the relatively high average income of consumer panel families may be high enough that the families were already spending an amount for dairy products adequate to satisfy their need. The second

TABLE VI

ESTIMATED INCOME ELASTICITIES FOR SPECIFIC FOOD GROUPS USING ONLY FAMILIES WHO HAD INCREASES IN FAMILY INCOME

Food Group	Family Income Group			
	Less than $4000	$4000 to $6000	More than $6000	All families
Dairy products	.24	-.04	-.26	-.06
Fats and oils	.09	-.01	-.41	-.01
Fruits	.35	.69	.40	.57
Vegetables	.35	.03	-.05	.06
Meat	-.08	.12	.14	.10
Bakery and cereal products	.29	.35	.43	.36
Sugar, sweets, and candy	.38	.85	1.45	.92

Source: M. S. U. consumer panel data. The average annual expenditures and changes in annual expenditures are shown in Appendix Table III.

TABLE VII

ESTIMATED INCOME ELASTICITIES FOR SPECIFIC FOOD GROUPS USING ONLY FAMILIES WHO HAD INCREASES IN PER CAPITA INCOME

Food Group	Per Capita Income Groups			
	Less than $1100	$1100 to $1900	More than $1900	All families
Dairy products	.02	.24	.04	.14
Fats and oils	-.08	-.05	-.51	-.18
Fruits	.33	.61	.27	.46
Vegetables	-.19	.03	-.19	-.08
Meat	.07	.21	-.03	.11
Bakery and cereal products	.21	.56	.50	.48
Sugar, sweets, and candy	.82	.63	.80	.74

Source: M. S. U. consumer panel data. The average per meal expenditures and changes in per meal expenditures are shown in Appendix Table IV.

consideration is the fact that larger families are represented in the income group of less than $1100 than in the other income groups. This group would be expected to have a higher income elasticity, but these families with more children were already spending approximately the same amount per meal for milk and other dairy products and they did not increase their expenditures when income increased.

The only family income group evidencing a positive income elasticity was the less than $4000 family income group. This group is primarily composed of small families. There are very few children in these families. This would mean the need for dairy products to satisfy dietary requirements is not nearly so rigid and the consumption pattern varies more readily with changes in income.

Evidence from past studies indicate dairy products may be classified as a low elasticity food.[1] This category includes foods with income elasticities of .25 and less. This would be in general agreement with the results obtained in this analysis. However, estimates from cross-sectional data indicate a somewhat higher value. Using expenditure data collected in a survey of urban families in 1948, Fox obtained an income elasticity of .32.[2] Just as in the case of total food, estimates from cross-sectional data tend to exceed the actual changes in expenditure with changes in income.

Fats and oils. A negative income elasticity was obtained for fats and oils (Tables VI and VII). This was true for all of the income

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[1]Schultz, op. cit., p. 72.

[2]Fox, "Factors Affecting Farm Income, Farm Prices, and Food Consumption," p. 81.

groups except the family income group receiving less than $4000. The decrease in expenditure with increases in income was progressively larger as the income level increased.

Armore and Burtis point out that fats and oils are primarily used in products having a very inelastic demand or in products to which the fat constitutes only a small part of the total cost.[3] Bread and pastries are the leading outlets for lard and shortening. Since baking at home tends to decrease as income increases, an inelastic demand for fats and oils may be inferred.

An analysis of prewar consumption of food fats other than butter indicated consumption rose as income increased, up to the middle income group, and then decreased slowly with rising income.[4] Fox obtained an income elasticity of .13 in his study of urban households.[5] Schultz indicates fats and oils are an inferior good against income with a slightly negative income elasticity.[6] Data from the Household Food Consumption Survey conducted in 1955 by the United States Department of Agriculture reveal a slight increase in the quantity of fats and oils purchased as the family income level increases up to $4000.[7]

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[3]Sidney J. Armore and Edgar L. Burtis, "Factors Affecting Consumption of Fats and Oils other Than Butter, in the United States," Agricultural Economics Research, II, No. 1 (January, 1950).

[4]Ibid.

[5]Fox, "Factors Affecting Farm Income, Farm Prices and Food Consumption," p. 81.

[6]Schultz, op. cit., p. 71.

[7]John M. Wetmore and Willard W. Cochrane, "Can Increased Food Consumption Decrease Surpluses?" Minnesota Farm Business Notes, No. 389 (St. Paul: University of Minnesota, November 25, 1957).

The results obtained in this analysis support the results reported from past research. The expenditure for fats and oils increases slightly with increases in income at the lower income levels but for the middle and upper income groups expenditure decreases.

Fruit. Positive income elasticities were obtained for all fruit as a food group. All income groups showed increases in expenditures with increases in income. The income elasticities ranged from .27 to .69 depending on the income group involved (Tables VI and VII). The middle income groups, using both per capita and family income as the criteria, showed the greatest increases in expenditures for fruit as income increased. The results obtained for the various income groups indicate no apparent difference between per capita and family income groups of comparable level.

Income elasticities of .33, .61, and .27 were obtained for the lower, middle, and upper per capita income groups respectively. The results for family income groups were .35, .69, and .40 for the comparable groups. An increase in percentage change in expenditure with an increase in income is indicated up to the $1900 per capita income and $6000 family income levels. Above these levels the percentage increase declines.

Reports of income elasticity obtained for fruit have usually differentiated between citrus and other fruit. The elasticities obtained range upward from .25 for both groups. It is difficult to estimate an elasticity for all fruit since such an elasticity is an average for dried, canned, fresh, and frozen fruit. The result will vary with the weight given to each form. However, the results obtained

in this analysis, as well as reports from research conducted in the past, indicate the income elasticity of demand for fruit is relatively high. This is one food group for which estimates from cross-sectional data do not differ significantly from the actual changes observed in consumer panel family expenditures.

Vegetables. Vegetables is another food group in which problems of aggregation are obvious. A review of reported results reveal a much higher income elasticity for fresh leafy, green, and yellow vegetables than for such items as dried beans and potatoes. Results for the group as a whole must be recognized as average figures.

The estimates obtained for per capita income groups were -.19, .03, and -.19 for the lower, middle, and upper income groups respectively. According to these results, per meal expenditure for vegetables tended to decrease as income increased. The middle income group showed a positive change in expenditure as income increased but the change in expenditure was very small.

The lowest family income group showed a definite increase in expenditure for vegetables as their incomes increased. The middle family income group increased their expenditure but only slightly. A decrease in expenditure was evidenced by the upper family income group. These results indicate only the smaller than average families, made up primarily of adults with family income of less than $4000, increased their expenditure for vegetables as income increased.

Meat. This food group includes meat, poultry, fish, and eggs. The results based on adjusted annual expenditure for the family income groups reveal an increase in income elasticity as the income level

increases (Table VI). This statement does not hold true for per capita income groups since the group of families with per capita income greater than $1900 decreased their expenditure for meat as income increased (Table VII). Estimates of income elasticities for the lower and middle per capita income groups were .07 and .21 respectively.

The negative elasticity for the income group receiving more than $1900 per capita income is related to the age-size distribution of these families. This group is primarily composed of smaller than average families. These families are of two main types. The first type is one and two person families who are older than the average consumer panel family. The other type is composed of young married couples without children where in many cases both the man and wife are employed. Wang's work showed that expenditures for meals away from home varied inversely with family size.[8] This would indicate that families in this group may have increased their expenditures for meals away from home rather than their expenditures for food served at home. This failure to increase expenditure for meals served at home is reflected in the negative income elasticity for meat.

Using all families, the income elasticities for meat were positive based on both per meal expenditure and annual family expenditure. The elasticities obtained were .10 using changes in annual expenditure and family income and .11 using changes in per meal expenditure and per capita income. These weighted averages of elasticities for income groups indicate a relatively low income elasticity of demand for meat.

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[8]Wang, op. cit., p. 98.

Riley indicates low or negative income elasticities may be partially attributed to the highly correlated movement of meat prices and current income.[9]

Results of other research have generally shown an income elasticity for all meat ranging from .25 to .50. However, eggs were not included as a part of the meats group in these estimates. Since the income elasticity of demand for eggs is relatively low this would tend to decrease the value for the meat group when eggs are included.

Bakery and cereal products. Relatively high income elasticities were obtained for this food group. The elasticities increased progressively moving from the lower to higher levels of income where annual family expenditure and family income were used in computing the values. The elasticities were .21, .56, and .50 for the lower, middle and upper per capita income groups respectively. An elasticity of .36 was obtained for all families using family income and .48 using per capita income.

Bakery and cereal products as a group is made up foods which have large quantities of marketing services attached. As incomes increase purchases shift from ingredients, such as flour, to bread, cakes, cookies, and pies. As pointed out earlier, the increase in expenditure does not represent increased quantity as much as increased payment for marketing services. Using the cross-sectional data obtained in the United States Department of Agriculture survey of 1955, Wetmore and Cochrane indicate purchases of bakery products tend to increase as the

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[9]Riley, op. cit., p. 210.

income level rises while the purchase of flour and cereals tends to decrease.[10] The survey of urban households conducted by the United States Department of Agriculture in 1948 indicated a positive income elasticity for bakery products and a negative elasticity for flour, meal, cereals, and pastes.[11]

The results reveal a tendency for expenditures on the group as a whole to increase as incomes increase. Further, they suggest the percentage change increases moving from lower to higher levels of income. However, it must be recognized that this increase in expenditure does not necessarily reflect any increase in consumption of farm products. It is highly conceivable that the quantity of farm products being used could remain the same or decrease while expenditures for the food group increase. The increase would in this case reflect the purchase of additional marketing services.

Sugar, sweets, and candy. The income elasticity of demand for this food group is the highest of any obtained for the food groups, according to the results obtained here (Tables VI and VII). Expenditures for this food group make up only a small percentage of total food expenditures. The average percentages of total annual expenditure going for this food group were 3.4, 3.6 and 3.3 in the lower, middle, and upper family income groups respectively, during the period 1952-1955. Since expenditures for this food group are relatively small it is possible to have a large percentage change without involving a very sizeable

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[10]Wetmore and Cochrane, op. cit., p. 1.

[11]Clark, et al., op. cit., p. 43.

expenditure. An increase in annual expenditure of only five dollars for this food group represents a large percentage change. Expenditures for luxury food items such as candies and prepared dessert mixes can easily change by this much when income increases.

There is no apparent difference in the changes in per meal expenditure between per capita income groups. However, the income elasticity varies considerably with family income. The value obtained was only .38 for those families under $4000 family income but was 1.45 for those families with income over $6000. The difference in results obtained using per capita and family income indicate the importance of family size. Since family size increases as the family income level rises, it appears families with more children are more likely to increase their expenditure for sugar, sweets, and candy as income increases. This observation is substantiated by the fact that families in the middle and upper income groups, who increased their expenditure for this food group, were significantly larger on the average than those who decreased their expenditure.

Other Results from the Analysis

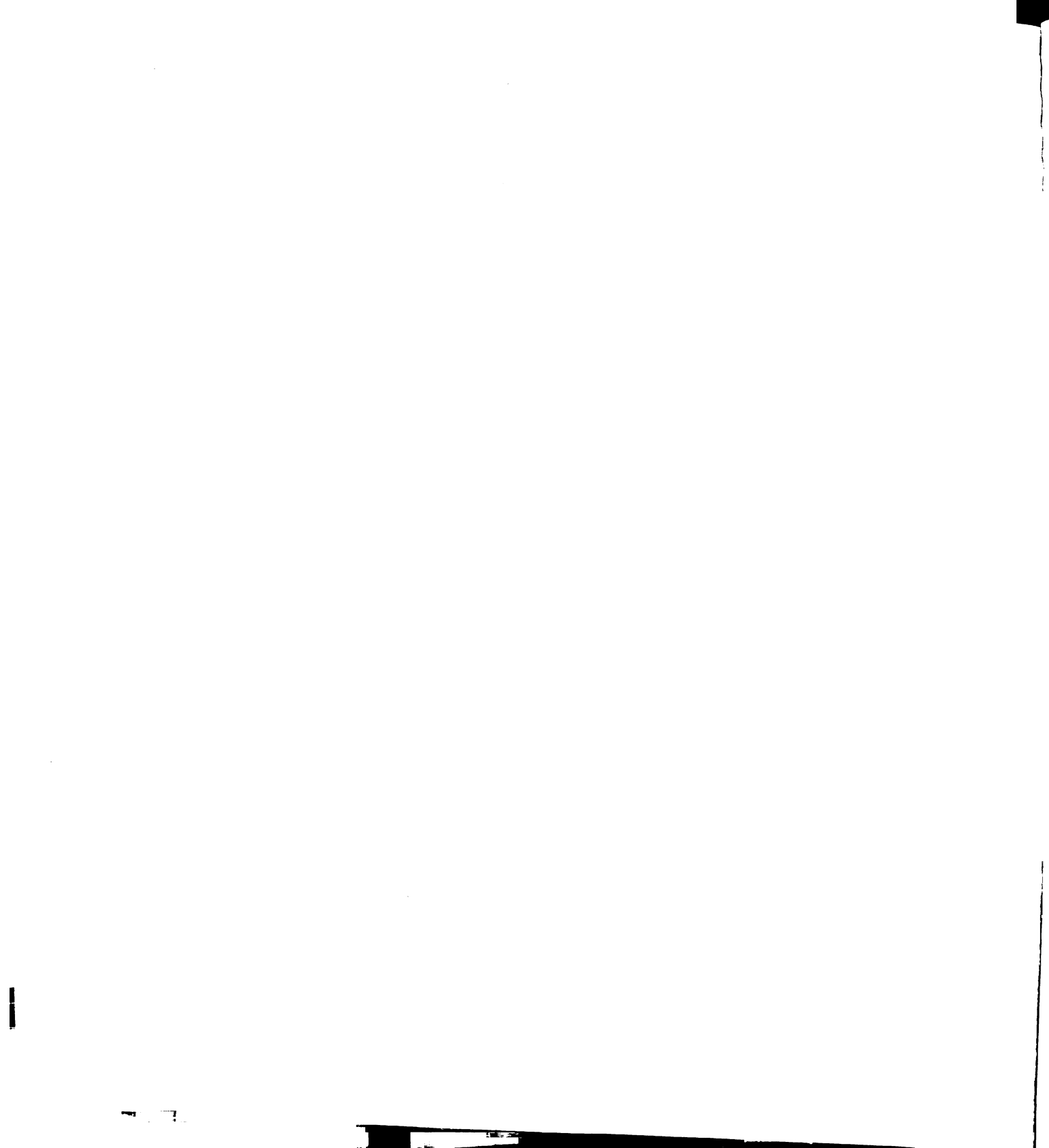
The results obtained above indicate that income elasticities are highest for fruit; bakery and cereal products; and sugar, sweets, and candy. These results are supported by the number of families increasing and decreasing their expenditure. The number of families increasing their expenditure exceeded the number decreasing their expenditure for each of these food groups. This was true not only for all families but also for each of the income groups.

The fraction of families increasing and decreasing their expenditure supports the income elasticities since the indication is that results are not just a reflection of extreme values reported by individual families. Rather the results may be attributed to a general tendency of families to increase their expenditure for each of these food groups as income increases. For example, in the case of fruit, 123 of the 185 families receiving increases in family income increased their annual expenditure for fruit.

Those food groups for which negative or small positive elasticities were obtained showed approximately the same number of families decreasing their expenditures as there were increasing their expenditures. Dairy products is an example of this. Of 203 families with increases in per capita income, 102 families increased their per meal expenditure while 101 decreased their per meal expenditure.

Elasticities for particular income groups were substantiated in the same way. In each of the four income groups for which positive income elasticities were obtained for meat, the number of families increasing their expenditure exceeded the number decreasing their expenditure. In the two income groups yielding small negative elasticities there were exactly the same number of increases as there were decreases.

This procedure of counting the number of families increasing and decreasing their expenditure for a specific food group shows the proportion of families who actually adjusted their expenditure pattern in the direction indicated by the income elasticity. Generally, the



results tended to support the elasticities, but the results also point out that an elasticity is an overall measure of change and does not necessarily reflect actions of individual families.

An attempt was made to determine whether or not family size affected family reaction to changes in income. Average size of family was computed for those families increasing their expenditure for specific food groups and those families decreasing their expenditure. This procedure was followed for each income group.

Changes in expenditure for dairy products; bakery and cereal products; and sugar, sweets, and candy were apparently influenced by family size. Families increasing their per meal expenditure for dairy products, and bakery and cereal products averaged smaller than those families decreasing their expenditure. In the case of sugar, sweets, and candy, those families increasing their expenditure were larger on the average than those families decreasing their expenditure. For the other food groups, the size of family did not appear to be important.

CHAPTER VI

CHANGES IN TOTAL FOOD EXPENDITURE ASSOCIATED WITH CHANGES IN EXPENDITURE FOR SPECIFIC FOOD GROUPS

Decreases in Total Food Expenditure

A number of families decreased their per meal expenditure for total food as their income increased. These families did not adjust their expenditure patterns in the same direction as elasticities for all the families in each income group indicated. Of the 250 observations of increases in per capita income during the period 1951 to 1955, 77 families decreased their per meal expenditure for food.

The expenditure patterns of these families were examined to see which food groups these families decreased expenditure for as their income increased. There were 16 of these observations in the less than $1100 per capita income group, 32 in the $1100-1900 group, and 29 in the group receiving more than $1900 per capita income. Of these 77 families only five decreased their per meal expenditure for all of the seven major food groups.

An attempt was made to determine if there were certain major food groups for which per meal expenditure by these families tended to decrease and if so what relationship this tendency had to food groups with low income elasticity. There did not appear to be any significant difference between income groups. The families in each of the income

groups who decreased their total food expenditure showed decreases in expenditure for approximately the same proportion of the food groups.

The food groups with the highest income elasticities, as indicated by the analysis discussed in Chapter V, also had the largest number of observations of increased expenditure. However, even for the food groups with the highest income elasticities, the number of increases barely exceeded the number of decreases. In the per capita income group of less than $1100 the decreases exceeded the increases for all the food groups. In the middle and upper per capita income groups, the only food groups in which the increases were more numerous than the decreases were bakery and cereal products, and sugar, sweets, and candy. These two food groups were the groups with the highest income elasticities.

The number of observed increases in expenditure for each of the food groups, with the exception of the two with high income elasticity, was approximately one-third of the total. This was true for all five of the other major food groups at each of the income levels. These results manifest the difference between family reactions to increases in income. The families who decreased their total food expenditure did not all adjust in the same way. Some families decreased their expenditure for one food group while others decreased their expenditure for another.

The fact that the proportion of observed decreases was approximately the same for five of the food groups gives emphasis to the family differences. Even the food groups with high income elasticities showed

a large number of observed decreases in expenditure. Though these families had negative income elasticities for total food they had positive elasticities for some food groups and the latter characteristic varied between families as to the specific food groups involved.

The families who decreased their expenditure for total food as their incomes increased are a special group. These families have a negative income elasticity of demand for food. Each elasticity is an aggregate of the family's income elasticities for the major food groups. Since the aggregate elasticity for each family is negative, the elasticity for one or more of the food groups must be negative. It might be hypothesized that these families all have negative income elasticities for the food groups which proved to have low elasticities. However, this was shown not to be the case. Only five of the families had negative elasticities for all seven of the food groups. The other 72 family observations showed negative elasticities for different food groups, depending on the family involved. The food groups with negative elasticities were not just the low elasticity food groups as the elasticities for all seven groups were negative for particular families. The income elasticities for the two food groups with the highest elasticities were negative in fewer cases than for the other five food groups but even the elasticities for these two groups proved negative for a large number of families.

Why did these families decrease their expenditure for food as their income increased? A number of explanations might be given but no conclusive proof is present to substantiate any of them. Among the

possible explanations are family size, magnitude of the change in income, expenditure for meals away from home, and efforts to reduce food expenditure in general.

The families in the less than $1100 per capita income group who decreased their expenditure for total food as their income increased averaged 5.23 persons per family as compared to 4.78 for the entire group. This larger than average family would tend to make the homemaker more conscious of food expenditure and perhaps prevent an increase in per meal expenditure even though income increased. Ten of the 16 families in this group increased their expenditure for meals away from home. Some of these families may have used their increase in income in this way rather than use it for food served at home. Neither size of family nor expenditure for meals away from home appeared to be satisfactory explanations for the reactions of the middle and upper per capita income groups.

The average increase in income received by these families in the three income groups was smaller than the average increase for all families. This would imply that many of the increases were not large enough to induce an increase in per meal expenditure. For instance, if $150 is taken to be a substantial increase in per capita income, only three of the families in the lowest per capita income group received a substantial increase in income. Approximately one-half of the families in the middle and upper income groups received per capita income increases of less than $150.

Another possible explanation which must be considered is the effect of panel membership on total food expenditure. Even though

families do not summarize purchases of food groups, it is possible that in the process of filling out the weekly diary they become more conscious of their expenditures and attempt to decrease their expenditure for food. This effort to decrease food expenditures might also result from increased experience of the homemaker regardless of panel membership.

An easy explanation for these decreases in expenditure is not available. Certainly no one reason is adequate. In many cases the results are probably attributable to several reasons. It is also difficult to explain why families decreased their expenditure for particular food groups while other families did not. Despite the lack of an explanation the fact remains that approximately one-third of the families decreased their food expenditure when their income increased. These families did not all decrease their expenditure for the same food groups. Adjustments such as these result in lower income elasticities and they also manifest the differences between families.

Food Groups for Which Expenditures Tend to Increase

General. Income elasticities for food groups suggest the changes in consumption patterns which occur as a result of increases in income. Food groups with relatively high elasticities are purchased in greater quantities, in improved qualities, or in a form involving increased quantities of marketing services.

The differences in income elasticities between income groups reveal the various reactions to changes in income at the different income levels. In order to assess the effects of an action program it

is necessary to consider the income level of the families involved. Some food groups have elasticities which increase as the income level increases while the elasticities for others grow progressively smaller.

Results from analyses of cross-sectional data indicate the importance of considering the level of income. For instance, analysis of the data obtained in the 1955 survey of food consumption conducted by the United States Department of Agriculture indicated that the quantity of sugar and sweets consumed increased going from the under $1000 family income level to the $1000-1999 level but for the higher levels the quantity consumed decreased.[1] Even for the food groups with all positive or negative changes the percentage change varied.

Changes in per meal expenditure with increases in income. Families with less than $1100 per capita income showed relatively high income elasticities for fruit; bakery and cereal products; and sugar, sweets, and candy. The elasticities were .33, .21, and .82 respectively for these three food groups. As indicated earlier, these are outlay elasticities, and for two of these food groups the high elasticities are primarily a reflection of increased demand for marketing services. The fruit group is the exception. The high elasticity for fruit involves an increased quantity and better quality as well as more marketing services.

The elasticities for the other food groups were small or negative which indicate no sizeable increases in expenditure occurred as income

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[1]Wetmore and Cochrane, op. cit., p. 1.

increased. The average per meal expenditure of these families for vegetables, and fats and oils decreased as their income increased.

It should be remembered that the families in the lowest per capita income group were primarily large families with an average family size of 4.78 persons. Since a large proportion of the family members were children and since family income was not low in many cases it is possible that income was not so great a limitation on expenditure for food as the low per capita income might indicate.

Families with $1100-1900 per capita income showed relatively high income elasticities for the same food groups as the lower income group. They also had income elasticities of .24 for dairy products and .21 for meat. These elasticities would indicate that these families increased their per meal expenditure for all of the food groups except vegetables, and fats and oils.

This income group is probably more representative of the average consumer panel family than either of the other two groups. The average size of family was 3.52 persons compared with 3.49 for all families and approximately forty-five per cent of the families were in this income group during the period 1952-1955.

The families with per capita income greater than $1900 evidenced high income elasticities for fruit; bakery and cereal products, and sugar, sweets, and candy. These families adjusted their consumption patterns in the same way as the lowest per capita income group. Low or negative elasticities were obtained for dairy products; fats and oils; vegetables; and meat. The average decrease in expenditure for fats

and oils was greater for this group of families than for either of the other two income groups.

These results for the three income groups and the elasticities computed for all families as a group indicate the food groups might be divided into three categories. The vegetables group and the fats and oils group would be placed in the category of food groups having very low or negative income elasticities. The meat and dairy product groups would have relatively low but positive income elasticities. The third category would include fruit; bakery and cereal products; and sugar, sweets, and candy and would be food groups with high income elasticities. The per meal expenditure for food groups in the first category would be expected to decrease with increases in income. Per meal expenditures for those food groups in the second category would increase by approximately one per cent with a ten per cent increase in income while those in the third category would increase by three per cent or more with a ten per cent increase in income.

Changes in annual expenditure with increases in income. It is possible for per meal expenditure to increase without affecting annual family expenditure. This can occur with decreases in the number of meals served at home. It is also possible for annual expenditure to increase while per meal expenditure remains the same if the family size increases or if the annual expenditure and number of meals served at home increase by different rates. Hence it is necessary to consider which of these expenditure measures is relevant to an analysis.

The families with family income less than $4000 had positive elasticities for all the food groups except meat. Except for the fats

and oils group, expenditure for the other food groups changed by about the same percentage. The income elasticity computed from the actual changes in expenditure for fats and oils was only .09. This was the only family income group indicating substantial increases in annual expenditure for vegetables and dairy products.

The family income groups receiving $4000-6000, and greater than $6000, indicated relatively high income elasticities for fruit; bakery and cereal products; and sugar, sweets, and candy. The elasticities obtained for dairy products, and fats and oils were negative. The income elasticity for meat was positive for both groups but relatively small. The average annual expenditure for vegetables increased slightly for the families with incomes of $4000 to $6000 but decreased for the families with incomes greater than $6000.

As incomes increased, annual expenditures for all the food groups except meat increased at the lowest family income level. Moving up to the higher income levels, the expenditure for dairy products, and fats and oils decreased with increases in income. The annual expenditure for vegetables also decreased at the higher level while remaining about the same at the $4000-$6000 level. The change in annual expenditure for meat increased as the income level increased. However, the elasticity was only .14 for the families receiving more than $6000. The change in annual expenditure for vegetables decreased and became negative at the highest income level. Elasticities obtained for fruits indicated a progressively larger addition to expenditure up to the $6000 level beyond which the relative increase became smaller. Changes in the

expenditure for the bakery and cereal products group and the sugar, sweets, and candy group increased in going from the lower to higher income groups.

What conclusions can be drawn then as to changes in annual expenditure for food groups with increases in income? The prospects do not appear as promising as results from analysis of cross-sectional data indicate. In general, the only food groups for which expenditures consistently increase are fruit; bakery and cereal products; and sugar, sweets, and candy. Meat expenditures increase in all of the income groups except two and these groups are primarily composed of one and two person families. Results indicate only a slight increase and very possibly a decrease in expenditure for vegetables, dairy products, and fats and oils.

The effect of an increase in expenditure for particular food groups on expenditure for total food varies with the fraction of total expenditure going for the specific group. The percentage of total per meal expenditure going for the major groups are given in Table VIII. Percentages of total annual food expenditure going for each of the food groups are shown in Appendix Table V. The tables include the percentages for all three income groups. This reveals the differences in relative importance of the food groups at the three levels of income.

The elasticities which were computed, combined with these percentages, provide an indication of the effect changes in expenditure for food groups can have on total food expenditure. It has already been pointed out which food groups have high elasticities. These food groups,

TABLE VIII

PER MEAL EXPENDITURE FOR THE MAJOR FOOD GROUPS AND THE PERCENTAGE OF TOTAL FOOD EXPENDITURE GOING FOR EACH GROUP

Food Group	Per Capita Income Group					
	Less than $1100		$1100-1900		More than $1900	
	Per meal expenditure	Percent of total	Per meal expenditure	Percent of total	Per meal expenditure	Percent of total
Dairy products	.0450	20.4	.0449	17.0	.0458	14.0
Fats and oils	.0104	4.7	.0123	4.6	.0161	4.9
Fruit	.0201	9.1	.0221	8.4	.0344	10.5
Vegetables	.0221	10.0	.0249	9.4	.0317	9.7
Meat	.0666	30.1	.0853	32.3	.1206	36.8
Bakery and cereal products	.0273	12.4	.0300	11.4	.0346	10.5
Sugar, sweets, and candy	.0080	3.6	.0092	3.5	.0115	3.5
Other*	.0215	9.7	.0353	13.4	.0333	10.1
Total	.2210	100.0	.2640	100.0	.3280	100.0

*Other includes such items as prepared baby food, nuts and nut products, beverages, vitamins and minerals, and cooking aids.

Source: Data from M.S.U. consumer panel.

which are fruit; bakery and cereal products; and sugar, sweets, and candy, compose approximately one-fourth of the total per meal expenditure. An increase in income which results in increased expenditure for these food groups can very easily cause an increase in total food expenditure.

Meat is one food group which composes a large proportion of total food expenditure. As shown in Table VIII, the percentage varies between 30.1 and 36.8 depending on the income group. Although the income elasticity obtained for meat was relatively small, it is highly conceivable that a change in total expenditure might be effected through an increase in expenditure for meat. Since meat expenditure makes up a large fraction of total per meal expenditure, even a one per cent increase in expenditure for meat is important. This is in contrast to the sugar, sweets, and candy group which composed only 3.5 per cent of total expenditure. A one per cent change in expenditure for the meat group will change total food expenditure almost as much as a ten per cent change in expenditure for sugar, sweets, and candy.

The other two high elasticity food groups, fruit, and bakery and cereal products, each comprise approximately one-tenth of total per meal expenditure. A change in income can have considerable effect on total per meal expenditure through increased expenditure for either of these two food groups.

Another variable which should be considered in assessing the effects of an income change is that of family size. This is particularly true for two of the major food groups. As indicated in Table VIII,

the percentage of total per meal expenditure going for dairy products and meat varies considerably between income groups. This may be attributable to differences in family size and age-distribution as well as income. The larger families with more children, in the less than $1100 per capita income group, spend a greater proportion of their food dollar for dairy products and a smaller proportion for meat. At the higher per capita income levels the families spend less for dairy products and more for meat. As the income level increases and family size decreases the percentage of total expenditure going for dairy products decreases while the percentage spent on meat increases.

The elasticities obtained for these food groups by income level do not indicate any relationship between the relative importance of the food group and the likelihood of expenditure for it changing with increased income.

Food Groups for Which Expenditures Tend to Decrease

Income elasticities for the various food groups indicate which food groups are affected by changes in income. Relatively low or negative elasticities were obtained for dairy products; fats and oils; and vegetables. Negative elasticities reflect decreases in the actual expenditure for the food groups with increases in income. Even though total food expenditures increase as families in the lower and middle income groups receive increased income, expenditures for specific food groups decrease.

Results for all consumer panel families as a group indicate a decrease in expenditure for fats and oils as incomes increase.

An elasticity of -.18 was obtained using changes in per meal expenditure and per capita income. When changes in annual family expenditure and family income were used the estimated elasticity was -.01. A decrease in expenditure is indicated regardless of the expenditure and income measure used.

The results for the vegetables and dairy product groups vary with the measures used. An increase in per meal expenditure for dairy products was indicated for those families receiving increases in income while the elasticity derived using annual family expenditure and family income was negative. The results for vegetables were just the reverse with indications of an increase in annual expenditure and a decrease in per meal expenditure. The elasticities were for all families and hence were aggregates of both positive and negative elasticities in some cases.

As incomes increase, the expenditures for these three food groups tend to decrease slightly or remain about the same. It is the effect of decreases in expenditure for these food groups which tends to lower the elasticity for all food. The overall adjustment in the consumption pattern is a combination of increases in expenditure for some food groups and decreases in others.

The decreases in expenditure for these food groups were greatest for the higher income groups. For instance, the elasticities for fats and oils were -.51 for those families receiving more than $1900 per capita income and -.41 for those families in the greater than $6000 family income group. The decreases indicated for the other two food groups were not so large but the general tendency was present in both cases.

In fact, positive elasticities were obtained for all three food groups when only those families receiving less than $4000 annual family income were considered. This would indicate income is a limiting factor in the expenditure patterns for all the food groups at this level. Therefore, even the food groups which are ordinarily considered low elasticity foods do not decrease in importance at this level. As the income level increases families can be more selective in their food purchases and thereby increase their expenditure for some food groups while decreasing their purchases of low elasticity or inferior food groups.

The question of differences in elasticity between food groups is often one of relative increase rather than that of which ones are positive and which ones are negative. For instance, Fox derived positive elasticities for all the major food groups used in the analysis of the 1948 survey of urban households.[2] In the Minnesota study of the 1955 survey data, positive changes were indicated for all of the food groups used except sugar and sweets, and flour and cereals.[3] Neither of these food groups include as many food items as the groups used here. Both of these examples are based on estimates from cross-sectional data and reflect changes over the long run. Elasticities computed from such data would be expected to be higher.

The considerations are primarily the same even if the indicated changes in expenditure are all positive. It is important to know what

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[2]Fox, "Factors Affecting Farm Income, Farm Prices, and Food Consumption," p. 81.

[3]Wetmore and Cochrane, op. cit., p. 1.

food groups will increase substantially and which ones will remain about the same. Of course, if expenditures for some food groups will decrease then this is important also. If possible, it would be even more meaningful to know what specific food items would be purchased in greater or smaller quantities.

What fraction of total food expenditure goes for low elasticity food groups? An answer to this question is just as relevant as the elasticities. The percentage of total expenditure provides an indication of the overall change which is likely to occur in the adjustment of consumption patterns. The percentage spent for vegetables; fats and oils; and dairy products varies from 28.6 per cent to 35.1 per cent depending on the income group involved. The lower per capita income groups spend a larger proportion for these food groups. These results manifest the importance of the low elasticity food groups and suggest why the income elasticity for total food is low compared with the value for particular food groups.

CHAPTER VII

CONCLUSIONS AND IMPLICATIONS OF RESULTS FOR WORK IN DEMAND EXPANSION

Summary of Results

An attempt was made in this study to measure true income elasticities by observing changes in food expenditure and income over time. The approach differs from other analyses in that the observations were actual changes in the variables as reported by consumer panel families during the period 1951 to 1955. This provided information on the actual adjustments made in consumption patterns with changes in income.

Income elasticities. Estimates of income elasticities were obtained for total food and for seven major food groups. Families experiencing increases in income were divided into three income groups, using both per capita and family income as the relevant measure. Income elasticities of demand for all food and for specific food groups were computed for each income group. Two measures of food expenditure, per meal and annual family expenditure, were used. The same procedure was followed for families experiencing decreases in income in order to compare their adjustments with families whose income increased.

The income elasticities derived for total food on a per capita basis were .28 for those families receiving less than $1100 per capita income, .18 for those families with per capita incomes of $1100 to

$1900, and .09 for those families receiving more than $1900 income per capita. These results indicate a progressively smaller reaction to changes in income as the per capita income level increased. Those families in the lower income group increased their per meal expenditures 2.8 per cent with each ten per cent increase in income while the families at the highest level only increased theirs by .9 per cent with the same percentage increase in income.

There was an even greater difference between income groups when family income was used to divide the families into groups. The elasticities obtained were .26, .10, and -.02 for the income groups of less than $4000 family income, $4000-6000, and greater than $6000 respectively. The families in the lowest family income group evidenced approximately the same relative change in annual expenditure as was indicated for the families with the lowest per capita incomes. Families in the income groups receiving more than $6000 decreased their expenditure for food slightly as income increased.

The difference in the elasticities obtained between the highest per capita income group and the highest family income group, using actual changes in expenditure, is primarily attributable to the measures of income. Many of the families in the group receiving greater than $1900 per capita income were not receiving high family incomes. The average family size was only 2.18 so it was possible for a large fraction of the families to be in this per capita income group and yet have relatively low family income. With the costs of operating the household spread over fewer members it is conceivable that income was a limiting factor in the expenditure for food.

Income elasticities for families with decreases in income revealed an even greater difference between income groups. The elasticities were .38, .05, and -.43 for the lower, middle, and upper family income groups. The adjustment also differed from that by families with increases in incomes, in that, the families receiving less than $4000 family income evidenced a greater percentage change in food expenditure. Families in the middle and upper income groups showed a greater reluctance to change than families in the same income groups who received increases in income. The hypothesis that families tend to retain their food consumption patterns despite decreases in income appeared to hold true for families at the higher income levels but not for those at the lower levels.

An examination of data from families with substantial increases in income indicated that families in the lowest income group reacted to even small changes in income, while families at the higher levels required a substantial increase before changing their expenditure. This would substantiate the belief that cash subsidies will be more effective in increasing the demand for food if granted to families in the low income segments of the population.

Differences in elasticities between income groups were much more obvious in the elasticities computed on the basis of change in annual expenditure than on the basis of per meal expenditure. The relationship between income level and the income elasticity of some of the food groups was not clear when per meal expenditure was used. Low elasticity food groups showed an even smaller or negative elasticity as the family income level increased. The elasticities for the high

elasticity food groups increased going from the low to the high income groups. Part of this difference which appears between family income groups may be attributable to family size and age-distribution of the family members. The use of per meal expenditure tended to eliminate the effect of family size in the results for per capita income groups.

Estimates of income elasticity were also obtained from the panel data on a cross-sectional basis. Arc elasticities were computed from the average per meal expenditure and per capita income for each of the income groups. An income elasticity of .34 was obtained from the data on differences between the lower and middle per capita income groups. A value of .35 was obtained from the middle and higher income groups. These elasticities indicate no significant relationship between income elasticities and level of income. A comparison of these estimates with the ones obtained using actual changes in expenditure and income reveals that estimates from the data on a cross-sectional basis are much higher, especially for the higher income levels.

Limitations of results. A number of limitations are imposed upon the results from this study by the data and the procedures used in the analysis. These limitations should be pointed out as an aid to the interpretation and evaluation of results.

The consumer panel from which the data were obtained was designed to represent a Michigan city of approximately 100,000 population. It was not expected to be representative of the United States nor even the urban population. The consumer panel has a smaller proportion of non-white families, larger proportion of families employed in

manufacturing, and a higher level of income than the urban population as a whole. However, the results from an analysis of panel data should provide some information about this segment of the population and have some applicability in other geographic areas.

The use of food groups involves a high degree of aggregation. Income elasticities of demand for specific food items within a food group vary widely. The aggregation of food items into food groups tends to cover up this variation. This is even more true of the aggregation required in an analysis of total food expenditure. The income elasticities computed for the food groups and total food are averages of the elasticities for specific food items. The value is a weighted average with the expenditure for each item serving as the weight in the computation of an elasticity for a food group. Estimates of income elasticities for total food and food groups must be interpreted as average values with a realization that the value changes with shifts in consumption between food items and food groups.

Another limitation of the results is the procedure used in computing the elasticities. The elasticities are arc elasticities and hence are assumed to be the same over the entire segment of the income-consumption schedule covered in the calculation of the elasticity. The range was narrowed in this analysis through the use of three income groups. The procedure also involved the use of average changes in income and expenditure and the results are subject to variation because of extreme values. The effects of these extreme values were reduced by combining changes over the five year period, 1951 through 1955.

The results are also limited to the income groups used in this particular study and some adjustment is necessary before applying to other groups.

A number of other variables, besides income, affect a family's expenditure for food. In one phase of this analysis per meal expenditure and per capita income were used in an effort to eliminate changes due to differences in family size. The procedure did not account for changes in age-distribution, expenditure for meals away from home, holdings of liquid assets, debt position, relative prices of food items, and occupation of homemaker. Part of the change in expenditure which occurred may be attributable to one or more of these factors but this was not disclosed by the procedure used.

An effort should be made to consider the effects of the more important of these variables. More refined procedures should be used as a check on the results obtained with the relatively simple procedures used in this study. An analysis of the effects of these other variables would prove helpful in extending the application of these results to other areas. An effort should also be made to establish confidence intervals for the estimates derived. No attempt was made in this study to compute such intervals since it was impossible to establish controls on changes in other variables with the procedure used. Observations of actual changes in income and expenditure available in the consumer panel data eliminate some of the problems due to differences between families but changes within the families should be considered.

Lags in adjustment following increases in income. The adjustment of consumption patterns following increases in income does not always occur immediately. The procedure used in this analysis considers only those changes in expenditure taking place between two years. Therefore, changes which occur at a later date are not included in the estimates of income elasticity. This does not mean the lags in adjustment were unimportant but no method was found for measuring such lags.

Changes in expenditure attributable to changes in income during some previous period are difficult to measure for a number of reasons. Over one-third of the families cooperating in the consumer panel had changes in income every year during the period in which they reported. This makes it difficult to determine what fraction of the change in expenditure is attributable to changes in income during earlier years. The degree of lag also varies with changes in age and experience of the homemaker, debt position, nearness of retirement, income expectations, and level of income.

The importance of lags is partially revealed by differences in estimates of income elasticity from time-series and cross-sectional data. The kind of behavior measured from cross-sectional data is commonly long-run in nature while that measured with time series data is more often of a short-run character. Kuh and Meyer point out that cross-sectional data reveal quality differentials associated with income that are the result of a cumulative training and development that may have extended over a number of years.[1] Such is not the case

[1]Edwin Kuh and John R. Meyer, "How Extraneous are Extraneous Estimates," The Review of Economics and Statistics, XXXIX, No. 4 (November, 1957), p. 381.

with time series data or the data used in this study. Differentials in taste that take time to cultivate are more observable in the cross-sectional data since time is required for the adjustment.

Even though lags in adjusting expenditure patterns may be small this is not sufficient argument for forgetting about them. An evaluation of a proposed program for expanding demand must include some consideration of these lags. This is especially true if cross-sectional data are used for estimating changes in expenditure with increases in income. The change in consumption which is effected in the short-run may be much less than that indicated by estimates from cross-sectional data.

Changes in expenditure for meals away from home. The expenditure data used here did not include expenditure for meals away from home. The estimates of income elasticity do not include the additional food eaten away from home when income is increased. Actual changes in food consumption are under-estimated by the amount consumed in meals away from home. Wang's work on expenditure for meals away from home by the same consumer panel families showed a relatively high income elasticity for food eaten away from home.

Changes in expenditure for meals away from home are greatest at the higher income levels. This tendency affects the estimates of income elasticity in two ways. First, more meals are eaten away as income increases which tends to decrease the annual expenditure for food at home. Second, the meals taken away from home probably are those which contain larger amounts of meat and are heavier in terms of

total calories than the average of meals eaten at home and hence the per meal expenditure for food served at home is decreased.

An evaluation and interpretation of the results obtained here should give some consideration to food eaten away from home since the income elasticities would tend to be slightly higher if this food were included. However, at the lower income levels the problem is not as great as at the higher levels. The expenditure for food away from home was not included because a large fraction of the expenditure is for the services attached to the food and the income elasticity for food as such would tend to be over-estimated if these expenditures were included.

Implications of Results

Use of income elasticities. Estimation of the demand for food involves a consideration of the effects of changes in income. Income is one of the main variables responsible for changes in the demand for food. The effect of changes in this variable must be considered in attempts to estimate the demand at some future date. Income elasticities are used to measure the relative percentage change in quantity demanded (or expenditure) which results from a given change in income, other quantities, prices, and the like being held constant.

The estimates are not always designated as income elasticities but the same principle is involved. For instance, estimates of change are sometimes obtained by computing the difference in consumption rates at various income levels. Cross-sectional data are used to show the

percentage change in quantity of food purchased if families at one income level receive enough additional income to bring their food purchases to the level of the next higher income group. The assumption is made that if families receive increases in income they will take on the same consumption patterns as families already at that income level.

Estimates of income elasticity provide the researcher with the information necessary to forecast changes in consumption of total food and specific food groups. This is the type of information required in assessing the effects of general increases in income over a period of years or the granting of cash subsidies as an effort to expand the demand for farm products. Information is provided as to changes in total food consumption and the direction of change in expenditure for food groups.

Estimates of income elasticities are used to show what types of farm products are consumed in greater quantities as incomes are increased. Though the total quantity of food consumed may not change it is possible for shifts to occur between food groups or between specific items within a food group. Changes in expenditure for both the total and particular food groups are important in a determination of the agricultural resources involved.

Since the production of some food groups requires the use of greater quantities of agricultural resources and since some food groups are being produced in surplus quantities it is important to know the effects of increases in income. One phase of the Minnesota project on expansion

of demand for farm products is concerned with the reduction of surpluses through income subsidies. Estimates of changes in consumption following changes in income are necessary in order to determine the possibility of reducing these surpluses. The demands of some products gain substantially from increases in income while others lose ground.

Results from the analysis of changes in expenditure for food groups provide an indication of what food groups increase in relative importance with changes in income. On the basis of changes in per meal expenditure, fruit; bakery and cereal products; and sugar, sweets, and candy may be classified as relatively high elasticity foods. Income elasticities for the meat and dairy product groups were positive but relatively low indicating a small percentage increase in per meal expenditure as income increased. Per meal expenditure for vegetables, and fats and oils decreased as the per capita income of consumer panel families increased.

The same food groups, fruit; bakery and cereal products; and sugar, sweets, and candy had high income elasticities when changes in annual expenditure and family income were used in the analysis. The elasticity of demand for meat was about the same. The results were somewhat different for the other three food groups. The average change in annual expenditure for vegetables was positive for two of the income groups and for all families as a group. Families in both the middle and upper income groups evidenced negative income elasticities for dairy products, and fats and oils. However, the decrease in annual expenditure for fats and oils was small for all families compared with a sizeable decrease in per meal expenditure.

Analyses of changes in demand for food products usually involve a particular group of families rather than the whole population. Family budget data indicate that consumption of food increases at a decreasing rate as income rises and hence the income elasticity is different at different income levels. The income elasticity is highest at the lower income levels. This means that demand expansion programs will vary in their effectiveness with the income group involved and there is a need for elasticities for each group.

Income elasticities for income groups are also more meaningful since the income-consumption curve is more closely approximated by a linear relationship over short income ranges. The relationship is not linear over the full range of incomes. Neither a linear nor exponential form are appropriate if the whole range of incomes is considered.[2]

Results obtained compared with past estimates. The results obtained in this analysis provide information as to the degree to which estimates of income elasticity represent the actual changes in expenditure with increases in income. Estimates of income elasticity obtained in this study reflect the actual changes consumer panel families made in their expenditure patterns when their incomes increased. Differences in the populations involved in the estimates must be recognized in evaluating the results.

The elasticities obtained for total food varied with the income group involved. Families with family income less than $4000 or with

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[2]S. J. Prais, "Non-Linear Estimates of the Engel Curves," Review of Economic Studies, XX (February, 1953), pp. 77-104.

per capita income less than $1100 evidenced approximately the same change in expenditure as indicated by income elasticities obtained using time series data. The elasticities obtained for families in the middle and upper family and per capita income groups were much lower than estimates from time series data. Examination of the income distribution of the populations covered by time series data indicates the average income approaches that of families in the lower income groups used in this analysis. This is explained by the relatively high average income received by families in the Lansing area which the consumer panel is designed to represent. The fact that the lowest per capita income group and the lowest family income group evidenced approximately the same income elasticity indicates both low per capita income and low family income tend to limit expenditures for food.

Estimates of income elasticities for total food obtained from cross-sectional data are higher than estimates from time series data and the estimates obtained in this study. These estimates from cross-sectional data are based on the assumption that families will have the same consumption pattern as families in the income groups which they become members of with increases in income. The estimates are derived by computing the changes in expenditure for food (or quantity consumed) in moving from one level to another.

The change in expenditure estimated using cross-sectional data involves the long-run adjustment whereas the time series data and the data used here reflect primarily short period variations. Changes which tend to lag behind changes in income are not included in estimates

of income elasticity obtained from data such as that used in this analysis. The degree to which the estimates from the different types of data represent the true income elasticities depend on the length of period considered. The actual changes observed in this analysis were much less than estimates from cross-sectional data indicate.

Results of the analysis of actual changes in expenditure for food groups indicate that the income elasticities for fruit; bakery and cereal products; and sugar, sweets, and candy are higher than for the other major food groups. These food groups were found to have income elasticities ranging upward from .25. There was a tendency for the percentage change in expenditure to increase up to the $1900 per capita and $6000 family income levels and then start to level off. Relatively few estimates of income elasticity for these food groups are available but the ones published indicate approximately the same elasticities. This is true of research using both time series and cross-sectional data.

The estimates of income elasticity for meat and dairy products were small but generally positive. The estimates were much lower than those estimates which have been derived from cross-sectional data. The value for meat was lower than estimates obtained from time series data but was about the same for dairy products.

The examination of expenditure patterns of those families receiving increases in income indicated very little, if any, increase in the expenditure for vegetables and fats and oils. Families in the lowest family income group were the only ones evidencing a positive change of

any magnitude. The other income groups showed negative or very small positive changes in expenditure for these two food groups. The results for both groups were lower than estimates from cross-sectional data but were about the same as estimates from time series data.

The relatively high income level of families in the consumer panel must be considered. This is one reason why the estimates of income elasticity tended to be lower than results from analyses using cross-sectional data. In some studies only those families with incomes below a certain level are considered and even when all families within a region are included the average income is often very near that of the consumer panel families who received less than $4000. For instance, the average income of families included in the United States Department of Agriculture survey of urban households in 1948 was $3602.[3] If only those families with less than $4000 family income are considered the income elasticities for the food groups do not differ much from estimates using cross-sectional data. This points up the need for being specific as to level of income involved when reporting or using an estimate of income elasticity.

Adjustments indicated in consumption patterns. The consumer panel data used in this study made it possible to observe variation both over time and over consumer units. This is a slightly different approach but one which should approximate the true elasticities for this particular group of families. The procedure used not only indicates the income elasticities but also points out some of the variables other

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[3]Clark, et al., op. cit., p. 11. An adjustment for price and wage increases since 1948 indicates that the average for 1952-1955 probably would be slightly higher than the average for the low income groups in this study.

than income which tend to affect expenditure for food.

A change in expenditure for total food of approximately 2.5 per cent was indicated with each ten per cent increase in income at the lower income levels. This was true of estimates using both per capita and family measures. The change in expenditure for all food became smaller as the income level rose and was slightly negative for those families with family income greater than $6000.

These results imply that attempts to expand the demand for food should be restricted to families with per capita income less than $1100 or family income less than $4000. The change in expenditure for food with given increases in income will be much greater if programs are limited to families at these lower income levels.

The change in demand for food groups at the lower income levels will vary with the food group. Results from this analysis indicate that per meal expenditure for fruit; bakery and cereal products; and sugar, sweets, and candy will increase substantially if families receiving less than $1100 per capita income are given income subsidies. Per meal expenditure for meat and dairy products will increase slightly while per meal expenditure for vegetables, and fats and oils will decrease.

Annual expenditure for all food groups except meat, and fats and oils increased substantially as those families with less than $4000 received additional income. The elasticity for fats and oils was positive but small and the elasticity for meat was negative. The negative income elasticity for meat is attributable in part to family

size and expenditure for meals away from home. There is an implication here that if income subsidies are restricted to families at this income level the expenditure for all food groups might increase. This is not to argue that this necessarily should be the case. Families with low per capita income should also be considered.

Results obtained for the different income groups indicate that the percentage change in expenditure tends to increase for the food groups with higher income elasticities as the income level rises. This was true for meat; fruit; bakery and cereal products; and sugar, sweets, and candy. The percentage change decreased for fruit above the $6000 family income level. The food groups with lower income elasticity evidenced a decrease in the percentage change in expenditure in going from the lower to the higher income groups. These results emphasize the necessity of considering the income level in estimating changes in expenditure.

The procedure used in this analysis did not measure the adjustment in consumption patterns attributable to variables other than income. However, the variation in family reaction to increases in income reveals the importance of some of these factors. Examination of data from panel families indicate changes in family size, asset holdings, debt position, expenditure for meals away from home, age-distribution of family members, occupation of homemaker, and experience of homemaker are also important. Information on level of these factors and changes between years is necessary before accurate estimates of income elasticities can be made. Variation in these factors and differences between

measures of income and consumption must be recognized in estimating the effects of changes in income on the demand for all food and specific food groups.

APPENDIX

APPENDIX

SUPPLEMENTARY DATA

TABLE I

AVERAGE ANNUAL FAMILY INCOME, ADJUSTED FAMILY EXPENDITURE FOR ALL FOOD, CHANGE IN FAMILY INCOME, AND CHANGE IN ADJUSTED ANNUAL EXPENDITURE REPORTED BY CONSUMER PANEL FAMILIES RECEIVING INCREASES IN FAMILY INCOME, 1951-1955

Income group	No. of families	Average family income	Average change in family income	Average adjusted expenditure	Average change in adjusted expenditure
Less than $4000	65	$2858.	$368.	$639.95	$21.67
$4000-6000	111	$4836.	$656.	$1011.85	$14.11
More than $6000	53	$7227.	$758.	$1063.74	$-1.82

TABLE II

AVERAGE PER CAPITA INCOME, PER MEAL EXPENDITURE FOR ALL FOOD, CHANGE IN PER CAPITA INCOME, AND CHANGE IN PER MEAL EXPENDITURE REPORTED BY CONSUMER PANEL FAMILIES RECEIVING INCREASES IN PER CAPITA INCOME, 1951-1955

Income group	No. of families	Average per capita income	Average change in per capita income	Average per meal expenditure	Average change in per meal expenditure
Less than $1100	69	$849.	$108.	.221	.008
$1100-1900	111	$1440.	$215.	.264	.007
More than $1900	70	$2672.	$257.	.328	.003

TABLE III

AVERAGE ANNUAL ADJUSTED EXPENDITURE AND CHANGE IN ADJUSTED EXPENDITURE FOR EACH OF THE MAJOR FOOD GROUPS AS REPORTED BY FAMILIES IN EACH INCOME GROUP RECEIVING INCREASES IN FAMILY INCOME DURING THE PERIOD 1952-1955

Income group	Average annual expenditure (dollars)	Average change in annual expenditure (dollars)
A. Dairy products		
Less than $4000	96.73	2.99
$4000-6000	185.85	-1.04
More than $6000	211.03	-5.81
B. Fats and oils		
Less than $4000	29.13	.39
$4000-6000	46.00	-.04
More than $6000	52.42	-2.31
C. Fruit		
Less than $4000	57.38	2.86
$4000-6000	87.27	8.03
More than $6000	104.24	4.44
D. Vegetables		
Less than $4000	54.62	2.65
$4000-6000	97.99	.42
More than $6000	112.69	-.52
E. Meat		
Less than $4000	196.68	-2.19
$4000-6000	327.35	5.37
More than $6000	348.61	5.22
F. Bakery and cereal products		
Less than $4000	67.63	2.78
$4000-6000	123.73	5.69
More than $6000	116.52	5.41
G. Sugar, sweets, and candy		
Less than $4000	21.56	1.15
$4000-6000	36.30	4.11
More than $6000	35.21	5.45

TABLE IV

AVERAGE PER MEAL EXPENDITURE AND CHANGE IN PER MEAL EXPENDITURE FOR EACH OF THE MAJOR FOOD GROUPS AS REPORTED BY FAMILIES IN EACH INCOME GROUP RECEIVING INCREASES IN PER CAPITA INCOME DURING THE PERIOD 1952-1955

Income group	Average per meal expenditure	Average change in per meal expenditure
A. Dairy products		
Less than $1100	.0450	.0001
$1100-1900	.0449	.0016
More than $1900	.0458	.0002
B. Fats and oils		
Less than $1100	.0104	-.0001
$1100-1900	.0123	-.0001
More than $1900	.0161	-.0008
C. Fruit		
Less than $1100	.0201	.0008
$1100-1900	.0221	.0021
More than $1900	.0344	.0009
D. Vegetables		
Less than $1100	.0221	-.0005
$1100-1900	.0249	.0001
More than $1900	.0317	-.0006
E. Meat		
Less than $1100	.0666	.0005
$1100-1900	.0853	.0027
More than $1900	.1206	-.0004
F. Bakery and cereal products		
Less than $1100	.0273	.0007
$1100-1900	.0300	.0026
More than $1900	.0346	.0017
G. Sugar, sweets, and candy		
Less than $1100	.0080	.0008
$1100-1900	.0092	.0009
More than $1900	.0115	.0009

TABLE V

PERCENTAGE OF TOTAL ANNUAL FOOD EXPENDITURE GOING FOR EACH OF THE MAJOR FOOD GROUPS, USING AVERAGES FOR THE PERIOD, 1952-1955

Food Group	Family Income Group		
	Less than $4000	$4000-6000	More than $6000
	(Per cent)	(Per cent)	(Per cent)
Dairy Products	15.1	18.4	19.8
Fats and Oils	4.5	4.5	4.9
Fruit	9.0	8.6	9.8
Vegetables	8.5	9.7	10.6
Meat	30.7	32.4	32.8
Bakery and Cereal Products	10.6	12.2	11.0
Sugar, Sweets, and Candy	3.4	3.6	3.3
Other*	18.2	10.6	7.8
Total	100.0	100.0	100.0

*Other includes such items as prepared baby food, nuts and nut products, beverages, vitamins and minerals, and cooking aids.

TABLE VI

NUMBER OF FAMILIES IN EACH INCOME GROUP EXPERIENCING INCREASES AND DECREASES IN PER CAPITA INCOME DURING EACH YEAR OF THE PERIOD, 1951-1955

Year	Per Capita Income Groups					
	Less than $1100		$1100-1900		More than $1900	
	Families with Increases	Families with Decreases	Families with Increases	Families with Decreases	Families with Increases	Families with Decreases
1952	15	4	16	5	9	4
1953	27	2	27	9	17	10
1954	16	10	27	20	22	13
1955	13	5	41	10	20	12
Total	71	21	111	44	68	39

TABLE VII

NUMBER OF FAMILIES IN EACH INCOME GROUP EXPERIENCING INCREASES AND DECREASES IN FAMILY INCOME DURING EACH YEAR OF THE PERIOD, 1951-1955

Year	Family Income Groups					
	Less than $4000		$4000-6000		More than $6000	
	Families with Increases	Families with Decreases	Families with Increases	Families with Decreases	Families with Increases	Families with Decreases
1952	21	5	12	7	6	2
1953	14	9	25	3	10	3
1954	15	8	30	19	14	11
1955	15	6	44	8	23	4
Total	65	28	111	37	53	20

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