SOME RELATIONSHIPS OF MEALS EATEN AWAY FROM HOME TO FAMILY CHARACTERISTICS

Thesis for the Degree of M. S.
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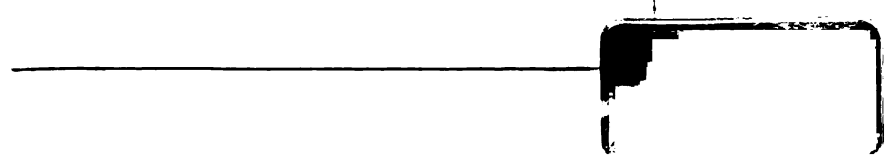

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by

Hsin Fu Wang

AN ABSTRACT

Submitted to the School of Graduate Studies of
Michigan State University of Agriculture and
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Hsin Fu Wang

ABSTRACT

The purpose of this study is to determine: (1) whether expenditures for meals eaten away from home are significantly related to such family characteristics as the level of income, size of family, employment, age and education of homemakers; (2) seasonal effects on changes in number of, and expenditures for, meals eaten away from home; and (3) the income elasticities of meals eaten away from home. The primary source of data was the weekly family food purchase diary of the Michigan State University consumer panel. For greater accuracy, the homemakers were personally interviewed in order to make a comparison of stated yearly incomes with the annual total of the weekly incomes as reported in the diaries.

The five-year period, 1951 to 1955, was chosen for most of this study. However, since the data for 1951 was incomplete it was excluded in the cross-sectional elasticity, simple correlation and multiple regression analyses.

The three methods used in computing the income elasticities were arc, cross-sectional, and time series. Simple correlation analysis was used in determining the relationship between family characteristics and expenditures for meals eaten away from home. It was also used for intercorrelation analysis between each two family characteristics.

Multiple regression analysis was used to determine the net effects of family characteristics on expenditures for meals eaten away from home. The basic multiple regression equations expressed the expenditures for meals eaten away from home as a function of income, size of family, age of homemakers, and employment of homemakers. The income elasticities, simple correlation and multiple regression analyses were set up on a per family basis and a per capita basis in order to make a inter-comparisons.

The income elasticities for all meals and meals at home were also computed in order to compare these with meals eaten away from home. In this case only the arc elasticity method was used. It was found that the income elasticities for meals eaten away from home were greater than those for all meals and for meals eaten at home. This relationship was true when computed on a per family basis as well as on a per capita basis.

Over the five-year period, the expenditures for meals eaten away from home and the number of meals eaten away from home were directly related to income. The seasonal patterns of meals eaten away from home, both number and expenditures, in each income group appeared to be the same. When the five years were averaged for a single seasonal trend it showed a seasonal high between the middle of July and August, falling to a seasonal low from early in December and lasting through the end of March.

When the various family characteristics were related to expenditures for meals eaten away from home it was found that income was consistently the most important factor on both per family and per capita bases. The results obtained from simple correlation and multiple regression analyses show that incomes were always positively correlated to expenditures for meals eaten away from home.

When the various family characteristics were related to each other it was found that the age of homemakers was negatively correlated to per family income and positively correlated to per capita income. The size of family was negatively related to age of homemakers and positively related to education of homemakers on both a per family basis and a per capita basis. Among these family characteristics the employment of homemakers seemed to bear no close relationship with other family characteristics. Perhaps this may be explained by the fact that on an average only 13.4 percent of the homemakers were employed and therefore did not yield a significant result in the correlation analysis.

The results of the multiple regression analysis show that the size of family, education of homemakers and employment of homemakers had more effect on per capita expenditures for meals eaten away from home than on per family expenditures for meals eaten away from home. However, the per capita income and the age of homemaker had less effect on per capita than on per family expenditures for meals

eaten away from home. Over the five year period income was significantly correlated to both per family and per capita expenditures for meals eaten away from home.

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The author assumes responsibility for any errors or omissions which may be present in the manuscript.

Hsin Fu Wang

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CHAPTER I

INTRODUCTION

Nature and Importance of This Study

Man inherits certain potentialities. How they develop depends on his environment, and the most fundamental influence in the environment is food. It builds and shapes his body, and through the glands, hormones, and nerves, it modifies sharply his mental and emotional make-up. If a person were entirely deprived of food, life would soon become extinct. The importance of food in the consumption pattern is obvious. Purchases of food to be served at home are the largest item in total personal consumption expenditures. Several studies have been made of relationship between income and food expenditures in the United States. Generally, it has been found that, for the United States population as a whole, about 25 percent of total income is spent on food.[1] In 1950, for example, total personal expenditures of people in the United States were about 194 billion dollars, and total expenditures on food were about 48 billion dollars.[2]

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[1] Harold T. Halcrow, Agricultural Policy of the United States, Prentice Hall, Inc., New York, p. 82.

[2] Office of Business Economics, United States Department of Commerce, Survey of Current Business, Vol. 31, July 1951, p. 8.

Moreover, this condition exists in the United States which has very large per capita productive resources. In some underdeveloped countries, such as China, India, Japan, Thailand, it is estimated that as high as 80 per cent of total productive resources is used to provide food.

In every economy, the provisions of food have always occupied a major place. Consumers' purchase is a major activity of marketing. If consumers do not buy the end product it is fruitless for farmers to produce the raw material from which it is made. People in the United States also depend on the market for the largest share of their food and clothing.

Farm families produce some of their own food, and homemakers still perform at home some services that they could buy on the market. But purchased food and services have become more important. In the average budget of urban wage-earner families, food takes about as much of every dollar as do housing expenses, like rent or the costs of home ownership, furniture, heat, light, and household supplies. The distribution of expenditures among commodities differs among the various income classes. Poor people spend a relatively large proportion of their food dollar on cereals and the cheaper vegetables, whereas people in higher income brackets spend a large proportion of their food dollar on meats, certain dairy products, and the higher-priced fruits and vegetables. As income increases, people tend to

spend more money on food. This relationship between income and food expenditures has very important implications for agricultural policy. A general conclusion is that if the national level of living or real income continues to improve, agriculture will tend to find it profitable to shift more and more to a livestock economy. If the supply of farm products is inelastic, a change in consumer income may have a considerable impact on farm prices and farm income even though income elasticity for total products is low.

There are many previous studies about consumption of food. Reports of total expenditures of foods consumed indicate that such consumption varies greatly with income. Reports are seldom made on a separate basis to indicate the change in meals eaten away from home varying with the size of income. Among the urban families, expenditures for meals eaten away from home have become increasingly important.

The growth of population in the United States is largely an urban growth. The farm population has rapidly declined due to movement from farm to nonfarm since 1910. The total population of farm in 1950 was less than half what was in 1910. The farm population was only 16 per cent of the total in 1950 compared with 35 per cent in 1910.[3]

In addition to income, other factors affecting meals eaten away from home which were considered include education,

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[3]Halcrow, op. cit., p. 24.

size of family, age and activity of homemaker. These factors affect the quantity and quality of meals eaten away from home as well as meals eaten at home. The relationship of expenditures for meals eaten away from home to level of income, size of family, age, education and employment of homemaker are also very important. But, because of the difficulty of their evaluation, they have been given little consideration in previous studies. This report will try to evaluate the relationships between these factors.

Objectives and Hypotheses of This Study

The objectives of this study are:

(1) To determine the effect of a change in income from one year to the next on the expenditures for meals eaten away from home.

(2) To determine the inter-relationship among the family characteristics.

(3) To determine whether expenditures for meals eaten away from home are significantly related to family characteristics such as the level of income, size of family, employment, age, and education of homemakers.

(4) To determine the effect of season on changes in expenditures for meals eaten away from home.

(5) To compare changes in expenditures for meals eaten at home and changes in expenditures for meals eaten away from home.

(6) To measure the income elasticity of meals eaten away from home for each year based on cross-sectional data.

(7) To measure the income elasticity of meals eaten away from home based on time series data.

Hypotheses made for this study follow:

(1) Changes in income affect significantly the expenditures for meals eaten away from home.

(2) The income elasticity of meals eaten away from home is greater than that of meals eaten at home.

(3) Expenditures for meals eaten away from home vary seasonally each year.

(4) Expenditures for meals eaten away from home differ with the size of family.

(5) Expenditures for meals eaten away from home differ with the age of the homemaker.

(6) Expenditures for meals eaten away from home differ with the education of the homemaker.

(7) Expenditures for meals eaten away from home differ with the employment of the homemaker.

Previous Studies

Most of the studies designed to determine the relationship between income and food expenditures in the United States have been based on annual data. However, these studies are generally concerned with meals eaten at home or all food consumption, the expenditures for meals eaten

away from home generally being excluded. There have been only a few studies which attempt to measure the effect of changes in income on the expenditures for meals eaten away from home. Cross-sectional analyses have been used to provide useful information in these studies.

Schultz[4] has studied the income elasticity relations and effects including food eaten away from home. He has found that nonfarm services are an important part, fully as large as is the part produced in agriculture. As income rises the demand for services, as a part of food eaten away from home, increases faster than the demand for food itself. In the nations in which people spent a small fraction of their income for food, the income elasticity of demand for services in food eaten away from home is 1.25. The demand effect of a 10 per cent increase in income increases expenditures for services in food eaten away from home to 12½.

Fox[5] has measured the income elasticity of demand by urban families for the spring of 1948. The income elasticity of food eaten away from home per family was 1.12, and per capita was 1.14.

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[4]Theodore W. Schultz, The Economic Organization of Agriculture, McGraw-Hill Book Company, Inc., New York 1953, p. 45.

[5]Karl A. Fox, "Factors Affecting Farm Income, Farm Prices, and Food Consumption", Agricultural Economic Research, Vol. iii (July, 1951), Bureau of Agricultural Economics, U.S.D.A.

A recent study by the Agricultural Research Service and Agricultural Marketing Service of the Department of Agriculture[6] provides more detailed information of food expenditures. The report is based on a nationwide survey of household food consumption made in April-June 1955 which was conducted in the Agricultural Research Service by the Household Economic Research Branch and in the Agricultural Marketing Service by the Marketing Development Branch and the Statistical and Historical Research Branch. The average food expenditure per family in the United States was $27 a week in the spring of 1955. About $22 of this was for food eaten at home, and $5 was spent for meals and between-meal snacks away from home. These figures include expenditures for soft drinks and alcoholic beverages, but exclude the nonfood items. The average size of family was 3.43 persons. These average expenditures per person were $7.89 a week for all food, $6.50 for food at home and $1.39 for meals eaten away from home. Urban families spent more than rural farm families. Urban families of all size spent $30, about 75 per cent more than the $17 spent by rural farm families. For the rural nonfarm families with income less than $2,500, about $24 per week was spent. It especially points out that rural-urban differences were wide

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[6]Agricultural Research Service and Agricultural Marketing Service, United States Department of Agriculture, Food Expenditures of Households in the United States, preliminary report of Survey of Household Food Consumption, Spring 1955, Washington D.C., August, 1956.

for expenditures for meals eaten away from home. The urban families spent about $5.75 per week while rural nonfarm families spent $3.50, and farm families spent $2.00.

The study referring to the eating places reported by the Bureau of Agricultural Economics, U. S. D. A. in cooperation with the Division of Agricultural Economics of the University of Minnesota[7] has pointed out that in 1948 an estimated 16 per cent of the total dollar civilian food supply of the United States was marketed by eating places, institutions, and other large scale feeding establishments. The value of the food supply for Minneapolis, Minnesota which was marketed by eating places was 18 per cent, and for Fairmont, a small city of Minnesota, was 16.5 per cent. Food costs of 20 Minneapolis firms averaged 44 per cent of the total sales value in 1949. The average for 13 Fairmont firms was 52 per cent. In 1948, commercial eating places accounted for 80 per cent of total sales of meals in Minneapolis and private places accounted for 20 per cent. Street restaurants accounted for more than half the value of meals sold.

The above mentioned studies indicated that the practice of eating away from home has become increasingly

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[7]Bureau of Agricultural Economics, United States Department of Agriculture, Eating Places as Marketers of Food Products, Marketing Research Report No. 3, 1952

important in recent years. Burk[8] has studied changes in the demand for food from 1941 to 1950 to point out that increased "eating out" is one of the important factors contributing to increased food expenditures. The cost of "eating out" includes the payment of additional processing, service, and atmosphere. If a greater proportion of total food consumed is purchased in public places, expenditures for food can be higher even without a change in total quantities of food consumed.

These studies have provided useful information concerning the relationship between expenditures for meals eaten away from home and income. However, no empirical studies are available to determine the expenditures for meals eaten away from home in relation to family characteristics such as level of income, size of family, age, education and employment of the homemaker.

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[8]Marguerit C. Burk, "Changes in the Demand for Food From 1941 to 1950", Journal of Farm Economics, Vol. XXXIII, No. 3, August 1951, pp. 281-298.

CHAPTER II

THE SOURCES AND NATURE OF DATA

Description of the Consumer Panel

The reporting panel is a more accurate way of measuring consumer behavior and deducing preferences from such behavior than the methods that rely on aggregate statistics. This method is more sensitive to change in individual behavior than are composite measurements. It may be specifically designed for particular problems. The M.S.U. consumer panel has operated since February 1951; about 250 diaries have been received each week since late 1951. This panel consists of about 250 families which each week provide considerable detail on their food purchases. Each family reports its income, expenditure and the number of meals eaten away from home, expenditures for meals eaten at home and the number of persons in the family during the week. In addition, each family reports the age, employment and education of its homemaker. This information can be analyzed both as a time series and on a cross-sectional basis.

The sample area to date has been the city of Lansing, Michigan. A sample of approximately 2,000 families was drawn and interviewed. It was agreed upon to choose a panel

with a potential size of 300 families.[1] This sub-sample was drawn on the basis of income of household, number in the household, age of the homemaker, and education of homemaker.

There is great doubt that a continuously reporting panel can ever be a truly representative sample of the universe it is supposed to depict. The original sample may be sound, but those who refuse to participate will introduce an initial bias. After three years of operation of the M.S.U. consumer panel, a second sample census was made in 1954. This provided a basis for revising the sample and a new pool of potential members. A third sample census was completed in 1956.

The Characteristics of M. S. U. Consumer Panel Families

The M. S. U. consumer panel is a local purchase panel. The first contact that prospective panel members had with the M. S. U. panel was a personal interview conducted as part of the sample census. For obtaining a representative sample of families, a sample census of the Lansing population was conducted to learn about its characteristics. A sample of approximately 2,000 families was systematically selected by taking every fourteenth residential address

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[1]Gerald G. Quackenbush, "Demand Analysis From M. S. C. Consumer Panel", Journal of Farm Economics, Vol. XXXVI, No. 3, August 1954.

from the addresses of Polk and Company Lansing City Directory. The sample was about seven per cent of the population. A total of 1885 interviews were conducted under the auspices of the Agricultural Economics Department of Michigan State University during late May and early June, 1950. This interviewing was done as a preliminary part of a long time study. Some basic characteristics of the sample families could be obtained from these interviews. A detailed discussion of the characteristics of the sample families can be found in T. N. Moss's doctoral thesis.[2]

In comparison with findings of other studies, one of the best now available is the 1950 census of population. Table 1 summarized this information and makes comparisons at the state and national level.

If one compares the data with 1950 U. S. census data, there are indications that the sample families have a higher level of income. This higher than average income level is evidenced by a relatively smaller percent of families with incomes of less than $2,000 per year and the higher than average proportion with income over $6,000.[3]

The average family income has fluctuated year after year. The panel average of $4,406 for January 1, 1953 was

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[2]Thomas N. Moss, Some Relationships of Selected Socio-Economic Factors to Food Consumption and Expenditures, Lansing, Spring, 1050, unpublished Ph.D. Thesis, Michigan State College, 1952.

[3]Ibid., Moss, p. 11.

about 17.24 per cent above the 1949 level of $3,738. However, the other factors such as age and education of homemaker, size of family, probably have changed little over time.

TABLE 1

CHARACTERISTICS OF THE LANSING POPULATION COMPARED WITH MICHIGAN AND UNITED STATES *

Characteristics	Lansing	Michigan	Urban Michigan	United States Urban	United States Total
Percent of families with income less than $2,000.	20.7	28.4	24.4	32.6	38.6
Medium income families	$4097	$3519	$3815	$3431	$3073
Percent of families with incomes over $6,000	21.6	15.7	18.6	15.3	12.3
Percent employed in manufacturing	33.8	40.9	44.3	29.4	25.9
Percent labor unemployed	4.8	5.4	5.8	5.6	4.3
Size of family	3.16	3.42	3.39	3.24	3.38

*Source: United States Census of Population 1950, Vol. 2, Pt. 22, Chap. B, General Characteristics of the Population.
Harold M. Riley, Some Measurements of Consumer Demand for Meat, 1951 to 1953, Unpublished Ph.D. Thesis, Michigan State University, 1954, p. 61.

CHAPTER III

METHOD OF ANALYSIS

Time Period Studied

The first diaries from the M.S.U. consumer panel were received in February, 1951. Since the late summer of 1951, between 200 and 275 families have been reporting regularly. The first information from this panel is that for the thirteenth week of 1951. In order to use a time series analysis, data from the thirteenth week of 1951 to the fifty-second week of 1955 were used. However, because of its lack of representation, the incomplete data of 1951 were excluded in the cross-sectional elasticity, simple correlation and multiple regression analyses. But it was used for measurement of time series income elasticity. Due to the data flexibility it can be used in time series and cross-sectional analyses. Studies in this dissertation were based upon annually and weekly data.

Preparing and Processing of the Data

The data for this study were taken from the Michigan State University Consumer Panel. The sample which was used in this dissertation was taken from these 250 families to be representative of the total sample. When this study

started, the data had been edited, coded, and punched on IBM cards. This system has been operated more than four and a half years. The basic IBM cards were sorted into three income groups, in terms of the annual disposable income. The summary and tabulation of the data were done almost exclusively by the IBM equipment. After the processing work by IBM equipment the following information on a weekly basis was obtained from the table:

1. Average family income by all families.

2. Average size of family by all families.

3. Average number of meals eaten away from home per capita by all families and by income groups.

4. Average expenditures for meals eaten away from home per family by all families and by income groups.

5. Average expenditures for meals eaten away from home per capita by all families and by income groups.

To get greater accuracy in the data it was necessary that each observation (each family's income) be examined. It is known that some weekly incomes were reported erroneously. A personal interview was conducted with each homemaker for making a comparison of stated yearly income with the sums of the weekly incomes reported in the diaries. If these two figures were comparable, this family would be accepted as one observation. There were 53 families who met these requirements in 1951, 97 families in 1952, 119 families in 1953, 120 families in 1954, and 103 families in 1955.

For a time series study comparing each year to the next, it was necessary to establish the same families in every two-year period. There were 53 families in the panel in 1951 who were also in 1952; 92 families in 1952 who also were in 1953; 111 families in 1953 who also were in 1954; 103 families in 1954 who also were in 1955. Per capita income and per capita expenditures for meals eaten away from home were obtained by dividing each family's income and expenditures by the size of family, and correcting for the member of weeks they were in the panel.

Method of Analysis

The coefficient of annual income elasticity described how the rate of change in expenditures for meals eaten away from home compares with the corresponding rate of change in income. The actual computation can be accomplished in one of several ways. The following arc income elasticity formula was used for a time series study comparing each year to the next.

$$\text{Income elasticity} = \frac{(E_1 - E_0) / (E_1 + E_0)}{(I_1 - I_0) / (I_1 + I_0)}$$

E_1 = Expenditures for meals eaten away from home in year two.

E_0 = Expenditures for meals eaten away from home in year one.

I_1 = Annual income in year two.

I_0 = Annual income in year one.

Substituting the data on income and expenditures for meals eaten away from home into the formula, we get the income elasticity for meals eaten away from home. To facilitate a time series study, the following combinations of families of every two years were established:

Families in 1951 also in 1952.

Families in 1952 also in 1951.

Families in 1952 also in 1953.

Families in 1953 also in 1952.

Families in 1953 also in 1954.

Families in 1954 also in 1953.

Families in 1954 also in 1955.

Families in 1955 also in 1954.

The purpose of setting up these combinations was to compare the rate of change in expenditures for meals eaten away from home in relation to the rate of change in income of the families from one year to the next. The above income elasticity formula was also used for computing the income elasticity of meals eaten at home and meals eaten away from home plus meals eaten at home. The only difference is that the expenditure for meals eaten away from home is changed into expenditures for meals eaten at home or expenditures for meals eaten away from home plus meals eaten at home.

Comparisons of income elasticities of meals eaten away from home, meals eaten at home and meals eaten away

from home plus meals eaten at home were made in this study.

However, data emerging from the M.S.U. Consumer panel were for only a five-year period. This small sample on a yearly basis was assumed to be unable to yield significant results in multiple regression analysis for a time series study. Therefore, average weekly data by 4-week average of the 13-week moving average were used in the simple regression equation for measuring a time series income elasticity of years from 1951 to 1955.

It was evident that the current income reported by the panel families showed wide variations from week to week. These data were obtained from the weekly reports of the panel families. However, part of the families were paid on a weekly basis while others were paid bi-weekly, monthly, or at irregular periods. Sometimes a wide fluctuation of weekly income reported by all panel families showed within a period of a month. In order to smooth the income data and expenditure data, a thirteen-week moving average was computed using the current week's income and the income of week the previous twelve weeks. These adjusted data were only used for showing the comparison between the average weekly income and average weekly expenditures for meals eaten away from home. In the analysis a four-week moving average, taken from the 13-week moving average, was used.

The various methods for measuring income elasticities by multiple regression analysis make it possible to determine the extent to which a given variable influences the predicted variable while other variables are being held constant at some known level. The multiple regression method was used for a cross-sectional income elasticity analyses in this study.

There are several approaches that might be used for measuring the extent to which consumer expenditures for food is related to family characteristics. One approach was used (multiple regression) to measure the responsiveness of expenditures for meals eaten away from home according to one or more family characteristics. Five characteristics used in the regression equation were: (1) family income or per capita income; (2) size of family; (3) age of homemaker; (4) education of homemaker; (5) employment of homemaker. Such an equation would express expenditures for meals eaten away from home as a function of the income, size of family, age, education and employment of homemaker.

The effects of the various characteristics were considered in the form of a least squares regression analysis of linear form all of which were converted to logarithms.

$\log Y = a + b_1 \log X_1 + b_2 \log X_2 + b_3 \log X_3 + b_4 \log X_4 + b_5 \log X_5$.

Where Y = per family (or per capita) expenditures for meals eaten away from home.

X_1 = family income (or per capita income)

X_2 = size of family

X_3 = age of homemaker

X_4 = education of homemaker

X_5 = employment of homemaker

The least squares multiple regression analysis was used to determine indications of the net relationship between differences in expenditures for meals eaten away from home and each family characteristic in a given time period. Due to the large number of observations in each series of data and the number of variables in each equation, there were practical reasons for preferring a function that was linear in mathematic terms. After experimenting with the interrelationships to test for linearity in arithmetic form it was decided that the functions should be expressed completely in logarithms.

To facilitate the comparisons of the cross-sectional income elasticity of each year with the time series income elasticity using the same data with respect both to per family and per capita, the combinations were set up as listed below. Because of lack of representation, the data of 1951 were not included in cross-sectional multiple regression analysis. The combinations of families were set up as follows:

Families in 1952 also in 1953

Families in 1953 also in 1952

Families in 1953 also in 1954

Families in 1954 also in 1953

Families in 1954 also in 1955

Families in 1955 also in 1954

The inter-relations between the family characteristics were also considered. The same data and same combinations of families in each year which were used in the multiple regression analysis were also used in the inter-correlation analysis between the family characteristics.

In summary, then, the following types of analyses were done: (1) arc elasticities from year to year changes in average incomes and average expenditures for meals away from home; (2) simple regression, where average expenditures for meals away from home is a function of average income, using a moving average derived from weekly data; and (3) multiple regression on cross-sectional data, where expenditures for meals away from home is a function of several selected socio-economic variables.

CHAPTER IV

SOME MEASUREMENTS OF DEMAND CHARACTERISTICS FOR MEALS EATEN AWAY FROM HOME

Level and Pattern of Income

The statistics of the 1950 census indicate that Lansing is a city with a fairly high level of income. The median family income in 1949 was $4,097. This is about 16.4 per cent higher than the $3,519 median income for Michigan as a whole, 7.4 per cent higher than the $3,815 reported for urban Michigan, 19.4 per cent higher than the $3,431 of urban family in the United States, and 33.3 per cent higher than the $3,073 family income of the total United States.

Total income continued to increase during the last five years in the United States. The National Disposable Income has increased each year in the same five year period. Per capita disposable personal income has increased 3.2 per cent from 1951 to 1952, 3.7 per cent from 1952 to 1953, remained the same from 1953 to 1954, and increased 4.5 per cent from 1954 to 1955. These are all measured in terms of current prices. The M.S.U. consumer panel income almost moved parallel to national per capita disposable income for the families selected in this study. The average level of income for panel members from 1951 to 1952 increased

7.6 per cent, 4.6 per cent from 1952 to 1953, .4 per cent from 1953 to 1954, and 3.? per cent from 1954 to 1955. Table 2 shows the changes in total National Disposable Income, and per capita disposable income from 1951 to 1955 in terms of current price for the period and on a 1955 price basis.

TABLE 2

NATIONAL DISPOSABLE PERSONAL INCOME
1951 TO 1955 *

	Total Disposable Personal Income (billions of $)		Per Capita Disposable Personal Income ($)		Population (1000)
	Current Price	1955 Price	Current Price	1955 Price	
1951	226.1	233.3	1,465	1,512	154,369
1952	237.4	239.6	1,512	1,526	157,028
1953	250.2	250.5	1,568	1.570	159,636
1954	254.4	253.6	1,566	1,561	162,417
1955	270.6	270.6	1,637	1,637	165,271

*Source: Survey of Current Business, U.S. Department of Commerce, 1955 Biennial Edition, and Feb. 1956.

The panel family income has fluctuated more than the panel per capita income. The average per family income increased 8.6 per cent from 1951 to 1952, 7.6 per cent from 1952 to 1953, 1.6 per cent from 1953 to 1954, and 10.2 per cent from 1954 to 1955. Table 3 shows changes in panel family income compared to the panel per capita income from 1951 to 1955.

TABLE 3

COMPARISONS OF ANNUAL DISPOSABLE INCOMES,
M. S. U. CONSUMER PANEL SELECTED FAMILIES
1951 - 1955

Year	Total Income of Families ($ yearly)	Number of Families Represented	Average Income Per Family ($ yearly)	Percent Increase from Previous Year
1951	*221,164	* 53	4,172.91	
1952	240,259	53	4,533.18	8.6
1952	*419,327	* 92	4,557.90	
1953	451,011	92	4,902.29	7.6
1953	*553,623	*111	4,987.59	
1954	562,287	111	5,065.65	1.6
1954	*523,538	*103	5,082.89	
1955	*576,734	*103	5,599.36	10.2
1951-1955	2,294,386**	462**	4,966.20	

	Sum of Per Capita Income ($ yearly)	Number of Families Represented	Average Income Per Person ($ yearly)	
1951	* 80,970	* 53	1,527.73	
1952	87,095	53	1,643.30	7.6
1952	*146,442	* 92	1,591.76	
1953	153,109	92	1,664.23	4.6
1953	*190,977	*111	1,720.51	
1954	191,759	111	1,727.56	.4
1954	*180,115	*103	1,748.69	
1955	*185,986	*103	1,805.69	3.2
1951-1955	784,510**	462**	1,698.07	

**The totals from 1951 to 1955 were computed by adding each figure marked *.

Level and Pattern of Food Consumption

A recent study on food expenditures by the Agricultural Research Service and Agricultural Marketing Service of the Department of Agriculture reported that food expenditures of housekeeping families in the U. S. average $27. a week in the spring 1955. About $22 of this expenditure was for food consumed at home. The remainder, $5.00 was spent for meals and between-meals food away from home. These figures include expenditures for soft drinks and alcoholic beverages. But the non-food items that are commonly bought in grocery stores are excluded. The average size of family reported was 3.43 persons. Therefore, the average expenditure per capita was $7.89 a week for all food, $6.50 for meals at home and $1.39 for meals eaten away from home. Table 4 shows a comparison of the expenditures for food between the 103 M. S. U. consumer panel families studied and United States families as a whole on a yearly basis of 1955. (U. S. average is weekly times 52.)

Table 4 provides us with information for a comparison of M. S. U. panel expenditures, and United States food expenditures including between-meal snacks, soft drinks and alcoholic beverages, etc. The panel families with a higher income than the families representing the whole United States would be expected to spend larger amounts for food. The opposite result is shown. The expenditures for between-

meal snacks, soft drinks, alcoholic beverages, and other foods not part of a meal away from home probably occupy a major place in the food expenditures. Another element of difference is that Lansing is a small city, and so the percentage of meals eaten away from home is lower than those in larger cities. This would tend to reduce total food costs in Lansing. Also, the data we collected in different manners.

TABLE 4

COMPARISON OF FOOD EXPENDITURES, 103 M. S. U. CONSUMER PANEL FAMILIES AND FAMILIES IN THE UNITED STATES, 1955

	M. S. U. Consumer Panel ($ yearly)	U. S. * ($ yearly)
A. Per Family		
All food expenditures	1,049.48	1,404
At home	917.35	1,144
Away from home	132.13[a]	260[b]
B. Per Capita		
All food expenditures	326.72	410.28
At home	282.73	338.00
Away from home	43.99[a]	72.28[b]

*Source: The National Food Situation, 1957 Outlook Issue, Agricultural Marketing Service, United States Department of Agriculture.

[a]Expenditures for meals only.

[b]Including between-meal snacks and other foods and beverages not part of regular meals.

The expenditures for meals at home and meals away from home of the M. S. U. consumer panel moved in the same direction with income in the past five year period. This indicates that as families obtained a higher income they spent not only more on meals at home but also spent more on meals away from home. Tables 5, 6 and 7 set forth this information and compare each year on a per family and per capita basis.

TABLE 5

COMPARISONS OF ANNUAL EXPENDITURES FOR ALL MEALS,
M. S. U. CONSUMER PANEL, 1951-1955

Year	Number of Families Represented	Average Expenditures for All Meals Per Family ($ yearly)
1951	* 53	971.99
1952	53	1,013.01
1952	* 92	1,019.69
1953	92	1,057.75
1953	*111	1,026.75
1954	111	1,026.28
1954	*103	1,046.37
1955	*103	1,049.49
1951-1955	462**	1,028.50

Year	Number of Families Represented	Average Expenditures for All Meals Per Person ($ yearly)
1951	* 53	320.76
1952	53	339.59
1952	* 92	332.68
1953	92	336.32
1953	*111	337.49
1954	111	333.84
1954	*103	330.38
1955	*103	326.72
1951-1955	462**	330.62

**The totals from 1951 to 1955 were computed by adding each figure marked *.

TABLE 6

COMPARISONS OF ANNUAL EXPENDITURES FOR MEALS AT HOME, M. S. U. CONSUMER PANEL, 1951-1955

Year	Number of Families Represented	Average Expenditures for Meals at Home Per Family ($ yearly)
1951	* 53	863.00
1952	53	878.67
1952	* 92	896.71
1953	92	931.04
1953	*111	900.93
1954	111	900.20
1954	*103	916.34
1955	*103	917.35
1951-1955	462**	902.83

Year	Number of Families Represented	Average Expenditures for Meals at Home Per Person ($ yearly)
1951	* 53	280.51
1952	53	287.32
1952	* 92	286.68
1953	92	292.47
1953	*111	292.74
1954	111	288.03
1954	*103	287.98
1955	*103	282.73
1951-1955	462**	286.84

**Ibid.

TABLE 7

COMPARISONS OF ANNUAL EXPENDITURES FOR MEALS AWAY FROM HOME, M. S. U. CONSUMER PANEL, 1951-1955

Year	Number of Families Represented	Average Expenditures for Meals Away from Home Per Family ($ yearly)
1951	* 53	108.98
1952	53	134.34
1952	* 92	122.97
1953	92	126.46
1953	*111	125.82
1954	111	126.08
1954	*103	130.05
1955	*103	132.13
1951-1955	462**	125.67

Year	Number of Families Represented	Average Expenditures for Meals Away from Home Per Person ($ yearly)
1951	* 53	40.26
1952	53	52.26
1952	* 92	46.00
1953	92	43.00
1953	*111	44.75
1954	111	45.80
1954	*103	42.40
1955	*103	43.99
1951-1955	462**	43.79

**Ibid.

Comparisons of income and expenditures.

It has been found that the food expenditures of M. S. U. consumer panel families did not change proportionately as much as their income. Those families with higher incomes spent a smaller proportion on food than families with lower incomes. These tendencies for food expenditures to increase (or decrease) with increases (or decreases) of income, but less than proportionately, are referred to as "Engel's laws". These indications emerge in the panel in per capita data as well as per family data.

Another indication has been found in the panel families that the proportions of total income spent on meals at home and meals away from home did not move in the same direction as the amount of expenditures. The proportion of income spent on meals at home decreases as the income increases, but the proportion of income spent on meals away from home does not decrease as the income increases, although it does not increase. These are indications that they would increase the expenditures for meals eaten away from home more than expenditures at home as their income increases, i. e., they spent more time on vacation and ate more in restaurants. These comparisons are indicated in Tables 8, 9 and 10.

TABLE 8

PROPORTION OF EXPENDITURES FOR ALL MEALS AND INCOME
M. S. U. CONSUMER PANEL, 1951 to 1955

Year	Number of Families Represented	Average Income ($ yearly)	Average Expenditures for All Meals ($ yearly)	Percent Average Expend. for All Meals Is of Ave. Income ($ yearly)
		Per Family	Per Family	Per Family
1951	* 53	4,172.91	971.99	23.29
1952	53	4,533.18	1,013.01	22.35
1952	* 92	4,557.90	1,019.69	22.37
1953	92	4,902.29	1,057.75	21.58
1953	*111	4,987.59	1,026.75	20.59
1954	111	5,065.65	1,026.28	20.26
1954	*103	5,082.89	1,046.37	20.58
1955	*103	5,599.36	1,049.49	18.74
1951-1955	462**	4,966.20	1,028.50	20.74
		Per Person	Per Person	Per Person
1951	* 53	1,527.73	320.76	21.00
1952	53	1,643.30	339.59	20.67
1952	* 92	1,591.76	332.68	20.96
1953	92	1,664.23	336.32	20.21
1953	*111	1,720.51	337.49	19.62
1954	111	1,727.56	333.84	19.32
1954	*103	1,748.69	330.38	18.89
1955	*103	1,805.69	326.72	18.09
1951-1955	462**	1,698.07	330.62	19.47

**Ibid.

TABLE 9

PROPORTION OF EXPENDITURES FOR MEALS AT HOME AND INCOME, M. S. U. CONSUMER PANEL, 1951 to 1955

Year	Number of Families Represented	Average Income ($ yearly)	Average Expenditures for Meals at Home ($ yearly)	Percent Average Expenditures for Meals At Home Is Of Average Income ($ yearly)
		Per Family	Per Family	Per Family
1951	* 53	4,172.91	863.00	20.68
1952	53	4,533.18	878.67	19.38
1952	* 92	4,557.90	896.71	19.67
1953	92	4,902.29	931.04	18.99
1953	*111	4,987.59	900.93	18.06
1954	111	5,065.65	900.20	17.78
1954	*103	5,032.89	916.34	18.03
1955	*103	5,599.36	917.35	16.38
1951-1955	462	4,966.20	902.83	18.18
		Per Person	Per Person	Per Person
1951	* 53	1,527.73	280.51	18.36
1952	* 53	1,643.30	287.32	17.48
1952	92	1,591.76	286.68	18.01
1953	* 92	1,664.23	292.47	17.57
1953	111	1,720.51	292.74	17.01
1954	*111	1,727.56	288.03	16.67
1954	103	1,748.69	287.98	16.47
1955	*103	1,805.69	282.73	15.66
1951-1955	462**	1,698.07	286.84	16.89

**Ibid.

TABLE 10

PROPORTION OF EXPENDITURES FOR MEALS AWAY FROM HOME AND INCOME, M. S. U. CONSUMER PANEL, 1951-1955

Year	Number of Families Represented	Average Income ($ yearly)	Average Expenditures for Meals Away from Home ($ yearly)	Percent Average Expenditures for Meals Away from Home Is of Average Income ($ yearly)
		Per Family	Per Family	Per Family
1951	* 53	4,172.91	108.98	2.61
1952	53	4,533.18	134.34	2.96
1952	* 92	4,557.90	122.97	2.69
1953	92	4,902.29	126.46	2.58
1953	*111	4,987.59	125.82	2.52
1954	111	5,065.65	126.08	2.49
1954	*103	5,082.89	130.05	2.55
1955	*103	5,599.36	132.13	2.35
1951-1955	462	4,966.20	125.67	2.53
		Per Person	Per Person	Per Person
1951	* 53	1,527.73	40.26	2.64
1952	53	1,643.30	52.26	3.18
1952	* 92	1,591.76	46.00	2.89
1953	92	1,664.23	43.00	2.58
1953	*111	1,720.51	44.75	2.60
1954	111	1,727.56	45,80	2.65
1954	*103	1,748.69	42.40	2.42
1955	*103	1,805.69	43.99	2.44
1951-1955	462**	1,698.07	43.79	2.58

**Ibid.

Comparisons of expenditures for all meals, meals at home and meals away from home.

It was assumed that larger sized families spend less of their income on meals away from home than those of smaller size. The reasoning is that (1) larger families have lower per capita income and (2) larger families with more children spend more time at home taking care of their children, even if they stay at home instead of going away for vacation. The panel shows that families spend less proportionately, expressed in terms of percent of meals at home, for meals away from home on a per family basis than on a per capita basis. This is comparable to the situation in the United States as a whole. Families having food away from home in a week were not only related as to their income but also closely related as to size of family. Families in the Northeast, with average size of family of 3.34, spent $24.77 for meals at home and $6.00 for meals and between-meal food away from home. The percentage of families having meals away from home in a week was 80.4. In the North Central, however, families with an average size of 3.39 spent $23.27 for meals at home and $4.95 for meals away from home. The percentage of families having meals away from home in a week was 75.4. The Southern families, with a larger size of 3.62, spent $18.25 for meals at home and $3.29 for meals away from home, and the percentage of families having meals

away from home was 75.2.[1] These figures show that the expenditures for meals away from home fluctuate more than expenditures for meals at home especially when expressed on a per capita basis. Over a five year period the N. S. U. panel families had the same tendency as for the United States as a whole. Tables 11 and 12 show the proportional relationships between the expenditures for meals away from home, meals at home and all meals.

Income Elasticity of All Food Consumption

The relationships between income and food expenditures are conveniently summarized under the term "income elasticity". The measurement of arc income elasticity compares the relative change, or percentage change, in expenditure associated with the corresponding relative change, or percentage change, in income. A coefficient of income elasticity that is negative means that the expenditures decreases as income increases; a coefficient of zero means that the expenditures spent is not influenced by changes in income; a coefficient greater than zero and less than 1 means that the proportional increase in expenditure spent is less than the corresponding proportional increase in income; a coefficient greater than 1 means that the proportional increase

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[1] Agricultural Research Service and Agricultural Marketing Service, United States Department of Agriculture, Preliminary Report of Survey of Household Food Consumption, Spring, 1955. August, 1956. Op. cit.

TABLE 11

PROPORTION OF EXPENDITURES FOR ALL MEALS AND EXPENDITURES FOR MEALS AWAY FROM HOME, M. S. U. CONSUMER PANEL, 1951-1955

Year	No. of Families Represented	Ave. Expend. for All Meals ($ yearly)	Expend. for Meals Away from Home ($ yearly)	Percent Ave. Expend. for Meals Away from Home Is of Ave. Expend. for all Meals ($ yearly)
		Per Family	Per Family	Per Family
1951	* 53	971.99	108.98	11.21
1952	53	1,013.01	134.34	13.61
1952	* 92	1,019.69	122.97	12.06
1953	92	1,057.75	126.46	11.96
1953	*111	1,026.75	125.82	12.25
1954	111	1,026.28	126.08	12.29
1954	*103	1,046.37	130.05	12.43
1955	*103	1,049.49	132.13	12.59
1951-1955	462**	1,028.50	125.67	12.22
		Per Person	Per Person	Per Person
1951	* 53	320.76	40.26	12.55
1952	53	339.59	52.26	15.39
1952	* 92	332.68	46.00	13.83
1953	92	336.32	43.00	12.79
1953	*111	337.49	44.75	13.26
1954	111	333.84	45.80	13.72
1954	*103	330.38	42.40	12.83
1955	*103	326.72	43.99	13.46
1951-1955	462**	330.63	43.79	13.24

**Ibid.

TABLE 12

PROPORTION OF EXPENDITURES FOR MEALS AT HOME AND EXPENDITURES FOR MEALS AWAY FROM HOME, M. S. U. CONSUMER PANEL, 1951-1955

Year	No. of Families Represented	Ave. Expend. for Meals at Home ($ yearly)	Ave. Expend. for Meals Away from Home ($ yearly)	Percent Ave. Expend. for Meals Away from Home Is of Ave. Expend. for Meals at Home ($ yearly)
		Per Family	Per Family	Per Family
1951	* 53	863.00	108.98	12.62
1952	53	878.67	134.34	15.28
1952	* 92	896.71	122.97	13.71
1953	92	931.04	126.46	13.58
1953	*111	900.93	125.82	14.97
1954	111	900.20	126.08	14.01
1954	*103	916.34	130.05	14.19
1955	*103	917.35	132.13	14.40
1951-1955	462**	902.83	125.67	13.92
		Per Person	Per Person	Per Person
1951	* 53	280.51	40.26	14.35
1952	53	287.32	58.26	18.19
1952	* 92	286.68	46.00	16.05
1953	92	292.47	43.00	14.70
1953	*111	292.74	44.75	15.29
1954	111	288.03	45.80	15.90
1954	*103	287.98	42.40	14.72
1955	*103	282.73	43.99	15.56
1951-1955	462**	286.84	43.79	15.27

**Ibid.

in expenditure is greater than the corresponding proportional increase in income.[2]

Using data from the M. S. U. Consumer Panel, a series of simple arc elasticities was calculated. (See Table 13.) These include all food, meals at home and meals away from home, based on per family and per capita data. From Table 13 we find that the percentage increases in income affect the percentage increases in expenditures for meals away from home to a greater extent than expenditures for meals at home. This is an indication that families (or persons) with higher income spend more for meals away from home than do those families with lower incomes. It is evidenced both on a per family and per capita basis. Another indication is that when families have a smaller percentage increase in income they do not always increase their food expenditures; sometimes other factors cause food expenditures to be decreased rather than increased.

Income Elasticity of Meals Eaten Away From Home

Income elasticities computed (using arc elasticity formula) are shown in Table 13 which illustrates the percentage change in expenditures associated with a one percent change in income from one year to the next. This measurement

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

TABLE 13

THE INCOME ELASTICITIES OF FOOD, EACH YEAR TO THE NEXT, M. S. U. CONSUMER PANEL, 1951-1955

Per Family	Years Compared	Percent Change in Income	Percent Change in Expenditure	Elasticity
All food expenditures	1951-1952	+ 8.63	+ 4.22	0.50
	1952-1953	+ 7.56	+ 3.71	0.50
	1953-1954	+ 1.56	- .05	-0.03
	1954-1955	+10.16	+ .30	0.03
Away from home	1951-1952	+ 8.63	+23.26	2.52
	1952-1953	+ 7.56	+ 2.84	0.38
	1953-1954	+ 1.56	+ .21	0.13
	1954-1955	+10.16	+ 1.60	0.16
At home	1951-1952	+ 8.63	+ 1.82	0.22
	1952-1953	+ 7.65	+ 3.81	0.52
	1953-1954	+ 1.56	- .08	-0.05
	1954-1955	+10.16	+ .11	0.01
Per Capita				
All food expenditures	1951-1952	+ 7.56	+ 5,87	0.78
	1952-1953	+ 4.55	+ 1.09	0.24
	1953-1954	+ .41	- 1.08	-2.67
	1954-1955	+ 3.26	- 1.11	-0.36
Away from home	1951-1952	+ 7.56	+29.84	3.56
	1952-1953	+ 4.55	- 4.68	-1.08
	1953-1954	+ .41	+ 2.34	5.62
	1954-1955	+ 3.26	+ 3.75	0.96
At home	1951-1952	+ 7.56	+ 2.43	0.33
	1952-1953	+ 4.55	+ 2.02	0.45
	1953-1954	+ .41	- 1.61	-3.97
	1954-1955	+ 3.26	- 1.82	-0.57

a. Formula used to calculate elasticities was: $$\frac{\frac{E_1 - E_0}{E_1 + E_0}}{\frac{I_1 - I_0}{I_1 + I_0}}$$

b. + Percent increase in income or expenditures
   - Percent decrease in income or expenditures

c. The income elasticities were computed in terms of yearly income and yearly expenditures for meals eaten away from home. The yearly expenditures were obtained by multiplying the average weekly expenditures by 52.

of elasticity is derived from panel data with observations extending over a period of time.

Another measurement of income elasticity has been derived from cross-sectional data. These two measurements are obtained from the same data. However, the result is somewhat different. When using cross-sectional data the income-expenditure elasticity represents the differences in expenditure pattern associated with different levels of family income (or per capita income) measured at a point in time. Due to difficulties in measuring the "net" relationships between income and expenditures for food, attempts to reconcile income elasticities based on cross-sectional data with those derived from time series seem to be unsuccessful or more difficult than attempted here.

Various methods have been used for measuring income elasticities. We can fit the same data as were used in the simple arc elasticities to a highly complex mathematical equation. The most widely used procedure has been multiple regression analysis. The annual and weekly data used were those from the period of 1952 to 1955. The variables used in the single equation regression analysis were as follows:

Y = per family (or per capita) expenditures for meals eaten away from home

X_1 = family income (or per capita income)

X_2 = size of family

X_3 = age of homemakers

X_4 = education of homemakers

X_5 = employment of homemakers

The regression equation is:

$$\log y = a + b_1 \log X_1 + b_2 \log X_2 + b_3 \log X_3 + b_4 \log X_4 + b_5 \log X_5.$$

The elasticities can be read directly from the equation since the variables are expressed in logarithms.

The regression equations results of income elasticities are as follows: *

Year	Number of families in	Income elasticity of Meals away from home (cross-sectional) Per family	Per capita
1952	92	2.0599	1.6765
1953	92	1.7433	1.6434
1953	111	1.6782	1.2649
1954	111	1.7706	1.6201
1954	103	1.6487	.8890
1955	103	1.5487	1.4010

*A detailed discussion of these equations will be taken up in Chapter VI "results from multiple regression analysis."

The results of income elasticities from cross-sectional data indicate that the elasticities derived from the per capita basis are smaller than those derived from the per family basis. These results indicate that the amount of expenditures for meals away from home vary inversely with the size of family (see later discussion).

A third method of measuring income elasticity is the time series study. Because of the small sample on the annual basis, the simple regression equation for measuring a

time series income elasticity from 1951 to 1955 was based on average weekly data by 4-week periods.[3] However, the current incomes of panel families showed wide variations from week to week (Figure 1). Each family reports its total income payment actually received each week. Part of the families are paid on a weekly basis, and others are paid biweekly, monthly, or at irregular intervals. It seemed unlikely that such an income series would be satisfactory to compare with the weekly expenditures for meals eaten away from home, even if they were computed as a four-week average. Therefore, a 13-week moving average was computed on both income and expenditures for meals eaten away from home. These computations were done by using the current week's income and expenditures for meals eaten away from home and the previous 12 week's income and expenditures for meals eaten away from home. Figures 1 and 2, using a 4-week average, taken from the 13-week moving average data (from Appendix 1) are plotted to compare the income and expenditures for meals eaten away from home, in terms of per capita basis. The relationships between these two variables are of particular importance to an understanding of the expenditures for meals eaten away from home associated with income.

Using the 4-week average of the 13-week moving average data (taken from Appendix 1) for a time series income elasticity study the data were fitted in a simple regression

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[3]Data were used including all the families in panel.

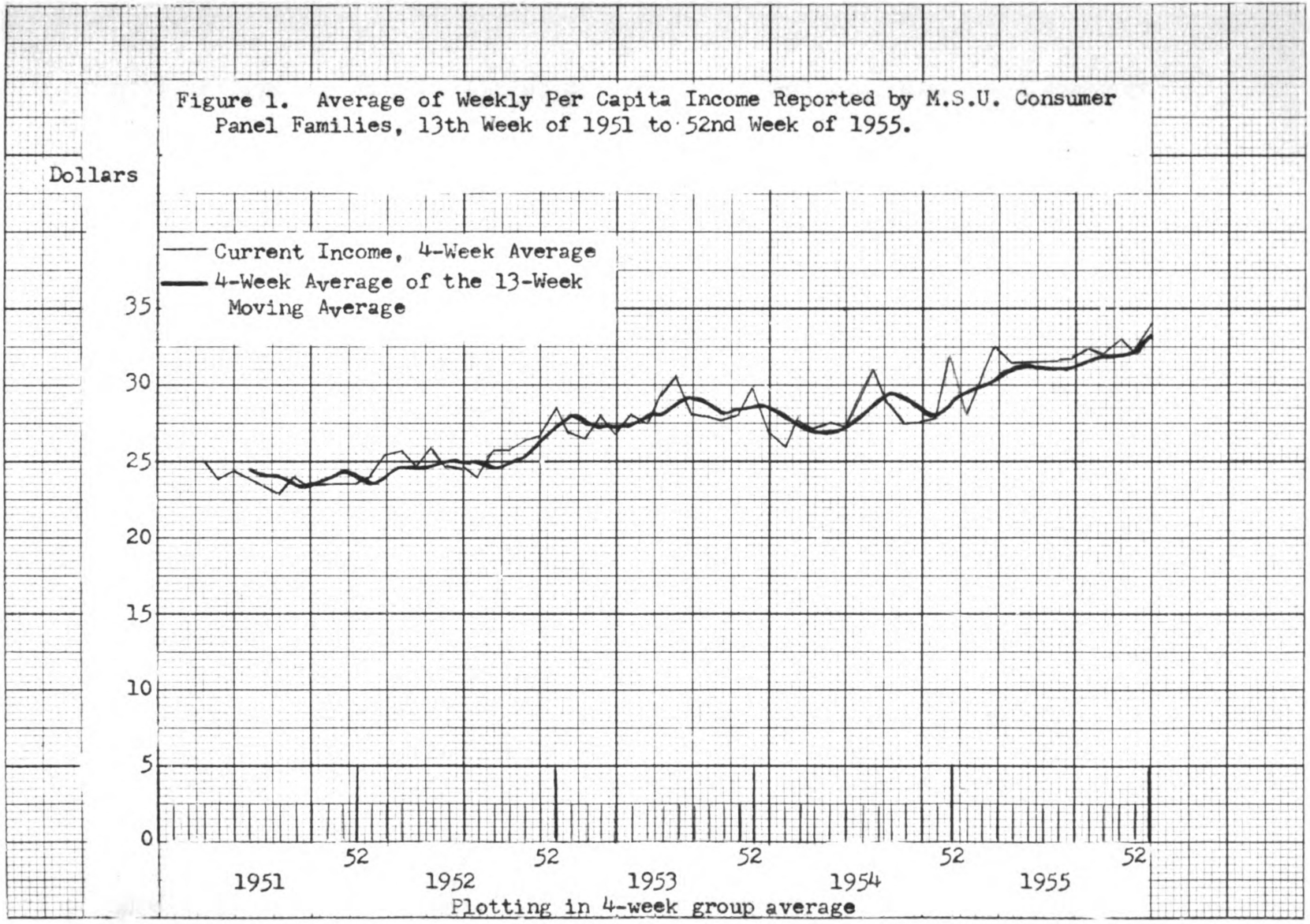
Figure 1. Average of Weekly Per Capita Income Reported by M.S.U. Consumer Panel Families, 13th Week of 1951 to 52nd Week of 1955.
Dollars
Current Income, 4-Week Average
4-Week Average of the 13-Week Moving Average
35
30
25
20
15
10
5
0
52
52
52
52
52
1951
1952
1953
1954
1955
Plotting in 4-week group average

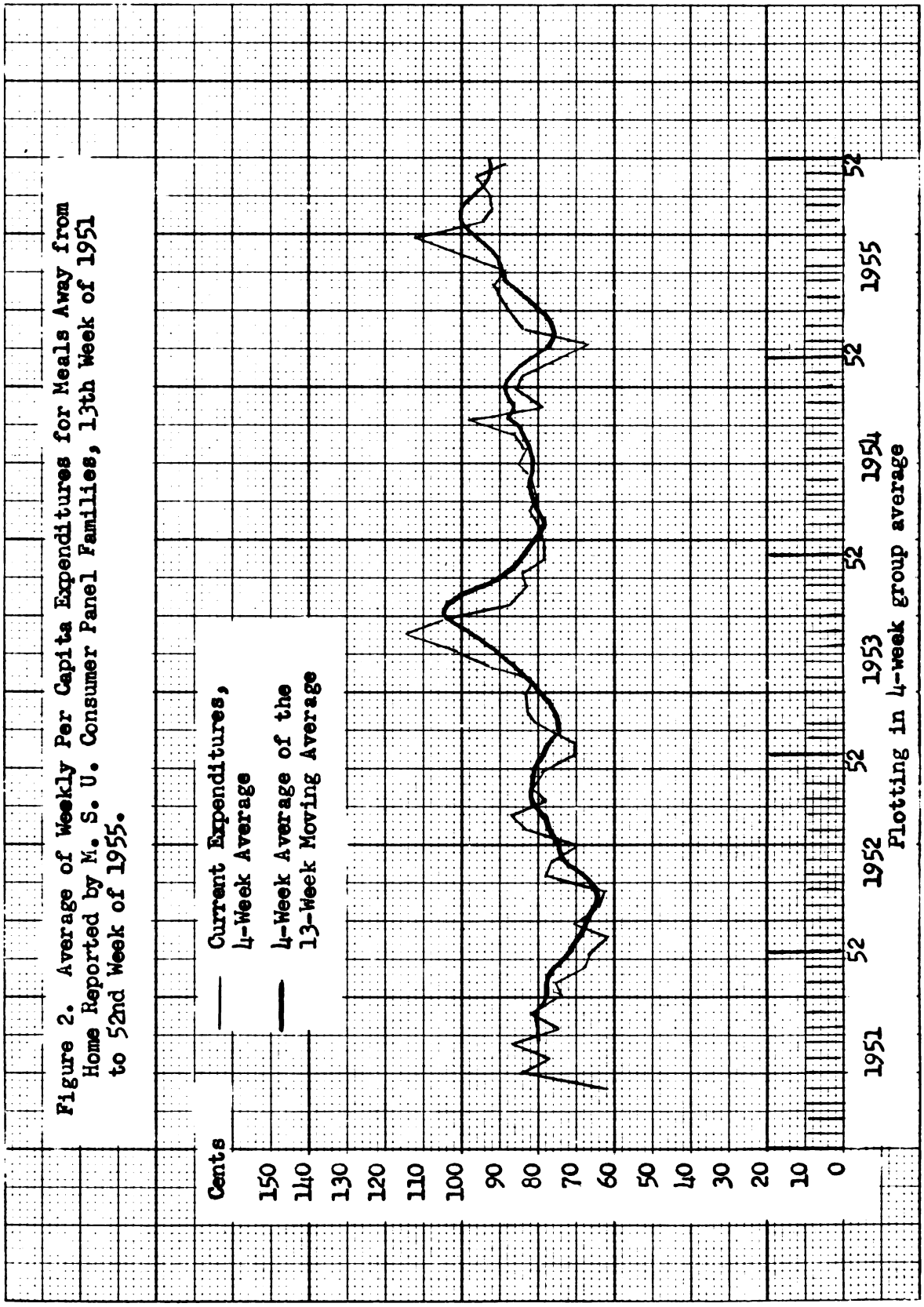

Figure 2. Average of Weekly Per Capita Expenditures for Meals Away from Home Reported by M. S. U. Consumer Panel Families, 13th Week of 1951 to 52nd Week of 1955.

equation as follows:

$$Y = .1620 + .0240X$$

Y = Average weekly expenditures for meals away from home, per capita

X = Average weekly income per capita

$$\text{Income Elasticity} = \frac{X}{Y} \cdot \frac{dy}{dx} = \frac{\bar{X}}{\bar{Y}} \cdot b = \frac{27.6688}{.8257} \cdot .0240 = .804$$

(Elasticity computed at the mean)

$\bar{Y}$ = $ .8257 average per capita weekly expenditures for meals eaten away from home

$\bar{X}$ = $27.6688 average per capita weekly income

b = .0240

In this analysis, the income elasticity of the 5-year time series was .804. A comparison of the cross-sectional study and the time series study indicates that the cross-sectional study has yielded higher income elasticities for meals eaten away from home than has the 5-year time series study. Cross-sectional studies have yielded higher income elasticities for food than have most studies based on time series and much effort has been expended to reconcile the two sets. However, it has been unsuccessful.[4] To reconcile income elasticities derived from time series data with those derived from cross-sectional studies is difficult. In addition to the disturbing influence of other factors, there is also a question as to how readily families take on consumption

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[4]Schultz, op. cit., p. 51.

habits of a higher income group as their incomes increase relative to other families. A detailed analysis of this question is beyond the scope of this dissertation.

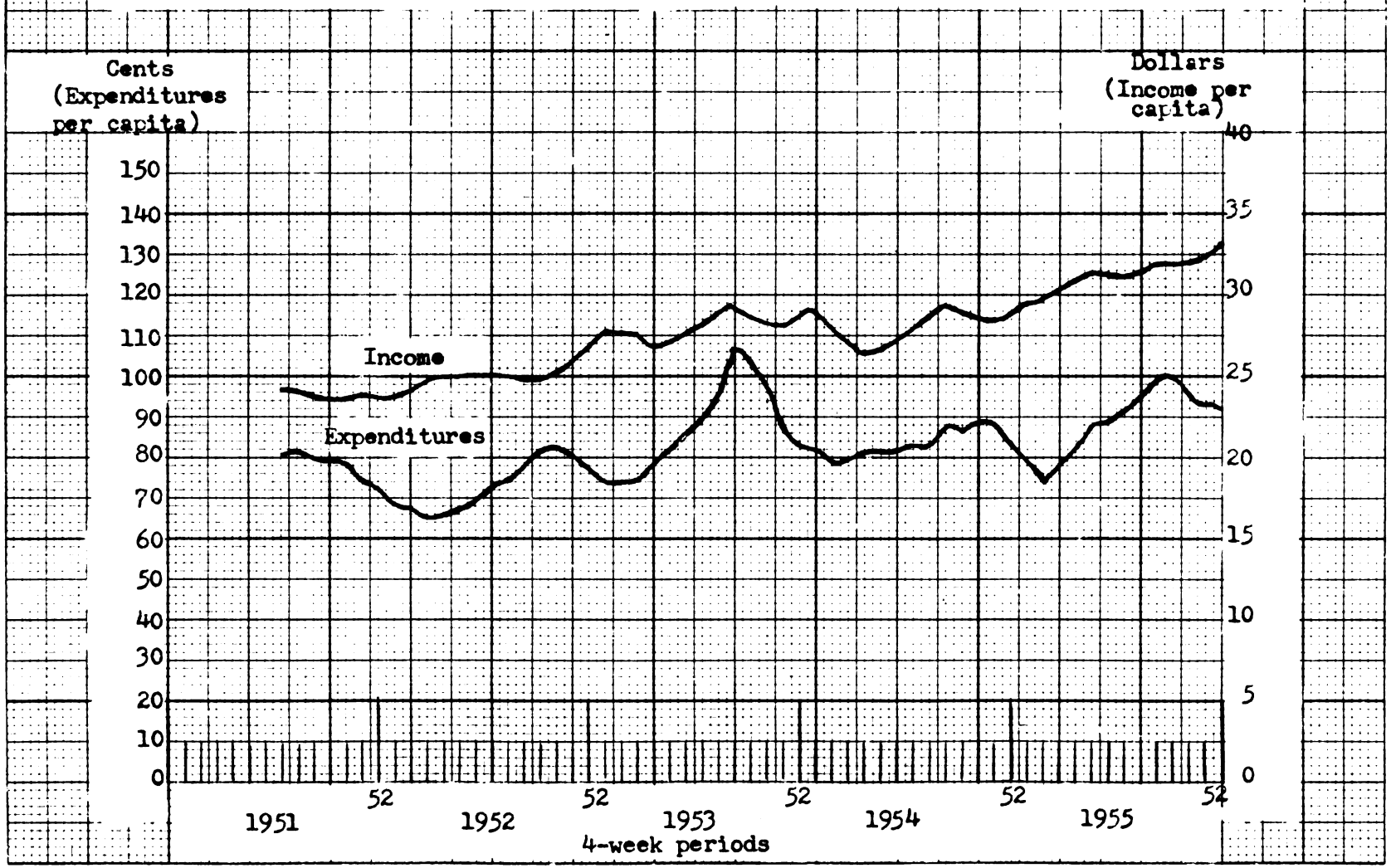
Variation of Meals Eaten Away From Home Due to Income

More important is a comparison of income and expenditures for meals eaten away from home over time. The income and expenditure trends show the relationship between them. Such a comparison has been made graphically and by correlation analysis.

Figure 3 shows a graphical comparison of income and expenditures for meals eaten away from home in terms of a 4-week average of the 13-week moving average. It is apparent from the Figure 3 presented that the average weekly expenditures for meals eaten away from home and the average income increased yearly with approximately the relationship as previously stated, the income elasticity was .804. It is indicated that the simple linear trend in expenditures for meals eaten away from home during the 5-year period from the 13th week of 1951 to the 52nd week of 1955 was at an increasing rate of about .8 percent as the income was increasing at a rate of 1 percent.

A significant correlation was found to exist between income and expenditures for meals eaten away from home in terms of a 4-week average of the 13-week moving average over a 5-year period as follows:

Figure 3. Four-Week Average of the 13-Week Moving Average of Per Capita Income and Expenditures for Meals Away from Home Reported by M.S.U. Consumer Panel Families, 13th Week of 1951 to 52nd Week of 1955.



Letting Y = Average expenditures for meals eaten away from home per capita per week

X = Average income per capita per week

Fitting to the equation $Y = .16197 + .023988X$

$r = .6795$

$t_r = 9.5293$

The result of simple regression equation yielded a correlation coefficient .6795; and the test of correlation coefficient was significant at the 1 percent level.

Variation of Meals Eaten Away From Home Due to Seasonality

Both expenditures for, and number of, meals eaten away from home are seasonal. Appendix 2 shows the average number of meals, and average expenditures for meals eaten away from home per capita by 4-week periods based on family income groups. The income groups were based on per capita income of the family for the previous year. Medium incomes were: 1951, $1,000 to $1,540; 1952, $1,070 to $1,690; 1953, $1,070 to $1,690; 1954, $1,250 to $1,890; 1955, $1,220 to $1,890.[5] For example, income of $1,000 to $1,540 in 1950 set the income groups in 1951.

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[5] Quackenbush, G. G. and Shaffer, J. D., "Cooperation and Sampling in Four Years of M. S. U. Consumer Panel Operation", Quarterly Bulletin of the Michigan Agricultural Experiment Station, Michigan State University of Agriculture and Applied Science, East Lansing, Vol. 38, No. 1, August, 1955, p. 97.

In figures 4 and 5, the data from Appendix ?, are plotted to show for each income group the expenditures for meals and number of meals eaten away from home over time.

As shown in Figures 4 and 5, the seasonal variations in expenditures for, and number of, meals eaten away from home appeared to follow a similar pattern in spite of level of income. However, the number of meals eaten away from home is fluctuated more than the expenditures for meals eaten away from home. These are especially shown in the medium group and lower income groups. These variations indicate the medium and lower income groups spent relatively less per meal than the higher income groups.

Over the five year period, it is shown on the figures that the number of meals eaten away from home, and the expenditures for the same, were greatest for the higher income group, next greatest for the medium income group, and lowest for the low income group. The seasonal pattern of meals eaten away from home, both number and expenditures, in each income group appear the same. Both reach a peak during the period of mid-summer of each year, falling to a seasonal low in the winter. This seasonal fluctuation of each year is obviously affected by the vacations and weather.

Further checking and comparing the seasonal trend of expenditures for meals eaten away from home and number of meals eaten away from home, a single seasonal trend was graphically illustrated in Figure 6. The data were taken

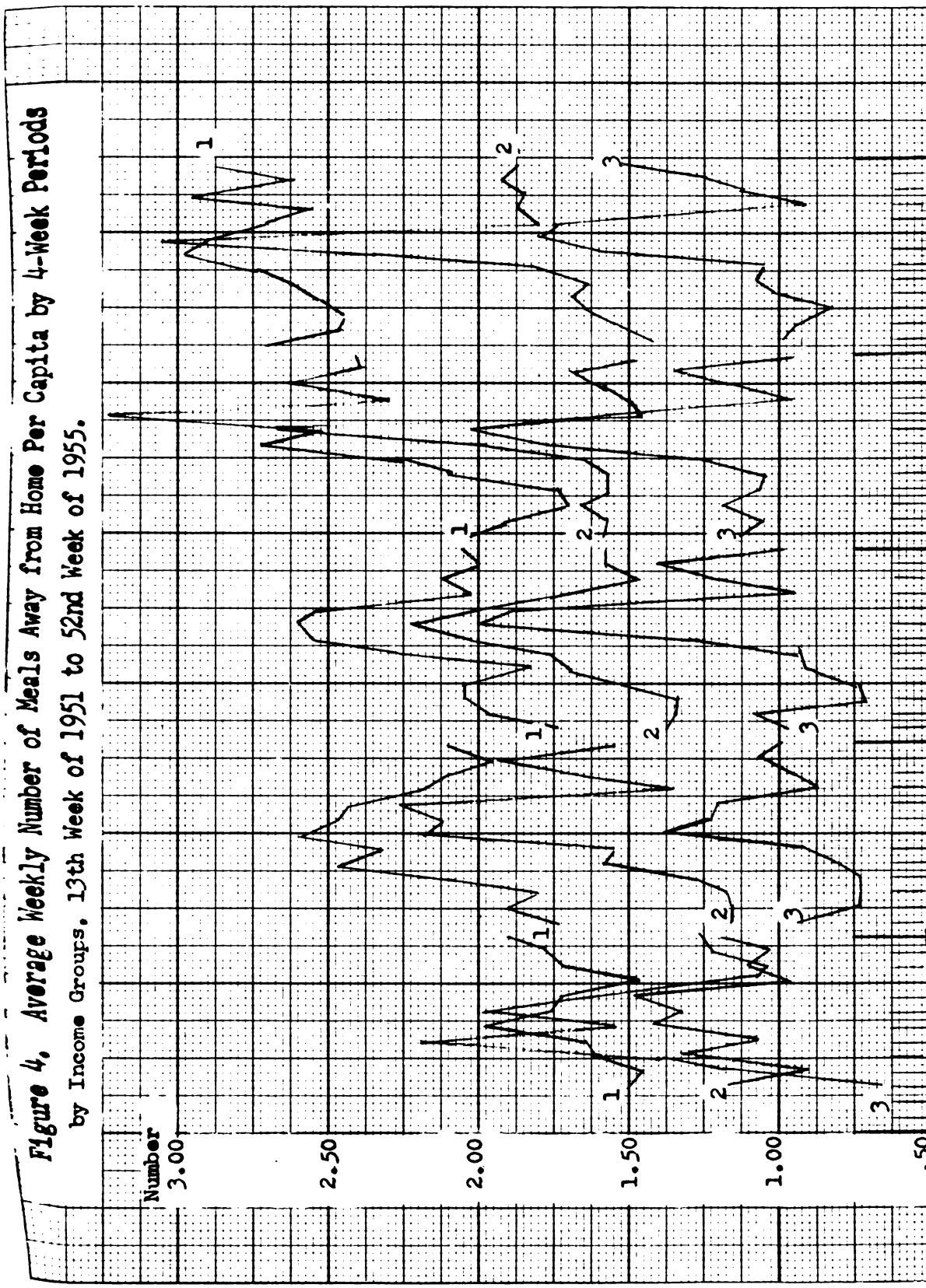

Figure 4. Average Weekly Number of Meals Away from Home Per Capita by 4-Week Periods

by Income Groups, 13th Week of 1951 to 52nd Week of 1955.

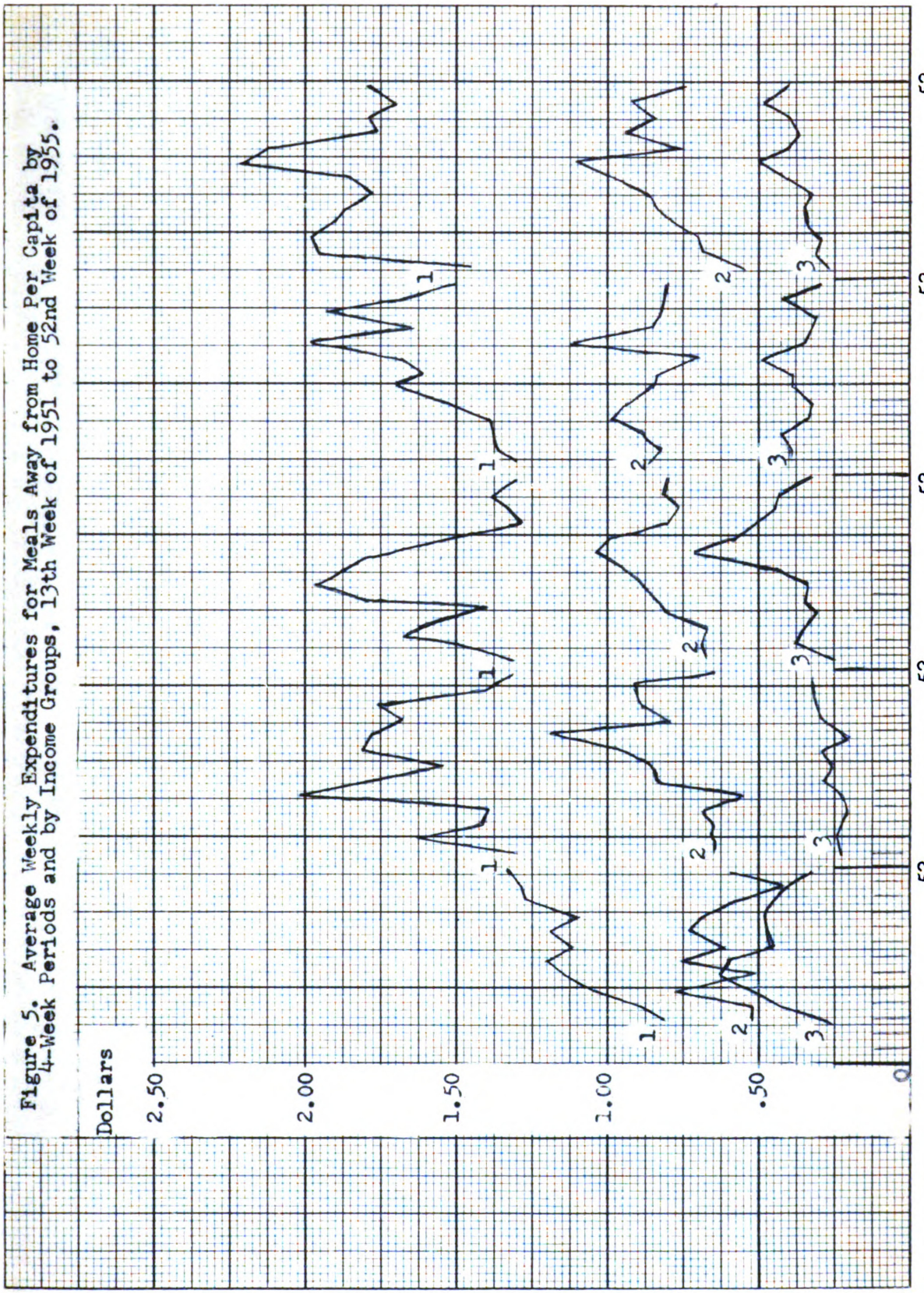

Figure 5. Average Weekly Expenditures for Meals Away from Home Per Capita by 4-Week Periods and by Income Groups, 13th Week of 1951 to 52nd Week of 1955.

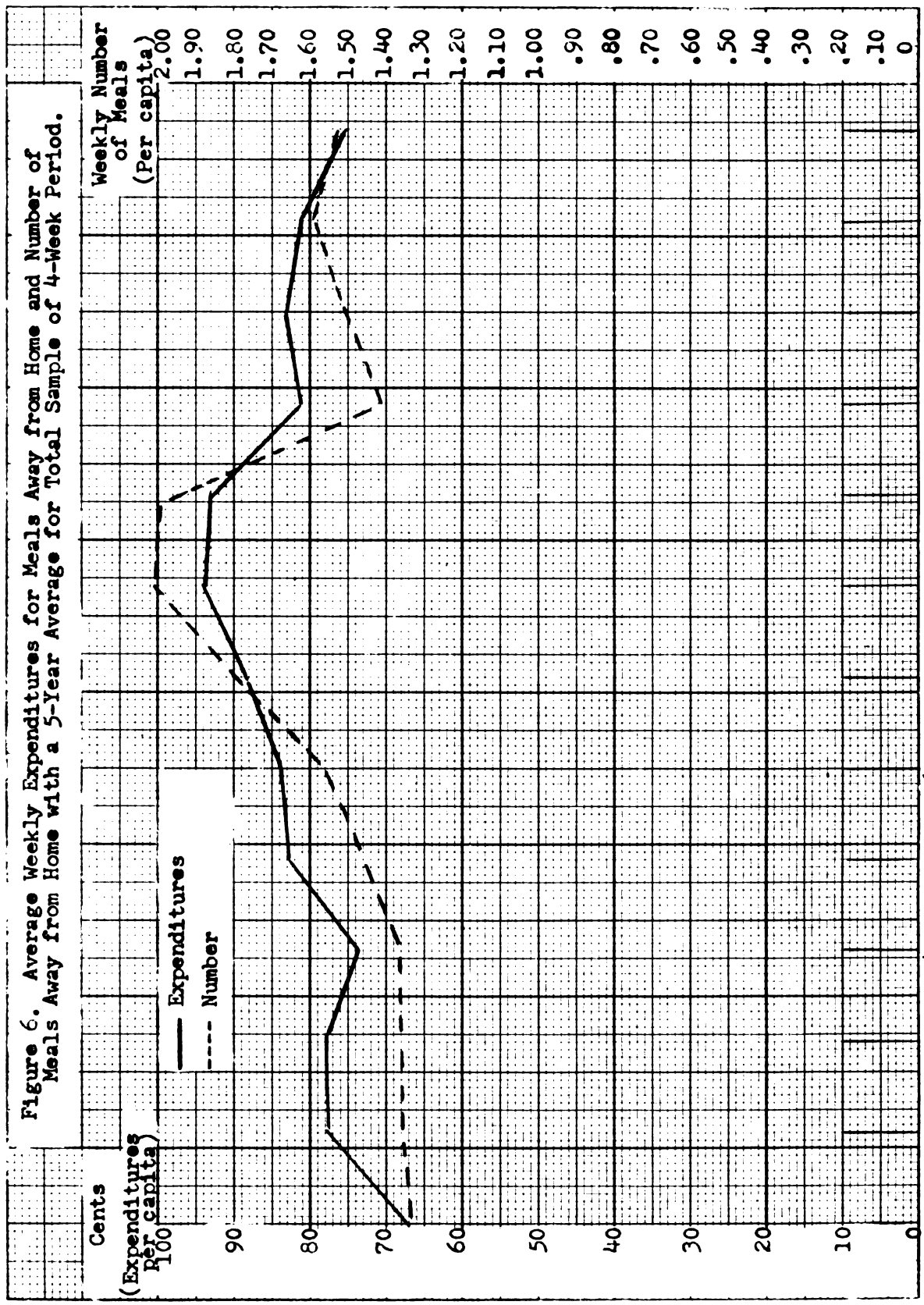

Figure 6. Average Weekly Expenditures for Meals Away from Home and Number of Meals Away from Home with a 5-Year Average for Total Sample of 4-Week Period.

from Table 14 with a 5-year average computed in terms of a 4-week period. It is noted that the seasonal patterns for both the expenditures for meals eaten away from home and number of meals eaten away from home followed the same trend with a seasonal high between the middle of July and August, falling a seasonal low starting early in December and lasting through the end of March.

In comparing the expenditures for meals eaten away from home and number of meals eaten away from home Figure 6 shows that the number of meals eaten away from home is high relative to expenditures during the months of June through September. This may be explained in part by the greater proportion of lower income families eating meals away from home during the summer vacation months. It is evidently shown in the Appendix 2 that, through the whole panel, the lower income groups spent less per meal eaten away from home than the higher income groups.

TABLE 14

AVERAGE WEEKLY NUMBER OF MEALS EATEN AWAY FROM HOME AND EXPENDITURES FOR MEALS EATEN AWAY FROM HOME WITH 5-YEAR (1951-1955) AVERAGE FOR TOTAL SAMPLE BY 4-WEEK PERIODS

Week	Average Weekly Number of Meals Away from Home Per Capita	Average Weekly Expenditures for Meals Away from Home Per Capita
1- 4	1.3570	.6872
5- 8	1.3625	.7843
9-12	1.3693	.7887
13-16	1.3622	.7492
17-20	1.4777	.8330
21-24	1.5684	.8401
25-28	1.7988	.8829
29-32	2.0411	.9391
33-36	1.9918	.9296
37-40	1.4099	.8177
41-44	1.5111	.8385
45-48	1.5950	.8194
49-52	1.5294	.7555

CHAPTER V

RELATIONSHIPS BETWEEN FAMILY CHARACTERISTICS AND BETWEEN EXPENDITURES FOR MEALS EATEN AWAY FROM HOME AND FAMILY CHARACTERISTICS

Introduction

The analyses contained in this chapter is to determine the simple correlation coefficients between the family characteristics such as size of family, age of homemakers, education of homemakers, per family income, per capita income, as related to significant variations in per family and per capita expenditures for meals eaten away from home.[1] The multiple correlation coefficients indicate the effect on the dependent variable of a change in the accompanying independent variable when allowance has been made for the other independent variables. Use of multiple correlation does not explain the relationships between the independent variables. They are assumed to be independent. The purpose of setting up the simple correlation in this study is to indicate the relationships between the independent variables and the relationships between the dependent variable and each independent variable. The correlations are simple correlations of the logarithms of the original data.

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[1]Over the 4-year period, the average size of family was 3.36, age of homemakers was 44.16, and education of homemakers was 11.69. (Studied families, 1952-1955)

The simple correlation coefficients from tables 15 to 26 show that the relationships between the family characteristics, and between the expenditures for meals eaten away from home and family characteristics in each year over the 4-year period. The combinations of families were used in this analysis as well as in multiple regression analysis and cross-sectional elasticities.

The significant of the simple correlation coefficient is tested by the calculation of t from $t = \frac{r\sqrt{n-2}}{\sqrt{1-r^2}}$ [2] where r is the coefficient being tested, n is the number in the sample.

Size of Family Related to Other Family Characteristics, and Expenditures for Meals Eaten Away from Home Per Family and Per Capita

Significant correlation coefficients were found to exist between size of family, per family income, age of homemakers, and education of homemakers. Tables 15 to 20, based on per family income, and per family expenditures for meals eaten away from home, show that the same results were yielded in each year over the 4-year period. The correlation coefficients were tested and are all significant at the 1 per cent level except between the size of family and education of homemakers in 1953, 1954 and 1955 which are

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[2]This formula was taken from Fryer, H. C., Elements of Statistics, John Wiley & Sons, Inc., New York, 1954, p. 218.

TABLE 15

SIMPLE CORRELATION COEFFICIENTS BETWEEN FAMILY CHARACTERISTICS, AND BETWEEN PER FAMILY EXPENDITURES FOR MEALS AWAY FROM HOME AND FAMILY CHARACTERISTICS*

(Families in 1952 also in 1953)

	Age of Homemakers	Education of Homemakers	Size of Family	Employment of Homemakers	Expenditures for Meals Eaten Away from Home (per family)
Income (per family)	-.3293[a] (1 o/o)[b] 3.309[d]	+.3419 (1 o/o) 3.452	+.5432 (1 o/o) 6.137	+.0463 (N.S)[c] .440	+.4712 (1 o/o) 5.069
Age of Homemakers		-.2181 (5 o/o) 2.120	-.5904 (1 o/o) 6.939	-.0121 (N.S) .115	+.0783 (N.S) .742
Education of Homemakers			+.2749 (1 o/o) 2.713	+.0377 (N.S) .358	+.1982 (N.S) 1.918
Size of Family				-.2695 (5 o/o) 2.655	+.0948 (N.S) .903
Employment of Homemakers					+.0493 (N.S) .468

[a]Simple correlation coefficient

[b]With 90 degrees of freedom, $t_{.05} = 1.987$, $t_{.01} = 2.654$. Based on Table 3.8, value of t, in George W. Snedecor's, Statistical Methods, Iowa State College Press, Ames, Iowa, 4th edition, 1946, p. 65.

[c]None significance

[d]t value

*The simple correlation coefficients were computed

TABLE 16

SIMPLE CORRELATION COEFFICIENTS BETWEEN FAMILY CHARACTERISTICS, AND BETWEEN PER FAMILY EXPENDITURES FOR MEALS AWAY FROM HOME AND FAMILY CHARACTERISTICS

(Families in 1953 also in 1952)

	Age of Homemakers	Education of Homemakers	Size of Family	Employment of Homemakers	Expenditures for Meals Eaten Away from Home (per family)
Income (per family)	-.3845 (1 %)[b] 3.952	+.3647 (1 %) 3.716	+.5813 (1 %) 6.778	-.0221 (N.S.) .209	+.5039 (1 %) 5.534
Age of Homemakers		-.2202 (5 %) 2.142	-.6068 (1 %) 7.242	+.0133 (N.S.) .126	-.0082 (N.S.) .078
Education of Homemakers			+.2571 (5 %) 2.524	+.0545 (N.S.) .518	+.2471 (5 %) 2.419
Size of Family				-.1891 (N.S.) 1.827	+.2186 (5 %) 2.126
Employment of Homemakers					+.1108 (N.S.) 1.057

in terms of weekly expenditures for meals eaten away from home and yearly income. Each observation of the variables was converted into logarithm. Income measured in hundreds of dollars and expenditures measured per hundred families.

[b]Ibid., with 90 degrees of freedom.

TABLE 17

SIMPLE CORRELATION COEFFICIENTS BETWEEN FAMILY CHARACTERISTICS AND BETWEEN PER FAMILY EXPENDITURES FOR MEALS AWAY FROM HOME AND FAMILY CHARACTERISTICS

(Families in 1953 also in 1954)

	Age of Homemakers	Education of Homemakers	Size of Family	Employment of Homemakers	Expenditures for Meals Eaten Away from Home (per family)
Income (per family)	-.3721 (1 %)[b] 4.185	+.3715 (1 %) 4.178	+.5414 (1 %) 6.722	+.0019 (N.S.) .020	+.5087 (1 %) 6.169
Age of Homemakers		-.2731 (1%) 2.963	-.5563 (1%) 6.989	-.0016 (N.S.) .017	-.0955 (N.S.) 1.002
Education of Homemakers			+.2545 (1%) 2.779	.1394 (N.S.) 1.470	+.3155 (1%) 3.472
Size of Family				-.1770 (N.S.) 1.878	+.2329 (5%) 2.500
Employment of Homemakers					-.1587 (N.S.) 1.678

[b]Ibid., with 109 degrees of freedom, $t_{.05} = 1.983$, $t_{.01} = 2.625$.

TABLE 18

SIMPLE CORRELATION COEFFICIENTS BETWEEN FAMILY CHARACTERISTICS AND BETWEEN PER FAMILY EXPENDITURES FOR MEALS AWAY FROM HOME AND FAMILY CHARACTERISTICS

(Families in 1954 also in 1953)

	Age of Homemakers	Education of Homemakers	Size of Family	Employment of Homemakers	Expenditures for Meals Eaten Away from Home (per family)
Income (per family)	-.3327 (1%)[b] 3.683	+.4189 (1%) 4.817	+.5121 (1%) 6.224	+.1615 (N.S.) 1.709	+.4852 (1%) 5.793
Age of Homemakers		-.2737 (1%) 2.971	-.6016 (1%) 7.864	-.0335 (N.S.) .350	-.0298 (N.S.) .312
Education of Homemakers			+.2641 (1%) 2.858	+.0953 (N.S.) 1.000	+.2097 (5%) 2.239
Size of Family				-.0759 (N.S.) .795	+.1503 (N.S.) 1.587
Employment of Homemakers					+.1449 (N.S.) 1.529

[b]Ibid., with 109 degrees of freedom.

TABLE 19

SIMPLE CORRELATION COEFFICIENTS BETWEEN FAMILY CHARACTERISTICS AND BETWEEN PER FAMILY EXPENDITURES FOR MEALS AWAY FROM HOME AND FAMILY CHARACTERISTICS

(Families in 1954 also in 1955)

	Age of Homemakers	Education of Homemakers	Size of Family	Employment of Homemakers	Expenditures for Meals Eaten Away from Home (per family)
Income (per family)	-.2336 (5%)[b] 2.415	+.2998 (1%) 3.159	+.5103 (1%) 5.964	+.0909 (N.S.) .918	+.4552 (1%) 5.138
Age of Homemakers		-.2356 (5%) 2.437	-.5669 (1%) 6.917	+.0186 (N.S.) .187	+.0144 (N.S.) .145
Education of Homemakers			+.2397 (5%) 2.482	+.0401 (N.S.) .404	+.1176 (N.S.) 1.190
Size of Family				-.0527 (N.S.) .531	+.1876 (N.S.) 1.920
Employment of Homemakers					+.1440 (N.S.) 1.463

[b]Ibid., with 101 degrees of freedom, $t_{.05} = 1.980$, $t_{.01} = 2.617$.

TABLE 20

SIMPLE CORRELATION COEFFICIENTS BETWEEN FAMILY CHARACTERISTICS AND BETWEEN PER FAMILY EXPENDITURES FOR MEALS AWAY FROM HOME AND FAMILY CHARACTERISTICS

(Families in 1955 also in 1954)

	Age of Homemakers	Education of Homemakers	Size of Family	Employment of Homemakers	Expenditures for Meals Eaten Away from Home (per family)
Income (per family)	-.3183 (1%)[b] 3.375	+.3405 (1%) 3.640	+.5722 (1%) 7.012	+.1564 (N.S.) 1.575	+.4525 (1%) 5.099
Age of Homemakers		-.2364 (5%) 2.445	-.5723 (1%) 7.012	+.1318 (N.S.) 1.336	-.1051 (N.S.) 1.062
Education of Homemakers			+.2431 (5%) 2.519	+.1247 (N.S.) 1.263	+.2553 (5%) 2.654
Size of Family				+.0338 (N.S.) .340	+.2078 (5%) 2.135
Employment of Homemakers					+.2533 (5%) 2.631

[b]Ibid., with 101 degrees of freedom.

TABLE 21

SIMPLE CORRELATION COEFFICIENTS BETWEEN FAMILY CHARACTERISTICS AND BETWEEN PER CAPITA EXPENDITURES FOR MEALS AWAY FROM HOME AND FAMILY CHARACTERISTICS

(Families in 1952 also in 1953)

	Age of Homemakers	Education of Homemakers	Size of Family	Employment of Homemakers	Expenditures for Meals Eaten Away from Home (per capita)
Income (per capita)	+.2416 (5%)[b] 2.362	-.0114 (N.S.) .108	-.4393 (1%) 4.639	+.3173 (1%) 3.174	+.5129 (1%) 5.668
Age of Homemakers		-.2181 (5%) 2.120	-.5904 (1%) 6.939	-.0121 (N.S.) .115	+.2241 (5%) 2.181
Education of Homemakers			+.2749 (1%) 2.713	+.0376 (N.S.) .358	+.1169 (N.S.) 1.116
Size of Family				-.2695 (1%) 2.655	-.2013 (N.S.) 1.950
Employment of Homemakers					+.1149 (N.S.) 1.097

[b]Ibid., with 90 degrees of freedom.

TABLE 22

SIMPLE CORRELATION COEFFICIENTS BETWEEN FAMILY CHARACTERISTICS AND BETWEEN PER CAPITA EXPENDITURES FOR MEALS AWAY FROM HOME AND FAMILY CHARACTERISTICS

(Families in 1953 also in 1952)

	Age of Homemakers	Education of Homemakers	Size of Family	Employment of Homemakers	Expenditures for Meals Eaten Away from Home (per capita)
Income (per capita)	+.2740 (1%)[b] 2.703	+.0916 (N.S.) .873	-.4867 (1%) 5.286	+.2025 (N.S.) 1.925	+.4696 (1%) 5.045
Age of Homemakers		-.2202 (5%) 2.142	-.6068 (1%) 7.242	+.0133 (N.S.) .126	+.1768 (N.S.) 1.704
Education of Homemakers			+.2571 (5%) 2.524	+.0545 (N.S.) .518	+.1810 (N.S.) 1.746
Size of Family				-.1891 (N.S.) 1.827	-.0781 (N.S.) .743
Employment of Homemakers					+.1675 (N.S.) 1.612

[b]Ibid., with 90 degrees of freedom.

TABLE 23

SIMPLE CORRELATION COEFFICIENTS BETWEEN FAMILY CHARACTERISTICS AND BETWEEN PER CAPITA EXPENDITURES FOR MEALS AWAY FROM HOME AND FAMILY CHARACTERISTICS

(Families in 1953 also in 1954)

	Age of Home-makers	Education of Home-makers	Size of Family	Employ-ment of Home-makers	Expenditures for Meals Eaten Away from Home (per capita)
Income (per capita)	+.1686 (N.S.) 1.784	+.1480 (N.S.) 1.563	-.3493 (1%) 3.893	+.1911 (5%) 2.033	+.4651 (1%) 5.485
Age of Homemakers		-.2731 (1%) 2.963	-.5563 (1%) 6.989	-.0016 (N.S.) .017	+.0488 (N.S.) .510
Education of Homemakers			+.2545 (1%) 2.779	+.1394 (N.S.) 1.470	+.2581 (1%) 2.789
Size of Family				-.1770 (N.S.) 1.878	-.0315 (N.S.) .329
Employment of Homemakers					+.2168 (5%) 2.319

[b]Ibid., with 109 degrees of freedom.

TABLE 24

SIMPLE CORRELATION COEFFICIENTS BETWEEN FAMILY CHARACTERISTICS AND BETWEEN PER CAPITA EXPENDITURES FOR MEALS AWAY FROM HOME AND FAMILY CHARACTERISTICS

(Families in 1954 also in 1953)

	Age of Homemakers	Education of Homemakers	Size of Family	Employment of Homemakers	Expenditures for Meals Eaten Away from Home (per capita)
Income (per capita)	+.2739 (1%)[b] 2.973	+.1607 (N.S.) 1.700	-.4673 (1%) 5.519	+.2347 (5%) 2.520	+.4807 (1%) 5.723
Age of Homemakers		-.2737 (1%) 2.971	-.6016 (1%) 7.864	-.0335 (N.S.) .350	+.0766 (N.S.) .802
Education of Homemakers			+.2641 (1%) 2.858	+.0953 (N.S.) 1.000	+.1598 (N.S.) 1.690
Size of Family				-.0759 (N.S.) .795	-.0927 (N.S.) .972
Employment of Homemakers					+.2532 (1%) 2.733

[b]Ibid., with 109 degrees of freedom.

TABLE 25

SIMPLE CORRELATION COEFFICIENTS BETWEEN FAMILY CHARACTERISTICS AND BETWEEN PER CAPITA EXPENDITURES FOR MEALS AWAY FROM HOME AND FAMILY CHARACTERISTICS

(Families in 1954 also in 1955)

	Age of Homemakers	Education of Homemakers	Size of Family	Employment of Homemakers	Expenditures for Meals Eaten Away from Home (per capita)
Income (per capita)	+.3967 (1%)[b] 4.343	-.0707 (N.S.) .712	-.4701 (1%) 5.352	+.1106 (N.S.) 1.118	+.2781 (1%) 2.909
Age of Homemakers		-.2356 (5%) 2.437	-.5669 (1%) 6.915	+.0186 (N.S.) .187	+.1215 (N.S.) 1.230
Education of Homemakers			+.2398 (5%) 2.482	+.0401 (N.S.) .404	+.0607 (N.S.) .611
Size of Family				-.0527 (N.S.) .531	-.0548 (N.S.) .552
Employment of Homemakers					+.2327 (5%) 2.405

[b]Ibid., with 101 degrees of freedom.

TABLE 26

SIMPLE CORRELATION COEFFICIENTS BETWEEN FAMILY CHARACTERISTICS AND BETWEEN PER CAPITA EXPENDITURES FOR MEALS AWAY FROM HOME AND FAMILY CHARACTERISTICS

(Families in 1955 and in 1954)

	Age of Homemakers	Education of Homemakers	Size of Family	Employment of Homemakers	Expenditures for Meals Eaten Away from Home (per capita)
Income (per capita)	+.2839 (1%) 2.957	+.1056 (N.S.) 1.067	-.4510 (1%) 5.078	+.1304 (N.S.) 1.322	+.3922 (1%) 4.284
Age of Homemakers		-.2364 (5%) 2.445	-.5723 (1%) 7.012	+.1318 (N.S.) 1.336	+.0585 (N.S.) .589
Education of Homemakers			+.2431 (5%) 2.519	+.1247 (N.S.) 1.263	+.2019 (5%) 2.093
Size of Family				+.0338 (N.S.) .340	-.0562 (N.S.) .5660
Employment of Homemakers					+.2599 (1%) 2.705

[b]Ibid., with 101 degrees of freedom.

significant at 5 per cent level. The correlation coefficients between size of family and per family income are positive in sign. It is indicated that the larger the family in size the higher the income.

The correlation coefficients between size of family and age of homemakers are negative in sign. This indicates that the size of families is inversely correlated with the age of homemakers. In other words, the homemakers of the larger size families are younger than those of the smaller size families.

The correlation coefficients between size of family and education of homemakers are positive in sign. It indicates that the homemakers of larger families received a higher education than those of smaller families.

The findings discussed above are very interesting. These tell that the larger size family has a younger homemaker with a higher income and higher education.

From the Tables 15 to 20, no significant relationship has been found between size of family and employment of homemakers. This may be due to the fact that a small proportion of homemakers in the panel were employed and therefore would not yield a significant result in the correlation analysis.[3]

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[3]During the 4-year period an average of 13.43 per cent of the homemakers were employed.

Size of family was probably associated with expenditures for meals eaten away from home. The correlation coefficients between size of family and expenditures for meals eaten away from home were found to be + .2186 and + .2329 in 1953, and + .2078 in 1955 which were all significant at 5 per cent level.

Tables 21 to 26 present the correlation coefficients, based on per capita income and per capita expenditures for meals eaten away from home. It was found that the same significant correlation coefficients between size of family, per capita income, age of homemakers, and education of homemakers in each year over the 5-year period, but the correlation coefficients between size of family and per capita income are negative in sign and between size of family and per family income are positive in sign. The correlation coefficients between size of family and per capita income were found significant in each year. However, the coefficients between these two independent variables are lower than those based on per family income, but all are significant at the one per cent level, and negative in sign. It is evident that the larger the family size, the lower the per capita income. It has been mentioned that the larger size of families have a higher per family income than the smaller size families. But the larger size of families have a lower per capita income when the family income is averaged by the number of persons in the family. This indicates that

the larger size of families have higher incomes, but not proportionately relative to the number of persons in the families.

In this study, the data on size of family, age of homemakers, education of homemakers, and employment of homemakers were used both as a per capita and per family analysis, so the same correlation coefficients were yielded in per capita as well as in per family analysis. Therefore, there is no difference in the relationships between these four independent variables whether they are based on per capita or per family data. The differences are whether each of these variables is related to income and expenditures for meals eaten away from home.

Age of Homemakers Related to Other Family Characteristics, and Expenditures for Meals Eaten Away from Home Per Family and Per Capita

From the Tables 15 to 20, the correlation coefficients between age of homemakers and per family income are all significant at the one percent level, except in 1954 which is significant at the five percent level. However, all of these correlation coefficients are negative in sign. This indicates that the younger the age of homemakers the higher the income. This result coincides with the relationship between size of family and per family income, and between size of family and age of homemakers. It has been mentioned that the larger size of families have a younger homemaker

and also have a higher income. In the other words, the older homemakers are in the smaller size of families and with a lower income.

The correlation coefficients between the age of homemakers and per capita income are all significant at the one percent level except in 1953 which is at only a little less than the five percent level and in 1952 which is at the five percent level. However, these correlation coefficients have a negative sign. This indicates that the older the age of homemakers the higher the per capita income. This coincides with the relationships between size of family, per family income, and age of homemakers. Since the larger size of families have a smaller average per capita income and a younger homemaker, so the older age of homemakers are in the smaller families and with a higher average per capita income.

Negative correlation coefficients between age of homemakers and education of homemakers have been found in each year over the 4-year period. These are all significant at the five percent level except in 1953 and 1954 which are significant at the one percent level. This indicates that the younger the homemaker the higher the education.

No significant correlation coefficients have been found between age of homemakers and employment of homemakers. Since only a small percentage of homemakers in the

panel were employed, it could not yield the significant results in the correlation analysis.

Age of homemaker was also not found to be a significant factor with regard to the expenditures for meals eaten away from home. These correlation coefficients were not significant in any year over the 5-year period except in 1952 based on per capita basis which is significant at the five percent level. This indicates that expenditures for meals eaten away from home were not related to the age of homemakers. These expenditures were related to factors other than the age of homemakers.

Education of Homemakers Related to Other Family Characteristics, and Expenditures for Meals Eaten Away from Home Per Family and Per Capita

It is also evident from the tables that the relationships between education of homemakers and per family income are different from the relationships between education of homemakers and per capita income. Highly significant correlation coefficients were shown from Tables 15 to 20 which were on a per family basis. However, per capita income was not found to be significant with regard to education of homemakers. There are indicated that the higher education of homemakers the higher the per family income, but not in relation to per capita income. This suggests that the non-significant correlation coefficients were affected by size of family. Since the higher education the homemakers

received, the larger families they had, therefore the higher education of homemakers, the lower the per capita income.

Age of homemakers was found to be related to education of homemakers. The correlation coefficients between these two independent variables are shown from Tables 15 to 26. This indicated that the negative correlation coefficients were significant in each year over a 4-year period. These are all significant at the five percent level except in 1953 and in 1954 which are significant at one percent level. The negative correlation coefficients indicate that the younger homemakers received higher educations and the older less.

No significant correlation coefficients have been found between education of homemakers and employment of homemakers. Education of homemakers was found in 1953, 1954 and 1955 to be significant in relation to expenditures for meals eaten away from home which were based on per family data and only in 1953 and 1955 to be of significance in relation to expenditures for meals eaten away from home which were based on per capita data. The education of homemakers was positively related to the expenditures for meals eaten away from home both per family and per capita. Correlation coefficients show that the higher educated homemakers spent more money on expenditures for meals eaten away from home than the lower educated homemakers. It can

be seen that use of per family expenditures for meals eaten away from home yielded higher correlation coefficients than use of per capita expenditures for meals eaten away from home. These indications coincide with the relationships between size of family and education of homemakers. It has been found that the higher education homemakers were in the larger size of families which should have a lower average per capita income. The correlation coefficients in terms of per capita expenditures for meals eaten away from home did not reach as high as that in terms of per family expenditures for meals eaten away from home.

Employment of Homemakers Related to Other Family Characteristics, and Expenditures for Meals Eaten Away from Home Per Family and Per Capita

It has not been found that employment of homemakers was significantly correlated with per family income. Tables 15 to 20 show very low correlation coefficients between these two independent variables. However, it is shown on the Tables 21 to 26 that employment of homemakers in 1952, 1953, and in 1954 was positively correlated with per capita income. It is possible that the employed homemakers have a higher average per capita income, but this did not affect the per family income. It is also known that the employed homemakers had a smaller size of family.

Employment of homemakers was not found to be significant with respect to both age of homemakers and education

of homemakers. It was also not found to be significant in relation to per family expenditures for meals eaten away from home except in 1955 which is significant at the five percent level.

With respect to per capita expenditures for meals eaten away from home, employment of homemakers was positively correlated in 1953, 1954 and 1955 which are significant at the 5 percent level, 1 percent and 5 percent level, and 1 percent level, respectively. These relationships may be caused by the size of family. From the tables, it is evident that employment of homemakers was negatively correlated with size of family. Employed homemakers might spend more on expenditures for meals eaten away from home which is in terms of average per capita basis. However, they spent comparatively less in terms of average per family expenditures.

Per Family Income and Per Capita Income Related to Family Characteristics, and Expenditures for Meals Eaten Away from Home Per Family and Per Capita

The relationships between per family income and per capita income related to other family characteristics have already been discussed in the previous paragraphs.

The correlation coefficients between per family income and per family expenditures for meals eaten away from home, and between per capita income and per capita expenditures for meals eaten away from home were all significant at the 5 percent level in each year over the 4-year period. These

are indications that families with higher incomes spent more on meals eaten away from home than those lower income families in spite of the effects of family characteristics.

All explanations of those findings are in terms of the correlation coefficients between the variables. A brief summary of the relationship between these variables is to be found in Chapter VII, Summary and Conclusions.

CHAPTER VI

RELATIONSHIPS OF EXPENDITURES FOR MEALS EATEN AWAY FROM HOME DURING 1952 TO 1955 TO FAMILY CHARACTERISTICS

Introduction

In many regression problems the investigator is concerned with the effect of one variable on another. In problems of a different nature we may be concerned with the effect of more than one independent variable on the dependent variable where relations as given by simple regression coefficients may not give satisfactory information. The same principles are involved in multiple regression as in simple regression, but the procedure is more laborious, since there is more than one independent variable. The analysis in this chapter will deal with the relationship between expenditures (per family or per capita) for meals eaten away from home by income (per family or per capita), and size of family, age of homemakers, education of homemakers, and employment of homemakers. Expenditures for meals eaten away from home is the dependent variable, and the other five are independent variables.

The basic equation used was based on

$$\log Y = a + b_1 \log X_1 + b_2 \log X_2 + b_3 \log X_3 + \ldots\ldots + b_n \log X_n.$$

where there are n independent variables and the regression

coefficients b_1, b_2, ... , b_n are referred to as multiple regression coefficients. This equation represents a method of predicting values of Y from individual values of the n variables with which we are concerned.

Due to the large number of observations in each series of data and the number of variables in each equation, there were practical reasons for preferring the less laborious procedure of fitting a function that was linear in arithmetic terms. After experimenting with arithmetic relationships to determine the basic factors affecting expenditures for meals eaten away from home, it was found desirable to do the equation in logarithms.

The dependent variable that was used in this series of equations was the average weekly expenditures for meals eaten away from home. The income used as an independent variable was yearly income. The data on size of family, age of homemakers, education of homemakers, and employment of homemakers that were used in the per capita analysis were the same as were used in the per family analysis.

In order to simplify the notations, each dependent variable is designated by the letter Y, and each independent variable is designated by letter X, differentiating between the variables by means of subscripts. The variables were designated in the following manner:

Dependent variables:

Expenditures for meals eaten away from home per

family .. Y_1

Expenditures for meals eaten away from home per capita .. Y_2

Independent variables:

Per family income .. X_{1a}

Per capita income .. X_{1b}

Size of family .. X_2

Age of homemakers .. X_3

Education of homemakers .. X_4

Employment of homemakers .. X_5 [1]

Results from Multiple Regression Analysis

Twelve multiple regression equations were fitted to the data for the period 1952 to 1955. The first, (1.52), was based on per family weekly expenditures for meals eaten away from home and per family annual income in 1952. Ninety-two families in 1952 were selected from the panel and data on the families were used in this equation. The second equation, (1.53_a), was the same as (1.52). The families used in 1953 were the same families as those used in 1952. One-hundred eleven families in 1953 were selected from the panel and data representing these families was used in equation (1.53_b). These families were also used in equation (1.54_a), but the observations were based on 1954. The fifth

[1] Employed homemakers were treated as 1, unemployed homemakers were treated as 0.

equation, (1.54_b), was the same as the sixth equation (1.55) data and 103 families were selected from the 1954 data and were used in equation (1.54_b), and the same families in 1955 were used in equation (1.55).

Equations (2.52), (2.53_a), (2.53_b), (2.54_a), (2.54_b) and (2.55) were the same as equations (1.52), (1.53_a), (1.53_b), (1.54_a), (1.54_b), and (1.55) except that the former were based on per family data and the later were based on per capita data. The prediction equations, standard error of estimates, t values, and multiple correlation coefficients are shown in the following pages.[2]

The significance of a regression coefficient is tested by the calculation of t from $t_i = \frac{b_i}{s_{b_i}}$ where t_i is the t value of the i^{th} regression coefficient being tested, s_{b_i} is the standard error of b_i

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[2]For the convenience of computation, each observation of the variables in the equations was coded as follows:

$Y = \log (100Y')$

$X_1 = \log \left(\frac{X_1'}{100}\right)$

$X_2 = \log X_2'$

$X_3 = \log X_3'$

$X_4 = \log X_4'$

$X_5 = \begin{cases} 1, & \text{if employed} \\ 0, & \text{if unemployed} \end{cases}$

Where Y', X_1', X_2', X_3', X_4' represent the original observations.

[3]This formula was taken from Goulden, Cyril H., Methods of Statistical Analysis, John Wiley & Sons, Inc., New York, second edition, 1952, p. 142.

$(1.52)Y_1 =$

$-3.7479 + 2.0599X_{1a} - .3858X_2 + 1.1652X_3 + .6389X_4 - .0183X_5$

	(.4057)	(.4648)	(.6159)	(.7794)	(.2033)
t =	5.0776	.8300	1.8918	.8197	.0899
R =	.5425				

$(1.53_a)Y_1 =$

$-3.7707 + 1.7433X_{1a} + .1961X_2 + 1.3079X_3 + .6358X_4 + .2442X_5$

	(.3709)	(.4156)	(.5865)	(.7295)	(.1783)
t =	4.7000	.4718	2.2300	.8717	1.3698
R =	.5630				

$(1.53_b)Y_1 =$

$-3.1658 + 1.6782X_{1a} + .1340X_2 + .7774X_3 + 1.1087X_4 + .2794X_5$

	(.3466)	(.5221)	(.3761)	(.6868)	(.1627)
t =	4.8415	.3562	1.4889	1.6143	1.7171
R =	.5586				

$(1.54_a)Y_1 =$

$-2.2623 + 1.7706X_{1a} - .1650X_2 + .70330X_3 + .2328X_4 + .1098X_5$

	(.3524)	(.4022)	(.5830)	(.7302)	(.1663)
t =	5.0246	.4103	1.2063	.3188	.6602
R =	.5108				

$(1.54_b)Y_1 =$

$-1.9308 + 1.6487X_{1a} + .1281X_2 + .6999X_3 - .0006X_4 + .2044X_5$

	(.3854)	(.4034)	(.5397)	(.7524)	(.1807)
t =	4.2775	.3175	1.2968	.0009	1.1308
R =	.4828				

$(1.55)Y_1 =$

$-1.4579 + 1.5489X_{1a} - .2732X_2 - .0594X_3 + .9414X_4 + .5091X_5$

	(.4039)	(.4536)	(.6430)	(.8695)	(.2623)
t =	3.8347	.6022	.0923	1.0827	1.9413
R =	.5009				

$(2.52)Y_2 =$

$-3.1058 + 1.6765X_{1b} + .2764X_2 + .9182X_3 + 1.0653X_4 - .0573X_5$

	(.3354)	(.4101)	(.5852)	(.7269)	(.1932)
t =	4.9986	.6741	1.5691	1.4659	.2966
R =	.5492				

$(2.53_a)Y_2 =$

$-3.3905 + 1.6434X_{1b} + .9267X_2 + 1.1616X_3 + .6595X_4 + .1969X_5$

	(.3334)	(.3699)	(.5300)	(.6562)	(.1615)
t =	4.9295	2.5053	2.1917	1.0051	1.2190
R =	.5510				

$(2.53_b)Y_2 =$

$-2.1412 + 1.2649X_{1b} + .5955X_2 + .5238X_3 + 1.707X_4 + .2372X_5$

	(.2536)	(.3865)	(.4721)	(.6182)	(.1477)
t =	4.9869	1.6095	1.1095	1.7319	1.6062
R =	.5323				

$(2.54_a)Y_2 =$

$-2.3892 + 1.6201X_{1b} + .5840X_2 + .3126X_3 + .2249X_4 + .2573X_5$

	(.3228)	(.3668)	(.5307)	(.6625)	(.1510)
t =	5.0197	1.5920	.5890	.3395	1.7038
R =	.5248				

$(2.54_b)Y_2 =$

$-.9453 + .8890X_{1b} + .3839X_2 + .4232X_3 + .4751X_4 + .3825X_5$

	(.3448)	(.3751)	(.5421)	(.7302)	(.1787)
t =	2.5784	1.0236	.7808	.6507	2.1406
R =	.3663				

$(2.55)Y_2 =$

$-1.3207 + 1.4010X_{1b} + .2799X_2 - .0121X_3 + .9356X_4 + .4899X_5$

	(.4008)	(.3969)	(.7997)	(.7881)	(.2375)
t =	3.4782	.7053	.0152	1.18717	2.0624
R =	.4719				

The regression coefficient for X_{1a}, per family income, in equation (1.52) was positive and significant. With 86 degrees of freedom, t value significant at the .1 percent level is 3.412. With a regression coefficient for X_{1a}, 2.0599, and a standard error of .4057, the t value computed was 5.0776. It was enough to be significant at the .1 per cent level.[4]

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[4]With 86 degrees of freedom, $t_{.50} = .677$, $t_{.10} = 1.66$, $t_{.05} = 1.99$, $t_{.01} = 2.636$, $t_{.001} = 3.412$. Based on table of

The regression coefficient for X_2, size of family, was .3858. With a standard error of .4648, the t value, .8300 was significant at the 50 percent level.

With a regression coefficient + 1.1652 of age of homemakers, X_3 of equation (1.52), and a standard error of .6159, the t value obtained was 1.8918. It was significant at the 10 percent level.

The regression coefficient for X_4, education of homemakers, was .6389, and the standard error was .7794. A t value of .8197 obtained was significant at the 50 percent level.

The regression coefficient for X_5, employment of homemakers, .0183, was not significant at a t value .0899.

The above analyses of equation (1.52) indicates that per family income was the main factor affecting the variation of per family expenditures for meals eaten from home. The age of homemakers would be the next most important factor. The size of family and education of homemakers affected less. There was no relationship between employment of homemakers and per family expenditures for meals eaten away from home.

The coefficient of multiple determination, R^2, was .29, it has been explained 29 percent of the variation present in y_1. An R of .5425 and a standard error of estimate

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t values in Cyril H. Goulden's Method of Statistical Analysis, John Wiley and Sons, Inc., New York, Second Edition, 1952, p. 443.

of .0611 were associated with this equation.

Since the dependent variable and independent variables changed year after year, it was decided to use the data of 1953 and compute a new prediction equation, (1.53_a).

The multiple correlation R for this equation was .5630, a little higher than the previous equation. A standard of error of estimate was ascertained to be .0569, a little lower than the previous equation. The coefficient of multiple determination, R^2, was .2772, a little lower than the previous equation. The regression coefficient for X_{1a}, per family income was still significant at the .1 percent level. The sign changed for size of family, X_2, but the regression coefficient changed to non-significant. The age of homemakers, X_3, changed to be significant at the 5 percent level. The education of homemakers was still significant at the 50 percent level. The sign for employment of homemakers changed to positive and the coefficient became significant at the 50 percent level.

From the equation (1.53_a), it has been found that some independent variables were more significant while the coefficient of multiple correlation R was higher.

The data of 111 families which were selected from the panel in 1953 were used in equation (1.53_b). The coefficient of multiple correlation R for equation (1.53_b) was .5586. The proportion of total variation that was present

in the variations of the y_1 which was 31 percent. The standard error of estimates was .0624. The regression coefficient for X_{1a}, per family income, was still significant at the .1 percent level. The regression coefficient for X_2, size of family, was still non-significant. The regression coefficients on age of homemaker and education of homemakers were significant at the 50 percent level. The regression coefficient for employment of homemakers became more significant which was at the 10 percent level.

The same families in 1953 were used in 1954 of equation (1.54_a) yielding a coefficient of multiple correlation R of .5108. It was a little lower than the R of equation (1.53_b). Therefore, the lower coefficient of the independent variables were associated with the lower R value. An R^2 of .26 and a standard error of estimate of .0656 were obtained from the equation. The regression coefficient of X_{1a}, per family income, was the same as previous, also significant at the .1 percent level. The sign changed for size of family, X_2, but the regression coefficient was still non-significant. The regression coefficients of other independent variables were all non-significant except the age of homemakers, X_3, significant at the 50 percent level.

The data of 103 families in the panel were used to fit equation (1.54_b). An R^2 of .2331 and a R of .4828 were

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[5]Ibid., with 105 degrees of freedom, $t_{.50} = .676$, $t_{.10} = 1.66$, $t_{.05} = 1.98$, $t_{.01} = 2.626$, $t_{.001} = 3.382$.

obtained from this equation. The standard error of estimate was .0611.

The regression coefficients of all independent variables were all positive in sign. The regression coefficients of X_{1a}, per family income, was still significant at the .1 percent level.[6] The regression coefficients for X_3, age of homemakers, X_5, employment of homemakers, were significant at the 50 percent level. The others were all non-significant, but the education of homemakers changed to the negative.

When these families changed from 1954 to 1955 and the data of these families were fitted into equation (1.55), it yielded some coefficients which were different from the equation (1.54_b). The coefficient of multiple determination, R^2, was .25. The standard error of estimate was .6961. The coefficient of multiple correlation was .5009, a little higher than the equation (1.54_b). However, the regression coefficient for X_{1a}, per family income, was lower than the previous equation, but still enough to be significant at the .1 percent level. Other variables became more important than they were in the previous equation. The regression coefficient for X_2, size of family, changed sign and became more significant, but still could not reach a significance level of 50 percent. The regression coefficient for X_3, age of homemaker, from 50 percent significant level changed

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[6]Ibid., with 97 degrees of freedom, $t_{.50} = .676$, $t_{.10} = 1.66$, $t_{.05} = 1.986$, $t_{.01} = 2.63$, $t_{.001} = 3.396$.

to non-significant. The regression coefficient for X_4, education of homemakers, became a significant level of 50 percent, but the sign changed from negative to positive. The regression coefficient for X_5, employment of homemakers, became more significant, reaching a 10 percent significant level.

Which of the regression equations produced the best estimates of the structural relationships among the studied variables? An answer to this question must be based partly on the relationship between the variables which were used. The above equations were based on per family expenditures for meals eaten away from home and per family income. However, the age, education and employment were based only on the homemaker's themselves. It was expected to be more significant if per capita expenditures for meals eaten away from home and per capita income was consistent with the age, education and employment of homemakers. Therefore, the data, based on per capita expenditures for meals eaten away from home and per capita income of the same families, were used in equation (2.52), (2.53_a), (2.53_b), (2.54_a), (2.54_b) and (2.55). It can be seen that the coefficients for X_{1b}, per capita income, and standard errors of estimate both became smaller than the equations which were based on per family. Due to the variation between per capita incomes, which was smaller than between per family incomes, it had been expected that higher significant t value would be obtained

with the lower standard error of estimate. However, the t values which were obtained from these equations did not show a higher significance level; in fact, they even dropped to a 5 percent level in equation (2.5^4_b). These results indicate that the ratio of change in coefficients between per family income and per capita income is smaller than the ratio of change in standard error of estimate between per family income and per capita income.[7] Although the regres-

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[7]Statistically proved as follows:
Assumption on distribution
Y_c = per capita income
Y_f = per family income
Both are normal and independent with the following parameters
Y_c = n.1. $(0, \sigma^2)$
Y_f = n.1. $(0, F^2\sigma^2)$
$F^2\sigma^2$ is derived by the following computation

$$E[Y_c - E(Y_c)]^2 = \sigma^2 \qquad Y_c \text{ has n}(0, \sigma^2)$$

y_c = on an average $\frac{y_f}{F}$

while F = average size of family

If F is a constant

$FY_c = Y_f$ has n$(0, F^2\sigma^2)$

Since $F > 1 \quad \therefore \sigma^2 < F^2\sigma^2$

t is determined by the ratio of regression coefficient and standard error of estimate

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

When the expenditures for meals eaten away from home and income were changed from per family basis to per capita basis, the regression coefficients of expenditures for meals eaten away from home and income would also change. If

$\frac{\Delta b}{\Delta \sigma} > 1$ the regression coefficient would be more significant than before.

sion coefficients of X_2, size of family, indicate that the per capita expenditures for meals eaten away from home were also associated with per capita income, they had less effect than those based on per family basis.

The equations based on per capita data also show that size of family, X_2, education of homemakers, X_4, and employment of homemakers, X_5, all changed the negative sign to positive (except X_3, in equation (2.55) and X_5, in equation (2.52). All three variables became more important in each regression equation and significant at a higher level than before. These differences indicate that size of family, education of homemakers and employment of homemakers were more significantly correlated with per capita expenditures for meals eaten away from home than with per family expenditures for meals eaten away from home.

Based on per family income and per family expenditures for meals eaten away from home, the regression coefficient of X_2, size of family, was only significant in equation (1.52) at a 50 percent level, and the rest were all non-significant. When the income and expenditures for meals eaten away from home were based on per capita data, the coefficients of X_2 became significant at the 5 per cent

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$\frac{\Delta b}{\Delta \sigma} = 1$ the regression coefficient would be significant as before.

$\frac{\Delta b}{\Delta \sigma} < 1$ the regression coefficient would be less significant than before.

level in equation (2.53_a), 50 percent level in equation (2.53_a), (2.54_a), (2.54_b), and (2.55). A slight decrease in equation (2.52) changed it from 50 percent level to non-significant. These results emphasize the different relationships of size of family to per family expenditures for meals eaten away from home and per capita expenditures for meals eaten away from home. Since the per capita expenditures for meals eaten away from home were obtained by dividing per family expenditures for meals eaten away from home by the size of family, the percent change in income from per family to per capita were directly determined by the size of family. Since per capita income was also computed by dividing the family income by the size of family, it can be explained that the decreasing effect of income was caused by the size of family. In other words, the size of family became more significant in the equations based on per capita data which indicated that the size of family was more closely related to the per capita expenditures for meals eaten away from home than when based on per family expenditures. It is not only effected by the small expenditures for meals eaten away from home which were associated with the size of family as based on per family data, but also affected by the relationships between size of family, expenditures for meals eaten away from home, and income.

In summary, the results of the above equations show that the size of family, education of homemakers and employ-

ment of homemakers which affected per capita expenditures for meals eaten away from home were associated with the effect of per capita income and age of homemakers. The increase in regression coefficients of size of family, education of homemakers and employment of homemakers must be relatively associated with the decrease in regression coefficients of per capita income and age of homemakers. The relative decrease in coefficients of income and age of homemakers in each equation indicate that the per capita income and age of homemakers were less effective for per capita expenditures for meals eaten away from home than those based on per family income and per family expenditures.

Finally, a measure was computed that permitted us to state the proportion of total variation which had been explained by variation in computed values of the dependent variables. The coefficient of multiple determination, $R^2_{y.x_{12345}}$, states the proportion of total variation that is present in variations of the $Y_{c.x_{12345}}$ values and which has been explained by reference to independent variables. The R^2 of the multiple regression equations, which were based on per family income and per family expenditures for meals eaten away from home, was .275 on the average. This means that all these independent variables can only explain 27.5 percent of the total variations. The other 72.5 percent of the variations has been failed to be explained. The unexplained variations must be caused by something else.

If we were able to include all pertinent independent variables, $R^2_{y.x_{12345....n}}$ would be 1.0, and we could make perfect estimates of dependent variable Y.

The coefficient of multiple determination, R^2, of the equations, which were based on per capita income and per capita expenditures for meals eaten away from home, was .25 on the average. This means that, when income and expenditures were based on per capita basis, all these independent variables can only explain 25 percent of the variation. Seventy five percent of variation was affected by some other factors. The difference between the coefficients of multiple determination was evidently caused by the changes of income. Due to the fact that income was the only important consistant factor effecting the estimated value, when income and expenditures changed from per family to per capita, the regression coefficient of income became smaller. This indicates that the per capita expenditures for meals eaten away from home is affected less by per capita income than per family expenditures for meals eaten away from home is affected by the per family income. As a result of decreasing effect of income on expenditures for meals eaten away from home, the proportion of total variation which has been explained by reference to the independent variables was 2.5 percent higher on the average when based on a per family basis rather than a per capita basis.

CHAPTER VII

SUMMARY AND CONCLUSION

This study was an attempt to determine some relationships between meals eaten away from home and family characteristics. Previous food consumption studies were generally concerned with meals eaten at home or all food. The meals eaten away from home were usually not separated. During the time of writing this manuscript a preliminary report on household food consumption made in April-June 1955 by the Agricultural Research Service and Agricultural Marketing Service of the Department of Agriculture was released. Although this was limited to a 3-month period it provided some information in comparing it with the panel families since it included some data on expenditures for meals eaten away from home.

The data for this study were obtained from the Michigan State University consumer panel. Weekly expenditures for meals eaten away from home were used in order to be consistant with weekly income data. The yearly expenditures for meals eaten away from home used in this study was weekly average times 52. (The yearly expenditures were only used in computation of arc elasticities.)

A personal interview was conducted with each homemaker to make a comparison of stated yearly income with the sum of the weekly incomes reported in the diaries. When the two figures were comparable, this family was accepted as one observation.

Several comparisons were made, such as National Disposable Personal Income to M. S. U. panel families; food expenditures of the United States as a whole and food expenditures of M. S. U. panel families; changes of expenditures for meals (including all meals eaten at home and away from home) between years.

Using current prices, per capita disposable income of M. S. U. consumer panel selected families moved almost parallel to National Disposable Personal Income. However, the panel family income has fluctuated more than the panel per capita income over the studied 5-year period.

The comparison of the expenditures for food between the 103 M. S. U. consumer panel families and all United States families for the year 1955 shows that United States food expenditures, including between-meal snacks, soft drinks and alcoholic beverages, were higher than M. S. U. panel families, when it might be expected that M. S. U. panel families expenditures should be higher due to higher income. This seems to indicate that the expenditures for between-meal snacks, soft drinks, and alcoholic beverages, and other food not part of regular meals and not included

in the panel, probably occupy a major place in the food expenditures. Other elements effecting this difference would be: (1) Lansing is a small city and the percentage of meals eaten away from home may be lower than those in large cities; (2) the data were collected in different manners.

The expenditures for meals eaten at home and meals eaten away from home by the M. S. U. consumer panel members moved in the same direction with income in each year. As families obtained a higher income they spent more on both meals eaten at home and meals eaten away from home. However, the proportion of income spent on meals eaten at home decreased as the income increased, but the proportion of income spent on meals away from home did not decrease as the income increased. This indicates that families would increase their expenditures for meals eaten away from home more than expenditures for meals eaten at home when their income increases. Higher income families not only ate more meals away from home but they also spent more on each meal, than those lower income families.

The three methods used for measurement of income elasticities were arc, cross-sectional and time series. Due to the fact that only five years data were available in the M. S. U. consumer panel, the use of each year as one observation would not yield a significant result in time series study. Therefore, a 4-week average of the 13-week moving

average of income and expenditures for meals eaten away from home over a 5-year period was used in the time series study. The arc and cross-sectional elasticity studies were fitted to yearly data with the exception of the weekly expenditure data used in cross-sectional studies.

The arc elasticity method was also used in computing for all meals and meals eaten at home in order to compare with the income elasticities of meals eaten away from home. Comparing these results of income elasticities, it was shown that the income elasticities for meals eaten away from home were greater than those for all meals and meals eaten at home both on a per family basis as well as on a per capita basis.

The results of income elasticities from cross-sectional data were directly derived from the multiple regression equations. Since all the variables were expressed in logarithms, the income elasticity for meals eaten away from home was the regression coefficient for income in the prediction equation.

These results indicated that the elasticities derived from the per capita basis are smaller than those derived from the per family basis. Thus it appears that the amount of expenditures for meals eaten away from home varies inversely with the size of family. Due to the fact that the arc elasticity is the rate of change in expenditures with the corresponding rate of change in income from one year to the next, and cross-sectional elasticity is an estimate of

the variation in expenditures associated with a variation in income at a given time, the results derived from these two methods seems to be difficult to compare with each other. The income-expenditure elasticity from the cross-sectional analysis over the time period averaged 1.74 on a per family basis and 1.41 on a per capita basis. The income-expenditure elasticity from arc method over the 5-year period averaged .80 on a per family basis and 2.26 on a per capita basis.

Using the 4-week average of the 13-week moving average data for a time series income elasticity study, the result obtained was .80. Which indicated that the time series study yielded a lower income elasticity for meals eaten away from home than the cross-sectional study.

To give assurance of the relationship between income and expenditures for meals eaten away from home, a simple correlation was computed in terms of a 4-week average of the 13-week moving average over a 5-year period both for income and expenditures. A simple regression equation was fitted as follows:

Average expenditures for meals eaten away from home per capita per week = f (average income per capita per week). A significant correlation coefficient of .68 was obtained, with a t value of 9.53 significant at the 1 per cent level.

To reconcile income elasticities derived from time

series with those derived from cross-sectional studies appears to be quite difficult.

Per capita expenditures for meals eaten away from home and the number of meals eaten away from home by income groups were used in studying the seasonal variation. A 5-year average of numbers of, and expenditures for, meals eaten away from home was used in deriving a single seasonal trend. The seasonal trend of meals eaten away from home, both number and expenditures, in each income group appeared to be the same. They reached a peak during the period of midsummer of each year, and fell to a seasonal low in the winter. When the five years were averaged for a single seasonal trend it showed the same relationship as by income groups, with a seasonal high between the middle of July and August, falling to a seasonal low from early in December and lasting through the end of March.

In order to determine the inter-relationships between the family characteristics and between family characteristics and expenditures for meals eaten away from home, a series of simple correlation coefficients were computed for each of these on both a per family and a per capita basis. The correlations were simple correlations of the logarithms of the original data.

The results of these simple correlation analyses indicated that income was consistently the most important factor related to the expenditures for meals eaten away from

home. It was positively correlated to expenditures for meals eaten away from home in each year based on a per family basis as well as on a per capita basis. The t values of the correlation coefficients for income were significant at the 1 percent level in each year over the 4-year period on both a per family basis and a per capita basis.

Per family income was also correlated to the age of homemakers, education of homemakers and size of family. However, it was positively correlated to the education of homemakers and size of family and negatively correlated to the age of homemakers.

Age of homemakers was negatively correlated with education of homemakers and size of family; and education of homemakers was positively related to size of family.

These results indicate that the older homemakers had a lower income, lower education and a smaller size of family. The higher educated homemakers had a higher income, larger size of family and were younger. The employment of homemakers does not appear to be correlated with other family characteristics. This may be due to the fact that only an average of 13.4 per cent of the homemakers in the panel were employed, which might not yield a significant result.

Education of homemakers seemed to be positively related to per family and per capita expenditures for meals eaten away from home, but was not significantly correlated in each year. Size of family seemed to be positively

correlated to per family expenditures for meals eaten away from home and negatively correlated to per capita expenditures for meals eaten away from home. Employment of homemakers did not show a significant relationship with per family expenditures for meals eaten away from home, but had a small positive relationship with per capita expenditures for meals eaten away from home.

When per capita income is positively correlated to age of homemakers and negatively correlated to size of family, this evidently shows that though the older homemakers had a lower income, they were in smaller sized families, and therefore they still had a higher per capita income. Large families had higher incomes; however, when income was divided by the size of family, large families had a lower per capita income. Although per family income was correlated with education of homemaker, there was no relationship with education of homemaker when incomes were divided by the size of family.

Multiple regression analysis was used to determine the net effects of family characteristics on expenditures for meals eaten away from home.

Due to the large number of observations in each series of data and the number of variables in each equation, we could not assume a linear relationship between the independent variables and dependent variables. After experimenting with inter-relationships to test for linearity in

arithmetic form, it was decided that the functions were best expressed completely in logarithms.

The equations were then fitted using estimating equation of the type:

$$\log Y = a + b_1 \log X_1 + b_2 \log X_2 + b_3 \log X_3 + b_4 \log X_4 + b_5 \log X_5$$

Where Y was expenditures for meals eaten away from home and the X_1, X_2, X_3, X_4, X_5 were income, size of family, age of homemakers, education of homemakers and employment of homemakers, respectively.

The result of the multiple regression analyses indicated that income was consistently the most important factor affecting expenditures for meals eaten away from home. The effects of per family income and per capita income were consistently highly correlated in each year. The results were therefore the same as obtained in simple correlation analysis. However, in all cases per capita income had less effect on per capita expenditures for meals eaten away from home than per family income on per family expenditures for meals eaten away from home.

The result of regression coefficients for size of family showed no effect on per family expenditures for meals eaten away from home. But they had some positive effect on the per capita expenditures for meals eaten away from home. The regression equations indicated that age of homemakers had a slight effect on expenditures for meals eaten

away from home on both a per family and a per capita basis. Education of homemakers and employment of homemakers had little effect on expenditures for meals eaten away from home. However, they were related to per capita expenditures for meals eaten away from home more than they were related to per family expenditures for meals eaten away from home.

It was generally found that the size of family, education of homemakers and employment of homemakers had more effect on per capita expenditures for meals eaten away from home than effect on per family expenditures for meals eaten away from home. However, per capita expenditures for meals eaten away from home were affected by per capita income and age of homemakers less than per family expenditures for meals eaten away from home were affected by per family income and age of homemakers.

The result of the multiple regression study indicated that income was an important factor effecting expenditures for meals eaten away from home. To a lesser extent the expenditures for meals eaten away from home were also affected by size of family, age of homemakers, education of homemakers and employment of homemakers.

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APPENDICES

APPENDIX I

AVERAGE WEEKLY EXPENDITURES FOR MEALS EATEN AWAY FROM HOME PER CAPITA AND AVERAGE WEEKLY INCOME PER CAPITA AND THEIR 13-WEEK MOVING AVERAGE FOR TOTAL SAMPLE 13th WEEK OF 1951 TO 52th WEEK OF 1955

Wk.	Ave. Expend. for Meals Eaten Away From Home Per Capita	13 Week Moving Ave.	Ave. of Col. 3 by 4 Week Groups*	Ave. Income Per Capita	13 Week Moving Ave.	Ave. of Col. 6 by 4 Week Groups*
A. Year-1951						
113	.4239			29.29		
114	.5998			27.57		
115	.7176			20.16		
116	.7121			23.45		
117	.9750			17.66		
118	.8398			32.89		
119	.7551			18.20		
120	.8452			28.05		
121	.8288			19.51		
122	.6663			28.86		
123	.7696			21.47		
124	.8163			28.37		
125	.9874	.76361		20.64	24.32	
126	.7916	.79189		29.89	24.36	
127	.8784	.81332		23.18	24.02	
128	.8854	.82623	.79076	22.66	24.22	24.23
129	.7738	.83098		22.66	24.16	
130	.6610	.82682		22.77	24.55	
131	.8346	.80719		21.90	23.70	
132	.7014	.80306	.81201	26.84	24.37	24.19
133	.8024	.79977		21.46	23.86	
134	.8620	.80232		24.77	24.27	
135	.8545	.81681		20.48	23.62	
136	.7460	.81498	.80847	25.71	23.95	23.72
137	.7487	.80978		22.96	23.53	
138	.6938	.78720		25.05	23.87	
139	.7080	.78077		24.37	23.45	
140	.8218	.77642	.78854	24.26	23.53	23.59
141	.7812	.76840		25.85	23.78	
142	.8201	.77196		19.49	23.53	
143	.7179	.77634		28.46	23.97	

APPENDIX I-Continued

Wk.	Ave. Expend. for Meals Eaten Away From Home Per Capita	13 Week Moving Ave.	Ave. of Col. 3 by 4 Week Groups*	Ave. Income Per Capita	13 Week Moving Ave.	Ave. of Col. 6 by 4 Week Groups*
A. Year-1951 (continued)						
144	.7193	.76747	.77104	17.64	23.64	23.73
145	.5831	.75837		31.40	23.99	
146	.7321	.75296		20.81	23.94	
147	.7519	.74449		24.53	23.92	
148	.6699	.73029	.74653	18.79	23.79	23.91
149	.7323	.72931		25.52	23.78	
150	.8318	.73563		25.65	23.99	
151	.6532	.73251		22.73	23.81	
152	.4909	.71581	.72832	20.93	23.54	23.78
B. Year-1952						
201	.5712	.69653		30.08	23.99	
202	.6148	.68373		20.12	23.55	
203	.6125	.66776		24.99	23.97	
204	.6290	.66092	.67724	21.88	23.46	23.74
205	.8014	.66724		29.44	24.37	
206	.7023	.67641		24.57	23.85	
207	.6418	.66946		24.95	24.17	
208	.6883	.66456	.66942	22.19	23.98	24.09
209	.5955	.65885		30.28	24.87	
210	.6238	.65050		24.34	24.78	
211	.6890	.63958		23.91	24.65	
212	.6554	.63975	.64717	24.11	24.75	24.76
213	.5978	.64798		18.95	24.60	
214	.5700	.64788		32.67	24.80	
215	.6707	.65218		19.36	24.74	
216	.6944	.65848	.65163	28.46	25.01	24.79
217	.8216	.67330		20.06	24.87	
218	.8849	.67972		33.65	25.19	
219	.6941	.67909		19.38	24.79	
220	.7633	.68844	.68014	28.76	25.09	24.99
221	.8689	.70233		19.13	24.85	
222	.7382	.71331		31.33	24.93	
223	.7569	.72355		24.01	24.91	

APPENDIX I-Continued

Wk.	Ave. Expend. for Meals Eaten Away From Home Per Capita	13 Week Moving Ave.	Ave. of Col. 3 by 4 Week Groups*	Ave. Income Per Capita	13 Week Moving Ave.	Ave. of Col. 6 by 4 Week Groups*
B. Year-1952 (continued)						
224	.7314	.72674	.71648	24.89	24.98	24.92
225	.6512	.72642		21.84	24.81	
226	.6683	.73184		24.51	25.23	
227	.7116	.74273		31.67	25.16	
228	.7608	.74966	.73766	20.57	25.25	25.11
229	.8266	.75983		25.44	25.02	
230	.8232	.75995		22.31	25.19	
231	.8359	.75618		27.71	24.73	
232	.8276	.76645	.76060	21.27	24.88	24.95
233	.9228	.77872		23.31	24.46	
234	.8926	.78055		21.77	24.66	
235	.8547	.78951		27.09	24.34	
236	.7916	.79218	.78524	30.64	24.85	24.58
237	.7386	.79273		18.91	24.39	
238	.8069	.80471		30.32	25.04	
239	.7794	.81325		19.78	24.68	
240	.8035	.82032	.80775	34.43	24.89	24.75
241	.7929	.82279		19.74	24.82	
242	.9460	.83198		30.47	25.21	
243	.7586	.82701		21.71	25.17	
244	.8292	.82649	.82707	33.88	25.64	25.21
245	.7383	.81962		24.99	25.93	
246	.8134	.81121		30.22	26.46	
247	.8344	.80673		22.72	26.53	
248	.7337	.79742	.80875	28.90	26.67	26.40
249	.7607	.79505		29.18	26.56	
250	.7419	.79530		27.46	27.22	
251	.7956	.79443		29.03	27.12	
252	.5167	.77422	.78975	28.99	27.82	27.18
C. Year-1953						
301	.6234	.76037		31.98	27.64	
302	.7157	.75443		25.02	28.04	
303	.7512	.73945		28.11	27.86	

APPENDIX I-Continued

Wk.	Ave. Expend. for Meals Eaten Away From Home Per Capita	13 Week Moving Ave.	Ave. of Col. 3 by 4 Week Groups*	Ave. Income Per Capita	13 Week Moving Ave.	Ave. of Col. 6 by 4 Week Groups*
C. Year-1953 (continued)						
304	.7280	.73709	.74784	23.20	27.98	27.88
305	.9492	.75250		29.44	27.63	
306	.8187	.75251		27.86	27.85	
307	.7300	.74609		21.02	27.15	
308	.7293	.73801	.74728	28.05	27.56	27.55
309	.7650	.74041		27.27	27.43	
310	.9000	.75113		31.52	27.61	
311	.9028	.76351		24.74	27.40	
312	.7851	.76270	.75444	29.01	27.40	27.46
313	.7532	.78089		21.27	26.81	
314	.8167	.79576		34.80	27.02	
315	.9666	.81506		21.13	26.72	
316	.8279	.82096	.80317	31.89	27.02	26.89
317	.8622	.83128		21.08	26.85	
318	.8401	.82289		36.58	27.40	
319	.7419	.81698		22.62	27.00	
320	.8091	.82307	.82356	32.45	27.88	27.28
321	.9564	.84054		22.08	27.42	
322	.9074	.85149		31.43	27.74	
323	.9971	.85896		29.89	27.61	
324	.9042	.85907	.85252	26.89	27.78	27.64
325	1.1285	.88548		30.47	27.89	
326	.8650	.89415		25.96	28.25	
327	1.1118	.91685		34.71	28.24	
328	1.0376	.92231	.90470	26.49	28.66	28.26
329	.8314	.92258		32.99	28.74	
330	1.1038	.94116		26.42	29.15	
331	1.2129	.96984		35.11	29.04	
332	1.4690	1.02577	.96483	28.65	29.50	29.11
333	1.1709	1.05360		28.89	29.23	
334	1.0480	1.06065		25.19	29.47	
335	.9497	1.06390		22.64	28.79	
336	1.0077	1.06472	1.06071	36.57	29.31	29.20
337	.9796	1.07054		20.40	28.81	
338	.8390	1.04825		32.93	29.00	
339	.8350	1.04588		22.03	28.69	
340	.7836	1.02063	1.04632	35.48	28.75	28.81

APPENDIX I-Continued

Wk.	Ave. Expend. for Meals Eaten Away From Home Per Capita	13 Week Moving Ave.	Ave. of Col. 3 by 4 Week Groups*	Ave. Income Per Capita	13 Week Moving Ave.	Ave. of Col. 6 by 4 Week Groups*
C. Year-1953 (continued)						
341	.7555	.99893		24.73	28.62	
342	.8785	1.00255		31.49	28.50	
343	.8011	.97927		23.05	28.24	
344	.8778	.95349	.98356	32.18	28.02	28.34
345	.9470	.91103		28.93	28.04	
346	.8041	.88512		31.59	28.25	
347	.8824	.87238		25.51	28.27	
348	.7208	.85478	.88083	26.39	28.56	28.28
349	.8146	.83992		33.29	28.31	
350	.8001	.82616		27.39	28.84	
351	.8416	.82632		33.38	28.88	
352	.6911	.81525	.82691	26.62	29.23	28.82
D. Year-1954						
401	.6024	.80131		32.48	29.00	
402	.7556	.80132		25.10	29.03	
403	.8637	.80479		27.60	28.73	
404	.8914	.80712	.80364	22.92	28.72	28.87
405	.7502	.79731		29.18	28.49	
406	.7977	.78582		27.58	28.39	
407	.7837	.78425		20.77	27.55	
408	.8252	.77985	.78681	27.88	27.74	28.04
409	.8312	.78835		27.19	27.80	
410	.8154	.78841		31.33	27.65	
411	.8306	.79075		24.67	27.44	
412	.7914	.78689	.78860	28.58	27.07	27.49
413	.7727	.79317		20.95	26.63	
414	.7233	.80247		34.49	26.79	
415	.7808	.80441		20.69	26.45	
416	.9398	.81026	.80258	31.59	26.76	26.66
417	.8659	.80830		20.63	26.58	
418	.7737	.81011		35.71	27.08	
419	.6967	.80233		22.28	26.67	
420	.8873	.81031	.80776	32.07	27.54	26.97

APPENDIX I-Continued

Wk.	Ave. Expend. for Meals Eaten Away From Home Per Capita	13 Week Moving Ave.	Ave. of Col. 3 by 4 Week Groups*	Ave. Income Per Capita	13 Week Moving Ave.	Ave. of Col. 6 by 4 Week Groups*
D. Year-1954 (continued)						
421	.8529	.81244		21.94	27.09	
422	.7712	.80782		31.24	27.40	
423	.7760	.80479		29.62	27.27	
424	.9781	.81614	.81030	26.56	27.41	27.29
425	.9107	.82531		30.01	27.52	
426	.8411	.83059		25.48	27.87	
427	.7723	.83435		34.82	27.90	
428	.7877	.83488	.83128	26.82	28.37	27.91
429	.8988	.83172		33.62	28.52	
430	.5886	.81039		26.67	28.99	
431	.8421	.81565		35.66	28.98	
432	1.0604	.84363	.82535	29.20	20.52	29.00
433	1.0607	.85697		29.35	29.31	
434	1.0271	.87036		25.66	29.59	
435	1.0537	.89210		23.07	28.96	
436	.8440	.89733	.87919	37.38	29.56	29.36
437	.7795	.88205		20.53	29.10	
438	.7450	.86930		32.83	29.31	
439	.8251	.86807		22.03	29.05	
440	.7721	.86806	.87187	35.37	29.09	29.14
441	.8566	.87336		24.73	28.93	
442	.8448	.86920		31.01	28.73	
443	.9189	.89460		23.19	28.46	
444	.8029	.89158	.88219	32.38	28.21	28.58
445	.9394	.88228		28.93	28.19	
446	.8933	.86940		31.88	28.38	
447	.8684	.85719		25.83	28.40	
448	.6668	.82743	.85908	26.81	28.68	28.41
449	.7580	.82082		34.14	28.44	
450	.7855	.82128		28.18	29.02	
451	.7750	.82358		34.45	29.15	
452	.6656	.81132	.81925	27.56	29.57	29.04

APPENDIX I-Continued

Wk.	Ave. Expend. for Meals Eaten Away From Home Per Capita	13 Week Moving Ave.	Ave. of Col. 3 by 4 Week Groups*	Ave. Income Per Capita	13 Week Moving Ave.	Ave. of Col. 6 by 4 Week Groups*
E. Year-1955						
501	.7067	.80628		31.84	29.30	
502	.7005	.79428		28.78	29.61	
503	.6098	.77620		27.38	29.33	
504	.6219	.75337	.78253	24.52	29.44	29.42
505	.6937	.74497		40.85	30.09	
506	.7865	.73321		22.18	29.57	
507	.9862	.74035		35.72	29.86	
508	.8686	.74037	.73973	22.76	29.63	29.79
509	.8794	.75672		42.54	30.84	
510	.8495	.76376		23.06	29.99	
511	.9070	.77311		39.37	30.85	
512	.7989	.77495	.76714	25.60	30.17	30.46
513	.9344	.79562		40.26	31.14	
514	.8369	.80564		25.99	30.69	
515	.8892	.82015		36.44	31.28	
516	.9054	.84289	.81608	22.64	30.92	31.01
517	.9229	.86605		36.20	31.82	
518	.8838	.88067		29.71	30.96	
519	.9017	.88953		33.73	31.85	
520	.9082	.88353	.87995	26.70	31.15	31.45
521	.8720	.88379		28.85	31.62	
522	.7957	.87735		38.17	31.29	
523	.9275	.88335		28.06	31.67	
524	.9159	.88404	.88213	32.37	31.13	31.43
525	1.0339	.90212		27.62	31.29	
526	1.0359	.90992		37.65	31.09	
527	1.0028	.92268		30.43	31.43	
528	.8010	.91590	.91266	30.50	30.97	31.20
529	1.1220	.93256		31.52	31.65	
530	1.1228	.94794		33.25	31.43	
531	1.1819	.97087		36.56	31.95	
532	1.0656	.98348	.95871	25.99	31.36	31.60
533	1.0071	.99108		35.95	32.07	
534	.9565	.99758		24.48	31.73	
535	.8870	1.00460		39.93	31.87	
536	.9034	1.00275	.99900	29.45	31.98	31.91
537	.8923	1.00938		35.15	32.19	

APPENDIX I-Continued

Wk.	Ave. Expend. for Meals Eaten Away From Home Per Capita	13 Week Moving Ave.	Ave. of Col. 3 by 4 Week Groups*	Ave. Income Per Capita	13 Week Moving Ave.	Ave. of Col. 6 by 4 Week Groups*
E. Year-1955 (continued)						
538	.8738	.98862		24.92	31.98	
539	.9823	.98450		37.71	31.99	
540	.9210	.97821	.99018	30.69	32.01	32.04
541	.9335	.98840		34.98	32.35	
542	.8984	.97120		24.08	31.78	
543	.9058	.95451		35.13	31.92	
544	.9346	.93548	.96240	37.03	31.96	32.00
545	.9086	.92341		30.50	32.31	
546	1.0152	.92403		31.06	31.93	
547	.9723	.92525		31.06	32.44	
548	.9112	.92711	.92495	36.52	32.18	
549	.9141	.92793		34.84	32.59	
550	.9378	.93143		34.32	32.53	
551	.7815	.92433		36.89	33.45	
552	.8403	.91340	.92428	28.70	32.75	32.83

* For the purpose of platting on a graph, four weeks of the 13-week moving average were combined then averaged as one observation.

APPENDIX II

AVERAGE NUMBER OF MEALS AND EXPENDITURES FOR MEALS FOR TOTAL SAMPLE AND 9th WEEK OF 1951

Year	4-Week Periods	Week	Income Group	Ave. Per Capita No. of Meals Eaten Away From Home	Ave. Per Capita Expend. for Meals Eaten Away From Home (dollar)	Income Group
1951	103	9-12	1	1.5102	.8324	2
	104	13-16	1	1.4501	.9160	2
	105	17-20	1	1.6191	1.0530	2
	106	21-24	1	1.6401	1.1620	2
	107	25-28	1	1.9894	1.2336	2
	108	29-32	1	1.7556	1.1328	2
	109	33-36	1	1.7206	1.2345	2
	110	37-40	1	1.4637	1.0939	2
	111	41-44	1	1.7234	1.2689	2
	112	45-48	1	1.7678	1.2897	2
	113	49-52	1	1.9106	1.3552	2
1952	201	1-4	1	1.7502	1.3170	2
	202	5-8	1	1.9235	1.6591	2
	203	9-12	1	1.8032	1.4231	2
	204	13-16	1	2.0981	1.4111	2
	205	17-20	1	2.4926	2.0430	2
	206	21-24	1	2.3506	1.7891	2
	207	25-28	1	2.6067	1.4478	2
	208	29-32	1	2.4981	1.8313	2
	209	33-36	1	2.4332	1.7931	2
	210	37-40	1	2.1866	1.6742	2
	211	41-44	1	2.0943	1.7815	2
	212	45-48	1	1.9525	1.4220	2
	213	49-52	1	2.1090	1.3395	2
1953	301	1-4	1	1.7317	1.3348	2
	302	5-8	1	1.9740	1.5103	2
	303	9-12	1	2.0540	1.6991	2
	304	13-16	1	2.0435	1.6152	2
	305	17-20	1	1.8317	1.3828	2
	306	21-24	1	2.2878	1.8080	2
	307	25-28	1	2.5702	1.9846	2

APPENDIX II

EATEN AWAY FROM HOME PER CAPITA BY 4-WEEK PERIODS
BY INCOME GROUPS
TO 52th WEEK OF 1955

Ave. Per Capita No. of Meals Eaten Away From Home	Ave. Per Capita Expend. for Meals Eaten Away From Home (dollar)	Income Group	Ave. Per Capita No. of Meals Eaten Away From Home	Average Per Capita Expend. for Meals Eaten Away From Home (dollar)
1.1692	.5336	3	.6663	.2298
.9030	.5232	3	1.1866	.4263
1.3351	.7640	3	1.4144	.7604
1.0720	.5052	3	2.2090	.6268
1.4169	.7620	3	1.5486	.5918
1.3261	.5972	3	2.0127	.4501
1.4908	.7357	3	1.6473	.4658
.9332	.6834	3	1.0730	.4686
1.0963	.5909	3	1.0351	.4552
1.0313	.4411	3	1.2440	.4948
1.1949	.5891	3	1.2721	.3250
1.1493	.6322	3	.9616	.2409
1.1492	.6583	3	.7365	.2830
1.1811	.6414	3	.7331	.2581
1.2933	.7026	3	.7237	.2403
1.5909	.5431	3	.8127	.2458
1.5541	.8493	3	.9116	.2964
2.1961	.8760	3	1.3802	.2794
2.1276	.9556	3	1.1949	.3250
2.2671	1.1996	3	1.1881	.2318
1.3536	.7909	3	.8534	.3146
1.6328	.8897	3	.9501	.3093
1.9409	.9218	3	1.0559	.3453
1.5551	.7726	3	.9708	.3396
1.3814	.7009	3	.9543	.2691
1.3108	.7367	3	1.0760	.3883
1.3097	.7169	3	.8077	.3570
1.5213	.8243	3	.8215	.3085
1.7027	.8576	3	.9017	.3581
1.7884	.8894	3	.9454	.3505
2.0396	.9440	3	1.3118	.4429

APPENDIX II

AVERAGE NUMBER OF MEALS AND EXPENDITURES FOR MEALS FOR TOTAL SAMPLE AND 9th WEEK OF 1951

Year	4-Week Periods	Week	Income Group	Ave. Per Capita No. of Meals Eaten Away From Home	Ave. Per Capita Expend. for Meals Eaten Away From Home (dollar)	Income Group
1951	103	9-12	1	1.5102	.8324	2
	104	13-16	1	1.4501	.9160	2
	105	17-20	1	1.6191	1.0530	2
	106	21-24	1	1.6421	1.1620	2
	107	25-28	1	1.9894	1.2336	2
	108	29-32	1	1.7556	1.1328	2
	109	33-36	1	1.7206	1.2345	2
	110	37-40	1	1.4637	1.0939	2
	111	41-44	1	1.7234	1.2689	2
	112	45-48	1	1.7678	1.2897	2
	113	49-52	1	1.9106	1.3552	2
1952	201	1-4	1	1.7502	1.3170	2
	202	5-8	1	1.9235	1.6591	2
	203	9-12	1	1.8032	1.4231	2
	204	13-16	1	2.0981	1.4111	2
	205	17-20	1	2.4926	2.0430	2
	206	21-24	1	2.3506	1.7891	2
	207	25-28	1	2.6067	1.4478	2
	208	29-32	1	2.4981	1.8313	2
	209	33-36	1	2.4332	1.7931	2
	210	37-40	1	2.1866	1.6742	2
	211	41-44	1	2.0943	1.7815	2
	212	45-48	1	1.9525	1.4220	2
	213	49-52	1	2.1090	1.3395	2
1953	301	1-4	1	1.7317	1.3348	2
	302	5-8	1	1.9740	1.5103	2
	303	9-12	1	2.0540	1.6991	2
	304	13-16	1	2.0435	1.6152	2
	305	17-20	1	1.8317	1.3828	2
	306	21-24	1	2.2878	1.8080	2
	307	25-28	1	2.5702	1.9846	2

APPENDIX II

EATEN AWAY FROM HOME PER CAPITA BY 4-WEEK PERIODS
BY INCOME GROUPS
TO 52th WEEK OF 1955

Ave. Per Capita No. of Meals Eaten Away From Home	Ave. Per Capita Expend. for Meals Eaten Away From Home (dollar)	Income Group	Ave. Per Capita No. of Meals Eaten Away From Home	Average Per Capita Expend. for Meals Eaten Away From Home (dollar)
1.1692	.5336	3	.6663	.2298
.9030	.5232	3	1.1866	.4263
1.3351	.7640	3	1.4144	.7604
1.0720	.5052	3	2.2090	.6268
1.4169	.7620	3	1.5486	.5918
1.3261	.5972	3	2.0127	.4501
1.4908	.7357	3	1.6473	.4658
.9332	.6834	3	1.0730	.4686
1.0963	.5909	3	1.0351	.4552
1.0313	.4411	3	1.2440	.4248
1.1949	.5891	3	1.2721	.3250
1.1493	.6392	3	.9616	.2409
1.1492	.6583	3	.7365	.2830
1.1811	.6414	3	.7331	.2581
1.2933	.7026	3	.7237	.2403
1.5909	.5431	3	.8127	.2458
1.5541	.8493	3	.9116	.2964
2.1961	.8760	3	1.3802	.2794
2.1276	.9556	3	1.1949	.3250
2.2671	1.1996	3	1.1881	.2318
1.3536	.7909	3	.8534	.3146
1.6328	.8897	3	.9501	.3293
1.9409	.9218	3	1.0559	.3453
1.5551	.7726	3	.9708	.3396
1.3814	.7009	3	.9543	.2691
1.3108	.7367	3	1.0760	.3883
1.3097	.7169	3	.8077	.3570
1.5213	.8243	3	.8215	.3085
1.7027	.8576	3	.9017	.3581
1.7884	.8894	3	.9454	.3505
2.0396	.9440	3	1.3118	.4429

APPENDIX II-Continued

Year	4-Week Periods	Week	Income Group	Ave. Per Capita No. of Meals Eaten Away From Home	Ave. Per Capita Expend. for Meals Eaten Away From Home (dollar)	Income Group
	308	29-32	1	2.6134	1.8744	2
	309	33-36	1	2.5496	1.6715	2
	310	37-40	1	2.0162	1.4042	2
	311	41-44	1	2.1345	1.4485	2
	312	45-48	1	1.9717	1.3850	2
	313	49-52	1	2.0589	1.3937	2
1954	401	1-4	1	2.0344	1.2919	2
	402	5-8	1	1.9110	1.3792	2
	403	9-12	1	1.7232	1.3805	2
	404	13-16	1	1.8281	1.4098	2
	405	17-20	1	2.0891	1.5427	2
	406	21-24	1	2.2576	1.7214	2
	407	25-28	1	2.7215	1.6502	2
	408	29-32	1	2.5097	1.7102	2
	409	33-36	1	3.2631	2.0306	2
	410	37-40	1	2.2749	1.5639	2
	411	41-44	1	2.6530	1.9667	2
	412	45-48	1	2.3815	1.6953	2
	413	49-52	1	2.4016	1.4976	2
1955	501	1-4	1	2.7277	1.4760	2
	502	5-8	1	2.4879	1.9770	2
	503	9-12	1	2.4589	1.9951	2
	504	13-16	1	2.5427	1.9361	2
	505	17-20	1	2.5890	1.8872	2
	506	21-24	1	2.7542	1.7919	2
	507	25-28	1	2.9943	1.8824	2
	508	29-32	1	2.9104	2.1875	2
	509	33-36	1	2.7379	2.0920	2
	510	37-40	1	2.5788	1.7644	2
	511	41-44	1	2.9827	1.8071	2
	512	45-48	1	2.5912	1.7209	2
	513	49-52	1	2.8854	1.7734	2

APPENDIX II-Continued

Ave. Per Capita No. of Meals Eaten Away From Home	Ave. Per Capita Expend. for Meals Eaten Away From Home (dollar)	Income Group	Ave. Per Capita No. of Meals Eaten Away From Home	Average Per Capita Expend. for Meals Eaten Away From Home (dollar)
2.2200	1.0548	3	2.0139	.7298
1.9659	1.0093	3	1.8696	.5837
1.7480	.8153	3	.9330	.4958
1.4478	.7585	3	.9853	.4448
1.5829	.8395	3	1.4004	.4424
1.5813	.8251	3	.9745	.3332
1.5634	.8969	3	1.1278	.4000
1.5576	.8640	3	1.0404	.4067
1.5550	.9248	3	1.1818	.4440
1.6684	1.0089	3	1.0718	.3489
1.5664	.9490	3	1.0553	.3411
1.5633	.8607	3	1.2384	.3946
1.6389	.8686	3	1.7606	.3955
2.0265	.7112	3	2.0315	.5159
2.6610	1.1582	3	1.6058	.3603
1.4561	.8532	3	.9613	.3544
1.4978	.8496	3	1.1552	.3394
1.6821	.8256	3	1.3689	.4338
1.4836	.8076	3	.9546	.3104
1.4259	.5482	2	.9987	.2875
1.5540	.6951	3	.9662	.3354
1.6397	.7101	3	.8259	.3327
1.7058	.7764	3	1.0294	.3755
1.6256	.8321	3	1.0945	.3772
1.8362	.8503	3	1.0538	.3569
2.3560	.9995	3	1.5989	.4108
2.8251	1.0995	3	1.8177	.5126
1.8132	.7648	3	1.7467	.3907
1.8844	.9458	3	.9366	.3705
1.8235	.8554	3	1.1314	.4029
1.9478	.9233	3	1.2467	.5189
1.8772	.7615	3	1.5208	.4372

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