A Study of Recent Relationships
Between Income and Food Expenditures

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Postwar variations from prewar levels in income, expenditures, and prices have necessitated the reconsideration and re-evaluation of our ideas of consumer demand for food. The Bureau of Agricultural Economics has been devoting attention to the improvement of food consumption data and analyses, particularly those which are useful in forecasting demand in terms of quantities and prices. This article, prepared under the Agricultural Research and Marketing Act of 1946, analyzes relationships between food expenditures and income, including an appraisal of the static and dynamic forces involved.

AT FIRST GLANCE, data on food expenditures and income in the United States in the past 20 years indicate that a larger proportion of income has been spent for food in this postwar period of record high incomes than in less prosperous years. This is contrary to what one would expect on the basis of Engel's famous law and the results of many studies of family expenditures. Engel's law is generally remembered as stating that families with higher incomes spend a smaller proportion of their incomes for such necessities as food than do families with smaller incomes. If that is true of individual families, should it not hold for national averages? But can Engel's law be applied to historical comparisons of national averages? If it can be, what is the explanation of the apparent contradiction in the postwar period?

The analysis of the problem posed by these questions will proceed in five steps. First, we shall point out the principal differences between the static and dynamic aspects of the problem of income-food expenditure relationships. Second, we shall review information on family food expenditures and income taken from sample surveys, often called family-budget data. These are similar to the data collected by Engel, and each survey reflects an essentially static situation. Third, a set of data on food expenditures and income will be developed under partly static and partly dynamic concepts; that is, including changes in the food consumption pattern and income through time, but excluding changes in the price level, in relative prices, and excluding major shifts in marketing. Fourth, we shall arrive at a fully dynamic situation by adding price changes to the set of data developed in the

preceding section, then by making certain adjustments in the Department of Commerce food expenditure series and in the Department of Agriculture series on the retail cost of farm food products, and then comparing the results with disposable income per capita. The pattern of these comparisons will be examined to learn whether, through time, there is a strong tendency of income-food expenditure relationships to adhere to the static pattern, that is, to follow Engel's law. Finally, the postwar situation will be analyzed to ascertain the extent to which the variation of income-food expenditure relationships in 1947-50 from the prewar pattern reflects either temporary aberrations in the underlying pattern, or an enduring shift in relationships which may or may not still evidence the pattern predicated by Engel's law.

Obviously, the average proportion of income spent for food in the entire country is a weighted average of the income-expenditure relationships of all families and individuals, from the lowest to the highest incomes. But the comparison of the average proportion of income spent for food in the United States over several years involves a shift from a static to a dynamic concept and introduces a new complex of factors.

Let us begin by recalling the circumstances under which Engel developed his law. Ernst Engel studied the expenditures of families of all levels of income in Belgium and Saxony, in the middle of the nineteenth century. His data showed a consistently higher percentage of total expenditures going for food coincident with lower average incomes per family. He concluded, "The poorer a family, the greater the proportion of the total out-

go that must be used for food."[1] It is to be noted that Engel's analysis was confined to one period in time. The data on food expenditures which he examined included costs of alcoholic beverages, and the food purchases were almost entirely for home consumption. Furthermore, food commodities in that century were not the heterogeneous commodities they are today. Families bought raw food from rather simple shops or local producers and did most of the processing at home. Their food expenditures did not include such costs as labor and cooking facilities in the homes. Now, families have a wide choice of kinds of places to buy their food, of many more foods both in and out of season, of foods extensively processed into ready-to-serve dishes, and of eating in many kinds of restaurants. Accordingly, families of higher income now may spend as large a proportion of their incomes as lower income families, or even a larger proportion, by buying food of better quality, expensively processed, and with many marketing services.

Such developments in food commodities and marketing might be expected to affect income-food expenditure relationships over time in the same way as at a particular period. Numerous other factors are present in the dynamic situation which do not enter into the problem at a given period and given place, although they are significant in place-to-place comparisons, which are considered only incidentally in this study. These dynamic factors include changes in the average level of income, distribution of income, the geographic location and the composition of the population, relative supplies of food and nonfood commodities, and changes in both the general price level and relative prices, and also changes in the manner of living that are independent of income. With these factors in mind, we shall examine income-food expenditure relationships of aggregate data for a 20-year period to learn whether there is a pattern and to what extent economic and social disturbances have caused variations from that pattern.

Survey Data on Income-Food Expenditure Relationships

Data on food expenditures and incomes in this country are of two types: (1) information on fam-ily-food expenditures taken from sample surveys, often called family-budget data, similar to those collected by Engel and essentially static in character and (2) aggregate time-series data such as those of the Department of Commerce and the Department of Agriculture. The survey data here used were obtained from reports by individuals and families, as those of the *1935-36 Consumer Purchases Study*, the *1941 Study of Spending and Saving in Wartime*, and the *1948 Food Consumption Surveys* (urban). These data must be handled cautiously and they require many adjustments before they can be compared.[2]

For purposes of analysis, approximations can be made to meet most of the problems inherent in the data except that of consistent under-reporting of expenditures for snacks and meals away from home and for beverages. However, value of food consumed at home appears to be somewhat high in the aggregate and presumably offsets this underreporting to a considerable but unknown extent.[3] As the underreporting of such expenditures is likely to be greater in the higher income groups than in the lower, the income-elasticity of demand derived from reported data is probably understated.

Table 1 contains the data on food and beverage expenditures for the whole population derived by the author from the 1935-36 and 1941 surveys, as well as roughly comparable data on total consumer disposable income per person, the proportion thereof being used for such expenditures, and average food and beverage expenditures per person. Several observations are in order at this point. Comparison of the percentages spent for food in the two studies can be made, although there was a

[1] Translated from page 26—DIE LEBENSKOSTEN BELGISCHER ARBEITER-FAMILIEN FRÜHER UND JETZT—ERMITTELT AUS FAMILIEN-HAUSHALTSRECHNUNGEN. Inst. Internatl. Statis. Bul. 9: 1-124. illus. 1895.

[2] Numerous references to their limitations can be found in the literature. One of the best articles is by DOROTHY S. BRADY and FAITH M. WILLIAMS. ADVANCES IN THE TECHNIQUES OF MEASURING AND ESTIMATING CONSUMER EXPENDITURES. Jour. Farm Econ. Vol. 27:2:315-44. May 1945. Others are the papers by SELMA GOLDSMITH in Volume 13 of the STUDIES IN INCOME AND WEALTH, issued by the NATIONAL BUREAU OF ECONOMIC RESEARCH, and by STANLEY LEBERGOTT before the American Statistical Association, 1949, unpublished, and Part II, FAMILY SPENDING AND SAVING IN WARTIME, Bulletin No. 822, UNITED STATES DEPARTMENT OF LABOR, BUREAU OF LABOR STATISTICS, 1945.

[3] For example, expenditures for alcoholic beverages reported in the 1941 study averaged only a little over $7 per person, whereas the Department of Commerce estimate of such expenditures in 1941 is about $32 per capita. Data from the same survey on expenditures for food away from home yield an average of $22 per person, but an estimate derived from Commerce data for the same year totals $30. On the other hand, food consumed at home, including home-produced foods, was valued at $156 per person. After making adjustments in Commerce data to bring them to the same price level, the average was only $133 per capita.

TABLE 1.—*Average disposable income and food expenditure per capita, and proportion of income spent for food, by income group, 1935-36 and 1941*[1]

Total income per consumer unit[2]	Average disposable income per capita in current dollars	Food expenditures per capita	
		Average in current dollars	Percentage of disposable income
	Dollars	*Dollars*	*Percent*
	1935-36		
Under $500	113	69	61
$500 to 999	242	104	43
1,000 to 1,499	370	132	36
1,500 to 1,999	502	154	31
2,000 to 2,999	679	179	26
3,000 to 4,999	982	209	21
5,000 and over	3,270	344	11
Average	462	134	29
	1941		
Under $500	122	91	75
$500 to 999	293	130	44
1,000 to 1,499	446	167	37
1,500 to 1,999	529	179	34
2,000 to 2,999	734	206	28
3,000 to 4,999	1,008	247	24
5,000 and over	2,027	354	18
Average	680	191	28

[1] Data derived by author from 1935-36 CONSUMER INCOME AND EXPENDITURE STUDIES of the NATIONAL RESOURCES COMMITTEE and 1941 STUDY OF SPENDING AND SAVING IN WARTIME. Disposable income includes money and non-money incomes; 1941 incomes adjusted for underreporting. Food expenditures include expenditures for alcoholic beverages and for food away from home, and home-produced food valued at local prices. All data exclude residents of institutions.

[2] Approximates disposable income.

small difference in the price level between the two surveys and some redistribution of incomes in the two open-end groups. There seems to have been remarkable stability in the relationships of all but the highest and lowest income groups. The income elasticities of the two sets of data are fairly similar.[4] Engel's law is certainly borne out in each of

[4] The regression lines fitted to the logarithms of average expenditures per person, for food and alcoholic beverages, money and non-money, against logarithms of average total disposable income per person, all in current dollars, are for 1935-36, $Y' = .88 + .48X$, and for 1941, $Y' = .93 + .49X$, Both $R^2 = .99$. Regression lines fitted in a comparable way to data for urban families in 1941, 1944 and 1947 gave the following equations: 1941, $Y' = .64 + .58X$, $R^2 = .99$; 1944, $Y' = 1.47 + .33X$, $R^2 = .95$; 1947, $Y' = 1.61 + .31X$, $R^2 = .96$, based on unpublished data of the Bureau of Human Nutrition and Home Economics. The coefficients of X in these equations are a measure of the income-elasticity of demand for food at a particular period, that is, "static income-elasticity."

For discussion of the technical problems of measurement, see LEWIS, H. GREGG, and DOUGLAS, PAUL H. STUDIES IN CONSUMER EXPENDITURES. The University of Chicago Press, Chicago, Ill. 1947. Also, ALLEN, R. G. D., and BOWLEY, A. L. FAMILY EXPENDITURES, Staples Press Limited. London, 1935.

AVERAGE FOOD EXPENDITURES AND DISPOSABLE INCOME PER CAPITA OF URBAN FAMILIES*

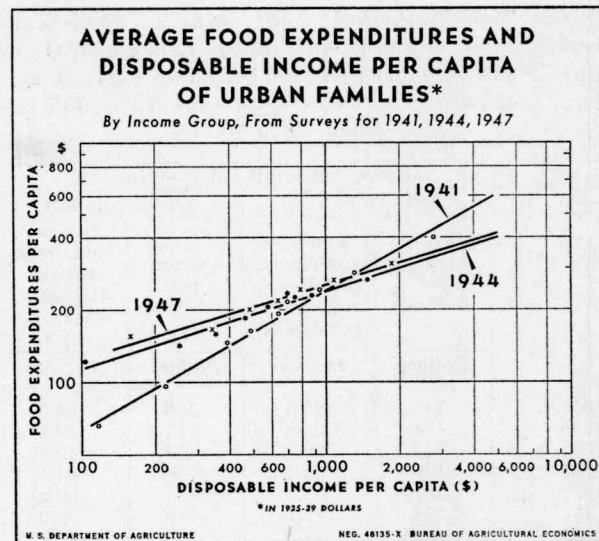By Income Group, From Surveys for 1941, 1944, 1947

FIGURE 1.

these sets of data. The single-point difference between the average proportions of income spent for food in 1935-36 and 1941 precludes using these data for argument for or against the application of Engel's law through time.

The income elasticities derived from the 1941 data on urban families' incomes and food expenditures and from comparable 1947 data reported in the 1948 spring survey, are significantly different —0.58 for the former and 0.31 for the latter. As a check, a similar analysis of the study for 1944 by the Bureau of Labor Statistics[5] was made, yielding a 0.33. The data from these studies have been plotted on figure 1 in terms of constant 1935-39 dollars. The differences in the slopes of the three lines, which were fitted by least squares, indicate the differences in average income elasticity of food expenditures. Analysis of the possible causes for such differences will follow in the last section of this article.

Static-Dynamic Situation

Although Engel's law of food expenditures is directly applicable only to the static situation described above, it seems logical that it should be reflected to some extent in a dynamic economy by time-series data on national income and food expenditures. We investigate this possibility by constructing a time series to match most of the basic concepts of the family-budget data.

[5] From table 2, EXPENDITURES AND SAVINGS OF CITY FAMILIES IN 1944, Monthly Labor Review, January 1946.

TABLE 2. — *Estimated retail value of foods consumed per civilian, including expenditures in public eating places, in 1935-39 and current dollars, and ratios to real and current disposable income, 1929-50*

Year	Estimated retail value of food in			
	1935-39 dollars		Current dollars	
	Average per civilian[1]	As a percentage of real disposable income per capita[2]	Average per civilian[3]	As a percentage of current disposable income per capita
	Dollars	Percent	Dollars	Percent
1929	145	26.5	193	28.6
1930	144	28.9	181	30.4
1931	143	30.7	148	29.4
1932	139	35.5	120	31.5
1933	137	35.5	115	32.2
1934	138	32.7	130	32.0
1935	135	29.3	136	30.0
1936	141	27.1	142	27.8
1937	142	26.6	150	27.3
1938	143	26.8	140	27.9
1939	148	27.6	141	26.4
1940	151	26.6	146	25.6
1941	157	24.0	165	24.1
1942	158	21.4	196	22.7
1943	161	20.6	222	23.0
1944	166	19.7	226	21.3
1945	172	20.5	239	22.2
1946	177	22.1	283	25.3
1947	171	23.2	331	28.3
1948	165	22.2	348	27.2
1949	164	22.2	331	26.5
1950[4]	165	21.2	336	25.3

[1] Value aggregates of civilian per capita food consumption index plus estimated extra cost of food in public eating places, in constant 1935-39 dollars.

[2] Department of Commerce series on disposable income deflated by consumers' price index.

[3] Value in 1935-39 dollars multiplied by BLS retail food price index.

[4] Preliminary.

The construction proceeded as follows: The basis for the series was the value aggregates of the civilian per capita food consumption index (quantities of major foods consumed per person multiplied by average retail prices in 1935-39). To these were added estimates of the extra cost for services of public eating places on a per capita basis, estimated from Department of Commerce food-expenditure data, and deflated by the consumers' price index in order to approximate constant prices. The total estimated retail cost of food per person plus additional costs of food served in public eating places was then compared with real disposable income per capita (table 2).

This derived series has the character that would be expected on the basis of Engel's law—we find a higher proportion of income going for food purchases in depression years and a smaller proportion in prosperous years. It represents a static situation in that it does not reflect price changes through time, nor changes in marketing channels. Moreover, because of the rather simple structure of prices used, it does not reflect some of the additional expenditures for commercial processing. On the other hand, some dynamic factors are reflected in the series because they have brought about changes in the rates of food consumption through time. Among these are changes in average incomes and distribution of incomes among consumer units and changes in relative supplies of food and non-food goods and services. The series explicitly includes the increased expenditures for eating away from home.

Dynamic Situation

The next step toward a dynamic situation is relatively simple. It is the introduction of price changes. The per capita food-value series in constant 1935-39 dollars was multiplied by the retail food price index (1935-39 = 100) and the resulting series was compared with disposable income in current dollars. For prewar years the income-food expenditure relationships changed from year to year in about the way that would be expected from Engel's law. The data for the war years reflect, of course, the controlled prices. For the years after the decontrol of prices in 1946, the introduction of the price factor puts the income-food expenditure relationships out of line with the pattern of the years before 1942. These data present us with the core of our problem, but we defer its analysis until the next section.

At this point, it is necessary to indicate certain deficiencies, from a dynamic standpoint, still inherent in this derived series on retail value of food consumed. They stem from the basic concept of the per capita food consumption index which was constructed to measure quantitative changes in food consumption, rather than qualitative changes or changes in food expenditure.[6] This index includes shifts in consumer purchases from fresh to processed fruits, vegetables, fish and dairy products; but it excludes such shifts within the meat, sugar, and flour categories, as well as the consumption of offals (which is assumed to vary directly

[6] For description of the index, See UNITED STATES BUREAU OF AGRICULTURAL ECONOMICS, CONSUMPTION OF FOOD IN THE UNITED STATES, 1909-48. U. S. Dept. of Agr. Misc. Pub. 691, June 1949, pp. 88-96.

TABLE 3.—*Department of Commerce estimates of food expenditures, including alcoholic beverages, and adjusted estimates of food expenditures, per person and as a percentage of disposable income, 1929-50[1]*

Year	Food and alcoholic beverage expenditures		Expenditures for food including rough adjustments to exclude military food and value all food except that in public eating places at retail	
	Per person in current dollars	As percentage of disposable income	Per person in current dollars	As percentage of disposable income
	Dollars	*Percent*	*Dollars*	*Percent*
1929	160	23.8	179	26.6
1930	146	24.5	164	27.6
1931	118	23.4	136	26.9
1932	91	23.9	107	28.0
1933	91	25.4	102	28.5
1934	112	27.6	112	27.6
1935	127	28.0	123	27.1
1936	143	27.9	134	26.1
1937	154	28.1	142	25.9
1938	145	28.9	135	26.9
1939	146	27.4	134	25.2
1940	156	27.4	141	24.8
1941	182	26.5	163	23.8
1942	228	26.4	201	23.3
1943	257	26.6	232	24.0
1944	280	26.5	247	23.3
1945	306	28.4	268	24.9
1946	354	31.7	310	27.7
1947	391	33.4	349	29.9
1948	406	31.8	371	29.0
1949	390	31.2	356	28.5
1950[2]	396	29.8	362	27.2

[1] See text for description of adjustments.
[2] Rough estimates only.

with consumption of carcass meat, but contributes an increase of $3). The inclusion of these factors would add about $5 to the average retail value of food consumed in 1939 and $15 in 1947 (in current dollars).

The effect of two other factors in food expenditures, which were important only in the war period of the two decades covered by the data, is also omitted by this series. The factors are the understatement of prices by the retail-price series during the war (because of such developments as disappearance of low-cost items and deterioration of quality) and shifts from lower cost to higher cost marketing channels — for example, from chain stores to small independent stores. The shifts are discussed later.

We are now ready to analyze two well-known series relating to food expenditures—the Department of Commerce series on food expenditures and the Department of Agriculture series on the retail cost of farm food products. Although both of these are affected by dynamic factors, certain adjustments are necessary to bring them in line with the concepts of retail value of the survey data on food expenditures. The Commerce series is compiled as part of the process of estimating national income.[7] It should be noted that these data include food and beverages purchased for off-premise consumption (valued at retail prices), purchased meals and beverages (including service, etc., valued at prices paid in public eating places), food furnished to commercial and Government employees including military (valued at wholesale), and food consumed on farms where grown (valued at farm prices).

The following very rough adjustments were made in the Commerce series: (1) A rough division of expenditures for alcoholic beverages was made into purchases for off-premise consumption and purchases with meals; the former was then subtracted from the combined total of off-premise food and alcoholic beverages expenditures. (2) Food furnished civilian employees was revalued at approximately the retail level as was food consumed on farms where produced. (3) The revised estimate of total retail value of civilian food (in current dollars) was put on a per capita basis and compared with disposable income per capita. This series (table 3) bears out Engel's law until about 1945. From then on, the proportions of disposable income spent for food are even more out of line with prewar years than are those in the new series described above.

The other existing series, the retail cost of farm food products,[8] excludes food consumed on farms where produced, imported foods, non-civilian takings, nonfarm commodities, and alcoholic beverages. To obtain comparability, estimates of the retail value of farm-produced and farm-home-consumed foods, of the nonfood costs in public eating places, of the retail value of imported foods, and of fish and fishery products, were added to the retail cost of farm food products. Table 4 contains the adjusted series and comparisons with disposable income.

Comparison of the three series indicates that the general patterns are rather similar although the levels are somewhat different. The series derived from the value aggregates of per capita consumption is generally lower than the adjusted series

[7] For a brief summary of the methods used in constructing this series, see *ibid.*, pp. 96-98.
[8] *Ibid.*, pp. 98-100, and The Marketing and Transportation Situation, September 1950, pp. 11-15.

TABLE 4.—*Retail cost of farm food plus adjustments to cover all foods and extra services of public eating places, total and per capita compared with disposable income, 1929-50*

Year	Retail cost of farm food[1]	Adjusted retail cost of all foods for civilians[2]		Adjusted retail cost per capita as percentage of disposable income
		Total	Per capita	
	Million dollars	*Million dollars*	*Dollars*	*Percent*
1929	17,920	24,900	203	30.2
1930	16,810	23,420	189	31.8
1931	13,600	19,200	154	30.5
1932	11,070	15,770	126	33.0
1933	11,340	15,770	125	34.9
1934	12,870	17,570	138	34.1
1935	13,470	18,780	147	32.4
1936	14,720	20,200	157	30.5
1937	14,690	20,390	157	28.7
1938	13,960	19,340	148	29.5
1939	14,100	19,340	147	27.5
1940	14,630	19,870	150	26.2
1941	16,530	22,410	169	24.6
1942	19,900	26,430	200	23.2
1943	22,110	29,960	231	24.0
1944	22,060	30,250	234	22.1
1945	23,630	32,330	249	23.1
1946	30,450	40,610	292	26.1
1947	35,950	47,830	333	28.5
1948	37,970	50,310	344	26.9
1949	36,200	47,690	321	25.7
1950[3]	36,800	48,500	321	24.3

[1]From table 5, p. 12, *Marketing and Transportation Situation*, September 1950.
[2]Adjusted as described in text.
[3]Rough estimates only.

based on retail cost of farm food products. On the other hand, the series derived from the Department of Commerce food-expenditure data is significantly lower in prewar years and higher since 1943 than the data in the other two series.

Study of the proportion of average disposable income spent for food in relation to the level of real income in the years 1929-41, as measured by each of the series (fig. 2), leads to the surmise that national averages of income-food expenditure relationships through time do tend to follow Engel's law.[9] The complexity of wartime price and supply relationships prevents our drawing any conclusion from the lower percentages spent for food during

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[9]The following regression equations were calculated from the logarithms of the income-food expenditure ratios (Y) and of the index of real disposable income per capita (X) (1935-39 = 100), fitted 1929-41;
(a) Series derived from per capita consumption and retail food price indexes
$Y' = 2.54 - .55X; R^2 = .86$
(b) Adjusted Commerce food expenditure series
$Y' = 2.04 - .31X; R^2 = .83$
(c) Series based on retail cost of farm food products
$Y' = 2.71 - .62X; R^2 = .83$

the years 1942-45, when real income per capita was the highest on record. The ratios of average food expenditures to average disposable income since 1945 bring us to our real problem.

Postwar Income-Food Expenditure Relationships

A higher ratio of food expenditures to disposable income, in terms of national averages, can result from (1) lower average real incomes, which would be accompanied by a change in the proportional distribution of the population among and/or within the several real-income groups; (2) an increase in average food expenditures, with or without a change in the "static income-elasticity of demand." An example of this would be a rise in the average food expenditures of two or three adjacent income groups with none in the others and no change in average incomes of each group. If there is an equi-proportional rise in food expenditures of all income groups, there will be no change in static income-elasticity of demand but a higher "dynamic income-elasticity of demand" would result. This term is used here to describe the relationship of changes through time in the national average of food expenditures to changes in national average income.[10]

The situation in 1946-49 did not result from the first of these alternatives because real incomes per person (disposable) were substantially higher than before the war, although they were somewhat less than in 1945.

The fact that food expenditures have increased more than incomes since 1940 and 1941, so that the ratio between the two has risen, indicates an increase in the demand for food. Is this increase likely to be permanent or have unusual factors of short duration brought about only temporary aberrations in the underlying pattern of income-food expenditure relationships? Obtaining an answer to this question necessitates the determination of the

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[10]The regression equations for the logarithms of the four food expenditures series (Y) and the logarithms of disposable income per capita (X), 1929-41 are:
(a) Series derived from per capita consumption data, in constant dollars (against real disposable income)
$Y' = 1.53 + .23X, R^2 = .73$
(b) Series derived from per capita consumption and retail food price indexes (current dollars)
$Y' = .35 + .67X; R^2 = .84$
(c) Adjusted Commerce food expenditure series (current dollars)
$Y' = -.07 + .81X; R^2 = .96$
(d) Series based on retail cost of farm food products (current dollars)
$Y' = .53 + .61X; R^2 = .78$

RELATIONSHIP OF THREE MEASURES OF FOOD EXPENDITURES TO DISPOSABLE INCOME, 1929-50

DERIVED ESTIMATES OF RETAIL VALUE OF FOOD

ADJUSTED DEPARTMENT OF COMMERCE SERIES ON FOOD EXPENDITURES

ADJUSTED DEPARTMENT OF AGRICULTURE SERIES ON RETAIL COST OF FOOD

PERCENTAGE OF INCOME SPENT FOR FOOD

INDEX OF DISPOSABLE INCOME PER CAPITA*

*IN 1935-39 DOLLARS   1950 PRELIMINARY

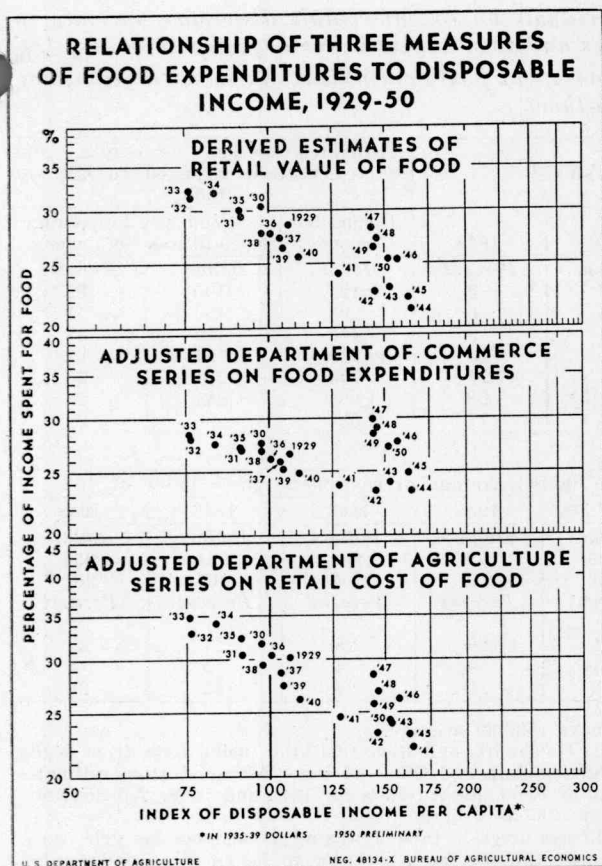U. S. DEPARTMENT OF AGRICULTURE   NEG. 48134-X BUREAU OF AGRICULTURAL ECONOMICS

FIGURE 2

major factors in higher food expenditures and insofar as possible the evaluation of their importance. A supplemental problem is the determination of whether the change in demand for food has taken place equally at all income levels or only in some segments; that is, whether the "static income-elasticity of demand for food" has changed.

The first step in the analysis of postwar income-food expenditure relationships is to measure so far as possible the effect of changes in the average level of income and the distribution of income within the population on the national average of the relationship of food expenditures to income. The sum of the population in each income group multiplied by the average income of that group divided by the total population, will give a reasonable approximation of average income. A similar procedure will give average food expenditures. In order to evaluate the effect of changing income on income-food expenditure relationships, it is advantageous to hold prices constant. Distributions of individuals by total disposable real income per con-

sumer unit have been developed for several years (adjusted to consumers' price index of 133), although they should be regarded only as rough approximations. These were used to derive weighted averages of income and food expenditures (including alcoholic beverages) for those years. The weighted averages of income in 1943 and 1946 underestimate the average income in those years by 5 to 10 percent, according to comparable estimates of non-military, non-institutional income derived from data of the Department of Commerce. This is largely the result of some upward shift within income groups, particularly that with real incomes above $5,000. However, an accompanying upward movement in the averages of food expenditures for each group would be expected.

In table 5 the derived estimates of income and food expenditures, adjusted to exclude the costs of alcoholic beverages, are compared. The results indicate that food expenditures would have been expected to take 31 percent of total disposable income in 1935-36 and 24 percent in 1948 if people at each level of real income in those years spent the same proportion of income for food as did people at that income level in 1941. In other words, all factors except income are held constant and there is no change in static income-elasticity of demand for food. Under these conditions, the national averages of the relationship of food expenditures to income would follow Engel's law. With about the same real disposable income in 1949 as in 1948 we might expect the same proportion of income to have been spent for food.

At this point, we recall that the static pattern of income-food expenditure relationships did change for urban families between 1941 and 1947, as shown by figure 1. This change indicates the importance of factors other than shifts in the distribution of income and higher average income to the level of postwar food expenditures. These factors may be short or long in duration.

Two obviously short-run factors were (1) the natural lag in adjustment of food-consumption patterns to rapid postwar changes in income and in the relative supplies of food and nonfood commodities and (2) availability of unusual sources of purchasing power over and above current income.

Record quantities of food had been consumed at controlled prices during the war, with the peak coming in 1946 when very large supplies were available for civilians, prices were still controlled

TABLE 5.—*Rough approximations of distribution of individuals by consumer-unit disposable incomes in selected years; 1941 survey pattern of per capita incomes and food expenditures adjusted to consumers' price index of 133; weighted averages of disposable incomes and food expenditures in selected years, and ratios between them*

Total disposable income per consumer unit[1]	Approximate proportion of individuals[2]					Estimated average per capita, 1941 survey pattern adjusted to CPI of 133[3]		
	1935-36	1941	1943	1946	1948	Disposable income	Food expenditures	Percentage of income
	Percent	*Percent*	*Percent*	*Percent*	*Percent*	*Dollars*	*Dollars*	*Percent*
Under $500	11	3	3	3	3	122	100	82
500 to 999	17	10	7	6	6	293	150	51
1,000 to 1,499	20	10	10	8	9	446	189	42
1,500 to 1,999	16	13	14	11	10	529	194	37
2,000 to 2,999	19	24	23	22	27	734	241	33
3,000 to 4,999	12	27	27	32	28	1,008	284	28
5,000 and over	5	13	16	18	17	2,027	406	20

Item	Weighted average at consumers' price index of 133				
	1935-36	1941	1943	1946	1948
	Dollars	*Dollars*	*Dollars*	*Dollars*	*Dollars*
Average real disposable income per capita[4]	599	858	908	964	939
Average expenditure for food and alcoholic beverages	206	249	257	265	262
	Percent	*Percent*	*Percent*	*Percent*	*Percent*
Percentage of income					
Total	34	29	28	27	28
Alcoholic beverages[5]	3	4	4	5	4
Food	31	25	24	22	24

[1]Money and nonmoney income; dollar values set 33 percent above 1935-39 average.

[2]Estimated by author with assistance of Nathan Koffsky, Selma Goldsmith, and Richard Butler, using data from *Study of Consumer Incomes for 1935-36*, *Study of Family Spending and Saving* data and Office of Price Administration estimates for 1941 and 1943, and data of the Census Bureau and the Council of Economic Advisers for 1946 and 1948. All distributions in terms of dollars at consumers' price index of 133 percent of 1935-39 average.

[3]The 1941 survey pattern of average incomes and food expenditures given in table 1 was adjusted from the price level 5 percent above the 1935-39 average, to a price level 33 percent above that average, in order to be on same dollar-value basis as the income distributions and to match data previously developed on per capita food consumption by income level.

[4]Derived from adjusted 1941 survey pattern. Averages for 1943 and 1946 appear to be 5 to 10 percent low, in comparison with averages derived from aggregate national income data, because of somewhat higher average incomes within income groups, particularly the much higher average for the group with incomes over $5,000. This understatement of income would be accompanied by some understatement of food expenditures; therefore, the derived proportion of income spent for food is regarded as a reasonable estimate, under the conditions imposed.

[5]Estimated from 1941 survey data.

for part of the year, and demand for food was exceedingly strong. Civilian per capita food consumption in that year averaged 19 percent above the prewar average. Not all of this food was eaten in the calendar year 1946. Some went to restock pantry shelves as well as those distribution channels for which no inventory data are available.

Then in 1947 apparent consumption of food per person declined to an index of 115, but retail food prices averaged 21 percent higher than in 1946. A possible explanation of the precipitous rise in food prices after decontrol in 1946, as well as their high levels in 1947 and 1948, is the fact that many consumers, particularly those of low and medium incomes, were willing to spend increasingly more money if necessary in order to continue to buy the quantity, the quality, and the kinds of foods they had become accustomed to buying in the preceding

years of high incomes and controlled prices, or that they had wanted and couldn't buy because of restricted supplies and official and unofficial rationing during the war. After the middle of 1948 there was a gradual change in per capita rates of civilian consumption of most individual foods toward those of the prewar high-income years, and the proportion of disposable income spent for food also declined significantly.

Contributing to the lag in adjustment of food-consumption patterns and food prices was the availability to many families of unusually large liquid assets, the relaxation of controls on consumer credit, the opportunity to reduce the rate of savings, as was done, and the continued shortage of some durable items of high cost, such as cars and houses. The use of liquid assets and consumer credit to buy consumers' goods and services rep-

resented, in the first instance, a net addition to the purchasing power available from current income. Later, this purchasing power was incorporated, at least in part, in the flow of the income stream and included in disposable income of other individuals, corporations, and Government. Accordingly, for a year such as 1947, the average disposable income understates the purchasing power of consumers and leads to a disproportionately high estimate of the ratio of food expenditures to purchasing power.

The use of liquid assets and the opportunity to increase consumer debt were particularly significant for low- and moderate-income families, in 1947-49. With such supplemental purchasing power many were able to keep up their high wartime rate of expenditure for food and other nondurable goods even while they increased their purchases of durable goods. Data from the 1950 Survey of Consumer Finances indicate that among those spending units that were reducing liquid assets in 1949, 49 percent of the units with incomes under $2,000 reported using at least part of their liquid assets for food, clothing, and nondurable goods, compared with 31 percent for the $2,000 to $4,999 income group and 17 percent of those units with incomes over $5,000.[11] The extra purchasing power available for food apparently contributed substantially to the higher level of food expenditures in relation to income, in 1947 compared with 1941, and to the reduction in the "static income-elasticity of demand" indicated in figure 1.

Surveys of consumer finances made for the Federal Reserve Board indicate that record amounts of liquid assets, which had been accumulated during the war and immediately thereafter, were reduced significantly from 1947 to 1950—from $470 per spending unit early in 1947, to $350 a year later, $300 early in 1949, and $250 in 1950. The reduction was about $39 per person in 1947 and $16 in both 1948 and 1949, and represented an addition of that amount to the purchasing power available from current income. According to the 1949 survey[12] about one-third of the reduction in 1947 went directly into nondurable goods and services and one-fifth for automobiles and other durable goods.

Another important source of funds for consumers' expenditures in 1947-49 was the rapid expansion in consumer credit as controls over consumer credit were relaxed after the war. Outstanding consumer indebtedness increased $3.2 billion in 1947, $2.5 in 1948, and $2.4 in 1949. The increase of $3.2 billion in 1947 amounted to $22 per capita.

The total of the reduction in liquid assets and use of consumer credit in 1947 amounted to about $61 per person, in 1949 to $32. The addition of this extra purchasing power to current disposable income brings total purchasing power per capita for 1947 up to $1,231, and to $1,281 in 1949. This makes a significant change in the ratio of food expenditures to purchasing power, from the 29.9 percent, based on adjusted Commerce data, to 28.4 percent in 1947, and 28.5 to 27.8 percent in 1949.

Expenditure and savings data of the Department of Commerce indicate the unusual character of the income-expenditure-savings relationships in the immediate postwar years.[13] Although disposable personal income rose $10.6 billion from 1946 to 1947, the rate of savings declined $8 billion. Expenditures for personal consumption increased $18.7 billion. The increase of $4.8 billion in expenditures for durable goods was to be expected on the basis of deferred demand for such items, but the $9.3 billion increase in nondurables greatly exceeded expectations. Much of this increase was in food expenditures, as already noted. The fact that the decline in the proportion of income going to food in 1948, 1949, and 1950, was not offset by increases in expenditures for other items, but was offset in part by a return to the prewar relationship of savings to high-level disposable incomes, gives further support to the hypothesis that the extraordinarily high expenditures for food in 1947 and early 1948 were due largely to a temporary lag in the adjustment of patterns of consumer-expenditure and savings to a changing situation.

We now consider possible factors contributing to the postwar rate of food expenditures which are likely to be more permanent in duration and most of which appear to indicate some changes in manner of living. Among such factors are movement of population from rural to urban areas, increased "eating out," shifts in channels of distribution, increased consumption of processed foods, greater use of fresh vegetables in "off-seasons," and changes in the age distribution of the population.

[11]Table 14, Part V, reprinted from Federal Reserve Bulletin for December 1950.

[12]Page 8, part III, of the reprint from the Federal Reserve Bulletin for July 1949.

[13]Excellent discussions of these relationships may be found in two articles in the *Survey of Current Business*, FRIEND, IRWIN, PERSONAL SAVINGS IN THE POSTWAR PERIOD, September 1949; ATKINSON, L. JAY, THE DEMAND FOR CONSUMERS' DURABLE GOODS, June 1950.

A movement of population from rural to urban areas, such as that which took place between 1941 and 1949, is bound to affect food expenditures and incomes, but the extent is difficult to measure. Obviously, farm families spend less money for food than nonfarm families because they grow some of their own food and the food they buy costs about 10 percent less than the urban prices.[14] But nonfarm incomes average much higher than farm incomes, even on the basis of total disposable income. The problems of definition of net farm income and valuation of home-produced foods make the comparison of urban and rural patterns of income-food expenditure relationships subject to considerable question.[15] However, the proportion of income spent for food was calculated for 1949 using both the January 1, 1941 ratio of farm to total population and the January 1, 1949 ratio, along with the 1941 survey data on farm and nonfarm average money and nonmoney food expenditures and disposable income. (These data had not been inflated to national totals shown by Department of Commerce data.) Use of the 1941 ratio resulted in food expenditures averaging 28.7 percent of reported disposable income whereas the 1949 ratio resulted in 28.3 percent.

This shift from rural to urban areas is not reflected fully in the three adjusted series on food expenditures. The series which was derived from the per capita food-consumption aggregates values all foods at prices paid by moderate-income families in urban areas. The other two series, as adjusted to the concepts of the survey data, value the food for home consumption on farms where produced at a composite rural-urban price.[16] At the most, the difference in prices paid for food arising from the rural-urban shift might account for a $7-increase in the national average of food expenditures, equivalent to about 0.6 of a percentage point in the ratio of food expenditures to income in 1949. The effect on food expenditures of changes in the distribution of the population by income group reflects most of the impact of the rural-urban shift.

One factor in higher postwar food expenditures

—increased eating in public restaurants and other institutions—appears to be a significant change in eating habits. The costs of "eating out" include the payment for additional processing, serving, atmosphere, and sometimes entertainment. If a greater proportion of total food consumed is purchased in public eating places, expenditures for food can be higher even without a change in total quantities of food consumed. The increased cost due to this factor was about $8 per person, from 1941 to 1949, equivalent to 0.6 percent of disposable income in the latter year.

Another type of shift in the channels of food distribution which would be expected to affect the level of food expenditures is the shift from lower cost to higher cost distributors in urban areas, such as that from large chain stores to small corner groceries or delicatessens. This factor was probably important during the war but the 1941 pattern of distribution was apparently restored by 1949. For example, chain-store and mail-order food sales accounted for 29.8 percent of total retail sales in 1941, 25.4 percent in 1944, 29.9 percent in 1948, and 31.7 percent in 1949.

In the discussion of the retail-value or food-expenditures series derived from the per capita consumption and retail food price indexes, mention was made of the additional cost of processed food in postwar years compared with a prewar year. The increase between 1939 and 1947 which had not been accounted for in the derived series is estimated at about $7 per capita (excluding the increase in cost of offals). Analysis of the shifts from fresh to processed foods reflected in the consumption index for 1941 and for 1949 is the basis for an estimate of $5 for the remaining part of the additional cost (in 1949 prices). The pattern of fresh versus processed foods in 1939 was probably not greatly different from that of the 1941 survey of family food consumption, nor was 1947 much different from 1949 for the foods in the omitted category.

Accordingly, we may conclude that the total increase in food expenditures from 1941 to 1949, due to shifts to foods processed outside the home (except in public eating places) might amount to $12 per person, or 1 percent of disposable income. But at this point we recall that some of the shift from fresh to processed foods would be expected to result from increased incomes. An item-by-item analysis of income-expenditure patterns is the basis for the

[14]See p. 161 of the article by NATHAN KOFFSKY, FARM AND URBAN PURCHASING POWER in volume II of Studies on Income and Wealth.

[15]Margaret G. Reid, in intensive research in this area, has found evidence of similarity between the rural and urban patterns when major farm expenses are spread over several years and apparent variations in incomes are averaged out.

[16]Combining the prices paid by farmers, BAE index, for rural segment of the population and the BLS retail food prices for the urban population.

estimate that about three-fifths of this rise in food expenditures for processed foods is due to higher incomes, and two-fifths is due to the trend toward increased processing outside the home, which is a continuing change in food marketing.

In order to learn the possible effect on food expenditures of somewhat greater consumption of foods in "off-seasons" (from local production), available data on changes in seasonal production of several foods were studied. The only item showing a significant change was truck crops for fresh market. Even here, the increase in output in the winter season, from 1941 to 1949, totaled less than 10 pounds per capita and the increased cost totaled only about 15 cents.

The substantial increase in the birth rate during the last 11 years leads one to consider the effect of a larger proportion of children on food expenditures. The increased consumption of prepared baby foods and of dairy products has already been accounted for. As to other commodities, it might well be argued that this change in age makeup might contribute to lower rather than to higher food expenditures.

To summarize, on the basis of changes in average income and distribution of income we would have expected 24 percent of disposable income in 1949 to have been spent for food, instead of the 28.5 percent indicated by the adjusted Commerce Department food expenditure data, 25.7 percent indicated by the adjusted series on retail cost of farm food products, and 27.7 percent by the derived series (including additional processing and offals). If we add to the 24 percent figure the effects of the enduring, dynamic factors, roughly 0.6 percent for the rural-urban shift (not already accounted for by income changes), 0.6 percent for increased costs of eating out, and 0.4 percent for the extra costs of processing in 1949 as compared with 1941 and not due to higher incomes, we obtain 26 percent as the estimated relationship of food expenditures to disposable income. Furthermore, we should take into consideration the additional $33 of purchasing power (1949 dollars) available per person in 1949 from the use of liquid assets and consumer credit. This would increase the derived ratio of food expenditures to available purchasing power by another 0.7 percent and bring it surprisingly close to the ratios derived from the three dynamic series. The proportion of current income spent for food in 1950 was again lower than in the preceding year, indicating further adjustment in the income-food expenditure relationship toward the long-time pattern. Moreover, the outbreak of hostilities in Korea undoubtedly encouraged extra buying to increase the stocks of food in households.

Conclusions

We may draw three conclusions from the foregoing analysis.

(1) Engel's law probably applies reasonably well to the relationship of national averages of income and food expenditures through periods in which no substantial changes take place in population patterns, distribution of income, manner of living, and marketing practices. That is to say, it applies under conditions that are relatively static and are similar to the circumstances in which Engel formulated his law.

(2) In the wartime and immediate postwar years certain forces arising from the war materially altered the peacetime pattern of national averages of income and food expenditures. Some of these carried over as far as 1949, although they were essentially temporary in character. The most significant were the supplemental sources of total purchasing power and the diversion of an unusually large proportion of that purchasing power to food, as long as supplies of durable goods, particularly the expensive items, failed to meet the potential demand. These forces increased the dynamic elasticity of demand by raising the level of food expenditures and decreased the static income elasticity of demand by raising the food expenditures of lower- and moderate-income families more than those of families of higher income.

(3) Two dynamic forces active in 1941-50 are likely to have a lasting effect on the relationship of aggregate food expenditure to income: the shift of population from rural to urban areas and the change in manner of living reflected in increased processing of food outside the home, either in public eating places or in processing plants. These forces appear to have increased the dynamic income elasticity of demand for food by raising the general level of food expenditures. Lacking sufficient basis as yet for ascertaining the contribution of these enduring forces to the lower static income elasticity of demand that is evident in the 1947 urban data compared with 1941, we cannot estimate their possible offsetting effect upon future dynamic income elasticity of demand for food.