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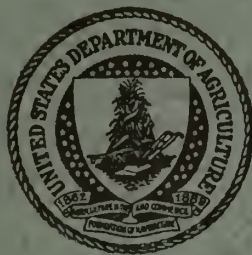
CONTENTS FOR JULY 1958

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Coffee Consumption and Prices in the United States

By Rex F. Daly

The current situation and prospects for coffee are of widespread interest to American consumers and to those who supply them, and it is of vital interest to the many Latin American countries that depend on coffee as a primary source of foreign exchange earnings. The smaller per capita use of coffee in the United States in 1956 and 1957, and the rising world production and stocks, combined to reduce prices of coffee during 1957 and early 1958. The trade, foreign producers, and foreign and U. S. Government administrators have a continuing interest in the analysis and measurement of factors that influence world demand and prices of coffee. The purposes of this paper are (1) to report some research on statistical analyses of the major economic factors that influence U. S. consumption and wholesale prices of coffee, and (2) to use these analyses in appraising the current situation and prospective trends in coffee consumption in the United States. This study was prepared by the author in connection with a short assignment in February this year with the Nicaraguan Government. Their Government was interested in the probable future expansion of the U. S. market for tropical products that can be grown in Nicaragua.

CONSUMERS in the United States use more coffee than do those in any other country. In 1956 and 1957, we imported about 21 million bags of coffee. United States imports in 1957 made up 62 percent of coffee exports from Brazil, and 86 percent of Colombia's and more than a third of Africa's exportable production. Our imports represented about 42 percent of the world crop in 1955 and about 46 percent of the smaller 1956 crop.

Coffee is a major beverage in the diet of some 120 million adults in the United States. Outlays for nonalcoholic beverages in the average household in 1955 made up around 5 or 6 percent of expenditures for food, and coffee accounted for about two-thirds of the expenditures for beverages. In 1956 and 1957, the average adult (15 years and over) consumed about 22 pounds of coffee (in terms of green beans). This compares with an average of more than 24 pounds consumed in the postwar years 1947–49.

Consumption of Coffee in the United States

The major factor that influences United States requirements for coffee is growth of the population. But per capita use depends on relative prices for coffee, consumer incomes, and many other considerations, including habit, custom—such as the American coffee break—and the development of substitutes.

Big supplies of coffee, relatively low prices, and limited overseas shipping due to wartime conditions apparently contributed to a sharp increase in coffee consumption in the United States during World War II. Since the war, relatively high

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prices have encouraged the development of substitute products and coffee extenders, as well as greater efficiency in the preparation and use of coffee.

Factors Influencing Per Capita Use

For this analysis, per capita use of coffee (green bean equivalent) per person 15 years and older was calculated (*1 p. 113*).[1] Changes in per capita use were appraised relative to changes in retail prices of coffee and consumer incomes. Several other variables, including lagged consumption and trend, were tried but they did not improve the analysis. Use of trend to explain differences in consumption from prewar to postwar years appeared to introduce a doubtful income elasticity of demand. This is explained in another section.

A single equation demand function was assumed for these analyses. In effect, our analyses state that per capita use of coffee in the United States was a function of changes in relative prices for coffee and real incomes of consumers. Consumers are faced with a price for coffee that they are only partly responsible for determining. Price reflects also the general world supply situation and demand for coffee in other importing countries as well as exporting countries. Probably the supply facing United States consumers is fairly elastic, but as our consumers take two-fifths of exportable production this country plays an influential role in determining world prices for coffee.

The demand function was assumed to be logarithmic in order to show relative or proportionate relationships among the variables. Data were fitted for 1922–41 and 1947 to 1957 (excluding the Korean War years, 1950 and 1951) and for the entire period combined. The following relationships based on the 1922–41 period are believed to be a reasonable approximation of consumer behavior in the last 3 or 4 decades.

$$\log q = k + b \log p + c \log I$$
$$\log q = 1.034 - 0.258 \log p + 0.226 \log I \quad (1)$$
$$\qquad\qquad (0.041) \qquad\quad (0.072)$$
$$R_{1.23} = 0.88$$

In this relationship, (q) represents civilian use of coffee (green bean equivalent) per person 15 years and over, (p) is retail price of coffee deflated by the consumer price index, and (I) is real per capita consumer income.

Price and Income Elasticity of Demand

Price elasticity of demand (b) indicates that, with an increase of 10 percent in the relative price of coffee, consumers tend to reduce per capita use by about 2½ percent. A 10-percent rise in real consumer incomes usually leads to an increase of nearly 2½ percent in per capita use of coffee—an income elasticity of demand of +0.23 represented by (c) in equation (1).[2]

The price effect on consumption—price elasticity of demand coefficient—was fairly stable in the prewar and postwar analyses around −0.25 to −0.30 whether using a trend variable or lagged consumption. Indicated price influence on consumption in these analyses are reasonably consistent with those in a recent study regarding coffee made by the Food and Agriculture Organization of the United Nations (*2, p. 8*), but they indicate a smaller price influence than that reported in a recent Federal Trade Commission report on coffee (*3, p. 510*).

Income elasticity of demand indicates the way consumers usually modify their consumption in response to changes in income. As indicated above, it was 0.23 in the prewar period. A smaller income effect (0.10) was indicated for the postwar years, but the results were not statistically significant. And when a trend variable was used in the postwar years, the results were completely illogical with a negative income effect. An analysis for the entire period suggested a much higher income effect (around 0.5 or higher) with or without the trend variable. The FAO study (*2, p. 8*) reports an income elasticity of demand around 0.55, whereas the FTC study (*3, p. 510*), based on relative changes in variables from year-to-year, reports a coefficient of 0.2. These results point up the magnitude of variation in statistical measurement depending on method and periods analyzed.

Consumption of coffee rose sharply during the war years. Probably, the rise cannot be explained by economic forces or by any simple trend

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[1] Italic numbers in parentheses refer to literature cited, page 71.

[2] The standard error terms for each coefficient are shown in parenthesis. Intercorrelation between price (p) and income (I) was very low—$r^2_{23} = 0.026$.

COFFEE CONSUMPTION IN U. S.
Per Person 15 and Over, Actual and Estimated

WORLD WAR II

Actual

Estimated
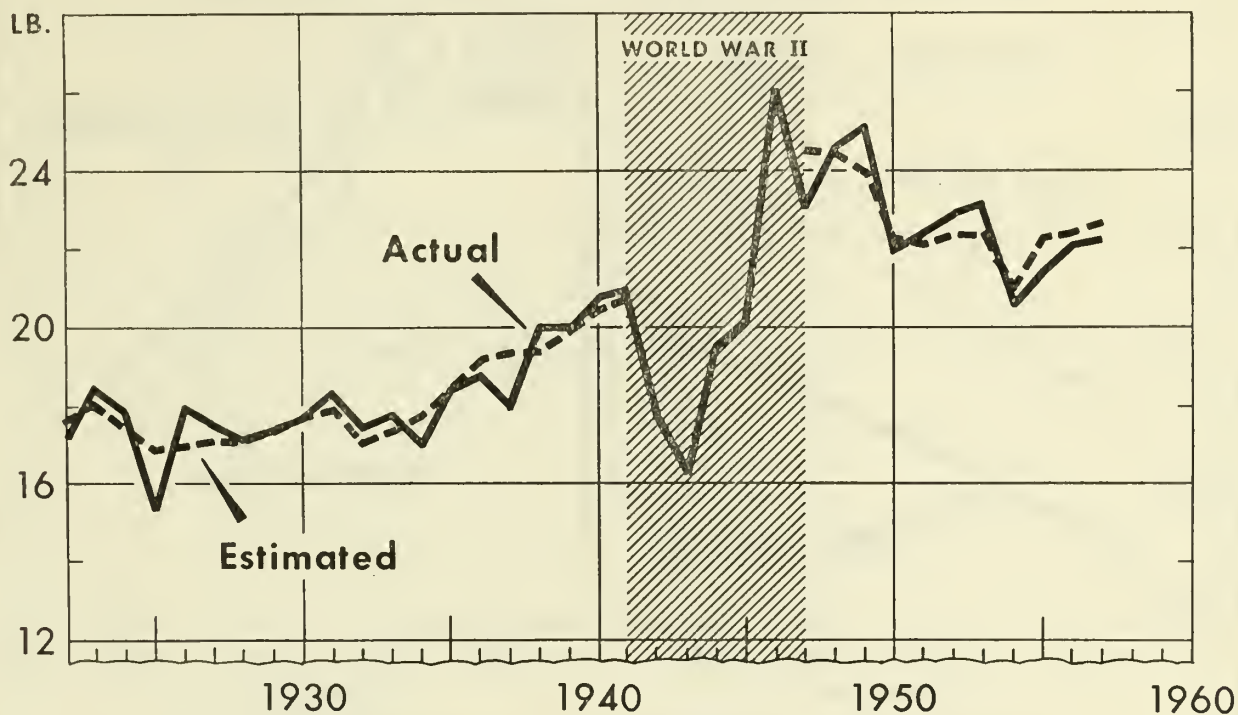
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FIGURE 1.

analysis. Big supplies, restricted shipping facilities, relatively low prices, and wartime strains apparently contributed to that sharp rise in consumption. When the prewar and postwar years are analyzed together, a higher income effect is indicated than for either period separately. This situation apparently exists for all foods combined as well as for a number of other commodities.
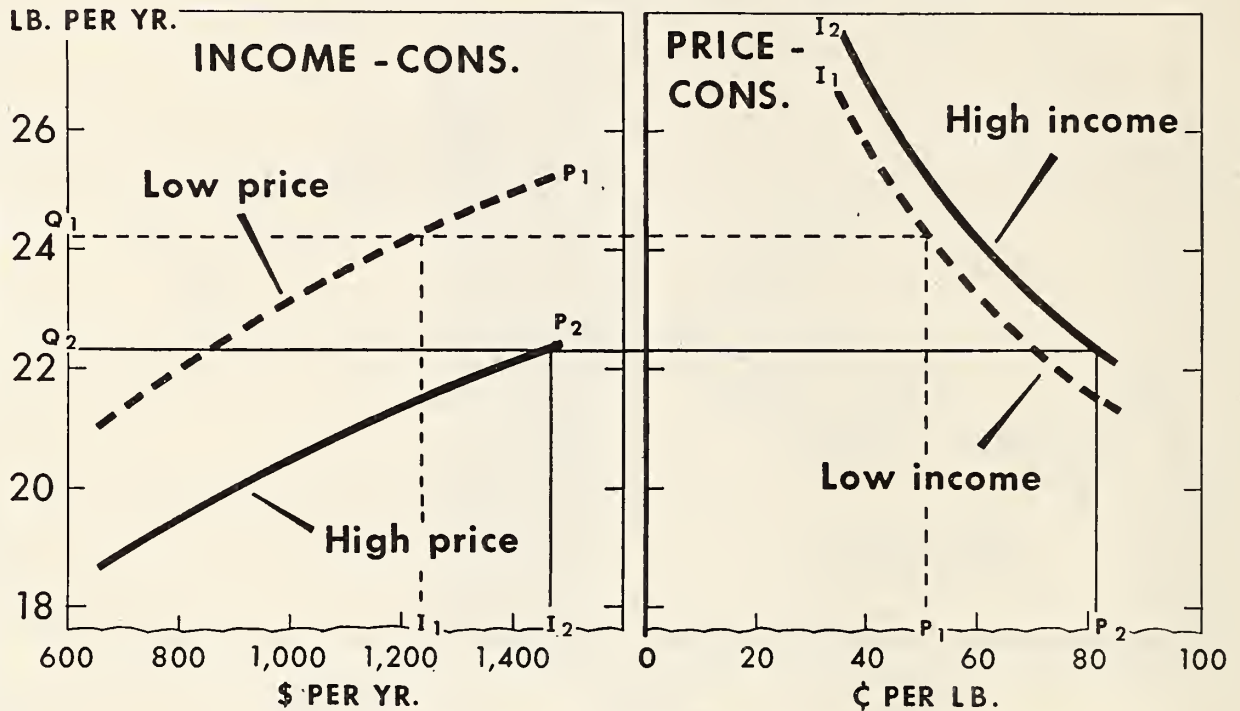
If the price elasticity of demand is around −0.25 to −0.3, the lower estimate of income elasticity of demand is probably more reasonable. Consumer behavior making for a low price elasticity of demand probably would result in a similar income effect—of the opposite sign—particularly if there are no highly competitive commodities. There is some logic as well as empirical evidence to suggest that the sum of elasticities for all monetary variables should approximate zero—price and income elasticity of

demand would be about the same size but of different sign. However, the extent to which consumption is positively related to prices of highly competitive products, price elasticity of demand should exceed income elasticity of demand (*5, p. 292 ff., and 6, pp. 114–115, 143, and 144*).

As a check on the unsatisfactory results for the postwar period, data on coffee consumption relative to income were available from income-expenditure surveys for 1948 and 1955 (*7, pp. 85 and 90 and 8, pp. 11, 17, and 161*). These studies report coffee consumption by income levels at a particular point in time. Both show a flexibility of consumption relative to income a little above 0.2 compared with the 0.23 based on the prewar analysis (equation 1) and this elasticity is about half as large as reported in the FAO study. These data, when plotted, emphasize also the much lower level of per capita use in 1955

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DEMAND FOR COFFEE IN U. S.
Income, Price, and Consumption Relationships*

INCOME - CONS.

LB. PER YR.

Low price

High price

Q_1
Q_2
P_1
P_2
I_1
I_2

26
24
22
20
18

600   800   1,000 1,200 1,400

$ PER YR.

PRICE - CONS.

High income

Low income

I_2
I_1
P_1
P_2

0   20   40   60   80   100

¢ PER LB.

* REAL INCOME PER PERSON, AVERAGE RETAIL PRICES, CONSUMPTION PER PERSON 15 YEARS AND OVER

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FIGURE 2.

than in 1948, chiefly because of the higher prices for coffee and, possibly, some technological developments between the two periods.

On the basis of results of these consumption-income studies it appears that price and income elasticities of demand based on the prewar analyses were the best indication of how consumers modify their consumption in response to changes in price and income. But in order to use these relationships in the postwar period, it was necessary to adjust arbitrarily the constant term in the estimating equation to reflect the higher postwar level of coffee consumption.[3] This adjustment does not change the price and income elasticities assumed for the period. It does recognize that no simple analytical framework explains the large

[3] The constant term in equation (1) was raised from 1.034 to 1.126 in order to make estimated equal actual consumption in the 1947–49 period when price and income levels were taken into consideration.

increase in consumption during the World War II period.

Per Capita Use Trending Downward

Consumption per capita estimated on the basis of equation (1) follows closely actual consumption for the prewar and postwar years. Despite rising consumer incomes in the postwar years, the sharp rise in relative prices for coffee contributed to the decline in per capita consumption of coffee beans during that period.

Average retail prices of coffee for 1956 and 1957, adjusted for changes in the general price level, were about 56 percent above the 1947–49 average. Possibly a fourth of all coffee consumed in the United States is sold through restaurants, hotels, and other institutions, and the retail price of a cup of coffee has generally doubled in these outlets. In addition, few places now give a second and third cup of coffee with a meal.

Rising prices for coffee in recent years have encouraged the development of substitute beverages and coffee extenders. Less coffee is wasted at the higher prices and institutional users are reportedly making more cups of coffee per pound of beans—possibly as many as a third more. Although lower relative prices are likely to stimulate increased consumption, some of these inroads in the demand for coffee probably will be permanent.

Consumption, Price, and Income

Relationships among consumption, prices, and income are illustrated for the immediate postwar years and for 1956 on the basis of the demand analysis, in order to point out shifts among these relationships between the two periods. The left grid of figure 2 shows the relationship between per capita real income and consumption at the 1956 level of coffee prices (P_2) and the 1947–49 average (P_1). For any given income level, consumption is greater at a low than at a higher price for coffee. Also, at any given price level, higher incomes contribute to increased consumption of coffee. In this grid, the higher 1956 price of coffee is also associated with the high real consumer income shown by the solid line.

The right grid of figure 2 shows the relationship of retail price per pound to consumption for two levels of demand. The 1956 demand level (I_2) corresponds to the low consumption (Q_2) and the higher price level (P_2). The 1947–49 income level (I_1) corresponds to the higher consumption level (Q_1) and the lower price level (P_1). If consumption were held at the 1947–49 level of 24 pounds, the 1956 demand conditions, according to these relationships would suggest substantially lower relative prices for coffee.

Efficiency and More Cups Per Pound

Some analysts suggest that much of the decline in per capita use of beans in recent years reflects increased use of instant or soluble coffee. The greater efficiency in instant coffee is difficult to appraise. Estimates by coffee experts vary all the way from little or no increase to a gain of possibly 40 percent in cups of coffee per pound of green coffee bean.

A recent official Government report indicates that instant coffee represents about 17 percent of total consumption in this country and that such soluble products provide about 15 percent more liquid coffee than can be brewed from the same quantity of regular coffee (9, *January 1958, p. 20*). However, the advantage on a cost-per-cup basis probably would be less than 15 percent (*11, NFS–81, p. 31*).

If an efficiency of 15 percent for 17 percent of the coffee is assumed, this technological factor would represent only around $2\frac{1}{2}$ percent fewer pounds of beans used because of the greater efficiency of soluble coffee. With the consumption of coffee beans for 1957 this would amount to around $22\frac{1}{2}$ pounds per adult rather than the 22 pounds reported. But the convenience of instant coffee may have resulted in greater consumption in some households, particularly between meals.

The Federal Trade Commission report (*3, pp. 44 and 45*) suggests that the efficiency of extraction in instant over roasted coffee is larger than 15 percent. Although the quantity of water used by the consumer is not known, this report indicates an advantage in instant over roasted coffee of possibly 40 percent. If the efficiency factor was this large in 1957, consumption of beans was around 1 to 2 pounds per person smaller than it would have been without the instant coffee. Moreover, such high efficiency may result in an increasing share of coffee consumed in instant form in coming years.

Stretching the use of coffee to make more cups per pound also has a significant influence on the use of coffee beans. If institutional users retail about a fourth of the coffee sold and if they now get about a third more cups per pound of coffee than formerly, this addition of water would substantially reduce total bean requirements for a given number of cups of coffee. An adjustment for increased use of water together with assumed greater efficiency of instant coffee, on 1957 consumption, may represent 2 or 3 pounds of beans per adult.

These two adjustments would largely account for the difference between 22 pounds per person in 1957 and around 25 pounds in 1949. At best, these calculations are only rough approximations. Not all public eating places may be brewing more cups of coffee per pound of beans, whereas probably many household users are getting more cups per pound and are less wasteful than formerly.

Some of the increase in number of cups of coffee per pound of beans probably represents technological developments in brewing and possibly a

more widespread use of extenders. Although the use of less coffee bean per cup of coffee may be largely a matter of price, cheaper coffee probably would not bring a complete reversal to earlier brewing techniques and wasteful habits.

Coffee Prices and Some Forces Influencing Them

Coffee prices depend to a considerable extent on general economic conditions and consumer incomes in the United States as well as on world supply conditions and many other forces that cannot be measured. Most producing countries exercise controls over the production and marketing of coffee. The consumption and price are influenced in many European countries by import restrictions, colonial preference, tariffs, and taxes. Cyclical variations in production and inadequate statistical reporting on production and stocks contribute to considerable variation in price, and complicate the job of analyzing price movements as well.

Many of these institutional factors are major influences in price-making in the current coffee situation, particularly as they modify available market supplies. Another analytical complication arises from the need to treat the interdependence of world supply and demand conditions. We cannot isolate the influence of different markets with simple analytical frameworks.

For the major United States market, a simple economic framework will require successive approximations among relationships to get reasonably consistent results. For example, an appraisal of domestic requirements for coffee requires an assumption for retail prices. In the price equation, the domestic supply must be prejudged as a first approximation when estimating wholesale prices.

Despite these limitations, some simple single equation relationships were found to be useful in analyzing the major forces that have influenced wholesale coffee prices at New York during the last quarter-century. An attempt was made to include both the United States and European markets for coffee, as well as the world supply of coffee. But most reasonable results were obtained from a relationship expressing the wholesale price of coffee at New York as a function of (1) United States domestic demand conditions, (2) United States supplies of coffee facing the consumer, and (3) a composite variable designed to show world supplies relative to world exports.

Coffee Prices: An Appraisal

Wholesale prices of Santos No. 4 coffee at New York appeared to be one of the most representative price series. This series, which is represented by (P_w), was adjusted for change in the price level by deflating by the consumer price index. As in the demand analyses, per capita consumer disposable income, adjusted for change in the price level, was used as the indicator of domestic demand conditions (Y). Domestic supplies (S) facing the United States consumer consist of the sum of United States carryover stocks and imports per person 15 years and over (table 1).

The world supply variable (W) is an involved composite of both supply and demand influences. Carryover stocks supposedly represent visible world stocks in both importing and exporting countries. Some of this statistical information is not a matter of record—such estimates are rough approximations. Stocks and world production estimates are those reported for marketing years by the United States Foreign Agricultural Service (10). Total supplies (carryover plus production) were divided by world exports to indicate the relative size of supplies. This variable was lagged by a half-year. Thus, in appraising calendar year 1958, estimated production and exports for 1957–58, which are available early in the calendar year, can be used in an appraisal of price prospects for the year.

These analyses were expressed in logarithms to show proportionate changes among variables. The prewar and postwar years were analyzed separately because of indicated substantial shifts in relationships among variables. Results of the 1922–41 period analysis follow:

$$\log P_w = 2.078 + 0.713 \log Y$$
$$(0.504)$$
$$-2.070 \log S - 0.563 \log W \qquad (2)$$
$$(0.620) \qquad (0.215)$$
$$R_{1.234} = 0.82$$

There was very little intercorrelation among the independent variables. However, the error terms were fairly large and the correlation is

TABLE 1.—*Coffee prices, consumption, world supply, and related data, 1922–57*

Years	Per capita consumption	Retail prices per pound	Per capita income	Consumer price index	Wholesale price per pound	U. S. supply per person	World supply	World production	World net exports	Population 15 and over
	Pounds [1]	Cents [2]	Dollars [3]	1947–49= 100 [4]	Cents [5]	Pounds [6]	Million bags [7]	Million bags [8]	Million bags [9]	Millions [10]
1922	17. 2	36. 1	756	71. 6	14. 2	19. 1	8. 6	22. 7	19. 6	75. 2
1923	18. 4	36. 9	845	72. 9	14. 5	19. 8	8. 6	18. 2	18. 1	76. 7
1924	17. 8	42. 6	834	73. 1	21. 3	19. 0	5. 3	30. 2	22. 3	78. 5
1925	15. 3	50. 4	848	75. 0	24. 5	17. 0	9. 6	21. 0	20. 0	79. 9
1926	17. 9	50. 2	861	75. 6	22. 3	19. 7	6. 8	25. 8	21. 2	81. 3
1927	17. 5	47. 4	869	74. 2	18. 7	18. 8	7. 3	26. 0	21. 4	82. 8
1928	17. 1	48. 2	891	73. 3	23. 2	18. 4	7. 7	38. 6	23. 7	84. 2
1929	17. 3	47. 9	930	73. 3	22. 1	18. 5	18. 2	22. 6	22. 0	85. 6
1930	17. 7	39. 5	846	71. 4	13. 2	19. 3	14. 3	45. 2	23. 4	87. 1
1931	18. 3	32. 8	792	65. 0	8. 7	21. 1	31. 4	28. 9	26. 2	88. 2
1932	17. 4	29. 4	668	58. 4	10. 7	19. 4	28. 7	40. 1	23. 6	89. 3
1933	17. 7	26. 4	658	55. 3	9. 3	19. 4	31. 7	27. 9	21. 4	90. 4
1934	17. 0	26. 9	719	57. 2	11. 2	18. 2	23. 1	45. 5	24. 8	91. 6
1935	18. 4	25. 7	782	58. 7	8. 9	19. 9	27. 1	29. 8	21. 1	92. 9
1936	18. 7	24. 3	872	59. 3	9. 5	19. 9	24. 1	37. 9	25. 6	94. 1
1937	18. 0	25. 5	897	61. 4	11. 1	18. 9	28. 9	42. 7	24. 0	95. 3
1938	20. 0	23. 2	839	60. 3	7. 8	21. 4	30. 4	38. 4	24. 7	96. 5
1939	20. 0	22. 4	906	59. 4	7. 5	21. 8	23. 3	37. 5	26. 6	97. 8
1940	20. 7	21. 2	962	59. 9	7. 2	22. 3	23. 0	35. 2	25. 6	99. 2
1941	20. 9	23. 6	1, 108	62. 9	11. 4	27. 0	23. 5	26. 2	22. 5	100. 5
1942	17. 7	28. 3	1, 250	69. 7	13. 4	22. 6	17. 4	27. 0	18. 6	100. 7
1943	16. 2	30. 0	1, 320	74. 0	13. 4	23. 2	14. 7	30. 8	17. 4	103. 0
1944	19. 5	30. 0	1, 410	75. 2	13. 4	29. 4	18. 7	31. 6	24. 2	104. 3
1945	20. 1	30. 5	1, 398	76. 9	13. 4	31. 4	17. 9	32. 8	25. 4	105. 4
1946	26. 1	34. 4	1, 350	83. 4	18. 7	31. 3	17. 5	33. 7	27. 9	106. 3
1947	23. 1	46. 9	1, 228	95. 5	26. 4	27. 6	16. 4	35. 3	27. 2	107. 5
1948	24. 6	51. 4	1, 245	102. 8	26. 8	29. 6	17. 0	34. 4	30. 8	108. 6
1949	25. 1	55. 4	1, 239	101. 8	31. 8	30. 9	13. 3	39. 1	32. 3	109. 8
1950	21. 9	79. 4	1, 322	102. 8	50. 9	26. 7	10. 8	37. 7	31. 2	110. 9
1951	22. 3	86. 8	1, 319	111. 0	54. 3	27. 9	9. 3	38. 1	31. 6	112. 1
1952	22. 8	86. 8	1, 332	113. 5	54. 1	27. 5	7. 7	39. 2	32. 2	113. 2
1953	23. 1	89. 2	1, 371	114. 4	58. 5	28. 2	6. 4	41. 5	32. 9	114. 2
1954	20. 5	110. 8	1, 365	114. 8	78. 3	23. 8	6. 7	44. 0	33. 5	115. 3
1955	21. 3	93. 0	1, 428	114. 5	57. 0	24. 8	9. 1	42. 2	29. 2	116. 5
1956	22. 0	95. 1	1, 470	116. 2	58. 3	26. 8	13. 8	50. 4	38. 9	117. 6
1957	22. 0	93. 2	1, 457	120. 2	57. 3	26. 8	16. 9	45. 4	36. 5	119. 1
1958							17. 7	51. 9	37. 0	120. 6

[1] Consumption of coffee per person, 15 years and over. Computed from data in *Supplement for 1956 to Consumption of Food in the United States.* 1909–52, U. S. Department of Agriculture Handbook 62, 1957, p. 113.

[2] Average retail price of coffee per pound in leading cities of the United States, 1922–55. The years 1956 and 1957 are an average of the reported retail price of coffee in bags and in vacuum packs. Bureau of Labor Statistics.

[3] Per capita disposable income deflated by the consumer price index (1947–49=100). Department of Commerce, 1929 to 1957 and for early years, *Supplement for 1956 to Consumption of Food in the United States,* 1909–52, U. S. Department of Agriculture Handbook 62, 1957, p. 55.

[4] Consumer price index (1947–49=100). Department of Commerce.

[5] Average wholesale price of coffee per pound, Santos No. 4, N. Y., Bureau of Labor Statistics.

[6] U. S. supply (beginning stock plus imports) per person 15 years and over. Computed from data in *Supplement for 1956 to Consumption of Food in the United States,* 1909–52, U. S. Department of Agriculture Handbook 62, 1957, p. 113.

[7] Stocks supposedly represent reported world stocks in importing and exporting countries. Years 1921–45 based on data from New York Coffee and Sugar Exchange. Recent years from Foreign Agricultural Service.

[8] World production from *Foreign Agriculture Circular* FCOF–8–57, Dec. 27, 1957. Years back of 1925–26 based on net exports and estimated distribution of coffee in producing countries.

[9] Net exports consist of Brazilian exports and production outside Brazil based largely on reported exports. Data from Foreign Agricultural Service and New York Coffee and Sugar Exchange. See also *Foreign Agriculture Circular* FCOF–8–57, Dec. 27, 1957.

[10] Population 15 years and over. U. S. Bureau of the Census, *Current Population Reports* Series P–25, No. 170 for 1955–57 and Nos. 98, 114, and 146 for 1922 to 1954.

relatively low. Possibly a lagged price variable (Pwt–1) would have improved the correlation and might have resulted in a better estimating equation.

The same relationships for the postwar years, 1947 to 1957, though based on only a few years, gave logical results:

$$\log P_w = 0.561 + 1.513 \log Y$$
$$(0.514)$$
$$-2.257 \log S - 1.989 \log W \qquad (3)$$
$$(0.440) \qquad (0.347)$$
$$R_{1.234} = 0.98$$

The results of equation (3) indicate that a 10-percent rise in real consumer income in the United States were usually associated in the postwar period with an increase of about 15 percent in the wholesale prices of coffee (P_w). But a 10-percent increase in United States coffee supplies per adult usually accompanied a reduction of around 22 percent in wholesale prices of coffee. An increase of 10 percent in the relative world supply situation (W) tended to reduce United States wholesale prices for coffee by about 20 percent.

Although these analyses are greatly oversimplified, they account closely for prewar and postwar variation in wholesale coffee prices on the New York market (fig. 3). In some instances, the direction of change was missed, particularly in 1941, a year in which speculative stock accumulations strengthened prices, and again in the 1950–52 Korean war period. The upsurge in prices in 1954 is fairly well explained and the recent weakening in coffee prices is suggested by the relationship.

The Coffee Situation: 1958

Coffee prices in the United States at both retail and wholesale have declined substantially during the past year. Average retail prices of bagged coffee in the first quarter of 1958 averaged 13½ percent below a year earlier and prices for vacuum packed coffee were down about 12 percent. April retail prices were down around 11 percent from 1957. Wholesale prices also are down; in May Santos No. 4 averaged around 15 percent below a year earlier and prices for Colombian Manizales averaged nearly a fifth lower. The characteristic year-to-year variation in the supply, along with a fairly low price elasticity of demand, put coffee prices under considerable downward pressure when supplies increase as they have in the last year.

Prospective Demand-Supply Conditions

Let us examine more closely the economic forces in the situation in the analytical framework so far presented. Current and prospective trends in economic activity point to some decline in general demand particularly in the United States market. However, real consumer incomes are not expected to average as much as 5 percent below those of 1957.

Carry-in stocks in the United States at the beginning of 1958 totaled 2.96 million bags, 5 percent larger than a year earlier. Apparently, roastings of coffee so far this year are running about a tenth ahead of a year earlier, according to trade reports. But imports in the early months of 1958 were more than a million bags below the first 2 months of 1957. It appears that United States consumption is being well maintained at the lower price levels this year by drawing on stocks. Even with some reduction in United States carryover stocks, consumption requirements at current prices probably will necessitate some increase in imports. Reasonably consistent relationships among supply, consumption, and price variables in the demand and price equations suggest United States coffee supplies per adult at a level a little above 1957.

Recent reports on world production put the 1957–58 crop at 51.9 million bags, some 6½ million larger than output for the 1956–57 marketing year. Trends in world exports of coffee so far in the 1957–58 marketing year indicate that net exports may change little from the 36½ million bags in 1956–57—possibly up slightly. With a production of 51.9 million bags and carry-in stocks of 17.7 million, world supplies for 1957–58 total more than 7 million bags above a year earlier, and the ratio of supplies to exports increases by around a tenth. Indicated supply and disposition also suggest a substantial increase in carryover stocks during the 1957–58 marketing year.

Lower Wholesale Prices Indicated

These demand and supply prospects for coffee in the framework of equation (3) point to a substantial decline in wholesale coffee prices—possibly upward of a fourth on the average from 1957 to 1958 for Santos No. 4. In May, prices of

WHOLESALE PRICE OF COFFEE
Santos No. 4 at New York City, Actual and Estimated

¢ PER LB. *

WORLD WAR II

Actual

Estimated

60

40

20

0

1930   1940   1950   1960
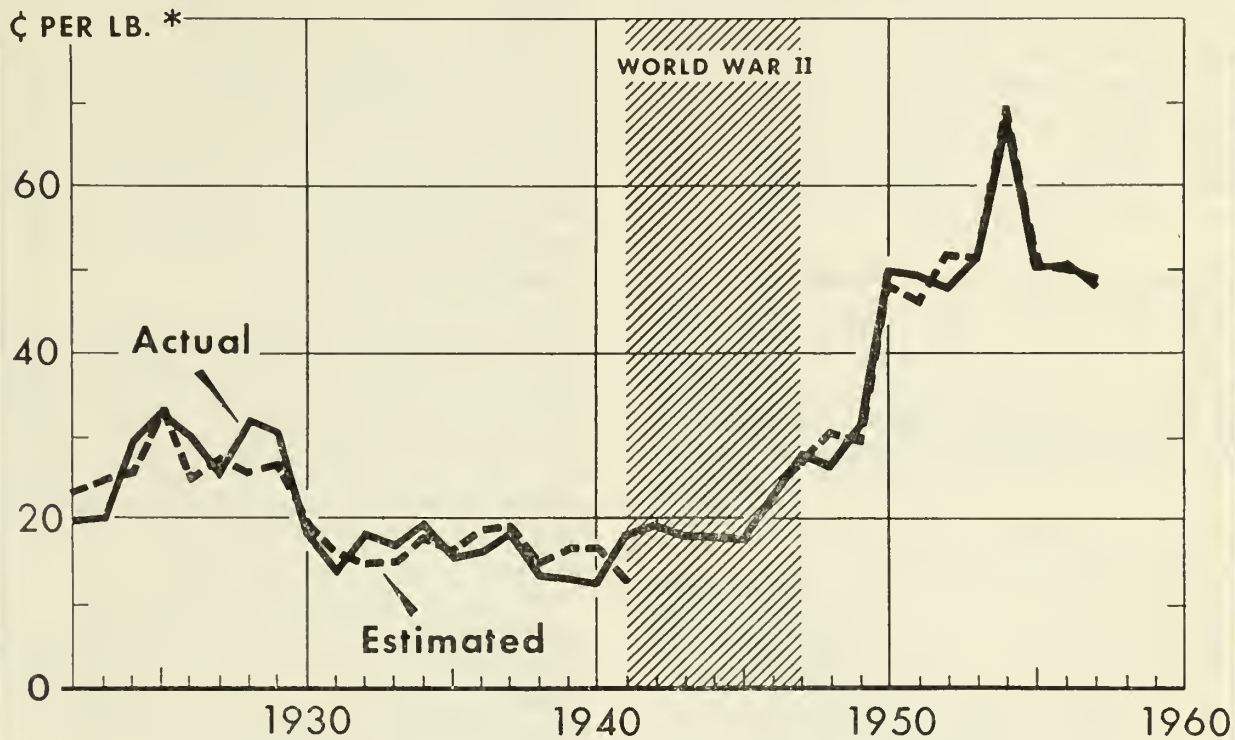
* AVERAGE WHOLESALE PRICE DEFLATED BY CONSUMER PRICE INDEX (1947-49 = 100). BUREAU OF LABOR STATISTICS

U. S. DEPARTMENT OF AGRICULTURE   NEG. 6213-58 (5)   AGRICULTURAL MARKETING SERVICE

FIGURE 3.

Santos No. 4 averaged around 15 percent lower and Colombian Manizales nearly a fifth lower than in May 1957. In the same analytical framework and the basic assumptions for 1958, an increase of around 4 million bags in world exports or an effective insulation from the market of possibly 7 to 10 million bags, would suggest wholesale prices of Santos No. 4 at New York around the levels of April and early May 1958. These magnitudes are suggestive, not precise.

Many assumptions had to be made about U. S. demand and supply conditions as well as probable world exports. Estimates of supply and of the quantity of withholding of coffee by exporting countries are still tentative. There is some indication that world production may be higher than current estimates. Moreover, if the 1958–59 crop is again large, this and the expected substantial increase in carryover stocks during 1957–58 could put considerable pressure on prices later in 1958. Programs designed to maintain coffee prices could be of major importance in influencing future price trends.

Larger Domestic Use Indicated

Declining wholesale prices for coffee have been accompanied by a drop in retail prices. In general, variations in wholesale and retail prices follow each other with very little lag.[4] If wholesale prices are down by almost a fourth as indi-

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[4] Retail prices of coffee in the United States expressed as a function of the wholesale price of Santos No. 4 at New York showed their movements to be highly correlated— $r_{12}=0.99$. At 1957 price levels, the relationship indicated that variations in retail prices amounted to about 0.8 of the variation in wholesale prices.

cated from 1957 to 1958, we may expect average retail prices to drop by nearly a fifth. In March, they averaged around 12 to 14 percent lower than in the early months of 1957.

With such a price decline, despite a small decline in consumer incomes from 1957 to 1958, price and income elasticities shown in equation (1) would suggest some increase in per capita use of green bean coffee—possibly around 2 to 5 percent under conditions assumed. If the retail price decline were around a tenth, little change in per capita use is indicated from 1957 to 1958.

Prospective United States Market for Coffee

Requirements for coffee in the United States during the next 2 or 3 decades will depend primarily on growth of population, relative prices for coffee, consumer incomes, and possibly several other factors, including development of substitute products and efficiencies in extraction techniques.

Prices and Institutional Controls

The substantial rise in relative prices for coffee since the immediate postwar years was a major cause of the decline in its use per person. In future years, relative prices for coffee will depend to a considerable extent on export-control programs in major producing countries. Manipulation of the production and marketing of coffee has been a fairly standard practice in exporting countries for many years. These policy considerations spring primarily from a knowledge of demand and supply characteristics for the product.

As price elasticity of demand is relatively inelastic—small variations in quantity result in big price changes—smaller United States imports, under given demand conditions, result in greater returns to the exporter. When United States imports began to ease down from levels in the immediate postwar years, expanding demand brought a rapid rise in the value of imports. The sharply lower imports in 1954 were more valuable than the much larger imports in 1955 and 1956.

Coffee output, like the output of many fruit crops, varies from year to year and has a longer periodic cycle, which stems largely from economic considerations. Because of these variations some kind of stabilization program may be helpful in ironing out wide price fluctuations (*3, pp. 20–21, and 4, pp. 434–437*).

But attempts to maintain artificially high prices may encounter difficulty from both the demand and the supply side of the picture. The history of coffee contains much about negotiations between Brazil and other countries in their attempts to control world supplies.

During the decade of the 1930's—a depressed period—Brazil burned large quantities only to meet increased competition from rising production in Colombia and Central America. As countries in the Western Hemisphere attempt to control supplies they are encountering increased competition from rising production of coffee in Africa.

In 1957, the United States imported 42 percent of its supply from Brazil and 42 percent of the mild coffees from Colombia and other Central and South American countries. The remaining 16 percent came from Africa and Asia. In the 1951–55 period, Africa and Asia furnished an average of about 8 percent of United States needs. Most of this increase in recent years comes from Africa.

Production in Africa rose from around 2.6 million bags in the last half of the 1930's to 8.8 million bags in 1956–57. This rise in African production probably was due to available resources adapted to coffee production and prospects for an expanding demand.

A policy of controlling supplies must be considered in the light of its effect on encouragement of competing production and development of competing products in major importing countries. A parallel situation is that of cotton. Many cotton producers have come to the realization that price-support policies have tended to price that commodity out of the export markets as well as out of many domestic markets for fibers.

Probable Expansion in the United States Market

In appraising prospective expansion in the United States market for coffee, let us assume, for the sake of simplicity, one relative price at the average 1957 level and another at the lower 1947–49 average level. Real consumer incomes per person are assumed to rise by about 16 percent from 1957 to 1965 and by approximately 40 percent by 1975.

In the framework of equation (1), per capita use of coffee beans (per person 15 years and

older) would increase around 3 to 4 percent from 1957 to 1965 under the higher price assumption. An increase of possibly 15 percent is indicated under 1947–49 relative prices, which are more than a third below 1957.

If it is assumed also that the use of instant coffee rises to a fourth of total use from the current 15 to 20 percent, and yields about 20 percent more cups of coffee per pound of beans, a very small rise in per capita use is indicated between now and 1965 under the higher price assumption. The projected rise under the lower price assumption would also be scaled down from around 15 percent to possibly 12 percent above 1957. This range in per capita use and population growth results in domestic use rising by 15 to 25 percent from 1957 to 1965.

Indicated per capita use for 1975 rises around 8 percent from 1957 under the lower price assumption, and as much as a fifth if the lower price level is assumed. Assuming that the use of instant coffee rises to around a fourth of total utilization, the indicated rise in per capita use would be scaled down to gains of around 6 percent and about 18 percent from 1957. Projected total domestic use would rise by 40 to 55 percent from 1957 to 1975.

If the advantage of instant over roasted coffee is as much as 40 percent, instant coffee would probably make up an increasing share of total coffee consumed. Under the higher price level and conditions projected for 1965 and 1975, per capita use of green bean coffee probably would not increase, and may decline some, in the next decade. Projected increases under the lower price assumption would also be scaled down to about half those indicated above for the smaller efficiency assumption. Total domestic use, assuming the higher (1957) price level, would rise only 5 to 10 percent from 1957 to 1965 and possibly a third by 1975.

The projected changes above are very rough approximations based on fairly specific assumptions regarding relative prices, consumer incomes, and consumer behavior. Some attempt is made to handle explicitly the possible effect of instant coffee, but the influence of other technological developments, and the development of competitive products and coffee extenders, could also modify projected United States requirements.

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Quasi-Fixed Costs and Their Impact

By Paul E. Nelson, Jr.

In analyzing the behavior of firms, economists have long distinguished between the influence of fixed and variable costs. There have gradually appeared in the budgets of many companies certain cost items like promotion and advertising which are allocated for a given period, but which are essentially independent of actual production for the same period in the manner of fixed costs. In this article, the growth in the importance of such budgeted items is outlined and their meaning analyzed in terms of pricing under monopolistic competition.

INSTITUTIONAL DEVELOPMENTS in our economy since 1860 merit the designation "organizational revolution." The extension and elaboration of the corporate form of business organization with all its associated practices is an integral part of this revolution. One of the more noteworthy developments of current corporation practices is the growth of what may be termed "quasi-fixed costs." These are costs, such as those budgeted for research and promotion, that do not vary directly with scheduled output, but that would not be incurred if there were no output.

The term "quasi" is used in a manner analogous to Marshall's use. Through the use of diagrams and supporting statistics, four questions concerning the impact of quasi-fixed costs under monopolistic competition are examined: (1) What is the incidence of these costs? (2) What is their impact on pricing and production scheduling? (3) What are the differences between long-run and short-run effects? (4) What are the implications of large quasi-fixed costs for the economy as a whole?

Examples of quasi-fixed costs include promotional and research expenditures and legal retainer fees. None of these vary directly with scheduled production, and each is increasingly included as an annually budgeted item.[1]

In theory, promotional expenditures include advertising, gifts, and expenditures incurred in creating goodwill. Some years ago, Professor Chamberlin noted that classical analysis is predicated on the assumption that total costs are essentially production costs, whereas an implicit characteristic of monopolistic competition is that total costs include both production and sales costs. In his presentation,[2] Chamberlin did not consider research expenditures, legal retainer fees, or corporation income taxes.

Importance of Specific Quasi-Fixed Costs

Promotional expenditures have mounted steadily. Full promotional expenditures are difficult to obtain, but advertising expenditures may be used as an indicator. Table 1 shows total advertising expenditures for the United States for selected years. The $9 billion spent in 1955 dramatizes their increasing importance.

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[1] If companies do not budget, that is, allocate (thereby providing what amounts to a contractual basis for their expenditures), the relevance of this analysis is subject to question. Also, some budgeted items can be suggested as quasi-fixed costs from the viewpoint of an accountant, but from an economist's viewpoint, they would not be in this category. Thus, Maurice Moonitz writes in the April 1957 *Accounting Review*, pages 175–183, "To judge by published financial statements businessmen and accountants insist that income taxes are an expense to be taken into account before arriving at net income for the year," and, in its Accounting Research Bulletin 43, page 88, The American Institute of Accountants states, "Income taxes are an expense that should be allocated when necessary and practicable, to income and other accounts as other expenses are allocated." If the accountant budgets in advance and actually prevents the use of funds so budgeted for any purpose except actual tax payments, then the case for including them as quasi-fixed costs has merit. But if—as some economists will argue—this is purely an accounting convenience, then such accounting devices are really not quasi-fixed costs as we have defined them. Also, the actual tax is dependent upon future earnings and is usually either plus or minus the best of estimates.

[2] Chamberlin, Edward. THE THEORY OF MONOPOLISTIC COMPETITION. Harvard University Press, Cambridge, Massachusetts. 1936. Chapters VI and VII.

Research has increased greatly as a budget item. Expenditures for this purpose approximated $4 billion in 1954.[3] This compares with almost $1 billion in 1941. In 1954, research expenditures in the food industries were equivalent to 10.6 percent of profits after taxes. In drugs, the corresponding figure was 37.6 percent and in instruments, 46.9 percent.

Focus and Initial Assumptions

Because circumstances vary greatly, questions concerning the impact of quasi-fixed costs must be answered within the frame of reference of specific situations. In examples I (A) and I (B), the company is assumed to possess a capacity that is less than its long-run optimum. In I (A), expenditure of budgeted quasi-fixed costs achieves the objectives for which they were budgeted, whereas in I (B) they fail. In circumstances II (A) and II (B) the company is assumed to possess a capacity greater than its long-run equilibrium; and again in II (A) budgeted expenditures succeed, and in II (B) they fail to attain the objectives for which they were budgeted.

Within each of these situations are posed certain basic questions: (1) Does the incidence of these quasi-fixed costs fall upon the company? (2) Does their impact alter (*a*) basic capacity, and (*b*) pricing and production scheduling? (3) Do short-run answers vary markedly from long-run answers? (4) Are there any implications for the economic behavior of the economy as a whole?

Basic Analytical Model

In figure 1 the company initially is assumed to have only production costs. It is a participant in monopolistic competition[4] but not with its optimum capacity of plant for its long-run equilibrium. Its capacity is smaller than the long-run equilibrium capacity (ATC$_3$), suggested by the assumed long-run average total-cost curve. Its initial demand curve is (AR), its marginal revenue (MR), and its cost curves, (ATC$_1$) and (MC$_1$).

[3] Turner, H. S. HOW MUCH SHOULD A COMPANY SPEND ON RESEARCH? Harvard Business Review. 32: 101–107. 1954.
[4] This analysis pertains only to companies, associated with agriculture, that have characteristics of monopolistic competition.

TABLE 1.—*Advertising expenditures in the United States for selected years* [1]

Year	Millions	Year	Millions
1867	50	1930	2,607
1880	200	1940	2,087
1900	542	1950	5,710
1909	1,142	1955	9,029
1920	2,936		

[1] Printer's Ink, Aug. 24, 1956, pp. 40–41.

Each respectively represents the company's short-run average total unit and marginal costs. (LATC) is its long-run average total unit cost curve, and (LMC) its long-run marginal cost curve. Straight-line (AR) and (MR) curves are assumed in figure 1, as in all following diagrams, in order to facilitate graphics. There is no apparent reason why such a simplification should alter the basic character of the results obtained.

With an initial output of (O–A), this company is assumed to be making abnormal profits because normal profits have been incorporated in its total costs, and yet average total unit costs are less than average revenue received. Hence abnormal profits are pictured by the area (BCDE). The analytical model in figure 1 assumes that no changes in production (O–A), price (A–D), or the basic capacity reflected by (ATC$_1$), can occur without a shift in the entire (MC$_1$) curve, the entire (MR) curve, or both.

This model assumes, as figure 1 demonstrates, that during the short run quasi-fixed costs do not directly affect either marginal curve. Over time, however, the budgeted expenditures of quasi-fixed costs can result in the movement of (MC$_1$) or (MR), or both. For example, successful research expenditures can result in a shift of the entire (MC$_1$) curve.

The success of the research from the viewpoint of the company is its ability to perform the same process at lower cost—a shift in (MC$_1$)—or the creation of a new process which either replaces the old one, or enables a new product or product refinement to be accomplished for the first time. But these results follow after the budgeted expenditure, and thus immediate quasi-fixed cost expenditures do not alter the marginal curve.
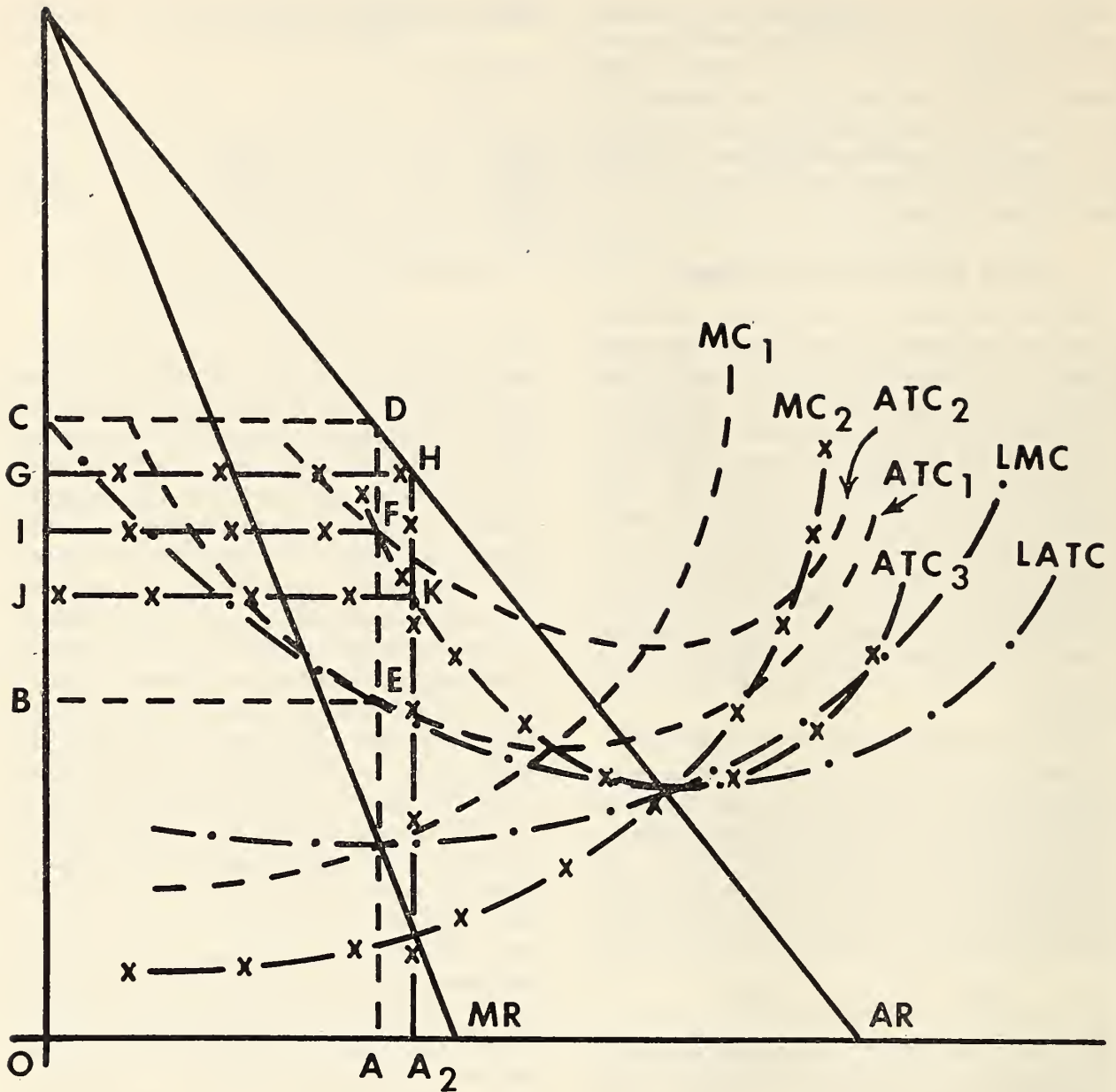
FIGURE 1.

Success of Quasi-Fixed Expenditures

The impact of promotional and of research expenditures is treated separately for the sake of graphic simplicity, and figure 2 repeats the analytical model assumed in figure 1 as a starting point. Figure 1 is used to show the impact of research expenditures, and figure 2 the impact of promotional expenditures for any company with

characteristics analogous to those of the assumed model. Furthermore, it is assumed that the budgeting of either research or promotional expenditures will raise the short-run average total unit cost curve from its initial position of (ATC₁) to (ATC₂).

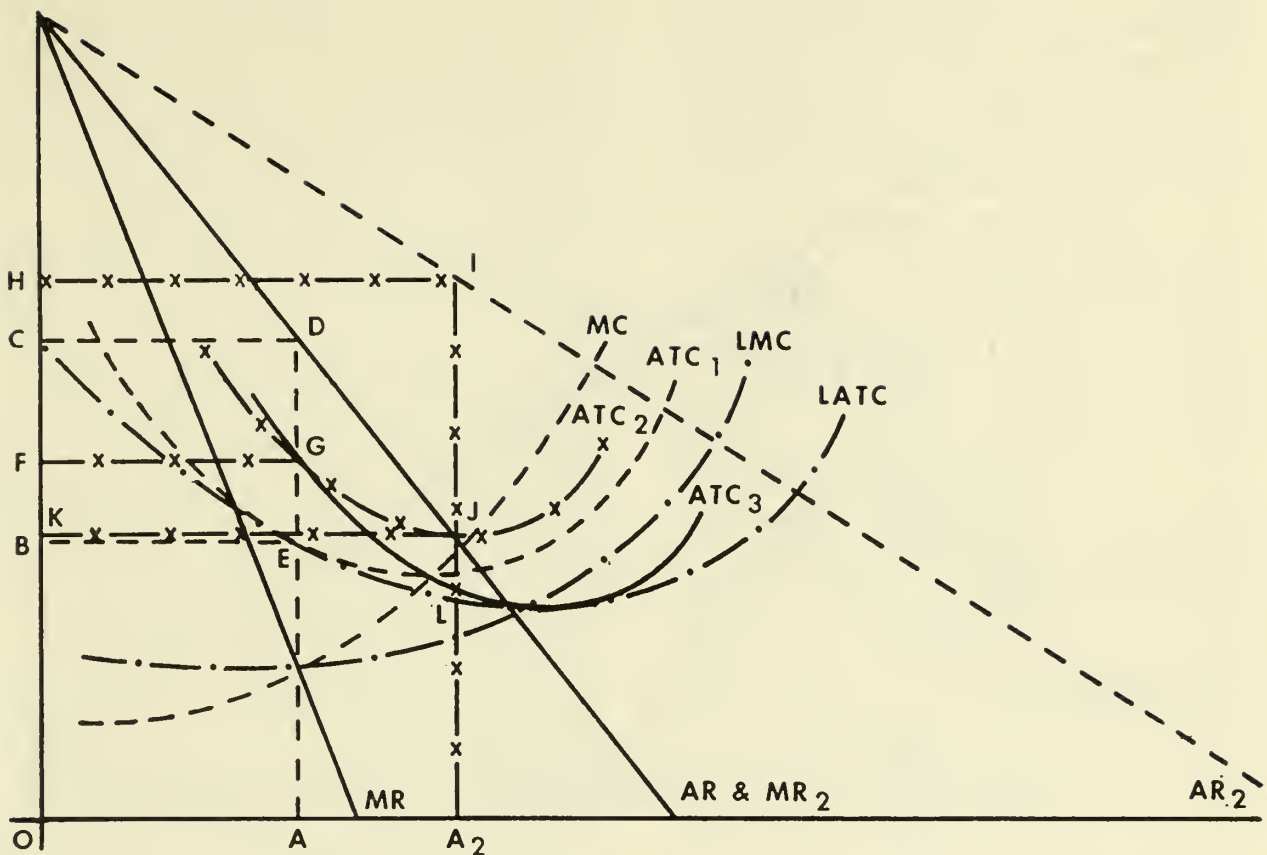If research is a success and results in a lowering of variable costs, and hence of marginal costs

FIGURE 2.

(fig. 1), this may be illustrated by showing that (MC_1) becomes (MC_2), while (ATC_2) drops to (ATC_3). Production would become ($O–A_2$), price (A_2–H), and total abnormal profits (JGHK).

The impact of successful promotional expenditures is shown in figure 2. Success in promotional expenditures will mean the upward movement of the entire demand curve. Thus in figure 2, the initially assumed demand curve, (AR) becomes (AR_2) and consequently (MR) shifts to position (MR_2). The initial promotional expenditures are depicted by the rise of (ATC_1) to (ATC_2).

Production increases from ($O–A$) to ($O–A_2$), and price changes from (D) to (I). Total profits become (KHIJ). In this instance, note that the average total unit cost for production of ($O–A_2$) units is (JL) greater than the long-run average total unit cost for this production. Note also that

(ATC_3) at this level of production is only slightly higher than the long-run average total unit cost at point L. Thus, this company will be encouraged to expand its capacity from that associated with (ATC_2) to that which represents (ATC_3) and which in this instance happens to be the company's long-run optimum capacity, given its technology. It is emphasized that this analysis pertains only to companies whose capacity is less than their long-run optimum.

I (B)—Failure of Quasi-Fixed Expenditures

If budgeted research is a failure, only the average total unit cost curve will shift position, all others remaining constant. Thus, in figure 1, we noted that the expenditure of budgeted research funds raised (ATC_1) to the position (ATC_2). As a result, profits will have been cut, in this instance by an amount equal to the area (BIFE), and profits will be the area (ICDF). If budgeted
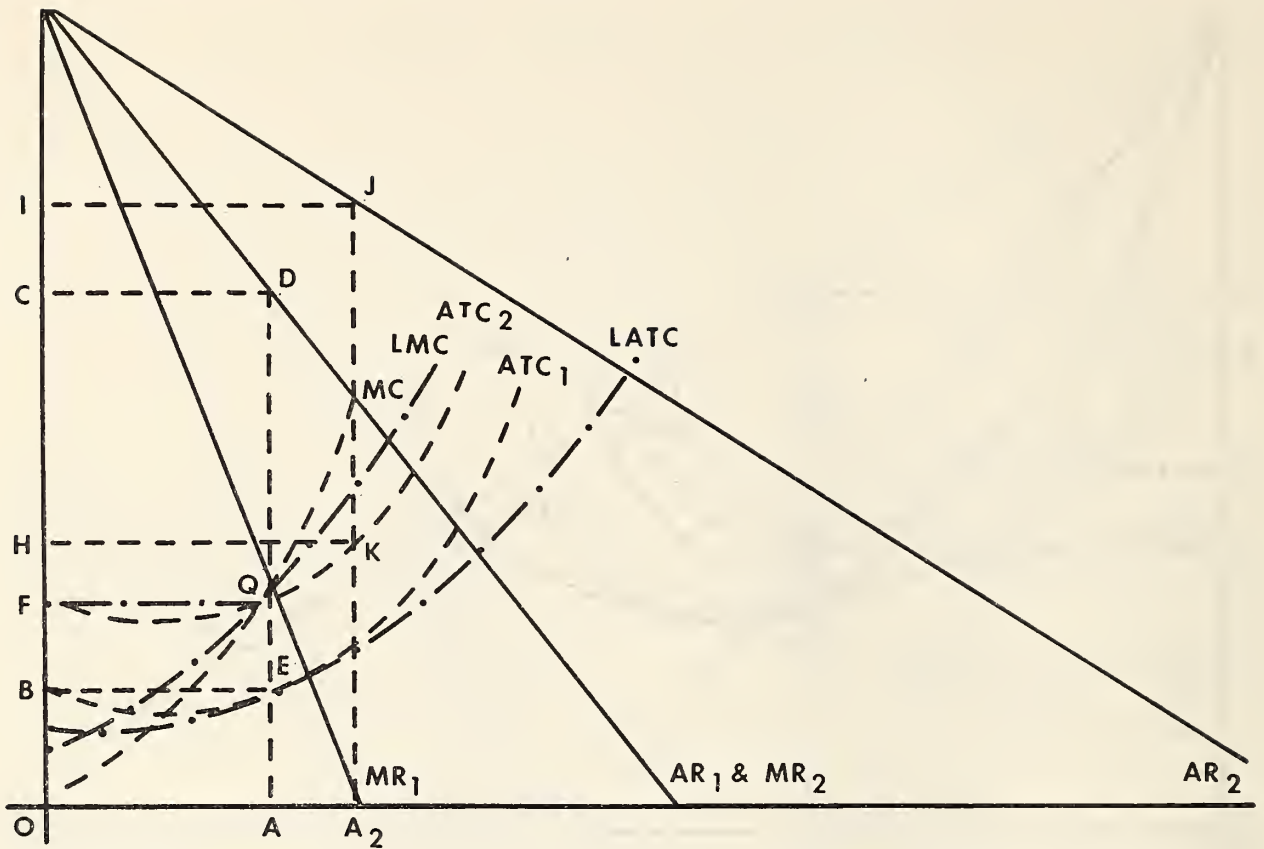
FIGURE 3.

research continues to fail, such expenditures probably will be eliminated.[5]

If promotional activities fail, the same results as those obtained for failure in research will occur. In figure 2, budgeted promotional expenditures raised (ATC₁) to position (ATC₂). If promotion fails completely, then all other curves remain constant. Thus, in the instance of failure, in figure 2, profits become (FCDG), which reflect a drop equal to the area (BFGE). Production remains at (O–A).

II (A)—Success of Expenditures to Obtain Objectives

In figure 3, the original model is altered so that the company represents one that has expanded its

[5] When provision for tax deduction permits deduction of a portion of such expenditures from gross income in computing taxable income, this area (ICDF) will be increased by the amount of permitted deduction, related to the existing tax rate.

capacity to such an extent that it is larger than the long-run optimum capacity of the company. (ATC₁) represents this initial assumed capacity for this altered model. This model will be used to demonstrate the success and failure of promotional expenditures. The initial production is (O–A), price is (P), and total abnormal profits (BCDE). Successful promotion moves the demand curve from (AR₁) to (AR₂) and (MR₁) to (MR₂). Promotional expenditures immediately move (ATC₁) to (ATC₂), price becomes (J), production (O–A₂), and abnormal profits (HLJK).

II (B)—Failure of Expenditures to Obtain Objectives

In figure 3, failure of promotional expenditures is illustrated by a movement of (ATC₁) to (ATC₂) without any movement in the other curves. Thus, with failure, production remains (O–A), price re-

mains (AD), and profits shrink from the area (BCDE) to the area (FCDQ).

The importance of the advertising budget is emphasized by tax provisions that permit deduction of "reasonable promotional expenses" in the company's determination of its taxable income. Further encouragement for the budgeting of advertising expenditures is the fact that it is difficult, if not impossible, for the company to ascertain the effectiveness of promotion with any marked degree of precision.

There is some evidence to suggest that certain of the 100 largest advertisers in the country budget and spend increments for promotion not matched by equal increments in sales receipts.[6] Hence, while the levy of the corporation tax does not directly or immediately affect the marginal curves of a company, over time the impact of the provisions for computing the tax can affect them.

If the tax provisions encourage promotional expenditures, and if these expenditures are successful in moving the demand curve, and hence the marginal revenue curve, the production, prices, and profits will change. But it is through the medium of the promotion that tax provisions encouraged that such a change could occur. Other tax provisions, such as loss carry-back or carry-forward, encourage expansion by merger rather than by internal growth,[7] though recent decisions of the United States Supreme Court may deemphasize this impact. These rulings appear to require that the acquisition possess the same business organization as that of the acquiring company if carryover provisions are to be acceptable.

Analytical Summary

Quasi-fixed costs have become increasingly important during the last half century. These costs include annually budgeted items such as promotional contracts, legal retainer fees, and research expenditures. Under the assumption of monopolistic competition, microanalysis was adopted to examine the impact of these costs.

Information obtained from the models used in figures 1, 2, and 3 provides answers to the four basic questions raised under situations I (A) and I (B) and II (A) and II (B).

When a company possesses a capacity of less than optimum size, and research succeeds, the incidence of cost essentially is borne by the company; the price drops, production increases, and the company expands its abnormal profits. In this instance, short-run and long-run answers for the impact on the individual company do not vary markedly.

When a company with the characteristics assumed in the preceding paragraph has a successful promotion program, the cost is borne essentially by the consumers; and price, production, and abnormal profits rise. When the company concurrently experiences success in both research and promotion, price will change as a function of the magnitude of the change in marginal cost and the amount by which demand has changed.

For the individual company, no difference exists between long- and short-run answers under the given assumptions.

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[6] *Printer's Ink* for years 1951–55 published advertising expenditures for all companies budgeting $1 million or more, and listed by name and amount the 100 leading advertisers. For the corresponding period *Moody's Industrial Manual* published total net sales. Data from these sources were used to ascertain if any relationship between the increments or decrements in budgeted advertising expenditures and increments or decrements in total sales receipts existed among the companies of the 100 largest advertisers which could be classified in six basic industries, (1) appliances; (2) automobiles; (3) food and beverage; (4) petroleum products; (5) soap and cosmetics; and (6) tobacco. Of the six industry aggregates, all except one had a statistically significant correlation at the 1-percent level. Four of the six, however, had an inverse relationship. These results must be interpreted with caution. The one thing that may be stated is that they do not yield any data that dispute the contention that some leading advertisers have budgeted increments in advertising expenditures and have not received back equivalent increments in total sales receipts.

[7] One example is Foremost Dairies. The prospectus filed by Foremost with the Securities Exchange Commission states: "The provisions for Federal taxes on income of Foremost in 1950, 1953, 1954, and 1955 periods are $141,000; $248,000; $1,200,000, and $30,000, respectively, less than the amounts computed at current tax rates on the income for these years owing to the benefits available through the carryover for Federal tax purposes of the operating losses incurred by subsidiaries in years prior to the acquisition thereof by Foremost."

When a company with a capacity less than its long-run optimum fails in either promotion or research, it bears essentially the cost burden, the precise share being a function of the elasticity of its demand curve. Price and production remain constant; and for the company there are no differences between short- and long-run answers under the given assumptions.

When the company operates with a capacity that is greater than its long-run optimum and has success in budgeting, its quasi-fixed expenditures for promotion, price, production, and abnormal profits increase. When it has success only in research, its production increases, as do its abnormal profits, but the price drops.

When the company has success in both research and promotion concurrently, the price changes, as price is a function of the elasticity and extent of shift in the demand curve, and the magnitude of change in the marginal cost curve. Production and abnormal profits increase. Generally speaking, the primary benefits for the consumers under such a situation are improved quality and availability of product. Again, for the individual company there is no marked difference between long- and short-run answers, given the assumptions upon which the model was based.

When a company with a capacity greater than its long-run optimum fails to achieve its promotional and research objectives, price remains constant, as does production, but profits fall as average total unit costs increase. Short- and long-run answers for the individual company remain the same, given the constancy of initial assumptions. However, the difference between long- and short-run answers for the economy as a whole will differ according to which company model predominates an industry or industries. This means that if the model—that of companies with capacities which are greater than their long-run optimum—predominates in sufficient industries, the impact for the economy as a whole will vary from that when other models dominate.

The pattern initially assumed—that of a company with capacity less than its long-run optimum—is more likely to be characteristic of young industries. Under such conditions quasi-fixed expenditures (costs) for attaining technological improvement, and a broadened extent of the market, if successful, can encourage growth of plant and the adoption of more efficient techniques, with resulting lower prices and an increase in product availability.

But young industries do mature, and in the long run they can develop a pattern more analogous to that of figure 3—a company possessing greater than its long-run optimum capacity. If, during the intermediate and long-run periods, entry to an industry is closed,[8] then, while product availability may be maintained, there appears to be little likelihood that lowered prices will be experienced by consumers of the industry's product.

This assumption of closed entry almost automatically forces additional assumptions concerning the dominance of any given industry by companies whose operating capacity is greater than their long-run optimum. Under such conditions, the analysis related to figure 3 prevails.

As industry structures develop in which the dominating companies are those characterized by capacities greater than their long-run optimum, the most important overall implications relate to monetary-fiscal policies and their implementation.

If many large industries become dominated by firms with operating capacities greater than their long-run optimum, and if these industries virtually have closed entry, there might be great institutional resistance to price drops. This might be especially likely if industry management considers that any reduction in price could be the signal for a downward price spiral.

Thus a situation could develop in which reluctance to decrease prices could mean a growth of pools of unemployment and underemployment during a period in which prices continued at a historic high level. Broad fiscal-monetary policies that could be implemented readily during periods of low prices could not be adopted with the same degree of safety. Such broad-monetary-fiscal policies, if introduced into an economy in which many industries were dominated by companies with the characteristics assumed under figure 3, could trigger a dangerous inflationary spiral, without simultaneously and measurably improving conditions of employment.

This analysis indicates the importance of knowing which model is predominant in the economy.

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[8] Either by birth or expansion of existing companies in other industries over into this industry.

It also implies that, over time, the kind of model which dominates may change. Ready entry is a factor that could do much to prevent a development and dominance of a pattern analogous to that of figure 3. Since 1900, quasi-fixed costs have increasingly influenced the market organization of the economy, and the behavior of companies that are its constitutent units.

Use of 1955 Food Survey Data for Research in Agricultural Economics

By Marguerite C. Burk and Thomas J. Lanahan, Jr.

Statisticians studying the demand for farm commodities have long made use of data collected by home economists, particularly those issued by the Institute of Home Economics of the United States Department of Agriculture in reports of research on family dietary levels and economic problems. They have also made extensive use of data collected by the Bureau of Labor Statistics for revision of price indexes. The most comprehensive food survey yet undertaken was the 1955 Survey of Household Food Consumption, and apparently it was the first in which agricultural economists took an active part. Because of the widespread demand for current data on food consumption patterns, statistical data from the survey were published jointly by the Institute of Home Economics of the Agricultural Research Service and the Agricultural Marketing Service immediately after the data were tabulated, but a minimum of descriptive information accompanied the data. Early publication of the data enabled public and private researchers outside the Department to proceed with their own analysis at the same time that several research groups within the Department were carrying on studies. Although various facets of food use have been described and analyzed in the many articles and speeches prepared by our research workers, from the many requests received from agricultural economists for guidance in use of the new data, it appeared desirable to publish a comprehensive article designed especially for their research needs. The authors have been working with the basic data for the last 18 months, and this article summarizes their experience.

CENSUS-TYPE BENCHMARKS for statistics on food consumption are provided by the 1955 Survey of Household Food Consumption. In view of the gradualness with which food habits change, data from these reports will be directly useful in the next 5 or 6 years, or more, for analysis of consumption patterns and markets for food commodities.

Study of food consumption patterns existing at one point in time in relation to region, degree of urbanization, and income adds greatly to our understanding of factors that affect the demand for food commodities. Even more can be learned about changes in demand from data obtained in two or more such surveys, spaced some years apart.

These data can also be analyzed in combination with other types of information, such as long-time statistical series on food supplies, marketing, consumption, price, and related economic and social categories. They contribute materially to our understanding of the factors that bring about historical trends in food consumption and food marketing. With such information we can improve our projections of possible future changes in pat-

terns of food consumption and in the structure of the United States market for farm food commodities.[1]

This article has three parts: (1) A description of the survey and the types of data obtained from it; (2) notes on procedures for working with the data based on problems we have encountered; and (3) examples of use of the data in economic analyses of problems of significance to agricultural adjustment.

Description of the Survey

The 1955 survey was designed to provide reliable statistics on food consumption by all housekeeping households in the spring of that year, and for major segments of this total. The housekeeping population included about 153 million civilians. Excluded were about 9 million people (1) who lived in households not having at least one person who ate 10 or more meals from household supplies during the survey week, and (2) who lived in rooming houses or hotels, or in public or private institutions—often described as the nonhousekeeping population.

The Sample

Only a brief description is given here.[2] A total of 6,060 households participated in the survey. The basic part was a national self-weighting probability sample of 4,605 households. There was also a supplementary sample of 1,455 farm households, taken to assure particularly reliable data on farm-consumption patterns.[3]

The sample was designed to represent households only in the four regions for which the data were tabulated and not to yield data on smaller geographic subgroupings. Therefore, reorganization of the sample data into other subgroupings by area is on uncertain statistical grounds.[4]

Collection of the Data

The survey was conducted by a private marketing research firm under contract with the U. S. Department of Agriculture. It was directed by survey statisticians and food economists of the Institute of Home Economics and by sampling specialists and other statisticians of the Agricultural Marketing Service. The data were collected by trained interviewers in personal interviews averaging 2 hours each. These were made in the April–June period.

Studies made by the Institute had indicated that spring is the most representative part of the year for most foods, and this was the period covered by several earlier surveys. A detailed schedule with questions regarding the family's economic status and its food consumption was used. This is known as the recall-list method.[5]

The response rate of eligible households was 89 percent. The food consumption data pertained to the week preceding the interview, a period of reasonably good recall for this detail under circumstances of the interview situation.

Although some of the terminology may be new to a few readers, we shall not explain all terms at this point. Terms found to be critical for analytical work are noted at appropriate points in this article. An extensive glossary accompanies each survey report.

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[1] A series of four regional articles, one on urban food patterns, and a series on the household market for major commodities were published in *The National Food Situation*, a quarterly periodical of the Agricultural Marketing Service, U. S. Department of Agriculture. Beginning in February 1957, each issue has carried a list of reports, articles, and speeches based on survey data. See also FOOD CONSUMPTION AND DIETARY LEVELS OF HOUSEHOLDS IN THE UNITED STATES—SOME HIGHLIGHTS FROM THE HOUSEHOLD FOOD CONSUMPTION SURVEY, SPRING 1955. U. S. Dept. Agr., Agr. Res. Serv. ARS 62–6. Aug. 1957.

[2] More detail can be found in U. S. DEPARTMENT OF AGRICULTURE. FOOD CONSUMPTION OF HOUSEHOLDS IN THE UNITED STATES. U. S. Dept. Agr. Household Food Consumption Survey 1955 Report 1, pp. 186–192. 1956.

[3] The oversampling of the farm households necessitates the use of a weight of one-quarter for the farm household data in making combinations of farm, rural nonfarm, and urban samples.

[4] A number of requests for additional tabulations has been received. Each must be considered separately. Although the Department cannot undertake special tabulations of these data, it will authorize such work, provided certain conditions are met. National Analysts Inc. (Philadelphia, Pa.), made the basic tabulations of the 1955 survey data under contract with the Department; it is currently keeping duplicate sets of the summary cards.

[5] For a comparison of the recall method using a detailed food list and the record-keeping approach, see MURRAY, JANET, BLAKE, ENNIS C., DICKENS, DOROTHY, AND MOSER, ADA M. COLLECTION METHODS IN DIETARY SURVEYS. Southern Coop. Ser. [Exp.] Bul. 23. April 1952. (Available from the South Carolina Station.)

The schedule in the survey was reprinted as AMS–200, U. S. Dept. Agr. July 1957.

TABLE 1.—*Types of food data from first five reports on 1955 Survey of Household Food Consumption*

Data Given in Survey Reports 1 to 5

(1) Average money value per family of:
    (a) All foods and beverages used in a week at home and away from home, including purchased and without direct expense;
    (b) Purchased food for home use and meals, snacks and beverages consumed away from home;
    (c) Food used at home received without direct expense from home production or as gifts or payment in kind.[1]
(2) For each of some 230 food items separately and for groups of foods, from all sources and purchased only:
    (a) Percentage of households in group using item in week;
    (b) Average quantity used at home per household in week;
    (c) Average money value of the quantity used per household.
(3) Use of major home-produced foods by rural nonfarm and farm households:
    (a) Percentage of households in group using item in week;
    (b) Average quantity used at home per household in week;
    (c) Average money value of the quantity used per household.

Averages Reported for Households Grouped by

Area	Urbanization category	1954 money income of family after income taxes [2]	
United States	All combined	Under $1,000	$5–6,000
Northeast	Nonfarm	$1–2,000	$6–8,000
North Central Region	Urban	$2–3,000	$8–10,000
South	Rural nonfarm	$3–4,000	$10,000 and over.
West	Farm	$4–5,000	

Data Computable from Reported Statistics for Each Group

(1) Per person averages for each type of data for individual foods and for groups of foods.
(2) Per household averages for those households using item during week.
(3) Estimates of regional, urbanization, and income shares of (a) the commercial market for all food and for individual foods, (b) home-produced foods, (c) all food consumed at home.
(4) Breakdown of the money spent for food at home among commodities.
(5) Average prices paid by selected groups of households for individual foods and groups of foods.
(6) Structural indexes of food consumption per person (retail level), of total food use per person (farm level), and of use of purchased foods per person (farm level)—now in process.[3]

[1] Valued at prices paid for purchased item by households in the same urbanization category and region.
[2] Some income classes were combined in some urbanizations of same regions because of small number of cases in sample.
[3] Described in footnote 25 of this article.

Types of Data

The first five statistical reports[6] on the 1955 Survey of Household Food Consumption provide about 1,000 pages of data. Participating households supplied information about their family membership and household composition, the 1954 money incomes of the primary economic families,[7]

expenditures for meals and snacks away from home by members of the primary economic families, and their use of all individual foods at home in the 7 days preceding the interviews. The major types of data available from these reports are summarized in table 1.

Survey Reports 6 to 10[8] contain (1) less detailed tables on the quantities of foods used than in Reports 1 to 5, (2) detailed information on the nutritive value of the foods used by the households, computed schedule by schedule from the quantities of individual food items reported, and (3) distributions of persons into specified age and sex groups for the same groupings of households used in Reports 1 to 5. Report 11 contains data on home canning and freezing, Report 12 covers

[6] U. S. DEPARTMENT OF AGRICULTURE. FOOD CONSUMPTION OF HOUSEHOLDS IN THE UNITED STATES; NORTHEAST; NORTH CENTRAL REGION; SOUTH; AND WEST. U. S. Dept. Agr. Household Food Consumption Survey 1955 Reports 1 to 5. 1956.
[7] An "economic family" is a person living alone or a group of persons who live together and draw from a common fund for their major items of expense. The data on income and food expenditures away from home are for primary economic families and exclude guests, boarders, farm help, etc. If more than one economic family were living in the unit, the one that maintained the dwelling unit was the primary one. But the detailed data on food consumption at home include all food consumed in the household, defined as one or more persons sharing food supplies and including guests, boarders, secondary families, and farm help.

[8] U. S. DEPARTMENT OF AGRICULTURE. DIETARY LEVELS OF HOUSEHOLDS IN THE UNITED STATES; NORTHEAST; NORTH CENTRAL REGION; SOUTH; AND WEST. U. S. Dept. Agr. Household Food Consumption Survey 1955 Reports 6 to 10. 1957.

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home food production in 1954, and Report 13 will be on home baking practices.[9]

Some useful byproduct data from tabulations already made are still unpublished. They include such information as numbers of meals eaten at and away from home; distributions by household size and type; age, education, and employment of wife or female head; and some related economic data. Some progress has been made in assembling these data, but publication plans are still to be developed.

The Institute of Home Economics has made some additional tabulations with less item detail, using the following classifications: Household size, age of homemaker, and education of homemaker—in addition to the region, urbanization, and income class controls. Such data will be published in the survey series as soon as practicable.

Procedures Used in Working With the Survey Data

In this section we (1) describe the procedures followed in working with the data and (2) attempt to answer some of the questions more frequently raised.[10]

Value Data for All Food

The value data, summarized in table 2 of the first five reports, are on a family basis. (The family sizes given in the table must be used in deriving per person averages.) In this article, we refer to these (money) value data as *market* values. The estimates of expenditures for food away from home in the preceding week involved estimation by the respondent of each family member's expenditures for meals and beverages (including alcoholic) away from home and for snacks. Therefore, this segment of the data includes the costs of marketing involved in preparation and handling of such food in eating places.

[9] U. S. Department of Agriculture. home freezing and canning by households in the united states—by region. U. S. Dept. Agr. Household Food Consumption Survey 1955 Report 11. 1957.

U. S. Department of Agriculture. food production for home use by households in the united states—by region. U. S. Dept. Agr. Household Food Consumption Survey 1955 Report 12. 1958.

[10] The authors acknowledge extensive assistance received from the staff of the Institute of Home Economics—particularly Faith Clark, Janet Murray, Ennis C. Blake, and Mollie Orshansky.
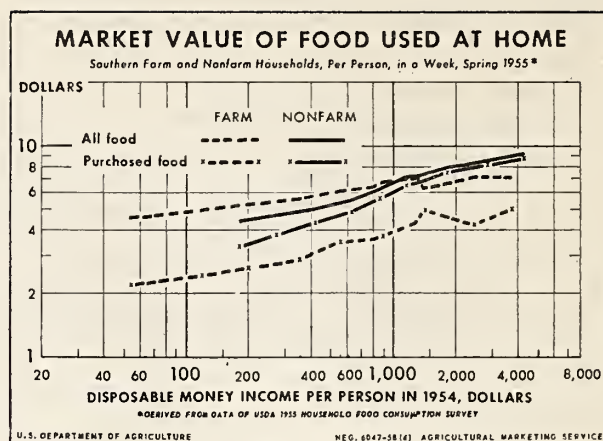
FIGURE 1.

The average values of all food consumed at home in tables 2 and 3 of the published reports include the estimates for alcoholic beverages. These market value data were built up from reported quantities and the information on value of purchased foods used. The quantities of foods received without direct expense—home-produced or received as gift or pay—were valued at the average prices for the same foods paid by other households in the same urbanization category of the region. Accordingly, the market value data for food at home represent essentially *retail* values. Figure 1 illustrates these sets of data.

The value data that summarize the values of all commodities consumed at home on a household basis are reported in table 3 of Survey Reports 1 to 5.

Commodity Data

The commodity detail in the reports cover use at home only. The objective of the major groupings of commodities in the first five reports was to expedite marketing analysis, but subgroupings followed the way foods are used in meals. Butter, for example, is grouped with fats and oils. Most processed items are grouped according to form. Fresh fruits and fresh vegetables represent special cases. They include home-canned and home-frozen items,[11] on the grounds that the items were

[11] Included in terms of processed weights. It now appears that conversion to fresh weight equivalents would have been wiser.

purchased "fresh" or home produced. This is a departure from usual procedures in dietary surveys. In reports on earlier surveys, home-canned foods were generally grouped with the commercially canned items.

Detailed data, from which other researchers may recombine to suit their own needs, have been published. Some alternative summaries also have been published. Special summary measures for dairy products (excluding butter) are given in table 5 of the first five reports. These include their fluid milk equivalent on a nutrition basis (calcium content), milk fat, and milk solids-not-fat. Data on flour equivalents of all grain products and other usual dietary study groupings are to be found in table 15 of Survey Reports 6 to 10. Fat content information is summarized in table 3 of these reports and includes fat content of meats, dairy products, and other such foods, as well as the consumption of so called "visible" fats and oils, as butter and lard.

Guides for Comparison With Other Data

In comparing the 1955 survey data with those from earlier surveys [12] (especially those for all households in spring 1942 and urban households of two or more persons in spring 1948), we frequently fell into two traps: We failed (1) to subtract home-canned fruits and vegetables from the "canned" classification in the 1942 report and add them to "fresh," and (2) to add pork fat cuts (classified with fats and oils in the 1942 report) to lean pork.

Whereas the general food situation in the spring of 1955 was quite "normal," the situations in April and May 1942 (the months in which practically all of the schedules were collected) and April, May, and June 1948 were so abnormal for some commodities as to require great care in making comparisons.[13]

We found it necessary to study the description of the food situation in the spring of 1942 in the

CONSUMPTION OF BEEF AT HOME
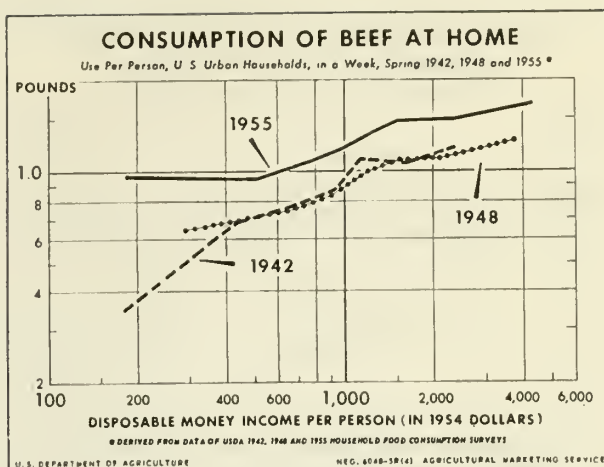Use Per Person, U S Urban Households, in a Week, Spring 1942, 1948 and 1955 *

FIGURE 2.

first issue of the Department of Agriculture's official publication on food, *The National Food Situation* (July 1942) and to refer to crop reports for that period. Short food supplies in the spring of 1942 were apparently shared at most income levels so that the general levels of the Engel curves [14] were lowered, but the shapes or patterns tend to be similar to those for 1948 and 1955 (fig. 2). Despite the problems of comparing levels, we believe that much can be learned about changes in the structure of food consumption by using data from the earlier surveys along with those for the spring of 1955.

Still another trap for the unwary is the difference in household coverage between the income breakdowns of the 1942 data and those for 1948 and 1955. The 1942 data reported in *Family Food Consumption in the United States, Spring 1942* [15] include one-person households, whereas the other two sets of survey data tabulated by income cover only households of two or more. A retabulation of 1942 data on urban households of two or more is given in table 54 of the 1948 report, *Food Consumption of Urban Families in the United States*,[16] and in more detail in tables 8 to 12 of

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[12] See the last page of the 1955 survey reports for list of selected publications in other surveys of family food consumption and dietary levels.

[13] For example, the discussion of the 1942 vegetable situation on page 30 of *The National Food Situation*. February 1958. Op. Cit.

[14] The graphic relationship between consumption and income, plotted for each family income class.

[15] U. S. BUREAU OF HUMAN NUTRITION AND HOME ECONOMICS. U. S. DEPT. AGR. Misc. Pub. 550. 1944.

[16] CLARK, FAITH, MURRAY, JANET, WEISS, G. S., AND GROSSMAN, EVELYN. U. S. DEPT. AGR. Agr. Inform. Bul. 132. 1954.
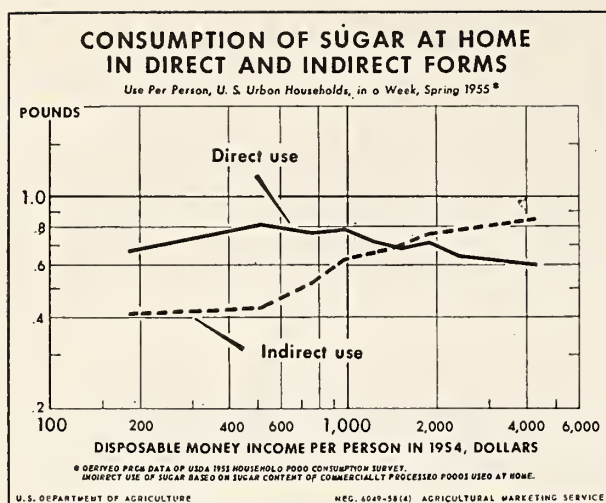
FIGURE 3.

in an earlier article.[19]   The importance of studying both "direct" consumption of sugar (use of purchased sugar) and "indirect" consumption in the form of purchased prepared foods, for example, is illustrated by figure 3.

In working with commodity detail from the 1955 household survey data and the AMS disappearance data (annual per capita civilian consumption), it is essential to keep in mind these differences of fact: The 1955 survey data on commodities cover 1 week's use of food at home in a week of April to June by housekeeping households, whereas the annual disappearance data cover the consumption of the entire civilian population at home and away from home, in eating places of all kinds and in public and private institutions.   It is not surprising, therefore, that the per person averages derived from the survey multiplied by 52 do not match the disappearance data.   More about this is given in the section that follows.

Although we do not have access to the A. C. Nielsen retail sales data, based on a sample of retail food stores, a few comments may be helpful to those who do have these data and wish to compare them with our survey data.

First, the household survey data include only the purchases (or consumption) of housekeeping households and not the food bought from retail stores by small restaurants, boarding houses, and others in the nonhousekeeping population.   The proportion of children in the housekeeping population may differ from that of the whole clientele of retail food stores.

Second, the household survey data include supplies obtained from sources other than retail stores—department stores, local produce markets, delicatessens, milkmen, farmers, and wholesalers.

Third, the household statistics pertain to use of food in a week in a specified number of meals for a carefully identified population, whereas buyers at retail stores are not identified directly in the process of obtaining the Nielsen sales data.

Problems are also encountered in comparing the 1955 United States Department of Agriculture household survey data with those collected from the household panel of the Market Research Corporation of America (MRCA).

Preliminary Report 12 [17] on the 1948 survey.

Household food surveys provide statistics on variations in food consumption that lie behind the United States annual averages.   Comparisons of averages from survey data with AMS data on annual per capita civilian consumption are informative, provided proper attention is paid to differences in classification, in level of distribution, and in universe covered.   Even though the commodity detail in Survey Reports 1 to 5 were organized along marketing lines, there are many variations from the classifications and specifications used in the annual consumption data.   A key to these differences in classification is provided by table 2 of this article.

In addition to regroupings, a variety of adjustments must be made to convert the retail-product weights of the survey data to weights appropriate to the level of distribution desired for the analysis to be undertaken.[18]   Some of the complexities and the significance of such conversions were explored

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[17] U. S. BUREAU OF HUMAN NUTRITION AND HOME ECONOMICS. 1948 FOOD CONSUMPTION SURVEY PRELIMINARY REPORT 12.   NUTRITIVE VALUE OF DIETS OF URBAN FAMILIES, UNITED STATES, SPRING 1948, AND COMPARISONS WITH DIETS IN 1942. 1948.

[18] Most of the factors needed for adjusting the data are available in CONVERSION FACTORS AND WEIGHTS AND MEASURES FOR AGRICULTURAL COMMODITIES AND THEIR PRODUCTS. U. S. Department of Agriculture, Production and Marketing Administration.   May 1952.

[19] See BURK, MARGUERITE C. PROBLEMS IN THE ANALYSIS OF FOOD CONSUMPTION. Agr. Econ. Res. 6: 10–19. 1954.

TABLE 2.—*Comparison of divergent classifications of commodities in the 1955 Household Food Survey Reports 1 to 5, primary distribution categories, and retail summary table for annual per capita food consumption data*

Used at home as reported in Survey Reports 1 to 5 [1]	Annual per capita civilian consumption data [2]	
	Primary distribution basis as in tables 8–26 of Agr. Handb. 62	Summary food groups on retail weight basis as in table 38 of Agr. Handb. 62
Table 5.—Summary measures of milk, cream, ice cream, cheese: Fluid milk equivalent based on calcium content (excluding butter). Milk fat (excluding butter)____ Milk solids-not-fat_____	All dairy products combined in terms of fluid whole milk on a fat content basis.[3] }Same basis as survey except includes butter.[3]	Same basis as survey.[3] Not shown.
Table 6.—Milk, cream, ice cream, cheese. Includes weight of chocolate in drink and cocoa in dry cocoa mixes, and fruit etc., in ice cream; excludes sherbet, ices.	Fluid milk and cream measured at farm or distributor level on a fluid milk equivalent basis; other items in terms of product weight (see table 31 for complete list of minor dairy products).[3]	Differs from primary distribution basis in that fluid milk and fluid cream are shown separately—cream in terms of 25 percent fat content equivalent (here half and half is considered to be cream). Ice cream is shown in terms of milk and cream used (see table 9 for product weight) to avoid duplication with fruits, sugar, etc.
Table 7.—Fats and oils: Includes ingredients other than fats and oils in salad dressing, mayonnaise, and sandwich spread.	Measured at processing level [3]	Same as primary distribution basis except includes fat pork cuts.
Table 8.—Flour and cereal products: Includes all ingredients of prepared flour mixes, noodles, and ready-to-eat breakfast cereals. Includes popcorn, tapioca, potato flour and soya flour.	Grain products (excl. corn sugar and sirup) measured at milling or processing level.[3] Excludes all non-grain material except small amounts of sweetener or flavoring in breakfast cereals and infant foods. Barley expressed in terms of malt equivalent. Excludes popcorn, soya flour, and tapioca. Potato flour in the potato figures.	Same as primary distribution basis. Soya flour included with dry beans and peas on product weight basis.
Table 9.—Bakery products, commercial.	No comparable series. Ingredients of mixed foods are included in their respective basic food groups.	
Table 10.—Meat, poultry, fish: Includes the nonmeat ingredients in luncheon meats, sausage, etc. These items purchased in a variety of forms.	*Meat*—measured at the slaughter level and expressed in terms of carcass weight which excludes edible offal. *Fish*—market weights converted to edible weight. *Poultry*—slaughter weight converted to ready-to-cook basis. Excludes edible offal and game.	Same as primary distribution basis for fish and poultry. Meat converted to "fresh retail cut" equivalent using constant conversion factors for all years. Fat cuts of pork included with fats and oils. Includes edible offal and game.
Table 11.—Eggs: Data given in dozens of assorted sizes.	Measured at the farm level. Data expressed in number of eggs.[3]	Primary distribution data converted to retail weights using constant loss factor (except in war period when breakage was considered slightly higher). Poundage derived using constant factor of 1.5 pounds per dozen 1909–1946, increasing thereafter to allow for larger size eggs in recent years.
Table 12.—Sugar, sweets: Excludes chocolate sirup. Includes all ingredients of jams, jellies, candy, and fruit, butterscotch and caramel sirups.	*Sugar and sirups* [3]—Beet and cane sugar, measured at the refining level, is expressed as granulated sugar, but because amounts of powdered and brown sugars reported in the survey are small, no significant difference is noted.	Same as primary distribution basis except excludes duplication of sugars ans sirups used in the processed foods and given elsewhere in this set of statistics (e. g., canned fruits and vegetables, condensed milk, etc.).

See footnotes at end of table.

Used at home as reported in Survey Reports 1 to 5 [1]	Annual per capita civilian consumption data [2]	
	Primary distribution basis as in tables 8–26 of Agr. Handb. 62	Summary food groups on retail weight basis as in table 38 of Agr. Handb. 62
Table 13.—Potatoes, sweetpotatoes: Includes product weight of chips and sticks.	Measured at farm level. Canned and frozen potatoes and sweetpotatoes reported in the vegetable tables; chips and sticks and dehydrated potatoes included on a fresh weight equivalent with the fresh category. Excludes quantities produced in home gardens.	"Fresh" converted to retail weight by use of constant conversion factors; canned and frozen same as primary distribution basis. Includes quantities produced in home gardens.
Table 14.—Fresh vegetables: Home canned and home frozen vegetables included on product weight basis. Includes sauerkraut, not canned, and horseradish.	Measured at farm level. Excludes quantities from home gardens. Sauerkraut and horseradish excluded. Melons, also given in the tables, being a truck crop.	Farm weights converted to approximate retail weights by use of constant conversion factors for individual items. Includes quantities from home gardens. Sauerkraut and horseradish excluded.
Table 15.—Fresh fruit: Home canned and home frozen included on product weight basis.	Measured at farm level. Excludes all home produced fruits and since 1934 apples grown in noncommercial areas of the United States. Excludes melons and minor fruits and berries.	Farm weight converted to approximate retail weights by use of constant conversion factors for individual items. Includes apples grown in noncommercial areas, and melons, but excludes all fruit produced in home gardens or grown wild and minor fruits and berries.
Table 16.—Commercially frozen fruits and vegetables: Excludes frozen fruit juices and potatoes.	Includes frozen fruit juices and fruit ades and potatoes.[3]	Same as primary distribution basis except excludes potatoes and includes frozen citrus juices on single strength basis.[4]
Table 17.—Commercially canned fruits and vegetables: Excludes bulk sauerkraut, tomato catsup, chili sauce, etc. and pickles, olives, and relishes.[5] Includes baby food and baked beans and mature peas.	Includes all sauerkraut; excludes minor canned fruits, baby foods, baked beans, and canned mature peas.[3] (Baby food shown as separate category and baked beans and canned mature peas included with dry beans and peas in terms of their dry equivalents.)	Same as primary distribution basis, except fruit and vegetable baby foods and all canned soups are included.[4]
Table 18.—Fruit and vegetable juices: Canned fruit and vegetable juice data include home canned and frozen juices. Frozen concentrated juice data exclude frozen ades (e. g. lemonade).	Data for juices reported in the tables on canned fruit juices, canned vegetables, and frozen fruit. Includes only commercially produced canned fruit and vegetable juice. Concentrated frozen fruit ades are included.	Same as primary distribution basis.[4]
Table 19.—Dried fruits and vegetables: Excludes canned baked beans and canned mature peas.	*Dry beans and peas* measured at farm level, on a cleaned basis. Includes dry bean equivalent of canned baked beans; excludes quantities produced in nonfarm gardens. *Dried fruit* measured at the packer level.	Same as primary distribution basis except includes quantities of dry beans and peas produced in all home gardens and soya flour on product weight b asis Dried fruit is shown with fruits.
Table 20.—Beverages: Coffee, tea and chocolate, cocoa Coffee includes coffee substitute. Ingredients of chocolate sirup included.	Measured at the import level. Coffee in terms of green beans; chocolate and products in terms of cocoa beans.[3]	Coffee converted to roasted equivalent, cocoa beans to chocolate liquor.
Soft drinks, bottled, canned and powdered and fruit ade other than frozen.	No comparable series. Ingredients included in their respective basic food groups.	
Frozen fruit ade_ _ _ _ _ _ _ _ _ _ _ _ _	Frozen lemonade, etc. included with frozen fruit juices.	Same as primary distribution basis.
Alcoholic beverages (no quantity data collected).	Not classified as a food; ingredients not included.	

See footnotes at end of table.

Used at home as reported in Survey Reports 1 to 5 [1]	Annual per capita civilian consumption data [2]	
	Primary distribution basis as in tables 8–26 of Agr. Handb. 62	Summary food groups on retail weight basis as in table 38 to Agr. Handb. 62
Table 21.—Miscellaneous foods:		
Nuts and peanut butter_____	Peanut butter included in shelled peanut equivalent.[3]	Same as primary distribution basis, included in dry bean, pea, nut category.
Soups, including home canned and dehydrated and frozen.	Commercially canned only	Same as primary distribution basis, included with canned vegetables.
Catsup, chili sauce, etc_____	Commercial only. Tomato products, pickles and relishes included in canned vegetable data, olives in canned fruit data.	Same as primary distribution basis.
Pickles, olives, relishes_____ (both include home made products).		
Puddings, pie fillings, icing mix, fudge mix, and mixtures other than baby food, prepared or partially prepared.	No comparable series, ingredients included in basic food groups.	
Strained canned pudding (baby)_		
Baby and junior foods, mixed, prepared or partially prepared.	Included with baby food in a separate category, "canned baby food."	Excluded. Ingredients included in basic food groups.
Sherbets, ices_____	Included with dairy products	Same as primary distribution basis.
Leavening agents (yeast, baking powder, cream of tartar, soda).	No series available	No series available.
Seasonings (vinegar, salt, spices, extract, flavors, flavoring sauces, meat tenderizer).	Data on spices only, measured at import level.	Not included.

[1] Quantities consumed at home per household; product weight. Unless otherwise noted, excludes quantities in mixed foods. Table numbers refer to tables in each of the 5 reports.

[2] As published in Agr. Handb. 62, Consumption of Food in the United States; includes all use away from home. Items on *primary distribution basis* are annual averages for the United States, measured at whatever level data are available, derived as a residual from data on production, stocks, foreign trade, and military takings, and include quantities used in producing mixed foods such as bakery products. *Retail weight data* are derived from primary distribution data using various loss factors or making other adjustments such as those to avoid duplication with other foods listed. Reference to tables are those in Agr. Handb. 62.

[3] Includes quantities used in mixed foods, such as bakery products, salad dressings, soft drinks, etc.

[4] In table 38 of Agr. Handb. 62 the fruits and vegetables are in 3 nutritional groupings: Citrus fruit and tomatoes; leafy, green and yellow vegetables; and other vegetables and fruit.

[5] As shown in table 21—Miscellaneous foods, tomato catsup, chili sauce, etc. and pickles and relishes do not have separate data for commercial and home canned items.

First, the USDA survey collected data on all foods used by the household through extended interviews by specially trained interviewers, using a detailed schedule. Although we understand that there is a personal interview when a family joins the MRCA panel, apparently the panel members receive most of their instructions by mail and send in their records each week.

Second, the USDA household survey data pertain to use of food in a week in a specified number of meals for a carefully identified number of persons, but MRCA data pertain to purchases during the period, not use.

Third, as already indicated, the USDA survey collected data on use of *all* foods, whereas MRCA panel members report purchases of only specified items on the records they keep.

Fourth, the USDA sample was a self-weighting probability sample, whereas, because of dropouts, it is difficult to maintain a continuous panel on a random probability basis, even if it is started in that way.

Fifth, the income data given in the 1955 food survey reports pertain to *1954* money income after payment of income taxes, whereas the MRCA data refer to income before taxes and usually are not shown in dollars or in much detail.

Converting to Per Person Basis

The survey data for commodities are reported in terms of average per household, because they

were collected from households as units. Rates of consumption or purchases per household are undoubtedly useful for some analyses because the household is a purchasing unit. Those concerned with retail marketing problems probably prefer to keep the consumption and income data in the reported units.

Because average household size varies systematically by (1) income level, (2) urbanization category, and (3) region, in general, we found it desirable to convert the data to a per-person basis. In developing comparisons with other types of data, such as time series on consumption, income, and population, the necessity for converting data to a per-person basis is emphasized. Household averages should be divided by the average household size in each subgroup of households, reported in table 3 of Survey Reports 1 to 5. Average household size for a subgroup was derived by dividing by 21 the total number of meals served to all persons in the household from its food supplies.[20]

The 21-meal equivalent person for survey data is widely accepted as a means of standardizing the base for comparisons. It allows account to be taken of all foods eaten at home by all persons actually present at meals, whether family members, boarders, hired help or guests, as well as for foods in carried lunches. In the 21-meal equivalent calculation, no distinction is made between morning, noon and evening meals. Meals eaten away from home by family members are excluded from this calculation.

The process of calculating per-person rates involves the analyst in a series of generalizations, as all persons in the families are considered of equal significance in dividing up the family income, whereas obviously their demands vary. Then, too, all persons who eat from the household

CONSUMPTION OF BEEF AND PORK
IN SOUTH AND WEST
Use at Home Per Person, Urban Households, in a Week, Spring 1955*

FIGURE 4.

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[20] Example: A family of 4 persons ate a total of 76 meals at home in the week, including 28 breakfasts, 23 lunches, and 24 dinners served to the family and one dinner served to a guest. On the basis of one person eating 21 meals at home in a week, this yields a computed household size of 3.6 persons.

For further consideration of problems of calculating per-person data, see pp. 6, 35, 40, AGR. INFORM. BUL. 132, op. cit., and pp. 179–183, ORSHANSKY, MOLLIE, LEBOVIT, CORINNE, BLAKE, ENNIS C., AND MOSS, MARY ANN. FOOD CONSUMPTION AND DIETARY LEVELS OF RURAL FAMILIES IN THE NORTH CENTRAL REGION, 1952. U. S. Dept. Agr. Agr. Inform. Bul. 157. Nov. 1957.
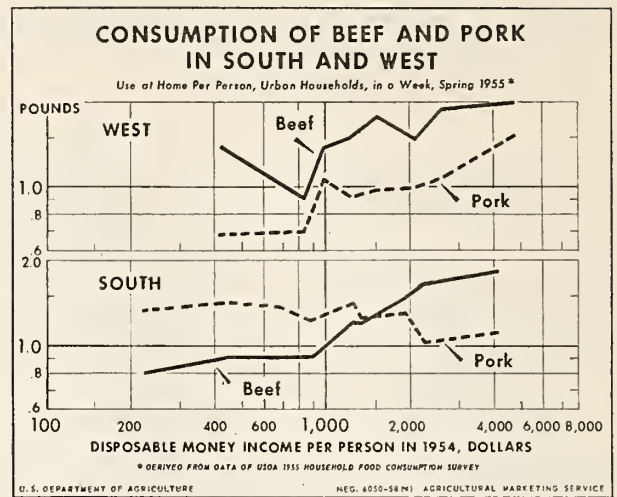
food supplies do not consume equal portions of all foods. (As yet, we know little about how they share in the household's food use.) Also, there are some economies of scale in cooking for large families. Additional tabulations of basic data will give clues to the significance of this factor. You will recall, however, that we make the same kinds of generalizations when we use annual averages of per capita food consumption and average disposable income per capita.

Graphic Analysis

To supplement work with statistical data arranged in tabular form, many analysts turn to graphic analysis. We make frequent use of logarithmic charts of consumption per person for each income class plotted against average income per person of families in that class for each urbanization category of each region. These curves are called Engel curves. For example, note figure 4. Such graphic analysis permits the analyst to see the outlines of the forest and to avoid getting lost among the trees of minor aberrations. Charts reveal the systematic variations in the consumption data with such factors as purchasing power and degree of urbanization. Sometimes, they bring unexpected patterns to light and enable the analyst to study and explain them by reference to other sets of data.

At this point a digression to possible reasons for apparently erratic variations may be useful. Variations of this kind may arise from such elements as special consumption patterns of the households of a given type in the universe being

sampled, in the sample thereof (sampling variation), or from reporting errors.

Sampling variations in the survey data are now being studied by statisticians in the Institute of Home Economics. The extent of reporting error cannot be measured by our available information. But we know that the effect of reporting error and sampling variation varied from cell to cell (income class within urbanization category in a region) and from item to item. It depends upon such things as number of cases, proportion of households in the cell that used the item, how difficult it is to recall the quantity of the item used (e. g. sugar out of canister, sugar bowls, etc.), and whether response is biased because of an element of prestige or status associated with reporting or not reporting an item.

Use of Related Data

Reference to other sets of survey data and to other kinds of information improves one's sense of direction in finding basic relationships. We have found also that the search for clues as to factors that account for seemingly incomprehensible variations from one survey to another or from one income group to the next, challenges our understanding of economic and social statistics. Unexpected patterns may result from special effects of age composition of the households (as on fluid milk and orange juice), from differences in national origins (as on high consumption of lamb in the Northeast), or from special marketing practices—such as the sale of cream by north central farmers to creameries and their purchase of butter at prices they received for their cream.

Some Problems in Analysis of the Data

It is hoped that the foregoing discussion has alerted the reader to some of the tricky procedural problems. In the section that follows we describe in more systematic fashion some of these problems, and show how we deal with them.

One-Person Households

Data for one-person households were handled separately in the survey tabulations—their consumption patterns are greatly influenced by the fact that they include primarily adults. Separate tabulations have not been made of consumption by one-person households subdivided by income. Budgetary limitations and the capacity of the

electronic computer forced a choice among subgroupings. As one-person households make up only 2.4 percent of the housekeeping population in the United States, all such households were grouped together.[21] Therefore, for all income-food analyses we use the relationships found among households of two or more that reported their income.

Foods Eaten Out

Study of the makeup of the total U. S. food market in terms of buyers is greatly limited by the lack of information on foods eaten out—by both housekeeping and nonhousekeeping populations. These survey data include global estimates of expenditures by the housekeeping population for meals purchased and eaten away from home (including alcoholic beverages) and for snacks. The 1955 survey also yielded information on which meals were eaten out, and by whom. From some unpublished data we found that 9 percent of the families' meals were eaten out, one-third being received as gifts or pay (probably many as visitors) and two-thirds as purchased meals. The cost of purchased meals averaged 75 cents a meal.

We believe that estimates of expenditures away from home are understated. The $1.40 average expenditure for food and beverages away from home per household member derived from the survey data and adjusted to a yearly total for this population sector ($10 to $11 billion), plus an allowance of $4 billion for the nonhousekeeping population (9.3 million people times the United States average money value of all food per person for the survey population in a week times 52 weeks) totals $14 to $15 billion. From what we can learn from available data, this appears to be a reasonable estimate for away-from-home *food* expenditures only (excluding alcoholic beverages).

Checks on Level of 1955 Survey Data

How do the estimates of food consumption derived from the 1955 Survey of Household Food Consumption check with other measures? Some critics of one-time surveys argue that surveys of this kind yield gross overestimates. Because such survey data provide the principal basis for

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[21] A substantial proportion of single individuals live in quasi-households (hotels, rooming houses) or do not qualify as housekeeping households by eating at least 10 meals from household supplies in a week.

analysis of the cross-section of our national food market in terms of its buyers, they would be useful for many purposes even if their levels were out of line.

We have carried through a variety of checks on the overall dollar figures, on overall measures of per capita food consumption, and on quantities of major foods consumed. Before going into the findings, these facts need emphasis: A range of error is to be expected in these survey data as well as in the aggregate figures for food expenditures and food disappearance. Neither set of data proves or disproves the validity or accuracy of the other.

In brief, these are our findings to date:

1. The survey data on market value of all farm food commodities consumed, adjusted to United States aggregates for the year, are 5 or 6 percent higher than our estimates of the market value of all farm foods and meals consumed by the civilian population. About half of the difference arises from the disparity between the amount of home food production as estimated for the disappearance data and that reported by housekeeping households, both for a week of spring 1955 and for the year 1954.

2. A comparable degree of difference was found between the overall level of use per person of farm food commodities by the sample of housekeeping households in a week of spring 1955 and the level indicated by the index of per capita use of farm foods in the year 1955. Again, about half of the difference arose from the estimation of home production. The small discrepancy remaining seems to indicate that seasonal variations for individual foods balance out in the total for all foods.

3. Among commodities, there is wider variation between averages computed from survey data for the housekeeping population's use of food at home and those derived from disappearance data. Average use of sugar at home in all forms, adjusted to a yearly total from the survey data, was much lower than average annual per capita consumption. But use at home excludes all the candy, soft drinks, and desserts consumed away from home.

At the other extreme, survey data on eggs appear to average substantially higher than AMS estimates of per capita consumption. The procedure by which equivalent persons are calculated apparently leads to upward or downward bias for

foods consumed primarily at one meal of the day.[22] When allowance is made for seasonal variations in food consumption, the survey data for meats and for fats and oils were found to be close to the levels indicated by annual per capita consumption data. Study of data for other commodities is still in progress.

For individual commodities and farm consumption of home-produced foods, analysts working with survey data will frequently face the problem of seasonality of supplies and of consumption. Reference to seasonal analyses in earlier household surveys,[23] quarterly disappearance data for some foods, carlot shipment, and trade data helps one to understand such variations and to develop necessary adjustments. Fortunately, the spring of 1955 was remarkably "normal" in both supplies and prices for most foods.

Which Measure to Use

With the several measures of food consumption supplied by the survey, the choice of the proper one for the particular job at hand becomes significant. Our study provides some clues. Market (money) value of all food at home and away is a useful measure for studying the relationship between overall food consumption and income. Market (money) value of food at home is in effect the retail value of all food consumption at home. *Food expenditures* for home consumption and away from home (money value of purchased food used at home, meals, and other food eaten away from home) provide a reasonably satisfactory measure of commercial sales of food and meals to the housekeeping population for the spring of 1955. The dollar outlays for food to be consumed at home approximate retail food sales to this population.[24]

The *quantities of food* used from all sources are directly pertinent to the study of the structure of the consumption of food commodities. ("Structure of food consumption" refers to varia-

[22] See BURK, MARGUERITE C., INTRODUCTION TO 1955 HOUSEHOLD SURVEY DATA ON EGGS. U. S. DEPT. AGR. AGR. MKTG. SERV. THE POULTRY AND EGG SITUATION. May 1957. pp. 13–19, 51.

[23] Agr. Inform. Bul. 132. op. cit. pp. 9–10 and 102–103.

[24] The only segments of the commercial food market not covered by household survey data on food expenditures are the sales of food to nonhousekeeping people and institutions and sales of meals, snacks, and beverages by public eating places to the nonhousekeeping population.

tions in averages among households grouped by region, urbanization, and income.) After the conversions indicated by the information in table 2 have been made, these data on a per-person basis can be compared with time series of apparent per-capita consumption by the whole civilian population at home and away from home. We consider the quantities of foods *purchased* to be the proper figures to use for work on demand for commercially produced and marketed foods, and for many other marketing problems.

To measure for demand analysis the structure of overall food consumption in quantitative terms, three new indexes are now being developed.[25] Two will match the definitions of the time-series index of per capita food use of farm commodities. The consumption data from the survey are being converted to their farm commodity equivalents and valued at 1947–49 farm prices. One of these will cover consumption from all sources, the other only purchased foods. The third index will measure variations in consumption from all sources in terms of average retail value at 1947–49 average prices. This index will match the time-series index of per capita food consumption.

Separation of Effects of Several Factors

The most difficult problem encountered in the analysis of food consumption in the spring of 1955 was the separate measurement of the effects of the many interrelated factors that contributed to its structure. These factors include: (1) Proportion of the population in each group or category having specified characteristics; (2) regional patterns of food use; (3) differences in consumption rates according to degree of urbanization; (4) relationships between food consumption and income; (5) differences in proportions of households using and in average use among using households; (6) variations caused by known factors such as family composition but not measurable with available data; and (7) effects of unknown social and economic factors. There is

[25] These indexes are being developed by the Consumption Section of the Statistical and Historical Research Branch, AMS. Each index will relate the per-person food consumption rates of households in the 1955 food survey in each income class of each urbanization category to the U. S. average (equal to 100) and the averages for each urbanization category of each region to the all U. S. average.

no short cut to the solution of this problem. It is a long, tedious job—one that involves many calculations, much plotting of data, and extensive statistical and economic analysis.[26]

Population Distributions

Reference to distributions of the housekeeping population among subgroupings [27] is essential to an understanding of how regional averages combine into United States averages; how urban, rural nonfarm, and farm averages merge into the regional figure; and how the averages for the several income classes result in the overall average for the urbanization category of a region.

Regional Data

Each regional average of food used per person represents a weighted combination of (1) the population distribution within the region, first, among urbanization categories and second, among income classes; and (2) the average consumption rates per person for each income class.

Regional data on consumption are a major contribution of the 1955 food survey; they have opened up new vistas for analysis of food consumption. What appear to be unique features of one region's consumption pattern sometimes turn out to be the result of a particular combination of income and degree of urbanization. For example, average consumption of beef and veal per person at home in all households of the Northeast was 1.42 pounds in a week, spring of 1955, compared with 0.89 pounds in the South.

But data in part (*a*) of table 3 hint that patterns of consumption of beef and veal in the two regions were not nearly so far apart as these overall averages indicate. This table illustrates the procedure we have followed to separate the effects of several major factors on average consumption per person.

[26] See also U. S. Dept. Agr. Agr. Inform. Bul. 132 op. cit.

[27] Starting with the family size data in table 2 of Survey Reports 1 to 5 and the number of families in the basic sample (including only the fourth of the farm families who were in the self-weighting sample), we developed a population distribution by region, urbanization, and income, summarized on pages 27 and 28 of *The National Food Situation* for February 1957. (Op. cit., footnote 1.) This distribution of family members is preferable for demand analysis for all food combined to a distribution of household members, which can be derived from data in table 3 of Survey Reports 1 to 5. However, the two distributions are so close that we use the former even for work on commodities.

TABLE 3.—*Relationship of region, urbanization, and income to consumption per person of meats and poultry during a week of spring 1955* [1]

(a) *Regional* differences, illustrated by data for urban households with money incomes after income taxes of $4–5,000

Food item	United States	Northeast	North Central Region	South	West
	Pounds	*Pounds*	*Pounds*	*Pounds*	*Pounds*
Beef and veal	1.46	1.41	1.51	1.31	1.56
Pork	1.08	.94	1.18	1.41	.92
Lamb and mutton	.09	.19	.02	.00	.11
Poultry	.73	.84	.68	.61	.53

(b) *Urbanization* differences, illustrated by data for southern households roughly comparable in money plus nonmoney income

Food item	Urban $4–5,000	Rural nonfarm		Farm		
		$4–5,000	$3–4,000	$4–5,000	$3–4,000	$2–3,000
	Pounds	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*
Beef and veal	1.31	0.81	0.81	1.12	0.76	0.83
Pork	1.41	1.72	1.45	1.11	1.40	1.20
Lamb and mutton	.00	.00	.01	.00	.03	.04
Poultry	.61	.54	.59	.62	.83	.55

(c) *Income* differences, north central urban households grouped by money income after income taxes

Food item	All	Under $2,000	$2–4,000	$4–6,000	$6–8,000	$8–10,000	$10,000 and over
	Pounds	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*
Beef and veal	1.62	1.40	1.49	1.61	1.59	1.78	1.81
Pork	1.21	1.38	1.20	1.20	1.36	1.08	1.08
Lamb and mutton	.07	.03	.07	.03	.03	.15	.28
Poultry	.68	.71	.58	.74	.64	.61	.76

[1] 1955 Survey of Household Food Consumption.

Urbanization Differences

The average consumption per person in households grouped in a particular urbanization category is compounded of the population distribution among income classes and the average rates for all households in each income class. To determine the effect of degree of urbanization on consumption rates one must make allowances for nonmoney income.

Because of its complexity, the Department did not ask for information on nonmoney income in this survey, hence analysts who use the survey data will have to make rough approximations for the effect of nonmoney income on food consumption. One possible procedure is illustrated by part (b) of table 3, which assembles some of the survey data for the South. As some rural nonfarm households have substantial amounts of nonmoney income in the form of home-produced food and fuel, there were probably households in the $3–4,000 money income group that had total income (including nonmoney income) approximating that of urban households in the $4–5,000 range.

The range of the averages for the two rural nonfarm income groups indicates how rural nonfarm consumption patterns may vary from those of urban households with comparable total incomes. The much greater significance of nonmoney income of farm families, such as home-produced food, fuel, and rental value of their homes, led us to decide that data of the $2–3,000 money income group must also be considered.

Income-Consumption Relationships

The probable effect of variations in income or purchasing power on consumption rates can be evaluated by means of Engel curves, as in figure 4, by organizing data as in part (c) of table 3. Certain facts about the income data from the survey need to be kept in mind. The data are for money income only as noted previously; some families in a given income class in 1954 might normally belong in a higher or a lower class. (Some background data for study of the transitory aspects of income were collected in the survey, but they are not yet published.) Although the relationships of money income and consumption per person, calculated from averages for each income class, are not the same as would have been obtained by sorting the cards by income per person, they do provide a working approximation.

Some of the complexities of the 21-meal person device have already been explored. To these must be added another—the idea that the per-person averages discussed in this article are the result of adding up all the quantities consumed by households in that cell (or broader grouping), and dividing by the total number of 21-meal equivalent persons in those households. This number includes nonusers of the commodity. As data covering household size are not available for using households only, relevant per-person averages cannot be calculated.

Experience with the available data has shown the need for (1) frequency distributions of households within income classes by quantities used to supplement the overall averages and (2) cross-tabulations. The staff of the Institute of Home Economics is planning to make frequency distributions. Lack of cross-tabulations prevents satisfactory analysis of cross-elasticities; but new tabulations being planned for a few items by the Institute of Home Economics will provide a beginning.

Price Implications

Survey data are generally unsatisfactory for price analysis because no large-scale cross-section survey has gathered quality data along with quantity and price or value information. The analyst cannot ascertain whether the price variation from one income class to the next results from such influences as differences in the quality of the product purchased, extensive buying in delicatessens on Sunday, or heavy purchases from relatives with farms.

The rather extensive classification of commodities used in the 1955 food survey represents in part the results of an attempt to identify the extent of commercial processing. This is useful for study of price relationships. The inclusion of home-canned fruits and vegetables in the fresh categories will affect average prices per pound for fresh produce. This problem can be avoided by use of the data for purchased quantities only.

Use of Survey Data in Agricultural Research

In this section, we introduce several types of analyses we are making with the survey data.

Structure of the Food Market

The 1955 Survey of Household Food Consumption has provided data needed for studies of many aspects of the food market. The total market value of all foods and beverages consumed at home and away from home (item 1, table 4) comes close enough to the concept of the food and beverage expenditure series of the Department of Commerce [28] to be used as a reasonable basis for regional breakdowns and for indications of variations in such expenditures by income level. However, as noted earlier, the away-from-home data must be handled judiciously.

Data on the average market value of all food consumed per person in this country for segments of the population grouped according to region, urbanization, and income, computed from the household averages, are the only available statistics for analysis of so-called food expenditure by groups of consumers (including nonhousehold members). Some marked differences in the dollar value of food consumption from region to region are revealed by similar data for each level within the same urbanization category, as well as the expected variations by income and between

[28] But there are two significant exceptions: (1) Commerce data cover the whole population, whereas the survey data apply only to housekeeping households, and (2) survey data on money value of all foods include home-produced foods used by nonfarm households and all payments in food, some of which are excluded from the Commerce series.

TABLE 4.—*Measures of the value of food consumed per family in U. S. in a week, spring 1955*[1]

Description of measure	Average per family (dollars)
1. Market value of all food and beverages consumed at home and away from home [2]	29.58
2. Market value of purchased food and beverages consumed at home and away from home (total food and beverage expenditures) [2]	27.05
3. Expenditure for meals, snacks, and beverages away from home [2]	4.76
4. Expenditure for alcoholic beverages for home consumption	.74
5. Market value of all food consumed at home (including food obtained without direct expense)	24.08
6. Expenditure for food consumed at home [3]	21.55
7. Market value of food obtained without direct expense: [4]	
Home-produced	1.85
Received as pay or gift	.68
	2.53

[1] Data from 1955 Household Food Consumption Survey Report 1. Report uses term "money value," which is equivalent here to market value.

[2] Includes alcoholic beverages consumed away from home; separate data on such expenditures away from home not reported.

[3] Excludes 74 cents for alcoholic beverages bought for consumption at home (based on average rate per "economic" family).

[4] Valued at average price paid for each item by other households in each urbanization category of each region.

farm and urban households. These variations are one indicator of the possible range of expansion or contraction in per capita food use and food sales in the future.

The data show, for example, that people in northeastern urban households ranked highest in market value of food consumed per person, owing to heavier away-from-home expenditures. Also, the average market value of food per person in southern households in each urbanization category fell below the corresponding average for other regions. Average prices paid for many foods were lower there, and the proportion of low-income families (incomes under $2,000) was more than twice as high in the South as in the North and West.

When the averages for market values of food consumed at home and those for food consumed away from home are compared by income levels, greater increases in relation to income in amounts spent for food away from home than in the value of food consumed at home are revealed. Dollar outlays for food purchased for consumption at home (as item 6 of table 4) increased more with income than did the market value of all food consumed at home. This reflected the decreasing importance of home-produced food in total food consumption of households in the higher range of money income. Averages for all urbanizations combined are also affected by the decreasing proportion of rural households.

The total market (or money) value figures for food at home, comparable to the overall figure for item 5 of table 4, are recorded for 230 individual commodities and major commodity groups. A subdivision into the value of purchased food and that of food received without direct expense provides the basis for deriving estimates of the commodity breakdown for perhaps 75 to 80 percent of the total food market, excluding the eating place and institutional market.

As mentioned earlier, these at-home patterns of food expenditures can be used as rough approximations of the commodity breakdown of total food expenditures including those away from home. Data for broad commodity groups have been developed and described in a series of articles on regional and commodity food patterns published in *The National Food Situation* (op. cit., footnote 1) beginning in February 1957. These articles provide further detail and some discussion of the factors back of consumers' allocations of their food dollars to particular foods.

Our estimates of shares of the U. S. food market by region, urbanization, and income show, for example, that farm households accounted for only 7 percent of the sales of food, meals, and snacks, compared with the 69-percent share taken by urban households. Why this picture emerges is easy to explain in general terms: There are five times as many urban as farm households; urban families have more purchasing power; and they produce little of their own food.

Variations in Consumption

Even more significant for research on agricultural problems than the data for all foods combined are statistics pertaining to each of some 230 food items and major groups of these items. They provide a welcome opportunity for study of the similarities and dissimilarities of the United States food consumption patterns and for consideration of tendencies toward homogeneity of food patterns.

Data such as those in table 3 reveal some striking variations, but comparison of consumption patterns of farm and urban households in the spring of 1942 and the spring of 1955 appear to indicate that U. S. households probably are eating more uniformly than they did a decade or so ago. However, there are still some underlying factors that create diversification. It is likely that differences in available supplies and in consumer purchasing power are the predominant influences, as they have been in the past.

We have described how we use such arrays of data as those in table 3 to study the influence on food consumption of regions, urbanization, and income. Agricultural economists are familiar with the significance of this type of analysis, therefore we proceed to a less familiar area.

Survey data on the proportion of households in each group using the commodity in the preceding week supply clues to the vital *marketing* question: Is the average consumption rate coming from very high rates of a relatively few households, or from relatively general usages? [29]

For example, consumption of butter and margarine in all urban households of two or more persons in the North Central Region averaged 0.82 and 0.64 pounds *per household*, respectively. But consumption of margarine in all households that used this commodity averaged precisely the same as consumption of butter by those who used butter.[30] Accordingly, the higher average for butter among households in the North Central

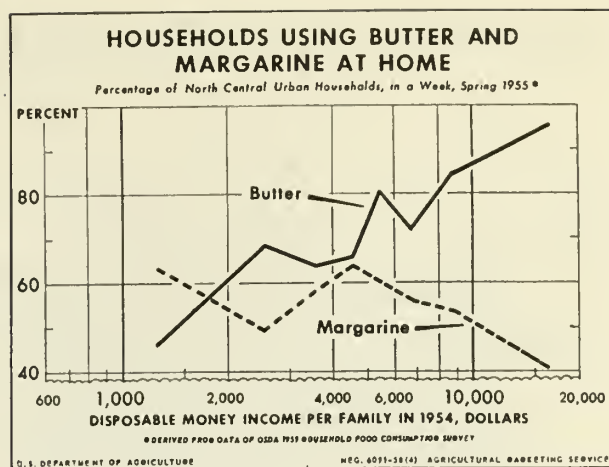HOUSEHOLDS USING BUTTER AND MARGARINE AT HOME

FIGURE 5.

Region resulted because relatively more households used butter than used margarine.

Consumption of butter rose from an average of 1.1 pounds per household using it at the $6–8,000 income level, to 1.6 pounds for the households with incomes of $10,000 or more. These two income groups consumed practically the same quantity of bread. The highest group bought more rolls but used much less flour. Figure 5 shows how the proportions using butter and margarine vary with income.[31]

Regional Production and Consumption Patterns

Estimates of the regional distribution of the United States market for farm food commodities *only*, as well as for all foods, can also be derived from survey data. Food expenditures by the non-housekeeping population are excluded, but they make up no more than 6 percent of the total population eating from civilian food supplies.

As the four sets of data in table 5 show, estimates of the regional pattern differ slightly according to the precise definition of "food market." The total market value of farm-produced

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[29] The percentage of users generally increases with the lengthening of the time period covered, so these data for the 7-day period of this survey are not directly comparable with those for longer periods.

[30] These averages are derived by dividing the average for all households in the cell or income group by the percentage of households using each commodity.

[31] Other related factors are household practices in use of foods. See (1) U. S. DEPARTMENT OF AGRICULTURE, AGRICULTURE MARKETING SERVICE, HOMEMAKERS' USE AND OPINIONS ABOUT FATS AND OILS USED IN COOKING. U. S. Dept. Agr., Agr. Mktg. Serv. Mktg. Rept. 67. 1951. (2) LEBOVIT, CORRINE AND CLARK, FAITH. HOUSEHOLD PRACTICES IN THE USE OF FOODS, THREE CITIES, 1953. U. S. Dept. Agr., Agr. Inform. Bul. 146. 1956. (3) Agr. Inform. Bul. 157. op. cit. pp. 53–61.

Item	North-east	North Central Region	South	West
All farm food commodities				
A. On supply side	*Percent*	*Percent*	*Percent*	*Percent*
1. Total food output based on farm value aggregates of farm output index, 1954 [1]	9	52	22	17
2. Cash receipts by farmers for domestic food commodities, 1954	11	48	22	19
B. On demand side (from data for a week in spring of 1955)				
1. Total market value of farm foods consumed by housekeeping families at home and away from home [2]	30	32	26	12
2. Total expenditures for farm foods by housekeeping families at home and away from home [2]	31	32	24	13
3. Purchases of farm foods for home consumption	30	32	25	13
4. Retail value of all farm foods used at home (including home produced foods)	29	32	27	12
Selected food groups				
A. Dairy products [3]				
1. Milk marketed by farmers	18	52	17	13
2. Dairy products purchased	31	37	19	13
B. Total meat [4]				
1. Net marketings of meat animals, 1955	3	63	22	12
2. Meat production from all slaughter (retail weight), 1955	9	59	19	13
3. Household meat consumption, spring 1955	27	35	26	12

[1] Using 1947–49 prices. In addition to fibers and tobacco, excludes 50 percent of wheat, 75 percent of rice, 50 percent of cottonseed, and 70 percent of soybeans as not being domestic food.

[2] Excluding fish, bananas, coffee, tea, cocoa, and alcoholic beverages used at home and same relative amounts away from home.

[3] Based on milk fat content. Marketing data for year 1955. Purchase data for 1 week in spring of 1955. See *The National Food Situation*, Feb. 1957. Op. cit.

[4] See p. 66 of *The National Food Situation*, April 1957.

foods consumed by housekeeping families both at home and away from home was divided percentagewise among the regions thus: Northeast 30, North Central 32, South 26, and West 12.

In economic terms, this measures the regional allocation of the demand for farm inputs in the form of primary food production plus the demand for inputs of marketing resources in the form of all services performed from the farm gate to the ultimate buyers in retail stores and eating places. Regional differences in away-from-home expenditures and in home production cause the slight variations from the first set of data to the others.

Structural indexes of per capita food use from all sources, including food purchased and home produced, and of purchased food only—measured at the farm level—are being developed, as noted earlier, for analysis of regional distributions of the demand for farm foods. They will be more comparable in concept to the two measures of regional patterns of farm food production given in table 5 than to measures based on the market value of purchased food (the third item under demand) or on the retail value of food used at home (the fourth item).

The production measure developed from data of the Department's farm output index reflects primary farm inputs of resources into food production. In the North Central share, for example, it includes the value of grains sold to other regions for livestock feeding.[32]

In the consumption end of the flow of food from production to consumption as compared with farm output, the four regions share differently. Whereas in 1954 the North Central Region produced half of the food in the country, a few months later households in that region accounted for only a third of the United States domestic market. In contrast, the Northeast consumed three times as large a share as it produced.

[32] Adjustments in commodity prices from 1947–49 averages used in computing the value aggregates of the farm output index to the 1954 levels might make small differences in the distribution.

Cash receipts by farmers for farm food commodities include some sales of commodities a step removed from the primary producing level. For instance, the total value of livestock sold in the Northeast is included, although it includes the value of some grain grown in the North Central Region.

No data on regional contributions of marketing inputs added to the farm commodities in the form of such services as handling, processing, and storage have been developed. Most of the data needed for such research are now available from the 1954 Censuses of Manufactures and Distribution.

Measures of regional shares of the input of productive resources and of consumption for dairy products and meat are given also in table 5.

Changes in Home Food Production

The first five survey reports yield useful information on relationships between consumption of home-produced food supplies and purchased foods, and this can be compared with United States data from earlier surveys. Except possibly for garden vegetables, primary production of food commodities by urban households for home use is relatively insignificant. But in rural areas, home production is a notable competitor of commercially produced and marketed foods.

The 1955 survey provided the first measurement of the overall extent of such competition since 1942. Rural nonfarm households of two or more persons relied on commercial sources for 88 percent of their food supply for *use at home*, whereas farm families bought only 56 percent of their food during a week in the spring of 1955. Both groups obtained from 3 to 4 percent of their food as gifts or payment in kind.

Home production supplied about 8 percent of the food consumed by rural nonfarm households at home and 41 percent for farm households in the spring of 1955. This represented a substantial change from the 22 percent for rural nonfarm and 61 percent for farm households in the spring of 1942.[33] For every major home-produced item

except beef, the proportion of home production in the total declined for both groups of rural households.

There was a marked increase in purchases of most major items, except butter and potatoes, and in the proportion of total food used, which had been purchased by rural nonfarm and farm households. Both this shift to more purchased food by rural nonfarm and farm households and the decline in the farm population (accompanied by a much larger increase in the rural nonfarm population) contributed to the great increase in commercial food marketing from 1942 to 1955.

A marketing analysis of the 1954 data on home food production, published in Survey Report 12,[34] is reported in two articles in *The National Food Situation* (op. cit., footnote 1) for April and July 1958.

Demand Analysis

Illustrations of the use of survey data already cited are from our research on the demand for farm foods. To indicate other aspects of such research, we mention four pieces of work now under way—parts have already been published: (1) Analysis of changes in the market value of food through time, using time-series and cross-section data;[35] (2) analysis of the effect on the demand for commercially produced and marketed farm foods of changes in rural food consumption;[36] analysis of trends in the demand for individual foods, as in the sugar and vegetable articles carried in *The National Food Situation*, February 1958; (4) a special AMS research report on the elasticity of demand with respect to income for major foods and groups of food. The report will show separate elasticities derived from per capita averages based on all households and on households using the foods. The report will show also the net effect of household size on food consumption at home. The computations

[33] See ORSHANSKY, MOLLIE. CHANGES IN FARM FAMILY FOOD PATTERNS. Address, Annual Agricultural Outlook Conference, November 21, 1957. Available from Institute of Home Economics, Agricultural Research Service, U. S. Dept. Agr.

[34] Op. cit.

[35] BURK, MARGUERITE C. INCOME-FOOD RELATIONSHIPS FROM TIME SERIES AND CROSS-SECTION SURVEYS. Amer. Statis. Assoc. Proc. Bus. and Econ. Statis. Sec. 1957. pp. 106–117.

[36] BURK, MARGUERITE C. AN ECONOMIC APPRAISAL OF CHANGES IN RURAL FOOD CONSUMPTION. Manuscript scheduled for publication in *Journal of Farm Economics*, August 1958.

were made from individual household observations rather than from averages for groups of households. This information is designed for research on market development and on broader aspects of demand analysis.

More to Come

This article has reviewed survey data principally from Survey Reports 1 to 5, with some reference to the dietary reports (Reports 6 to 10), and to Report 12 on home food production in 1954. Many more statistics are still to come from tabulations already made, in process, or in the planning stage. As a general policy, publication of the tabulated data for public use will continue to precede analysis by the Department of Agriculture. Some special tabulations will be possible. But costs of sorting and tabulating the thousands of cards on which basic data have been punched are sizable. These impose a limit on both the publication of special tabulations and analyses of relationships implicit in the data.

Two AMS Economists Winners in CED Essay Contest

Marguerite C. Burk, Head of the Consumption Section, Agricultural Economics Division, AMS, and B. Ralph Stauber, Chief of the Agricultural Price Statistics Branch, Agricultural Estimates Division, AMS, were two of the 50 winners in the essay competition of the Committee for Economic Development announced last month. The competition was open to people on all parts of the free world and sought answers to the question, "What is the most important economic problem to be faced by the United States in the next 20 years?" The 1,238 papers that qualified under the rules were judged on an anonymous basis. Both Miss Burk's and Mr. Stauber's papers dealt with the problem of allocation of resources, but from different angles. The 50 winning essays in the contest were published as Volume 2, *Problems of United States Economic Development*, by the Committee for Economic Development, 711 Fifth Avenue, New York 22, N. Y. $2.50.

Book Reviews

Linear Programming and Economic Analysis. By Robert Dorfman, Paul A. Samuelson, and Robert M. Solow. McGraw-Hill Book Co., Inc., New York. 525 pages. 1958. $10.

AT LAST ECONOMISTS can get in one book a comprehensive, authoritative, and not overly technical discussion of three of the most important developments in economic analysis—linear programming, input-output analysis, and the theory of games. Dorfman, Samuelson, and Solow give us by far the best general discussion of these subjects that has appeared anywhere. Each of these men is a recognized authority. And in this case, the group of three has pooled its knowledge and resources so well that the book is doubtless better than any one of the three authors could have written alone.

It is not a "popular" book that is written down to such a level that it can be absorbed without effort by a person who knows no mathematics and little economics. Frankly, the methods covered here are rather difficult. Wisely, the authors have used some mathematics but, I think, not too much. For example, the reader can understand everything in these pages without learning about matrices. The authors have here written mainly for economists, not for mathematicians.

The authors emphasize the close relationships between linear programming, input-output analysis, and the theory of games. They demonstrate, for example, that any linear-programming problem can be stated as a problem in game theory, and can be solved by the von Neumann principle.

They also discuss the curious fact that any linear-programming problem involving the maximization of a linear function can be restated as a *dual* problem involving the minimization of another linear function.

Developments in these fields are coming thick and fast these days. As I was reading this book, a friend showed me a newspaper article about a large corporation that is using an electronic computer to make day-to-day adjustments in the ingredients of animal feeds in order to minimize the cost of a mixture guaranteed to meet a large number of specifications concerning such things as nutritive content. Some railroads are reportedly using the simple form of linear programming discussed in this book as "the transportation problem." I hear that some agencies of Government are using the closely related "contract-awards problem" to save the taxpayers money. These methods are not just fancy gadgets to amuse bright mathematicians and economists. They have great practical possibilities that are just beginning to be understood.

Any young economist who is getting started in quantitative research would do well to invest in this book. It may be hard going, but it should pay the reader handsome dividends.

Frederick V. Waugh

Economic Models: An Exposition. By E. F. Beach. John Wiley & Sons, Inc. 1957. 227 pages. $7.50.

MATHEMATICS, according to Professor Paul Samuelson, has been knocking at the door of economic theory for more than a century. Somewhere along the line the door was opened, and for at least a quarter of a century, mathematics, along with statistics, has become increasingly important in economic analysis.

This has created some problems. One is the provision of adequate training for students of economics. Another is the provision of means whereby older economists, who may have limited knowledge of mathematics and statistics, can gain some understanding of the contributions being made by mathematical economists and econometricians.

Professor Beach's small volume is designed to help solve both of these problems. The general scope and purpose are fairly well described by the statement on the jacket—"an elementary exposition of the mathematical and statistical implications of multiple relations in economic theory."

Mathematical models, dealt with in part I, are divided into "static" and "dynamic," the former being defined as those which do not explicitly involve time. Static models involving linear relationships among the variables are illustrated by several formulations, such as Colin Clark's 6-equation model of the United States economy. Those involving nonlinear relationships are illustrated by models of Hicks and Modigliani designed to show the relation between the Keynesian and classical systems.

The dynamic models are divided into "continuous models" where "the variables are thought of as changing continuously through time;" and "sequence models," where the variables relate to "certain *time periods*." The continuous models include Domar's debt model and Samuelson's investment model, which involve the solution of first and second order differential equations, respectively. The sequence models employ difference equations, and are illustrated by a number of income-savings-investment models from Harrod and Samuelson.

"Econometric models," which is the subject of part II, is a résumé of methods relevant to the statistical estimation of the relationships specified in the theoretical models. Topics covered include an introduction to sampling theory, simple and multiple correlation, and the fitting of simultaneous relationships along Cowles Commission lines. Beach manages to pack a lot in a small space, covering partial correlation in three pages, confluence analysis in four, and autocorrelation in about four more.

What can be said of the book in terms of the author's stated objectives? With respect to the education of students, I would think that it could be very useful indeed. The presentation is logical, clear and concise, and the illustrative materials are well selected. For the most part, the references are well chosen. But unless students had recently had mathematics equivalent to a substantial portion of Allen's *Mathematical Analysis for Economists*, plus introductory statistics, it would certainly be necessary to supplement the text with special materials or assignments.

With respect to the older economist who wants to bring himself up-to-date, the book is one of the most useful that has appeared. This is especially true if one's interest is in obtaining a sort of bird's-eye view of economic model building. There has been a bewildering flow of models in recent years, and I think that Beach's exposition, particularly in part I, performs a real service by providing a compact and logical presentation of this whole field.

But if the economist wants to go beyond this point to understand the mathematical implications of some of the more sophisticated models and to acquire some facility of his own, the book is quite a way from being self-sufficient, especially chapters 5 and 6, where differential and difference equations are involved.

Beach himself recognizes the problem by noting the desirability of the reader's having had some calculus and a beginning course in the theory of statistics. At the same time, however, he expresses the hope that much can be learned from the book on the basis of elementary algebra, and he tries to help the cause along by the occasional introduction of some mathematical instruction, such as the short appendix on derivatives following chapter 3.

Much depends, of course, on the background of the individual reader. For example, I found part II, which Beach regards as generally more difficult than part I, distinctly easier than some portions of part I. In my opinion, non-mathematical economists who wish to maximize the return from this book will have to be prepared to make a few serious excursions into some fairly difficult mathematical topics.

Apart from this problem, Professor Beach's volume has many excellent qualities, some of which have already been noted. The fact that it is brief and inclusive will enable both the beginning student and the older economist to become acquainted with the broad field of economic models without danger of failing to see the forest for the trees. It will also enable them readily to compare their stock of mathematical and statistical knowledge with that required for a reasonably good understanding of the field of economic models and to reach a decision as to whether it is worth their while to make the intellectual investment necessary to yield a high return in that field.

J. P. Cavin

Marketing Research. By Richard D. Crisp. McGraw-Hill Book Company, New York. 798 pages. 1957. $7.50.

TO MANY ECONOMISTS, marketing research suggests systematic study with the aim of increasing efficiency in the marketing system and reducing costs. The present text, however, confines its attention to the problem of increasing business success. The statement is made that marketing research is a management tool and its primary function is to aid executive judgment.

Major areas of research application in marketing are listed as (1) sales forecasting, (2) determining the size and characteristics of the market for a product, (3) estimating territorial sales potentials and measuring territorial variations in sales effectiveness, (4) product research, (5) new-product development, (6) advertising research, (7) test marketing, and (8) qualitative and "motivational" research.

Within its defined limits, the book is a thorough, knowledgeable, and judicious teaching text. Because of its length, it is not adapted to rapid reading; but with its well-arranged chapter headings, and its case, name and subject indexes, it is, as the author suggests, probably useful as a guide to (at least some) workers already in the field.

One of the values of the book to such workers lies in its searching portrayal of current practice in business circles in the conduct of marketing research. Thus it is possible for those who are engaged in the area to check their own methods and techniques (and problems) against what might be considered par for the course. The author's acquaintance with research methods used by various segments of industry is wide and experienced.

The teaching is practical rather than theoretical, although ample reference is made to theoretical sources in methodology. Extensive use of case histories is made to illustrate both method and conceptual approach in problem solving. Unlike most earlier texts, this one covers the broad area of problem solving for the business firm, including not only use of the survey technique but also use of data from other sources, both within and without the firm. Considerable attention is given to sources of "secondary" data and their application.

Nevertheless, sampling receives its due share of consideration. Here we find a sturdy recognition of the virtue of random or probability sampling. At the same time, the author, by reason of widespread industry usage, is forced to the defense of the usually less costly, more rapid quota sampling. With proper safeguards, it is pointed out, quota samples can contribute to the solution of many problems in which knowledge of confidence limits is not considered essential. Or, if we want to be uncritical about this kind of thing, we may, as some apparently do, establish rough confidence limits, but at three standard errors rather than two.

So far as technical methods are concerned, the author appears to be generally well informed and up to date. In the chapter on product research, however, no mention is made of use of the single-stimulus test involving two or more variants of a single product to be rated, or of use of the unstructed rating scale. Both of these techniques have been used successfully.

Concerning qualitative and "motivational" research, the three-level classification of awareness formulated by George Horsley Smith is followed. The first level deals with material that can be discussed with respondents, although consumers' lack of training in "introspecting" may make it difficult for them to give complete information. Here the author notes that the area of information accessible by direct approaches at this level is smaller than it was once thought to be. The second level of awareness deals with material that is rarely openly discussed, largely because of ego involvement. The third level deals with material not consciously recognized by respondents and likely to give rise to anxiety or other disturbance if brought to conscious awareness.

Certain psychoanalytical projective techniques have been adapted to marketing research to obtain qualitative responses. Among these are sentence completion, thematic apperception test, cartoon technique, and word association. Attention is called to the danger of the analyst projecting his own personality into the interpretation of the responses, and to deficiencies in sampling. The

view, now coming to be widely recognized, is expressed that there is room for both qualitative and quantitative research to obtain answers as to the *why* of consumer behavior. For motivational research alone, that is, use of projective techniques unaccompanied by quantitative surveys, the author suggests a team approach of psychologist and seasoned marketing research man, to give it the "promise of becoming a tool almost as significant as the exaggerated claims of a few years ago suggested it might be."

Robert M. Walsh

Problems in Marketing (Second Edition). By Malcolm P. McNair, Milton P. Brown, Davis S. R. Leighton, and Wilbur B. England. McGraw-Hill Book Company. 740 pages. 1957. $7.00.

INSTRUCTORS of marketing courses should find this latest in the series of marketing case books by the faculty of the Harvard Business School a valuable addition to the literature in the field. It will provide useful supplementary information even for those instructors who do not completely agree with the authors that ". . . the case method makes the difference between real education and merely passively acquired words and ideas." Researchers concerned with decision-making of individuals or firms may find a study of many of the cases informative, but those concerned with aggregates or broad policy may find the material less helpful.

In justification of the use of the case method, the authors dismiss the industry or commodity approach as being needlessly time-consuming and ineffective, and the institutional approach because of its failure to emphasize dynamic aspects of marketing. They contend that an approach which emphasizes physical functions would fail to give consideration to functions that are of primary concern to businessmen and that an approach from the standpoint of economic functions is not appropri-

ate for the would-be practitioners of marketing for whom the text is designed. They conclude, therefore, that case studies which focus attention upon business management functions and upon the interdependence and complexity of marketing functions provide the best approach.

The 79 cases, most of which are presented for the first time, are organized into 9 sections relating to such marketing problems or questions as the influence of the consumer, channels of distribution, merchandising, advertising policy, and pricing. Sections added for the first time in the series relate to the use of marketing research and integrated marketing programs.

The cases that relate to channels of distribution may be of interest to researchers concerned with market structure and organization since they suggest something of the importance and possible usefulness of the case method in developing studies in this area. The section on merchandising is particularly pertinent to workers in agriculture, because of its treatment of the problem of product planning and its relation to the competitive position of products.

William A. Faught

Federal Lending and Loan Insurance. A Study by the National Bureau of Economic Research. By R. J. Saulnier, Harold G. Halcrow, and Neil H. Jacoby. Princeton University Press, Princeton, N. J. 566 pages. 1958. $12.00.

FEDERAL CREDIT programs have grown rapidly. They are now an important part of our financial structure, and for some time there has been need for a treatise that would bring together in one publication information on the various Federal credit agencies. This need has now been met by three leading economists—R. J. Saulnier, Harold G. Halcrow, and Neil H. Jacoby—in this book. Economists and others interested in finance will find it a useful study.

The authors state that the purposes of their study are to show how the Federal credit programs developed, describe their services, and record the experience and analyze the impact of these programs on private finance and the economy generally. The first part of the volume deals mainly with the nature and scope of the Federal credit agencies, their services, lending experience, economic significance, and effect on credit markets and lending practices. Following is a discussion

of the three main areas served by Federal credit agencies: (1) Agricultural credit programs; (2) Federal lending and loan insurance programs for business and financial institutions; and (3) Federal lending and loan insurance programs for housing. The first of three appendixes consists of summary tables for the various agencies showing by years the loans made, insured, or guaranteed. The second appendix analyzes business loans of the Reconstruction Finance Corporation from 1934 to 1951. A discussion of the business loan guaranty and insurance program of the Veterans Administration from 1945 to 1955 is found in the third appendix from 1945 to 1955.

Agricultural credit programs, which began with the establishment of the Federal land bank system in 1916, are reviewed and analyzed. The land banks were organized with the use of Government capital, but all Government capital has been retired and the banks are now wholly owned by farmer borrowers through the National Farm Loan Associations, which hold all the stock of the land banks.

The strong net worth position of the system at present would indicate that its earning position has been stronger than is indicated by the authors when they state, "it seems probable that the earnings somewhat exceeded full costs of operation over the long run and that the regular land bank program has been self-sustaining."

Similarly, the Federal Farm Mortgage Corporation, which operated on its income from mortgages and investments in land bank bonds, and which has paid back its capital and more than $139 million in dividends to the Treasury, appears to have a better record than that indicated by the statement that "it appears . . . the Commissioner loan program has been more than self-supporting." The reimbursement which the Corporation and the land banks received from the Treasury for

reducing to 3½ percent the interest charged borrowers on loans during certain depression years was at the direction of Congress and should be considered a subsidy to the borrowers and not a cost chargeable against these agencies.

The development of the Production Credit System is reviewed and the services and loan experience analyzed. Production credit associations are local associations that make short-term and intermediate-term loans to farmers and obtain funds by discounting farmers' notes with the Federal Intermediate Credit Banks. Their importance as a source of credit varies by regions. The authors conclude that the loan experience has been similar to that of commercial banks.

Other Federal agencies that finance agriculture are considered and analyzed. These include the Banks for Cooperatives, the Farmers Home Administration and the Rural Electrification Administration.

The book contains an excellent general discussion of Federal lending and loan insurance programs for housing. The study shows that in 1953 about 43 percent of the home mortgage debt was composed of insured and guaranteed loans. The program has encouraged mortgage loans for housing with full amortization.

In summarizing the lending experience of Federal Credit agencies in general, the authors draw three main conclusions. First, the record is exceptionally favorable in programs that provided for refinancing of debts in default during the depression of the 1930's. Second, the experience generally is unfavorable in supplying credit to farms and firms which, because of some weakness, could not get credit through private lenders. Third, cooperative financial institutions sponsored by the Federal Government have fared well as lenders.

E. C. Johnson

Capital in Agriculture—Its Formation and Financing Since 1870. By Alvin S. Tostlebe. Princeton University Press, Princeton. 232 pages. 1957. $6.00.

A STUDY of long-term trends in capital formation and financing in the United States was begun by the National Bureau of Economic Research in 1950. This is the second report in that series. Findings previously published by Dr. Tostlebe in the National Bureau's Occasional Paper 44, *The Growth of Physical Capital in Ag-*

riculture, 1870–1950, and in "Trends in Capital Formation and Financing Agriculture," *Journal of Finance*, May 1955, are included in this book.

The purposes stated by the author were "to measure and analyze the growth of farm capital over the eighty year span from 1870 to 1950, to analyze for as much of this period as possible the

financing that accompanied it, and to extract from this historical survey suggestions as to prospective future trends in capital formation and financing in agriculture." Within the limitations of the data available, Dr. Tostlebe reached these objectives and at the same time made an enduring addition to the working tools of agricultural economics. It is a valuable contribution to the historical studies that describe the development of agriculture in the United States and provide bases for projecting trends in the future.

The more important sources of data used were Census and Bureau of Agricultural Economics reports; Goldsmith's *A Study of Savings in the United States, 1897–1949;* Strauss and Bean's *Gross Farm Income and Indices of Farm Production and Prices in the United States, 1869–1937;* and Atkinson and Jones' *Farm Income and Gross National Product (Survey of Current Business).*

The analysis shows by regions the growth of various classes of physical and financial assets, variations in capital per farm and per person, the relation of capital to product, and sources of farm capital. Capital and output per person engaged in agriculture rose throughout the 80-year period. The same trend was observed in output per unit of capital. The regional comparison revealed strikingly the influential role of capital as a determinant of productivity of labor.

The increase in output per person could not be attributed entirely to the increases in capital per worker. Capital efficiency also rose as a result of improvements in equipment and in methods of livestock and crop production.

Capital increased much faster when farm income was favorable, and this was the main source of capital accumulation. New capital was estimated to total $78.9 billion from 1900 to 1950, of which 75 percent originated from gross farm income, 22 percent from credit, and 3 percent was represented by savings in the form of financial reserves.

Dr. Tostlebe expects these trends to continue into the indefinite future. Capital growth in the aggregate will occur, however, "only in times of reasonable prosperity" at an average rate that is likely to be substantially less than 1 percent per annum. Machinery, productive livestock, and cash balances will grow more rapidly than capital represented by land, buildings, and stored crops. Income will remain the major source of capital, but credit, especially non-real-estate credit, will gain in importance.

The material is organized and presented in the workmanlike way that characterizes National Bureau studies. Readers will find the main results and conclusions in the summary in chapter 1. In the Foreword, Dr. Simon Kuznets calls attention to some of the more significant findings in the study. The nine appendixes will be helpful to students concerned with sources and methods.

Russell C. Engberg

Farm Crisis: 1919–1923. By James H. Shideler. University of California Press, Berkeley. 345 pages. 1957. $5.00.

THE THESIS of this work is that the period 1919–1923 was "a crisis standing as a basic event in the history of agriculture." This period is singled out from earlier economic crises because it marked a turning point in the attitude of farmers toward governmental intervention in economic affairs. "During the 2½ years of Harding's presidency, agriculture led a movement away from *laissez-faire* to Government participation in business affairs, one of the great economic changes of the twentieth century."

Farmers' experiences with the Food Administration's minimum prices and controls are stressed as an influential factor in shaping their demands for governmental intervention to change agriculture's relative economic position during the postwar crises. The author notes that farmers did not know what to ask for and were not united on a plan or remedy until late in 1923 when major farm interests joined in promoting the McNary-Haugen plan for raising farm prices. By this time, the agricultural crisis had merged into what the author calls a chronic agricultural depression.

The book is organized on a chronological basis with special emphasis given to farmer self-help solutions, the cooperative-marketing remedy, the

Harding administration, agricultural reform legislation, and the persisting farm problem. An impressive array of sources is listed and discussed in the author's bibliographical notes. He has consulted the records of major governmental agencies, including records of governmental conferences and meetings, private manuscript collections, Federal documents and official publications, State publications, and newspapers and periodicals for the period covered. Mr. Shideler has also interviewed or corresponded with persons involved in or close observers of agricultural development during the 1920's. With this full coverage of sources it is unfortunate that the footnotes are relatively inaccessible; they are organized by chapters at the back of the book. But the usefulness of the book as a reference work is greatly enhanced by an unusually well-organized and detailed index.

Although Mr. Shideler does not compare post-World War I conditions and problems with those of post-World War II, the wealth of factual material he presents on governmental activities and farmer reactions provides a basis for drawing analogies. Readers unfamiliar with the events of 35 years ago may be surprised to learn that in the immediate postwar period, a direct-payment plan for wheat producers was favored by Secretary Houston to make up the difference between the market price for wheat and the guaranteed price of $2.26 a bushel; that in 1921 a farm journal urged farmers to "bank" their fertility in the soil by raising less corn and more legumes; and that in 1920 a bill providing for the fixing of minimum prices for staple crops on a cost-of-production-plus-profit basis and for the purchase of unsold surpluses for sale abroad was introduced into Congress.

The chapter on the Harding administration will be of special interest to government personnel. The author discusses the competition between the Department of Agriculture and the Department of Commerce over the development of marketing research and service work. He states that Secretary of Commerce Hoover considered agriculture an extractive industry and argued that functions of the Department of Agriculture should be confined to production on the farm.

Some may feel that Mr. Shideler has over-emphasized one 5-year period in the evolution of the farm problem, which has been developing since the Civil War. Others may consider that the turning point in farmers' response to economic crisis and depression occurred in 1932 when acute dissatisfaction was registered in the voting booths. In any event, the author has provided a comprehensive and valuable history of a critical period that should be read by everyone concerned with agricultural policy.

Gladys L. Baker

Manual of Nutrition. Fourth Edition. Prepared by Members of the Scientific Advisor's Division (Food) of the Ministry of Agriculture, Fisheries, and Food. Philosophical Library, Inc. New York. 67 pages. 1957. $3.50.

THE SCOPE of this book is broad. It includes a discussion of the major nutrients—their sources and role in the body; energy needs; digestion of foods and absorption of nutrients; recommended nutritional allowances; composition of foods; cooking; and meal planning. The subject matter is so arranged that the manual can serve as a basis for nutrition lectures.

Because of its comprehensive nature and small size—about 70 pages—the manual can give only an overview, or highlights, of the present status of nutrition, rather than a more complete account. Even though the complex science of nutrition is presented in a simplified form, it may be difficult for the general reader to understand unless he has a sound background in science.

To round out the nutrition picture, the effect of cooking on different essentials and on foods is included, as well as the nutrient composition of foods. The need for providing adequate diets is emphasized, and suggestions for meeting nutritional requirements of different groups of individuals are included.

Certain sections, although interesting, may be of limited usefulness to many in the United States. This is mainly because the book, which

was prepared in the United Kingdom, applies nutrition principles in light of British dietary habits, food supplies, and viewpoints on nutrition, and these factors are not always the same as those. found in the United States. For instance, the part that deals with recommended nutritional allowances is in terms of the dietary allowances proposed by the British Medical Association. The amounts recommended for some nutrients differ from those set up by the National Research Council of the United States, primarily because of the difference in the philosophy underlying the purpose of these two dietary standards.

In the main, however, those interested in gaining a general understanding of nutrition and the importance of different kinds of foods to health should find this manual a handy reference. This is particularly true because so many aspects of nutrition are brought together under one cover.

Louise Page

Moderne Methoden in der Agrarstatistik (Modern Methods in Agricultural Statistics). By Heinrich Strecker. Deutschen Statistischen Gesellschaft, Munich, Germany. 142 pages. 1957. 17.50 Deutche Marks (about $4.50).

THE JANUARY 1955 ISSUE of this journal carried a translation of a short but impressive paper by Dr. Strecker on "Sampling in West German Official Agricultural Statistics." The author has now produced a much more comprehensive treatment of the subject. Published as Number 8 in a series of bulletins issued by the German Statistical Association, the text describes remarkable advances in the application of modern viewpoints and techniques to collection of agricultural data in West Germany during the last decade. It is an outstanding example of what can be accomplished in a compatible marriage of theory and practice.

Although the guiding hand of the mathematical statistician is clearly in evidence, major emphasis is always on the practical job to be done. After giving a summary of the history and evolution of census and sample-survey methods, particularly with reference to agricultural statistics in Germany, the author proceeds directly to descriptions of recent research studies and modernized operating surveys conducted in his country. These cover such topics as preliminary sample tabulations of agricultural census data, use of sample surveys to check the accuracy of a census, the replacement of censuses by sample surveys, farm population and labor-force surveys, milk production surveys, crop and livestock estimating, and the use of objective preharvest samples for estimating yields of field crops and fruit.

These are all discussed in detail and cover the practical operating aspects of each problem as well as the statistical theory. Numerous tables show the sample allocations used and the results of the work. Illustrative diagrams and maps help give a clear picture of operations.

The planning of each study or survey and the analysis of the data are in accord with the most modern statistical viewpoints in all respects. Although the particular sample designs and working procedures described are, as one would expect, largely geared to administrative, cultural, and other factors characteristic of West Germany, every agricultural statistician anywhere in the world can find much in the book that he can use.

The reviewer knows of no other publication in the field of agricultural statistics in which the subject is discussed in such breadth and detail or with such a happy blending of theory and applications.

An English summary is appended for those who do not read German. But any reader who is sincerely interested in the subject stands to miss much if he does not read the entire text in the original or have it translated for him. With true Teutonic thoroughness, the author lists an extensive bibliography, much of it consisting of recent German publications, as well as references to works familiar to statisticians in this country. The book is also well indexed.

Agricultural statisticians in this country should be particularly interested in the professional approach displayed in the designs of the surveys, the meticulous attention given to optimum sample allocations and the estimation of sampling errors in sample surveys, and the measurement of reporting errors in censuses. The relationship of

sample surveys to complete censuses is another topic on which the author's views are of interest.

A few specific procedures are particularly worthy of mention. In designing an area sample for surveys of hog producers, tracts of land were put into 3 strata on the basis of numbers of breeding sows reported in those tracts in the most recent livestock census. The problem of choosing class intervals for the 3 strata in such a way as to minimize the sampling error, for a given sample size, was subjected to thorough analysis. The methods used were developed by the Swedish statistician Tore Dalenius, partly in cooperation with Margaret Gurney of the U.S. Bureau of the Census. But the mere fact that this was taken into consideration at all, testifies to the thoroughness with which the sampling problem was investigated. In fact, a number of alternative sample designs and sampling units were appraised, with the help of past census records, before the area sample was adopted as the most desirable.

Another example is to be found in the description of monthly mail surveys to estimate milk production. The problem of non-response is discussed fully. But a more eye-catching feature of these surveys is the device of staggering the survey over 6 specified sample days in each month to allow for trends in milk flow during the month.

Some minor misprints are present, as in any first printing. The following were pointed out by the author himself in a note to this reviewer:
1. The factor n_{ij} that should accompany $N_{ij}-1$, and the factor n_j that should accompany N_j-1 were omitted in the last two equations on page 21.
2. The reference to "4 days" on page 22 should have read "42 days".
3. The upper limit given on page 23 for the class interval on size of land tracts in stratum 2 should be 2 hectares instead of 1 hectare.
4. The word "objective" in the fourth line of page 57 should read "subjective".

Walter A. Hendricks

The Theory of Economic Growth. By W. Arthur Lewis. Richard D. Irwin, Inc., Homewood, Illinois. 453 pages. $7.20.

ANYONE who has devoted much thought and study to economic growth and development is struck by the complexity of the subject. This is true whether it involves an entire economy or a major industry. Many of the things that need to be known and understood cannot be foreseen. Even if we could evaluate all of the forces that influence economic development, the human mind probably could not encompass the many variables and the infinitely complex systems of relationships among variables which are likely to prevail in a growing economy.

Mr. Lewis, the Stanley Jevons Professor of Political Economy at the University of Manchester, is aware of the dimensions of his undertaking. His book presents no precise well-defined models of economic growth. The title, *The Theory of Economic Growth*, hardly describes its contents. As the author points out in his introduction, he is presenting more of a map of economic growth the scale of which is very large and permits little detail.

Though the focus of the study is growth in output per head, it is interesting that Mr. Lewis is concerned primarily with human behavior and only secondarily with the natural resources with which a nation might be endowed. Thus he recognizes the tremendous importance of human behavior, accidents of history, and plain fortuitous events in shaping the economic development of a nation.

Lewis believes that the proximate causes of economic growth are principally three: (1) The effort to economize, that is, to get the most out of limited resources; (2) increases in knowledge and their application; and (3) the amount of capital and resources per capita. What he is particularly interested in, however, are the fundamental forces that lie behind these proximate causes. Accordingly, he inquires into such matters as the environment most favorable to growth, institutions that encourage innovations and investments, social beliefs and ends, religion, and other forces which motivate human actions. Mr. Lewis relegates to the latter part of his book factors to which econ-

omists typically give special emphasis, such as those influencing capital requirements, savings and investment, population, labor force, market development, mobility of resources, and the like.

Many of the facets of economic growth transcend the boundaries of contemporary economic theory. A realistic appraisal of economic growth and development must go beyond the usual subject matter of the economist and into the domain of the sociologist, anthropologist, historian, philosopher, and political scientist. Attempts to develop comprehensive models of economic growth without reference to these other domains are likely to be unrealistic and often sterile.

Despite Mr. Lewis' very substantial effort to fill some of the gaps in our knowledge of economic growth, I think he would probably agree that we are unlikely to develop a theory that is completely realistic and satisfactory. But even from somewhat oversimplified models of economic growth, it is possible to make appraisals that are useful for many analytical purposes. Since man's experience provides much of the basis for such appraisals, the resultant projections probably tend to be conservative. But they can be used to indicate the nature of many underlying trends and to obtain some general ideas of the economic magnitudes that can be expected in the process of economic growth.

Although persons working on specific problems of economic growth, such as agricultural production or the demand for farm products, will not be able to take into account all the forces that Mr. Lewis mentions, his book brings into focus both the complexities of the task and many of the specific forces that must be considered in appraising past and prospective economic growth. Any student or research worker who embarks on an undertaking in this general area will do well to devote considerable attention to this book.

Rex F. Daly

The Great Siberian Migration. By Donald W. Treadgold. Princeton University Press, Princeton, N. J. 278 pages. 1957. $5.00.

DURING THE HALF-CENTURY between the emancipation of serfs and World War I, about 6 million persons migrated from European Russia to Siberia. Although this migration siphoned off only a tenth or so of Russia's tremendous natural increase of population during this period, the economic and social opportunities that it engendered profoundly affected Russian society as a whole. The image of a new kind of peasant, self-reliant, wealthy, and strong-willed, came into existence. A new alternative appeared in Russia's fateful dilemma of reaction or revolution. And the agricultural surpluses from newly cultivated Siberian lands accelerated Russian industrialization by providing both cheaper food and exports.

The economic effects of the Siberian migration have proved to be long-lasting, for Western Siberian agricultural surpluses later provided food supplies essential to the Soviet economic development of the Urals, of Central Asia, and of the Far East. The social effects proved, on the contrary, to have been transitory, for Stolypin's farsighted reforms, which might have given Russia a free and stable society patterned on Siberian experience, were nullified after his assassination in 1911.

Professor Treadgold's well-written and stimulating volume sketches the history of the great Siberian migration. Undertaking the treatment of a large and complex subject in a relatively brief compass, the author has chosen to indicate its many facets without treating any one in an exhaustive manner.

He analyzes the migration to Siberia from three viewpoints: (1) Its relation to major turning points in Russian history, such as the conquest of Siberia, the emancipation of the serfs, the construction of the Trans-Siberian Railroad, and the Russo-Japanese War; (2) the effects of migration upon the economic and social condition of the peasant; (3) and the Siberian migration as an intellectual and political issue in pre-revolutionary Russia.

It is in relation to the last theme that Donald Treadgold makes his most significant contributions. In essence, he summarizes the tragedy of

Tsarist Russia as follows (p. 60): "By its nature the intelligentsia was anti-official above all else, and accordingly fostered the notion . . . that the peasant himself was a helpless, passive victim of history, incapable of either achieving or suggesting solution. Because the intelligentsia felt that the educated intellect was the crucial and indispensable weapon in the revolutionary arsenal, they not only dismissed the opinions of the unlettered peasant, but also neglected his deepest attitudes." This arrogance blinded Russia's leaders to the lessons of the Siberian migration, and led finally to their own destruction.

Some aspects of the volume would have benefited from additional research. For example, an examination of the considerable bodies of Russian peasant customary law would have shown that the Russian peasant institutions were founded upon well-developed concepts of private property and individual welfare. The Siberian migration lessened State and landlord interference with peasant institutions, and it destroyed an imposed rather than indigenous collectivism. The *mir* owes more to Peter's tax regulations than to any peculiarities of the Russian psyche.

In sum, Professor Treadgold's volume may be recommended as a readable and thoughtful introduction to a little-known aspect of Russian history. I hope that it will be joined, in time, by the results of more definitive investigations.

Demitri B. Shimkin

Selected Recent Research Publications in Agricultural Economics Issued by the United States Department of Agriculture and Cooperatively by the State Colleges [1]

BOGARDUS, R. K. A WAREHOUSE LAYOUT FOR A FRUIT AND VEGETABLE SERVICE WHOLESALER IN A TERMINAL MARKET. U. S. Dept. Agr. AMS–232, 10 pp., illus. March 1958.

Designed to provide service wholesalers with guides for the layout of a warehouse within a modern terminal market facility, this report places special emphasis on storage requirements, materials-handling methods, warehousing efficiency, and structural changes required in modern terminal buildings to accommodate the suggested layout.

BONSER, H. J. PART-TIME FARMING IN THE KNOXVILLE CITY-COUNTRY FRINGE. Tenn. Agr. Expt. Sta. Bul. 270, 34 pp., illus. September 1957. (Pub. 28, Southeast Land Tenure Com.)

This study (made in 1951) is a follow-up of one made in 1946 in the same area. Between 1946 and 1951, the average size of farms increased; numbers of livestock kept decreased; acreage planted to corn decreased; average value of investment rose; total costs increased; amount by which estimated total income from the farm exceeded costs decreased; and family labor earnings from all sources increased.

BRENNAN, M. J. PROGRESS REPORT ON COTTON PRODUCTION RESPONSE; WITH SPECIAL APPLICATION TO THE SOUTHEAST. U. S. Dept. Agr. ARS 43–72, 31 pp., illus. April 1958.

From 1943 to 1950, when acreage allotments on cotton were not in effect, the acreage of cotton decreased. Substitution of hay and peanuts for cotton in response to relative changes in price may explain the changes in cotton acreage before 1949. After that year, the effect of off-farm work on cotton acreage became increasingly important. Tentative acreage-response functions for cotton were constructed for each of three regions: Southeast, Mississippi Delta, and Southwest. More precise formulations of acreage and production response are needed.

BUTLER, C. P., AND LANHAM, W. J. AN ECONOMIC APPRAISAL OF THE CONSERVATION RESERVE PROGRAM IN AREA III B, UPPER COASTAL PLAIN OF SOUTH CAROLINA. S. C. Agr. Expt. Sta. AE 135, 59 pp. February 1958.

The immediate effect of the Conservation Reserve program in this area was to reduce acreages of corn, oats, and soybeans on participating farms. The Acreage Reserve Program operated to reduce acreages of cotton. Reduction in these acreages meant more idle cropland in 1957. The effect on total farm production may have been smaller than was reflected by the changes in acreages. The labor force was reduced more on the larger than on the smaller farms because of the programs. Many participating operators used the program as a means toward retirement. Purchases of fertilizer were reduced. Effects on farm income varied.

CARPENTER, FRANCES, AND BURLEY, S. T., JR. MEASURING COTTON FIBER LENGTH: THE TRUNCATED ARRAY METHOD. U. S. Dept. Agr. Mktg. Res. Rpt. 217, 15 pp. March 1958.

This report summarizes the investigation and evaluation of several suggested techniques and methods for measuring the length of fibers in a sample of cotton. A shorter technique, called the truncated array method, was compared with three other methods, and the results analyzed.

DOUGHTY, H. N. PRICING SOYBEANS, AN ECONOMIC APPRAISAL OF ALTERNATIVE METHODS. (Preliminary Report). U. S. Dept. Agr. AMS–229, 8 pp. February 1958.

This preliminary report presents findings of a study to determine the economic feasibility of utilizing a quick and relatively simple method for ascertaining the oil content of soybeans at the time of sale. Called the dielectric oil-determining method, this could improve the grading and pricing system for soybeans.

ENGELMAN, GERALD, AND GAARDER, R. O. MARKETING MEAT-TYPE HOGS; PROBLEMS, PRACTICES, AND POTENTIALS IN THE UNITED STATES AND CANADA. U. S. Dept. Agr. Mktg. Res. Rpt. 227, 49 pp., illus. April 1958.

Production and marketing of meat-type hogs is an important problem in American agriculture. Although meat-type strains have been developed in this country, farmers do not obtain a fair price for their extra efforts in raising meat-type hogs. Canada has provided incentives for production of meat-type hogs, and this is reflected in better markets and prices for Canadian hogs. A group of men was sent to Canada to study the grading and marketing methods, and to appraise the effects of these methods on the characteristics of pork production in Canada. The results are presented here, with information on the pork quality problems in the United States and an appraisal of the progress made in both countries.

ENGELMAN, GERALD, AND PENCE, SUE. LIVESTOCK AUCTION MARKETS IN THE UNITED STATES. DEVELOPMENT, VOLUME HANDLED, AND MARKETING CHARGES. U. S. Dept. Agr. Mktg. Res. Rpt. 223, 37 pp., illus. March 1958.

The livestock auction market, which handled over 30 million head of cattle and calves in 1955, is now one of the major market outlets for livestock in the United States. Livestock auctions in the U. S. have increased in number about threefold since 1935. This study examines the role of the auction in the marketing of livestock in this country, and provides information which may serve as a benchmark for future analyses of the economic importance and effectiveness of livestock auctions.

FARNWORTH, VIRGINIA, AND JACKSON, DONALD. MARKETING MARGINS, PRACTICES, AND COSTS FOR SOYBEAN AND COTTONSEED OILS. U. S. Dept. Agr. Mktg. Res. Rpt. 231, 46 pp., illus. May 1958.

Report gives information on marketing practices and marketing charges for soybean and cottonseed oil from the time the oilseeds leave the farm until the oil reaches the consumer in the form of margarine or shortening. It includes information on seasonal variations in prices and marketing margins for these oilseeds and their products.

HALE, P. W., AND CHAPOGAS, P. G. PACKING CALIFORNIA POTATOES IN FIBERBOARD BOXES. U. S. Dept. Agr. Mktg. Rpt. 214, 24 pp., illus. February 1958.

This report evaluates a new 50-pound fiberboard box for use in shipping California potatoes, in comparison with the conventional 100-pound burlap bag now in general use by potato shippers. It compares arrival condition, costs, and trade acceptance of potatoes packed in the two different containers.

HARRIS, E. S. CLASSIFIED PRICING OF MILK. SOME THEORETICAL ASPECTS. U. S. Dept. Agr. Tech. Bul. 1184, 106 pp., illus. April 1958.

Classified pricing of milk is the prevalent system by which farmers sell milk to handlers in city markets; handlers pay different prices for milk in accordance with the way they use it. This report goes into the functions and economic consequences of classified pricing and studies some of the conflicting interests involved.

HARVEY, E M., AND ATROPS, E. P. SHIFTING TESTS WITH CALIFORNIA CITRUS FRUIT, FROM LOS ANGELES TO ROTTERDAM. U. S. Dept. Agr. Mktg. Res. Rpt. 219, 26 pp., illus. February 1958.

Six shipments of California oranges, grapefruit, and lemons shipped from Los Angeles to Rotterdam were tested to learn better methods of maintaining the fruit during shipment. Much fruit arrives in bad condition; this report recommends precautions to take in handling and shipping.

HAY, D. G. ENROLLMENT IN VOLUNTARY HEALTH INSURANCE IN RURAL AREAS. U. S. Dept. Agr., Agr. Inform. Bul. 188, 20 pp., illus., April 1958.

Participation in voluntary health insurance among farmers and other self-employed workers has fallen behind that of persons in other types of employment. This report gives the figures on relative enrollment in health insurance in rural and urban areas, supplies data on the extent of enrollment among farm families, and summarizes the experience that carriers have had in enrolling rural groups.

HAY, D. G., AND LOWRY, S. G. USE OF HEALTH CARE SERVICES AND ENROLLMENT IN VOLUNTARY HEALTH INSURANCE IN MONTGOMERY COUNTY, NORTH CAROLINA, 1956. N. C. State Col. Prog. Rpt. Rs–31, 12 pp., March 1958. (U. S. Dept. Agr. cooperating.)

Information is needed as to the extent of acceptance of voluntary health insurance by people living in the country and in villages. Stokes County and Montgomery County, North Carolina, were selected as study areas to find out what health-care resources in rural localities in the Piedmont area of North Carolina are available; to what extent people in these rural areas use existing health care personnel and facilities; how much use is made of such preventive health practices as physical and dental examinations, immunizations, and chest X-rays; to what extent individuals in these rural areas of the State enrolled in voluntary health insurance. The data were obtained by personal interviews of a representative sample of the people in the counties. (See also: Lowry and Hay.)

HERRICK, J. F., JR., McBIRNEY, S. W., AND CARLSEN, E. W. HANDLING AND STORAGE OF APPLES IN PALLET BOXES. U. S. Dept. Agr. AMS–236, 41 pp., illus. April 1958.

Pallet boxes are being used more and more for the handling and storage of apples, especially in the Pacific Northwest. A variety of pallet boxes was studied, tests

were made on the condition of the apples stored in these boxes, and costs of using pallet boxes and standard boxes were compared.

HUTTON, R. F., KING, G. A., AND BOUCHER, R. V. A LEAST-COST BROILER FEED FORMULA. METHOD OF DERIVATION. U. S. Dept. Agr. Prod. Res. Rpt. 20, 39 pp. May 1958.

This report describes the linear programming model used in deriving a least-cost broiler-feed formula that will meet each of a number of stated specifications. The reasoning back of the development and application of the formula is given. The text outlines a set of nutritive and other specifications of broiler feeds, including restrictions as to minimum and maximum amounts of the ingredients that make up the ration. Some specifications, salt, for example, can be met from only one source. For others, the least-cost source can be predetermined.

IBACH, D. B. USE OF STANDARD EXPONENTIAL YIELD CURVES. U. S. Dept. Agr. ARS 43–69, 24 pp., illus. Feb. 1958.

Economic interpretation of yield response to fertilizers based on use of standard exponential yield curves can be accomplished with a few calculations that involve only simple arithmetic.

KLEIN, J. E. COSTS OF DISTRIBUTING MILK THROUGH VENDING MACHINES AND BY RETAIL AND WHOLESALE ROUTES, MARTINSBURG, W. VA. U. S. Dept. Agr. Mktg. Res. Rpt. 229, 42 pp., illus. May 1958.

This report describes the operations and compares the costs of milk distribution by vending machine, home delivery, and wholesale routes, when vending is carried on as a complement rather than in competition with wholesale and retail route distribution. Both the physical and monetary costs involved in milk vending are presented as a guide in learning whether such operations are feasible.

KOTTKE, M. W., AND PUTERBAUGH, H. L. ADOPTION OF SUPPLEMENTAL IRRIGATION ON CONNECTICUT FARMS. Conn. (Storrs) Agr. Expt. Sta. Bul. 336, 15 pp., illus. [April 1958]

Technological advances such as aluminum pipe and biological innovations relating to the effects of water on the quality and yield of certain crops have probably stimulated interest in irrigation in Connecticut. Tobacco, potatoes, and vegetables are irrigated extensively. There is room for expansion in irrigated acres of hay and pasture, although changes in both technology and economic conditions will be needed to make irrigation more favorable for them.

LOWRY, S. G., AND HAY, D. G. USE OF HEALTH CARE SERVICES AND ENROLLMENT IN VOLUNTARY HEALTH INSURANCE IN STOKES COUNTY, NORTH CAROLINA, 1956. North Carolina State College Progress Rpt. Rs–32, 15 pp. March 1958. (U. S. Dept. Agr. cooperating.)

This report gives information for Stokes County similar to that for Montgomery County given in the report by D. G. Hay and S. G. Lowry.

MAITLAND, S. T., AND FISHER, D. A. AREA VARIATIONS IN THE WAGES OF AGRICULTURAL LABOR IN THE UNITED STATES. U. S. Dept. Agr. Tech. Bul. 1177, 54 pp., illus. March 1958.

Hired workers on farms earned a cash wage equivalent to 52 cents an hour, exclusive of perquisites, in the spring of 1950. In the fall of 1954, farmers were paying an average of 79 cents an hour in cash. About half of this increase represents the temporary seasonal rise in farm wage rates each fall; the remaining half represents an increase in cash wage rates for farm workers. More than 3,000,000 persons earn some cash wages on farms each year. This report emphasizes that the hired agricultural worker and his wage earnings are influential in management of production and determination of production costs. Geographic variation in farm wage rates, based on data collected in the 1950 and 1954 Censuses of Agriculture, is studied in detail.

MAITLAND, S. T. THE HIRED FARM WORKING FORCE OF 1956. U. S. Dept. Agr. Agr. Inform. Bul. 187, 50 pp., illus. April 1958.

More than 3½ million persons did some farm work for wages in the United States in 1956, and 2 million worked 25 days or more at farm wage work. This report includes the size and composition of the hired farm working force, the chief activity of the force during the year, earnings of hired farm workers, migratory farm workers and their characteristics.

MANCHESTER, A. C. AND PODNAY, J. C. SHIFTS IN SUPPLY AREAS AND CONSUMPTION RATES FOR VEGETABLES, 1939 TO 1955. U. S. Dept. Agr. Mktg. Res. Rpt. 221, 30 pp., illus. March 1958.

Changes in supply areas and consumption rates for vegetables have impacts on marketing agencies as well as on producers and consumers. This report brings together available data in these shifts between the immediate prewar years, 1939–41, and 1953–55, the most recent period for which data are available.

MARTIN, R. G., AND GILLILAND, C. B. WEIGHT AND POLARIZATION CHANGES OF PUERTO RICAN RAW SUGAR IN STORAGE AND SHIPMENT. U. S. Dept. Agr. Mktg. Res. Rpt. 220, 26 pp., illus. March 1958.

Losses of weight and polarization in bagged raw sugar during storage and shipment between Puerto Rican mills and United States mainland ports amount to approximately a million dollars a year. This report studies and analyzes these weight losses, using data on weight and polarization of the raw sugar at the mill and at the mainland ports, the method and date of shipment, and the mainland port of entry.

MEHL, PAUL. INDUSTRIAL EMPLOYMENT AND OTHER FACTORS IN SELECTING AN AREA FOR RURAL DEVELOPMENT; SURVEY OF 8 SOUTHEASTERN STATES. U. S. Dept. Agr. Misc. Pub. 760, 38 pp., illus. April 1958.

A general survey of industrial employment in 8 southeastern States was made for use in the Rural Development Program which is designed to provide more employment for underemployed farmers. A more intensive study of conditions in Georgia was made as an example of the selection of a specific area for rural development work.

MEYER, C. H. COMPARATIVE COSTS OF HANDLING APPLES AT PACKING AND STORAGE PLANTS. U. S. Dept. Agr. Mktg. Res. Rpt. 215, 75 pp., illus. March 1958.

Apple packinghouse operators in the Pacific Northwest have become concerned over increasing costs involved in receiving, packing, and loading out fruit. This report shows the relative labor and equipment costs of performing handling operations using various types of equipment in 1- and 2-floor plants for different volumes.

MITCHELL, J. A., JACKSON, DONALD, AND GILLILAND, C. B. LABOR AND POWER UTILIZATION AT COTTONSEED OIL MILLS. U. S. Dept. Agr. Mktg. Res. Rpt. 218, 68 pp., illus. February 1958.

Cottonseed oil mills of all types can improve their utilization of labor, power, and steam considerably and thereby lower unit processing costs. Seventy-seven mills were studied to make available to mill operators information about the industry which would help them to achieve savings in man-hours and power.

NAUHEIM, C. W., BAILEY, W. R., AND MERRICK, D. E. WHEAT PRODUCTION. TRENDS—PROBLEMS—PROGRAMS—OPPORTUNITIES FOR ADJUSTMENT. U. S. Dept. Agr. Agr. Inform. Bul. 179, 89 pp., illus. March 1958.

Because yields vary widely by regions, total production of wheat is unpredictable. Annual utilization also varies greatly from year to year. Prospective utilization for 1960 and beyond is estimated at about 860 million bushels and probably will not exceed 900 million, even by 1975. Despite 20 years of farm programs, serious problems persist in major wheat areas: (1) Much land unsuited to cultivation continues to be planted to wheat; (2) much suitable land lacks adequate soil and water conservation programs; (3) many wheat farms are too small to be adequate operating units. Producers seek profitable alternative uses for land and other resources diverted from production of wheat. Feed grains, particularly barley and sorghum, grassland, and livestock are alternatives used.

NICHOLLS, C. A., SMITH, C. N., AND BROOKE, D. L. THE FLORIDA FOLIAGE PLANT INDUSTRY. Florida Agr. Expt. Sta. Agr. Econ. Rpt. 58–10 (mimeo). 25 pp., illus. April 1958. (U. S. Dept. Agr. cooperating.)

Sales of foliage plants in 1949 in Florida were estimated by the Census of Agriculture to be approximately $2 million at wholesale. Estimates on the wholesale receipts of this industry in 1956 ranged between $5 million and $20 million. This report estimates acreage, greenhouse area, value of sales and receipts of the industry, and determines the type and extent of use of various selling practices and the scope of market distribution.

PHILLIPS, V. B., AND ENGELMAN, GERALD. MARKET OUTLETS FOR LIVESTOCK PRODUCERS. U. S. Dept. Agr. Mkt. Res. Rpt. 216, 24 pp., illus. March 1958.

This report presents a brief resume of the development, growth, and change in pattern of livestock market outlets in the United States. It gives information on the relative importance of different types of market outlets available to livestock producers.

POND, G. A., AND NODLAND, T. R. THE CHANGING PICTURE OF FARMING IN SOUTHEASTERN MINNESOTA. A QUARTER OF A CENTURY OF FARM RECORDS. Minn. Agr. Expt. Sta. Bul. 446, 32 pp., illus. January 1958.

These records, which were kept by 160 members of the Southeastern Minnesota Farm Management Service, show some of the striking changes in farm organization and earnings that occurred during the last 25 or 30 years. Changes feature fewer and larger farms, more capital per acre and per man with more in the form of working capital and less in real estate, and operators with more technical knowledge.

PRICE, P. H., BERTRAND, A. L., AND OSBORNE, H. W. THE EFFECTS OF INDUSTRIALIZATION ON RURAL LOUISIANA: A STUDY OF PLANT EMPLOYEES. Louisiana Agr. Expt. Sta. Progress Rpt. 65 pp. January 1958. (U. S. Dept. Agr. cooperating.)

This is a study of the effects of industrial employment on the lives of plant employees in a rural community in Louisiana. The purpose is to show what happens to a selected group of rural residents when industry is brought in—the changes made in their lives, their habits, their farming operations, their characteristics.

QUINLAN, J. K., AND MILLER, R. F. EVALUATION OF SYNERGIZED PYRETHRUM FOR THE CONTROL OF INDIAN-MEAL MOTH IN STORED SHELLED CORN. U. S. Dept. Agr. Mktg. Res. Rpt. 222, 13 pp., illus. March 1958.

This report gives the results of the first year's tests with a synergized pyrethrum spray applied to the top surface of bulk shelled corn at different dosages and frequencies to control infestation by the Indian-meal moth.

SKRABANEK, R. L., KEEL, L. B., AND DUCOFF, L. J. TEXAS FARMERS AND OLD AGE AND SURVIVORS INSURANCE. Texas Agr. Expt. Sta. Bul. 886, 12 pp., illus. January 1958. (U. S. Dept. Agr. cooperating.)

This is part of the results of a field study made in Texas during the summer of 1956. Five hundred farm operators were interviewed on eligibility for coverage, their knowledge of OASI, and their attitudes toward OASI. Results are presented here.

SNITZLER, J. R., AND BYRNE, R. J. INTERSTATE TRUCKING OF FRESH AND FROZEN POULTRY UNDER AGRICULTURAL EXEMPTION. U. S. Dept. Agr. Mktg. Res. Rpt. 224, 88 pp. (Agr. Mktg. Serv. and Farmer Coop. Serv. cooperating.)

The interstate trucking of fresh and frozen processed poultry under the agricultural exemption clause has resulted in lower rates and, in the opinion of processors, improved service. This report studies the effects of exemption upon the interstate transportation of fresh and frozen poultry—volume of shipments, trends in the distribution of fresh and frozen poultry, processors' opinions on use of truck transportation, evaluation of motor carrier freight rates.

U. S. Agricultural Marketing Service. compilation of agricultural marketing agreement act of 1937 reenacting, amending, and supplementing the agricultural adjustment act, as amended, as of january 1, 1958. U. S. Dept. Agr. Agr. Handb. 124, 28 pp. April 1958.

U. S. Agricultural Marketing Service. evaluation of methoxychlor for the protection of stored wheat and shelled corn from insect attack. U. S. Dept. Agr. Mktg., Res. Rpt. 213, 25 pp., illus. February 1958.

First of a series giving results of tests with various insecticidal dusts and sprays applied to stored grain for protection against insect attack, this report summarizes the tests with methoxychlor made in August 1953 through December 1956 on wheat and shelled corn.

U.S. Agricultural Marketing Service. production and marketing practices for mellorine. U. S. Dept. Agr. Mktg. Res. Rpt. 212, 79 pp., illus. February 1958.

Frozen desserts made with fats other than milk fat are commonly known as mellorine. They have been made and sold in 12 States during the last decade. The low price at which mellorine can be sold in comparison with ice cream is an important factor in its growth. A few problems of marketing the product are given, and some features of marketing mellorine that may be associated with its development are included.

U. S. Agricultural Marketing Service. wholesale food distribution facilities for philadelphia, pa. U. S. Dept. Agr. Mktg. Res. Rpt. 201, 59 pp., illus. March 1958.

This report analyzes the inadequacies of present marketing and handling facilities in Philadelphia and indicates the kinds of marketing facilities that are needed for proper distribution of food. A new food center for Philadelphia can be developed economically only by making a new start in a new location.

U. S. Agricultural Research Service, Farm Economics Research Division. the conservation reserve program of the soil bank. effects in selected areas, 1957. U. S. Dept. Agr. Agr. Inform. Bul. 185, 34 pp., illus. March 1958.

More than 1,000 farm operators in Aroostook County, Me.; Franklin and Kennebec Counties, Me.; the central Wisconsin dairy area; the South Carolina upper coastal plain; the Texas panhandle (dryland farms); north-central South Dakota; southeastern South Dakota; and the Columbia Basin wheat area of Oregon were interviewed. The program is helping many farmers make adjustments in their farming operations and is speeding up adjustments in progress.

Wesson, W. T. the economic importance of futures trading in potatoes. U. S. Dept. Agr. Mktg. Res. Rpt. 241, 42 pp., illus. June 1958.

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