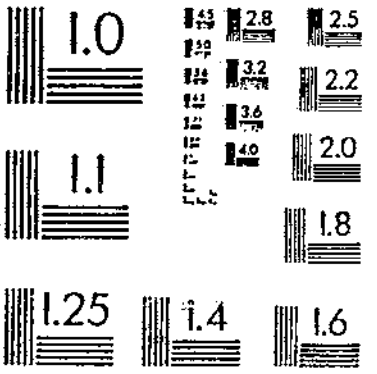
START



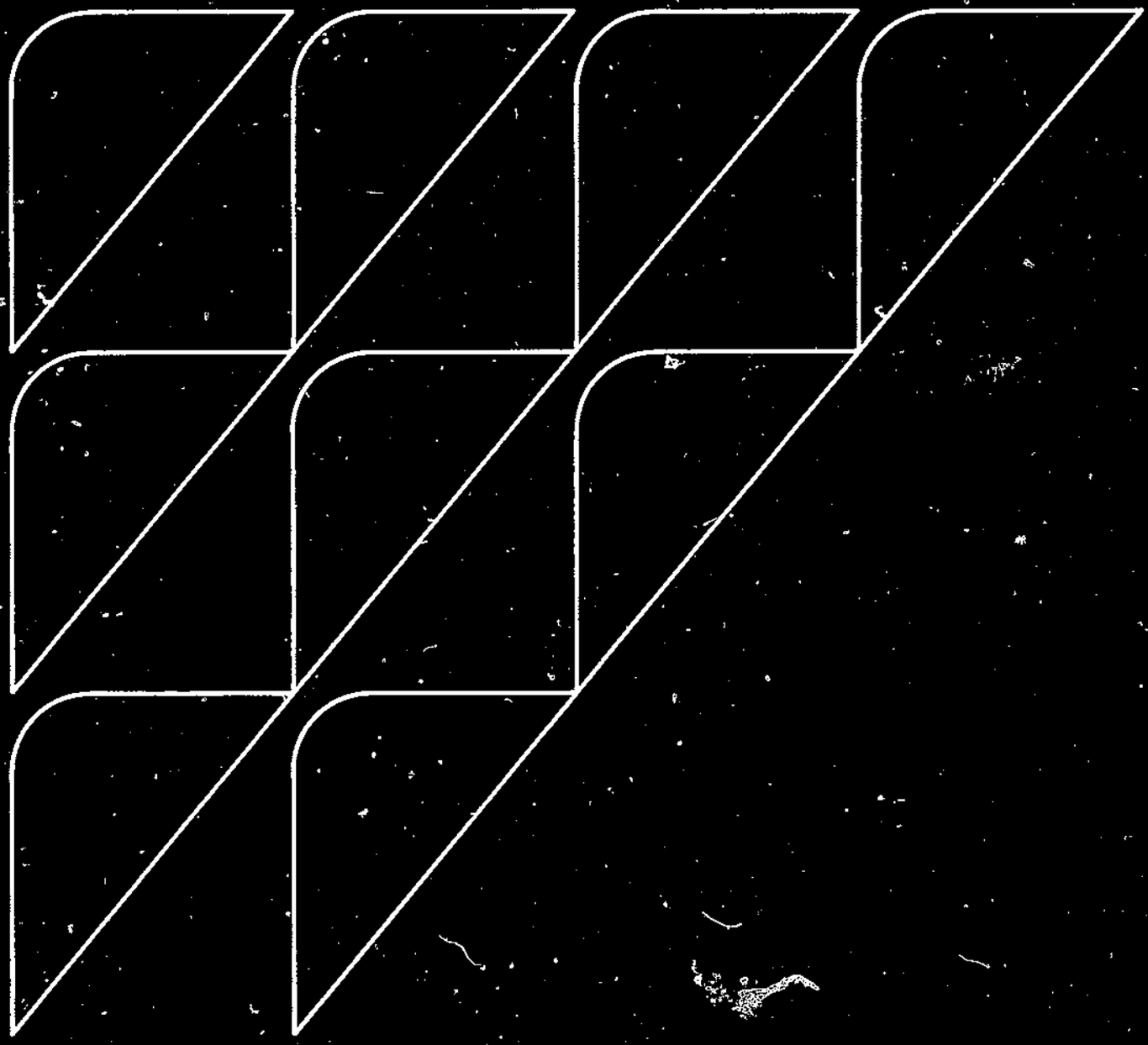
United States Department of Agriculture

Economic Research Service

Technical Bulletin Number 1713

U.S. Demand for Food: Household Expenditures, Demographics, and Projections

James R. Blaylock
David M. Smallwood



Sales Information

Additional copies of this report can be purchased from the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402. Ask for *U.S. Demand for Food: Household Expenditures, Demographics, and Projections* (TB-1713). Write to the above address for price and ordering instructions. For faster service, call the GPO order desk at (202) 783-3238, and charge your purchase to your VISA, MasterCard, Choice, or GPO Deposit Account. A 25-percent bulk discount is available on orders of 100 or more copies shipped to a single address. Please add 25 percent extra for postage for shipments to foreign addresses.

Microfiche copies ($5.95 each) can be purchased from the Order Desk, National Technical Information Service, 5285 Port Royal Road, Springfield, VA 22161. Ask for *U.S. Demand for Food: Household Expenditures, Demographics, and Projections.* Enclose check or money order, payable to NTIS. For faster service, call NTIS at (703) 487-4650 and charge your purchase to your VISA, MasterCard, American Express, or NTIS Deposit Account.

The Economic Research Service has no copies for free mailing.

Preface

U.S. food demand is a critical component in the economic analyses of various national food programs and agricultural policies. It is also an integral component in most commodity outlook and situation activities that forecast and project food prices, expenditures, and consumption. Demand information is also used in many other economic and marketing decisions.

This technical bulletin is one of three related publications representing research conducted during fiscal year 1985 in the Economic Research Service's continuing research program on U.S. food demand. *Food Spending in American Households, 1980-81* (SB-731) provides a tabular analysis of household food expenditures from the Continuing Consumer Expenditure Survey (CCES) of the Bureau of Labor Statistics for the years 1980-81. *U.S. Demand for Food: Household Expenditures, Demographics, and Projections* (TB-1713) presents the results of a comprehensive econometric analysis of the CCES data and develops projections of food expenditures. *U.S. Demand for Food: A Complete System of Price and Income Effects* (TB-1714) uses ERS data on civilian disappearance for the years 1953-83 to estimate a complete system of price and expenditure elasticities for 40 food commodity categories and 1 nonfood category.

U.S. Demand for Food: Household Expenditures, Demographics, and Projections. By James R. Blaylock and David M. Smallwood. National Economics Division, Economic Research Service, U.S. Department of Agriculture. Technical Bulletin Number 1713.

Abstract

Higher income households spend more per person on most food groups, especially beef, fish, cheese, vegetables, butter, and alcoholic beverages, than do lower income households. Elderly Americans spend less than younger people on food away from home and alcoholic beverages. Households in the Northeast and West spend more on food than those in the South and North Central regions, and nonblacks spend more on food than do blacks. Per person spending on food varies little across seasons. This study uses tobit analysis of the 1980-81 Continuing Consumer Expenditure Survey of the Bureau of Labor Statistics to measure effects of income and other demographic factors on per person spending for 28 food groups and alcoholic beverages. The results are combined with projections of income, age distribution, regional population shifts, racial mix, and population growth to project food spending to the year 2020. Food groups projected to increase most are food away from home, fish, fresh fruits and vegetables, and alcoholic beverages.

Keywords: Household food expenditures, income, demographics, tobit analysis, projections, 1980-81 Continuing Consumer Expenditure Survey of the Bureau of Labor Statistics

Washington, DC 20005-4788 February 1986

Contents

Page

Summary iii

Introduction 1

Theoretical and Empirical Considerations 2

Demand Components 3

Measurement Procedures 4

Data 5

Descriptive Characteristics 7

Model Specification and Variables 10

Empirical Results 11
Influence of Income 13
Demographic and Seasonal Effects 15

Population and Demand Projections: Background and Methods 21
Population Projections 22

Food Expenditure Projections 25
Per Capita Effects 25
National Effects 34

References 47

Appendix Table 48

Summary

Higher income households spend more per person on most food groups, especially beef, fish, cheese, vegetables, butter, and alcoholic beverages, than do lower income households. Elderly Americans spend less than younger people on food away from home and alcoholic beverages. Households in the Northeast and West spend more on food than those in the South and North Central regions, and nonblacks spend more on food than do blacks. Per person spending on food varies little across seasons.

This report analyzes the effects of income and other demographic factors on per person expenditures of 28 food groups and of alcoholic beverages using data from the 1980-81 Continuing Consumer Expenditure Survey of the Bureau of Labor Statistics.

The authors use tobit analysis to compare the relationship of income and other demographic factors to (1) changes in the proportion of consumers purchasing the commodity, and (2) changes in the level of expenditures by purchasers. Tobit analysis is a statistical procedure used to assess simultaneously both the probability and level of consumption. The demographic factors analyzed are region of household residence, race, age composition, and season of the year.

The authors use the estimated relationships to simulate the changes in food expenditures per person resulting from changes in income and other demographic factors. A similar procedure projects the per person effects of individual and combined changes on food expenditures from 1980 to the year 2020 and the national effects of the combined changes.

- *Income.* A 10-percent increase in income generates a 5.7-percent increase in spending for food eaten away from home and a 2-percent increase in spending for food eaten at home. Demand for fish, cheese, butter, and alcoholic beverages responds the most to income changes, and demand for eggs, milk and cream, and margarine responds the least.

- *Age.* People over 74 years of age spend about 76 percentage points less per person each week on food eaten away from home and about 121 percentage points less on alcoholic beverages than do people in the 20-29 age group. The elderly spend more on eggs, cereals and bakery products, fruits, vegetables (especially fresh), sugars and sweeteners, fats and oils, and prepared foods, and less on beef than do younger people. Teenagers have a smaller effect than other age groups on household expenditures for fresh and processed vegetables, fats and oils, and prepared foods.

- *Region.* Spending on food in the Northeast and West is about 6 percentage points more than in the South and North Central regions. Residents of the Northeast and West spend more per person on food at home, cereals and bakery products, and dairy products than do similar residents of other regions. Spending on meat, poultry, fish, and egg products is 12 percentage points higher in the Northeast than in any other region.

- *Race.* Nonblacks spend about 11 percentage points more on food than do blacks. In addition, nonblacks spend about 14 percentage points more on food eaten away from home, 10 percentage points more on food eaten at home, 35 percentage points more on dairy products, and 53 percentage points more on cheese. Blacks spend about 10 percentage points more on meat, poultry, fish, and eggs, and within this broad group, about 30 percent more on fish and poultry products.

- *Season.* Spending on food eaten away from home is at least 6 percentage points higher in the spring than in the other seasons, while spending on food eaten at home is about 5 percentage points higher in the fall.

The authors use U.S. Census Bureau projections of changes in age, regional, and racial distributions of the population and a 2-percent increase in income to project food spending to the year 2020. Spending for total food, food eaten at home, and food eaten away from home is projected to increase 38.9 percent, 23.5 percent, and 62.5 percent, respectively. Income will be the major contributing factor.

U.S. Demand for Food: Household Expenditures, Demographics, and Projections

James R. Blaylock
David M. Smallwood

Introduction

Today's rapidly changing economic and social environment challenges the producers and marketers of America's agricultural products. While day-to-day survival is of paramount importance to firms operating in this dynamic arena, longrun survival and well-being requires understanding the effects a changing populace will have on food desires. A statement made by former Secretary of Agriculture Ezra Taft Benson over 30 years ago is perhaps even more applicable in today's world: (*12*)[1]

> I write these words in a time of uncertainty. No one can foresee the results of recent economic and international developments. We can see, though, the need to understand the underlying trends and to use them to advantage.

Slower population growth, changing age distribution, regional migration, increased longevity, and altered employment patterns—to list a few significant demographic trends—present an ever changing and uncertain environment within which the food sector must operate and respond.

American demographics continue to change. The two most pervasive changes potentially affecting consumer food demand and growth rates of many agricultural subsectors are the slowing of the overall population growth rate and the subsequent aging of the population. For example, the U.S. population grew from 152.2 million in 1950 to 227.7 million in 1980, a 50-percent increase. From 1980 to 2010, Census projects that the population will increase 55.5 million, a 24-percent increase (*14*).[2] Thus, on a percentage basis, population growth during the next 30 years is expected to be less than half of the rate of the preceding three decades. Furthermore, from 2010 to 2040, the population will only increase an estimated 9 percent. These figures imply that, from 1980 to 2040, the population growth rate will be slower than it has been at any time during the past. After 2050, the growth rate is projected to be almost zero (0.01 percent per year). These numbers indicate that industries that rely on population growth to fuel expansion must find alternative markets for their products if they are to maintain growth patterns.

Changes in the age distribution of the U.S. population will likely accompany a slower growing population. To illustrate these possible changes, first consider that the median age of the U.S. population in 1982 was at an all-time high of 30.6 years. The median age is that age where exactly half the population is older and half younger, and is often used as a measure of the age of the population. According to the Bureau of the Census middle projections, the median age of the population will reach 36.3 years at the turn of the century, 40.8 years in 2030, and 42.8 years in 2080.[3] These increases in the median age of the population signal important changes in the age distribution of America. For example, those aged 65 or older made up 8.5 percent of the population in 1950, 10.5 percent in 1970, and 12.3 percent in 1980, and are projected to make up 14.0 percent of the population in 1990, 16.2 percent in 2010, and 27.3 percent by 2050. The percentage of the population under age 35 is projected to decline far into the next century, while the opposite is true for the group 35 and over.

These demographic changes, regional population shifts, and anticipated growth in consumer purchasing power suggest implications for food consumption. To understand these implications, it is imperative to estimate the existing structure of household demand for food and to understand the way in which changes in the population may affect consumer demand. This report focuses on household expenditure patterns for 28 food groups and alcoholic beverages. A comprehensive behavioral model that isolates the net impact of income and other socioeconomic characteristics on household food expenditures

[1]Underscored numbers in parentheses refer to items in references at the end of this report.

[2]The high and low series project population increases of 36 percent and 14 percent, respectively.

[3]For an explanation of low, middle, and high projections of the Bureau of the Census, see p. 22.

is estimated. The implications of this model for developing product-marketing strategy and for measuring the potential for market growth or decline are discussed. The model is then applied to predict shifts in consumer demand for food that will result from changes in the socioeconomic characteristics of the domestic population. This study is based on the Bureau of Labor Statistics' 1980-81 Continuing Consumer Expenditure Survey, the latest available data source on household food expenditures (*16*).

Theoretical and Empirical Considerations

Surveys of individual households generally provide the information necessary to analyze the relationships between consumption of different commodities expressed in terms of quantities or expenditures and income. Ernst Engel, a pioneer in analyzing family budgets, found that "the poorer a family is, the greater is the proportion of the total outgo (total expenditure) which must be used for food" (this is a literal translation from his writings) (*17*). His most important finding, known as Engel's law of consumption, states the following: "As income increases the expenditure on different items in the budget has changing proportions, and the proportions devoted to urgent needs (such as food) decrease, while those devoted to luxuries or semi-luxuries increase" (*17*).

Later analyses of family budgets have shown that the proportions devoted to the various groups of commodities not only change with increasing income in the manner stated in Engel's law but also vary in a systematic way. This suggests that the expenditure on a given commodity varies with income in accordance with some underlying mathematical law. This observation led to the statistical estimation of Engel functions by employing a variety of functional forms to express the underlying relationship between expenditure on a given commodity and income.

The analytic framework used in the analyses of household surveys is conceptually based on the classical theory of consumer demand. The theory of the individual is broadened to encompass the vast heterogeneity in households and the differing environments in which they live. Cross-sectional surveys contain numerous observations on households of varying sizes, incomes, and preferences. In addition, these households often live in different economic, social, and climatic environments that influence their food purchase decisions. To capture these factors and control for them requires an expanded analytic framework.

A number of household socioeconomic characteristics other than income have been shown to be important factors influencing food expenditures (*2, 3, 4, 5*). Some of the more salient characteristics include household size, the age distribution of household members, season, region of residence, and similar types of variables. Consequently, contemporary statistical representations of Engel curves usually include many of these characteristics as explanatory variables.

Household survey data generally are collected within a span of several days or weeks. It is generally assumed that prices will fluctuate little in such a short period. Because prices are at quasi-controlled levels, the problem of estimating Engel relationships is greatly simplified: Demand equations are functions of only income and relevant household characteristics. Food expenditures and budgeting patterns observed in cross-sectional survey data are "snapshots" of a wide variety of households in different circumstances. Analysts usually assume at the outset that the expenditure patterns of similar households in different circumstances reflect what would occur if the circumstances changed for a particular household. Given the validity of this assumption, one can then use statistical models to measure the implied behavioral response parameters. Hence, the fact that one does not usually observe a particular household under changing circumstances does not prevent the measurement of these response parameters.

Individual food item prices influence consumer purchases. In household survey data, where information on many detailed items is gathered over a short time period, the observed price differences are usually assumed to reflect variation in product content and quality rather than variation in relative prices for the same product. Consequently, the influence of item prices on purchase behavior is modeled differently in household data than in aggregate time series data.

Food consumption is often measured in terms of quantity (physical weight) and money value (expenditure) in household surveys. The quantity measure is closely related to the physical satisfaction of demand and the need to fulfill certain nutritional requirements (*17*). The money value of purchased foods is a measure of consumer satisfaction and economic well-being obtained through the marketplace in the sense that the prices consumers pay reflect the unit value of the goods. The money value of a purchased product group, such as fruits and vegetables, is a price-(value)-weighted sum of the physical quantities used. Viewing expenditures as a value-weighted quantity provides a link between household budget analysis and the traditional theory of consumer demand. Using prices as weights to aggregate items into groups has been shown to be consistent with economic theory when relative

item prices are constant (*3*). Consequently, the use of expenditures or money value provides a consistent method for aggregating many detailed and heterogeneous items into a manageable number of product groups when using cross-sectional data.

Household composition and size are two of the most important demand factors after income that help explain food consumption variation among households (*11*). Several alternative procedures have been used in Engel analyses to model these effects. At one extreme, each household member is assumed to contribute equally to the household demand for food, and hence, household size is measured simply by the number of individuals residing in the household. No adjustments are made for either age or sex of the individual members. At the other extreme, each individual in the household is assigned a weight relative to an arbitrary consumption standard, such as an adult male. The magnitude of these weights, commonly referred to as adult equivalent (AE) scales, reflects the relative consumption requirements of individual household members. These weights generally vary by age and sex and differ from one commodity to another (*2*). The AE scale for income is determined by a weighted average of all commodity scales. A major problem with applications of AE scales is that they are usually unknown prior to the analysis and must be estimated from the data. Also, econometric problems, such as identification and multicollinearity, hinder the estimation of AE scales. This study uses a compromise between these two extremes.

In specifying a statistical model, one must account for those household features that contribute substantially to differences in consumption among households. Income and household composition are the response parameters of primary importance in this study. Other determinants of demand, such as geographic region of household residence and season of the year, are also included in the model to improve the measurement and statistical properties of the equations but are of less economic concern. Regional and seasonal variables may also represent price variation. Hence, they are not exact measures of regional taste differences. Statistically, the omission of a relevant explanatory variable that is correlated with an included variable will bias the parameter estimator for the corresponding included variable. Therefore, to the extent feasible, it is important to include all the relevant determinants of household consumption.

Demand Components

The number of consumers, the frequency of product use, and the amount of product consumed per eating occasion influence total household expenditures for various food items. Household expenditure surveys usually contain a large number of households that report detailed information on food consumption over 1 or 2 weeks, which is not long enough to represent the average expenditure pattern for any particular household. However, by examining a group of similar households, one can infer how a typical household within the group would behave over a longer period. Inferences can be drawn regarding the average expenditure, probability of purchase, and the amount spent per household during a given period.

A problem specific to analyses of household survey data is how to handle the zero values reported for the consumption of individual items or small groups of items. Numerous zero values are not uncommon in household surveys, and the economic interpretation one should give to these observations is not always clear. Survey information is usually insufficient to determine whether a given zero value represents a household that (1) never consumes the item, (2) does not consume the item given the current values of the household's demand determinants (such as prices and income), or (3) consumes the item infrequently (*4*).

The specific category to which a nonconsuming household is assigned has important implications for demand analysis. The frequency or infrequency of a given product's use by a particular household is not usually reported and, consequently, must be inferred by examining the reported use or nonuse by many similar households. By analyzing such behavior in a large sample of households, it is possible to determine the probability of consumption or purchase during a given time period and to relate this probability to household characteristics.

If one discards observations on households not purchasing an item during the survey and the probability of use or nonuse is determined by the same household characteristics that determine the level of use, then traditional regression procedures will yield biased estimates of behavioral relationships, and valuable information on the probability of use will have been ignored.

The model used in this study assumes that the probability of consumption is related to household income and other selected socioeconomic and demographic features. This estimated probability is based on all three of the above categories of nonconsumption and does not differentiate between them. The phenomenon is often referred to as representing frequency of purchase or consumption. Even though the specific determinants cannot be isolated without additional information, valuable marketing information can be obtained by separating retail demand for a product into two components: (1) the number of consumers using the product in a given time frame and

(2) the average level of consumption by users of the product.

Measuring the entry and exit of consumers from the market and the frequency of product use is just as important, if not more so, than the conventionally measured changes in the average level of product use. Knowledge about the size of these two components of consumer demand has implications for developing a product-marketing strategy and measuring potential for market growth or decline. For example, marketing strategies for seldom used products may be more successful if directed toward infrequent users. Conversely, marketing strategies for products used frequently by many people may be more successful if aimed at inducing these people to use more. Frequency of use becomes more important as a commodity is more narrowly defined because fewer people use the commodity, and so its potential for extensive (as opposed to intensive) market expansion is greater. Likewise, as product categories narrow, substitute products become more numerous, increasing the probability of product switching.

Additional useful information can be obtained by measuring the separate effects of economic determinants on frequency of use. Income effects can be separated into two components: (1) changes in the average level of product expenditures and (2) changes in the proportion of consumers using the product under analysis. For example, suppose that a 10-percent increase in consumer income causes beef expenditures to increase by 5 percent, of which 80 percent is due to new consumers entering the beef market. This is potentially useful information for developing more effective marketing and advertising strategies. In a similar fashion, assessing the potential of selected markets based on area demographics and the identification of population subsets that are frequent or infrequent users of a product provides timely information to members of the agricultural sector. The statistical procedures used in this report allow many of these issues to be approached directly.

Measurement Procedures

The statistical model presented in this section uses information from both consuming and nonconsuming households to measure simultaneously the relationship of household characteristics to the probability that an item will be purchased and to the size of the purchase. This technique is known as the tobit procedure *(5, 6, 10)*.

The tobit model can be expressed mathematically for a typical household, i:

$$\begin{aligned} y_i &= X_i\beta + \epsilon_i \quad &&\text{if } X_i\beta + \epsilon_i > 0 \\ y_i &= 0 \quad &&\text{if } X_i\beta + \epsilon_i \leq 0, \end{aligned} \tag{1}$$

where $i = 1, 2, \ldots, n$; n is the number of sample consumer units;[4] y_i is item expenditures; X is a vector of explanatory variables; β is a vector of response coefficients to be estimated; and ϵ_i is an independently and normally distributed random disturbance term with a mean of zero and constant variance, σ^2. The level of expenditures for the ith consumer unit is determined by the combination of a nonstochastic component, $X_i\beta$, and a stochastic component, ϵ_i. The determinate or nonstochastic portion of the model is a linear function of household characteristics and their respective response parameters. Expenditures differ among households due to both varying household characteristics and the stochastic element, which embodies the unobserved factors and idiosyncrasies of individual consumer units.

The tobit model can be estimated by the maximum likelihood procedure. The maximum likelihood estimator is that estimator of the model parameters which maximizes the likelihood of observing the given sample values. To derive the likelihood function for the tobit model, one must separate the sample observations into two classes: Those with positive expenditures and those with zero expenditures. For all $y_i > 0$, the probability of y_i given X_i is simply the value of the normal density, $f(\epsilon_i)$, evaluated at $\epsilon_i = y_i - X_i\beta$, where ϵ_i has mean zero and constant variance σ^2. For all $y_i = 0$, the probability of y_i given X_i is the probability that $X_i\beta + \epsilon \leq 0$. Because ϵ_i is normally distributed, this probability is given by the following:

$$P(\epsilon_i \leq -X_i\beta) = F(-z_i), \tag{2}$$

where F is the unit-normal probability function and $z_i = X_i\beta/\sigma$ is the standardized value of $X_i\beta$. Given that ϵ_i is independently distributed across the sample, the likelihood function for the sample is the product of the probability of observing each household as expressed by the following:

$$L = \prod_{i \epsilon S_1} f(z_i) \quad \prod_{i \epsilon S_2} F(-z_i), \tag{3}$$

where S_1 is the set of observations with $y_i > 0$, S_2 is the set of observations with $y_i = 0$, and $f(\cdot)$ and $F(\cdot)$ are the unit-normal density and probability functions, respectively. Maximizing L with respect to β yields the maximum likelihood estimators. Although L is highly nonlinear, many computer programs are available that can easily solve this problem.

The following equation gives the expected value of expenditures for households with characteristics denoted by X:

$$E(y) = X\beta F(z) + \sigma f(z). \tag{4}$$

[4]For an explanation of consumer units, see p. 6.

This includes both consuming and nonconsuming households. The following gives the expected value of expenditures for only those purchasing the items:

$$\begin{aligned} E(y^*)L &= E(y \mid y>0) \\ &= E(y \mid \epsilon > -X\beta) \\ &= X\beta + \sigma f(z)/F(z). \end{aligned} \quad (5)$$

From (4) and (5), the relationship between the expected value of expenditures for all households and the expected value for consuming households is shown as follows:

$$E(y) = F(z)E(y^*). \quad (6)$$

Because F(z) is a probability function and $0 \leq F(z) \leq 1$, it follows that $E(y) \leq E(y^*)$. In other words, the degree to which the expected value of expenditures by consumers exceeds the expected value of expenditures over all households is directly related to the probability or proportion of consumers using the item.

One is often interested in the market response in expenditures associated with a change in one of the explanatory variables. The following equation gives the total change in the expected value of expenditures associated with a change in x_j:

$$\begin{aligned} \partial E(y)/\partial x_j &= F(z)(\partial E(y^*)/\partial x_j) \\ &\quad + E(y^*)(\partial F(z)/\partial x_j) \end{aligned} \quad (7)$$

and using two relationships for the unit-normal distribution, $\partial F(z)/\partial z = f(z)$ and $\partial f(z)/\partial x_i = -zf(z)$, then

$$\partial F(z)/\partial x_i = f(z)(\partial X\beta/\partial x_i)/\sigma \quad (8)$$

and

$$\begin{aligned} \partial E(y^*)/\partial x_i &= \partial x\beta/\partial x_i \\ &\quad + (\sigma/F(z))\partial f(z)/\partial x_i \\ &\quad - (\sigma f(z)/F(z)^2)\partial F(z)/\partial x_i \\ &= \partial X\beta/\partial x_i[1 - zf(z)/F(z) \\ &\quad - f(z)^2/F(z)^2]. \end{aligned} \quad (9)$$

The aggregate market response is composed of two components: One component is due to changes in the level of expenditures by consumers, and the other component is due to a change in the number of consumers. The partial derivative given by (9) expresses the marginal expenditure response due to changes in expenditures by consumers. Based on (7), (8), and (9), the fraction of the total response due to this effect is given by the following:

$$[1 - zf(z)/F(z) - f(z)^2/F(z)^2]. \quad (10)$$

The formulas described above can be used to compute the expected value of consumer expenditures and the probability of consumers using these items for a particular household type by evaluating the formulas using the characteristics of the typical household and the estimated parameter values. The market level response is computed by aggregating these responses over all households in the market. The probability of purchase at the market level can be interpreted as the proportion of the market population that purchases the item during the time period.

It is often convenient to express consumer demand responses to changes in continuous explanatory variables in terms of elasticities. Elasticities measure the percentage change in expenditures associated with a 1-percent change in the explanatory variable. Demand elasticities are most often reported with respect to income or prices. The general formula for an elasticity with respect to an explanatory variable x_i follows:

$$\eta = [\partial E(y)/\partial x_i]\,[x_i/E(y)]. \quad (11)$$

For the tobit model, the total elasticity is found by substituting into equation (11) from equations (4) and (7). Equation (10) gives the proportion of the total demand elasticity that is attributable to changes in expenditures by purchasing households. Equation (8) gives the proportion attributable to changes in the number of consumers.

Data

The Continuing Consumer Expenditure Survey (CCES) of the Bureau of Labor Statistics (BLS) for calendar years 1980 and 1981 is the source of data used in this analysis (*16*). The CCES contains the most recent and comprehensive data available on food spending in American households.

The CCES evolved from consumer expenditure surveys of American households that BLS has been conducting at about 10-year intervals since 1888. A major objective of the first surveys was to collect information necessary to construct the old Cost-of-Living Indices and today's Consumer Price Indices (CPI). The uses of the survey have been expanded to include a continuous flow of information on the buying habits of Americans not only for revising the CPI but also for use in a variety of research by government, business, labor, and academic analysts.

The CCES comprises two components, each with its own questionnaire and sample: (1) An Interview Panel Survey in which each of approximately 5,000 households is surveyed every 3 months over a 1-year period, and (2) a

Diary Survey of approximately the same sample size in which households keep an expenditure diary for two consecutive 1-week periods.

The Interview Panel Survey obtains data on relatively large and infrequently purchased items, such as those for real property, automobiles, and major appliances and those which occur on a regular basis, such as rent, utilities, and insurance premiums. Personal expenditures on trips are also included. These are expenditures that respondents can typically be expected to recall over a 3-month period.

The Diary Survey obtains data on small, frequently purchased items that are normally difficult to recall, including foods and beverages, tobacco, housekeeping supplies, nonprescription drugs, personal care products, services, and fuels. The Diary Survey excludes expenditures incurred while away from home overnight or longer. The Diary Survey is the source of data for this report. For a detailed tabular presentation of the data, see (*9*).

Several features of the 1980-81 CCES differ from those of the 1960-61 and 1972-74 Consumer Expenditure Surveys (CES). First, only the urban population is continuously represented in the CCES. Second, the size of the new sample is approximately half that of the previous surveys. The estimates, therefore, are subject to greater sampling error. Third, students living in college or university housing report their own expenditures directly instead of having them reported by their parents or legal guardians. Last, the new survey has a somewhat different definition of the "head" of a consumer unit. In previous surveys, husbands were automatically considered to be the heads of consumer units in which both a husband and a wife were present. The new survey adopts the term "householder," or "reference person," defined as the first member of the consumer unit mentioned by the respondent as an owner (or renter) of the premises at the time of the initial interview.

A consumer unit, the basic reporting unit for the Diary Survey, comprises either of the following: (1) all members of a particular household who are related by blood, marriage, adoption, or other legal arrangement such as a foster child; (2) a financially independent person living alone or sharing a household with others, living as a roomer in a private home or lodging house, or living in permanent living quarters in a hotel or motel; or (3) two or more persons living together who pool their income to make joint expenditure decisions. To be considered financially independent the respondent must provide at least two of the three major expense categories: Housing, food, and other living expenses. For convenience, we use the term household to refer to consumer units.

Data for the CCES are obtained from a nationwide probability sample of households designed to be representative of the total civilian noninstitutional population.[5] The sample consists primarily of persons living in regular housing units and some selected group quarters such as college dormitories.

Approximately 7,500 households are scheduled for selection in each year of the Diary Survey. Of these, some are found to be vacant, nonexistent, or ineligible for the period and are, therefore, not surveyed. Of those remaining, some cannot be contacted by the interviewer, some refuse to participate, and some are temporarily absent for reasons such as a vacation. Sample households where the occupants are temporarily absent are included in the final sample.

The Bureau of Census collects the data for BLS. At the beginning of the 2-week collection period, the Census interviewer uses the Household Characteristics Questionnaire to record information on the age, sex, race, marital status, and family relationships of members of the sample household. At this time, the interviewer also leaves the Diary Questionnaire, or daily expense record, with the household.

The Diary Questionnaire, designed as a self-reporting, product-oriented diary, is used by respondents to record all expenses incurred during the survey. It is divided by day of purchase and by a broad classification of goods and services.

The interviewer picks up the diary at the end of the first week, reviews the entries, clarifies any questions, and leaves a second dairy. The interviewer returns the following week to pick up the second diary; review the entries; and collect previous-year information on work experience, occupation, industry, retirement status, earnings from wages and salaries, net income from business or profession, net income from one's own farm, and income from other sources. This information, along with the other household characteristics data, permits (1) classification of families for analysis, (2) determination of eligibility of the family for inclusion in the population covered by the CPI, and (3) adjustment for nonresponse by families who do not cooperate in the survey.

Total income is defined as the combined income earned by all household members 14 years old or over in the preceding 12-month period. The income components include wages and salaries, net business and farm income, social security and other pension income, interest, dividends and other asset income, and other income.

[5]For a complete technical description of the CCES, see (*16*).

Other income include (1) supplemental security income paid by Federal, State, and local welfare agencies to low-income persons who are aged 65 years or over, blind, or disabled; (2) income from unemployment compensation; (3) income from workers' compensation and veterans' payments, including education benefits but excluding military retirement; (4) public assistance or welfare, including money received from job training grants; (5) alimony and child support as well as any regular contributions from persons outside the household; (6) money income from care of foster children, cash scholarships, fellowships, or stipends not based on working; and (7) the purchase value of food stamps.

Data are presented for four major regions: Northeast, North Central, South, and West. These regions comprise the following States:

Northeast—Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, and Vermont.

North Central—Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, and Wisconsin.

South—Alabama, Arkansas, Delaware, District of Columbia, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia, and West Virginia.

West—Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming.

The household size is the number of persons that normally makes up the household at the sample address.

Transaction costs are expenditures, including excise and sales taxes, on goods and services acquired during the recordkeeping period. The respondent records the full transaction cost of each purchase, even though full payment may not have been made on the date of purchase. The expenditure estimates exclude purchases made while away from home overnight, purchases directly assignable to business use, and periodic credit or installment payments on goods or services already acquired.

The sample used in the statistical analysis is made up of a subset of the 1980-81 CCES. Criteria for inclusion is based on completeness of reporting and consistency across the 2 survey years. Households may be excluded from the analysis sample for several reasons. The largest number of exclusions are due to incomplete income reporting. Only households with complete income reporting are included.

The second major group excluded from the sample is households residing outside of Standard Metropolitan Statistical Areas (SMSA's). Except in New England, an SMSA is a county or group of contiguous counties that contain at least one city of 50,000 inhabitants or more, or "twin cities" with a combined population of at least 50,000. In addition to a county or counties containing such a city or cities, contiguous counties are included in an SMSA if, according to certain criteria, they are essentially metropolitan in character and are socially and economically integrated with the central city. In New England, SMSA's consist of towns or cities, rather than counties.

Non-SMSA households are excluded because region of residence information for these households was not disclosed in the 1980 public use tape. Also, BLS dropped the rural component of the sample in 1981 due to budget reasons. Consequently, these observations are excluded because they do not contain the information required by the econometric model.

The third group excluded from the analysis sample is college students residing in dormitories. Preliminary analysis revealed that few of these consumer units reported food purchases. Because their purchasing patterns deviated substantially from the sample norm, including them with the rest of the sample was deemed inappropriate. The fourth group excluded is those households that did not participate in both weeks of the Diary Survey. This group is excluded for two reasons. First, there are doubts about the completeness of reporting for a 1-week period. Second, including these observations with those that reported 2 weeks of data would have added complexity to the econometric model in the form of a heteroskedastic error variance. That is, the variance associated with 1 week of expenditures is more than the variance of weekly expenditures computed from 2 weeks of data. An error specification of this type is difficult to model within the econometric framework used for this study. Thus, after eliminating these data problems, the analysis sample comprises observations on 5,892 households.

Descriptive Characteristics

The share of the total food dollar that was spent on food at home declined over 5.5 percentage points between the 1972-73 CES and the 1980-81 CCES as more money was allocated to food away from home (table 1). The rising share of the food dollar spent for food away from home reflects such factors as increasing labor force participation by women, the desire for convenience, and rising consumer incomes. For comparison, changes in the CPI's between the two surveys are also included in the table.

There were several noteworthy changes in the way Americans allocated their at-home food dollar between 1972-73 and 1980-81. Meat, poultry, fish, and eggs made up 37.6 percent of the at-home food budget in the 1972-73 period but only 34 percent in 1980-81. The major contributors to this decline were beef, down 1 percentage point, and pork, off 2 points. The share of the at-home budget allocated to cereals and bakery products rose over one-half a percentage point between 1972-73 and 1980-81, while dairy products showed a decline of similar magnitude The decline in dairy's share of the consumer's food budget was caused almost exclusively by the milk and cream category, while cheese helped mitigate the decline.

Table 1—Allocation of food expenditures[1]

Item	1980-81	1972-73	Percentage change in Consumer Price Index, 1972-73 to 1980-81
		Percent	
Total	100.0	100.0	87.1
Food away from home	32.4	26.8	95.7
Food at home	67.6	73.2	84.6
Food at home	100.0	100.0	84.6
Meat, poultry, fish, and eggs	34.0	37.6	60.8
Beef	13.1	14.1	70.4
Pork	6.9	8.9	43.2
Other meat	4.6	4.7	69.6
Poultry	4.4	4.6	37.0
Fish	3.1	2.8	109.8
Eggs	1.9	2.5	18.4
Cereals and bakery products	12.7	12.1	95.6
Dairy products	12.7	13.3	86.3
Milk and cream	7.0	8.3	75.9
Cheese	3.6	2.8	109.8
Other dairy products	2.1	2.2	NA
Fruits	8.2	6.7	102.9
Fresh	4.7	3.7	101.7
Processed	3.6	3.0	103.7
Vegetables	7.4	7.9	95.3
Fresh	4.6	4.5	81.3
Processed	2.8	3.4	104.4
Sugars and sweeteners	3.6	3.1	162.3
Nonalcoholic beverages	9.0	7.5	206.9
Fats and oils	3.4	3.5	109.9
Butter	.6	.6	118.9
Margarine	.7	.8	101.3
Other	2.1	2.1	NA
Miscellaneous	9.0	8.4	99.5

NA = Not available.
[1]Totals may not add due to rounding.

Sources: *(15, 16)*.

The share of the at-home budget allocated to fruits was up over 1.5 percentage points between the two surveys. Both fresh and processed fruits contributed to this rise. Conversely, the budget share allocated to vegetables was down one-half a percentage point, largely due to a decline in purchases of processed vegetable products.

Both sugars and sweeteners and nonalcoholic beverages increased their shares of consumers' budgets in 1980-81. The share of the budget allocated to nonalcoholic beverages jumped 1.5 percentage points to a full 9 percent of the food budget.

The budget share allocated to fats and oils was down slightly, and the share for miscellaneous foods rose about one-half a percentage point.

In summary, the major winners with respect to increased budget shares appear to be cereals and bakery products, fruits, sugars and sweeteners, nonalcoholic beverages, and miscellaneous foods. These products have a widely variety of nutritional characteristics, and hence, these budget changes do not provide a definitive answer to the question of whether or not Americans are more health and nutrition conscious.

Table 2 presents annual household income before taxes and household size by various socioeconomic characteristics and season of the year. A great diversity in income and household size are found across the selected characteristics. This analysis of the 1980-81 CCES data reveals that households in the West were smaller and had higher incomes than did their counterparts in other regions. Southern households had the lowest incomes, while North Central households were the largest in terms of size. Nonblack households had considerably larger incomes than black households, about $5,000 more per year, and also had fewer household members. The mean before-tax income for households in the lowest 20 percent of the income distribution was $3,732 in contrast to $40,022 for those in the highest 20 percent. However, this income disparity is narrowed somewhat if one adjusts for household size because lower income households tend to have fewer members.

Table 3 presents a breakdown of total food expenditures per person into their at-home and away-from-home components by selected socioeconomic characteristics and

season. Care is required in interpreting this table as it does not isolate the effect of a single socioeconomic characteristic on expenditures. That is, other socioeconomic factors are not held constant. For example, household size, income, and other factors are not held constant in the breakdown by racial group.

Total food expenditures in 1980-81 were highest in the fall and lowest in the winter, a pattern that was also true for at-home food expenditures. Away-from-home food expenditures were lowest in the summer and highest in the spring. This may be attributed to increased activities at home, such as cooking out, and to the exclusion of vacation expenditures from the survey. During the summer, Americans also spent the largest share of their food budget on at-home eating.

Food spending varied substantially by region, which may have been partially caused by relative price differences, income disparities, and tastes and preferences. In any case, residents of the South spent the least on total food, while their counterparts in the Northeast spent the most. This also held for at-home food expenditures, but Westerns spent the most on away-from-home eating and North Central residents the least.

Nonblack households spent substantially more on food both at home and away from home, due to income disparity between nonblacks and blacks and larger household sizes among blacks.

As expected, higher income households spent more per person for both at-home and away-from-home eating in 1980-81. Higher income households also spent a smaller percentage of their total food budget on food at home.

Larger households spent less per person for both food at home and away from home. However, dollar for dollar,

Table 2—Annual household income and size by selected demographic groups, 1980-81

Demographic group	Annual income before taxes	Household size (members)
	Dollars	*Number*
All groups	18,542	2.59
Season:		
Winter	18,638	2.58
Spring	18,371	2.60
Summer	18,661	2.62
Fall	18,502	2.57
Region:		
Northeast	18,646	2.64
North Central	19,212	2.72
South	17,522	2.53
West	20,148	2.53
Race:		
Nonblack	19,184	2.55
Black	14,524	2.87
Income quintile:		
I (lowest)	3,732	1.69
II	9,501	2.28
III (middle)	16,244	2.70
IV	24,273	3.07
V (highest)	40,022	3.34
Household size:		
1 member	10,236	1.00
2 members	19,235	2.00
3 members	22,373	3.00
4 members	24,565	4.00
5 members	25,098	5.00
6 or more members	23,176	6.73

Source: *(16)*.

Table 3—Weekly food expenditures per capita at home and away from home by selected demographic groups, 1980-81

Demographic group	Total	At Home	Away from home	Percentage at home
	---------- *Dollars* ----------			*Percent*
All groups	19.49	13.18	6.31	67.6
Season:				
Winter	19.25	12.91	6.34	67.1
Spring	19.53	12.99	6.54	66.5
Summer	19.45	13.35	6.11	68.6
Fall	19.70	13.44	6.26	68.2
Region:				
Northeast	20.49	14.10	6.39	68.8
North Central	18.95	13.06	5.89	68.9
South	18.71	12.34	6.37	66.0
West	20.23	13.32	6.91	65.8
Race:				
Nonblack	20.37	13.66	6.71	67.1
Black	14.41	10.42	3.99	72.3
Income quintile:				
I (lowest)	16.51	12.21	4.30	74.0
II	17.44	12.69	4.75	72.8
III (middle)	19.25	13.09	6.16	68.0
IV	21.41	14.45	6.95	67.5
V (highest)	24.26	15.16	9.10	62.5
Household size:				
1 member	25.88	14.29	11.59	55.2
2 members	23.87	15.72	8.15	65.9
3 members	19.13	13.19	5.93	68.9
4 members	17.41	12.27	5.14	70.5
5 members	15.86	11.50	4.36	72.5
6 members or more	13.89	10.93	2.96	78.7

Source: *(16)*.

larger households spent a larger percentage of their total food budget on food at home, partially due to the economies of size in food buying and preparation that are often found in larger households. Also, there were few, if any, economies of size in away-from-home food purchases. In addition, larger households tended to have smaller per capita incomes.

The 1980-81 CCES data reveal that 75 percent of the population purchased meat, poultry, fish, or eggs during the survey period (table 4). In contrast, only 15.5 percent purchased butter. As expected, the broad categories of items were purchased during the survey by a higher percentage of the population than were the narrower groups. The seemingly low percentage of the population purchasing such aggregates as food at home is a result of survey design. That is, households away from home overnight or longer during the survey period are included in the CCES sample, but their expenditures while away from home are excluded from the diary. Also, the CCES is an expenditure, not a use, survey. Consequently, households do not report expenditures for items consumed out of inventories.

Table 4—Percentage of population purchasing food items in a week, 1980-81

Item	Percentage of population
	Percent
Total food	92.2
Food away from home	73.1
Food at home	88.1
Meat, poultry, fish, and eggs	75.0
Beef	49.3
Pork	41.9
Other meat	42.5
Poultry	35.5
Fish	29.1
Eggs	46.1
Cereals and bakery products	78.2
Dairy products	78.0
Milk and cream	71.1
Cheese	42.2
Other dairy products	32.3
Fruits	66.5
Fresh	53.1
Processed	47.3
Vegetables	64.4
Fresh	55.8
Processed	43.5
Sugars and sweeteners	44.0
Nonalcoholic beverages	60.5
Fats and oils	46.6
Butter	15.5
Margarine	23.8
Other	33.7
Miscellaneous	61.5
Alcoholic beverages	40.2

Source: *(16)*.

Model Specification and Variables

The tobit model discussed earlier is the econometric procedure used to quantify the relationship of household characteristics and income to the purchase/nonpurchase decision and to the level of purchase.

The tobit models are specified on a per person basis. That is, the dependent variable is average weekly food expenditures per person. Table 5 gives the vector of household socioeconomic and demographic variables, X_i in equation (1), used to explain the observed expenditure patterns in the tobit model, together with descriptions of the variables and their sample means. Table 6 presents food groups analyzed in this study. For each product category, the same general model specification is applied.

The effect of variations in household size and composition on demand are controlled in the model by including the inverse of household size and the proportion of household members in selected age groups. The inverse household size variable captures the effects of economies of size, while the proportion of members in each age group controls for age composition of the household. Because the inverse of household size decreases as household size increases, a positive coefficient on this variable indicates positive economies of scale. That is, larger households, even after controlling for the age of members, tend to spend less per person than smaller households. The opposite is true if the coefficient is negative. The inverse transformation forces the size of the scale effect to diminish as households grow larger, as would be expected. Nine age groups are used to delineate the effects of household composition. However, the 45-65 age group is not entered directly into the equation to avoid perfect multicollinearity. This modified per capita specification is a pragmatic solution to the complex alternative of adult equivalent scales and also helps to alleviate additional econometric problems associated with heteroskedastity, which are often found in household expenditure models.

Income per person, which includes the net value of food stamps, is entered quadratically. This specification has been shown to provide a good statistical fit in models with income and household compositions entered separately (*11*).

The quadratic form also allows the marginal propensity to spend and the income elasticity to vary with the level of income and has been shown to satisfy the adding-up criteria (that is, total expenditures must sum to equal income).

Region of household residence, race, and season of the year are entered as a series of binary dummy variables. That is, the variable is assigned the value of 1 if the household has that characteristic and the value of zero otherwise. The year in which a household was surveyed is also entered as a binary variable.

Empirical Results

Estimated parameters for the 28 food groups and alcoholic beverage equations and summary statistics useful for model evaluation are presented in the appendix. These parameter estimates can be used to evaluate the proportion of consumers purchasing these items and the level of expenditures by consumers with a specified set of household characteristics. For convenience, the estimated responses in per capita weekly expenditures associated with changes or differences in household demand factors are presented. The estimated responses are evaluated at

Table 5—Definitions and sample means of independent variables

Variable	Mean	Definition
Region:		
Northeast	0.2196	Omitted base region
North Central	.2685	Equals 1 if household resides in North Central region; zero otherwise
South	.2626	Equals 1 if household resides in South; zero otherwise
West	.2493	Equals 1 if household resides in West; zero otherwise
Race:		
Nonblack	.8554	Omitted base group; includes all nonblack households
Black	.1446	Equals 1 if household head is black; zero otherwise
Income	1.7045	Annual household income before taxes measured in hundreds of dollars per week per household member
Income squared	4.6264	Income raised to the second power
Season:		
Winter	.2057	Omitted base season; includes January, February, and March
Spring	.2178	Equals 1 if spring; zero otherwise; includes April, May, and June
Summer	.2381	Equals 1 if summer; zero otherwise; includes July, August, and September
Fall	.3384	Equals 1 if fall; zero otherwise; includes October, November, and December
Year:		
1980	.4664	Omitted base year
1981	.5336	Equals 1 if 1981; zero otherwise
Household size (inverse)	.5250	Inverse of household size (members)
Household age composition:		
Proportion under age 5	.0148	Proportion of household composed of members under 5 years
Proportion aged 5-9 years	.0491	Proportion of household composed of members 5-9 years
Proportion aged 10-14 years	.0542	Proportion of household composed of members 10-14 years
Proportion aged 15-19 years	.0624	Proportion of household composed of members 15-19 years
Proportion aged 20-29 years	.2318	Proportion of household composed of members 20-29 years
Proportion aged 30-44 years	.1922	Proportion of household composed of members 30-44 years
Proportion aged 45-64 years	.2166	Proportion of household composed of members 45-64 years
Proportion aged 65-74 years	.0946	Proportion of household composed of members 65-74 years
Proportion over age 74	.0556	Proportion of household composed of members over 74 years

Table 6—Food product groups and their compositions included in food expenditures

Product group	Composition
Total	Food at home and away from home (except that purchased on overnight trips), excluding alcoholic beverages
Food away from home	Lunch, dinner, breakfast, brunch, snacks, and nonalcoholic beverages (except meals and beverages purchased on overnight trips) at restaurants, vending machines, and carryouts, including tips; board, meals for someone away at school, and catered affairs
Food at home	Food used in the home, excluding alcoholic beverages
Meat, poultry, fish, and eggs	Meat, poultry, fish, and eggs
Beef	Ground beef, roasts, steaks, veal, and other cuts of beef, excluding canned
Pork	Bacon, pork chops, ham (including canned), roasts, sausage, and other cuts of pork
Other meat	Frankfurters, lunch meats (such as bologna, liverwurst, and salami), lamb, mutton, goat, and game
Poultry	Fresh and frozen chickens and other specified fresh and frozen poultry (duck, turkey, Cornish hens, etc.), excluding canned
Fish	Fresh and frozen fish and shellfish
Eggs	Fresh and powdered, and egg substitutes
Cereals and bakery products	Ready-to-eat and cooked cereals, pasta, flour, prepared flour mixes, other cereal products (such as corn meal, corn starch, rice), bakery products (such as bread, crackers, cookies, biscuits, rolls, cakes, and other specified frozen and refrigerated bakery products)
Dairy products	Fresh and processed dairy products
Milk and cream	Fresh whole milk and other fresh milk (such as buttermilk and fresh cream, including table, whipping, sour, and fresh sour cream dressings)
Cheese	All types of cheeses
Other dairy products	Ice cream and its products, yogurt, powdered milk, condensed and evaporated milk, liquid and powdered diet beverages, milk shakes, malted milk, chocolate milk, and other specified dairy products
Fruits	Fresh and processed fruits, including juices
Fresh	Fresh fruits
Processed	Frozen fruits and fruit juices, canned and dried fruits, and canned or bottled juices
Vegetables	Fresh and processed vegetables, including juices
Fresh	Fresh vegetables
Processed	Frozen, canned, dried, and vegetable juices
Sugars and sweeteners	Sugar, candy and chewing gum, artificial sweeteners, jams, jellies, preserves, fruit butters, syrup, fudge mixes, icings, and other specified sweets
Nonalcoholic beverages	Diet and nondiet carbonated drinks; coffee (roasted, instant, and freeze-dried); tea (loose, instant, and ready-to-drink); other nonalcoholic, chocolate flavored powders; and other specified nonalcoholic beverages
Fats and oils	Margarine, butter, shortening and salad dressings, nondairy cream, peanut butter, and substitute and imitation milk
Butter	All types of butter
Margarine	All types of margarine
Other fats and oils	Shortening and salad dressings, nondairy cream, peanut butter, and substitute and imitation milk
Miscellaneous	Frozen prepared foods and other foods, canned and packaged soups, potato chips, nuts and other snacks, condiments seasonings, olives, pickles, relishes, sauces and gravies, salads, desserts, baby foods, and canned beef and poultry
Alcoholic beverages	Beer and ale, wine, whiskey, and other alcoholic beverages purchased for consumption at home and at restaurants in home city (not on trips)

the sample means for all variables except the one being examined in the particular table.

Influence of Income

The influence of income on weekly per capita expenditures for the 29 product groups is measured in the form of elasticities and changes in expenditure levels (table 7). The elasticities are multiplied by a factor of 10 to approximate the percentage response in expenditures associated with a 10-percent increase in income. Income is a significant determinant of consumer expenditures for all food groups analyzed, except for eggs and milk and cream. All elasticities are positive, although those for eggs, milk and cream, and margarine are insignificant from zero. This indicates that higher income households spend more than their lower income counterparts on all food groups analyzed, all else held constant. In general, higher income households prefer beef and fish to pork and poultry, cheese to other dairy products, and butter to margarine.

Table 7—Per capita effects of a 10-percent increase in income on weekly food expenditures, 1980-81

Item	Total effect	Market entry effect	Expenditure level effect	Share of total effect due to market entry
		Percent		
Total food	3.47	0.52	2.94	15
Food away from home	5.68	2.46	3.22	43
Food at home	2.01	.41	1.60	20
Meat, poultry, fish, and eggs	2.17	.81	1.36	37
Beef	2.34	1.31	1.03	56
Pork	1.60	.93	.67	58
Other meat	1.90	1.10	.80	58
Poultry	1.05	.65	.40	62
Fish	3.75	2.54	1.21	68
Eggs	.01	.01	.01	54
Cereals and bakery products	1.60	.51	1.09	32
Dairy products	1.38	.44	.94	32
Milk and cream	.21	.08	.13	38
Cheese	3.17	1.82	1.35	58
Other dairy products	2.11	1.35	.76	64
Fruits	1.93	.93	1.00	48
Fresh	1.88	1.09	.79	58
Processed	2.22	1.21	1.01	55
Vegetables	2.40	1.05	1.35	44
Fresh	2.44	1.22	1.22	50
Processed	2.27	1.29	.98	57
Sugars and sweeteners	1.67	.99	.68	59
Nonalcoholic beverages	1.26	.57	.69	45
Fats and oils	1.81	.94	.87	52
Butter	3.50	2.64	.86	75
Margarine	.83	.57	.26	69
Other	1.44	.88	.56	61
Miscellaneous	2.51	1.18	1.33	47
Alcoholic beverages	5.58	3.59	1.98	64

Source: Based on tobit analysis of *(16)*.

The product groups most responsive to a change in income are total food, food away from home, beef, fish, cheese, vegetables, butter, miscellaneous foods, and alcoholic beverages. A 10-percent increase in income raises expenditures on these items more than 2 percent and as high as 5.68 percent for food away from home. The items that respond the least to changes in income are eggs, milk and cream, and margarine. Expenditures on these items remain virtually unchanged with increased income.

The probability-of-use or frequency-of-use phenomenon accounts for more than half of the total expenditure response for many of the food groups. The smaller, more narrowly defined product groups have a smaller probability of being used in a particular week. For example, 37 percent of the demand response for meat, poultry, fish, and eggs is due to changes in the proportion of households consuming these foods, while 68 percent of the total demand response for fish is attributed to this factor. Similar relationships are found between other major groups and their respective subgroups. The relatively larger response in the subgroups can be partially attributed to product switching and substitution among foods within the group.

As noted previously, the market entry response comprises several components that are distinctly different yet difficult to identify with the CCES data. Correct interpretation of the entry response requires an understanding of these components as well as the data. Three points deserve repeating. First, the CCES is an expenditure, not a use, survey. Consequently, some households did not report any food expenditures during their survey period.

Second, sampling units at which occupants were temporarily absent are included in the sample. These two factors will tend to cause the market entry response to be overestimated and possibly misinterpreted, especially for total food and food at home. Third, it is not possible to discern short-term frequency-of-purchase behavior from longer term purchase/nonpurchase decisions. Recall that households reported only for a 2-week period during the survey.

The products that have market entry responses greater than 1.5 (meaning that a 10-percent increase in income causes item expenditures to increase by at least 1.5 percent because of either increased use or market entry) are food away from home, 2.46 percent; fish, 2.54 percent; cheese, 1.82 percent; butter, 2.64 percent; and alcoholic beverages, 3.59 percent. Those with the lowest market entry responses include eggs, dairy products, and milk and cream.

Those products with over 50 percent of the total income response due to market entry or frequency of use include beef, pork, other meat, fish, cheese, other dairy products, fresh and processed fruits, processed vegetables, sugars and sweeteners, butter, margarine, other fats and oils, and alcoholic beverages.

These results have several important implications for developing marketing strategies and assessing market potential as real consumer income increases. In general, marketing strategies for broad groups may be more successful if focused on intensive market development because many consumers already use some individual items within the group. Conversely, for some categories, such as cheese or butter, extensive market development may be more appropriate. That is, the relatively high market entry response for these products shows that many consumers use them infrequently or not at all. This presents abundant opportunities for market expansion. For example, marketing efforts could be aimed at educating the consumer about alternative uses of cheese or the cooking attributes of butter.

Average per capita expenditures on the various food groups are simulated at selected per capita income levels using the estimated tobit equations evaluated for an average sample household. Income is measured in constant 1980-81 dollars, and the results are reported in table 8. Expenditures in all categories, except for eggs, increase with income. In general, expenditures in groups with the highest income elasticities, such as food away from home and alcoholic beverages, increase most as income rises. However, these responses are not as large as would be predicted using the elasticities because the consumer response to income diminishes as income rises. The latter result is due to the quadratic formulation used for income in the estimated models. Also, the market entry component diminishes as fewer nonusers are available to become potential market participants.

For example, raising per capita income from $4,000 to $8,000 increases average total food expenditures by 24.4 percent, while extrapolation from the values reported in table 7 gives an increase of 34.7 percent. Also, note that the effect of an additional $4,000 of income, from $8,000 to $12,000, increases expenditures by only 15.2 percent, revealing the diminishing effect of income on expenditures at higher income levels. Note that expenditure elasticities embody both quantity and quality components. For example, a 15.2-percent increase in expenditures cannot be translated directly into a 15.2-percent increase in quantities demanded. Part of this increase is in the form of increased demand for quality factors, such as convenience, packaging, and the substitution of products (for example, steak for hamburger); the remainder of the increase is

in the form of increased quantities. Because the CCES is an expenditure survey, separating an expenditure elasticity into its quality and quantity components is not possible.

Demographic and Seasonal Effects

Household characteristics and factors other than income that are hypothesized to influence consumer demand for food include household age composition, region of household residence, race, and season. The influence of each of these factors is analyzed. Differences in per capita expenditures associated with these factors are simulated using the estimated tobit equations evaluated at alternative levels of the particular factor being examined, while other factors are held constant at their respective sample averages. For example, households are grouped into four categories according to their region of residence: Northeast, South, North Central, and West. To simulate expenditures in a region, the dummy variable representing the region of residence is set equal to one and the

Table 8—Simulated weekly expenditures per capita by income level, 1980-81

Item	Base ($8,863)	Income level				
		$4,000	$6,000	8,000	$10,000	$12,000
	Dollars	*Percent*[1]				
Total food	23.47	80.0	88.4	96.6	104.4	111.8
Food away from home	8.63	69.7	81.9	94.5	107.3	120.2
Food at home	15.26	87.9	93.1	98.0	102.5	106.6
Meat, poultry, fish, and eggs	5.12	86.8	92.5	97.8	102.7	107.1
Beef	2.07	86.1	92.1	97.7	102.9	107.8
Pork	1.03	89.8	94.3	98.4	102.0	105.0
Other meat	.68	88.0	93.3	98.1	102.3	106.0
Poultry	.68	92.6	96.0	98.9	101.3	103.0
Fish	.56	78.6	87.6	96.3	104.7	112.7
Eggs	.30	99.4	99.8	100.0	100.0	99.8
Cereals and bakery products	1.97	89.9	94.3	98.4	102.0	105.1
Dairy products	1.93	91.6	95.2	98.6	101.7	104.5
Milk and cream	.99	98.8	99.3	99.8	100.3	100.7
Cheese	.64	81.1	89.2	96.9	104.0	110.4
Other dairy products	.33	87.5	92.8	97.9	102.6	107.0
Fruits	1.39	89.9	93.9	98.1	102.5	107.1
Fresh	.85	90.9	94.4	98.2	102.5	107.2
Processed	.60	86.8	92.4	97.8	102.8	107.3
Vegetables	1.21	85.4	91.7	97.6	103.0	107.8
Fresh	.77	85.4	91.7	97.6	103.0	108.0
Processed	.46	85.9	92.1	97.7	102.8	107.2
Sugars and sweeteners	.72	89.2	94.0	98.3	102.0	105.1
Nonalcoholic beverages	1.41	92.3	95.7	98.7	101.6	104.1
Fats and oils	.55	88.8	93.7	98.2	102.2	105.8
Butter	.11	80.1	88.4	96.6	104.4	111.9
Margarine	.10	93.7	96.7	99.1	101.0	102.1
Other	.33	91.1	95.0	98.6	101.8	104.7
Miscellaneous	1.55	84.9	91.4	97.5	103.1	108.2
Alcoholic beverages	3.56	71.4	82.6	94.6	107.2	120.4

[1]Simulated percentage of base expenditures.

Source: Based on tobit analysis of (*16*).

dummy variables for the other regions are set equal to zero. If the household resides in the Northeast region, the three dummy variables are set equal to zero. A similar procedure is used to examine the other socioeconomic characteristics.

The results of this analysis can be used to examine (1) the potential for selected markets based on area demographics, and (2) the effects of population changes on markets over time. Major findings are briefly discussed for each household characteristic. Each factor is examined separately with all other factors held constant at respective sample averages.

Household Age Composition. The ages of a household's members have a significant influence on average food expenditures per person (table 9). As expected, older household members spend more on many food items than younger members do. One exception to this is away-from-home food spending. Households whose members are under 45 tend to spend more on food away from home than similar but older households. Households composed entirely of persons over 74 spend significantly less for eating out than their younger counterparts.

Individuals under age 5 and between the ages of 15-19 tend to have less of an effect on household expenditures per person for meat, poultry, fish, and eggs than members of other age groups, especially for beef, other meats, and fish. Aside from the over-45 age groups, individuals in the 10-14 age group have the largest effect on household expenditures for cereal and bakery products. Among persons under 30 years old, the under 5 and 10-14 age groups have the largest influence on expenditures for dairy products, especially milk and cream.

Teenagers tend to have a smaller effect than other age groups on household expenditures for fresh and processed

Table 9—Simulated weekly food expenditures per capita by age group, 1980-81

Item	Base 45-64	Age group (years)								
		Under 5	5-9	10-14	15-19	20-29	30-44	45-64	65-74	Over 74
	Dollars	*Percent*[1]								
Total food	25.77	60.2	70.6	83.8	79.0	90.9	96.2	100.0	100.2	92.9
Food away from home	7.35	77.1	101.5	116.6	129.8	148.0	142.3	100.0	92.5	72.0
Food at home	18.90	59.3	63.3	73.2	61.5	69.3	77.7	100.0	102.2	97.8
Meat, poultry, fish, and eggs	6.78	51.6	56.7	64.2	53.3	63.8	72.2	100.0	97.6	93.7
Beef	2.62	60.7	72.2	80.1	59.4	69.1	71.7	100.0	97.9	87.2
Pork	1.43	44.9	46.9	62.0	47.6	56.9	68.8	100.0	105.0	97.1
Other meat	.86	53.0	73.0	77.7	59.0	66.6	76.4	100.0	102.8	88.2
Poultry	.91	62.1	51.8	51.9	52.6	61.5	75.8	100.0	98.9	110.7
Fish	.67	59.2	73.9	81.5	63.3	72.3	78.7	100.0	100.1	134.3
Eggs	.39	69.5	60.4	69.4	58.8	62.1	71.3	100.0	103.8	108.0
Cereals and bakery products	2.34	63.2	76.4	86.6	70.1	70.8	78.8	100.0	103.2	110.0
Dairy products	2.20	80.6	75.3	83.9	78.8	78.5	86.3	100.0	97.0	102.1
Milk and cream	1.10	95.1	81.0	101.0	85.1	79.9	79.5	100.0	94.9	112.0
Cheese	.72	69.1	72.9	68.5	77.4	82.2	97.8	100.0	103.4	90.0
Other dairy products	.37	69.1	98.4	91.1	83.5	70.4	86.6	100.0	108.4	113.3
Fruits	1.70	74.1	67.6	69.8	57.1	65.5	70.1	100.0	127.2	122.7
Fresh	1.07	67.8	67.1	74.7	53.3	59.4	65.2	100.0	137.7	121.6
Processed	.69	84.7	74.2	69.7	67.3	75.9	80.5	100.0	113.1	135.1
Vegetables	1.54	54.4	57.0	69.5	50.5	67.7	76.7	100.0	108.3	103.6
Fresh	.98	50.4	50.6	64.5	49.2	66.8	77.2	100.0	113.7	109.8
Processed	.57	65.8	67.1	84.4	54.9	69.1	76.7	100.0	101.3	101.7
Sugars and sweeteners	.83	80.8	102.4	100.2	80.3	63.7	78.8	100.0	129.6	97.8
Nonalcoholic beverages	1.78	48.8	59.6	78.4	61.8	71.7	84.7	100.0	86.3	81.6
Fats and oils	.67	58.3	65.5	77.8	55.2	71.6	77.5	100.0	109.2	122.7
Butter	.11	88.5	114.2	90.2	75.1	88.8	93.4	100.0	115.5	142.3
Margarine	.14	49.5	54.7	76.6	44.9	50.4	64.7	100.0	118.7	148.9
Other	.39	53.7	68.7	90.6	66.2	74.8	78.3	100.0	102.6	112.3
Miscellaneous	1.58	101.3	90.8	105.0	83.5	100.1	94.1	100.0	109.9	96.3
Alcoholic beverages	3.15	76.6	94.8	100.2	116.1	164.7	143.7	100.0	71.3	43.1

[1]Simulated percentage of base expenditures.

Source: Based on tobit analysis of (*16*).

vegetables, fats and oils, and miscellaneous prepared foods.

As expected, households with members under age 9 tend to spend less per person on alcoholic beverages than households with older children, all else held constant. In contrast, households composed of members age 20-29 spend the most on alcoholic beverages.

Elderly households tend to spend less per person on meat, poultry, fish, and eggs than do similar households with members under age 65. Also, the division of the food dollar within this food group is different for the elderly and nonelderly. For example, the elderly generally spend more per person on eggs and less on beef than their younger counterparts. Elderly persons are also more likely to spend more per person than younger people on cereals and bakery products, fruits, vegetables (especially fresh), sugars and sweeteners, fats and oils, and prepared foods. The elderly spend significantly less than do persons in the 20-64 age brackets on alcoholic beverages.

The figures in table 9 may be used to calculate expenditures for a household with a user-specified age composition and other factors held at their sample means. The figures approximate the per capita effect that a household member of a given age has on total household expenditures. The weekly expenditure of a particular household is approximated by adding together the consumer equivalents for age groups corresponding to each household member and multiplying this sum by the average expenditure for the base group. For example, households composed of two adults and a child aged 25, 32, and 7, respectively, have average weekly at-home food expenditures of $39.75 ($18.90 · (0.633 + 0.693 + 0.777) = 39.75).[6] In this way, the expenditures for households of different sizes and/or age composition can be easily compared.

The Bureau of the Census projects that the age distribution of the American population is likely to change dramatically over the next half a century. This, coupled with the wide variation in expenditures for households with different age compositions, suggests that future expenditure patterns are likely to be altered. The last section of this report addresses this issue.

Region. Food spending exhibits substantial regional variation (table 10). Away-from-home food expenditures are highest in the South and West. Aggregate food spending is about 6 percentage points higher in the Northeast and West than in the South and North Central regions. Some of these differences may be attributed to regional price differences and consumer tastes and preferences.

Spending on meat, poultry, fish, and egg products is 12 percentage points higher in the Northeast than in any other region. Spending for this broad category varies little among the other three regions, but substantial differences are noted for the more disaggregated components of this group. This appears to reflect the substitution of one meat item for another in these regions. For example, residents, of the North Central and West spend about $5 weekly per person on meat, poultry, fish, and eggs, but in the case of fish, Westerners outspend their North Central counterparts by over 30 percentage points.

Spending on cereals and bakery products as well as dairy products are highest in the Northeast and West and lowest in the South. Northeastern residents spend $2.21 and $2.01 weekly per person on cereals and bakery products and dairy products, respectively, compared with $1.81 and $1.79, respectively, for similar Southern housholds. Western residents spend about 25 percentage points more on other dairy products (such as ice cream) than residents of either the South or North Central regions. Some of these apparent differences may be caused by relative price differences, tastes and preferences, and climatic conditions.

Per person expenditures on fruit and vegetables are highest in the Northeast and West but lowest in the North Central region. Western residents use fresh fruits and vegetables considerably more than residents of other regions, probably because of their relative proximity to production areas. Northeasterners spend an average of 67 cents weekly per person on processed fruits compared with 54 cents for North Central residents, a difference of approximately 20 percent. Southerners are the highest spenders per person on processed vegetables, and North Central residents the lowest. Many of these results are similar to those found by Smallwood and Blaylock using data from the 1977-78 Nationwide Food Consumption Survey (NFCS) (*8*).

Expenditures on sugar and sweeteners are highest in the Northeast. Spending on these items appears to be fairly homogenous among residents of the North Central, Southern, and Western regions. Except for the North Central region, per person expenditures on nonalcoholic beverages varies little regionally.

Spending on fats and oils is nearly identical in the Northeast and West. However, Northeastern residents appear to have a distinct preference for butter, spending at least 36 percentage points more per person than their counter-

[6] A small adjustment for household size is not included in this calculation.

parts in other regions. On the other hand, Southern residents spend the least per person for butter and margarine combined.

Western residents spend more per person on prepared foods than similar residents of other regions. Northeastern residents spend the least, followed by Southern and North Central residents. Westerners also spend more than nonwesterners for alcoholic beverages, perhaps reflecting the climatic differences among regions.

The wide variation found in regional per person expenditures suggests that marketing strategies may be more effective if regionalized. For example, Southern residents spend about 11 percentage points less on cheese than the national average, indicating that substantial potential exists for market expansion in this region. Likewise, butter consumption is about 19 percentage points less in the North Central and Southern regions than the national average, again indicating a rich market for expansion opportunities.

Table 10—Simulated weekly food expenditures per capita by region, 1980-81

Item	Mean (base)	Northeast	North Central	South	West
	Dollars	*Percent*[1]			
Total food	23.47	103.4	96.6	97.6	103.2
Food away from home	8.63	98.7	98.6	100.0	102.7
Food at home	15.26	105.9	96.2	96.2	103.0
Meat, poultry, fish, and eggs	5.12	110.0	96.4	97.9	97.5
Beef	2.07	107.5	96.6	98.3	99.0
Pork	1.03	99.1	104.2	99.0	97.4
Other meat	.68	124.4	104.8	88.8	87.5
Poultry	.68	119.2	82.8	103.0	100.5
Fish	.56	128.4	77.1	96.6	107.7
Eggs	.30	107.0	93.7	97.6	103.4
Cereals and bakery products	1.97	112.4	97.7	91.9	100.3
Dairy products	1.93	104.3	97.9	92.7	106.4
Milk and cream	.99	103.6	99.4	94.7	103.1
Cheese	.64	106.0	99.8	88.8	107.3
Other dairy products	.33	107.4	90.9	90.0	115.3
Fruits	1.39	106.9	91.0	93.2	111.6
Fresh	.85	104.6	91.2	93.2	113.5
Processed	.60	112.4	90.1	91.5	109.8
Vegetables	1.21	102.9	91.6	100.7	106.0
Fresh	.77	103.3	91.6	95.7	111.3
Processed	.46	102.9	91.9	107.5	98.7
Sugars and sweeteners	.72	103.0	98.6	100.8	98.1
Nonalcoholic beverages	1.41	101.5	97.9	101.2	99.7
Fats and oils	.55	105.0	96.6	94.6	105.2
Butter	.11	144.9	81.3	81.5	108.7
Margarine	.10	98.2	103.8	95.0	103.0
Other	.33	96.4	97.2	97.4	109.3
Miscellaneous	1.55	92.2	101.4	96.5	109.5
Alcoholic beverages	3.56	104.7	101.3	85.2	111.3

[1]Simulated percentage of base expenditures.

Source: Based on tobit analysis of (*16*).

Race. Nonblack households spend more per person than their black counterparts for most food groups studied, other factors being equal (table 11). For example, nonblacks spend about 14 percentage points more on food away from home than blacks and 10 percentage points more on food at home. Black households are found to spend about 10 percentage points more than nonblack households on meat, poultry, fish, and eggs, and within this broad group, about 30 percent more for fish and poultry products. Conversely, nonblacks spend about 35 percentage points more than blacks on dairy products and an even larger percentage on cheese. The latter result is similar to that found by Blaylock and Smallwood using the 1977-78 NFSC data (*1*). In summary, blacks spend less on the various food groups, except for the meat group, than similar nonblack households, implying that blacks and nonblacks allocate their food dollar in substantially different ways. Whether these results are due to different tastes and preferences among racial groups or to physiological factors is unknown. But the results do indicate that in the development of effective marketing strategies, especially for certain food products, racial differences should be given serious consideration.

Table 11—Simulated weekly food expenditures per capita by race, 1980-81

Item	All (base)	Nonblack	Black
	Dollars	*--- Percent[1] ---*	
Total food	23.47	101.7	90.3
Food away from home	8.63	102.1	87.7
Food at home	15.26	101.5	91.3
Meat, poultry, fish, and eggs	5.12	98.6	108.6
Beef	2.07	100.7	95.7
Pork	1.03	97.4	116.4
Other meat	.68	101.2	92.8
Poultry	.68	95.1	131.8
Fish	.56	96.1	125.1
Eggs	.30	99.5	103.1
Cereals and bakery products	1.97	101.8	89.3
Dairy products	1.93	105.3	70.6
Milk and cream	.99	104.9	72.9
Cheese	.64	109.0	56.1
Other dairy products	.33	104.1	77.7
Fruits	1.39	100.8	95.5
Fresh	.85	101.6	91.0
Processed	.60	100.1	99.4
Vegetables	1.21	101.2	93.0
Fresh	.77	101.2	93.1
Processed	.46	102.0	88.8
Sugars and sweeteners	.72	102.7	84.9
Nonalcoholic beverages	1.41	103.9	78.2
Fats and oils	.55	103.2	82.2
Butter	.11	103.4	81.8
Margarine	.10	105.3	72.3
Other	.33	102.9	83.8
Miscellaneous	1.55	104.3	76.5
Alcoholic beverages	3.56	102.8	84.7

[1]Simulated percentage of base expenditures.

Source: Based on tobit analysis of (*16*).

Season. Away-from-home food spending is at least 6 percentage points higher in the spring than in the other seasons, while at-home food spending is highest in the fall (table 12). In general, seasons with higher away-from-home food spending also have lower at-home food spending. Consequently, little change is noted in total food spending across seasons.

Spending on beef is highest in the winter and lowest in the fall. Pork and poultry expenditures are higher in the colder months and lower in the spring and summer. Conversely, spending on other meats (such as coldcuts) is highest in the summer. Fish expenditures are highest in the winter and lowest during the spring. Americans buy more eggs in the fall and winter, possibly because they serve more hot breakfasts and bake more in these seasons.

Spending on cereal and bakery products and on sugars and sweeteners is highest in the fall, partially because of increased baking and candy consumption during the holiday season. As expected, spending on fresh fruits and vegetables is highest in the spring and summer. Conversely, spending on processed fruits and vegetables is highest in the fall and winter. The replacement of processed products for fresh produce in the winter provides a means of stabilizing expenditures across seasons. As expected, spending on nonalcoholic beverages is highest in the spring and summer, reflecting increased use of such products as diet sodas and iced tea.

Spending on fats and oils is highest in the fall and winter, again reflecting increased baking activities at home. Spending on miscellaneous prepared foods also followed this pattern, perhaps because of increased use of such items as soups and other prepared foods in colder months.

Spending on alcoholic beverages is highest in the summer and fall, probably reflecting increased use due to hot weather, sporting events (reflected principally in increased spending on beer), and the holiday season.

Survey Year. Per person expenditures varied somewhat between the survey years, holding income, household composition, and other factors constant (table 13). Table 13 also presents changes between 1980 and 1981 in the CPI for each food group.

Prices for all commodity groups rose between the 1980 and 1981 surveys. Beef prices increased the least at 0.9 percent, and fresh vegetables prices increased the most at 18.7 percent. Total food prices rose 7.9 percent, away-from-home food prices rose 9.0 percent, and at-home food prices increased 7.3 percent.

Statistically significant differences in expenditures, generally higher in 1981, were found for total food, food at home, other meat, eggs, cereal and baking products, dairy products, fruits and vegetables, other fats and oils, miscellaneous prepared foods, and alcoholic beverages. Alcoholic beverages were the only group to show a statistically significant decline in expenditures between survey

Table 12—Simulated weekly food expenditures per capita by season, 1980-81

Item	Mean (base)	Winter	Spring	Summer	Fall
	Dollars	*Percent*[1]			
Total food	23.47	98.5	100.4	99.0	101.4
Food away from home	8.63	98.7	105.7	99.6	97.5
Food at home	15.26	98.9	97.4	98.8	103.2
Meat, poultry, fish, and eggs	5.12	101.3	97.4	98.2	102.2
Beef	2.07	103.2	99.7	100.3	98.1
Pork	1.03	103.7	98.6	92.9	103.7
Other meat	.68	94.6	102.8	105.5	97.7
Poultry	.68	98.0	93.0	95.6	109.3
Fish	.56	109.4	93.5	100.1	98.7
Eggs	.30	98.7	96.8	96.1	105.7
Cereals and bakery products	1.97	99.3	96.8	99.5	102.9
Dairy products	1.93	96.5	100.7	99.9	101.8
Milk and cream	.99	99.7	99.8	97.4	102.2
Cheese	.64	97.1	97.3	99.0	104.2
Other dairy products	.33	90.3	107.6	110.0	94.6
Fruits	1.39	95.1	99.6	108.0	97.8
Fresh	.85	91.6	102.0	114.9	94.0
Processed	.60	102.8	97.4	95.4	103.3
Vegetables	1.21	99.6	102.3	99.4	99.1
Fresh	.77	97.8	107.8	102.9	94.4
Processed	.46	105.1	92.9	92.7	107.0
Sugars and sweeteners	.72	94.6	92.7	86.2	119.2
Nonalcoholic beverages	1.41	99.9	101.2	101.7	98.1
Fats and oils	.55	102.2	97.8	96.2	102.9
Butter	.11	101.6	94.2	85.4	114.5
Margarine	.10	108.4	91.2	90.7	107.9
Other	.33	99.8	101.2	101.6	98.3
Miscellaneous	1.55	101.5	91.5	96.9	107.0
Alcoholic beverages	3.56	93.2	98.0	100.0	105.7

[1]Simulated percentage of base expenditures.

Source: Based on tobit analysis of (*16*).

years. This variation in expenditures between survey years was partially due to the changes in relative food prices noted above, but sampling variation between surveys may also have been a factor.

Population and Demand Projections: Background and Methods

The dramatic demographic changes that the Bureau of the Census is projecting and the variation found earlier in food expenditures by household income, age composition, region of residence, and race suggest that household food expenditures are likely to change. In this section, we combine Census projections with the estimated tobit models to project future expenditures to the year 2020 in 5-year intervals.

Table 13—Simulated weekly food expenditures per capita by survey year

Item	1980 (base)	1981[1]	Change in CPI's between 1980-81
	Dollars	------- *Percent* -------	
Total food	23.09	103.1	7.9
Food away from home	8.69	98.7	9.0
Food at home	14.29	104.2	7.3
Meat, poultry, fish, and eggs	5.09	101.3	4.4
Beef	2.08	98.7	0.9
Pork	1.01	104.6	9.3
Other meat	.65	107.2	4.3
Poultry	.68	102.2	4.1
Fish	.57	97.5	8.3
Eggs	.29	105.6	8.3
Cereals and bakery products	1.90	107.0	10.0
Dairy products	1.88	105.3	7.1
Milk and cream	.94	109.7	5.8
Cheese	.65	98.3	8.3
Other dairy products	.33	101.6	9.7
Fruits	1.36	104.8	8.3
Fresh	.82	105.4	5.4
Processed	.59	103.4	11.6
Vegetables	1.15	110.1	15.8
Fresh	.72	113.5	18.7
Processed	.46	101.3	12.3
Sugars and sweeteners	.72	98.9	7.9
Nonalcoholic beverages	1.41	100.3	4.2
Fats and oils	.54	104.1	9.9
Butter	.11	97.2	7.7
Margarine	.10	101.0	2.6
Other	.32	107.9	13.9
Miscellaneous	1.50	105.8	10.3
Alcoholic beverages	3.71	92.2	7.1

[1]Simulated percentage of base expenditures.
Source: Based on tobit analysis of (*16*). CPI's from Bureau of Labor Statistics.

Several assumptions and limitations underlying the projections should be noted. First, the analysis assumes that the relationships of income and demographics to food expenditures are the same as those found in the statistical analysis of the 1980-81 CCES data. These relationships are assumed to remain unchanged over time, implying that relative prices and alternative opportunities for food choices, as well as tastes and preferences, remain unchanged. Second, as their economic and demographic circumstances change, consumers are assumed to acquire the expenditure patterns of individuals already observed in those circumstances. That is, a household that migrates from the Northeast to the West acquires the expenditure characteristics of Westerners. Likewise, a 5-year-old in 2020 has the food expenditure features of a 5-year-old observed in 1980. Third, the model is driven by projected changes in demographics and projected income growth. Because of the importance of these factors and the uncertainty concerning their future values, several alternative scenarios are provided to place bounds on the influence of these particular factors on the demand projections. Fourth, the projections are for the entire nation and may not adequately reflect trends in any particular geographic area. While these assumptions may appear restrictive, the information required to relax them is either unavailable or unreliable.

One way to view the projections is not as projections per se but rather as scenarios of what would have occurred in 1980 if a future population change was already in place. For example, the relevant question may be as follows: "What would have happened to expenditures in 1980 if the racial mix of the population was the one projected for 2020?" This contrasts with the question that is typically posed: "What will happen to expenditures in 2020 because of the projected changes in the racial mix of the population?" Viewing the projections in the first way lessens the potential for misinterpretation by centering attention on the underlying assumptions described above. Given the nature of our data, we feel the former interpretation is the most appropriate. However, we will use the term "projections" here and draw comparisons between the base year and a future period in the discussion of our results.

Projections of food expenditures in this report are based on changes in the age distribution of the population, future regional population shifts, changes in the racial

mix of the population, population growth, and real income growth. Both the isolated and combined effects of each of these socioeconomic factors on food expenditures are projected. Food expenditure projections are based on the low, middle, and high Census population projections (see explanation below) and assumed annual income growth of 1 percent and 2 percent and are presented on both a per person and national basis.

Population Projections

Bureau of the Census projections of the U.S. population by age and race for 1985-2020 are used in this report.[7] These projections are based on population estimates of July 1, 1982, and were projected forward by Census using the cohort-component method with alternative assumptions for future fertility, mortality, and net immigration levels. The series using the middle assumption for each of these three components is designated as the "middle series."

Fertility in the middle series is assumed to reach an ultimate completed cohort fertility of 1.9 births per woman. This is consistent with recent levels of fertility, women's expectations of future births, and social and economic trends leading to lower fertility (increases in labor force participation, educational attainment, and age at first marriage). For the low and high assumptions, levels of 1.6 and 2.3 births per woman were chosen. These ultimate fertility levels are assumed to be first attained by the 1985 birth cohort (persons born in that year) for whites and other races and by calendar year 2050 for blacks. Mortality is projected to decline under all three assumptions.

The middle assumption is consistent with demographic analyses conducted by the Social Security Administration in which rapid declines in mortality rates were projected to the year 2005. After that time, mortality rates are projected to decrease more slowly, and life expectancy will be 81 years in 2080. The low mortality assumption projects faster declines in mortality with total life expectancy reaching 85.9 in 2080. Even under the high mortality assumption, life expectancy is expected to increase to 77.4 years by 2080. The life expectancy of blacks, which has historically lagged behind that of whites, is not projected to reach white levels until 2080 under all assumptions.

The middle assumption for net immigration is a constant annual net inflow of 450,000, roughly equal to the measured level of net annual immigration over the past decade. A wide range between the high and low assumptions of net immigration was needed given the uncertainty of future refugee movements and other concerns. The high assumption of 750,000 was made to accommodate these concerns. The low assumption of 250,000 assumes little or no undocumented migration to the United States and a substantial outmigration of both aliens and U.S. citizens.

Age Distribution. Tables 14-16 present the projected percentages of the total population in various age groups for the low, middle, and high population series. Regardless of the series, the proportion of the population over 45 years old is projected to increase over 1985 levels. Note that all people over 40 years old by 2020 are already alive in 1980. On the other hand, those under 40 years old in 2020 are born after 1980. Thus, it is easy to see which age groups will be most affected by assumptions about mortality rates and which age groups will be most affected by assumptions about fertility rates. The low series, because of its higher life expectancy assumption, indicates that almost 46 percent of the population will be 45 years of age or older by the year 2020. In contrast, the middle series projects 43.2 percent of the population will be in this age bracket, and the high series projects 40.4 percent by the year 2020. The three series project the opposite pattern for the percentage of the population under 30 years old. For example, 33.3 percent, 37.6 percent, and 41.2 percent of the population are projected by the low, middle, and high series, respectively, to be under 30 by the year 2020. However, all three series project that the proportion of the population under 30 will decline steadily from 1985 levels.

Regional Population Distribution. The Bureau of the Census projects regional population distributions only for the years 1990 and 2000. In order to maintain consistency with the expenditure projections by the other demographic characteristics, we developed regional population distributions for the missing years. A multinomial logit model with a quadratic trend was employed to project regional population distributions beyond the year 2000. The 1980, 1990, and 2000 regional population distributions were used to estimate the future trends. Our projections indicate that the percentage of the population in the Northeast and North Central regions will decline from 1985 to 2020 (table 17). We project that between 1985 and 2000, the percentage of the total population residing in the Northeast will decline about 7 percentage points, and the percentage in the North Central region will decline about 6 percentage points. Conversely, the percentage of the population living in the South and West will increase about 6 and 7 percentage points, respectively. Regional population projections are not done separately for each of the three population series because the effects of regional migration on projected per capita expenditures would be identical regardless of the population series used.

[7]For a complete description of the methodology used by Census in making populaton projections, see (*14*).

Table 14—Projected percentage of population by age group, low series

Age group (years)	1985	1990	1995	2000	2005	2010	2015	2020
				Percent				
0-4	7.6	7.1	6.4	5.8	5.6	5.5	5.4	5.1
5-9	7.0	7.4	7.0	6.4	5.8	5.5	5.5	5.4
10-14	7.0	6.8	7.2	6.9	6.3	5.8	5.6	5.0
15-19	7.7	6.8	6.7	7.2	6.9	6.3	5.8	5.6
20-29	18.1	16.2	14.0	13.2	13.6	13.9	13.1	12.2
30-44	21.8	24.2	25.0	24.0	21.9	20.1	20.0	20.4
45-64	18.8	18.8	20.5	23.4	26.7	28.7	28.9	27.9
65-74	7.1	7.3	7.3	6.8	6.6	7.5	9.2	10.8
Over 74	4.9	5.5	5.9	6.4	6.6	6.5	6.6	7.2

Source: (*14*).

Table 15—Projected percentage of population by age group, middle series

Age group (years)	1985	1990	1995	2000	2005	2010	2015	2020
				Percent				
0-4	7.7	7.7	7.2	6.6	6.3	6.3	6.4	6.2
5-9	7.0	7.4	7.4	7.0	6.4	6.2	6.2	6.3
10-14	7.0	6.7	7.2	7.3	6.9	6.3	6.1	6.2
15-19	7.7	6.8	6.5	7.1	7.1	6.7	6.2	6.1
20-29	18.1	16.1	13.9	12.9	13.2	13.8	13.6	12.8
30-44	21.8	24.0	24.5	23.4	21.2	19.2	18.9	19.4
45-64	18.7	18.6	20.2	22.7	25.6	27.5	27.1	25.8
65-74	7.1	7.2	7.1	6.6	6.4	7.2	8.7	10.1
Over 74	4.9	5.5	5.9	6.4	6.7	6.7	6.7	7.3

Source: (*14*).

Table 16—Projected percentage of population by age group, high series

Age group (years)	1985	1990	1995	2000	2005	2010	2015	2020
				Percent				
0-4	7.9	8.1	7.8	7.3	7.2	7.4	7.5	7.5
5-9	7.0	7.5	7.8	7.5	7.0	6.9	7.1	7.3
10-14	7.0	6.7	7.3	7.5	7.3	6.8	6.7	6.9
15-19	7.7	6.8	6.5	7.0	7.3	7.0	6.6	6.5
20-29	18.1	16.0	13.8	12.7	13.0	13.7	13.7	13.0
30-44	21.7	23.9	24.3	23.1	20.7	18.5	18.1	18.5
45-64	18.6	18.4	19.7	22.0	24.6	26.0	25.4	23.8
65-74	7.0	7.2	7.0	6.4	6.2	6.8	8.1	9.3
Over 74	4.9	5.4	5.9	6.4	6.7	6.7	6.8	7.3

Source: (*14*).

Racial Distribution. Table 18 presents Bureau of the Census projections for the percentage of the population that is black for each of the three population series. All three series indicate that the percentage of the total population that is black will increase between 1985 and 2020. The high series indicates that blacks will comprise 12.2 percent of the total population in 1985 and 15.0 percent in 2020. The low series shows a somewhat smaller percentage increase, while the middle and high series are virtually identical.

Population Growth. Table 19 presents Bureau of the Census projections of the size of the total population for each of the three series. As expected, the low series shows the smallest increase in total population and the high series the largest. The differences among the three series are large, especially after the turn of the century. The low series projects an increase in the total population of 25 million persons between 1985 and 2020, the middle an increase of almost 58 million, and the high series an increase of about 100 million persons. After 2015, the low series projects that the total U.S. population will actually start to decline.

Table 17—Projected percentage of population by region

Year	Northeast	North Central	South	West
		Percent		
1985	20.54	25.09	34.22	20.15
1990	19.43	24.18	35.15	21.24
1995	18.37	23.26	36.06	22.32
2000	17.35	22.33	36.95	23.38
2005	16.38	21.40	37.81	24.42
2010	15.45	20.47	38.66	25.43
2015	14.56	19.55	39.48	26.41
2020	13.73	18.64	40.29	27.35

Sources: (*13*) and extrapolations by the authors for the remaining years.

Table 18—Projected percentage of population that is black

Year	Low series	Middle series	High series
		Percent	
1985	12.2	12.2	12.2
1990	12.6	12.6	12.6
1995	12.9	13.0	13.0
2000	13.3	13.3	13.4
2005	13.6	13.7	13.8
2010	14.0	14.1	14.2
2015	14.4	14.5	14.6
2020	14.7	14.9	15.0

Source: (*14*).

Methods. Consumer demand for food commodities is projected to the year 2020 at 5-year intervals beginning with 1985. The projections are developed using knowledge about the existing structure of demand gained from the tobit expenditure models reported earlier. Specifically, the projections are made by combining projections of demographic characteristics of the American population and projected income growth with demand response parameters estimated for the tobit per capita food expenditure models.

Three alternative demographic projections are combined with two alternative income growth assumptions to make a total of six scenarios. The Bureau of Census' low, middle, and high population series are used for the demographic projections. Income growth rates averaging 1 percent and 2 percent per year are assumed for increases in real consumer purchasing power. Although these income growth rates may appear small, they imply increases in purchasing power of 49 and 121 percent, respectively, between 1980 and 2020. Historically, per capita growth in real income has averaged 2.12 percent per year between 1950 and 1980. Thus, the 1-percent income growth assumption represents a lower bound for the expected long-term average growth rate, and the 2-percent assumption is used to approximate past growth rates.

The demographic determinants of demand considered in our projections are race (black-nonblack), age distribution, geographic distribution, and size of the populaton. Real income or consumer purchasing power is the other factor considered. Although commodity prices and consumer tastes and preferences are known to be important factors influencing food consumption over time, economists generally have little knowledge about the future course of these factors. In this study, relative prices and consumer tastes and preferences within the defined socioeconomic and demographic categories are assumed to re-

Table 19—Projected population by series

Year	Low series	Middle series	High series
		Millions	
1985	237.61	238.63	239.96
1990	245.75	249.66	254.12
1995	251.89	259.56	268.15
2000	256.10	267.96	281.54
2005	259.18	275.68	295.28
2010	261.48	283.24	310.01
2015	262.80	290.41	325.42
2020	262.70	296.60	340.76

Source: (*14*).

main stable at the levels existing during the 1980-81 period.

Three general types of projections are developed. The first two are per capita projections and the third is a national market level projection. Over time, projected average per capita demand changes are due to the changing demographic composition and purchasing power of an average or typical consumer. Because several factors change simultaneously, ascertaining which factors are contributing most to the overall changes in demand is difficult. As an aid to answering questions of this type, separate per capita demand projections are made for future age, regional, and racial distributions, income levels, and the full combination of these factors. The relative impact of particular factors can be readily determined by comparing the individual responses with the combined effect. Finally, national market level projections are made by expanding the per capita projections of the combined effects by the projected population size.

The procedure for computing projections is similar to that used for the simulations presented in the previous section. Per capita projections are developed by evaluating the estimated tobit models using the average projected demographic characteristics of the population and an assumed annual growth rate for income. Several variables in the tobit models do not enter into the projections directly and, therefore, are held constant in all projection scenarios. The dummy variable for the 1981 sample year is set equal to 0.5, and the dummy variables for season are set equal to 0.25. This procedure gives equal weight to each season and year in the estimation sample. Household size is held constant at the sample average of 2.6 persons per household.[8]

The tobit model is nonlinear, so the best measure of average expenditures is developed by projecting expenditures for each possible household type (size, age composition, race, region of residence, and income level) and computing a weighted average of expenditures using weights proportional to the number of households of each type. However, the detailed data required for such a procedure far exceed what is available. As a pragmatic alternative, average expenditures are estimated by evaluating the model for a typical consumer.

The projections are then expressed as a percentage of the base year (1980) for ease of interpretation and to minimize any bias introduced by using population averages rather than the entire distribution.

[8]Bureau of the Census only projects household size to the year 1995. Consequently, holding household size constant at 1980 levels is necessary. Errors in the expenditures projections caused by this assumption are likely to be small.

Food Expenditure Projections

This section presents projected per capita effects of individual and combined demographic and income changes on weekly food expenditures per person, and national effects of combined demographic and income changes.

Per Capita Effects

Projected per capita effects of changing age, regional, and racial distributions on weekly food expenditures, and per capita effects of the combined demographic and income changes are considered below.

Age Distribution Changes. Tables 20-22 present the effects of a changing population age distribution on future per capita food expenditures. The projections assume that all demographic factors (except age distribution), relative prices, and income remain constant at 1980 levels. Projections are made using each of the Census' three population series.

Expenditure projections made using the low population series indicate that per capita expenditures for all food groups considered will increase more over time than projections derived using either the middle or high population series. As expected, projections from the middle series lie between those using the low and high series. The low series forecasts higher per person expenditures because of the larger percentage of older Americans in that series versus the others. We only discuss projections derived from the middle series as expenditure patterns are similar across all projections regardless of the population series used.

The projected changes in age distribution will cause all food group expenditures, except for those away from home and those for alcoholic beverages, to increase steadily from the base year in 1980 to 2020. Expenditures on food at home are projected to increase 2.6 percent between 1980 and 2000 and increase another 2.6 percent from 2000 to 2020. The major food groups to be most affected by a changing population age distribution include meat, poultry, fish, and eggs, up 6.4 percent from 1980 to 2020; fruits, up 7.2 percent; vegetables, up 6.7 percent; and fats and oils, up 6.2 percent. The groups least affected will be total food, up 2.2 percent; dairy products, up 2.9 percent; and miscellaneous foods, up 0.7 percent.

The projected changes in the age distribution are expected to have a negative influence on per capita expenditures for food away from home and alcoholic beverages. Expenditures on food away from home are projected to decline about 3.9 percent between 1980 and 2020. Expenditures on alcoholic beverages are projected to fall about

5.8 percent between 1980 and 2020. These results are caused by the projected increase in the percentage of the population over age 64. The latter group was shown in the previous section to spend less on these items than younger groups.

Individual subcategories of food items that are most affected by the projected changes in the age distribution are pork, up 8.3 percent between 1980 and 2020; poultry, up 7.6 percent; fresh fruits, up 8.2 percent; fresh vegetables, up 7.6 percent; and margarine, up 10.3 percent. The least affected subgroups are milk and cream, up 2.1 percent; cheese, up 3.1 percent; other dairy products, up 3.6 percent; and butter, up 3.3 percent.

Regional Distribution Changes. Table 23 presents the effects of a changing regional population distribution on per capita food expenditures. The projections assume that all other factors influencing consumer demand remain constant at their 1980 levels and that the new residents of a region will assume the expenditure patterns of the old population in that region.

Projected changes in the regional distribution of the population are expected to have minor effects on per capita food expenditures. Total per person food expenditures are projected to increase 0.1 percent between 1980 and 2020. Away from home food spending is expected to in-

Table 20—Projected per capita effects of changing age distribution on weekly food expenditures, low series

Item	1980	1985	1990	1995	2000	2005	2010	2015	2020
					Percent				
Total food	100.0	100.4	100.7	101.3	101.8	102.3	102.8	103.0	103.4
Food away from home	100.0	100.2	99.9	99.4	98.8	98.1	97.3	96.7	96.1
Food at home	100.0	100.3	101.0	102.1	103.1	104.3	105.3	106.1	106.9
Meat, poultry, fish, and eggs	100.0	100.4	101.2	102.5	103.8	105.4	106.8	107.6	108.5
Beef	100.0	100.0	100.4	101.4	102.3	103.5	104.6	105.2	105.8
Pork	100.0	100.6	101.6	103.3	104.9	106.7	108.4	109.7	111.0
Other meat	100.0	100.2	100.9	102.1	103.0	104.1	105.1	105.9	106.7
Poultry	100.0	101.0	102.0	103.4	104.8	106.4	107.8	108.7	109.9
Fish	100.0	100.4	101.2	102.3	103.3	104.4	105.2	105.9	106.7
Eggs	100.0	100.4	101.1	102.3	103.5	104.8	106.1	107.0	108.0
Cereals and bakery products	100.0	100.1	100.7	101.7	102.5	103.5	104.3	104.9	105.6
Dairy products	100.0	100.2	100.5	101.2	101.8	102.5	103.0	103.3	103.7
Milk and cream	100.0	99.7	99.8	100.3	100.9	101.5	101.9	102.1	102.3
Cheese	100.0	100.7	101.3	101.9	102.4	102.9	103.4	103.9	104.5
Other dairy products	100.0	99.9	100.7	101.6	102.3	102.6	103.1	103.7	104.4
Fruits	100.0	100.5	101.2	102.3	103.2	104.5	106.0	107.4	108.7
Fresh	100.0	100.3	101.1	102.4	103.5	104.9	106.6	108.3	109.9
Processed	100.0	100.6	101.3	102.0	102.8	103.7	104.7	105.5	106.5
Vegetables	100.0	100.7	101.6	102.9	104.0	105.3	106.6	107.7	108.7
Fresh	100.0	100.9	101.9	103.3	104.5	106.0	107.5	108.7	110.0
Processed	100.0	100.4	101.1	102.1	103.0	104.1	105.1	105.8	106.5
Sugars and sweeteners	100.0	99.7	100.3	101.2	101.6	102.0	102.7	103.8	104.6
Nonalcoholic beverages	100.0	100.3	101.0	102.2	103.2	104.2	105.0	105.3	105.7
Fats and oils	100.0	100.6	101.4	102.6	103.6	104.7	105.9	106.8	107.8
Butter	100.0	100.5	101.2	101.6	101.7	102.0	102.3	102.9	103.6
Margarine	100.0	100.6	102.0	104.1	105.8	107.5	109.2	110.8	112.6
Other	100.0	100.1	100.6	101.7	102.7	103.7	104.6	105.2	105.9
Miscellaneous	100.0	100.1	100.1	100.1	100.0	100.2	100.5	100.7	100.9
Alcoholic beverages	100.0	100.3	99.6	98.7	97.9	97.3	96.6	95.5	94.3

crease 0.4 percent per person between 1980 and 2020, and at-home food spending will decline about 0.2 percent.

Food groups expected to benefit most from regional population changes include fresh fruits, fresh vegetables, other fats and oils, and miscellaneous foods. Groups expected to decline the most include other meats, down 4 percent by 2020 from 1980 levels; cereals and bakery products, down 1.4 percent; and butter, down 2.3 percent.

The effects of regional migration on future food expenditures are relatively minor compared with the projected effects caused by changes in the population age distribution.

Racial Distribution Changes. Tables 24-26 present projected changes in per capita expenditures caused by changes in the racial mix of the population, all else held constant. The three Census racial population series yield food expenditure projections that are virtually identical. Therefore, we concentrate only on the expenditure projections based on the middle series.

Changes in the racial mix of the population, all else held constant at 1980 levels, are expected to have minor effects on per capita food spending. At-home and away-from-home food spending is projected to decline 0.3 percent and 0.5 percent, respectively, from 1980 to 2020. Only pork, poultry, fish, and eggs are expected to benefit

Table 21—Projected per capita effects of changing age distribution on weekly food expenditures, middle series

Item	1980	1985	1990	1995	2000	2005	2010	2015	2020
					Percent				
Total food	100.0	100.3	100.5	100.9	101.2	101.7	102.0	102.1	102.2
Food away from home	100.0	100.1	99.7	99.0	98.4	97.6	96.9	96.5	96.1
Food at home	100.0	100.3	100.8	101.7	102.6	103.7	104.5	105.0	105.2
Meat, poultry, fish, and eggs	100.0	100.4	101.0	102.1	103.2	104.6	105.7	106.2	106.4
Beef	100.0	99.9	100.3	101.2	102.0	103.0	103.9	104.3	104.4
Pork	100.0	100.5	101.3	102.8	104.1	105.7	107.0	107.8	108.3
Other meat	100.0	100.1	100.7	101.7	102.5	103.5	104.3	104.8	105.1
Poultry	100.0	101.0	101.9	103.1	104.1	105.5	106.6	107.2	107.6
Fish	100.0	100.3	101.0	102.0	102.9	103.9	104.6	105.0	105.4
Eggs	100.0	100.3	101.0	102.1	103.1	104.4	105.4	106.0	106.4
Cereals and bakery products	100.0	100.0	100.5	101.4	102.3	103.1	103.7	104.1	104.5
Dairy products	100.0	100.2	100.5	101.1	101.6	102.2	102.6	102.8	102.9
Milk and cream	100.0	99.7	99.8	100.3	100.9	101.6	101.9	102.0	102.1
Cheese	100.0	100.6	101.1	101.6	101.9	102.3	102.6	102.9	103.1
Other dairy products	100.0	99.9	100.5	101.5	102.1	102.5	102.8	103.1	103.6
Fruits	100.0	100.5	101.1	102.1	102.9	104.1	105.4	106.4	107.2
Fresh	100.0	100.3	101.0	102.3	103.2	104.5	106.0	107.2	108.2
Processed	100.0	100.6	101.3	101.9	102.5	103.4	104.2	104.8	105.4
Vegetables	100.0	100.6	101.4	102.4	103.3	104.5	105.5	106.2	106.7
Fresh	100.0	100.8	101.6	102.8	103.7	105.1	106.2	107.0	107.6
Processed	100.0	100.3	100.9	101.9	102.7	103.6	104.4	104.9	105.2
Sugars and sweeteners	100.0	99.6	100.2	101.2	101.7	102.1	102.7	103.4	104.1
Nonalcoholic beverages	100.0	100.3	100.7	101.7	102.5	103.4	103.9	104.0	103.9
Fats and oils	100.0	100.5	101.2	102.2	103.1	104.2	105.1	105.7	106.2
Butter	100.0	100.5	101.1	101.6	101.8	101.9	102.3	102.7	103.3
Margarine	100.0	100.5	101.8	103.7	105.2	106.9	108.2	109.3	110.3
Other	100.0	100.0	100.4	101.3	102.2	103.2	103.9	104.2	104.6
Miscellaneous	100.0	100.1	100.1	100.1	100.0	100.1	100.4	100.6	100.7
Alcoholic beverages	100.0	100.3	99.4	98.3	97.4	96.7	96.0	95.2	94.2

positively from changes in the racial mix. All other food groups, except processed fruits, are projected to decline as the racial distribution of the population changes through the years but always by less than 2 percent.

Income Changes. Tables 27 and 28 present the effects of 1-percent and 2-percent annual income growth on weekly food expenditures. Both sets of projections indicate that per capita expenditures will increase from 1980 to 2020, except those for eggs, all other factors held at 1980 levels. Per capita expenditures on eggs are projected to decline slightly after 1995 in the 1-percent income growth series and after 1985 in the 2-percent growth series.

The 2-percent growth assumption yields predicted per capita expenditures that are higher than those derived from the 1-percent income growth assumption. Exceptions to this include eggs, down 0.4 percent between 1980 and 2020 in the 1-percent series versus a decline of 2.4 percent in the 2-percent series, and margarine up 2.6 percent in the 1-percent series versus an increase of 0.6 percent in the 2-percent series. Regardless of the assumed rate of income growth, predicted per capita expenditures on poultry and milk and cream are approximately equal. The 1-percent and 2-percent income growth assumptions yield similar predictions in some cases because of the quadratic specification used for income in the tobit models. This specification allows for the possibility that

Table 22—Projected per capita effects of changing age distribution on food expenditures, high series

Item	1980	1985	1990	1995	2000	2005	2010	2015	2020
					Percent				
Total food	100.0	100.2	100.3	100.5	100.8	101.0	101.1	101.1	101.1
Food away from home	100.0	100.1	99.5	98.8	98.1	97.3	96.6	96.2	95.8
Food at home	100.0	100.2	100.6	101.3	102.1	102.9	103.5	103.7	103.8
Meat, poultry, fish, and eggs	100.0	100.3	100.7	101.6	102.6	103.6	104.4	104.6	104.6
Beef	100.0	99.9	100.1	100.8	101.6	102.4	103.1	103.3	103.3
Pork	100.0	100.4	101.0	102.1	103.3	104.5	105.4	105.8	105.9
Other meat	100.0	100.0	100.5	101.3	102.1	102.7	103.3	103.5	103.6
Poultry	100.0	100.9	101.7	102.5	103.5	104.5	105.3	105.6	105.6
Fish	100.0	100.2	100.8	101.6	102.6	103.3	103.8	104.0	104.2
Eggs	100.0	100.3	100.9	101.7	102.7	103.7	104.5	104.8	105.0
Cereals and bakery products	100.0	99.9	100.3	101.1	102.0	102.6	103.0	103.3	103.5
Dairy products	100.0	100.1	100.4	100.9	101.4	101.8	102.1	102.2	102.2
Milk and cream	100.0	99.8	99.8	100.3	100.9	101.5	101.9	101.9	102.0
Cheese	100.0	100.5	101.0	101.2	101.5	101.6	101.8	101.9	101.9
Other dairy products	100.0	99.8	100.4	101.3	101.9	102.2	102.4	102.6	103.0
Fruits	100.0	100.4	101.0	101.8	102.6	103.5	104.6	105.3	105.8
Fresh	100.0	100.2	100.9	101.9	102.9	103.9	105.1	106.0	106.7
Processed	100.0	100.6	101.2	101.7	102.3	103.0	103.7	104.1	104.5
Vegetables	100.0	100.5	101.1	101.9	102.7	103.5	104.3	104.7	104.8
Fresh	100.0	100.7	101.4	102.2	103.0	103.9	104.7	105.2	105.4
Processed	100.0	100.3	100.8	101.6	102.3	103.0	103.6	103.9	104.0
Sugars and sweeteners	100.0	99.6	100.2	101.1	101.7	102.0	102.5	103.0	103.6
Nonalcoholic beverages	100.0	100.2	100.5	101.1	101.9	102.5	102.7	102.6	102.4
Fats and oils	100.0	100.4	101.0	101.8	102.6	103.4	104.0	104.4	104.7
Butter	100.0	100.4	101.1	101.6	101.8	101.9	102.1	102.5	103.0
Margarine	100.0	100.4	101.5	103.1	104.7	105.9	106.9	107.6	108.3
Other	100.0	99.9	100.1	100.9	101.8	102.5	102.9	103.1	103.3
Miscellaneous	100.0	100.1	100.1	100.1	100.0	100.1	100.3	100.5	100.6
Alcoholic beverages	100.0	100.2	99.3	98.0	97.0	96.2	95.5	94.8	93.9

the effect of income on expenditures declines after income reaches a certain level. This also explains why per person expenditures on poultry and margarine show a slight decline between 2015 and 2020 under the 2-percent growth assumption.

Total food expenditures per capita are projected to increase 16.4 percent between 1980 and 2020 in the 1-percent growth series and 36.9 percent in the 2-percent series. Likewise, away-from-home food expenditures may increase about 27.8 and 66.8 percent under the 1-percent and 2-percent growth scenarios, respectively, by 2020. Conversely, at-home expenditures per capita may rise 9.1 percent and 18.7 percent, respectively, under the two income assumptions.

Commodity groups projected to be most responsive to income growth between 1980 and 2020 include fish, up 17.4 percent and 37.0 percent under the 1-percent and 2-percent income assumptions, respectively; cheese, up 14.1 percent and 27.6 percent, respectively; and alcoholic beverages, up 28.9 percent and 74.4 percent, respectively. Food groups found to be least responsive to income growth are eggs, milk and cream, and margarine.

The change in per capita expenditures is not uniform between any pair of 5-year intervals because of the nonlin-

Table 23—Projected per capita effects of changing regional population distribution on weekly food expenditures

Item	1980	1985	1990	1995	2000	2005	2010	2015	2020
					Percent				
Total food	100.0	100.0	100.0	100.0	100.0	100.0	100.1	100.1	100.1
Food away from home	100.0	100.1	100.1	100.2	100.2	100.3	100.3	100.4	100.4
Food at home	100.0	100.0	99.9	99.9	99.9	99.9	99.8	99.8	99.8
Meat, poultry, fish, and eggs	100.0	99.9	99.8	99.6	99.5	99.4	99.3	99.2	99.1
Beef	100.0	99.9	99.8	99.8	99.7	99.6	99.6	99.5	99.5
Pork	100.0	99.9	99.9	99.8	99.7	99.7	99.6	99.5	99.5
Other meat	100.0	99.5	98.9	98.4	97.8	97.4	96.9	96.4	96.0
Poultry	100.0	100.0	100.0	100.0	100.0	100.1	100.1	100.1	100.2
Fish	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.1	100.2
Eggs	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Cereals and bakery products	100.0	99.8	99.6	99.4	99.3	99.1	98.9	98.8	98.6
Dairy products	100.0	100.0	99.9	99.9	99.9	99.9	99.8	99.8	99.8
Milk and cream	100.0	100.0	99.9	99.8	99.8	99.8	99.7	99.7	99.6
Cheese	100.0	99.9	99.8	99.7	99.6	99.6	99.5	99.4	99.3
Other dairy products	100.0	100.1	100.1	100.2	100.3	100.4	100.4	100.5	100.6
Fruits	100.0	100.1	100.1	100.2	100.3	100.4	100.4	100.5	100.6
Fresh	100.0	100.1	100.2	100.3	100.4	100.6	100.7	100.8	100.9
Processed	100.0	100.0	100.0	99.9	99.9	100.0	99.9	100.0	100.0
Vegetables	100.0	100.1	100.2	100.4	100.5	100.6	100.7	100.8	101.0
Fresh	100.0	100.1	100.2	100.4	100.5	100.6	100.7	100.9	101.0
Processed	100.0	100.1	100.2	100.3	100.4	100.5	100.6	100.7	100.8
Sugars and sweeteners	100.0	100.0	99.9	99.9	99.9	99.8	99.8	99.8	99.8
Nonalcoholic beverages	100.0	100.0	100.0	100.0	100.0	100.1	100.1	100.1	100.1
Fats and oils	100.0	100.0	100.0	99.9	99.9	99.9	99.9	99.9	99.9
Butter	100.0	99.7	99.3	99.0	98.7	98.4	98.1	97.9	97.7
Margarine	100.0	100.0	99.9	99.9	99.9	99.9	99.8	99.8	99.8
Other	100.0	100.1	100.3	100.4	100.6	100.7	100.8	101.0	101.1
Miscellaneous	100.0	100.1	100.3	100.4	100.6	100.7	100.8	100.9	101.1
Alcoholic beverages	100.0	99.9	99.8	99.7	99.6	99.6	99.5	99.4	99.3

ear specification of the tobit model, the quadratic income term, and the compounding effect of income growth. For example, away-from-home food expenditures per capita are projected to increase by 27.7 percent between 1980 and 2000 and 39.1 percent from 2000 to 2020 under the 2-percent income assumption.

Higher rates of income growth are associated with higher future per capita expenditure levels, except for a few commodities. In this sense, most of the agricultural sector benefits from higher rates of economic growth. Because we assume relative prices to be constant in our analysis, the projected expenditure levels can be interpreted as quantity indices. For example, the approximate 4-percent increase in projected poultry expenditures per person between 1980 and 2020 translates into per capita consumption of 63.4 pounds (per capita consumption of poultry in 1980 at 61 pounds multiplied by 1.04), or an increase of 2.3 pounds. These projections may be interpreted as meaning that if the income levels projected for 2020 had already occurred in 1980, then per capita consumption of poultry would have been 63.4 pounds in 1980 instead of the actual figure of 61 pounds. Other projections can be converted to quantities in a similar manner. For example, the 21.8-percent and 11.2-percent increases projected for beef and pork expenditures, respectively, imply per person consumption of about 93 pounds and 76 pounds, respectively, by the year 2020. However, remember that

Table 24—Projected per capita effects of changing racial distribution on weekly food expenditures, low series

Item	1980	1985	1990	1995	2000	2005	2010	2015	2020
					Percent				
Total food	100.0	99.9	99.9	99.9	99.8	99.8	99.7	99.7	99.7
Food away from home	100.0	99.9	99.9	99.8	99.8	99.7	99.7	99.6	99.5
Food at home	100.0	99.9	99.9	99.9	99.8	99.8	99.8	99.7	99.7
Meat, poultry, fish, and eggs	100.0	100.0	100.1	100.1	100.2	100.2	100.2	100.3	100.3
Beef	100.0	100.0	100.0	99.9	99.9	99.9	99.9	99.9	99.9
Pork	100.0	100.1	100.2	100.2	100.3	100.4	100.4	100.5	100.6
Other meat	100.0	100.0	99.9	99.9	99.9	99.9	99.8	99.8	99.8
Poultry	100.0	100.2	100.3	100.4	100.5	100.6	100.7	100.9	101.0
Fish	100.0	100.1	100.2	100.3	100.4	100.5	100.6	100.7	100.7
Eggs	100.0	100.0	100.0	100.0	100.1	100.1	100.1	100.1	100.1
Cereals and bakery products	100.0	99.9	99.9	99.9	99.8	99.8	99.7	99.7	99.6
Dairy products	100.0	99.8	99.7	99.6	99.4	99.3	99.2	99.0	98.9
Milk and cream	100.0	99.8	99.7	99.6	99.5	99.4	99.2	99.1	99.0
Cheese	100.0	99.7	99.5	99.3	99.0	98.8	98.6	98.4	98.2
Other dairy products	100.0	99.9	99.8	99.7	99.6	99.5	99.4	99.3	99.2
Fruits	100.0	100.0	100.0	99.9	99.9	99.9	99.9	99.9	99.8
Fresh	100.0	99.9	99.9	99.9	99.8	99.8	99.8	99.7	99.7
Processed	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Vegetables	100.0	100.0	99.9	99.9	99.9	99.8	99.8	99.8	99.7
Fresh	100.0	100.0	99.9	99.9	99.9	99.8	99.8	99.8	99.8
Processed	100.0	99.9	99.9	99.8	99.8	99.7	99.7	99.6	99.6
Sugars and sweeteners	100.0	99.9	99.8	99.8	99.7	99.6	99.6	99.5	99.4
Nonalcoholic beverages	100.0	99.9	99.8	99.7	99.6	99.5	99.4	99.3	99.2
Fats and oils	100.0	99.9	99.8	99.7	99.6	99.6	99.5	99.4	99.3
Butter	100.0	99.9	99.8	99.7	99.7	99.6	99.5	99.4	99.4
Margarine	100.0	99.8	99.7	99.6	99.4	99.3	99.1	99.0	98.9
Other	100.0	99.9	99.8	99.8	99.7	99.6	99.5	99.4	99.4
Miscellaneous	100.0	99.8	99.7	99.6	99.5	99.4	99.3	99.2	99.1
Alcoholic beverages	100.0	99.9	99.8	99.8	99.7	99.6	99.6	99.5	99.4

consumer tastes and preferences and relative prices are constant at 1980 levels. Also, as the expenditure elasticity embodies both a quality and quantity component, the above figures will overstate actual quantities demanded because the quality component is not taken into account.

Combined Demographic and Income Changes. Tables 29-31 present projected per capita expenditures based on changing age, regional, and racial distributions for each of the Census' three population series combined with the 1-percent income growth assumption. Tables 32-34 present the effects of the three population distributions combined with 2-percent annual income growth. The individual effects of changing age, regional, and racial distributions and income that were reported earlier do not sum exactly to the combined projections given in these tables because the tobit model is not a linear function. However, because the total effect is approximately equal to the sum of the individual effects, the component parts indicate the relative importance of each individual population change on projected expenditures.

The projections for per capita expenditures based on the low population series are higher than those based on either the middle or high population series for a given income growth assumption. Also, the 2-percent income assumption predicts higher per capita expenditures for all commodity groups, except those for eggs and margarine,

Table 25—Projected per capita effects of changing racial distribution on weekly food expenditures, middle series

Item	1980	1985	1990	1995	2000	2005	2010	2015	2020
					Percent				
Total food	100.0	99.9	99.9	99.9	99.8	99.8	99.7	99.7	99.6
Food away from home	100.0	99.9	99.9	99.8	99.8	99.7	99.6	99.6	99.5
Food at home	100.0	99.9	99.9	99.9	99.8	99.8	99.8	99.7	99.7
Meat, poultry, fish, and eggs	100.0	100.0	100.1	100.1	100.2	100.2	100.2	100.3	100.3
Beef	100.0	100.0	100.0	99.9	99.9	99.9	99.9	99.9	99.8
Pork	100.0	100.1	100.2	100.2	100.3	100.4	100.4	100.5	100.6
Other meat	100.0	100.0	99.9	99.9	99.9	99.8	99.8	99.8	99.7
Poultry	100.0	100.2	100.3	100.4	100.5	100.6	100.8	100.9	101.0
Fish	100.0	100.1	100.2	100.3	100.4	100.5	100.6	100.7	100.8
Eggs	100.0	100.0	100.0	100.0	100.1	100.1	100.1	100.1	100.1
Cereals and bakery products	100.0	99.9	99.9	99.8	99.8	99.8	99.7	99.7	99.6
Dairy products	100.0	99.8	99.7	99.5	99.4	99.3	99.1	99.0	98.8
Milk and cream	100.0	99.8	99.7	99.6	99.5	99.3	99.2	99.1	98.9
Cheese	100.0	99.7	99.5	99.2	99.0	98.8	98.5	98.3	98.1
Other dairy products	100.0	99.9	99.8	99.6	99.6	99.4	99.3	99.2	99.1
Fruits	100.0	100.0	100.0	99.9	99.9	99.9	99.9	99.9	99.8
Fresh	100.0	99.9	99.9	99.9	99.8	99.8	99.7	99.7	99.7
Processed	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Vegetables	100.0	100.0	99.9	99.9	99.9	99.8	99.8	99.8	99.7
Fresh	100.0	100.0	99.9	99.9	99.9	99.8	99.8	99.8	99.7
Processed	100.0	99.9	99.9	99.8	99.8	99.7	99.7	99.6	99.6
Sugars and sweeteners	100.0	99.9	99.8	99.8	99.7	99.6	99.6	99.5	99.4
Nonalcoholic beverages	100.0	99.9	99.8	99.6	99.6	99.5	99.3	99.2	99.1
Fats and oils	100.0	99.9	99.8	99.7	99.6	99.6	99.5	99.4	99.3
Butter	100.0	99.9	99.8	99.7	99.7	99.6	99.5	99.4	99.3
Margarine	100.0	99.8	99.7	99.5	99.4	99.3	99.1	99.0	98.8
Other	100.0	99.9	99.8	99.7	99.7	99.6	99.5	99.4	99.3
Miscellaneous	100.0	99.8	99.7	99.6	99.5	99.4	99.2	99.1	99.0
Alcoholic beverages	100.0	99.9	99.8	99.8	99.7	99.6	99.5	99.5	99.4

than the 1-percent growth assumption. The following discussion is focused on the projections derived from the middle population series with 2-percent annual income growth as these assumptions more closely approximate past income growth rates and population changes.

Per person spending for total food is projected to increase by 38.9 percent from 1980 to 2020 under the most likely scenario, while food at home and away from home show increases of 23.5 percent and 62.1 percent, respectively. The major contributing factor to these changes is income. However, population changes (principally the age distribution) reduce the effect of income on per person away-from-home food spending by approximately 4 percent. That is, assuming 2-percent income growth and no demographic changes, away-from-home food spending is expected to increase 66.8 percent by 2020 (table 28). The effects of changing age and racial population distributions will decrease away-from-home food expenditures by 3.9 percent and 0.5 percent, respectively (tables 21 and 25). Changes in the regional population distribution will increase away-from-home food spending by 0.4 percent (table 23). Consequently, the sum of the individual effects of the demographic changes and income (66.8 − 3.9 − 0.5 + 0.4 = 62.8) approximates the 62.1-percent increase in away-from-home food spending shown in table 33. Conversely, the total effect of demographic changes on per person at-home food spending is to enhance the effect of income by 4 percent.

Table 26—Projected per capita effects of changing racial distribution on weekly food expenditures, high series

Item	1980	1985	1990	1995	2000	2005	2010	2015	2020
					Percent				
Total food	100.0	99.9	99.9	99.9	99.8	99.8	99.7	99.7	99.6
Food away from home	100.0	99.9	99.9	99.8	99.7	99.7	99.6	99.6	99.5
Food at home	100.0	99.9	99.9	99.9	99.8	99.8	99.7	99.7	99.7
Meat, poultry, fish, and eggs	100.0	100.0	100.1	100.1	100.2	100.2	100.2	100.3	100.3
Beef	100.0	100.0	100.0	99.9	99.9	99.9	99.9	99.9	99.8
Pork	100.0	100.1	100.2	100.2	100.3	100.4	100.5	100.5	100.6
Other meat	100.0	100.0	99.9	99.9	99.9	99.8	99.8	99.8	99.7
Poultry	100.0	100.2	100.3	100.4	100.5	100.7	100.8	100.9	101.1
Fish	100.0	100.1	100.2	100.3	100.4	100.5	100.6	100.7	100.8
Eggs	100.0	100.0	100.0	100.0	100.1	100.1	100.1	100.1	100.1
Cereals and bakery products	100.0	99.9	99.9	99.8	99.8	99.7	99.7	99.7	99.6
Dairy products	100.0	99.8	99.7	99.5	99.4	99.2	99.1	98.9	98.8
Milk and cream	100.0	99.8	99.7	99.6	99.4	99.3	99.2	99.0	98.9
Cheese	100.0	99.7	99.5	99.2	99.0	98.7	98.5	98.2	98.0
Other dairy products	100.0	99.9	99.8	99.6	99.5	99.4	99.3	99.2	99.1
Fruits	100.0	100.0	100.0	99.9	99.9	99.9	99.9	99.8	99.8
Fresh	100.0	99.9	99.9	99.9	99.8	99.8	99.7	99.7	99.6
Processed	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Vegetables	100.0	100.0	99.9	99.9	99.9	99.8	99.8	99.8	99.7
Fresh	100.0	100.0	99.9	99.9	99.9	99.8	99.8	99.8	99.7
Processed	100.0	99.9	99.9	99.8	99.8	99.7	99.7	99.6	99.6
Sugars and sweeteners	100.0	99.9	99.8	99.8	99.7	99.6	99.5	99.5	99.4
Nonalcoholic beverages	100.0	99.9	99.8	99.6	99.5	99.4	99.3	99.2	99.1
Fats and oils	100.0	99.9	99.8	99.7	99.6	99.5	99.5	99.4	99.3
Butter	100.0	99.9	99.8	99.7	99.6	99.6	99.5	99.4	99.3
Margarine	100.0	99.8	99.7	99.5	99.4	99.2	99.1	98.9	98.8
Other	100.0	99.9	99.8	99.7	99.7	99.6	99.5	99.4	99.3
Miscellaneous	100.0	99.8	99.7	99.6	99.5	99.3	99.2	99.1	99.0
Alcoholic beverages	100.0	99.9	99.8	99.8	99.7	99.6	99.5	99.5	99.4

Real per capita food expenditures at home and away from home increased 11.3 percent and 35.9 percent, respectively, between 1960 and 1980. Between 1980 and 2000, we project that at-home and away-from-home food expenditures will increase 11.4 percent and 25.9 percent, respectively. The latter projections are based on 2-percent income growth and the middle population series.

Per capita expenditures for major food groups expected to increase the most due to the changes in the demographic factors and 2-percent income growth between 1980 and 2020 include the following: meat, poultry, fish, and eggs, up 25.3 percent; fruits, up 35.2 percent; vegetables, up 29.1 percent, miscellaneous foods, up 22.9 percent; and alcoholic beverages, up 64.5 percent. Per capita expenditures for major food groups expected to increase the least include the following: dairy products, up 13.9 percent; sugars and sweeteners, up 14.1 percent; and nonalcoholic beverages, up 14.2.

Individual subgroups that may show the most growth in per capita expenditures are fish, up 45 percent; cheese, up 28.1 percent; fresh fruits, up 40.3 percent; fresh vegetables, up 31.5 percent; and butter, up 34.7 percent. Smaller growth in per capita expenditures are indicated for eggs, up 4.1 percent; milk and cream, up 2.6 percent; and margarine, up 9.5 percent.

Table 27—Projected per capita effects of a 1-percent increase in annual income on weekly food expenditures

Item	1980	1985	1990	1995	2000	2005	2010	2015	2020
					Percent				
Total food	100.0	101.8	103.7	105.6	107.6	109.7	111.9	114.1	116.4
Food away from home	100.0	102.9	106.0	109.2	112.6	116.1	119.8	123.8	127.8
Food at home	100.0	101.0	102.1	103.2	104.3	105.5	106.7	107.9	109.1
Meat, poultry, fish, and eggs	100.0	101.1	102.3	103.5	104.7	105.9	107.1	108.4	109.7
Beef	100.0	101.2	102.4	103.7	105.0	106.3	107.7	109.1	110.5
Pork	100.0	100.8	101.7	102.5	103.3	104.2	105.0	105.8	106.7
Other meat	100.0	101.0	101.9	102.9	103.9	105.0	106.0	107.0	108.0
Poultry	100.0	100.5	101.1	101.6	102.1	102.6	103.0	103.4	103.8
Fish	100.0	101.9	103.9	106.0	108.1	110.4	112.7	115.0	117.4
Eggs	100.0	100.0	100.0	100.0	99.9	99.9	99.8	99.7	99.6
Cereals and bakery products	100.0	100.8	101.7	102.5	103.4	104.2	105.1	105.9	106.8
Dairy products	100.0	100.7	101.4	102.2	102.9	103.7	104.5	105.3	106.1
Milk and cream	100.0	100.1	100.2	100.3	100.4	100.6	100.7	100.8	100.9
Cheese	100.0	101.6	103.3	105.0	106.8	108.5	110.4	112.2	114.1
Other dairy products	100.0	101.1	102.2	103.3	104.5	105.7	106.9	108.1	109.4
Fruits	100.0	101.0	102.1	103.2	104.4	105.7	107.1	108.6	110.1
Fresh	100.0	101.0	102.0	103.2	104.4	105.8	107.2	108.7	110.4
Processed	100.0	101.1	102.3	103.5	104.8	106.0	107.3	108.7	110.0
Vegetables	100.0	101.2	102.5	103.8	105.2	106.5	107.9	109.3	110.7
Fresh	100.0	101.3	102.6	103.9	105.3	106.7	108.1	109.6	111.0
Processed	100.0	101.2	102.3	103.5	104.7	106.0	107.2	108.4	109.6
Sugars and sweeteners	100.0	100.8	101.7	102.5	103.4	104.2	105.1	105.9	106.7
Nonalcoholic beverages	100.0	100.6	101.3	102.0	102.7	103.4	104.1	104.8	105.5
Fats and oils	100.0	100.9	101.9	102.8	103.8	104.8	105.8	106.9	107.9
Butter	100.0	101.8	103.7	105.6	107.6	109.7	111.8	114.0	116.2
Margarine	100.0	100.4	100.8	101.2	101.5	101.9	102.1	102.4	102.6
Other	100.0	100.7	101.5	102.3	103.0	103.8	104.6	105.4	106.3
Miscellaneous	100.0	101.3	102.6	103.9	105.3	106.7	108.2	109.6	111.1
Alcoholic beverages	100.0	102.9	106.0	109.2	112.7	116.4	120.3	124.5	128.9

Income is the dominant force increasing future per capita spending for a majority of the food groups analyzed. However, there are several noteworthy exceptions. For example, the demographic changes considered in this study are expected to increase per capita poultry expenditures by approximately 9 percent between 1980 and 2020 versus the 4-percent increase due to 2-percent income growth. Likewise, demographic changes are expected to more than offset a projected decline in per capita egg expenditures caused by increasing income. Similarly, population changes may have about 15 times the effect of income on per capita margarine expenditures. Other commodities for which demographic factors contribute a relatively large proportion to the total effect include the following: pork, about 9 percentage points of a total increase of 20.1 percent; fresh fruits, 10 percentage points out of 40 percent; fresh vegetables, 9 percentage points out of 31.5 percent; and alcoholic beverages, 10 percentage points out of 64.5 percent.

National Effects

This section presents projected national effects of combined demographic and income changes on weekly food expenditures. Tables 35-37 present the effects on national food expenditures of 1-percent income growth coupled with the effects of future age, regional, and racial distributions for each of the three demographic series. Tables

Table 28—Projected per capita effects of a 2-percent increase in annual income on weekly food expenditures

Item	1980	1985	1990	1995	2000	2005	2010	2015	2020
					Percent				
Total food	100.0	103.7	107.6	111.8	116.3	121.1	126.2	131.4	136.9
Food away from home	100.0	105.9	112.5	119.7	127.7	136.4	145.8	156.0	166.8
Food at home	100.0	102.1	104.3	106.6	109.0	111.5	114.0	116.4	118.7
Meat, poultry, fish, and eggs	100.0	102.3	104.6	107.1	109.6	112.2	114.7	117.0	119.2
Beef	100.0	102.4	105.0	107.7	110.5	113.4	116.3	119.1	121.8
Pork	100.0	101.6	103.3	105.0	106.6	108.2	109.5	110.6	111.2
Other meat	100.0	101.9	103.9	105.9	107.9	109.8	111.5	113.0	114.0
Poultry	100.0	101.1	102.1	103.0	103.8	104.4	104.7	104.6	103.9
Fish	100.0	103.9	108.1	112.6	117.3	122.2	127.2	132.2	137.0
Eggs	100.0	100.0	99.9	99.8	99.6	99.4	99.0	98.4	97.6
Cereals and bakery products	100.0	101.6	103.3	105.1	106.8	108.4	110.0	111.3	112.4
Dairy products	100.0	101.4	102.9	104.5	106.1	107.7	109.3	110.9	112.3
Milk and cream	100.0	100.2	100.4	100.7	100.9	101.2	101.4	101.7	101.9
Cheese	100.0	103.3	106.7	110.3	114.0	117.7	121.3	124.7	127.6
Other dairy products	100.0	102.2	104.4	106.9	109.3	111.9	114.4	116.9	119.2
Fruits	100.0	102.1	104.4	107.1	110.1	113.4	117.3	121.7	126.7
Fresh	100.0	102.0	104.4	107.1	110.4	114.1	118.6	123.9	130.7
Processed	100.0	102.3	104.7	107.3	109.9	112.6	115.3	117.9	120.4
Vegetables	100.0	102.5	105.1	107.9	110.7	113.5	116.2	118.8	121.1
Fresh	100.0	102.6	105.2	108.1	111.0	113.9	116.9	119.7	122.3
Processed	100.0	102.3	104.7	107.1	109.6	111.9	114.1	116.0	117.3
Sugars and sweeteners	100.0	101.7	103.4	105.1	106.7	108.2	109.4	110.3	110.7
Nonalcoholic beverages	100.0	101.3	102.6	104.0	105.5	106.9	108.3	109.7	110.9
Fats and oils	100.0	101.9	103.8	105.8	107.8	109.8	111.8	113.5	115.0
Butter	100.0	103.6	107.5	111.7	116.1	120.7	125.4	130.0	134.4
Margarine	100.0	100.8	101.5	102.1	102.6	102.7	102.5	101.9	100.6
Other	100.0	101.5	103.0	104.6	106.2	107.8	109.4	110.8	112.0
Miscellaneous	100.0	102.6	105.3	108.1	111.0	113.9	116.8	119.5	122.0
Alcoholic beverages	100.0	105.9	112.6	120.2	128.7	138.2	149.0	161.0	174.4

38-40 present projections based on the same demographic series but with a 2-percent income growth assumption. Tables 35-40 are based on the per capita projections given in tables 29-34 expanded by projected increases in the total population.

In general, the high population series projects higher national expenditures than either the middle or low series. Likewise, the middle series projects higher food expenditures than the low series. The reason for this is the large differences in the total population that the three series project over time (table 19). For example, the low series with the 1-percent income growth rate projects that total food expenditures may increase 38.7 percent between 1980 and 2020. Conversely, the middle and high series project total expenditure increases of 55 percent and 76.3 percent, respectively. These figures reveal the important effect that varying rates of population growth can have on national expenditures. These projections assume that prices and consumer tastes and preferences remain constant at 1980 levels.

The projections based on the middle population series and an assumed income growth rate of 2 percent will be

Table 29—Projected per capita effects of combined demographic changes and a 1-percent increase in annual income on weekly food expenditures, low series[1]

Item	1980	1985	1990	1995	2000	2005	2010	2015	2020
					Percent				
Total food	100.0	102.1	104.3	106.8	109.3	111.9	114.5	117.0	119.6
Food away from home	100.0	103.0	105.9	108.6	111.3	114.1	116.9	120.1	123.5
Food at home	100.0	101.3	102.9	105.1	107.2	109.5	111.7	113.6	115.5
Meat, poultry, fish, and eggs	100.0	101.5	103.3	105.8	108.2	111.0	113.6	115.7	117.9
Beef	100.0	101.1	102.7	104.8	107.0	109.4	111.9	113.9	115.9
Pork	100.0	101.4	103.3	105.9	108.4	111.1	113.7	115.9	118.1
Other meat	100.0	100.5	101.7	103.3	104.6	106.2	107.7	109.0	110.3
Poultry	100.0	101.7	103.4	105.4	107.5	109.8	111.9	113.5	115.3
Fish	100.0	102.4	105.4	108.7	112.1	115.7	119.1	122.4	126.1
Eggs	100.0	100.4	101.1	102.3	103.5	104.8	106.0	106.9	107.8
Cereals and bakery products	100.0	100.6	101.8	103.5	105.0	106.5	108.0	109.3	110.7
Dairy products	100.0	100.7	101.6	102.8	104.0	105.3	106.5	107.5	108.5
Milk and cream	100.0	99.6	99.6	100.0	100.6	101.1	101.5	101.7	101.8
Cheese	100.0	101.9	103.8	105.9	107.9	109.9	111.9	113.9	116.2
Other dairy products	100.0	100.9	102.7	104.8	106.6	108.2	109.9	111.7	113.8
Fruits	100.0	101.5	103.4	105.7	107.9	110.7	113.6	116.6	119.7
Fresh	100.0	101.4	103.3	105.9	108.3	111.2	114.5	118.0	121.5
Processed	100.0	101.8	103.6	105.5	107.5	109.8	112.1	114.4	116.8
Vegetables	100.0	102.0	104.3	107.0	109.6	112.4	115.3	117.9	120.6
Fresh	100.0	102.3	104.7	107.6	110.3	113.4	116.5	119.8	122.4
Processed	100.0	101.6	103.5	105.8	108.0	110.4	112.8	114.9	116.9
Sugars and sweeteners	100.0	100.4	101.7	103.4	104.6	105.8	107.3	109.0	110.7
Nonalcoholic beverages	100.0	100.8	102.1	103.9	105.5	107.1	108.5	109.5	110.6
Fats and oils	100.0	101.4	103.1	105.1	107.0	109.2	111.3	113.2	115.2
Butter	100.0	101.8	103.9	105.8	107.6	109.6	111.7	114.1	116.9
Margarine	100.0	100.8	102.4	104.8	106.7	108.6	110.4	112.1	113.9
Other	100.0	100.8	102.2	104.2	106.0	107.9	109.7	111.2	112.8
Miscellaneous	100.0	101.4	102.7	104.1	105.4	107.0	108.8	110.5	112.1
Alcoholic beverages	100.0	103.0	105.2	107.3	109.8	112.6	115.4	118.0	120.8

[1]See footnote at bottom of table 34.

discussed in detail. The projections based on this series indicate that away-from-home food expenditures may increase by 112.2 percent between 1980 and 2020. These projections can be viewed as indicating that if all population changes and the income levels projected for 2020 had been in place in 1980, then national away-from-home food expenditures would have been 112.2 percent higher in 1980 than they were actually. At-home food spending would have been 61.7 percent higher.

Major food groups expected to show the largest increases in national demand between 1980 and 2020 are meat, poultry, fish, and eggs, up 64.1 percent; fruits, up 76.9 percent; and vegetables, up 69.0 percent. Population dynamics and income have the smallest combined effect on cereal and bakery products, dairy products, sugar and sweeteners, and nonalcoholic beverages.

Specific subgroups affected the most include fish, up 89.8 percent; fresh fruits, up 83.6 percent; fresh vegetables, up 72.2 percent; butter, up 76.3 percent; and alcoholic beverages, up 115.3 percent. Least affected subgroups include eggs, up 36.2 percent; milk and cream, up 34.3 percent; and margarine, up 43.4 percent.

Table 30—Projected per capita effects of combined demographic changes and a 1-percent increase in annual income on weekly food expenditures, middle series[1]

Item	1980	1985	1990	1995	2000	2005	2010	2015	2020
					Percent				
Total food	100.0	102.1	104.1	106.4	108.7	111.3	113.7	116.0	118.4
Food away from home	100.0	103.0	105.6	108.1	110.8	113.6	116.5	119.9	123.5
Food at home	100.0	101.2	102.7	104.7	106.7	108.8	110.8	112.4	113.9
Meat, poultry, fish, and eggs	100.0	101.4	103.1	105.3	107.6	110.2	112.5	114.2	115.7
Beef	100.0	101.0	102.5	104.6	106.6	109.0	111.2	113.0	114.5
Pork	100.0	101.4	103.0	105.4	107.5	110.1	112.3	114.0	115.3
Other meat	100.0	100.5	101.4	102.9	104.2	105.6	106.9	107.8	108.6
Poultry	100.0	101.7	103.3	105.1	106.8	108.9	110.7	111.9	112.9
Fish	100.0	102.4	105.2	108.4	111.7	115.2	118.4	121.4	124.7
Eggs	100.0	100.4	101.0	102.1	103.1	104.3	105.3	105.8	106.2
Cereals and bakery products	100.0	100.6	101.6	103.2	104.7	106.2	107.5	108.5	109.5
Dairy products	100.0	100.7	101.5	102.7	103.8	105.0	106.0	106.9	107.6
Milk and cream	100.0	99.6	99.6	100.1	100.6	101.2	101.5	101.6	101.6
Cheese	100.0	101.8	103.7	105.5	107.3	109.2	111.0	112.8	114.5
Other dairy products	100.0	100.9	102.6	104.6	106.5	108.1	109.6	111.1	112.9
Fruits	100.0	101.5	103.3	105.5	107.6	110.2	113.0	115.6	118.1
Fresh	100.0	101.3	103.2	105.7	108.0	110.8	113.8	116.8	119.7
Processed	100.0	101.8	103.5	105.4	107.3	109.5	111.7	113.7	115.6
Vegetables	100.0	102.0	104.0	106.6	108.9	111.6	114.2	116.4	118.4
Fresh	100.0	102.2	104.4	107.0	109.5	112.4	115.1	117.6	119.8
Processed	100.0	101.5	103.3	105.6	107.7	109.9	112.0	113.8	115.5
Sugars and sweeteners	100.0	100.3	101.7	103.4	104.7	105.9	107.2	108.6	110.1
Nonalcoholic beverages	100.0	100.8	101.8	103.3	104.8	106.3	107.4	108.2	108.7
Fats and oils	100.0	101.3	102.8	104.8	106.5	108.6	110.4	112.0	113.5
Butter	100.0	101.8	103.9	105.8	107.6	109.6	111.6	113.9	116.4
Margarine	100.0	100.7	102.2	104.3	106.1	107.9	109.4	110.5	111.6
Other	100.0	100.8	102.0	103.8	105.5	107.4	108.9	110.2	111.4
Miscellaneous	100.0	101.4	102.7	104.1	105.4	107.0	108.7	110.4	112.0
Alcoholic beverages	100.0	103.0	105.0	106.8	109.2	111.8	114.7	117.7	120.6

[1]See footnote at bottom of table 34.

In summary, income and population growth are likely to be the primary forces behind increases in food expenditures. Aging of the U.S. population will also have some effect but with wide variation among commodity groups. Projected changes in regional and racial population distributions are expected to have relatively minor effects. Of course, the validity of these statements and projections is conditional on the many assumptions that were imposed.

Table 31—Projected per capita effects of combined demographic changes and a 1-percent increase in annual income on weekly food expenditures, high series[1]

Item	1980	1985	1990	1995	2000	2005	2010	2015	2020
					Percent				
Total food	100.0	102.0	103.9	106.0	108.3	110.5	112.8	115.0	117.2
Food away from home	100.0	103.0	105.5	107.9	110.5	113.2	116.1	119.5	123.2
Food at home	100.0	101.2	102.6	104.3	106.2	108.0	109.8	111.1	112.4
Meat, poultry, fish, and eggs	100.0	101.3	102.9	104.8	107.0	109.2	111.2	112.6	113.8
Beef	100.0	101.0	102.3	104.2	106.3	108.4	110.4	111.9	113.3
Pork	100.0	101.2	102.7	104.6	106.8	108.8	110.7	111.9	112.9
Other meat	100.0	100.4	101.2	102.5	103.7	104.8	105.8	106.6	107.1
Poultry	100.0	101.6	103.1	104.6	106.3	107.9	109.4	110.3	111.0
Fish	100.0	102.3	104.9	108.0	111.3	114.5	117.6	120.4	123.4
Eggs	100.0	100.3	100.9	101.7	102.7	103.7	104.4	104.7	104.8
Cereals and bakery products	100.0	100.5	101.5	102.9	104.4	105.7	106.8	107.6	108.5
Dairy products	100.0	100.6	101.4	102.4	103.6	104.6	105.5	106.2	106.9
Milk and cream	100.0	99.6	99.6	100.0	100.6	101.1	101.4	101.4	101.4
Cheese	100.0	101.8	103.5	105.1	106.8	108.4	110.0	111.6	113.2
Other dairy products	100.0	100.8	102.5	104.4	106.3	107.7	109.1	110.6	112.2
Fruits	100.0	101.5	103.2	105.2	107.3	109.6	112.1	114.4	116.7
Fresh	100.0	101.2	103.1	105.3	107.7	110.1	112.9	115.5	118.1
Processed	100.0	101.7	103.5	105.2	107.1	109.1	111.1	112.9	114.6
Vegetables	100.0	101.9	103.8	106.0	108.3	110.6	112.8	114.8	116.5
Fresh	100.0	102.1	104.1	106.4	108.8	111.2	113.6	115.6	117.5
Processed	100.0	101.5	103.2	105.2	107.3	109.3	111.2	112.8	114.2
Sugars and sweeteners	100.0	100.3	101.6	103.3	104.7	105.8	106.9	108.2	109.6
Nonalcoholic beverages	100.0	100.7	101.5	102.8	104.2	105.3	106.2	106.7	107.1
Fats and oils	100.0	101.2	102.6	104.3	106.0	107.7	109.3	110.7	111.9
Butter	100.0	101.8	103.8	105.8	107.6	109.4	111.4	113.6	116.1
Margarine	100.0	100.6	101.9	103.8	105.5	106.9	108.0	108.7	109.4
Other	100.0	100.7	101.7	103.3	105.0	106.6	108.0	109.0	110.1
Miscellaneous	100.0	101.4	102.7	104.0	105.4	106.9	108.6	110.2	111.8
Alcoholic beverages	100.0	102.9	104.8	106.6	108.7	111.3	114.2	117.2	120.2

[1]See footnote at bottom of table 34.

Table 32—Projected per capita effects of combined demographic changes and a 2-percent increase in annual income on weekly food expenditures, low series[1]

Item	1980	1985	1990	1995	2000	2005	2010	2015	2020
					Percent				
Total food	100.0	104.0	108.3	113.0	118.0	123.3	128.8	134.3	140.1
Food away from home	100.0	106.1	112.4	119.1	126.4	134.2	142.7	152.0	162.2
Food at home	100.0	102.4	105.1	108.5	111.9	115.5	119.0	122.2	125.2
Meat, poultry, fish, and eggs	100.0	102.6	105.7	109.4	113.3	117.4	121.3	124.5	127.6
Beef	100.0	102.3	105.2	108.8	112.5	116.6	120.6	124.2	127.4
Pork	100.0	102.3	105.0	108.5	111.8	115.2	118.4	120.9	122.9
Other meat	100.0	101.5	103.7	106.3	108.6	111.1	113.4	115.1	116.3
Poultry	100.0	102.3	104.5	106.9	109.3	111.7	113.6	114.7	115.4
Fish	100.0	104.4	109.6	115.4	121.5	127.9	134.2	140.3	146.5
Eggs	100.0	100.4	101.0	102.1	103.2	104.3	105.1	105.5	105.7
Cereals and bakery products	100.0	101.4	103.5	106.0	108.4	110.8	112.9	114.7	116.3
Dairy products	100.0	101.4	103.1	105.1	107.2	109.3	111.3	113.1	114.8
Milk and cream	100.0	99.7	99.8	100.4	101.0	101.8	102.3	102.6	102.9
Cheese	100.0	103.5	107.3	111.3	115.1	119.1	123.0	126.5	129.8
Other dairy products	100.0	102.0	105.0	108.4	111.6	114.5	117.5	120.7	123.8
Fruits	100.0	102.6	105.7	109.5	113.6	118.5	124.1	130.1	136.9
Fresh	100.0	102.4	105.7	109.9	114.4	119.8	126.4	133.7	142.2
Processed	100.0	102.9	106.0	109.3	112.8	116.6	120.3	123.9	127.5
Vegetables	100.0	103.3	106.9	111.1	115.2	119.5	123.8	127.7	131.3
Fresh	100.0	103.5	107.4	111.8	116.2	120.9	125.6	129.9	134.2
Processed	100.0	102.7	105.9	109.5	112.9	116.5	119.9	122.6	124.9
Sugars and sweeteners	100.0	101.2	103.4	106.0	107.9	109.7	111.6	113.5	114.8
Nonalcoholic beverages	100.0	101.5	103.4	106.0	108.3	110.8	112.9	114.5	116.1
Fats and oils	100.0	102.3	105.0	108.1	111.1	114.3	117.3	120.0	122.5
Butter	100.0	103.7	107.8	112.0	116.2	120.6	125.3	130.2	135.2
Margarine	100.0	101.2	103.2	105.8	107.7	109.5	110.8	111.6	111.9
Other	100.0	101.6	103.8	106.6	109.3	112.0	114.6	116.8	118.8
Miscellaneous	100.0	102.7	105.4	108.3	111.1	114.3	117.5	120.5	123.1
Alcoholic beverages	100.0	106.0	111.9	118.1	125.5	134.0	143.4	153.5	164.7

[1]See footnote at bottom of table 34.

Table 33—Projected per capita effects of combined demographic changes and a 2-percent increase in annual income on weekly food expenditures, middle series[1]

Item	1980	1985	1990	1995	2000	2005	2010	2015	2020
					Percent				
Total food	100.0	103.9	108.0	112.6	117.5	122.7	128.0	133.4	138.9
Food away from home	100.0	106.1	112.1	118.6	125.9	133.7	142.2	151.8	162.1
Food at home	100.0	102.3	105.0	108.2	111.4	114.9	118.1	121.0	123.5
Meat, poultry, fish, and eggs	100.0	102.6	105.5	109.0	112.6	116.5	120.1	123.0	125.3
Beef	100.0	102.2	105.0	108.6	112.2	116.1	119.9	123.2	126.0
Pork	100.0	102.2	104.7	107.9	110.9	114.2	117.0	118.9	120.1
Other meat	100.0	101.4	103.4	105.9	108.1	110.5	112.5	113.9	114.6
Poultry	100.0	102.2	104.3	106.6	108.6	110.8	112.4	113.1	113.0
Fish	100.0	104.4	109.4	115.1	121.1	127.4	133.5	139.3	145.0
Eggs	100.0	100.4	101.0	102.0	102.8	103.8	104.4	104.4	104.1
Cereals and bakery products	100.0	101.4	103.3	105.8	108.1	110.4	112.4	113.9	115.1
Dairy products	100.0	101.4	103.0	105.0	107.0	109.0	110.9	112.5	113.9
Milk and cream	100.0	99.7	99.8	100.4	101.1	101.8	102.3	102.5	102.6
Cheese	100.0	103.5	107.1	110.8	114.6	118.4	122.0	125.3	128.1
Other dairy products	100.0	102.0	104.9	108.2	111.4	114.4	117.2	120.1	122.9
Fruits	100.0	102.6	105.7	109.4	113.3	118.1	123.4	129.1	135.2
Fresh	100.0	102.4	105.6	109.7	114.1	119.4	125.6	132.5	140.3
Processed	100.0	102.9	106.0	109.2	112.5	116.2	119.8	123.2	126.3
Vegetables	100.0	103.2	106.7	110.6	114.5	118.7	122.7	126.2	129.1
Fresh	100.0	103.5	107.1	111.2	115.3	119.8	124.2	128.1	131.5
Processed	100.0	102.7	105.7	109.3	112.6	116.0	119.1	121.6	123.4
Sugars and sweeteners	100.0	101.2	103.4	105.9	108.0	109.8	111.5	113.1	114.1
Nonalcoholic beverages	100.0	101.4	103.1	105.4	107.6	109.9	111.8	113.1	114.2
Fats and oils	100.0	102.3	104.8	107.8	110.6	113.6	116.4	118.8	120.7
Butter	100.0	103.7	107.8	112.0	116.2	120.6	125.2	129.9	134.7
Margarine	100.0	101.1	102.9	105.3	107.2	108.8	109.8	109.9	109.5
Other	100.0	101.5	103.5	106.1	108.8	111.5	113.8	115.7	117.4
Miscellaneous	100.0	102.7	105.4	108.2	111.1	114.2	117.4	120.4	122.9
Alcoholic beverages	100.0	106.0	111.6	117.6	124.8	133.2	142.6	153.1	164.5

[1]See footnote at bottom of table 34.

Table 34—Projected per capita effects of combined demographic changes and a 2-percent increase in annual income on weekly food expenditures, high series[1]

Item	1980	1985	1990	1995	2000	2005	2010	2015	2020
					Percent				
Total food	100.0	103.8	107.8	112.2	117.0	122.0	127.1	132.3	137.7
Food away from home	100.0	106.0	112.0	118.4	125.5	133.3	141.8	151.4	161.8
Food at home	100.0	102.2	104.8	107.7	110.9	114.1	117.1	119.7	122.0
Meat, poultry, fish, and eggs	100.0	102.5	105.2	108.4	112.0	115.5	118.8	121.4	123.4
Beef	100.0	102.2	104.9	108.2	111.8	115.5	119.1	122.1	124.7
Pork	100.0	102.1	104.4	107.2	110.1	112.9	115.3	116.8	117.6
Other meat	100.0	101.3	103.2	105.4	107.7	109.7	111.4	112.6	113.1
Poultry	100.0	102.1	104.1	106.0	108.1	109.8	111.1	111.5	111.1
Fish	100.0	104.3	109.1	114.7	120.7	126.7	132.5	138.1	143.6
Eggs	100.0	100.3	100.8	101.6	102.4	103.1	103.5	103.3	102.7
Cereals and bakery products	100.0	101.3	103.2	105.5	107.8	109.9	111.7	113.0	114.1
Dairy products	100.0	101.3	102.9	104.7	106.7	108.6	110.4	111.8	113.1
Milk and cream	100.0	99.8	99.8	100.4	101.1	101.7	102.2	102.3	102.4
Cheese	100.0	103.4	107.0	110.4	114.0	117.6	121.0	124.1	126.7
Other dairy products	100.0	101.9	104.8	108.0	111.2	114.0	116.7	119.5	122.2
Fruits	100.0	102.5	105.5	109.1	113.0	117.5	122.5	127.9	133.7
Fresh	100.0	102.3	105.4	109.3	113.7	118.7	124.6	131.1	138.5
Processed	100.0	102.9	105.9	109.0	112.3	115.8	119.2	122.3	125.2
Vegetables	100.0	103.1	106.4	110.1	113.9	117.6	121.3	124.5	127.1
Fresh	100.0	103.4	106.8	110.6	114.6	118.6	122.5	126.0	129.1
Processed	100.0	102.6	105.6	108.9	112.2	115.4	118.2	120.5	122.1
Sugars and sweeteners	100.0	101.1	103.3	105.9	108.0	109.7	111.3	112.7	113.6
Nonalcoholic beverages	100.0	101.3	102.9	104.9	107.0	108.9	110.5	111.7	112.6
Fats and oils	100.0	102.2	104.6	107.3	110.1	112.8	115.3	117.4	119.1
Butter	100.0	103.6	107.7	112.0	116.2	120.5	125.0	129.7	134.3
Margarine	100.0	101.0	102.6	104.7	106.5	107.8	108.4	108.2	107.4
Other	100.0	101.4	103.3	105.7	108.3	110.7	112.8	114.5	116.0
Miscellaneous	100.0	102.7	105.4	108.2	111.1	114.1	117.2	120.2	122.7
Alcoholic beverages	100.0	106.0	111.5	117.3	124.4	132.6	142.0	152.6	164.0

[1]Demographic changes include changing age, regional, and racial distributions.

Table 35—Projected national effects of combined demographic changes and a 1-percent increase in annual income on weekly food expenditures, low series[1]

Item	1980	1985	1990	1995	2000	2005	2010	2015	2020
					Percent				
Total food	100.0	107.1	113.2	118.8	123.6	128.0	132.1	135.7	138.7
Food away from home	100.0	108.1	114.8	120.7	125.8	130.5	135.0	139.3	143.3
Food at home	100.0	106.2	111.7	116.8	121.1	125.2	128.9	131.7	134.0
Meat, poultry, fish, and eggs	100.0	106.4	112.1	117.6	122.3	127.0	131.1	134.2	136.7
Beef	100.0	106.0	111.4	116.5	120.9	125.2	129.2	132.2	134.4
Pork	100.0	106.4	112.1	117.7	122.5	127.1	131.3	134.4	136.9
Other meat	100.0	105.4	110.3	114.8	118.3	121.5	124.3	126.5	127.9
Poultry	100.0	106.7	112.2	117.2	121.5	125.6	129.1	131.6	133.7
Fish	100.0	107.4	114.3	120.9	126.8	132.3	137.4	142.0	146.2
Eggs	100.0	105.3	109.7	113.7	117.0	119.9	122.4	124.0	125.0
Cereals and bakery products	100.0	105.5	110.5	115.0	118.7	121.9	124.7	126.8	128.4
Dairy products	100.0	105.6	110.2	114.3	117.6	120.5	122.9	124.7	125.9
Milk and cream	100.0	104.5	108.0	111.2	113.7	115.7	117.2	117.9	118.1
Cheese	100.0	106.9	112.6	117.8	121.9	125.8	129.2	132.2	134.7
Other dairy products	100.0	105.9	111.5	116.5	120.5	123.8	126.8	129.6	131.9
Fruits	100.0	106.5	112.1	117.5	122.0	126.6	131.2	135.2	138.8
Fresh	100.0	106.3	112.1	117.7	122.4	127.2	132.2	136.8	140.9
Processed	100.0	106.7	112.3	117.3	121.6	125.7	129.4	132.7	135.5
Vegetables	100.0	107.0	113.1	119.0	123.8	128.6	133.1	136.8	139.8
Fresh	100.0	107.2	113.6	119.6	124.7	129.7	134.5	138.4	141.9
Processed	100.0	106.5	112.3	117.7	122.1	126.3	130.2	133.2	135.6
Sugars and sweeteners	100.0	105.3	110.4	115.0	118.3	121.0	123.8	126.5	128.3
Nonalcoholic beverages	100.0	105.8	110.8	115.5	119.2	122.6	125.3	127.1	128.2
Fats and oils	100.0	106.3	111.8	116.9	121.0	124.9	128.4	131.3	133.6
Butter	100.0	106.8	112.8	117.7	121.7	125.4	128.9	132.4	135.5
Margarine	100.0	105.7	111.1	116.5	120.6	124.2	127.4	130.0	132.1
Other	100.0	105.8	110.9	115.8	119.9	123.5	126.6	129.0	130.8
Miscellaneous	100.0	106.3	111.4	115.7	119.2	122.5	125.6	128.2	130.0
Alcoholic beverages	100.0	108.0	114.1	119.3	124.1	128.8	133.2	136.9	140.1

[1]See footnote at bottom of table 40.

Table 36—Projected national effects of combined demographic changes and a 1-percent increase in annual income on weekly food expenditures, middle series[1]

Item	1980	1985	1990	1995	2000	2005	2010	2015	2020
					Percent				
Total food	100.0	107.5	114.7	121.9	128.6	135.4	142.1	148.8	155.0
Food away from home	100.0	108.5	116.4	123.8	131.1	138.2	145.7	153.6	161.7
Food at home	100.0	106.6	113.2	120.0	126.1	132.4	138.5	144.1	149.1
Meat, poultry, fish, and eggs	100.0	106.8	113.6	120.7	127.2	134.1	140.6	146.4	151.5
Beef	100.0	106.4	112.9	119.8	126.1	132.6	139.0	144.8	149.9
Pork	100.0	106.8	113.5	120.7	127.2	134.0	140.4	146.1	151.0
Other meat	100.0	105.8	111.8	117.9	123.2	128.5	133.6	138.2	142.2
Poultry	100.0	107.1	113.8	120.4	126.4	132.6	138.4	143.5	147.9
Fish	100.0	107.8	115.9	124.2	132.1	140.2	148.1	155.7	163.2
Eggs	100.0	105.7	111.3	117.0	121.9	127.0	131.7	135.7	139.0
Cereals and bakery products	100.0	105.9	112.0	118.2	123.8	129.2	134.4	139.1	143.4
Dairy products	100.0	106.0	111.9	117.6	122.8	127.8	132.6	137.0	140.9
Milk and cream	100.0	104.9	109.8	114.6	119.0	123.1	126.9	130.2	133.0
Cheese	100.0	107.3	114.2	120.9	126.9	132.9	138.8	144.6	149.9
Other dairy products	100.0	106.3	113.9	119.9	125.9	131.5	137.0	142.4	147.8
Fruits	100.0	106.9	113.9	120.9	127.3	134.1	141.3	148.2	154.6
Fresh	100.0	106.7	113.7	121.1	127.7	134.8	142.3	149.7	156.7
Processed	100.0	107.2	114.1	120.8	126.9	133.2	139.6	145.7	151.4
Vegetables	100.0	107.4	114.7	122.1	128.8	135.8	142.7	149.2	155.0
Fresh	100.0	107.6	115.0	122.6	129.5	136.8	144.0	150.7	156.9
Processed	100.0	106.9	113.9	121.0	127.3	133.8	140.1	145.9	151.2
Sugars and sweeteners	100.0	105.7	112.0	118.5	123.9	128.8	134.0	139.2	144.1
Nonalcoholic beverages	100.0	106.2	112.2	118.4	124.0	129.4	134.3	138.7	142.4
Fats and oils	100.0	106.7	113.3	120.0	126.0	132.1	138.0	143.5	148.6
Butter	100.0	107.2	114.5	121.3	127.3	133.3	139.5	146.0	152.4
Margarine	100.0	106.1	112.6	119.5	125.5	131.3	136.7	141.6	146.0
Other	100.0	106.2	112.4	118.9	124.8	130.7	136.2	141.3	145.9
Miscellaneous	100.0	106.8	113.1	119.2	124.7	130.2	135.9	141.5	146.6
Alcoholic beverages	100.0	108.5	115.7	122.4	129.1	136.1	143.4	150.8	157.8

[1]See footnote at bottom of table 40.

Table 37—Projected national effects of combined demographic changes and a 1-percent increase in annual income on weekly food expenditures, high series[1]

Item	1980	1985	1990	1995	2000	2005	2010	2015	2020
					Percent				
Total food	100.0	108.0	116.5	125.4	134.5	144.1	154.4	165.2	176.3
Food away from home	100.0	109.0	118.3	127.7	137.3	147.6	158.9	171.7	185.3
Food at home	100.0	107.2	115.0	123.4	131.9	140.8	150.2	159.6	169.0
Meat, poultry, fish, and eggs	100.0	107.3	115.4	124.0	133.0	142.3	152.1	161.8	171.2
Beef	100.0	106.9	114.8	123.4	132.1	141.3	151.1	160.8	170.4
Pork	100.0	107.2	115.2	123.8	132.7	141.8	151.4	160.7	169.8
Other meat	100.0	106.3	113.5	121.3	128.9	136.6	144.8	153.1	161.2
Poultry	100.0	107.6	115.7	123.8	132.1	140.7	149.7	158.4	166.9
Fish	100.0	108.3	117.7	127.9	138.4	149.3	160.9	172.9	185.6
Eggs	100.0	106.3	113.2	120.4	127.7	135.1	142.9	150.4	157.7
Cereals and bakery products	100.0	106.5	113.8	121.8	129.7	137.7	146.1	154.6	163.2
Dairy products	100.0	106.6	113.8	121.3	128.7	136.4	144.4	152.6	160.8
Milk and cream	100.0	105.5	111.7	118.4	125.0	131.8	138.8	145.7	152.5
Cheese	100.0	107.8	116.1	124.4	132.7	141.3	150.6	160.4	170.2
Other dairy products	100.0	106.8	114.9	123.6	132.1	140.4	149.3	158.8	168.8
Fruits	100.0	107.5	115.8	124.5	133.4	142.9	153.5	164.4	175.5
Fresh	100.0	107.2	115.6	124.7	133.8	143.6	154.5	165.9	177.7
Processed	100.0	107.8	116.1	124.5	133.1	142.1	152.0	162.1	172.4
Vegetables	100.0	107.9	116.4	125.5	134.6	144.1	154.4	164.9	175.2
Fresh	100.0	108.1	116.8	125.9	135.2	144.9	155.4	166.1	176.8
Processed	100.0	107.5	115.7	124.6	133.4	142.4	152.2	162.0	171.8
Sugars and sweeteners	100.0	106.2	114.0	122.3	130.1	137.9	146.3	155.5	164.8
Nonalcoholic beverages	100.0	106.6	113.9	121.7	129.5	137.3	145.3	153.3	161.1
Fats and oils	100.0	107.2	115.1	123.5	131.8	140.4	149.6	158.9	168.3
Butter	100.0	107.8	116.5	125.3	133.7	142.6	152.4	163.2	174.6
Margarine	100.0	106.5	114.3	122.8	131.1	139.3	147.8	156.2	164.6
Other	100.0	106.6	114.1	122.3	130.5	139.0	147.7	156.6	165.6
Miscellaneous	100.0	107.4	115.2	123.1	131.0	139.3	148.6	158.4	168.2
Alcoholic beverages	100.0	109.0	117.6	126.1	135.1	145.1	156.2	168.4	180.8

[1]See footnote at bottom of table 40.

Table 38—Projected national effects of combined demographic changes and a 2-percent increase in annual income on weekly food expenditures, low series[1]

Item	1980	1985	1990	1995	2000	2005	2010	2015	2020
					Percent				
Total food	100.0	109.0	117.4	125.7	133.4	141.1	148.7	155.8	162.5
Food away from home	100.0	111.3	121.9	132.4	142.9	153.5	164.7	176.4	188.0
Food at home	100.0	107.4	114.1	120.6	126.5	132.1	137.4	141.7	145.2
Meat, poultry, fish, and eggs	100.0	107.6	114.7	121.7	128.0	134.3	140.0	144.4	147.9
Beef	100.0	107.3	114.1	121.0	127.2	133.4	139.2	144.0	147.8
Pork	100.0	107.3	113.9	120.6	126.3	131.8	136.7	140.2	142.5
Other meat	100.0	106.5	112.4	118.1	122.8	127.1	130.8	133.5	134.9
Poultry	100.0	107.2	113.3	118.8	123.6	127.8	131.1	133.0	133.8
Fish	100.0	109.5	118.9	128.3	137.4	146.3	154.9	162.8	169.9
Eggs	100.0	105.3	109.6	113.6	116.6	119.3	121.3	122.4	122.5
Cereals and bakery products	100.0	106.4	112.3	117.9	122.6	126.7	130.3	133.1	134.9
Dairy products	100.0	106.3	111.8	116.9	121.2	125.1	128.5	131.2	133.1
Milk and cream	100.0	104.6	108.3	111.6	114.2	116.4	118.1	119.0	119.3
Cheese	100.0	108.6	116.4	123.7	130.2	136.3	141.9	146.7	150.6
Other dairy products	100.0	107.0	113.9	120.5	126.1	131.0	135.7	140.0	143.6
Fruits	100.0	107.6	114.7	121.8	128.5	135.6	143.2	150.9	158.7
Fresh	100.0	107.4	114.6	122.2	129.3	137.1	145.8	155.1	164.9
Processed	100.0	108.0	115.0	121.5	127.5	133.4	138.9	143.7	147.8
Vegetables	100.0	108.3	116.0	123.5	130.2	136.7	142.9	148.1	152.3
Fresh	100.0	108.6	116.5	124.3	131.3	138.3	144.9	150.7	155.6
Processed	100.0	107.7	114.9	121.7	127.6	133.3	138.4	142.3	144.8
Sugars and sweeteners	100.0	106.1	112.2	117.8	122.0	125.5	128.8	131.7	133.1
Nonalcoholic beverages	100.0	106.5	112.2	117.8	122.5	126.7	130.3	132.9	134.6
Fats and oils	100.0	107.3	113.9	120.2	125.6	130.7	135.4	139.2	142.1
Butter	100.0	108.7	117.0	124.5	131.3	138.0	144.6	151.0	156.7
Margarine	100.0	106.1	111.9	117.6	121.8	125.3	127.9	129.4	129.7
Other	100.0	106.5	112.6	118.5	123.5	128.1	132.2	135.5	137.8
Miscellaneous	100.0	107.7	114.3	120.4	125.6	130.7	135.6	139.8	142.7
Alcoholic beverages	100.0	111.2	121.3	131.3	141.9	153.3	165.5	178.1	191.0

[1]See footnote at bottom of table 40.

Table 39—Projected national effects of combined demographic changes and a 2-percent increase in annual income on weekly food expenditures, middle series[1]

Item	1980	1985	1990	1995	2000	2005	2010	2015	2020
					Percent				
Total food	100.0	109.5	119.0	129.0	138.9	149.3	160.0	171.0	181.8
Food away from home	100.0	111.7	123.6	135.9	148.9	162.7	177.8	194.5	212.2
Food at home	100.0	107.8	115.7	123.9	131.7	139.8	147.7	155.1	161.7
Meat, poultry, fish, and eggs	100.0	108.0	116.2	124.9	133.2	141.8	150.2	157.7	164.1
Beef	100.0	107.7	115.7	124.4	132.7	141.3	149.9	157.9	164.9
Pork	100.0	107.6	115.4	123.6	131.2	139.0	146.3	152.4	157.2
Other meat	100.0	106.9	113.9	121.3	127.9	134.5	140.6	146.0	150.1
Poultry	100.0	107.7	115.0	122.1	128.4	134.9	140.6	145.0	148.0
Fish	100.0	109.9	120.5	131.9	143.2	155.0	166.9	178.5	189.8
Eggs	100.0	105.7	111.3	116.8	121.6	126.3	130.5	133.9	136.2
Cereals and bakery products	100.0	106.8	113.9	121.2	127.9	134.4	140.5	146.0	150.7
Dairy products	100.0	106.8	113.5	120.3	126.5	132.7	138.6	144.2	149.1
Milk and cream	100.0	105.1	110.0	115.0	119.6	123.9	127.9	131.3	134.3
Cheese	100.0	109.0	118.0	127.0	135.5	144.0	152.5	160.7	167.7
Other dairy products	100.0	107.4	115.6	124.0	131.8	139.2	146.6	153.9	161.0
Fruits	100.0	108.1	116.4	125.3	134.0	143.7	154.3	165.4	176.9
Fresh	100.0	107.8	116.3	125.7	134.9	145.3	157.1	169.8	183.6
Processed	100.0	108.4	116.8	125.1	133.1	141.4	149.8	157.9	165.3
Vegetables	100.0	108.7	117.6	126.8	135.4	144.4	153.4	161.7	169.0
Fresh	100.0	109.0	118.0	127.5	136.4	145.8	155.2	164.2	172.2
Processed	100.0	108.2	116.5	125.2	133.1	141.2	148.9	155.9	161.6
Sugars and sweeteners	100.0	106.6	113.9	121.4	127.8	133.6	139.4	144.9	149.4
Nonalcoholic beverages	100.0	106.8	113.7	120.8	127.3	133.8	139.7	145.0	149.5
Fats and oils	100.0	107.7	115.5	123.5	130.8	138.3	145.6	152.2	158.1
Butter	100.0	109.2	118.8	128.3	137.4	146.8	156.5	166.5	176.3
Margarine	100.0	106.5	113.4	120.6	126.7	132.4	137.3	140.9	143.4
Other	100.0	106.9	114.1	121.6	128.7	135.6	142.3	148.3	153.7
Miscellaneous	100.0	108.2	116.1	124.0	131.4	139.0	146.7	154.3	160.9
Alcoholic beverages	100.0	111.7	123.0	134.8	147.7	162.1	178.3	196.2	215.3

[1]See footnote at bottom of table 40.

Table 40—Projected national effects of combined demographic changes and a 2-percent increase in annual income on weekly food expenditures, high series[1]

Item	1980	1985	1990	1995	2000	2005	2010	2015	2020
					Percent				
Total food	100.0	110.0	120.9	132.8	145.4	159.0	173.9	190.1	207.1
Food away from home	100.0	112.3	125.6	140.1	156.0	173.7	194.1	217.5	243.4
Food at home	100.0	108.3	117.5	127.5	137.8	148.7	160.2	171.9	183.5
Meat, poultry, fish, and eggs	100.0	108.5	118.0	128.4	139.2	150.5	162.6	174.3	185.7
Beef	100.0	108.2	117.6	128.1	138.9	150.5	162.9	175.4	187.6
Pork	100.0	108.1	117.1	126.8	136.9	147.2	157.8	167.8	176.9
Other meat	100.0	107.3	115.8	124.8	133.8	143.0	152.5	161.7	170.1
Poultry	100.0	108.2	116.8	125.5	134.3	143.1	152.1	160.1	167.1
Fish	100.0	110.4	122.4	135.8	150.0	165.1	181.4	198.4	216.0
Eggs	100.0	106.3	113.1	120.3	127.3	134.4	141.7	148.4	154.5
Cereals and bakery products	100.0	107.3	115.7	124.8	133.9	143.2	152.8	162.4	171.6
Dairy products	100.0	107.3	115.4	124.0	132.6	141.6	151.0	160.6	170.2
Milk and cream	100.0	105.7	112.0	118.8	125.6	132.6	139.8	147.0	154.1
Cheese	100.0	109.5	120.0	130.7	141.7	153.2	165.5	178.2	190.5
Other dairy products	100.0	108.0	117.5	127.8	138.2	148.6	159.8	171.6	183.8
Fruits	100.0	108.6	118.4	129.1	140.4	153.1	167.7	183.7	201.1
Fresh	100.0	108.4	118.3	129.4	141.3	154.7	170.5	188.4	208.4
Processed	100.0	109.0	118.8	129.0	139.6	150.9	163.1	175.7	188.4
Vegetables	100.0	109.2	119.4	130.3	141.5	153.3	166.0	178.8	191.2
Fresh	100.0	109.5	119.8	130.9	142.4	154.5	167.7	181.0	194.2
Processed	100.0	108.7	118.4	128.9	139.5	150.3	161.8	173.1	183.6
Sugars and sweeteners	100.0	107.1	115.9	125.3	134.2	143.0	152.3	161.9	170.9
Nonalcoholic beverages	100.0	107.3	115.4	124.1	133.0	142.0	151.2	160.4	169.3
Fats and oils	100.0	108.2	117.3	127.0	136.8	147.0	157.8	168.6	179.2
Butter	100.0	109.8	120.8	132.5	144.4	157.0	171.0	186.2	202.0
Margarine	100.0	107.0	115.1	124.0	132.4	140.5	148.3	155.4	161.6
Other	100.0	107.4	115.8	125.1	134.6	144.3	154.4	164.5	174.5
Miscellaneous	100.0	108.8	118.2	128.1	138.0	148.7	160.4	172.6	184.6
Alcoholic beverages	100.0	112.2	125.0	138.9	154.6	172.9	194.3	219.1	246.7

[1]Demographic changes include combined age, regional, and racial distributions.

References

(1) Blaylock, James, R., and David M. Smallwood. *Effects of Household Socioeconomic Features on Dairy Purchases.* TB-1686. U.S. Dept. Agr., Econ. Res. Serv., Aug. 1983.

(2) Deaton, Anton, and John Muellbauer. *Economics and Consumer Behavior.* New York: Cambridge University Press, 1980.

(3) Green, H. A. J. *Aggregation in Economic Analysis.* Princeton, NJ: Princeton University Press, 1964.

(4) Haidacher, Richard C. "An Econometric Study of the Demand for Prune Juice." Ph.D. thesis. University of California at Berkeley, 1964.

(5) Maddala, George S. *Limited-Dependent and Qualitative Variables in Econometrics.* New York: Cambridge University Press, 1983.

(6) McDonald, John F., and Robert A. Moffitt. "The Uses of Tobit Analysis," *The Review of Economics and Statistics,* Vol. 62, No. 2 (1980), 318-21.

(7) Salathe, Larry E. "An Empirical Comparison of Functional Forms for Engel Relationships," *Agricultural Economics Research,* Vol. 31, No. 2 (1979), 10-15.

(8) Smallwood, David M., and James R. Blaylock. *Household Expenditures for Fruits, Vegetables, and Potatoes.* TB-1690. U.S. Dept. Agr., Econ. Res. Serv., May 1984.

(9) _____, and James R. Blaylock. *Food Spending in American Households, 1980-81.* SB-731. U.S. Dept. Agr., Econ. Res. Serv., July 1985.

(10) Tobin, James. "Estimation of Relationships for Limited Dependent Variables," *Econometrica,* Vol. 26, No. 1 (1958), 24-36.

(11) Tomek, William G. "Empirical Analyses of the Demand for Food: A Review," *Food Demand and Consumption Behavior.* Ed. Robert Rauniker. Athens, GA: Agricultural Experiment Station, University of Georgia, 1977.

(12) U.S. Department of Agriculture. *Marketing, the Yearbook of Agriculture.* 1954, p. vii.

(13) U.S. Department of Commerce, Bureau of the Census. *Provisional Projections of the Population of States, by Age and Sex: 1980-2000.* Series P-25, No. 973, 1983.

(14) _____, Bureau of the Census. *Projections of the Population of the United States by Age, Sex, Race: 1983 to 2080.* Series P-25, No. 952, May 1984.

(15) U.S. Department of Labor, Bureau of Labor Statistics. *Consumer Expenditure Survey: Diary Survey, July 1972-June 1974.* Bul. No. 1959. 1977.

(16) _____, Bureau of Labor Statistics. *Consumer Expenditure Survey: Diary Survey, 1980-81.* Bul. No. 2173. Sept. 1983.

(17) Wold, Hermann, and Lars Jureen. *Demand Analysis.* New York: Wiley, 1953.

Appendix table—Tobit model for food expenditures, 1980-81: Parameter estimates and summary statistics[1]

Independent variables	Total food	Food at home	Meat, poultry, fish, and eggs	Beef	Pork	Other meats
Constant	14.4646***	15.9424***	6.6703***	2.4913***	1.4700***	0.8889***
	(.8835)	(.6579)	(.3330)	(.2569)	(.1439)	(.0952)
North Central	-1.6695***	-1.5742***	-.8180***	-.3550**	.0886	-.2063***
	(.4835)	(.3548)	(.1799)	(.1402)	(.0778)	(.0506)
South	-1.4036***	-1.5655***	-.7250***	-.2970**	-.0012	-.3926***
	(.4890)	(.3589)	(.1822)	(.1418)	(.0790)	(.0517)
West	-.0497	-.4723	-.7524***	-.2734*	-.0286	-.4085***
	(.4955)	(.3635)	(.1847)	(.1436)	(.0802)	(.0525)
Race	-2.7730***	-1.6671***	.6017***	-.1684	.3173***	-.0976*
	(.4875)	(.3577)	(.1815)	(.1426)	(.0782)	(.0523)
Income	6.2323***	2.7244***	1.1740***	.6600***	.2828***	.2151***
	(.3205)	(.2335)	(.1221)	(.0969)	(.0559)	(.0381)
Income squared	-.3768***	-.2417***	-.1167***	-.0606***	-.0353***	-.0259***
	(.0404)	(.0299)	(.0162)	(.0130)	(.0079)	(.0055)
Spring	.4649	-.2333	-.2372	-.1132	-.0877	.0950*
	(.5154)	(.3781)	(.1920)	(.1498)	(.0831)	(.0547)
Summer	.1142	-.0110	-.1895	-.0943	-.1889**	.1249**
	(.5045)	(.3702)	(.1879)	(.1467)	(.0815)	(.0535)
Fall	.7080	.7001**	.0527	-.1663	-.0002	.0372
	(.4686)	(.3439)	(.1746)	(.1364)	(.0754)	(.0499)
Year	.7338**	.6703***	.0768	-.0435	.0781	.0793**
	(.3372)	(.2475)	(.1257)	(.0982)	(.0545)	(.0358)
Household size (inverse)	4.0743***	-.7849	-2.2516***	-2.0528***	-1.5333***	-.8012***
	(.7349)	(.5394)	(.2168)	(.2186)	(.1230)	(.0806)
Proportion age 0-4	-10.9654***	-8.2241***	-3.9651***	-1.6469***	-1.3609***	-.7031***
	(1.5609)	(1.2183)	(.6181)	(.4800)	(.2665)	(.1756)
Proportion age 5-9	-7.9625***	-7.3660***	-3.4861***	-1.1147**	-1.2959***	-.3708**
	(1.5968)	(1.1718)	(.5941)	(.4594)	(.2551)	(.1673)
Proportion age 10-14	-4.3187***	-5.3121***	-2.8209***	-.7751*	-.8650***	-.3007*
	(1.5207)	(1.1158)	(.5651)	(.4369)	(.2412)	(.1585)
Proportion age 15-19	-5.6353***	-7.7580***	-3.8017***	-1.7103***	-1.2749***	-.5950***
	(1.2164)	(.8980)	(.4627)	(.3633)	(.2042)	(.1336)
Proportion age 20-29	-2.4185***	-6.1044***	-2.8557***	-1.2541***	-1.0023***	-.4697***
	(.6032)	(.4461)	(.2268)	(.1775)	(.0997)	(.0651)
Proportion age 30-44	-1.0163	-4.3897***	-2.1544***	-1.1365***	-.6920***	-.3201***
	(.6865)	(.5053)	(.2571)	(.2021)	(.1125)	(.0739)
Proportion age 65-74	.0633	.4168	-.1812	-.0792	.0995	.0349
	(.7775)	(.5702)	(.2891)	(.2269)	(.1251)	(.0832)
Proportion age 75 and over	-1.8860**	-.4318	-.4716	-.4873*	-.0583	-.1542
	(.9313)	(.6828)	(.3466)	(.2749)	(.1510)	(.1012)
Sigma	12.8416	9.4133	4.7428	3.5640	1.9412	1.2746
Summary statistics:						
Mean square error	162.1327	85.3852	19.7741	7.9240	1.9699	.8238
Probability of purchase at means	.9654	.9454	.8414	.6264	.5964	.5966
Observed nonlimit values (proportion)	.9886	.9769	.9156	.7128	.6383	.6292
Income elasticity (total)	.3468	.2006	.2170	.2341	.1597	.1900

[1]See footnotes at end of table.

Continued

Appendix table—Tobit model for food expenditures, 1980-81: Parameter estimates and summary statistics—Continued[1]

Independent variables	Poultry	Fish and seafood	Eggs	Cereal and bakery products	Dairy	Milk and cream
Constant	0.8151***	0.2136	0.3844***	2.1585***	1.9125***	1.1564***
	(.1182)	(.1445)	(.0351)	(.1118)	(.1088)	(.0660)
North Central	-.4693***	-.6865***	-.0617***	-.3234***	-.1400**	-.0493
	(.0640)	(.0790)	(.0191)	(.0603)	(.0593)	(.0359)
South	-.1959***	-.3965***	-.0431**	-.4561***	-.2564***	-.1058***
	(.0639)	(.0789)	(.0193)	(.0611)	(.0600)	(.0363)
West	-.2274***	-.2489***	-.0165	-.2657***	.0455	-.0064
	(.0649)	(.0793)	(.0195)	(.0619)	(.0608)	(.0368)
Race	.4396***	.3656***	.0169	-.2839***	.8026***	-.4009***
	(.0630)	(.0792)	(.0193)	(.0610)	(.0606)	(.0367)
Income	.1720***	.4314***	.0096	.3439***	.2613***	.0196
	(.0476)	(.0564)	(.0130)	(.0416)	(.0392)	(.0237)
Income squared	-.0271***	-.0397***	-.0027	-.0392***	-.0244***	-.0016
	(.0070)	(.0078)	(.0017)	(.0056)	(.0051)	(.0031)
Spring	-.0662	-.2119**	-.0090	-.0577	.0916	.0014
	(.0684)	(.0842)	(.0204)	(.0643)	(.0632)	(.0383)
Summer	-.0308	-.1206	-.0124	.0036	.0734	-.0268
	(.0669)	(.0819)	(.0200)	(.0630)	(.0619)	(.0375)
Fall	.1422**	-.1402*	.0319*	.0785	.1149**	.0302
	(.0619)	(.0761)	(.0185)	(.0585)	(.0575)	(.0348)
Year	.0275	-.0343	.0253*	.1503***	.1140***	.1098***
	(.0447)	(.0553)	(.0134)	(.0421)	(.0414)	(.0251)
Household size (inverse)	-.7500***	-.9970***	-.1380***	-.2379***	-.1406	-.2038***
	(.0999)	(.1247)	(.0298)	(.0921)	(.0906)	(.0551)
Proportion age 0-4	-.6257***	-.6894**	-.1747***	-.9957***	-.4827**	-.0634
	(.2181)	(.2723)	(.0652)	(.2068)	(.2032)	(.1228)
Proportion age 5-9	-.8367***	-.4104	-.2345***	-.6186***	-.6208***	-.2524**
	(.2099)	(.2609)	(.0628)	(.1988)	(.1954)	(.1181)
Proportion age 10-14	-.8331***	-.2817	-.1749***	-.3463*	-.3986**	.0129
	(.1985)	(.2455)	(.0596)	(.1893)	(.1862)	(.1125)
Proportion age 15-19	-.8179***	-.6061***	-.2456***	-.7959***	-.5281***	-.1959**
	(.1659)	(.2075)	(.0492)	(.1530)	(.1503)	(.0913)
Proportion age 20-29	-.6366***	-.4388***	-.2231***	-.7752***	-.5366***	-.2667***
	(.0816)	(.1009)	(.0243)	(.0758)	(.0743)	(.0451)
Proportion age 30-44	-.3772***	-.3280***	-.1631***	-.5534***	-.3359***	-.2725***
	(.0921)	(.1134)	(.0276)	(.0861)	(.0845)	(.0514)
Proportion age 65-74	-.0166	.0016	.0197	.0816	-.0724	-.0651
	(.1025)	(.1288)	(.0307)	(.0970)	(.0955)	(.0580)
Proportion age 75 and over	.1501	.4452***	.0412	.2512**	.0502	.1506**
	(.1223)	(.1531)	(.0368)	(.1161)	(.1141)	(.0691)
Sigma	1.5548	1.8474	.4853	1.5938	1.5665	.9423
Summary statistics:						
Mean square error	1.0056	1.2294	.1363	2.2843	2.1858	.7203
Probability of purchase at means	.5327	.4202	.6502	.8808	.8804	.8307
Observed nonlimit values (proportion)	.5511	.4674	.6937	.9336	.9282	.8747
Income elasticity (total)	.1053	.3750	.0012	.1603	.1381	.0205

[1]See footnotes at end of table.

Continued

Appendix table—Tobit model for food expenditures, 1980-81: Parameter estimates and summary statistics—Continued[1]

Independent variables	Cheese	Other dairy	Fruit	Fresh fruit	Processed fruit	Vegetables
Constant	0.2988***	0.0857	1.2392***	0.6720***	0.4482	1.0846
	(.0863)	(.0648)	(.1238)	(.1123)	(.0698)	(.0949)
North Central	-.0650	-.1111***	-.3055***	-.1924***	-.2057***	-.1773***
	(.0468)	(.0352)	(.0681)	(.0620)	(.0384)	(.0517)
South	-.1849***	-.1178***	-.2613***	-.1627***	-.1918***	-.0335
	(.0478)	(.0357)	(.0690)	(.0629)	(.0388)	(.0523)
West	.0133	.0488	-.0842	.1192*	-.0232	.0473
	(.0480)	(.0357)	(.0697)	(.0632)	(.0392)	(.0529)
Race	-.6406***	-.1888***	-.1012	-.1533**	-.0063	-.1293**
	(.0510)	(.0367)	(.0691)	(.0634)	(.0391)	(.0525)
Income	.3063***	.1221***	.1954***	.1019**	.1787***	.3347***
	(.0331)	(.0245)	(.0447)	(.0406)	(.0257)	(.0356)
Income squared	-.0321***	-.0116***	.0059	.0158***	-.0170***	-.0339***
	(.0045)	(.0033)	(.0057)	(.0052)	(.0034)	(.0048)
Spring	.0021	.1164***	.0862	.1487**	-.0499	.0424
	(.0504)	(.0377)	(.0728)	(.0663)	(.0411)	(.0552)
Summer	.0201	.1315***	.2443***	.3233***	-.0691*	-.0026
	(.0493)	(.0369)	(.0712)	(.0648)	(.0403)	(.0541)
Fall	.0745	.0302	.0517	.0349	.0040	-.0075
	(.0457)	(.0346)	(.0662)	(.0605)	(.0373)	(.0502)
Year	-.0183	.0107	.0885*	.0743*	.0307	.1489***
	(.0330)	(.0246)	(.0476)	(.0434)	(.0269)	(.0362)
Household size (inverse)	-.2944***	-.3624***	-.1470	-.4218***	-.1595***	-.2710***
	(.0729)	(.0552)	(.1048)	(.0961)	(.0594)	(.0797)
Proportion age 0-4	-.3810**	-.2424**	-.5860**	-.5598***	-.1580	-.9205***
	(.1627)	(.1216)	(.2346)	(.2137)	(.1326)	(.1785)
Proportion age 5-9	-.3304**	-.0110	-.7487***	-.5731***	-.2760***	-.8584***
	(.1570)	(.1152)	(.2254)	(.2053)	(.1270)	(.1711)
Proportion age 10-14	-.3893***	-.0638	-.6927***	-.4298**	-.3294***	-.5864***
	(.1486)	(.1094)	(.2140)	(.1941)	(.1212)	(.1620)
Proportion age 15-19	-.2702**	-.1220	-1.0321***	-.8664***	-.3587***	-1.0146***
	(.1212)	(.0894)	(.1751)	(.1610)	(.0989)	(.1340)
Proportion age 20-29	-.2092***	-.2303***	-.8028***	-.7323***	-.2554***	-.6243***
	(.0592)	(.0451)	(.0858)	(.0785)	(.0485)	(.0651)
Proportion age 30-44	-.0249	-.0982*	-.6857***	-.6120***	-.2041***	-.4380***
	(.0669)	(.0507)	(.0976)	(.0891)	(.0552)	(.0739)
Proportion age 65-74	.0374	.0576	.5501***	.5459***	.1259**	.1475*
	(.0762)	(.0573)	(.1091)	(.0986)	(.0618)	(.0830)
Proportion age 75 and over	-.1148	.0894	.4627***	.3230***	.3219***	.0649
	(.0926)	(.0687)	(.1305)	(.1181)	(.0736)	(.0998)
Sigma	1.1748	.8458	1.7761	1.5769	.9750	1.3498
Summary statistics:						
Mean square error	.7168	.2644	2.4549	1.6348	.5388	1.4139
Probability of purchase at means	.6045	.4917	.7330	.5991	.6471	.7810
Observed nonlimit values (proportion)	.6351	.5092	.8374	.7286	.6825	.8423
Income elasticity (total)	.3171	.2109	.1934	.1881	.2217	.2402

[1]See footnotes at end of table.

Continued

Appendix table—Tobit model for food expenditures, 1980-81: Parameter estimates and summary statistics—Continued[1]

Independent variables	Fresh vegetables	Processed vegetables	Sugars and sweets	Beverages	Fats and oils	Butter
Constant	0.6386***	0.4130***	0.3628***	1.4449***	0.5912***	-0.3256***
	(.0748)	(.0600)	(.1044)	(.1150)	(.0581)	(.0622)
North Central	-.1298***	-.0837**	-.0537	-.0676	-.0669**	-.2505***
	(.0410)	(.0325)	(.0569)	(.0629)	(.0316)	(.0336)
South	-.0835**	.0337	-.0273	-.0061	-.0839***	-.2498***
	(.0415)	(.0328)	(.0575)	(.0636)	(.0320)	(.0340)
West	.0835**	-.0312	-.0604	-.0349	.0013	-.1292***
	(.0418)	(.0333)	(.0585)	(.0646)	(.0324)	(.0335)
Race	-.0896**	-.1011***	-.2302***	-.4976***	-.1754***	-.0972***
	(.0418)	(.0333)	(.0583)	(.0642)	(.0325)	(.0362)
Income	.2326***	.1654***	.2202***	.2046***	.1350***	.1272***
	(.0281)	(.0239)	(.0401)	(.0416)	(.0219)	(.0244)
Income squared	-.0225***	-.0193***	-.0288***	-.0201***	-.0146***	-.0118***
	(.0038)	(.0034)	(.0056)	(.0054)	(.0030)	(.0034)
Spring	.1078**	-.0916***	-.0238	.0240	-.0354	-.0139
	(.0436)	(.0348)	(.0609)	(.0671)	(.0338)	(.0365)
Summer	.0559	-.0928***	-.1108*	.0324	-.0486	-.0721**
	(.0428)	(.0340)	(.0598)	(.0658)	(.0330)	(.0360)
Fall	-.0372	.0139	.2960***	-.0350	.0054	.0515
	(.0398)	(.0315)	(.0551)	(.0611)	(.0306)	(.0327)
Year	.1372***	.0099	-.0133	.0064	.0325	-.0118
	(.0286)	(.0228)	(.0398)	(.0440)	(.0221)	(.0238)
Household size (inverse)	-.2974***	-.3134***	-.3641***	.0061	-.3194***	-.2083***
	(.0633)	(.0508)	(.0888)	(.0966)	(.0491)	(.0532)
Proportion age 0-4	-.7172***	-.3139***	-.2695	-1.2520***	-.4208***	-.0512
	(.1416)	(.1118)	(.1953)	(.2168)	(.1088)	(.1178)
Proportion age 5-9	-.7143***	-.3011***	.0320	-.9466***	-.3383***	.0575
	(.1360)	(.1071)	(.1859)	(.2078)	(.1041)	(.1119)
Proportion age 10-14	-.4848***	-.1341	.0031	-.4780**	-.2087**	-.0432
	(.1283)	(.1012)	(.1768)	(.1971)	(.0986)	(.1066)
Proportion age 15-19	-.7398***	-.4349***	-.2767*	-.8891***	-.4572***	-.1179
	(.1067)	(.0848)	(.1458)	(.1602)	(.0823)	(.0896)
Proportion age 20-29	-.4512***	-.2800***	-.5449***	-.6389***	-.2725***	-.0498
	(.0516)	(.0412)	(.0727)	(.0791)	(.0400)	(.0431)
Proportion age 30-44	-.2990***	-.2056***	-.2993***	-.3344***	-.2119***	-.0289
	(.0585)	(.0468)	(.0819)	(.0898)	(.0453)	(.0486)
Proportion age 65-74	.1654**	.0110	.3633***	-.2969***	.0797	.0627
	(.0655)	(.0526)	(.0915)	(.1020)	(.0508)	(.0554)
Proportion age 75 and over	.1197	.0139	-.0296	-.4033***	.1920***	.1584**
	(.0787)	(.0633)	(.1108)	(.1226)	(.0609)	(.0654)
Sigma	1.0534	.8181	1.4277	1.6383	.8050	.7030
Summary statistics:						
Mean square error	.7586	.3661	1.1953	1.9686	.3839	.0771
Probability of purchase at means	.7098	.6155	.5766	.7673	.6838	.2583
Observed nonlimit values (proportion)	.7690	.6600	.6719	.8160	.7077	.2650
Income elasticity (total)	.2437	.2267	.1669	.1258	.1809	.3497

[1]See footnotes at end of table.

Continued

Appendix table—Tobit model for food expenditures, 1980-81: Parameter estimates and summary statistics—Continued

Independent variables	Margarine	Other fats and oils	Miscellaneous prepared foods	Food away from home	Alcoholic beverages
Constant	0.0853***	0.2427***	0.6760***	3.1267***	6.5825***
	(.0278)	(.0537)	(.1347)	(.6607)	(.7019)
North Central	.0136	.0051	.1955***	−.0079	−.2461
	(.0149)	(.0293)	(.0738)	(.3649)	(.3861)
South	−.0081	.0065	.0927	.1442	−1.4809***
	(.0152)	(.0298)	(.0748)	(.3695)	(.3951)
West	.0119	.0764**	.3595***	.4360	.4583
	(.0154)	(.0300)	(.0757)	(.3737)	(.3920)
Race	−.0889***	−.1203***	−.6119***	−1.6253***	−1.3812***
	(.0159)	(.0301)	(.0758)	(.3712)	(.4019)
Income	.0305***	.0793***	.4662***	4.4098***	2.7530***
	(.0113)	(.0203)	(.0507)	(.2404)	(.2480)
Income squared	−.0054***	−.0083***	−.0468***	−.2165***	−.1048***
	(.0017)	(.0028)	(.0068)	(.0302)	(.0307)
Spring	−.0426***	.0080	−.2117***	.7597*	.3662
	(.0160)	(.0313)	(.0787)	(.3883)	(.4145)
Summer	−.0439***	.0105	−.0974	.0972	.5092
	(.0157)	(.0306)	(.0770)	(.3804)	(.4070)
Fall	−.0013	−.0095	.1110	−.1365	.9206**
	(.0144)	(.0284)	(.0714)	(.3537)	(.3769)
Year	.0025	.0458**	.1171**	−.1449	−.5972**
	(.0105)	(.0205)	(.0515)	(.2544)	(.2705)
Household size (inverse)	−.1824***	−.3592***	−.2924***	3.8833***	2.5519***
	(.0238)	(.0459)	(.1135)	(.5574)	(.5916)
Proportion age 0-4	−.1716***	−.3582***	.0273	−2.4600***	−1.7916
	(.0518)	(.1008)	(.2522)	(1.2527)	(1.3384)
Proportion age 5-9	−.1495***	−.2258**	−.1989	.1461	−.3738
	(.0495)	(.0960)	(.2435)	(1.2028)	(1.2910)
Proportion age 10-14	−.0695	−.0628	.1044	1.6199	.0109
	(.0462)	(.0906)	(.2310)	(1.1465)	(1.2276)
Proportion age 15-19	−.1927***	−.2463***	−.3612*	2.8281***	1.0744
	(.0398)	(.0758)	(.1890)	(.9160)	(.9872)
Proportion age 20-29	−.1676***	−.1778***	.0023	4.4271***	3.8409***
	(.0194)	(.0372)	(.0924)	(.4540)	(.4734)
Proportion age 30-44	−.1106***	−.1511***	−.1266	3.9365***	2.7199***
	(.0219)	(.0421)	(.1053)	(.5149)	(.5353)
Proportion age 65-74	.0484**	.0168	.2034*	−.7674	−2.2517***
	(.0237)	(.0476)	(.1193)	(.5967)	(.6524)
Proportion age 75 and over	.1176***	.0769	−.0795	−3.0716***	−5.2163***
	(.0280)	(.0570)	(.1440)	(.7355)	(.8452)
Sigma	.3434	.7160	1.9164	9.4959	9.3256
Summary statistics:					
Mean square error	.0311	.2110	2.7664	74.5420	43.0840
Probability of purchase at means	.4064	.5472	.7438	.7844	.4862
Observed nonlimit values (proportion)	.4075	.5570	.8225	.8629	.5709
Income elasticity (total)	.0827	.1439	.2507	.5583	.5677

Numbers in parentheses are standard errors for the parameter estimates. * = Significance at the 0.10 level. ** = Significance at the 0.05 level. ***Significance at the 0.01 level. [1]Income elasticities are evaluated at sample means reported in table 5.

☆U.S. GOVERNMENT PRINTING OFFICE: 1 9 8 6 —4 9 0 —9 2 0 / 4 0 0 4 2

END