APPLEBAUM SCHOLARSHIP PAPER

Analysis of Socio-economic and Demographic Factors

Affecting Food Away From Home Consumption:

A Synopsis[*]

by

Rodolfo M. Nayga, Jr.
Department of Agricultural Economics and Business
Massey University, New Zealand

Oral Capps, Jr.
Department of Agricultural Economics, Texas A&M University
College Station, Texas

Introduction

U.S. consumers States spent nearly $550 billion for both food at home (FAH) and food away from home (FAFH) in 1991, up 6.4 percent from 1989. This total includes spending at all retail outlets (e.g. food stores, restaurants), at service establishments (e.g. meals at lodging places, snacks at entertainment facilities), plus allowances for food served in institutions (e.g. schools, hospitals), in the travel industry (e.g. airlines), and for military spending. Expenditures for FAH amounted to almost $300 billion, up 5.7 percent from 1989. Spending for FAFH, on the other hand, came to roughly $250 billion, 7.2 percent above the 1989 level (*Food Retailing Review*, 1991).

In recent years, U.S. consumers have eaten an increased number of meals outside the home. Very roughly, the change has been from about one meal in four to about one in three, an increase of about 33 percent during the last 25 years (Manchester, 1990). As exhibited in Table 1, the share of food spending for FAFH rose from 26.6 percent in 1960 to 45.4 percent in 1990. In contrast, the share of food spending allocated for FAH dropped from 73.4 percent in 1960 to 54.6 percent in 1990.

Food expenditures continually take a smaller share of consumers' disposable income. Food expenditures, as a percent of income, decreased from 16.3 percent in 1970 to 13.8 percent in 1989. The percentage of disposable income going to FAH has also declined from 10.8 percent in 1970 to 7.6 percent in 1989. In con-

---

Table 1. Expenditures for Food at Home and Food Away from Home

Year	Food at Home		Food Away from Home	
	Nominal[a]	*Percent[b]*	*Nominal[a]*	*Percent[b]*
1960	54,121	73.4	19,607	26.6
1965	60,542	69.8	26,197	30.2
1970	77,527	66.2	39,583	33.8
1975	119,850	63.8	68,109	36.2
1980	185,638	60.6	120,530	39.4
1981	198,520	60.1	131,563	39.9
1982	206,184	59.4	140,722	40.6
1983	217,114	58.8	152,272	41.2
1984	228,447	58.3	163,093	41.7
1985	235,935	57.9	171,463	42.1
1986	244,897	57.0	184,957	43.0
1987	254,058	55.5	203,869	44.5
1988	266,163	54.8	219,625	45.2
1989	282,548	55.0	230,785	45.0
1990	306,600	54.6	254,500	45.4

[a]millions of dollar
[b]As a percentage of expenditures on all foods

Source: U.S. Department of Agriculture and *Food Retailing Review*, 1991 Edition.

trast, the percentage going to FAFH has increased from 5.5 percent in 1970 to 6.3 percent a decade later.

The away from home market is composed of commercial foodservice establishments (i.e. restaurants, fast food places, cafeteria) and non-commercial outlets (i.e. school or military dining rooms, child care centers). Although noncommercial outlets serve more food to more people, they account for only 30 percent of the total retail value of FAFH.

The majority of the FAFH sales from the past came from conventional restaurants. However, fast food eating establishments have more than tripled in number since the early 1960s. The fast food industry has started placing outlets in locations not previously served such as schools, military bases, and international markets. In addition, menus are being enlarged to include items such as salad bars, soups, baked potatoes, burgers, and whole grain buns. Franchised restaurants are now also facing growing competition from within the industry, from supermarkets and other food stores that prepare take-out food and from hotels that offer dining room service and catering.

Socio-economic and Demographic Forces

The move toward eating out is prompted by changes in consumer lifestyles. Some socio-economic and demographic factors that come into play are: a growing number of women, married and single, in the work force; increasing importance of convenience in eating out; more families living on two incomes; the impact of advertising and promotion by large food service chains; and more people in the age group of 25 to 44 who are inclined to eat out often (Putnam and Van Dress, 1984). Only about seven percent of all households now fit the old stereotype family of a working husband, a wife who does not work for wages, and two children (Kinsey, 1990).

Americans are spending less of their lives in family households. Married couples with children are declining as a share of all households (U.S. Statistical Abstracts, 1988 and 1989). According to the 1990 Census, the percentage of U.S. house-holds headed by married couples declined from 60 percent in 1980 to 55 percent in 1990. Thirty percent of the households in 1990 were non-family households or those in which no two individuals are related by blood, marriage, or adoption, up from 27 percent in 1980. In most cases, these non-family households consist of one person, often elderly and living alone (Noah, 1991).

The one-adult households are fastest growing and are likely to exhibit non-conventional food consumption patterns (i.e. FAFH consumption). For instance, single and employed persons living alone spend much more on FAFH than any other group (Manchester, 1990). The growth of one-adult households is fostered by later marriages, continued high divorce rates, decreased fertility and increased longevity.

More women now are in the labor force, increasing the demands for convenience in home prepared food, for home delivered food and for FAFH. In fact, over 70 percent of women age 25-44 are in the labor force, and notably about 75 percent of these working women work full time. Moreover, labor force participation rate of women increased from 52 percent in 1980 to 58 percent in 1990 (Waldrop and Exter, 1991).

In addition to these changes, per capita income in the United States has been rising. U.S. per capita personal income grew by an average 6.6 percent nationally in 1989, according to the Commerce Department. In 1982 dollars, per capita income increased over 43 percent between 1970 and 1989. More families now are living with two incomes. Families with two or more earners increased from 56 percent in 1980 to 58 percent in 1990 of family households. There is also a growing gap between the poor and the rich. Uneducated and poor households (mostly non-whites and single women) with incomes under $15,000 per year now account for about a third of the households. These households have a budget share for food of about 50 percent and are mostly participants in food assistance programs. In contrast, households with annual incomes over $35,000 spend only less than eight percent of their income for food. For this group, price will be less important than food safety, quality, taste and experience (Kinsey, 1990).

The U.S. population is more diverse than ever. As in the 1980s, the growing ethnic diversity of America will create new challenges for food marketers especially in the away from home sector. In early 1980s, less than 20 percent of Americans belonged to a racial or ethnic group. By 1990, nearly 25 percent of the U.S. population belonged to a racial or ethnic minority. Specifically, Americans of "other races" (e.g. those that are not white or black) grew seven times faster than the overall population in the 1980s (*American Demographics*, March 1991). The white and black populations only changed six and 13 percent, respectively, between 1980 and 1990 (*Business Week*, June 17, 1991). By 2005 there will be an equal number of blacks and hispanics in the United States which will make up over one quarter of the population. These trends will mean that the overall make-up of consumer needs and preferences will continue to change.

Rationale of the Study

Food consumption relationships are traditionally specified between socioeconomic factors and quantity or expenditure measures. Although numerous studies exist on FAFH quantity or expenditure models (see Table 2), these studies have used earlier data sets and hence, do not necessarily reflect recent market conditions. Moreover, only the McCracken and Brandt study has investigated FAFH consumption by type of food facility. There is, therefore, a need to develop FAFH quantity or expenditure models by type of facility using recent data sets (i.e. the 1987-88 National Food Consumption Survey). The development of these models would not only lead to improved market planning but would also allow comparison of the results with previous studies.

These approaches, however, would not allow inferences regarding the nutritional status of an individual's diet. Large quantities of food consumed or large expenditures on food either away from home or at home may not necessarily mean adequacy in terms of nutrient consumption (Adrian and Daniel, 1976). To quote McCracken and Brandt (1987), "knowledge is the key to rapid and efficient adjustments in the food system to changing consumer demands. Along with the

impact of these changing food consumption patterns on the food distribution system itself, the nutritional intake of consumers is likely to be also affected." Also, the increasing complexity of the food industry as well as the heightened consumer interest in health and nutrition have increased the need for a complete understanding of nutrient consumption patterns in the United States. It is, therefore, imperative that the effect of these changing food consumption patterns on the food distribution system and on the nutritional status of the consumer be examined. Although considerable literature exists on demand models for nutrients (i.e. Price, et al., 1978; Akin, et al., 1983; Chavas and Keplinger, 1983; Scearce and Jensen, 1979; Devaney and Fraker, 1989; Adrian and Daniel, 1976; Lane, 1978; Davis and Neenan, 1979; Windham, et al., 1983), little attention is paid to the analysis of the demand for nutrients derived from either FAFH or FAH. Evaluation of the nutrients that are consumed from either FAFH or FAH would provide a means of assessing the nutritional quality of American diets as well as a comprehensive description and understanding of nutrient consumption patterns not only from total food consumed but also from FAFH and FAH.

Little is known too about the demographic and socio-economic characteristics of individuals who have either eaten away from home or individuals who have eaten a particular meat product away from home or at home. With the exception of the Lee and Brown piece (see Table 2), no studies as yet have analyzed the effect of socio-demographic and economic factors on the decision to eat FAFH. Furthermore, Lee and Brown's study used the 1977-78 National Food Consumption Survey and, therefore, may not reflect current market conditions. The restaurant and fast food industries would benefit from a study that would provide them some information regarding the demographic and socio-economic profile of consumers who eat out. Likewise, information derived from this study would be useful for processors and producers who want to anticipate future market changes and derived demands for their products.

This research attempts to fill these voids by using the Individual Intake phase of the 1987-1988

Table 2. Selected Studies on Food Away from Home (FAFH) Expenditure and Consumption

Researcher(s)	Data Set[a]	Socio-Demographic Factors Considered	Focus of the Study
Derrick, Dardis, Lehfeld	1972-73 CES	Income, Household size, Age, Education, Region, Urbanization, Employment, Race, Marital Status	Impact of demographic variables on FAFH expenditure
Prochaska and Schrimper	1965-66 NFCS (Spring Portion)	Urbanization, Income, Race, Region, Employment, Number of children	Effect of opportunity cost of homemaker's time on FAFH consumption
Kinsey	PSID	Various sources of income, Race, Employment, Household size	Effect of various sources of income on marginal propensity to consume FAFH
Redman	1972-73 and, 1973-74 BLS, CES	Income, Employment, Family composition, Education, Age, Region, Race, Urbanization	Impact of socio-economic factors and women's time allocation on FAFH
Sexauer	1960-61 and, 1972-73 BLS, CES	Family size, Age, Urbanization, Education, Sex, Employment, Income	Effects of demographic shifts and income distribution changes on FAFH expenditure

Table 2. cont

Researcher(s)	Data Set[a]	Socio-Demographic Factors Considered	Focus of the Study
Lee, Brown	1977-78 NFCS	Income, Urbanization, Region, Employment, Education, Race, Household size	Factors affecting away from home and at home consumption and the decision to eat out
McCracken and Brandt	1977-78 NFCS	Education, Age, Retirement, Region, Race, Urbanization, Income, Household composition and size	Factors affecting FAFH expenditure by type of facility
Lippert, Love	1980 BLS, CES	Income, Employment, Education, Family size and composition, Region, Race, Urbanization	Relationship between FAFH expenditure and socio-economic characteristics of household between 1972-73 and 1980

[a] BLS, CES = Bureau of Labor Statistics, Consumer Expenditure Survey. NFCS = National Food Consumption Survey. PSID = Panel Study of Income Dynamics.

National Food Consumption Survey. Information on food consumption and nutrient intake of individuals in the away from home and at home markets are available from this particular data set. This research will attempt to assess the impact of various socio-economic characteristics of the individual not only on total nutrient consumption but also on nutrient consumption away from home and at home. This specification would allow not only the assessment and comparison of demand for nutrients derived from FAFH and nutrients derived from FAH but also would allow a comparison of the results with previous studies.

This study also attempts to identify, in definitive fashion, the demographic and socio-economic characteristics of individuals who have eaten away from home and individuals who have eaten a particular meat product either away from home or at home. Moreover, FAFH quantity models that examine the effects of socio-demographic and economic factors on FAFH consumption by type of facility are also developed. Due to the unavailability of the household expenditure phase of the 1987-88 National Food Consumption Survey during the completion stage of this study, no theoretical and empirical models of household expenditures for FAFH are developed in this study.

Monthly time series data are used in a three-commodity complete demand system framework to derive price and income elasticity estimates for food away from home, food at home, and non-food. Although the commodities involved are broad aggregates, the results of this study could be used by the food distribution and retail industry as an aid in making important pricing and policy decisions.

Objectives

The objectives of this research are: (1) to employ a complete demand systems approach using time series data for FAFH, FAH, and non-food to estimate own-price, cross-price, and income elasticities; (2) to determine factors affecting individual intake of nutrients derived from FAFH, nutrients derived from FAH, and nutrients derived from total food consumption; (3) to identify the demographic and socio-economic charac-

teristics of consumers who have eaten away from home and of those who have eaten a particular meat product either away from home or at home; and (4) to determine factors affecting FAFH consumption by type of facility using quantity models. The model specifications are exhibited in the Appendix.

Data Sources

Two sets of data are used in this study. The first data set consists of monthly time series data from 1970 to 1989 gathered from various government statistical documents or publications. This data set is used in the estimation of the dynamic Almost Ideal Demand System. The second data set is the 1987-88 National Food Consumption Survey (NFCS) from the U.S. Department of Agriculture. This data set is used is the estimation of the nutrient demand equations, the Logit models, and the quantity models for food away from home.

The monthly time series data from 1970 to 1989 consist of FAFH, FAH, and non-food expenditures, consumer price indexes, and consumption expenditures. The FAFH expenditure data are derived from monthly retail sales of eating and drinking places in the United States. Eating and drinking places include restaurants, lunchrooms, cafeterias, and fast-food operations or refreshment places. In 1989, commercial eating and drinking places accounted for two-thirds of the retail equivalent value of expenditures for FAFH (*Food Retailing Review*, 1991). The other third of the expenditures value for FAFH came from schools, hotels and motels, military facilities and other facilities. The FAH expenditure data, on the other hand, are derived from monthly retail sales of food stores. Food stores include grocery stores, meat and fish markets, and bakeries. The source of both the eating and drinking places, and the food stores sales data is the Bureau of Census. Non-food expenditures are derived by deducting both FAFH and FAH expenditures from total consumption expenditures. Another variable used in the analysis is the labor force participation rate of women. These data are obtained from the various issues of Employment and Earnings publications.

The data used in the nutrient demand, logit analyses, and quantity models for FAFH come from the U.S. Department of Agriculture's 1987-88 Nationwide Food Consumption Survey (NFCS). This data set is the most recent of the national household food consumption surveys conducted by USDA. The 1987-88 survey contains two parts: (1) household food use and (2) individual intake. The household phase provides information on food used by the household for a one-week period and on the cost of that food. The individual intake phase, on the other hand, provides three days of information on food intake of household members. The individual intake phase of the 1987-88 NFCS data set marks only the fifth time that nationwide information on the dietary intakes of individual household members has been collected by USDA. Only the individual intake phase is used in the empirical analysis part of this study due to the unavailability of the household food use phase during the completion stage of this dissertation.

The individual intake phase of the 1987-88 NFCS data set provides data on three days of food and nutrient intake by individuals of all ages surveyed in the 48 contiguous states. These individuals were asked to provide three consecutive days of dietary data. Respondents were also asked about the sources of each food eaten. Sources included food that was eaten at home, food brought into the home but later eaten away from home, and food that was never brought into the home. USDA considers food from the first two sources to be from the home food supply. Thus, this study considers food from the first two sources to be food at home (FAH), and the third source as food away from home (FAFH). Information is also available about the place where the FAFH was obtained (i.e. restaurants, school, fast-food establishments, or someone else's home).

The individual intake data set also includes information of the individual on the following variables: urbanization, region, race, sex, employment status, food stamp participation, WIC participation, National School Lunch and National School Breakfast Programs participation, special diet information, household size, age, household income, food sources, and foods consumed.

The response rate by households in the survey was low. In particular, participation by households drawn into the sample was below 35 percent. This is lower than in previous NFCS data sets. USDA indicated that a major reason for this occurrence was "heavy respondent burden" in terms of the amount of information asked from each respondent.

As in any cross-sectional study, several issues arise in handling the data set. The original number of respondents in the survey is 11,045. However, several individuals in the sample have incomplete socio-economic and demographic information. Subsequently, observations with missing individual relevant socio-economic and demographic information were deleted.

Summary of the Results and their Implications

Dynamic Almost Ideal Demand System Model

The first part of this study pertains to the development of a three commodity complete demand system using monthly time series data for FAFH, FAH, and non-food. Using the linear approximation of the dynamic version of the Almost Ideal Demand System, price and expenditure elasticities are derived that could aid in the improvement of market planning and pricing decisions for the food distribution sector. Other variables included in the system are the labor force participation rate of women and monthly seasonal dummy variables. Consistent with prior expectations, the results indicate that the share of total expenditure going to FAFH increases as the labor force participation rate of women increases. However, the expenditure share for FAH decreases as the labor force participation rate of women increases. These results could imply that women tend to rely more on FAFH than FAH as they become more involved in the labor force and as their opportunity costs of time become higher. Differences in the seasonal patterns are also evident in the FAFH and FAH equations.

In accord with economic theory, all the expenditure elasticities are positive and all the own-price elasticities are negative. The demand for FAFH is more price sensitive than the demand for FAH based on the compensated own-price

elasticities of -0.741 and -0.426 for FAFH and FAH, respectively. Based on the compensated cross-price elasticities, there seems to be general substitutability relationships among the three broad commodities of FAFH, FAH, and non-food. The price of non-food, however, has a larger effect on the demand of either FAFH or FAH compared to the price effects of FAFH and FAH on the demand for non-food.

This part of the study documents the use of time series data in determining the demand for FAFH, FAH, and non-food. Although the commodities examined are broad aggregates, the analyses in this study could be used by the food distribution and retail industry as an aid in making important pricing and policy decisions.

Nutrient Demand Models

Another objective of this research is to determine the factors affecting individual intake of nutrients derived from either all food, FAFH, or FAH. Although considerable literature exists on demand models for nutrients, little attention is paid to the analysis of the demand for nutrients derived from either FAFH or FAH. Evaluation of the nutrients that are consumed from either FAFH or FAH provides a means of assessing the nutritional or dietary quality of American diets as well as provide a comprehensive description and understanding of nutrient consumption patterns not only from total food consumption but also from FAFH and FAH. In addition, the information obtained from this study on the effects of various demographic and socio-economic variables on the individual's nutrient intake from FAFH could be used by nutrition educators and policy makers in targeting their nutrition education programs and dollars.

The results in this study generally indicate that average nutrient intakes from FAFH are lower than average nutrient intakes from FAH with the exception of fats, saturated fatty acids, mono-unsaturated fatty acids, and polyunsaturated fatty acids. Interestingly, the results also indicate that roughly 30 percent of the food energy kilocalories comes from FAFH while the remaining 70 percent comes from FAH. These results have important implications for the away from home

food industry. The fast food industry, for instance, has been criticized for serving food which are "unhealthy" due to its high fat content. An example would be a fast food meal of a hamburger, french fries, and milk shake which contains approximately half the RDA of calories and protein for the adult male but only gives about one-third of the RDA of vitamin C, thiamin, and niacin, and even lesser amounts of iron, calcium, vitamin A, and riboflavin (Putnam and Van Dress, 1984).

Concern about health and fitness has encouraged consumers to prefer foods perceived as "fresh" and "light." In a 1988 Gallup poll conducted for the National Restaurant Association, almost 60 percent of adult consumers claimed to be very interested in nutrition-conscious menu items in the away from home industry. As more consumers demand menu items with improved nutritive value, FAFH operators will have to adapt to these nutrition-conscious patrons if they are to stay competitive. Some of the fast food chains have, however, started to respond positively to the demand of the customers for healthier and low fat food. An example of this is McDonald's which recently unveiled their 91 percent fat free "McLean Deluxe" burger. Likewise, Hardee's is rolling out a new low fat burger called the "Real Lean Deluxe" (*Wall Street Journal*, July 15, 1991; p. B1). In addition, restaurants and fast food chains are enlarging their menus to include salad bars and lighter dishes.

Individuals residing in suburban areas have slightly higher intake of most of the nutrients analyzed from FAFH as a percentage of RDA than individuals residing in central cities or non-metro areas. Likewise, individuals from the South have slightly higher intakes of most nutrients from FAFH as a percentage of RDA than those from other parts of the country. Also having higher intakes from FAFH as a percentage of RDA are the following: employed individuals compared to unemployed individuals; non-food stamp recipients compared to food stamp recipients; and those who are not on a special diet compared to those who are. Across all sex and age groups, the average intake of nutrients from FAH is generally 50 percent or over of RDA. Except for the intake of calcium and magnesium

by certain population groups, the individuals in the sample seem to have generally acquired at least two-thirds of the recommended daily allowances from all foods which indicate that the sample, which is representative of the population, is basically of good health status.

The nutrient consumption regression models have also disclosed some interesting results. For instance, individuals who reside in central cities or suburban areas consume lower amounts of fats and the various fatty acids per 1000 kilocalories from FAFH than individuals who reside in non-metro areas. Significant regional differences are also evident in the consumption of various nutrients from FAFH. For example, individuals from the South seem to generally consume more amounts of various nutrients except alcohol from FAFH but less amounts from FAH than individuals from other regions of the United States. Males, as expected, consume more nutrients from either FAFH or FAH than females with the exception of fats and the various fatty acids. Evident in the results is the positive relationship between the weight of an individual and the consumption of various nutrients from FAFH.

Employed individuals consume more amounts of various nutrients except alcohol and dietary fiber away from home than unemployed individuals. In contrast, employed individuals generally consume less amounts of various nutrients at home compared to unemployed individuals. As expected, individuals who are on a special diet and individuals who receive food stamps significantly consume less amounts of numerous nutrients away from home than their counterparts.

An increase in household size is generally associated with an increase in nutrient consumption from FAH but a decrease in nutrient consumption from FAFH. This result is expected considering that the cost of eating out is proportionate to the number of persons eating out. Moreover, age and income are generally significant factors affecting individual consumption of many nutrients either from FAFH or FAH. In particular, consumption of almost all the nutrients from FAFH except for some energy yielding nutrients decreases (increases) initially with successive increments of age (income) and then

increases (decreases). The consumption pattern of most nutrients from FAH is the reverse with initial increases (decreases) and then followed with decreases (increases) with successive increments of age (income).

Logit Models

Little information is known about the demographic and socio-economic characteristics of individuals who have either eaten away from home or individuals who have eaten a particular meat product away from home or at home. Logit models are developed to investigate the decision to eat FAFH and the decision to eat a particular meat product either away from home or at home. The results of these logit models would be of significant interest to not only the restaurant and fast food industry but also to the various meat industries (i.e. beef, pork, lamb, poultry, fish).

The results indicate that the following individuals are less likely to eat FAFH: individuals from the Northeast compared to those in the South; blacks and hispanics compared to whites; unemployed individuals compared to employed individuals; food stamp recipients compared to non-food stamp recipients; those on a special diet compared to those not on a special diet; individuals who consumed their food mostly during weekdays compared to individuals who consumed their food mostly during weekends; and larger households compared to smaller households.

The likelihood of eating FAFH decreases with age but increases with income, *ceteris paribus*. Also, the probability of eating FAFH is significantly lower during the first and third quarters of the year compared to the second quarter of the year.

Generally, the demographic and socio-economic profiles of individuals eating the same meat product are different across the three different sources: FAFH, FAH, and all food. Similarly, the demographic and socio-economic profiles of individuals who eat from the same source are different across the various meat products.

Contrasting results are apparent between the FAFH and FAH logit models across the various

meat products. Employed individuals, for instance, are more (less) likely to eat a particular meat product away from home (at home) than unemployed individuals. This result could be related to the fact that employed individuals might have less time to prepare home-cooked meals than unemployed individuals. In addition, results generally indicate that the probability of eating a meat product away from home (at home) decreases (increases) as the household size increases. Once again, the cost of eating out is more with larger households than smaller households. The weekend variable is also a significant factor in most of the meat logit models for FAFH but not in meat logit models for FAH. This result could imply that during weekends, the likelihood of eating meats away from home is greater than the likelihood of eating meat at home.

Blacks are generally more likely to eat poultry, fish and shellfish but less likely to eat beef than whites either away from home or at home. Individuals residing in central cities and suburban areas are also more likely to eat poultry, fish and shellfish but less likely to eat beef and pork at home than those residing in non-metro areas. Males are more likely to eat beef and pork. Individuals who are on a special diet are generally more likely to eat poultry, fish and shellfish, lamb, veal, and game but less likely to eat beef and pork than those who are not on a special diet. This result might be related to the perception that beef and pork have higher fat content than other meat products. Thus, the beef and pork industries might have to emphasize the "leanness" of their products in their promotion campaigns to recapture health and nutrition conscious consumers. The poultry, fish, and lamb industries, on the other hand, should not only continue their efforts on promoting the "healthfulness" of their products but also focus on attracting minorities (i.e. blacks) as well as individuals who live in non-metro areas.

The logit models in this study identified the types of individuals that are more likely to eat FAFH as well as the types of individuals who are more likely to eat various meat products either away from home or at home. The identification of these types of consumers is essential in analyzing consumption behavior and developing specific marketing programs. Consequently, these information should aid market analysts focus their efforts on the group of consumers less likely to eat out or on the group of consumers less likely to eat a particular meat product either away from home or at home.

Quantity Models

The quantity models are also developed using the Heckman procedure to determine the factors affecting FAFH consumption not only from all food facilities but also from the different types of FAFH facility. The FAFH consumption measure used is number of meals purchased by an individual. The findings from the quantity model for all types of FAFH facilities indicate that the following variables significantly affect the number of meals purchased: regional variables as a group; race variables as a group; ethnicity; sex; household size; weekend variable; age; and income. Importantly, the results also indicate that employed individuals consume more meals away from home than unemployed individuals. This result supports the hypothesis that individuals with higher opportunity cost of time, assuming that employed individuals have higher opportunity cost of time than unemployed individuals, purchase and consume more meals away from home.

The disaggregate regression estimates for the number of meals consumed from restaurants, fast food facilities, and other away from home food facilities reveal differing significance of the various socio-demographic factors by type of FAFH establishment. Of most importance is the result that suggests that employed individuals significantly consume more meals from fast food facilities but only marginally consume more meals from restaurants than unemployed individuals. Income is not statistically significant in any of the three models on FAFH facilities. These findings may suggest that individuals eat at restaurants not only to save time but also to acquire some recreational diversion. Moreover, these results may suggest that consuming meals away from home in restaurants and fast food facilities depends less on income than on the employment status of the individual.

These results from the quantity models may be of considerable importance for the restaurant, fast food, and other away from home industries. For instance, the findings in this study suggest that marketing efforts by these FAFH industries should be focused on individuals who purchase relatively fewer meals away from home. These individuals may include those with larger household sizes, females, those who are unemployed, and even those who are on specials diets. The fast food industry (includes cafeterias and self-service restaurants in this study) should also cater to the taste of older people if it wants to boost its sales.

Concluding Remarks and Areas for Further Research

The increasing complexity of the away from home food industry as well as the heightened consumer interest in health and nutrition, have increased the need for a complete understanding of away from home consumption patterns in the United States. To keep up with the recent trends in consumer demand, the FAFH industry must continually be in the midst of creating a vast array of concepts that appeal to specific consumer tastes and preferences. It is, therefore, imperative that the effects of these changing food consumption patterns on the food distribution system and on the nutritional status of the consumer be examined.

This study identifies several socio-economic and demographic characteristics affecting food away from home consumption. The objectives of this study are: (1) to estimate own-price, cross-price, and income elasticities for food away from home, food at home, and non-food using a complete demand systems approach and time series data; (2) to determine factors affecting individual intake of nutrients derived from either food away from home, food at home, or total food consumption; (3) to identify the socio-demographic characteristics of consumers who have consumed food away from home and those who have eaten a particular meat product either away from home or at home; and (4) to determine factors affecting food away from home consumption by type of facility. The individual intake phase of the 1987-1988 National Food Consumption Survey is used to accomplish the last three objectives.

Consistent with prior expectations, results indicate that as the labor force participation rate of women increases, the share of total expenditure going to food away from home increases but the expenditure share of food at home decreases. As well, results generally indicate that distinct differences exist between the type of characteristics that significantly affect the intake of nutrients from food away from home and food at home. Various socio-economic and demographic characteristics also affect the following: (1) the likelihood of eating food away from home; (2) the likelihood of consuming a particular meat product (i.e. beef; pork; lamb, veal, and game; poultry; and fish and shellfish) either away from home or at home; and the number of meals purchased away from home by type of facility.

Due to the unavailability of the household food use or expenditure phase of the 1987-88 NFCS data during the completion stage of this dissertation, no theoretical and empirical models on household expenditures for FAFH are developed in this study. Although quantity models are developed using number of meals as measure for FAFH consumption, it is still essential to develop theoretical and empirical models of FAFH expenditures considering the significant alterations in expenditure patterns and the apparent substitution of expenditures on FAFH for FAH. The results of this type of study using the household food use phase of the 1987-88 NFCS data set can then be compared to the results from the McCracken and Brandt study in 1987 which used the 1977-78 NFCS data.

Future research should also focus on the effect of increased availability of convenience and prepared foods, which reduce the opportunity cost component of eating at home, on FAFH consumption. For instance, little is known about the cross-price elasticities of eating away from home and of eating a home cooked meal or prepared/convenience food at home. As well, limited information is available regarding the factors that influence relative market shares of these "commodities" over time.

So far, no studies have dealt with FAFH expenditures on a commodity basis (i.e. beef, pork, poultry, fish, etc.). Scant information is,

therefore, available on demand parameters for FAFH expenditures by type of commodity. This type of research could be handled with the use of the Consumer Reports on Eating Share Trends (CREST) data by the NPD Group. The CREST data series, collected by the NPD Group since 1976, is gathered via a comprehensive and detailed diary in which 12,800 U.S. households record their restaurant visits and purchases of meals, snacks, and beverages. The households, which are dispersed among the 48 contiguous United States, are recruited by mail using a stratified random quota sampling system. The CREST data series tracks over 140 different food and beverage items. This series is the most comprehensive data set available on household purchase patterns of food in the away from home market.

The role of inventory demand and habits on consumer expenditure patterns on FAFH and FAH should also be examined. This research would, however, need the availability of a comprehensive time series data with variable price and quantity data on food from the away from home and at home markets. The analysis in this type of study can be centered on the use of the Houthakker-Taylor state adjustment model. Generally, inventory demand tends to dominate habits in the short term. Likewise, short-run consumer behavior, as opposed to longer-run consumer behavior, is usually influenced more by consumer inventories than habits, particularly for food. It would be interesting to know the role of inventory demand and habits not only on aggregate FAFH and FAH but also on disaggregate commodities from away from home and at home markets.

Related to the topic of habit formation is structural change. In demand analysis, shifts in the utility function may result from outside information and other external influences on the consumer or from variables related to past decisions (i.e. habit formation). It would be worthwhile to investigate structural change in consumer behavior within the FAFH market. Ingco and Manderscheid (1988) discussed various ways to test for the presence of structural change in demand models. Although difficult, it would also be important to assess the magnitude of structural change, if there are any, in consumer behavior within the away from home food industry. The

results that can be obtained from this type of study could be vital in policy analysis and forecasting for the food industry.

References

Adrian, J. and R. Daniel, "Impact of Socio-economic Factors on Consumption of Selected Food Nutrients in the United States," *American Journal of Agricultural Economics*, 58(1976):31-38.

Akin, J. D., D. K. Guilkey, and B. M. Popkin, "The School Lunch Program and Nutrient Intake: A Switching Regression Analysis," *American Journal of Agricultural Economics*, 65(1983):477-85.

American Demographics, March 1991.

Business Week, "Suddenly, Asian Americans are a Marketer's Dream," June 17, 1991, pp. 54-55.

Chavas, J. P. and K. O. Keplinger, "Impact of Domestic Food Programs on Nutrient Intake of Low Income Persons in the United States," *Southern Journal of Agricultural Economics*, 15(1983):155-63.

Davis, C. G. and P. H. Neenan, "The Impact of Food Stamps and Nutrition Education Programs on Food Groups Expenditure and Nutrient Intake of Low Income Households," *Southern Journal of Agricultural Economics*, 11(1979):121-29.

Derrick, F., R. Dardis, and A. Lehfeld, "The Impact of Demographic Variables on Expenditures for Food Away from Home," *Journal of the Northeastern Agricultural Economics Council*, 11(1982):1-10.

Devaney, B. and T. Fraker, "The Dietary Impacts of the School Breakfast Program," *American Journal of Agricultural Economics*, 71(1989):932-48.

Food Retailing Review, 1991 Edition, The Food Institute, January 1991.

Heckman, J. J., "Sample Selection Bias as a Specification Error," *Econometrica*, 47(1979):153-161.

Houthakker, H. and L. Taylor. *Consumer Demand in the United States: Analysis and Projections*. Cambridge, Mass., Harvard University Press, 1970.

Ingco, M. and L. Manderscheid, "Modelling Parameter Variation in Econometric Models," Agri. Econ. Report No. 506, Dept. of Agri. Econ., Michigan State University, March 1988.

Kinsey, J., "Working Wives and the Marginal Propensity to Consume Food Away From Home," *American Journal of Agricultural Economics*, 65(February 1983):10-19.

Kinsey, J., "Diverse Demographics Drive the Food Industry," *Choices*, Second Quarter 1990, p. 23.

Lane, S., "Food Distribution and Food Stamp Program Effects on Nutritional Achievement of Low Income Persons in Kern County, California," *American Journal of Agricultural Economics*, 60(1978):108-16.

Lee, J. and M. Brown, "Food Expenditures at Home and Away from Home in the United States- A Switching Regression Analysis," *The Review of Economics and Statistics*, 68(1986):142-47.

Lippert, A. and D. Love, "Family Expenditures for Food Away from Home and Prepared Foods," *Family Economics Review*, 3(1986):9-14.

Manchester, A. C., "Food Expenditures at a Glance," *National Food Review*, ERS-USDA, 13(1990):25.

McCracken, V. A. and J. A. Brandt, "Household Consumption of Food Away From Home: Total Expenditure and by Type of Food Facility," *American Journal of Agricultural Economics*, 69(May 1987):274-284.

Nayga Jr., R. M., *Analysis of Socio-economic and Demographic Factors Affecting Food Away from Home Consumption*, Ph.D. dissertation, Texas A&M University, December 1991.

Noah, T., "Married Couples Are Found to Head Fewer Households," *Wall Street Journal*, June 11, 1991, p. A6.

Pindyck, R. S. and D. L. Rubinfeld, *Econometric Models and Economic Forecasts*, Third Edition, McGraw-Hill, 1991.

Price, D. W., D. A. West, G. E. Schier, and D. Z. Price, "Food Delivery Programs and Other Factors Affecting Nutrient Intake of Children," *American Journal of Agricultural Economics* 60(1978):609-18.

Prochaska, F. J. and R. A. Schrimper, "Opportunity Cost of Time and Other Socioeconomic Effects on Away from Home Food Consumption," *American Journal of Agricultural Economics*, 55(November 1973):595-603.

Putnam, J. J. and M. G. Van Dress, "Changes Ahead for Eating Out," *National Food Review*. 26(1984):15-17.

Redman, B., "The Impact of Women's Time Allocation on Expenditure for Meals Away from Home and Prepared Foods," *American Journal of Agricultural Economics*, 62,2(May 1980):234-37.

Scearce, W. K., and R. B. Jensen, "Food Stamp Program Effects on Availability of Food Nutrients for Low Income Families in the Southern Region of the United States," *Southern Journal of Agricultural Economics*, 11(1979):113-20.

Sexauer, B., "The Effects of Demographic Shifts and Changes in the Income Distributions of Food Away From Home Expenditure," *American Journal of Agricultural Economics*, 61(December 1979):1046-57.

U.S. Dept. of Agriculture, *National Food Situation*, Economic Research Service, Washington D.C., various issues.

U.S. Dept. of Commerce, *Survey of Current Business*, Bureau of Economic Analysis, Washington D.C., various issues.

U.S. Dept. of Commerce, *Business Statistics*, Bureau of Economic Analysis, Washington D.C., various issues.

U.S. Dept. of Commerce, *Current Population Reports*, Bureau of Census, Washington D.C., various issues.

U.S. Dept. of Labor, *Employment and Earnings*, Bureau of Labor Statistics, Washington D.C., various issues.

U.S. Statistical Abstracts, 1988-89.

Waldrop J. and T. Exter, "The Legacy of the 1980s," *American Demographics*, 13(March 1991):32-38.

Wall Street Journal, "Lean and Mean: Hardee's Joins Low-Fat Fray," July 15, 1991, p. B1.

Windham, C., B. Wyse, and R. Hansen, "Nutrient Density of Diets in the USDA Nationwide Food Consumption Survey, 1977-1978: II. Adequacy of Nutrient Density Consumption Practices," *Journal of the American Dietetic Association*, 82(January 1983):34-43.

APPENDIX

Dynamic Almost Ideal Demand System Model

The dynamic linear approximation almost ideal demand system (LA/AIDS) specification used in this study involves a three commodity demand system. The three commodities analyzed are FAFH, FAH, and non-food. The demand system is also augmented with the inclusion of a lagged budget share, eleven monthly seasonal dummy variables and a variable representing the labor force participation rate of women. Monthly dummy variables are used to capture the effects of seasonality. The coefficients associated with these variables may be positive or negative. Moreover, the labor force participation rate of women is included in the analysis since it is hypothesized that as the labor force participation rate of women increases, the demand for FAFH also increases because of increasing opportunity cost of time of women. On the other hand, the demand for FAH as the labor force participation rate of women increases could either increase or decrease depending on the relative strength of the substitutability between home-cooked food and convenience or prepared foods.

The consumer price indexes for FAFH, FAH, and CPI-less food are used as price variables in the analysis. In addition, personal consumption expenditures data are used as total expenditure instead of disposable personal income to limit the influence of savings in the analysis.

When estimating demand systems, one equation must be omitted. This will avoid singularity in the variance-covariance matrix of the residuals across equations. The commodity that is arbitrarily omitted in the model is non-food. The model is estimated using iterative Zellner's seemingly unrelated regression technique (IZEF) with homogeneity and symmetry restrictions imposed and with a first order serial correlation correction.

Nutrient Demand Models

The twenty-eight nutrients selected for the analysis, along with the units of measurement, are shown in Table A.1 below. Based on previous studies and conditioned on the data available in the 1987-88 NFCS, the independent variables used include urbanization, region, race, sex, employment, household size, age, height, weight, and

income. Dummy variables pertaining to whether the individual receives food stamps or not; whether the individual is on special diet or not; and whether the intake of nutrient occurred mostly during a weekend or a weekday are also included.

Table A.1

List of Nutrients Used in the Analyses And Their Unit of Measurement

Nutrient	Unit of Measurement
1. Food Energy	kilocalories
2. Protein	grams per 1000 kilocalories
3. Total Fat	grams per 1000 kilocalories
4. Saturated Fatty Acids	grams per 1000 kilocalories
5. Monounsaturated Fatty Acids	grams per 1000 kilocalories calories
6. Polyunsaturated Fatty Acids	grams per 1000 kilocalories
7. Cholesterol	milligrams
8. Carbohydrate	grams per 1000 kilocalories
9. Total Dietary Fiber	grams per 1000 kilocalories
10. Alcohol	grams per 1000 kilocalories
11. Vitamin A	international units
12. Carotenes	micrograms retinol equivalents
13. Vitamin E	milligrams alpha-tocopherol equivalents
14. Vitamin C	milligrams
15. Thiamin	milligrams
16. Riboflavin	milligrams
17. Niacin	milligrams
18. Vitamin B6	milligrams
19. Folate	micrograms
20. Vitamin B12	micrograms
21. Calcium	milligrams
22. Phosphorus	milligrams
23. Magnesium	milligrams
24. Iron	milligrams
25. Zinc	milligrams
26. Copper	milligrams
27. Sodium	milligrams
28. Potassium	milligrams

The general model specification used is therefore:

$$N_{ki} = b_0 + b_1 urban1 + b_2 urban2 + b_3 region1 + b_4 region2 + b_5 region4 + b_6 race2 + b_7 race3 + b_8 race4 + b_9 hisp1 + b_{10} sex1 + b_{11} employ1 + b_{12} fstamp1 + b_{13} diet1 + b_{14} hsize + b_{15} weight + b_{16} height + b_{17} age + b_{18} agesq + b_{19} weekend + b_{20} income + b_{21} incomesq$$

where:

N_{ki} = average daily intake of nutrient k by individual i. The units of measurement are displayed in Table A.1.

urban1 = 1 if individual resides in a central city; 0 otherwise

urban2 = 1 if individual resides in a suburban area; 0 otherwise

region1 = 1 if individual is in the Northeast; 0 otherwise

region2 = 1 if individual is in the Midwest; 0 otherwise

region4 = 1 if individual is in the West; 0 otherwise

race2 = 1 if individual is black; 0 otherwise

race3 = 1 if individual is Asian or Pacific Islander; 0 otherwise

race4 = 1 if individual is of some other race; 0 otherwise

hisp1 = 1 if individual is hispanic; 0 otherwise

sex1 = 1 if individual is male; 0 otherwise

employ1 = 1 if individual is employed; 0 otherwise

fstamp1 = 1 if individual is receiving food stamps; 0 otherwise

diet1 = 1 if individual is on a special diet; 0 otherwise

hsize = household size

weight = weight of the individual in pounds

height = height of the individual in inches

age = age of the individual in years

agesq = square of the age of the individual

weekend = 1 if the three-day intake of the individual occurred mostly during a weekend; 0 otherwise

income = household income

incomesq = square of household income

One classification is eliminated from each group of variables for estimation purposes. The base group are individuals who satisfy the following description: reside in a nonmetro area

(urban3); in the South (region3); white (race1); non-hispanic (hisp2); female (sex2); not employed (employ2); not participating in the food stamp program (fstamp2); not on a special diet (diet2); and the three-day intake occurred mostly during a weekday (weekday). Household income is used instead of individual income because the NFCS data set only provides income information for the household and not for an individual. The analyses are separated into three different food sources: FAFH, FAH, and all foods eaten, to determine nutrient consumption pattern differences and the factors that affect nutrient consumption across these three food sources. Since excess consumption of one nutrient does not compensate for deficiencies in another, twenty-eight separate nutrient consumption models are specified for each of the three food sources to explain nutrient intake. Also, the same set of independent variables is used for each nutrient consumption model because nutrients are constituent parts of food and therefore, may affect the consumption of each nutrient analyzed. Each nutrient may be affected differently by the various independent variables included, but there are no a priori reasons to include or exclude any of these factors in any of the nutrient equations. The energy yielding nutrients: protein, total fat, saturated fatty acids, monounsaturated fatty acids, polyunsaturated fatty acids, carbohydrate, and alcohol are all expressed as nutrient densities or in grams per 1000 kilocalories to allow proper comparison between individuals. The anthropomorphic measurements of the individual - age, sex, height, and weight - are included as independent variables to account for physical differences between individuals. For instance, male individuals might eat more than female individuals and taller and heavier individuals might eat more than shorter and lighter individuals. Thus, squared terms are included for income and age in order to investigate possible nonlinearities in the Engel relationships for FAFH, FAH and all food consumption.

Depending on the proportion of zero observations on a dependent variable, either the OLS or the Heckman Sample Selection Procedure is used in the analysis. When the proportion of zero observations on a dependent variable is high, omitting the zero observations in the OLS runs will result in the estimates characterized by sample selection bias. Subsequently, Heckman (1979) proposed a technique that amounts to estimating the omitted variable using probit analysis and then employing either OLS or generalized least squares to the model with the inclusion of the estimated omitted variable.

Logit Models

Logit analysis is used in the estimation of models that would investigate the decision to eat the following meat products:

(1) beef;
(2) pork;
(3) lamb, veal, and game;
(4) poultry; and
(5) fish and shellfish

either away from home, at home, or both.

Logit models are employed in the analyses to circumvent the inadequacies of the linear probability model and because of the dichotomous nature of the dependent variable that is used. These models are based on the cumulative logistic probability function and are specified as (Pindyck and Rubinfeld, 1991):

$$P = F(Z) = F(X_i'\beta) = 1/(1+e^{-Z}) = 1/(1+e^{-(X_i'\beta)})$$

where Z is a theoretical index determined by a set of explanatory variables X; F(Z) is the cumulative logistic function; e represents the base of natural logarithms (approximately equal to 2.718); and P is the probability that an individual will make a certain choice, given the knowledge of X.

The most suitable technique of estimation when using logit is maximum likelihood. Although this technique requires the use of iterative algorithm, this procedure assumes the large-sample properties of consistency and asymptotic normality of the parameter estimates so that conventional tests of significance are applicable.

The logit analyses center on the hypothesis that a set of variables influence the decision to eat FAFH and the decision to eat various meats either

away from home, at home, or both. The logit models are specified as follows:

$$PROB = b_0 + b_1 urban1 + b_2 urban2 + \\ b_3 region1 + b_4 region2 + b_5 region4 + \\ b_6 race2 + b_7 race3 + b_8 race4 + b_9 hisp1 \\ + b_{10} sex1 + b_{11} employ1 + b_{12} fstamp1 + \\ b_{13} diet1 + b_{14} hsize + b_{15} logage + \\ b_{16} logincome + b_{17} weekend + \\ b_{18} quarter1 + b_{19} quarter3 + b_{20} quarter4$$

where PROB represents the following dependent variables:

(1) equal to 1 if the individual consumed some nutrient from FAFH and 0 otherwise;
(2) equal to 1 if the individual consumed beef from FAFH and 0 otherwise;
(3) equal to 1 if the individual consumed beef from FAH and 0 otherwise;
(4) equal to 1 if the individual consumed beef from all foods and 0 otherwise;
(5) equal to 1 if the individual consumed pork from FAFH and 0 otherwise;
(6) equal to 1 if the individual consumed pork from FAH and 0 otherwise;
(7) equal to 1 if the individual consumed pork from all foods and 0 otherwise;
(8) equal to 1 if the individual consumed lamb, veal, and game from FAFH and 0 otherwise;
(9) equal to 1 if the individual consumed lamb, veal, and game from FAH and 0 otherwise;
(10) equal to 1 if the individual consumed lamb, veal, and game from all foods and 0 otherwise;
(11) equal to 1 if the individual consumed poultry from FAFH and 0 otherwise;
(12) equal to 1 if the individual consumed poultry from FAH and 0 otherwise;
(13) equal to 1 if the individual consumed poultry from all foods and 0 otherwise;
(14) equal to 1 if the individual consumed fish and shellfish from FAFH and 0 otherwise;
(15) equal to 1 if the individual consumed fish and shellfish from FAH and 0 otherwise;
(16) equal to 1 if the individual consumed fish and shellfish from all foods and 0 otherwise.

The independent variables include logage which is the logarithm of age; logincome which is the logarithm of income; and quarter1, quarter3, and quarter4 which correspond to a set of binary variables that measure seasonality, (qaurter1 = 1 if January -March; quarter3 = 1 if July-September; quarter4 = 1 if October-December) (reference category, April-June). The rest of the independent variables are defined the same way as in the nutrient demand equations.

Quantity Models

To determine the impact of socio-demographic and economic factors on FAFH consumption, Heckman procedure is used to estimate FAFH quantity models. Given the hypothesis that the demand for FAFH differs by type of facility, regression models are estimated separately for the number of meals purchased at restaurants, fast food establishments, and other facilities. Based on past studies and conditioned on the data available in the 1987-88 NFCS data set, the model specification suggest estimation of the following equations:

$$MEAL = b_0 + b_1 urban1 + b_2 urban2 + \\ b_3 region1 + b_4 region2 + b_5 region4 + \\ b_6 race2 + b_7 race3 + b_8 race4 + b_9 hisp1 \\ + b_{10} sex1 + b_{11} employ1 + b_{12} fstamp1 + \\ b_{13} diet1 + b_{14} hsize + b_{15} logage + \\ b_{16} logincome + b_{17} weekend + \\ b_{18} quarter1 + b_{19} quarter3 + b_{20} quarter4 \\ + b_{21} imratio$$

where MEAL represents the number of meals purchased by an individual from the following food sources:

(1) away from home per unit of time (3 days);
(2) restaurants per unit of time;
(3) fast food facilities per unit of time; and
(4) other away from home facilities per unit of time.

The independent variables consist of the same set of variables used in the logit models and are therefore defined the same way. Due to the relatively high proportion of zero observations in the dependent variables, the Heckman procedure is used in estimating the models. An additional

variable (imratio) is, therefore, included as an exogenous variable. The variable "imratio" is the inverse of Mill's ratio and is defined as the ratio of the value of the standard normal density function to the value of the standard normal distribution function. For this study, meals are defined to include only breakfast, brunch, lunch, dinner, and supper. Snacks, infant feeding, and other eating occasions are, therefore, not considered as meals. In addition, restaurants only refer to those restaurant facilities with waiter or waitress service. On the other hand, fast food facilities refer to self-service food facilities, cafeterias, and food facilities where food is ordered and picked up at the counter. Other facilities include schools, day care centers, vending machines, stores, and community feeding programs.