To accomplish the second goal will require the following activities:

(1) Research of domestic and foreign markets to identify key areas considered to have the highest potential for Northwest foods packed in retort bags.

(2) Placement of retort bags containing Northwest foods in test markets to determine acceptability--both retail and institutional.

(3) Determine from the retort bag characteristics (such as size, cost, etc.) those which would have the greatest saleability in the marketplace.

With information generated from the project, Northwest processing firms will have the opportunity to understand the production and market aspects of retort bag technology, and how this could be applied to their business; thus reducing risks in changing over their processing operations.

In the long run, the project is expected to enhance interest for the development of innovative packaging methods among the regions' food processors through the use of retort bag technology which will assist them in holding down or lowering packaging costs. Thus, the economic impact of the project will be to maintain the cost competitive position of food processors in this region with other producing areas, and possibly open up new markets due to the lower-cost, lighter weight, innovative packaging techniques.

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A FRAMEWORK FOR THE ANALYSIS OF THE IMPACTS OF SELECTED NONFOODS, FOODS, AND SOCIOECONOMIC AND DEMOGRAPHIC CHARACTERISTICS ON THE DECISION TO PURCHASE VARIOUS MEATS AND SEAFOODS FOR HOME CONSUMPTION

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INTRODUCTION

Due in large part to dramatic changes in lifestyles in the past two decades and the occurrence of rapid changes in the food system, the provision of assessments of the impacts of policies and programs on all participants in the food system, especially consumers, is crucial. In general, the basic thrust of food economics is to provide analytical support and policy analyses of the economic aspects of food consumption. Successful economic policies stem from sound economic policy research, and so, interest lies in the development of research tools and techniques to explain the impact of economic forces that influence food consumption. The development of traditional and non-traditional models of the economic behavior of households with particular emphasis on behavior with respect to food consumption and the improvement of techniques of demand analysis which encompass methods for analysis of time series, cross section, and panel data serve

as prime examples of research needs. Such innovations contribute toward the identification and analyses of the factors that affect food choices, which certainly warrant attention in order to provide detailed quantitative information regarding the role of prices, income, family size and composition, advertising and labeling, health status, attitudes, and lifestyles on consumer behavior in the food market. Food marketers, commodity specialists, economists, and Government policy makers may use this information to make projections of consumer food demand and to evaluate the impact of Government policies and programs on the purchase patterns of households.

In this light, the purpose of this paper is to present a framework for the analysis of the impacts of selected nonfoods, foods, and socioeconomic and demographic characteristics on the decision to purchase various meats and seafoods for home consumption. Special attention is given to meats and seafoods due to their relative importance in retail consumption. These items generally account for 25 to 30 percent of each food dollar in the consumer's budget. The broad categories of meats and seafoods include various types of beef-hamburger, roasts, and steaks, various types of poultry, pork, and other meats, and various types of seafood-fish, shellfish, and canned seafood.

MOTIVATION

Typically, traditional econometric models of food demand have only considered the effects of income, population, and changes in the relative prices of foods, and as a result, in recent times, the reliability of such demand models may be declining. The deficiencies of such traditional models of consumption behavior lie in the fact that they either ignore or inadequately treat the effects of nonfood prices and socioeconomic and demographic characteristics. It is quite reasonable to assume that food-nonfood price and expenditure relationships have some impact on food purchases. Rapid increases in the prices and expenditures of nonfood items, such as energy, housing, medical supplies and services, and durable goods during the current decade have raised some interesting questions concerning the effects of nonfood prices and expenditures upon the demand for food. For example, with large expenditures either on utilities, transportation, durable goods, or medical supplies, does the consumer behave in such a way so as to substitute low quality beef for high quality beef? In addition, are the demands for various types of meat and seafood products more sensitive to changes in prices of nonfood items than to similar changes in household income, own price, prices of other foods, and socioeconomic and demographic characteristics?

The large-scale admission of women into the labor force and the affluence of U.S. households in general are influential factors upon the demands for food consumed away from home and for prepared food. In turn, these demands are likely to affect the demand for food for home consumption. At present, consumers spend relatively more for prepared meals purchased from food service establishments and relatively less for food purchased from grocery stores for preparation and consumption at home. Since 1960, the retail value of the market for food away from home has grown at a rate, adjusted for inflation, of about three percent. In short, restaurants, fast food outlets, and other away-from-home eating places command nearly 35 percent of the U.S. food dollar.

Socioeconomic and demographic forces, particularly the size and composition of households, place of residence (region), and population density (degree of urbanization), may exert a notable influence on food consumption, in part because of the effect of age on durable goods purchases, shifts in the response of con-

sumption to the life cycle, differences in the accessibility of the product, differences in climate, and the development of consumer buying habits. Further, the inclusion of such variables in the analysis of household consumption patterns is desirable because systematic differences in consumption behavior of households with different socioeconomic and demographic characteristics may exist.

THE FRAMEWORK - A SYSTEMS APPROACH

The composition of consumer expenditure varies widely across individuals. Researchers wish to account for this variation by changes in observable economic determinants within a particular analytical framework. An approach to food demand analysis different from the traditional analysis, often referred to as the complete systems approach, explicitly takes into account all major economic determinants of food demand and in doing so guarantees a comprehensive analysis of the relevant research problem. Several studies demonstrate the potential of this approach in the provision of empirical estimates with regard to economic variables. Systems of demand equations have been the object of research for a number of econometricians in recent years. By definition, a complete set of consumer demand functions specifies the quantity demanded of all or some large number of goods as a function of total consumer expenditure or income and the prices of the goods. The basic problem for the consumer is the allocation of expenditures among different commodities given various economic factors such as prices, income, and household characteristics. When changes occur within this set of factors, the consumer may change the proportions spent on different commodities. A complete system of demand equations, in short, describes the household's allocation of expenditure among some exhaustive set of consumption categories.

The essence of the consumer demand systems approach consists of providing empirical demand analysis within a conceptual framework to deal with the interdependence of demand for various commodities. The system as a whole provides useful information on the degree and nature of interrelatedness of the demand functions. This integrationist's approach recognizes the interrelationships among all commodities, makes assumptions regarding the interaction of commodities and the nature of utility functions, and makes a formal attempt to incorporate theoretical restrictions into the model in order to insure consumer behavior consistent with theory. In contrast, a single commodity or sector model approach, by far the most common approach, fails to recognize the interrelationships among commodities and makes no formal attempt to incorporate theoretical restrictions into the model. The latter procedure implies that all omitted variables have zero effects, and the choice of included variables is based upon subjective evaluation.

One justification of the integrationist's approach is the need to impose an *a priori* structure on price effects because the price data may display too much collinearity to distinguish among the effects of individual prices. That is, it becomes difficult, if not impossible, to isolate and interpret the separate effects of price variables with any degree of confidence. In addition, complete demand systems have two principle advantages over other frameworks for analyzing the effects of socioeconomic and demographic variables. First, by incorporation the budget constraint into the analysis, the complete systems approach forces recognition of the fact that an increase in expenditure on one consumption category must be partially or totally offset by decreases in the expenditure on others. A change in any socioeconomic or demographic variable may cause a reallocation of expenditure among the consumption categories. Since total consump-

tion expenditure remains unchanged, increases in the consumption of some goods must be balanced by decreases in the consumption of others. Second, this nontraditional approach to consumption behavior permits the separation of income and price effects from socioeconomic and demographic effects. Unless such a separation is made, there is no presumption that socioeconomic and demographic effects estimated from one price situation are relevant in another. Further, the construction of a set of demand functions for commodity groups that comprise all consumption expenditure in any economy uses a well-developed theory, an extensive set of data, and refined estimation techniques. In particular, a strong relationship between theory and estimation distinguishes it from other empirical economic studies. Moreover, the work on consumer demand systems has potential use in larger models or for economic policy. In a narrow sense, the approach can supply the empirical basis for forecasting and planning of the composition of the respective bundle of commodities, for the construction of price indices, and so on. In a broad sense, the approach can serve where general allocation aspects dominate and a relatively developed theory is available. To paraphrase H. S. Houthakker (1960), "both for the scientific study of economic development and for the national formulation of economic policy, it is important to obtain a realistic description of the behavior of household consumption under varying conditions."

EMPIRICAL MODELS

In order to explore the effects of nonfoods, foods, and household characteristics on the demands for various meat and seafood products, some functional form must serve as a basis for estimation. In general, there are two different approaches to functional form specification: (1) specify a particular direct or indirect utility function; and (2) specify the functional form of the demand equations directly and impose the classical and modern theoretical restrictions. Note that the role of such constraints is to secure consistent behavior on the part of consumers in relation to economic theory. With regard to the former procedure, the form of the demand functions automatically satisfies all the restrictions globally; however, the disadvantage of this approach is a potential loss of generality attributable to the choice of a particular utility function. In the case of the latter procedure, the theoretical constraints are typically enforced at some local set of coordinates, often the sample means. Regardless of the respective methods to impose the pertinent restrictions, they clearly lead to important economies or parameterization, and furthermore, the theoretical restrictions provide very useful checks of the accuracy of the computations. However, a theoretically attractive specification may not be empirically superior and may turn out to be unmanageable. If a slight compromise of the theory yields a manageable and empirically almost equivalent system, the choice between model specifications is clear, certainly the case for those practitioners who want to apply economic reasoning to explain consumer behavior. Since underlying relationships are directly influenced by choice of a particular functional form it is necessary to investigate alternative specificiations.

SOME USES

A discussion of some of the specific uses of the empirical results of the complete systems approach merits much consideration. It is of particular interest to ascertain the usefulness of such an intricate model of consumer behavior with regard to the food market. In brief, the systems approach incorporates a large body of information into the respective analysis in order to improve current measures of the effects of changes in relative prices, level and distribution of household incomes, and

socioeconomic and demographic characteristics of the population on food consumption behavior. The overall goal of such an approach is to ameliorate decision-making on the part of the various personnel with some direct or indirect link with the food industry.

The use of consumer credit may cut into the money available for food expenditure. Installments due on consumer debt for durable and semi-durable goods and other fixed commitments such as house payments (rent or mortgage), taxes, insurance, and utility bills have a first lien on family income. Given this set of fixed commitment expenditures has risen sharply over the past few years, food expenditures and the other respective categories of living expenses from out of the residual must fall to compensate. Meat and seafood product demands, by type, as a result may be more sensitive to a given change in housing and utility expenditures, and consumer debt than to a similar change in either disposable income, meat and seafood prices, or other economic determinants. Along this line, given the substantial increases in the price of transportation, the price of medical services, and the prices of other non-food commodities in recent times, on the condition that the own-price elasticity for these non-food items is elastic, total expenditures for such items decrease, leaving a larger amount of income to be spent on food items, especially the various meat and seafood products. Such an increase in income available to purchase meat and seafood commodities may likely influence these demands similar to an increase in total income - positively for superior cuts of meat and negatively for inferior cuts. In short, this approach pinpoints the degree to which changes in the prices of non-food commodities influence the purchases of various types of meat and seafood products.

This analysis furthermore permits a determination of potential national and regional differences in consumer demand patterns and an exploration of the effects of food away from home, food prices, location of place of residence, family size, household income group, age structure, ethnic group, and other factors on consumer demand patterns. For example, increases in household size may cause away-from-home purchases to decline and at home purchases to rise. With regard to meat and seafood commodities, increases in household size may effect an upward shift in the demand for ground beef, pork, fish, and poultry and may stimulate a downward shift in the demand for various kinds of steaks and roasts. In addition, it is of prime interest to determine the strength of the demands for the various meat and seafood products according to the Standard Metropolitan Statistical Area breakdowns within the Northeast region, the North Central region, the South, and the West to obtain information for optimum size, number, and location studies of processing and packaging plants. The socioeconomic and demographic characteristics of the domestic population and the demand for food away from home have changes over the past couple of decades, but there exists little information with regard to the influence of these changes on food demand behavior for home consumption.

In addition, once all the respective elasticities[1] of the commodities are found in an empirical application of the nontraditional complete systems approach, knowledge of the magnitude and direction of retail price changes of the various commodities, income changes, and other factor changes allows a determination of the meat and seafood commodities that fair best or worst in terms of quantities demanded and total revenue. Along this line, if meat and seafood producers have an interest in policies to increase total revenue, this analysis leads to provision of appropriate recommendations in terms of supply shifts. Further, the complete systems approach may improve food price and consumption forecasts at the micro

and macro level since this procedure provides a framework to deal with the interdependence of demand for either aggregate commodities, disaggregate commodities, or various combinations of aggregate and disaggregate commodities. In short, the estimates of demand interrelationships via the use of this approach have importance for policy decisions, especially in the areas of supply control and demand adjustment.

CONCLUDING REMARKS

The objective of the systems framework in this application is to identify and assess the factors that affect food choices, particularly the choices among various meats and seafoods for home consumption and to provide information for consumers, producers, marketers, and policymakers concerning the likely impacts of changes in present food programs and policies. Simply put, the thrust of this approach is to extend the traditional econometric model of food demand to provide a more comprehensive analysis of the economic aspects of food consumption, potentially showing the direction of change for various subsectors and the meat and seafood industry as a whole.

FOOTNOTES

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[1]By definition, an elasticity is simply the ratio of the percentage change in the consumption of a commodity attributable to a particular percentage change in some factor.

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