Valuing Food Safety and Nutrition

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PART TWO: A Comparison of Valuation Methodologies

8. Health Risk Concern of Households vs. Food Processors: Estimation of Hedonic Prices in Fats and Oils

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This chapter presents a methodology for using the well-known hedonic price method to value attributes of a good. The specific application estimates the value consumers place on various fatty acids contained in major fats and oils consumed in the United States. The topic is important because of increasing public concerns over the relationships between intakes of fats, particularly saturated fat, and blood cholesterol, and between blood cholesterol and heart diseases. The hedonic price model is used to detect whether this seemingly increasing health knowledge, and more specifically, consumer information on cholesterol, has impacted consumption patterns and particularly, the consumer valuation of various fatty acids in fats and oils. The hedonic price method is different from the contingent valuation (CV) method in that the hedonic function is estimated with market price and consumption data and characteristics observable in the consumption decision. Therefore, the hedonic price method provides objective valuation of attributes such as nutrition and fats while the CV method deals with subjective valuation of attributes such as food safety. Another distinction in practice is that the hedonic price is typically estimated with historical data (time-series or cross-sectional), while the CV method relies mostly on survey data.

Two noticeable trends related to the consumption of fats and oils in the U.S. can be seen during the last four decades. First, many medical and dietary studies and much health information released by the media, consumer education groups, physicians, and advertising have become increasingly available to the consumer. Many medical studies have shown increasing health risk associated with excessive intakes of saturated fat and dietary cholesterol. Consequently, the medical profession, nutrition scientists, and public health agencies have been recommending to the public that they reduce consumption of fats, especially saturated fat and cholesterol. For example, the recently released Eating Right Food Pyramid, designed and published by the Human Nutrition Information Service of the U.S. Department of Agriculture, gave this advice: "*Eat less fat and sugar—and more fruits, vegetables, and grains*." The message emphasized choosing a diet low in fat, saturated fat, and cholesterol.

Second, a general trend of replacing animal fats by vegetable oils is observed in the American diet. Specifically, the consumption of soybean oil and corn oil with low saturated fat ratios, has been increasing, while that of lard and coconut oil with high saturated fat ratios have been declining for both cooking and salad oil uses, and for baking and frying. Above all, dietary animal fats are among the major sources of saturated fat and cholesterol. Data show that consumption of fats and oils with high saturated fat has declined since the late 1960s while consumption of oils with low saturated fat has increased, except for tallow, whose consumption turned around and began increasing in the 1970s. These increases in tallow consumption appear to offset the downward trends in the consumption of lard and coconut oil used for baking and frying. In analyzing these trends, one important question is whether the consumption patterns were shaped by relative prices or can be attributed to the consumer's concern about health risk related to fat and cholesterol. The increasing health information noted earlier may induce structural changes in the consumption of fats and oils as a response to consumer health concerns (Capps and Schmitz 1991, Chern et al. 1994).

In order to test the impact of health information on food consumption, two end uses of fats and oils are particularly relevant. The first is cooking and salad dressing uses in which corn, cottonseed, peanut, and soybean oil, and lard are the major products. The consumption of cooking and salad fat and oils better reflects the household choice problem than other uses because these fats or oils are mostly consumed directly by households. The second end use is for baking and frying in which the major products are cottonseed, soybean, coconut, and palm oil, and lard and tallow. The fats and oils in this category are mainly utilized by food manufacturers for producing such foods as cookies and potato chips and by fast food outlets or restaurants. Since the choices for this end use are typically not made by consumers, the effects of consumer health concerns on these choices are likely to be less important than for the cooking and salad uses. This chapter will compare the effects of health concerns between these two end uses.

The objectives of this chapter are to estimate consumer values of various fatty acids and to examine the impact of consumer health information on the demand for fats and oils, using a characteristics demand model rather than a commodity demand model. Specifically, in the hedonic price equations, consumer implicit values (i.e., hedonic prices) of attributes, such as saturated, monounsaturated, and polyunsaturated fats rather than the products, are estimated for two animal fats (lard and tallow) and six vegetable oils (coconut, corn, cottonseed, peanut, palm, and soybean), which are further separated into two end uses. The Consumer Good Characteristics Model (CGCM) developed by Ladd and Suvannunt (1976) is modified to become a market share model. In addition, the model is extended to incorporate a cholesterol information variable to examine the impact of consumer information on the consumer values of characteristics.

The major hypotheses to be tested are that (1) consumers place a higher value on unsaturated fats (polyunsaturated and monounsaturated) than saturated fat; (2) consumer health information affects the valuation of the three nutrient fats; and (3) consumers have taken health concerns more seriously than food processors or food-away-from-home providers. For testing these hypotheses, a moving regression procedure is employed for every fifteen-year interval from 1950 to 1990.

Methodology and Model Specification

Evolution of the Characteristics Model

Waugh (1928) was a pioneer in attempting to analyze the demand for product characteristics related to food. Houthakker (1951-52) and Theil (1951-52) are among the first to incorporate product characteristics into their theoretical models of utility maximization. Lancaster (1966) later constructed the conceptualization and interpretation of the characteristics model that has received much attention in subsequent applications and extensions. Lancaster's model embedded three important assumptions for a unique solution, which have been examined by Lucas (1975), Hendler (1975), and Ladd (1982).

Ladd and Suvannunt (1976) developed the Consumer Good Characteristics Model (CGCM) without the three assumptions related to Lancaster's original model. They formulated a utility maximization problem and derived the hedonic price equations. In the Houthakker-Theil models, commodities with different characteristics are treated as the same good with variable quality. In the Lancaster model, commodities with different characteristics are treated as separate goods. However, the CGCM model allows for n products and m common characteristics. The CGCM derives two theoretical results: (1) for each product consumed, the price paid by the consumer equals the sum of the marginal monetary values (MMV) of the product's characteristics, where the MMV equals the quantity of the characteristic obtained from the marginal unit of the product consumed times the implicit price of the characteristic, and (2) consumer demand functions for goods are affected by the characteristics of goods.

Several empirical studies have applied the CGCM framework to food and nutrition, e.g., Terry et al. (1985), Morgan (1987), and Morse and Eastwood (1989). Applying the characteristics model to production inputs, Ladd and Zober (1977) developed the neoclassical Input Characteristics Model (ICM). Rosen (1974) provided a theoretical basis for deriving equilibrium implicit prices for characteristics with demand and supply interaction. Excellent reviews of the development of the characteristics model and empirical studies are provided in Morse (1991), Ladd (1991), Bowman (1991), and Eastwood (1991). The model used in the present chapter is based on the CGCM with some modifications as discussed in the next section.

Conceptual and Empirical Model Specification

This chapter attempts to analyze changes in consumer preferences for fats and oils caused by consumer health information. Following Lancaster, a consumer chooses a bundle of goods that maximizes his or her utility by consuming characteristics (c_i) of those goods, subject to a household budget. Total utility depends on the total amount of characteristics consumed, not on the products themselves. In the presence of changing consumer health information, the classical assumptions of perfect information and constant tastes do not hold. In this chapter, consumer preferences are assumed to change as additional information is being accumulated. A change in preference is defined as a change in the parameters of a utility function, which are assumed to depend on the consumer's state of knowledge as well as other factors. Assuming n products and m characteristics, the utility function of a representative consumer is written as:

(1) $$U = U(C_1, C_2, ..., C_m; S(N))$$

where C_j = total amount of the j^{th} characteristic such as saturated fat consumed by the consumer from all products. S is a state variable, representing the consumer's state of knowledge, which is a function of consumer health information (N). The level of the j^{th} characteristic is a function of the quantities of goods consumed and the quantities of characteristics obtained from the good:

(2) $$C_j = C_j(q_1, ..., q_n, C_{i1}, ..., C_{im}; S(N))$$

where C_{ij} = the amount of characteristic j per unit of i^{th} good, and q_i = the quantity demanded of good i. Assuming the consumer has a limited and constant money income (M), the budget is:

(3) $$I = M - r = \sum_{i=1}^{n} p_i q_i$$

where r is the household expenditure for all other goods and I is the total expenditure for the products of interest.

The consumer's decision is to maximize the utility derived from characteristics which are obtained from the consumption of q_i's. The constrained utility maximization problem can be expressed as:

$$\text{(4)} \qquad Max\ L = U + \lambda \left(I - \sum_{i=1}^{n} p_i q_i \right) .$$

The first order conditions are:

$$\text{(5)} \qquad \frac{\partial L}{\partial q_i} = \sum_{j=1}^{m} \left(\frac{\partial U}{\partial C_j} \right) \left(\frac{\partial C_j}{\partial q_i} \right) - \lambda p_i = 0$$

$$\text{(6)} \qquad \frac{\partial L}{\partial \lambda} = I - \sum_{i=1}^{n} p_i q_i = 0 .$$

Since λ is the marginal utility of expenditure (income), equation 5 can be expressed as:

$$\text{(7)} \qquad p_i = \sum_{i=1}^{m} \left(\frac{\partial C_j}{\partial q_i} \right) \left[\left(\frac{\partial U}{\partial C_j} \right) \Big/ \left(\frac{\partial U}{\partial I} \right) \right]$$

where $(\partial U/\partial C_j)/(\partial U/\partial I)$ is the marginal rate of substitution of expenditure for the j^{th} characteristic or the implicit price paid for the j^{th} characteristic by the i^{th} product and $(\partial C_j/\partial q_i)$ is the marginal yield of the j^{th} product characteristic by the i^{th} product. Assuming that the marginal implicit price is constant, and if a linear form is selected, equation 7 becomes:

$$\text{(8)} \qquad p_i = \alpha_i + \sum_{j=i}^{m} h_{ij} s_{ij}$$

where $(\partial C_j/\partial q_i) = s_{ij}$ and $(\partial U/\partial C_j)/(\partial U/\partial I) = h_{ij}$. The constant term (α_i) is added to capture the implicit values of other characteristics than the three nutrient fats.

This chapter deals with three nutrient fats (saturated, monounsaturated, and polyunsaturated) as common characteristics. Each fat and oil is composed of the three fatty acids in a constant ratio, although all fats and oils have different compositions of nutrient fats. Since the composition of the three fatty acids did not change over time, using these ratios as the measures of s_{ij} would make it very difficult to estimate the implicit values of h_j because the characteristics variables (s_{ij}) would be highly correlated. In order to overcome this problem, the implicit price equation is converted to become an expenditure share equation. The expenditure share form avoids the multicollinearity problem and still allows the identification of hedonic prices. Furthermore, the expenditure share is used instead of expenditure because the former usually encounters fewer problems of heteroscedasticity. Specifically, equation 8 can be rewritten as an expenditure equation as:

$$p_i q_i = \alpha_i q_i + \sum_{j=1}^{m} h_{ij} s_{ij} q_i . \tag{9}$$

The expenditure share equation can then be obtained from equation 9 as:

$$W_i = \frac{p_i q_i}{\sum_{i=1}^{n} p_i q_i} = \frac{\alpha_i q_i + \sum_{j=1}^{m} h_{ij} s_{ij} q_i}{\sum_{i=1}^{n} \alpha_i q_i + \sum_{i=1}^{n} \sum_{j=1}^{m} h_{ij} s_{ij} q_i} \tag{10}$$

for i = 1,...,n, j = 1,...,m, and where W_i is the expenditure share of good i.

It is further assumed that the consumer values of various fats do not vary among commodities. Under this assumption, the hedonic prices are restricted as:

$$h_{1j} = h_{2j} = \ldots = h_{nj} = h_j . \tag{11}$$

The impact of consumer information on consumption has been modeled previously by incorporating a linear or quadratic time trend variable as done in Cowling and Rayner (1970), Ethridge and Davis (1982), and Brorsen et al. (1984). Recently, Brown and Schrader (1990) developed a cholesterol information index (CHOL) defined as the accumulated number of medical journal articles supporting a link between cholesterol and arterial disease minus the sum of articles questioning the link. They constructed the index for 1966-1988, using the Medline data base. This information index was shown to be a better proxy of the amount of consumer information than a time trend variable. The use of this index can be justified on the basis that medical research papers provide basic materials for public and professional information released by the media or public education agencies, used by physicians for medical advice, or used by the food industry for commercial advertising. We have updated this index to 1990 for this chapter.

The differing effects of negative and positive information can be found in previous psychological and marketing studies. It was found that negative information is more powerful in influencing consumer impressions than is positive. Osgood et al. (1957) found that equally polarized positive and negative information did not have a balancing effect on impression formation; rather, the direction of influence favored the negative information. Several marketing studies, such as Arndt (1968) and Wright (1974), have found a greater reliance on negative information. Based on this evidence, we use only the number of articles supporting the link (CHOLS) as a proxy for consumer information instead of using the CHOL developed by Brown and Schrader (1990). The use of CHOLS also avoids the problem of assuming equal weights for the articles containing negative and positive information about fat intakes used in computing CHOL. As shown in Figure 8.1, the CHOLS increased steadily from 1966 to

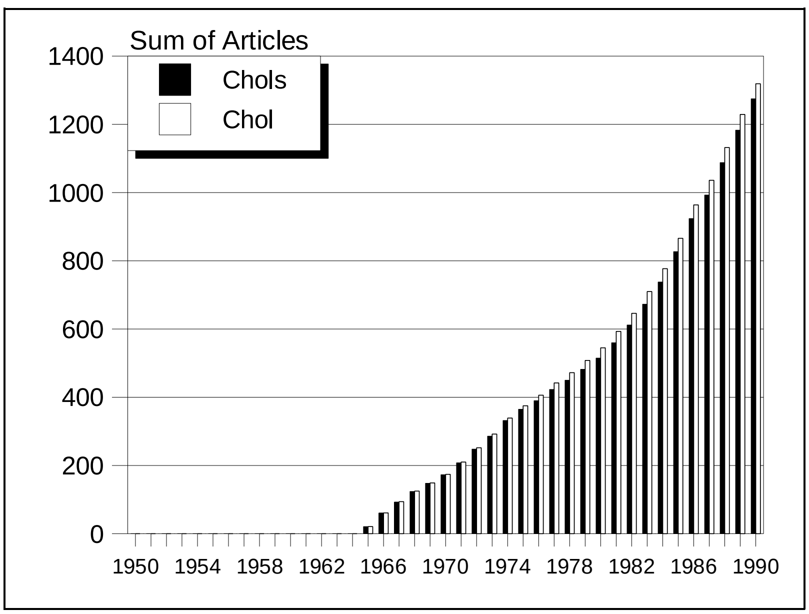

FIGURE 8.1 Cholesterol Information Index (CHOLS and CHOL), 1950-1990[a]

[a]The Medline computerized data base began in 1966. The CHOL and CHOLS are assumed to be zero for 1950-1965.

1976, followed by more dramatic increases from 1982 to 1990. The Medline computerized data base began in 1966 and thus the CHOL was not computed prior to this year. Since the number of articles published prior to 1966 was believed to be relatively small, the CHOLS is assumed to be zero for 1950-1965.

The CHOLS variable is incorporated into the model to capture changes in consumer taste. The information is assumed to affect the consumption of characteristics only through the consumer's subjective valuation of characteristics (implicit prices) because the ratio of characteristics in a product does not change over time. In this context, the implicit price (h_j) is further specified as:

(12) $$h_j = h_j^*(1 + c_j N)$$

where N is measured by the CHOLS as a proxy of consumer health information. Then, the expenditure share equation incorporating consumer health information can be written by substituting equations 11 and 12 into equation 10:

(13) $$W_i = \frac{\alpha_i q_i + \sum_{j=1}^{m} h_j^*(1 + c_j N)\, s_{ij} q_i}{\sum_{i=1}^{n} \alpha_i q_i + \sum_{i=1}^{n} \sum_{j=1}^{m} h_j^*\,(1 + c_j N)\, s_{ij} q_i}$$

for i = 1,...,n.

In this expenditure share equation system, the consumer health information affects directly the implicit values of the three nutrient fats. This is the empirical model to be estimated in this study. In order to allow for time lag in information dissemination, the cholesterol information index is lagged for one year. Previously, Brown and Schrader (1990) adopted a lag of two quarters in their quarterly egg demand model.

Data

Annual data from 1950 to 1990 are used for this chapter. Both quantity and price data were collected for crop years beginning October 1. The quantity data were collected from the Bureau of the Census, U.S. Department of Commerce (various issues). The price data were collected from the Economic Research Service of U.S. Department of Agriculture (1972, 1980, 1983, and various issues). The nutrient ratios composed in the fats and oils under investigation are presented in Figure 8.2. The ratio of saturated fat is the highest in coconut oil. Among the cooking and salad fat and oils, lard has the largest percentage

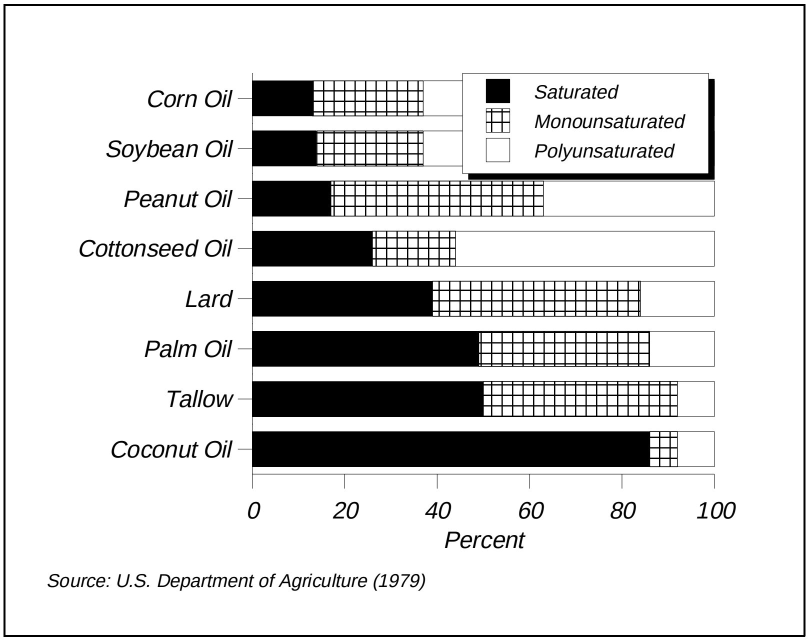

FIGURE 8.2 The Composition of Fatty Acids by Product

of saturated fat. Over 85 percent of corn and soybean oil is composed of unsaturated fat. In the case of peanut oil or lard, monounsaturated fat is the largest component. From the standpoint of the composition of fatty acids, corn oil and soybean oil are the best for health considerations. Olive oil and canola oil, the two products with high monounsaturated fat and increasing market shares in recent years, are not included because of incomplete data.

Estimation Results

The nonlinear model, equation 13, is estimated as a system for both end uses by a maximum likelihood procedure, assuming additive and normally distributed errors. The Davidson-Fletcher-Powell method is used as a nonlinear estimation algorithm. The regression coefficients, h_j's, are consumer values (unit = cents/lb) of nutrient fats. As mentioned earlier, the nonlinear regressions are run for 15-year intervals during 1950-1990. In total, there are fourteen regression runs for each end use.

First, a likelihood ratio test using the total sample of 1950-1990 was conducted to check the significance of information effects on consumer valuation of nutrient fats. This test is used to decide whether the information variable should be incorporated into the model. The null hypothesis is:

(14) $$H_0 : c_1 = c_2 = ... = c_n = 0 .$$

The estimation of cooking and salad fat and oils for 1950-1990 produces significant estimates for three implicit prices at the 1 percent significance level, and for information coefficients of saturated and polyunsaturated fats at the 1 percent level, and of monounsaturated fat at the 10 percent level. The likelihood ratio test rejects the null hypothesis of no information effect at the 1 percent level. On the other hand, for six baking and frying fats and oils, the likelihood ratio test cannot reject the null hypothesis of no information effect at the 10 percent level. These test results provide clear evidence that the health information effect on consumer valuation of nutrient fats is significant for cooking and salad dressing uses, but not significant for baking and frying uses. Consequently, in order to examine changes in consumer preferences, equation 13 is estimated for cooking and salad fat and oils and equation 11 without the variable N is estimated for baking and frying fats and oils.

Table 8.1 shows regression results for four selected 15-year time periods for cooking and salad fat and oils. All the implicit price coefficient estimates (h_j) are positive and significant at the 1 percent significance level. Figure 8.3 shows the trend of the estimated implicit prices, computed from equation 12. For the variable N, the values for the first year of the indicated period are used in the computation. Alternative estimates using the mean value or the value in the last year of the indicated period produced similar trends. As shown in Figure 8.3, until the 1964-1978 period, implicit prices of all three fats had a very similar value. From the 1966-1980 period on, consumer health information began to exhibit considerable influence on consumers' subjective valuation of the three nutrient fats, making unsaturated fats more valued and saturated fat less valued until the 1972-1986 period.

The impacts of consumer information on implicit prices (coefficients on c_i) were the greatest in the period of 1968-1982. The most obvious pattern of changes in consumer taste was in the periods from 1966-1980 to 1970-1984. In those periods, consumers revealed much higher values on unsaturated than on saturated fats. In particular, from the 1966-1980 to 1970-1984 periods, monounsaturated fat has become the most valued fat. The negative impacts of the information variables on the implicit prices for all three fats estimated from the 1972-1986 to 1976-1990 periods may reflect the reaction by the consumer to the health information in recent years that every type of fat is bad for health. It is also noted that the prices of most fats and oils fluctuated more during the period covered by the last three regression runs than the earlier periods. Thus,

TABLE 8.1 Estimated Coefficients from Selected Moving Regression Runs, Cooking and Salad Fat and Oils[a]

Variables	1954-1968	1968-1982	1976-1989	1950-1990
H_s	11.837*	19.826*	24.054*	20.196*
H_m	11.197*	24.394*	26.130*	17.111*
H_p	12.834*	25.679*	25.722*	20.557*
C_s	-0.0045	0.0021***	-0.0008*	-0.0008*
C_m	-0.0076*	0.0220***	-0.0004***	-0.0005
C_p	-0.0052**	0.0099	-0.0005*	-0.0006*
A_1	1.2851***	13.230**	-0.3684	0.4188
A_2	0.1288	4.889**	-0.3469	0.2266
A_3	1.7024***	5.766	5.4791*	4.7697*
A_4	-0.5119	-13.962**	-2.3558**	-0.7250
A_5	-0.8820	-12.266**	-1.0874	-0.5921
L.L.F.	207.44	212.55	231.58	537.71

Note: The superscripts *, **, and *** correspond to levels of statistical significance of 1 percent, 5 percent, and 10 percent, respectively. L.L.F. is the value of the log likelihood function.

[a]The subscript letters s, m, and p refer to saturated fat, monounsaturated fat, and polyunsaturated fat, respectively, and the subscript numbers indicate corn oil (1), cottonseed oil (2), peanut oil (3), lard (4), and soybean oil (5) in order.

the estimated implicit prices from the last three regression runs may be distorted because of the simultaneity bias from ignoring the supply side.

Also, the estimated implicit prices are found to be very high from the 1966-1980 period to the 1970-1984 period. These large implicit prices correspond to very large magnitudes of the estimated constant terms (α_i). As shown in Table 8.1, the coefficient estimates of the constant term (α_i) are much greater in the 1968-1982 period than other periods. The basic proposition of a hedonic price equation, as shown in equation 8, is that the commodity price is composed of the sum of implicit monetary values of three nutrient fats and a constant term. Therefore, it seems that the large estimated constant term may have impacted the relative magnitudes of the estimated implicit prices.

The moving regression results for the baking and frying fats and oils show that all the implicit price estimates are positive and significant at the 1 percent level. Under the assumption of no information effect, the fourteen moving regressions show only five out of forty-two estimated hedonic price coefficients being insignificant at the 10 percent level. However, there is no evidence of structural change in the consumption pattern. Therefore only two sets of re-

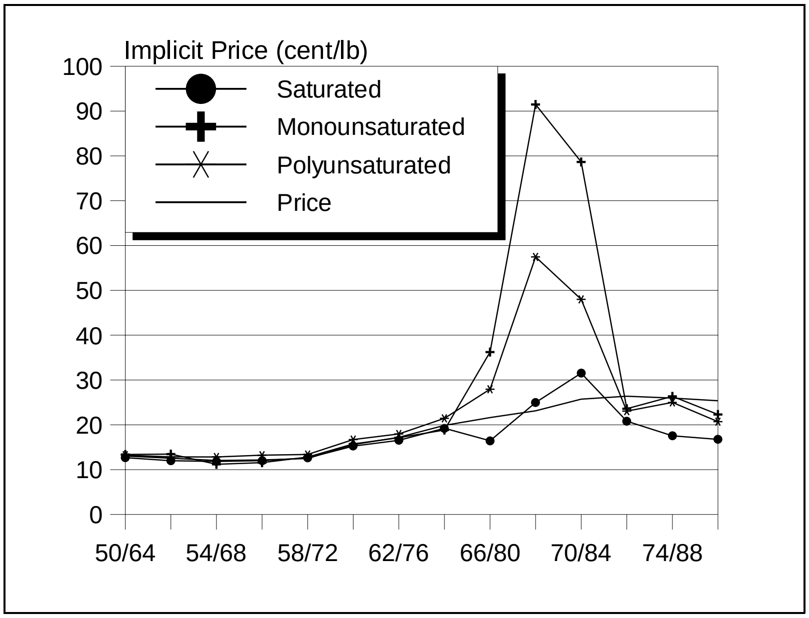

FIGURE 8.3 Estimates of Implicit Prices of Nutrient Fats for Cooking and Salad Dressing Use

gression results with and without the information variable for the entire sample period are shown in Table 8.2. The results show that the hedonic price coefficients (h_j) are statistically significant at the 1 percent level while the estimated coefficients for the information variables are not. The estimates of implicit prices for all three nutrient fats produce very similar trends to that of average prices (Figure 8.4). Particularly, the implicit prices of saturated fat are always higher than those of unsaturated fats, and the implicit prices of polyunsaturated fat are always higher than those of monounsaturated fat. Consequently, we may conclude that there has been no change in consumer preferences during the last four decades in the consumption of baking and frying fats and oils.

Estimated Expenditure Share on Nutrient Fats

To further explain the changes in oil consumption patterns, the estimated hedonic prices are used to predict the expenditure shares of the three nutrient fats for each time period. The prediction results provide further evidence on

TABLE 8.2 Estimated Coefficients from the Entire Sample With and Without Cholesterol Information Variable, Baking and Frying Fats and Oils[a]

Variables	1950-1990 (Under H_0)	1950-1990 (Under $H_0 \neq 0$)
H_s	19.254*	18.586*
H_m	15.980*	16.017*
H_p	17.771*	18.301*
C_s	-	0.0013
C_m	-	-0.0003
C_p	-	0.0012
A_1	4.1317*	3.2237***
A_2	1.4963***	1.0593
A_3	-0.9056	-0.1854
A_4	-1.3988***	-1.2601
A_5	-0.2517	-0.8079
A_6	-2.1558*	-1.8790***

Note: The superscripts *, **, and *** correspond to levels of statistical significance of 1 percent, 5 percent, and 10 percent, respectively.

[a]The subscript letters s, m, and p refer to saturated fat, monounsaturated fat, and polyunsaturated fat, respectively, and the subscript numbers indicate coconut oil (1), cottonseed oil (2), palm oil (3), lard (4), soybean oil (5), and tallow (6) in order.

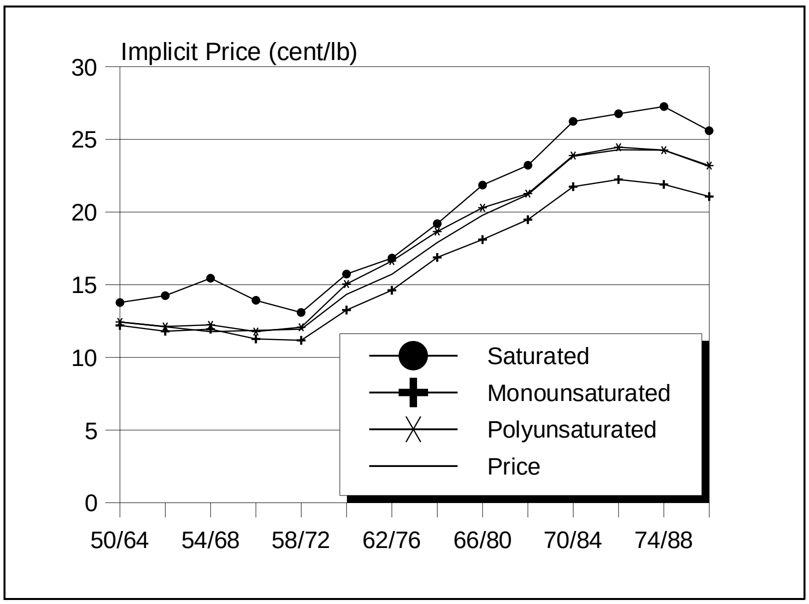

FIGURE 8.4 Estimates of Implicit Prices of Nutrient Fats for Baking and Frying Use

changing consumer preferences. The estimated expenditure share (EES) of fat j is defined as:

$$EES_j = \frac{\sum_i \dot{h}_j s_{ij} q_i}{\sum_i \sum_j \dot{h}_j s_{ij} q_i} = \frac{\dot{h}_j Q_j}{\sum_j \dot{h}_j Q_i} \tag{15}$$

for j = 1,2,3 and where Q_j is total amount of fat j consumed and $\dot{h}_j$ is the predicted implicit price based on equation 12. Since it includes the arguments of actual consumption of nutrient fats as well as the estimated implicit price, the EES measure is an appropriate indicator of changing consumption patterns.

As shown in Figure 8.5, the consumer expenditure allocation for cooking and salad uses for polyunsaturated fat was gradually increasing while the allocations for the other two fats continued to decline over the time period studied. And the EES on saturated fat was always lower than that of unsaturated fats. These trends show a gradually changing consumption pattern of cooking and salad fat and oils. On the other hand, for baking and frying fats and oils, the EES of all three fats remained almost unchanged among the 14 time periods (see Figure 8.6). In addition, the EES for polyunsaturated fat was always greater than that

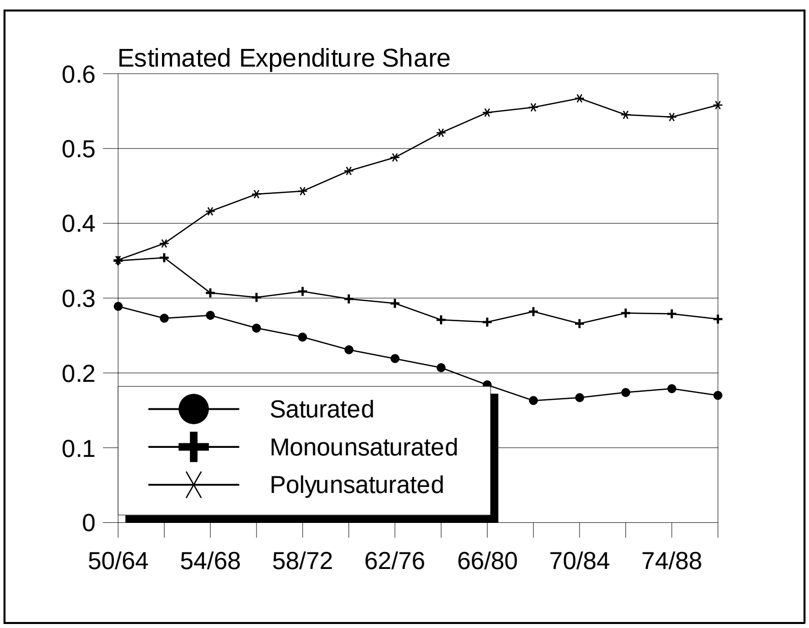

FIGURE 8.5 Estimated Expenditure Shares of Fatty Acids in Cooking and Salad Fat and Oils

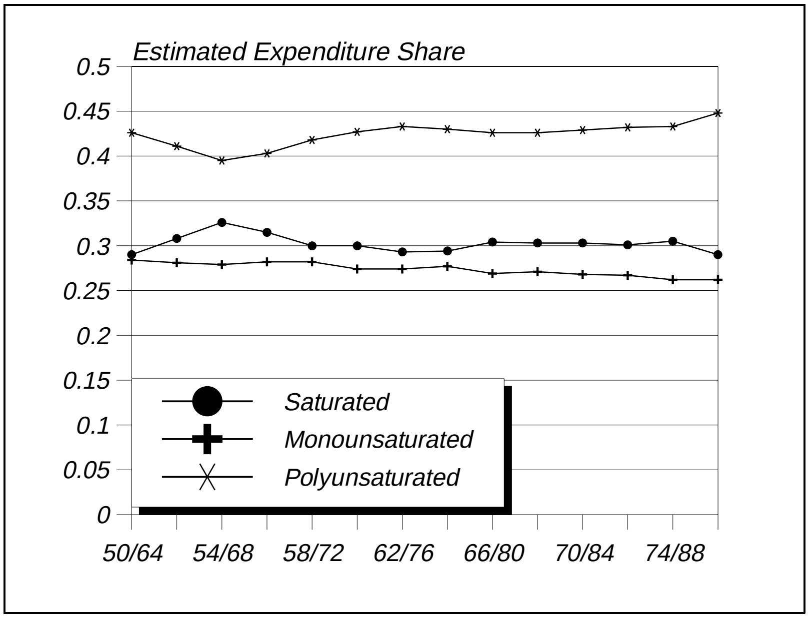

FIGURE 8.6 Estimated Expenditure Shares of Fatty Acids in Baking and Frying Fats and Oils

of saturated fat while saturated fat was always greater than monounsaturated fat. These relatively stable trends of EES would reconfirm the earlier conclusion that there were no structural changes in the consumption of baking and frying fats and oils during the study period.

Conclusions

Modified hedonic price equations in an expenditure share form are developed here for estimating the implicit prices of three nutrient fats (saturated, monounsaturated, and polyunsaturated fats). Two end uses of fats and oils are analyzed and compared. The chapter focuses on examining whether changes in the consumption patterns of fats and oils occurred during the study period, whether consumer health information had an impact on consumer valuation of nutrient fats, and whether consumers have taken health concerns more seriously (in the case of cooking and salad dressing use) than food processors (in the case of baking and frying use).

Based on the system estimation for five cooking and salad fat and oils, we found the implicit prices of all fats are significant. The implicit values for unsaturated fats are much higher than saturated fat from the mid-1960s to mid-1980s, implying changes in consumer tastes in the consumption of cooking and salad fat and oils. These changes were shown to be influenced by dramatic increases in available cholesterol information from 1982 to 1987. On the other hand, the estimation of six baking and frying fats and oils produces significant estimates of implicit prices, but the estimates of the information coefficients are mostly not significant. No noticeable changes in consumer preferences and no evidence of an information effect on consumer valuation of nutrient fats are found for baking and frying uses.

Therefore, we may conclude that the consumer has indeed taken health concerns more seriously than the food processors and food service outlets during the study period. It is clear from the results that consumers' health concerns have been more critical in their direct choice of fats and oils for uses at home, than indirectly in their choice through purchase of processed food products, and fast food or food-away-from-home at restaurants. This may be partially explained by the fact that there has been a lack of widespread health related information for snacks, fast food, or food-away-from-home at restaurants. The estimated expenditure shares (EES) among the three fats provide additional evidence supporting the above findings about the relative implicit prices of fats and the impacts of health information. The results of this chapter have important implications for consumers, food-away-from-home sectors, and government and other health agencies. As shown in several recent studies, spending on food-away-from-home has steadily increased. Therefore, it is increasingly important for the food-away-from-home consumption to be responsive to health concerns.

The expenditure share form of hedonic price specification is a useful model when there is a problem of severe multicollinearity, especially when the ratios of characteristics contained in goods are constant over time. The results suggest that health information can play an important role in household choice among substitutes in food consumption. Finally, the chapter demonstrates once more that the hedonic price model is an effective and useful approach for estimating consumer valuation of food attributes such as fats and cholesterol based on observed market price and consumption behavior.

Note

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