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Characteristics of Organic Food Shoppers

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Data from a national survey of food shoppers are analyzed by probit and ordered probit models that incorporate elements of Lancaster's product attribute model and Weinstein's precaution adoption process. The models are used to investigate the characteristics of organic and nonorganic food shoppers. Where one shops, food beliefs, and food knowledge have the largest significant impact on the probability that shoppers buy organic food. Among the demographic characteristics, only the lack of religious affiliation, higher education, and youth are significant explanatory variables.

Key Words: consumer decision making, consumer profiles, organic food, product attributes

JEL Classifications: C25, D12, M31

Global sales of organic foods are estimated to be growing at 10% to 20% annually. They were $US23 billion in 2002 (Willer and Yussefi) and estimated at $US29–31 billion in 2005 (Kortbech-Olesen). Researchers attribute the growing demand for organic products to concerns about the environment, health, genetically modified (GM) foods, and the recent series of highly publicized food scares (Davies, Titterington, and Cochrane; Dimitri and Greene; Tregear, Dent, and McGregor; Willer and Yussefi).

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This is despite the fact that organic food premiums range from 50% to 75% (Willer and Yussefi). Brown and Sperow estimated the cost of an all-organic diet using the USDA's Thrifty Food Plan would increase food expenditures by 49% for a family of four. Price differences between individual organic and conventional foods ranged from −74% to 450%.

Given that organic food sales are growing rapidly despite the generally higher cost, the purpose of this paper is to identify who are organic shoppers and what characteristics are associated with their organic food demand. This will help in predicting how big the market for organic food eventually will be. Organic shoppers are subdivided into those who buy organic foods occasionally and those who buy organic foods every shopping trip. This is to identify whether there are substantial differences in these two groups.

Lancaster's product attribute model and Weinstein's precaution adoption process are used to formulate a hybrid model to examine the factors related to organic food shoppers. Weinstein's precaution adoption process provides insights into the process of behavior change. Using cost–benefit analysis as a foundation, he views the adoption of new behavior

as a dynamic process that incorporates competing life demands and cues to action. The hybrid models are estimated by probit and ordered probit analysis using data from a 2003 U.S. consumer survey.

Background

Given that organic food is generally more costly, some researchers have found that organic food demand is linked with higher income (Davies, Titterington, and Cochrane; Tregear, Dent, and McGregor; Willer and Yussefi). However, Goldman and Clancy and Storstad and Bjørkhaug found no relationship. Zepeda, Chang, and Leviten–Reid found high cost to be a barrier to organic food purchases but that it was not necessarily related to income. Turnbull and Lockie et al. found that the lack of availability of organic foods, their high cost, and high search costs or inconvenience were major obstacles to organic food demand. Neither Goldman and Clancy or Thompson and Kidwell found price to be a deterrent to buying organic, however, the latter found that store choice was the main factor in organics purchase, with health food stores and food cooperatives generally having a greater variety and concentration of organic foods than conventional grocery stores. Chang and Zepeda also found the lack of availability to be a major barrier to purchasing organic foods.

Several researchers found that concerns about personal health, the environment, and animal welfare are associated with organic food purchases (Chang and Zepeda; Davies, Titterington, and Cochrane; Dimitri and Greene; Storstad and Bjørkhaug; Swanson and Lewis; Thompson; Tregear, Dent, and McGregor; Zepeda, Chang, and Leviten-Reid). In addition, Chang and Zepeda found that taste and dietary restrictions (particularly vegans and vegetarians) were motivations for organic consumption. Zepeda, Chang, and Leviten-Reid also found that dietary restrictions motivated buying organic foods, while lack of familiarity and lack of trust in organic labels were major barriers. Wier and Andersen found that the highest propensity to purchase organic foods was among those who believed there were direct personal effects (health, taste, and freshness attributes) as well as external effects (environmental or animal welfare attributes).

Demographic variables have mixed results with respect to organic food demand. Willer and Yussefi found no clear linkages between organic demand and gender, age, or education. Shaffer found that males were more likely to buy organic foods, while Byrne et al. found the opposite, and Thompson and Kidwell and Swanson and Lewis found no gender differences. The presence of children increased the likelihood of purchasing organic in one study (Thompson and Kidwell) and decreased it in another (Shaffer). Age was not found to be significant in studies by Byrne et al., Swanson and Lewis, or Thompson and Kidwell; however, Shaffer found the young more likely to buy organic and Goldman and Clancy found the middle-aged more likely to buy organic. Wilkins and Hillers found no relationship with education, while Swanson and Lewis found organic demand was positively related to education, and Byrne et al. and Thompson and Kidwell found the opposite. These differences in findings regarding demographic variables may be due largely to the studies being done at different times and regions in the United States as well as different countries. Another explanation is differences in the populations being surveyed. Some studies were of the general population, while others targeted food shoppers.

Existing literature does indicate that economic and demographic variables alone do not present a clear picture of who is buying organic food and why. They reveal helpful directions to pursue: examining the underlying preferences and motivations for purchasing organic foods, especially those related to beliefs about the environment, animal welfare, personal health, and dietary restrictions, as well as looking at barriers such as limited availability and lack of shopping venues that sell organic foods. The next section develops a model formalizing how these concepts can be incorporated into a behavioral model.

Modeling the Probability of Buying Organic Food

The focus of this study is to identify the characteristics of organic food shoppers as compared to those who do not buy organic food. The production process distinguishes organic food from conventional food. Organic food is produced without antibiotics, genetically modified organisms (GMOs), or synthetic pesticides and fertilizers. Along with positive consequences for the environment, many associate these production practices with positive health benefits for humans. Therefore, to examine the demand for organic food requires examining the demand for its production attributes. Lancaster proposed that consumers demand attributes of goods and services, not just quantities of particular goods and services. Lancaster's approach implies that organic food shoppers buy organic foods because of their production-specific characteristics or perceived characteristics, such as benefits to the environment, personal health, and family health.

While Weinstein's precaution adoption process was developed to address preventive behavior associated with hazards, his model offers insights into how individuals make behavior changes. Using a benefit–cost approach as a foundation, Weinstein develops a dynamic model of the stages individuals pass through before actually modifying their behavior. He posits that different interventions will influence the five different stages: awareness, belief that it may affect others, belief that it has personal relevance, intention to act, and action. Thus, the perceived costs of taking an action affect whether one intends to act or takes action, but have no relevance if one is not aware of the potential action. The implication is that effective communication regarding consumer choice must be targeted to the relevant stage of the audience.

Far from being an orderly process, he views actions as competing with other life priorities. "Action here will depend on the complexity of the precaution, on events that make information about the action available, and on reminders (p. 377)." Hence, cues to action are important prompts for behavior modification. In addition, special skills may be needed for an individual to carry out their intention.

Weinstein's precaution adoption process is modified for analysis of organic food shoppers. Because Weinstein developed his model for hazard avoidance, recognition of risk was divided into two stages: risk to others and personal risk. Modifying this model for analysis of organic food, we drop the "others" stage and focus only on the personal benefits and cost, as we did not have data on whether individuals felt others might benefit or not from buying organic foods. Weinstein also assumed that all individuals had the opportunity to take precautions. In the case of organic foods, while availability may be growing, it is still not universally accessible. Thus, opportunity becomes an important stage.

The five stages for this model are therefore: information/awareness, personal connection, intention to act, opportunity, and action. Lancaster's attributes can be embedded in any of the different stages. First, shoppers must be aware of organic foods. Then they must perceive a need, develop an intention to act, have the opportunity to act, and finally act on the preference. This model is useful in explaining discrepancies between attitudes, intentions, and behavior. Individuals may express concern about an issue, but do not recognize how their behavior may be related, or may not yet have a plan or opportunity to act. In addition, there are costs, albeit nonmonetary time costs, associated with each stage: information search costs, information processing, planning, time and effort, and finally purchase. In the case of food, there are also post-purchase costs (preparation and cleanup) as well as post-purchase utility (consumption of the final product).

This hybrid of Lancaster's and Weinstein's models is applied to the question of who shops for organic foods. Stage I (information/awareness) variables measure awareness and knowledge. Stage II (personal connection) is characterized as having personal concerns about the environment, or perceiving linkages be-

tween organic production practices and health impacts on farm families or own family health. Stage III (intention to act) is represented by intention to buy organic. Stage IV (opportunity) can be represented by availability of organic foods, including shopping venue. As an example, health food stores and food cooperatives generally feature a greater variety and concentration of organic foods than conventional grocery stores, thus reducing search costs both in finding a shopping venue with organic foods and in reducing search costs finding organic foods within the venue. Cost and income also will influence the ability or opportunity to purchase organic food. Costs include the direct monetary costs as well as the indirect search costs for finding organic foods. For example, someone may intend to buy organic tomatoes and be willing to pay a premium of 50 cents a pound for them, but if organic tomatoes are not available at their usual shopping venue, it would require them to both find and go to an alternate venue. The time and effort involved is an additional (nonmonetary) cost that may far outweigh their willingness to pay even if there is no price premium charged for organic tomatoes. Both direct and indirect costs are weighed against the benefits to influence the final decision to purchase organic foods, Stage V (action).

Some variables may have multistage effects. For example, frequency of cooking may affect knowledge (Stage I) as well as opportunity (Stage IV), since most organic food is sold for food preparation, not in restaurants. Enjoyment of cooking may affect personal connection (Stage II) and intention (Stage III). Use of cross-sectional data means that it is not strictly necessary to categorize variables into a single stage.

Demographic characteristics (age, race, gender, education) can be included as proxies for unspecified preferences. Inclusion permits examining their effect when preferences are explicitly incorporated. The model can be conceptualized as the probability of organic purchase (Stage V) being a function of variables that represent Stages I–IV, economic factors, and demographic characteristics.

Data

Data used to estimate these models are from a Fall 2003 U.S. household survey on food buying (N = 956). The survey was administered using the Dillman method both as a CATI (computer-assisted telephone interview) telephone survey (N = 434) and mail survey (N = 522) to compare the effectiveness of each method. The mail survey did substantially better than the phone survey; it had an unadjusted response rate of 47.7% versus 29.1%. The superior performance of the mail survey is probably explained by the proliferation of telemarketers and caller ID.

All respondents were screened for adults who shopped and cooked. In the case of multiple adults in the household who did both, any one of them would be eligible to complete the survey. Answers to questions were rotated in four different versions of the survey to mitigate order bias. The four versions also included negative and positive wording of the knowledge questions.

In order to assess how representative the survey was, household income data was divided into quintiles based on U.S. Census household income data. Ideally, 20% of respondents would have fallen into each category. However, neither survey did particularly well among the lowest quintile; only 8% of the mail survey and 10% of the phone survey respondents were in the lowest income quintile. The higher overall response rate of the mail survey was due to a higher response rate among the three highest income quintiles. Whether it is because higher income households move less frequently, screen their calls more frequently, or are just more likely to open and read their mail, it does appear that mail surveys are an effective way of reaching them.

The usable data was 680 observations after all missing variables were omitted. For the probit model, the dependent variable (*Or-Shopper*) takes on a value of one for those who buy organic food every shopping trip (regularly) or not every shopping trip (occasionally), and zero otherwise. For the ordered probit model, the dependent variable (*Ordered*) is

zero if no organic food is purchased, 1 if organic food is purchased occasionally, and 2 if purchased regularly. The explanatory variables include variables influencing Stages I–IV, demographic characteristics of the respondent, and economic variables (Table 1).

Organic foods are produced without chemical pesticides or fertilizers, radiation, hormones, or GMOs. Respondents were asked true/false questions whether foods produced with each of these technologies were organic. More than 75% of the respondents were able to correctly define what practices are permitted for food to be labeled organic, with the exception of use of GMOs. Therefore, in this model we use whether the respondent correctly identified that organic foods do not contain GMOs (*gmo*) as an indicator of knowledge. It is expected that those who are more knowledgeable and familiar (Stage I—*knowledge*) with organic foods are more likely to purchase them. Familiarity is represented by whether they have seen the USDA organic label (*usda*).

For stage II (personal connection), it is expected that people concerned about their own diet, concern about personal or family health problems related to the environment, or concern about farmers and their families being exposed to agricultural chemicals, and general concerns about the environment, represented by affiliation with an environmental group, would most likely be those who buy organic foods (Brown; Chang and Zepeda; Davies, Titterington, and Cochrane; Dimitri and Greene; Storstad and Bjørkhaug; Swanson and Lewis; Thompson; Tregear, Dent, and McGregor; Zepeda, Chang, and Leviten-Reid). To represent dietary considerations, variables are included in the model for households that follow a vegan or vegetarian diet (*veg*) or have members with food allergies, intolerances, or sensitivities (*diet*). Respondents were asked to rank the most important of four environmental issues: water contamination, personal or family health problems due to pollution, energy or resource conservation, and wildlife preservation. A variable for respondents who ranked their own personal and family health as the most important environmental issue (*pfhealth*) is also included. Another variable was created for respondents who ranked farmers and their families being exposed to agricultural chemicals as the most important farming issue[1] (*farmfam*). Because organic production methods are associated with environmental stewardship, membership in an environmental group (*envgrp*) is included to see if there is a correlation to organic food purchases (Chang and Zepeda; Storstad and Bjørkhaug; Swanson and Lewis; Zepeda, Chang, and Leviten-Reid). However, in a U.K. study, Davies, Titterington, and Cochrane found that environmental concerns were not strongly linked with organic food purchases. To explore the extent to which actions demonstrating a priority placed on health and fitness might influence organic food choice, membership in a fitness club (*fitclub*) is included. It is expected that these variables would be positively associated with organic purchases.

Variables about food beliefs are used to capture Stage III, the intention to act. The belief that organic foods are more nutritious than conventional foods (*monutri*) is expected to have a positive impact on the likelihood of purchase of organic foods. Respondents were asked to rank which of the following was the most important characteristic of food: brand, nutrition/health, cost, convenience, or food safety.[2] It is expected that those who say that nutrition and health are the most important characteristics of food (*nutrition*) would be more likely to buy organic since these are cited as reasons for buying organic food (Dimitri and Greene; Swanson and Lewis; Thompson; Tregear, Dent, and McGregor; Zepeda, Chang, and Leviten-Reid). It is expected that those who place a priority on convenience (*conven*) and cost (*cost*) would be less likely to buy organic food since it is generally more

[1] The alternatives to *farmfam* included: U.S. farmers getting an adequate price for their products, all consumers being able to buy quality food at prices they can afford, or animal welfare. Those who answered that exposure of farmers and their families to chemicals was the most important farming issue may view their household consumption choices as having a direct impact on farm families.

[2] Only 1.5% of the sample chose brand.

Table 1. Variable Description ($N = 680$)

Variables	Description	Mean	SD
Dependent Variables			
OrShopper	1 = Respondent buys organic food regularly or occasionally 0 = Respondent never buys organic food	0.5647	0.4962
Ordered	2 = Respondent buys organic food regularly (7.79%) 1 = Respondent buys organic food occasionally (48.68%) 0 = Respondent never buys organic food (43.53%)	0.6426	0.6214
Independent Variables[a]			
Stage I: knowledge/familiarity			
gmo	1 = Respondent correctly defines that "organic foods are not genetically modified"	0.7485	0.4342
usda	1 = Respondent has seen the U.S. Department of Agriculture's (USDA's) organic label	0.3338	0.4719
Stage II: personal connection			
diet	1 = Someone in the household follows a special diet due to food allergies, intolerances, or sensitivities	0.1118	0.3153
veg	1 = Someone in the household follows a vegetarian or vegan diet	0.0368	0.1883
pfhealth	1 = Personal or family health problems due to pollution are the most important environmental issues	0.4779	0.4999
farmfam	1 = Farmers and their families being exposed to agricultural chemicals are the most important farming and food issues	0.2029	0.4025
envgrp	1 = Respondent belongs to a environmental group	0.0574	0.2327
fitclub	1 = Respondent belongs to a fitness club	0.2662	0.4423
Stage III: intention to act			
nutrition	1 = Nutrition/health is the most important characteristic of food	0.4353	0.4962
cost	1 = Cost is the most important characteristic of food	0.1235	0.3293
conven	1 = Convenience is most important characteristic of food	0.0559	0.2299
monutri	1 = Respondent believes that organic foods are more nutritious than other foods	0.6809	0.4665
Stage IV: opportunity (shopping venue and economic variables)			
coop	1 = Get groceries at food co-op on a regular basis	0.0779	0.2683
healthfd	1 = Get groceries at health food store on a regular basis	0.1500	0.3573
direct	1 = Get groceries directly from a farmer on a regular basis	0.2191	0.4140
Economic variables			
foodexp	Household food expenditures per week (in units of $100)	1.2125	0.7380
inc1	1 = Household low income (first quintile: <$15,000)	0.0868	0.2817
inc2	1 = Household low middle income (second quintile: $15,000 to $29,999)	0.1588	0.3658
inc3	1 = Household middle income (third quintile: $30,000 to $44,999)	0.1838	0.3876
inc4	1 = Household upper middle income (forth quintile: $45,000 to $75,000)	0.2897	0.4540
inc5	1 = Household high income (fifth quintile >$75,000)	0.2809	0.4498
Multistage			
enjcook	1 = Respondent enjoys cooking very much	0.4132	0.4928
cook1 × *d*	1 = Household prepares meals from raw ingredients at least once per day	0.2794	0.4490
Demographic variables			
kid6–17	Number of children (age 6 to 17) in the household	0.4779	0.9144
male	1 = male respondent	0.3500	0.4773

Table 1. (Continued)

Variables	Description	Mean	SD
age	Age of respondent in units of 10 years	5.0340	1.5327
edu	1 = Education at least 4 years of college	0.4191	0.4938
white	1 = Race: Caucasian	0.8397	0.3671
noreligion	1 = Religious affiliation: None	0.1412	0.3485
liberal	1 = Political affiliation: Liberal	0.2015	0.4014

[a] 0 = otherwise for all independent variables unless otherwise noted

costly, and although packaged organic foods are increasing in availability, they are not as common as organic produce and other unprepared organic foods (Brown and Sperow; Dimitri and Greene). In general, packaged foods are designed to be convenient and require little skill, while produce is often less convenient, generally requiring some skill and preparation time. It is not clear what impact placing the highest priory on food safety would have, but it is included as the reference category.

Stage IV (opportunity) is represented by shopping venue and the economic variables. Shopping venue affects the search cost and availability of organic food (Chang and Zepeda; Lockie et al.; Thompson and Kidwell; Turnbull). Variables are included for those who shop at health food stores (*healthfd*), food cooperatives (*coop*), and directly from farmers (*direct*) because these venues are more likely to have organic foods available than conventional supermarkets (Kortbech-Olesen). Dimitri and Greene indicate that organic foods are available in 73% of conventional grocery stores and these make up 99% of all food stores but only comprise 49% of all organic food sales. Income quintiles (*inc1–5*) are included to represent the ability of households to purchase organic foods.[3] Because organic foods are generally more expensive than conventional foods, one might expect that the likelihood of purchasing organic food will increase with income quintiles, however, the literature is mixed on this (e.g., Goldman and Clancy, Willer and Yussefi). Weekly food expenditures (*foodexp*) measured in hundreds of dollars[4] are also included to represent the ability or inclination to spend on food. Because organic foods generally are more expensive, it is expected that the higher the amount allocated for food expenditures, the more likely a household will purchase organic foods.

Two variables can be viewed as multistage affecting knowledge, personal connection, and intention. Enjoyment (*enjcook*) and frequency (*cook1* × *d*) of cooking are associated with knowledge of food and food quality as well as personal connection and intention. It is expected that those who enjoy cooking or cook more frequently are more likely to buy organic food. Until recently, few restaurants offered organic foods. While organic packaged foods are increasing, the majority of organic food sales is produce (Dimitri and Greene), which generally requires more cooking skill to prepare than packaged foods. Because packaged organic foods are a recent phenomena, those buying organic foods would generally need to be more inclined to cook and to cook more frequently.

Demographic variables are included for comparison to other studies. They include the

[3] The income quintiles are based on U.S. Census data on household income. Thus, approximately 20% of all U.S. households at the time of the survey had a household income under $15,000, approximately 20% had a household income between $15,000 and $29,999, etc. We did round the cutoffs to the categories for simplification. We used quintiles for two reasons. First, respondents are much more willing to provide a range in their income than the actual household income level. Second, since the quintiles are based on actual U.S. household income, they provide an easy means to assess the representativeness of the sample.

[4] Units of $100 are used for food expenditures to ensure that all the units of measurement for the variables in the model are of the same order of magnitude to avoid scaling problems in the estimation procedures.

presence of children 17 or under (*kid6–17*), gender[5] (*male*), age measured in units of ten years[6] (*age*), race (*white*), and education (*edu*). It is not expected that any of these variables will be significant when variables representing the various stages of knowledge, personal connection, intention to act, and opportunity are accounted for. Religious[7] (*noreligion*) and political (*liberal*) affiliations are included to assess whether organic food purchase is associated with a particular religious or political viewpoint.

Findings

Probit and ordered probit models are estimated using Limdep 8 software (Greene 2002). Probit models allow the dependent variable to take on a categorical value(s). They control for multiple explanatory variables, which permits examination of the relative importance of demographic characteristics and economic variables as well as the variables representing Weinstein's stages. The probit model (Table 2) examines the variables affecting the probability of purchasing organic foods, while the ordered probit model (Table 3) examines the differences between those who regularly buy organic, those who occasionally buy organic, and those who never buy organic foods. The overall fit of both models is similar. The ordered probit model does a somewhat better job than the probit model of correctly predicting those who do not buy organic (66% versus 64%) but a worse job of predicting those who do buy organic foods (60% versus 71%).

For the probit model, at the 5% level of significance, the most important and significant factor influencing the probability of purchasing organic food is shopping venue (opportunity, Stage IV). Shopping at a health food store or food cooperative increases the probability of purchasing organic food by 31% and 23%, respectively, while purchasing directly from farmers increased the probability of buying organic food by 10% at the 10% level of significance.

The second-largest marginal effects influencing organic food purchase at the 5% level of significance were those who viewed convenience as the most important factor in buying food. These shoppers were 26% less likely to purchase organic foods, holding all other variables constant (Stage III—intention). The belief that nutrition/health or cost was the most important aspects of food had no significant impact on purchase of organic food. Knowledge, represented by the ability to correctly define organic, had no significant impact, while familiarity with the USDA organic label (Stage I) increased the probability of purchasing organic foods by 18% at the 5% level of significance. Belief that organic foods were more nutritious (intention, Stage III) increased the probability of purchase by 12% at the 5% level of significance.

A few Stage II variables (personal connection) were significant but only at the 10% level. Membership in a fitness club is associated with an 8% increase in the probability of buying organic. Interestingly, those who felt that personal and family health was the most important environmental issue were 7% *less* likely to purchase organic foods. In addition, viewing exposure by farmers and their families as the most important farming issue had no significant impact on organic purchase behavior. Being on a special diet had no significant impact on organic purchases; neither did frequency of cooking.

None of the economic variables (income or amount of food expenditures) had any significant impact on the probability of buying organic foods. Enjoyment of cooking significantly increased the probability of purchasing organic foods by 11% holding all other

[5] Note that because the population is food shoppers, the sample is predominantly female (65%). Therefore the results will examine the effect of gender on food shopping behavior

[6] Units of ten years are used for age to ensure that all the units of measurement for the variables in the model are of the same order of magnitude to avoid scaling problems in the estimation procedures.

[7] Several religious categories were examined, including atheist and agnostic, but only the category "no religious affiliation" was correlated with organic food shoppers.

Table 2. Results of Probit Analysis on Organic Shoppers (N = 680)

Variables	Coefficients	SE	Marginal	SE
Intercept	−0.0154	0.3523	−0.0059	0.1361
Stage I: knowledge/familiarity				
gmo	0.1559	0.1245	0.0607	0.0488
usda	0.4822*	0.1213	0.1803*	0.0433
Stage II: personal connection				
diet	−0.0119	0.1891	−0.0046	0.0732
veg	0.4093	0.3870	0.1471	0.1258
pfhealth	−0.1878**	0.1099	−0.0725**	0.0424
farmfam	0.1486	0.1399	0.0567	0.0525
envgrp	0.3608	0.2560	0.1315	0.0862
fitclub	0.2170**	0.1303	0.0825**	0.0486
Stage III: intention to act				
nutrition	−0.1227	0.1218	−0.0474	0.0471
cost	−0.1641	0.1725	−0.0642	0.0681
conven	−0.6751*	0.2476	−0.2640*	0.0920
monutri	0.3206*	0.1155	0.1249*	0.0451
Stage IV: opportunity				
coop	0.6609*	0.2507	0.2257*	0.0707
healthfd	0.9413*	0.1971	0.3090*	0.0491
direct	0.2648**	0.1412	0.0998**	0.0516
Economic variables				
foodexp	−0.0161	0.0837	−0.0062	0.0323
inc2 (ref: *inc1*)	−0.0316	0.2316	−0.0122	0.0899
inc3 (ref: *inc1*)	−0.3195	0.2268	−0.1254	0.0897
inc4 (ref: *inc1*)	−0.2029	0.2206	−0.0790	0.0864
inc5 (ref: *inc1*)	−0.2670	0.2357	−0.1042	0.0925
Multistage				
cook1 × *d*	−0.0743	0.1299	−0.0288	0.0505
enjcook	0.2900*	0.1146	0.1109*	0.0432
Demographic variables of respondent				
kid6–17	−0.1075**	0.0615	−0.0415**	0.0238
male	−0.0339	0.1133	−0.0131	0.0438
age	−0.0866*	0.0393	−0.0334*	0.0152
edu	0.2691*	0.1187	0.1030*	0.0449
white	0.0192	0.1538	0.0074	0.0596
noreligion	0.3920*	0.1711	0.1438*	0.0586
liberal	0.1738	0.1457	0.0661	0.0543

Note: Restricted log likelihood is −465.63, Chi-square is 163.24 and is significant at 0.0000000 with 29 df.
*Significant at 0.05 level.
**Significant at 0.10 level.

variables constant at the 5% level of significance. Of the demographic variables, lack of religious affiliation was the most important. It significantly increased the probability of organic food purchase by 14%, while a college degree increased the probability by 10% and age decreased the probability by 3%, all at the 5% level of significance. Having children under 18 reduced the probability of buying organic foods by 4% at the 10% level of significance. Gender and race had no significant impact on the probability of purchasing organic foods, nor did political affiliation.

The ordered probit results are similar to the probit results (Table 3). However, while the model did a good job of correctly predicting nonorganic shoppers (66% correct) and the occasional organic shoppers (67% correct), it

Table 3. Ordered Probit Results for Frequent and Occasional Organic Food Shoppers (N = 680)

	Ordered = 0		Ordered = 1		Ordered = 2	
Variables	Marginal	SE	Marginal	SE	Marginal	SE
Stage I: knowledge/familiarity						
gmo	−0 0575*	0.0216	0.0468*	0.0187	0.0107	0.0192
usda	−0.1924*	0.0244	0.1451*	0 0224	0.0473*	0.0170
Stage II: personal connection						
diet	−0.0483*	0.0214	0.0376*	0.0176	0.0107	0.0230
veg	−0.0786*	0.0220	0.0593*	0.0183	0.0193	0.0233
pfhealth	0.0636*	0.0193	−0.0509*	0.0142	−0.0127	0.0271
farmfam	−0.0887*	0.0222	0.0681*	0.0189	0.0206	0.0216
envgrp	−0.1316*	0.0234	0.0946*	0.0199	0 0370	0.0227
fitclub	−0.0623*	0.0217	0.0487*	0.0182	0.0135	0.0218
Stage III: intention to act						
nutrition	0.0089	0.0204	−0.0071	0.0161	−0.0018	0.0240
cost	0.0314	0.0201	−0.0255	0.0157	−0.0059	0.0240
conven	0.2252*	0.0205	−0.1969*	0.0130	−0.0283	0.0250
monutri	−0.1156*	0.0223	0.0946*	0.0204	0.0210	0.0161
Stage IV: opportunity						
coop	−0.2102*	0.0262	0.1369*	0.0229	0.0733*	0.0217
healthfd	−0.2860*	0.0288	0.1745*	0.0262	0.1115*	0.0186
direct	−0.0608*	0.0216	0.0474*	0.0181	0.0134	0.0222
Economic variables						
foodexp	0.0006	0.0285	−0.0005	0.0228	−0.0001	0.0057
Income (ref: *inc1*)						
inc2	0.0511*	0.0199	−0.0417*	0.0153	−0.0093	0.0245
inc3	0.1096*	0.0194	−0.0911*	0.0139	−0.0185	0.0259
inc4	0.1290*	0.0188	−0 1063*	0.0129	−0.0227	0.0279
inc5	0.0976*	0.0192	−0.0800*	0.0138	−0.0176	0.0267
Multistage						
cook1 × *d*	0.0011	0.0205	−0.0009	0.0164	−0 0002	0.0236
enjcook	−0.0939*	0.0223	0.0742*	0.0194	0.0198	0.0196
Demographic variables of respondent						
kid6–17	0.0587*	0.0217	−0.0470*	0.0174	−0.0117**	0.0068
male	−0.0066	0.0207	0.0053	0.0166	0 0013	0.0234
age	0.0372*	0.0137	−0.0297*	0.0110	−0.0074*	0.0032
edu	−0.0864*	0.0221	0.0684*	0 0192	0.0181	0.0198
white	0.0339**	0.0196	−0.0267**	0.0148	−0.0072	0.0269
noreltgion	−0.1622*	0.0242	0.1163*	0.0211	0.0460*	0.0210
liberal	−0.0379**	0.0212	0.0299**	0.0174	0.0081	0 0228

Note: Restricted log likelihood is −619.75, Chi-square is 222.99 and is significant at 0.0000000 with 29 df.
*Significant at 0.05 level.
**Significant at 0 10 level

did a poor job of predicting regular organic shoppers (23% correct). That latter is probably due to the small number of observations; regular organic shoppers made up less than 8% of the sample. Turning to the significant explanatory variables, the largest marginal effects across all shopping categories were shopping venue (health food store or food cooperative), followed by familiarity with the USDA organic label, no religious affiliation, and being younger, at the 5% level of significance. At the 10% level of significance, across all three categories, having children reduced the probability of buying organic

foods. Ignoring the regular shoppers category, which the model did not predict very well, all the rest of the marginal effects are significant at the 5% level except: believing that nutrition is the most important characteristic of food, believing cost is the most important characteristic of food, weekly food expenditures, frequency of cooking, gender, race, and political affiliation.

Conclusions

A hybrid of Lancaster's and Weinstein's models is developed to represent the stages a consumer goes through when deciding to buy organic foods. The model is estimated using probit and ordered probit analysis. The ordered probit model did not predict frequent shoppers well, probably because of the small number of observations in that category. Direct economic variables (*foodexp*, *inc2–5*) did not significantly impact the probability of buying organic foods. However, the indirect variables, representing search costs or opportunity (*coop*, *healthfd*, *direct*), not only were significant, but had the largest marginal impact on buying organic foods. Of the demographic variables, the ones that are significant are: having no religious affiliation (*noreligion*), being more educated (*edu*), and being younger (*age*).

The data from this national survey imply that interest in organic foods is limited by lack of availability or shopping venue; where one shopped had the largest significant impact on the probability that one would buy organic foods. This is consistent with other research that has shown access to be important (Chang and Zepeda; Lockie et al.; Thompson and Kidwell; and Turnbull). This might also explain why some previous research has linked organic food sales to income; it may simply reflect availability of organic foods in more affluent neighborhoods. While we know on average the price of organic food is greater (Brown and Sperow), this research did not find a positive relationship between income and organic food demand. Indeed, the ordered probit results point to a negative relationship between organic purchases and income (*inc2–5*) when all other factors are taken into account. Food simply may be too small an expense, and organic foods too small a category within food expenditures for income to matter, especially among higher-income households. The economic cost that *does* appear to be important is search cost as represented by shopping venue (*coop*, *healthfd*, *direct*).

Given that so few shoppers currently have access to food cooperatives (8%) or health food stores (15%), the implication of the increasing availability of organic foods in conventional shopping venues would support continued growth in demand for organic foods. The sample indicates that 56% of shoppers say they buy organic foods, but only 8% do so regularly. Clearly, the existing market is large but the intensity of shopping is low; the ordered probit results indicate that access (shopping venue) is a significant factor for shopping intensity. The finding that enjoyment of cooking increases the probability of buying organic foods also supports the idea that the potential size of the market is large, since these people made up 42% of the sample. Furthermore, educational attainment is growing and this is linked to organic food demand. Overall, these results point to continued and robust growth in the market for organic foods.

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