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Differences Between Buyers and Nonbuyers of Organic Produce and Willingness to Pay Organic Price Premiums

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U.S. per capita food consumption has increased consistently over the last twenty years. Using the 1982-84 period as a base, the per capita food consumption index increased from 95.3 in 1966 to 105.5 in 1987 (USDA). In general, this reflects an overall improvement in the economic status of the U.S. population, as well as the elasticity of the supply function for food. There have been shifts in the consumption of various commodities, however, due to economic, demographic and socio-cultural factors. Decreases in per capita beef and milk consumption are illustrative of some of the more dramatic changes. On the other hand, fresh fruit and vegetable consumption have increased noticeably over the period due to availability, lifestyle changes and their touted health benefits (*The Packer - Focus 1989*).

Despite the large increases in consumption, consumer concerns about the potential health effects of food contaminants have grown. While there is probably little overall threat to any particular sector, specific commodities may be vulnerable to consumer reactions to these perceived health risks. In 1987, the Committee on Scientific and Regulatory Issues Underlying Pesticide Use Patterns and Agricultural Innovation of the Board on Agriculture, National Research Council, issued a report which did little to assuage consumers' fears about food safety. In its *Regulating Pesticides in Food: The Delaney Paradox*, the Committee presented a summary of its major findings on the health risks deriving from chemical residues. The report stated that

- about 55 percent of the total estimated dietary oncogenic risk stems from residues on crops that have raw and processed food forms. About 35 percent deriving from consumption of the raw product and 20 percent from the processed product.
- about 45 percent of estimated dietary oncogenic risk derives from foods that the EPA considers to have no processed form. These foods

include many fruits and vegetables and all meat, milk and poultry products (National Research Council).

The Committee listed several specific crops including many fruits and vegetables that, by its estimates, pose the greatest oncogenic risk. They also presented numerical estimates of these risks from lifetime consumption of these products. These include: tomatoes, beef, potatoes, oranges, lettuce, apples, peaches, pork, wheat, soybeans, beans, carrots, chicken, corn and grapes (National Research Council). Archibald and Winter have challenged the committee's assumptions and methodology based on a perception of an inherent upward bias in its oncogenic risk estimates. Nonetheless, consumers continue to regard the safety of foods with some amount of uncertainty, and pesticide residues continue to be of particular concern.

In addition to concerns about food safety, consumers have developed a parallel concern about environmental contamination. A significant proportion of consumers now favor doing more to protect the environment (*Davis Enterprise*). And the new environmental ethic that gained global prominence with Earth Day 1990 stresses personal responsibility along with social action; personal responsibility which includes making informed consumer choices, among them a choice for organic products (MacEachern). So far, organic products have not been as widely available as conventional products, and they have been significantly more costly. For example, in a price survey conducted by the author in Marin and Sacramento food markets in August 1988, organic strawberries were \$2.69 per basket, while conventionally grown strawberries of comparable quality sold for \$.99 per basket. Also, organically grown Macintosh apples were \$1.89 per pound compared with conventionally grown apples at \$.59-1.49 per pound, depending on the variety. Price differentials were of this size for most products. Not surprisingly, respondents to our survey identified high relative prices as a significant constraint to their continued purchase of organic foods.

This study assesses the market penetration of organic foods among California consumers. The paper will also analyze the factors that are conducive to the adoption of consumption patterns that favor organic food consumption. In particular, the analysis focuses on demographic, economic and attitudinal factors that distinguish between buyers and nonbuyers. I gathered the data through a survey of 1950 randomly selected households in three California counties - Marin, Sacramento and San Diego. The overall rate of return was 54 percent with little intercounty variation in the rate of return.

Demographic and economic variables that were statistically significant for buyers vs nonbuyers included: occupation, age, and size of community. Statistically significant psychographic variables included: rating of organic food about

the perception of whether they are better than, equivalent to, or worse than their conventional counterparts; level of concern for residues; level of concern for artificial coloring; level of concern for additives and preservatives; level of concern for radiation byproducts, and levels of concern for sugar and salt. Thus, the analysis suggests that organic food buyers tend to be younger than nonbuyers; to work more at white collar or technical-service jobs; and to live in smaller-sized communities. Additionally, organic food buyers rate organic foods significantly higher than nonbuyers and are more concerned about residues, artificial coloring, additives and preservatives, irradiation, sugar and salt. Thus, there are demographic and attitudinal factors that dispose certain elements of the population to the adoption of consumption patterns that favor organic horticultural products.

Materials and Methods

Using a list from a national mailing list service as the sampling frame I conducted a random survey of 1950 California households in Marin, Sacramento and San Diego counties in September-October 1987. I used a four-wave mailing system following Dillman. This consisted of an initial letter and questionnaire, followed by a reminder postcard one week after the initial survey and letter. Three weeks after the initial mailing, I sent another letter and questionnaire to nonrespondents and finally, a reminder postcard one week following the third mailing. The eight page survey required about 30 minutes.

The purpose of the study was to try to better understand consumer perceptions, attitudes and activities concerning food items in the marketplace. Of particular interest were consumer attitudes toward organically grown products. I asked consumers to respond to questions about factors affecting their food purchasing decisions and about how they rate the overall level of quality of flavor and healthfulness of the food supply in comparison with five years previous. I asked respondents to rate their levels of concern about 10 potential food risk factors on a five point scale. I also asked consumers to rate the overall quality of organic produce versus their conventional counterparts of better, worse, or about the same. Further, for those who rank organic products as better, I asked them to rate the importance to their rating of attributes commonly associated with organic products. I presented users of organically grown products with a list of 10 products and asked them to provide additional information about the type of product purchased in the preceding months, frequency of purchase, level of customer satisfaction, and their willingness to pay organic price premiums. I queried non-users as to constraints or reasons for no purchases. I also sought demographic characteristics. I numerically coded occupational and educational levels and attitudinal responses where appropriate.

Respondents completed and returned 54 percent of the 1769 deliverable questionnaires. Cross-tabulation of 76 selected variables analyzed by week of return showed no statistically significant monotonic trend differences over time, suggesting that non-responder bias was not a significant issue.

Results

Regarding consumer perception of overall product quality, about 65 percent of the respondents rated organic foods as about the same as or better than conventionally produced foods, with 40 percent rating them as better. Only five percent thought they were worse than the conventional products; 30 percent had no opinion. Given this favorable perception of organic foods one would expect purchasing behavior to mirror this pattern. However market penetration appears to be less impressive—only 23 percent of our sample said they regularly purchase organic foods, although 29 percent noted that they planned to buy organic foods the following month. Somewhat arbitrarily, we categorized organic food purchasers into four classes of buyers—high level users purchase organic products more than 16 times per month; moderate users, from five to 15 times per month; low level users from one to four times per month, and occasional users less than four times per month. This classification has more to do with buying frequency than with quantities bought. Consumer surveys often, however, use purchase frequency in classifying users. By our classification system, three percent fell into the high level usage group and 15 percent into the moderate. Low level users made up 37 percent of our organic food purchasers and occasional users 45 percent.

Constraints. Asked to identify the major constraints that limit their purchases of organic products, respondents identified the following constraints shown in Table 1. As shown, the most significant constraints identified by consumers that have not continued buying organic products are: high price, store location, and search time. Respondents did not identify product quality attributes as important limiting factors—appearance, flavor, color and quality were important concerns for less than seven percent of the respondents. Consumers that have never purchased organic products identify the same key constraints except that availability is a more common constraint than price. Also, 27 percent perceived no quality advantage to organic products (Table 2). Search time is an important constraint for 34.8 percent of this subset.

Since significant price differentials exist and they represent a serious constraint to consumption, and since other constraints such as store location and product availability restrict purchases, we need to explain why some consumers

Table 1.
Constraints Identified by Consumers That Have Not Continued Purchasing Organic Foods.

Constraints	Percent of Respondents
High price	56.9
Location of store(s)	53.5
Time to search	47.1
Appearance	6.8
Flavor	5.8
Color	5.8
Quality	5.3
Don't Know	8.9
Other	16.2

Table 2.
Constraints Identified by Consumers Who Never Have Purchased Organic Products.

Constraints	Percent
Availability	43.4
High price	41.3
Time to search for product	34.8
No better than conventional	27.3
Store location	16.1
Appearance	13.3
Shelf life	10.5
Quality Standards	4.2
Flavor	4.2
Don't know	16.1
Other	9.2

purchase organic products while others do not. Are there systematic, and statistically significant demographic, economic and psychographic differences between organic food buyers and nonbuyers?

ANOVA Analysis of Buyers vs Nonbuyers. We employed ANOVA in the analysis of the data to test the hypothesis of no difference between buyers and nonbuyers. Of the five demographic and economic factors employed as potential explanatory variables to explain differences in buying behavior, three proved to be statistically significant (Table 3). The two factors that were not statistically significant included differences in educational level and gross household income.

Table 3.

Demographic Factors - Buyers vs Nonbuyers of Organic Produce

Variable	Mean Scores for		t-values	F-values ^a
	Buyer	Nonbuyer		
Educational Level	5.75	5.73	0.134 (0.897)	.0094 (.99)
Occupation	6.03	7.62	-3.097* (.002)	5.1880* (.0058)
Household Income ^b	43.7	43.2	.383 (0.702)	.4797 (.6192)
Age	40.9	48.6	-6.179* (.0000)	25.6156* (.0000)
Size of Community ^b	39.4	44.5	-4.069* (.0000)	11.1740* (.0000)

a. From pooled variance estimate.

b. Income and population units are in thousands.

* Statistically significant at the .01 level. Probabilities for t- and F-statistics are in parentheses below t and F values.

However, type of occupation was significant, with buyers of organic produce more likely to be in service and white-collar occupations. Why persons in these occupational groups would be more innovative regarding organic food consumption is not clear. Conceptually, they may be less under the influence of primary consumer reference groups and thus, more free to risk innovative consumption choices. Age was statistically significant. Nonbuyers were noticeably older than buyers. The size of the community in which the respondent lived was also statistically significant; buyers lived in smaller towns and cities than nonbuyers.

Psychographic Factors. Several psychographic factors - factors that reflect attitudes and concerns, were statistically significant (Table 4). There was a large difference in how buyers and nonbuyers rated the quality of organic foods against their conventional counterparts. This shows that while availability and relative cost may have some influence on purchasing patterns, perceptions and preferences are important as well. The level of concern about residues is also statistically significant, as are levels of concern for artificial coloring and for additives and preservatives. Other factors that were statistically significant include; concern about radiation by-products from food irradiation, concern

Table 4.
Psychographic Factors: Buyers vs Nonbuyers

Variables	Mean Levels		t-values	F-values
	Buyer	Nonbuyer		
Importance of:				
Nutrition	1.79	1.71	1.961 (.056)	1.9112 (.1487)
Food Safety	1.78	1.69	2.056 (.040)	2.1626 (.1158)
Healthfulness	1.74	1.63	2.669* (.008)	3.7037 (.0251)
Flavor	1.72	1.67	1.055 (.292)	2.7130 (.0671)
Cost of Food	1.36	1.42	-.939 (.348)	.6910 (.5014)
Rating of Organic Food	.45	.04	8.763* (.000)	45.7176* (.0000)
Level of Concern for:				
Residues	4.37	3.92	7.279* (.000)	32.4955* (.0000)
Artificial Coloring	3.88	3.22	6.311* (.000)	21.1306* (.0000)
Additives & Preservatives	4.21	3.71	5.492* (.000)	17.5352* (.0000)
Radiation Byproducts	4.37	3.75	6.224* (.000)	20.0240* (.0000)
Cholesterol	4.02	4.01	.210 (.833)	.8407 (.4317)
Salt	4.14	3.87	2.868* (.004)	4.4326 (.0122)
Sugar	4.10	3.75	3.867* (.000)	9.3700* (.0001)
Fiber	3.95	3.86	.957 (.339)	1.209 (.2986)
Fat	4.22	4.11	1.207 (.228)	2.0877 (.1248)

* Denotes statistical significance at the .01 level.

about sugar and salt, and, the importance of the healthfulness of the food supply to food purchasing decisions.

Variables that were not statistically significant in this analysis included nutrition, overall food safety, flavor, and food cost. Mean scores on these factors were not far apart. Nor were the mean scores for the following factors: concern levels for cholesterol, fiber and fat.

Willingness to Pay Organic Premiums. The goals of this study included the development of estimates of the average levels of price premiums that consumers

would be willing to pay for organically produced horticultural products. Estimates of these organic premiums would be of material significance to growers and marketers, particularly regarding potential large scale marketing efforts.

Since organic products usually sell at a premium over their conventional counterparts, our study elicited responses that shed light on the price responsiveness of consumers to organic price premiums. In short, the willingness to pay various hypothesized levels of organic premiums. We derived price responsiveness for several products. We will present only the apples example here (Table 5). The subset for this portion of the analysis included consumers that had purchased organic products in the prior three months and consisted of 459 respondents—49 percent of the total number of survey respondents.

Table 5.

Willingness to Purchase Organic Apples at Alternative Prices (n = 459).

Conventional Price	Organic Price	% Price Differential	% of All Consumers
.68	.78	15.00	45.4
.68	.98	44.00	41.1
.68	1.18	74.00	8.2
.68	1.28	88.00	2.3
.68	1.68	147.00	3.1
.68	.98	37.00	(Avg)

As shown in Table 5, when the conventional price for apples was 68 cents, 45 percent of respondents who had bought organic products within the prior three months would pay up to 15 percent more for the organic product. Another 41 percent are willing to pay up to 44 percent more for organic apples—an organic price of 98 cents per pound. However, when the organic price premium increases to 74 percent and above, the percent of consumers willing to pay these levels of premiums declines to 13 percent. Only three percent of these were willing to pay 147 percent or more. Organic apples often sell at more than 100 percent price premium. Not surprisingly, the level of market penetration is correspondingly low. Table 6 presents data on the average price premium for all consumers as well as for consumers differentiated by county of residence.

As shown, consumer willingness to pay price premiums varied with the commodity and with the comparison price of the conventional product. In this specific instance, of the four horticultural products included in the survey, consumers were willing to pay the highest premiums for peaches and carrots

Table 6.

Average price premiums—all consumers, and by county of residence

Product	All	County		
		Marin	Sacramento	San Diego
		percent		
Apples	37.37	37.71	34.12	40.48
Peaches	67.86	72.29 ^a	60.22 ^a	68.33
Broccoli	38.68	39.95	34.58	40.89
Carrots	61.33	64.99	54.73	62.03

a. Statistically significant at .05 level of significance.

(68 percent and 61 percent, respectively) and lower premiums for apples and broccoli (37 percent and 39 percent, respectively). Average premiums varied as well by county of residence. In general, average premiums were lowest in Sacramento and highest in Marin and San Diego. In one case the differences were statistically significant. The difference in the average organic premium for peaches between Marin and Sacramento was statistically significant at the .05 level.

As shown in Table 7, consumers said that they would pay an average organic premium of 25 cents when conventional apples are 68 cents per pound; 33 cents per pound for organic peaches when the regular product is 49 cents; 26 cents per pound when the conventional product is 68 cents; and, 24 cents per pound for carrots when the conventional is 39 cents. Obviously, organic premiums vary with the product and with the cost of the conventional product.

Tables 8 and 9 show variations in willingness to pay premiums by various demographic characteristics. Logistical and economic considerations constrained our ability to carry out statistical tests on these data. However, scrutiny of the mean premiums by demographic characteristics show which groups of consumers are more or less willing to pay premiums for organic products. (We included only the data for apples.)

Table 7.

Conventional and Organic Prices Based on Willingness to Pay Price Premiums.

Product	Conventional	Organic
Apples	\$.68	\$.93
Peaches	.49	.82
Broccoli	.68	.94
Carrots	.39	.63

Table 8.
Willingness of Demographic Groups to Pay Price Premiums for Organic Apples, by Income Group, Gender, Rural and Size of Community, and Household Size.

Income	Total	Sex		City size		Household size					
		Female	Male	Rural-10	10-<50	50-<250	1 Person	2 Persons	3 Persons	4 Persons	5+ Persons
Total	459	291	168	203	125	101	80	175	90	69	43
Avg %	37.2	38.2	35.4	38.9	35.1	37.1	44.6	34.2	37.4	33.4	40.1
Income \$(000)											
<30	74	57	17	36	18	10	27	17	14	5	10
Avg %	36.2	39.7	24.5	40.3	28.3	42.3	54.5	30.5	23.5	29.4	26.5
30-49	148	87	61	58	48	34	33	57	27	17	14
Avg %	34.7	38.3	29.1	35.8	35.7	32.6	38.4	29.4	39.5	36.2	36.1
50+	237	147	90	109	59	57	20	101	49	47	19
Avg %	39.0	37.6	41.6	40.0	36.8	38.4	43.2	37.9	39.8	32.7	55.1

Of the total sample, demographic groups willing to pay higher average premiums are one person households, and households of more than five persons. There appears to be little variation by income group—all averages being close to the overall mean of the larger sample. By gender, males show a higher average than females, however, it is unlikely that the difference is statistically significant. Groups below the overall mean include; males in middle and lower income groups, low income consumers in towns of 10,000-50,000, and households of greater than 1 person in the below \$30,000 income group.

Table 9.

Average Willingness to Pay Organic Premiums, by Occupation and Marital Status.

Income	Total	Occupation				Marital status	
		Student	Retired/ Household	Blue Collar	White Collar	Married	Not Married
Total	418	5	105	55	253	317	144
Avg %	37.2	36.8	32.3	39.1	38.6	35.2	42.0
Income \$ (000)							
<30	63	2	27	7	27	28	47
Avg %	37.7	14.7	35.9	22.1	42.8	24.1	44.1
30-49	133	2	37	25	69	93	56
Avg %	34.4	44.1	24.9	37.2	37.9	33.6	37.0
50+	222	1	41	23	157	196	41
Avg %	38.6	44.1	37.0	44.9	38.0	37.6	46.1

Occupational and Marital Status. Table 9 presents data by occupational and marital status. Among those groups described in Table 9, only the unmarried appear to vary significantly from the overall mean. The disaggregated data show greater differentiation. Students with low incomes—below \$30,000 per year—are willing to pay an organic premium of only 14.7 percent. This is compared with 44 percent for students in the middle and higher income groups. However, note the small numbers of student respondents. Middle income retirees show a low average organic premium, as do low income, blue-collar workers. Low income marrieds also show a lower average premium—24.1 percent. Willingness to pay organic premiums varied directly with income for blue-collar workers—low income, blue-collar workers are significantly below the overall mean. At the same time, high income, blue-collar workers were above the mean.

For married couples also, the average premium varies directly with income. The same is not true for unmarrieds.

Age and Education. Conceptually, age and education levels may affect attitudes and access to knowledge and information that could determine consumer preferences. Table 10 presents data on the average premiums for these demographic groups.

In the overall breakdown, the over 60 age group showed a preference for significantly lower average organic premiums, while in the educational groups, respondents with graduate degrees show a higher willingness to pay. Respondents in the over 60 age group showed a willingness to pay an average premium of 28.4 percent compared to the overall mean of 37 percent. The two younger age cohorts, below 29 years and 30-39 show average premiums at about the mean level for the total set of respondents. Respondents in the 40-49 age group reported the highest average premium of 40.4 percent while the 50-59 age group had an average premium close to the overall mean. An interesting finding is that the average level of organic premium appears to increase directly with increasing levels of education. We found that persons with graduate degrees being noticeably above the overall mean. There are some other marked deviations from the overall mean. However, in many instances, these cells do not have many respondents and one questions how representative those responses are of the respective demographic groups. For example, six respondents in the 40-49 age group with average incomes below \$30,000 show a preference to pay an average premium of 98.0 percent. However, the small number of respondents in this group limit the usefulness of their responses for drawing inferences.

For reasons of economy, we have chosen to focus the disaggregated data analysis on only one product—apples. However, this brief analysis shows how the demand for safety varies across demographic groups as shown by their relative willingness to pay various levels of organic price premiums.

Implications

Consumer behavior continues to present a challenge to producers and marketers as well as to analysts. Some have questioned whether consumption decisions conform to the values and concerns expressed in consumer surveys. For example, while 49 percent of 1260 respondents surveyed in the Packer's Fresh Trends '90 consumer survey reported increased levels of concern about pesticide residues, and 46 percent about preservatives and additives, only 26 percent reported changes in their food purchasing patterns to reflect those concerns. Our analysis sheds light on this contradiction. It recognizes that, at

Table 10.
Willingness to Pay Organic Premiums by Age and Educational Attainment.

Income	Total	Age					Education				
		<=29	30-39	40-49	50-59	60-69	70+	HS grad	Some coll	Coll grad	Grad degree
Total	459	53	130	115	74	58	29	44	178	155	84
Avg %	37.1	38.8	37.0	40.4	38.6	28.4	35.1	32.7	36.6	35.0	43.7
Income \$(000)											
<30	74	19	24	6	8	14	13	17	34	16	8
Avg %	35.8	24.5	34.3	98.0	50.4	23.5	44.1	26.5	34.5	43.1	39.2
30-49	148	19	46	23	24	24	12	17	70	40	22
Avg %	34.7	52.0	39.2	38.9	30.3	19.1	20.6	42.8	31.5	34.5	39.2
50+	237	15	70	86	42	20	4	10	74	99	54
Avg %	39.0	45.2	36.0	38.0	40.8	47.8	44.1	24.5	42.0	33.7	46.2

least regarding organic foods, changing consumption patterns involves increased costs. These include economic costs as well as the time required to access information about alternative products and to find the products themselves. In this study we identified the higher cost of, and the search time required to find organic products as important constraints to continued consumption. Because of the typical price differentials between conventionally grown and organically grown products, it is not irrational for consumers to behave as they do. As Table 5 showed, when the price differential between organic and conventional apples was about 15 percent, 45 percent of our respondents would buy the organic product. Even at a 44 percent price differential, 41 percent of the respondents would buy the organic product. However, only eight percent were willing to pay a price premium of 74 percent. Given price premiums that typically characterize the relationships between conventional and organic products it is not surprising that organic products currently exploit a narrow consumer market.

Our analysis identifies those factors that appear conducive to the adoption of nonconventional consumption patterns. Among those factors are age, occupation and size of residential area. Yet, importantly, attitudinal factors—concern with pesticide residues, artificial coloring, additives and preservatives, irradiation's byproducts and salt and sugar—are key distinguishing characteristics. The information may be useful to the marketing efforts of organic as well as conventional sectors as it may aid in information dissemination, promotion and distribution programs, as well as in product development. There is no reason to believe that organic produce is a meaningful competitive threat to conventionally grown produce. However, the data suggests that a potential market niche for these products does exist. But, successful penetration of this market will depend on improvements in production technology and in marketing efficiency. Furthermore, we need to more effectively target the market. Mass marketing techniques are unlikely to be very productive.

Notes

Giannini Foundation Research Paper #996.

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