



# UPDATE

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### What Exactly Are They Paying For? Explaining the Price Premium for Organic Fresh Produce

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*This article investigates consumer preferences for organic fresh produce, and decomposes the organic price premium into some of the key attributes of organic products, using data from a survey of Sacramento-area households.*

It is well known that organic markets have grown rapidly in the past decade, with sales of organic products growing at a rate of 10 to 20 percent annually. According to the Organic Trade Association, organic food sales reached \$14 billion nationwide, and they are expected to reach nearly \$16 billion by the end of this year. This represents 2.5 percent of all retail food sales, compared with a 1.9 percent share in 2003. Once a small niche market, organic products have crossed over to become a mainstream, common choice alternative for many consumers. Dimitri and Green report that among many different types of organic products, fresh produce remains the largest product category in terms of sales.

One interesting feature of organic products is the "price premium" they command in the market. Various consumer reports and academic studies have identified some of the key factors that make consumers buy organic products, which include health and nutritional concerns, superior taste, food-safety concerns, and environmental friendliness.

However, it is difficult to quantify what exactly consumers are paying for, because the factors that are reported to be important to consumers when purchasing organic products cannot be observed

when making purchasing decisions. In fact, consumers may not observe the effect of many of these factors even after consumption. For example, it would take a long time after consumption to realize the effect of pesticide use on the body or to the environment.

It seems that consumers nevertheless create their own perceptions or expectations about products and their qualities, and make purchasing decisions accordingly. Thus, it is important to understand how consumers perceive the quality of the product. Organic products must have some perceived benefits to those who are willing to pay higher prices. Consumers who do not buy organic products either have different perceptions, or their perceived benefit from organics is not worth the price premium. In order to analyze the effect of such unobservable factors, one must obtain information on individuals' perceptions about these factors. Such information is not available from typical market data.

In order to better understand consumer preferences (and willingness to pay price premiums) for organic produce, we conducted a comprehensive mail survey of grocery shoppers in the Sacramento area during 2005. The survey collected information on shoppers' perceptions, attitudes, knowledge about

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**Table 1. Definitions of Attribute Labels in the Choice Experiments**

Label	What does it mean?	No label (blank)
Organic	A product is certified to be grown organically. By definition, it is also “No GMO” and “Environmentally Friendly.” See these labels below.	A product is NOT organically grown.
Pesticide Free	A product was tested, and no pesticide residues were found on or in the product.	Either: (i) a product was not tested, or (ii) it was tested, and small amount of residues were found. Any residue levels are 10 to 100 times less than the level that can cause any adverse health effects.
No GMO	A product is certified to be NOT genetically modified.	A product may or may not be genetically modified.
Environmentally Friendly	A product is certified to be grown using the full range of environmentally friendly production techniques. The methods address three types of environmental concerns:  (1) Low/no use of pesticides. This will reduce soil and water contamination.  (2) Conservation of energy and use of renewable resources in production.  (3) Taking more carbon into soil, which can reduce greenhouse gases and global warming.	Use none of these techniques.

conventionally produced version of the same item, with differences in up to four attributes, and was asked to choose which they preferred. Based on previous studies and focus group meetings, the key attributes identified were pesticide free, no GMO, environmentally friendly, and unit price. The first three attributes were characterized as product labels, where absence or presence of a label defines a characteristic of the product. Each consumer was asked from eight to 16 comparisons about a single type of produce, out of four produce items studied: Fuji apples, bananas, broccoli, and red leaf lettuce. These are the largest-selling produce items among produce with both organic and conventional offerings in Sacramento-area supermarkets.

organic standards, and some of their socioeconomic characteristics that help explain purchase patterns. The survey also included “choice experiments,” which is a relatively new, powerful, and consumer-friendly technique to elicit peoples’ preferences. These choice experiment data were then used to determine the consumer’s willingness to pay price premiums for specific attributes of four types of fresh produce.

### Survey and Data Collection

Our survey data were collected during January to June 2005. Mail questionnaires were sent to 2,400 households in Sacramento and neighboring cities in Northern California. Preparation for the survey, two focus groups, nine personal interviews, and two pretests of the survey were conducted during May to December 2004. Implementation of the survey itself was state-of-the-art, with an initial mailing, reminder postcard, and two follow-up mailings with questionnaires included. The response rate was 50 percent after accounting for undeliverable surveys.

**Choice Experiments.** Each respondent was presented a series of comparisons (choice experiments) between an organic version of a produce item and a

Table 1 shows more detailed definitions of each label, which were provided to respondents as part of the survey. The *pesticide free* label may be perceived to convey a private health benefit to the consumer, while the *environmentally friendly* label is related to a public benefit of improved environmental quality. The *no GMO* label is not currently used for fresh produce, though it will become relevant since genetically-modified produce is in development.

In each choice experiment, respondents were asked two questions: (1) if you had to buy the product today, which one would you choose? (Product A or Product B); and (2) would you actually buy it today? (YES or NO). This tells us not only which product the consumer prefers, but whether they are preferred over no purchase at all.

Decision-making by respondents in answering the choice experiments is modeled using a random utility framework, which presumes that the consumer chooses the alternative that gives the highest utility, and that utility depends not only the consumer’s demographics and the attributes of the produce they are presented with, but also on unmeasured influences that are represented by a random error. Because

there are multiple responses for each person, and to allow the preferences to vary across the population, the model used was a panel mixed logit. (Technical details can be found in Onozaka, Bunch, and Larson, 2006.)

Respondents were segmented into two groups based on their response to the question, “Do you buy fresh organic produce on a typical shopping trip?” “Non-regulars” are those who answered “no” to this question, while “regulars” are those who answered “yes.” The segmentation approach was used to highlight the similarities and differences in the willingness to pay (WTP) for produce attributes.

Economic theory offers little guidance for how preferences for organic attributes might be distributed in the population. Comments obtained from the focus groups and personal interviews suggested strongly that different people may view each produce attribute positively or negatively, and as a result have a positive or negative WTP for it. For example, use of genetic modification is a controversial issue, with some in favor and some against, so that WTP for the *no GMO* label on produce could be positive or negative. Similarly, the *environmentally friendly* attribute refers to particular production techniques, and a person may or may not believe that these techniques are better for the environment, or are worth paying for. Likewise, the *pesticide free* label was viewed both favorably and unfavorably in focus group meetings and pre-testing. As a result, our model was designed to be flexible about whether each attribute increases or decreases a person’s WTP for produce.

## Findings and Conclusions

Table 2 presents the results on willingness to pay for the produce attributes, by type of produce and market segment (regular versus non-regular organic produce

purchasers). It shows the average (mean) WTP, and the 95 percent confidence intervals for the mean. (This is the interval in which we expect the mean to be found 95 percent of the time.) The “percent premium” is calculated as the WTP for the produce attribute as a percentage of the average conventional price for that produce item, and “percent negative” is the percentage of the population with negative WTP. (These people view the attribute as undesirable.) As an example of how to interpret the table, the first line indicates that non-regular organic purchasers are willing to pay an average of \$0.13 per pound more for a banana labeled “pesticide free” compared to one without that label, which is a 15 percent price premium, and 16 percent of the population view this attribute as undesirable.

Regular organic purchasers have higher average

**Table 2. Summary of Willingness to Pay for Produce Attributes**

Market Segment	Produce Item	Attribute	Willingness to Pay for Each Attribute			% Price Premium	% Negative
			Mean <sup>a</sup>	95% Confidence Interval			
Non-regulars	Banana (\$/lb)	Pesticide Free	<b>0.13</b>	0.09	0.17	15%	16%
		No GMO	0.04	-0.03	0.11	4%	42%
		Env. friendly	0.04	-0.13	0.16	5%	41%
	Fuji Apples (\$/lb)	Pesticide Free	<b>0.14</b>	0.10	0.20	10%	16%
		No GMO	0.04	-0.04	0.12	3%	42%
		Env. friendly	0.06	-0.11	0.19	4%	40%
	Broccoli (\$/bunch)	Pesticide Free	<b>0.26</b>	0.16	0.39	19%	16%
		No GMO	0.07	-0.05	0.23	5%	42%
		Env. friendly	0.09	-0.25	0.37	7%	41%
Red Leaf Lettuce (\$/head)	Pesticide Free	<b>0.21</b>	0.14	0.31	15%	16%	
	No GMO	0.06	-0.04	0.18	4%	42%	
	Env. friendly	0.09	-0.08	0.29	7%	39%	
Regulars	Banana (\$/lb)	Pesticide Free	<b>0.19</b>	0.14	0.26	23%	6%
		No GMO	<b>0.16</b>	0.02	0.29	19%	31%
		Env. friendly	<b>0.22</b>	0.11	0.34	26%	22%
	Fuji Apples (\$/lb)	Pesticide Free	<b>0.25</b>	0.17	0.36	17%	6%
		No GMO	<b>0.20</b>	0.02	0.40	13%	32%
		Env. friendly	<b>0.29</b>	0.16	0.48	20%	22%
	Broccoli (\$/bunch)	Pesticide Free	<b>0.47</b>	0.28	0.78	34%	6%
		No GMO	<b>0.37</b>	0.03	0.83	27%	32%
		Env. friendly	<b>0.54</b>	0.25	0.99	39%	22%
Red Leaf Lettuce (\$/head)	Pesticide Free	<b>0.35</b>	0.22	0.54	26%	6%	
	No GMO	<b>0.26</b>	0.03	0.57	19%	33%	
	Env. friendly	<b>0.40</b>	0.20	0.69	29%	22%	

<sup>a</sup> Means in **bold** are statistically significant (95% level).

WTP for all the attributes than do non-regular purchasers, and the price premium they are willing to pay ranges from 13 percent to 39 percent, depending on the produce item and attribute. The price premiums for each attribute are highest for broccoli, and the *environmentally friendly* attribute is highest for all four produce types. All of these are statistically significant; that is, statistically the differences in WTP are greater than zero.

For non-regular organic purchasers, the average WTP is statistically greater than zero for only one of the attributes, *pesticide free*, and is not statistically different from zero for the other two. The price premium for *pesticide free* ranges from 10 percent (Fuji apples) to 19 percent (broccoli), depending on the produce item.

Comparing the two groups of purchasers, WTP for the *pesticide free* attribute is most similar between the two market segments, while preferences for the other two attributes, *no GMO* and *environmentally friendly*, are more diverse, with considerably higher fractions of the population viewing them as undesirable in both groups. Roughly 40 percent of non-regulars have negative WTP for these attributes, while 31 percent and 22 percent of regulars have negative WTP for the *no GMO* and the *environmentally friendly* attributes, respectively.

A few additional observations can be made. First, the fact that *pesticide free* is the most important attribute for non-regulars makes sense, as this attribute is likely to provide the most tangible personal benefit to an individual. However, regulars have the highest average WTP for the *environmentally friendly* attribute, suggesting that the voluntary contribution to society as a whole through their product choice (i.e., through improved environmental quality) is a significant motivation for regulars, and is larger in magnitude than the personal benefit of avoiding pesticide residues, on average. Second, the *no GMO* attribute has the lowest average WTP and largest proportion of the population with negative WTP, for both regulars and non-regulars. This is not surprising, as use of genetic modification is probably the most controversial and unfamiliar concept among the three attributes. However, about 60 percent of non-regulars and 70 percent of regulars are willing to pay some positive amount for the *no GMO* attribute, suggesting that a majority of consumers have some degree of concern towards the use of genetic modification and are willing to pay extra to avoid it.

This research provides some insights into what affects fresh consumers' organic versus conventional produce choices. There is considerable room for further research. How attitudes toward the environment and perceptions about produce attributes affect the price premiums is not yet fully understood and requires more attention for other products. Combining the choice experiment data with other sources of consumer information, such as supermarket scanner data, would also help enhance the statistical properties of the choice models and resulting price premium estimates.

For additional information,  
the authors recommend the following sources:

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