USDA ORGANIC—What Is It Worth to the Consumer?

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This research investigates consumer reactions to changes in information provision regarding organic production. Quantitative analyses focus on the implementation the National Organic Program and the unique nature of the fluid milk market. Our results suggest the appearance of the USDA organic seal on milk containers had an important effect on consumer milk purchasing choices and offer empirical support for the involvement of the USDA in developing uniform and standardized organic labeling guidelines.

Organic labeling is just one example of health, environmental and ethical claims increasingly being used in a variety of markets, both as marketing tools and regulatory mechanisms. The implementation of the USDA seal under the National Organic Program (NOP) in October 2002, with its national organic standard and mandatory labeling, has created a market-level experiment in a policy-relevant setting.

Governmental policies have long influenced food choices, with labels as an example of regulated information provision. This research provides a cost-benefit analysis of changes in labeling regulations under the NOP, which are essential for an evaluation of this program. It also serves as a benchmark for further government regulations of the demand of related specialty foods, such as proposed guidelines for natural products currently under consideration and the ongoing debate about appropriate labeling regarding genetic modification in food products. Focusing on milk demand is appealing, as fluid unflavored milk can be viewed as a relatively standardized and ubiquitously processed commodity. These qualities permit us to abstract from brand and taste preferences while at the same time investigating consumer preferences for privately certified rBGH-free labeled milk (Recombinant Bovine Somatotropin, is a genetically modified version of a growth hormone that occurs naturally in cows and enhances milk production), third party and government certified labeled organic milk, and conventional milk.

Unlike most of the existing literature that relies on survey response and hypothetical choice experiments, this research presents consumer valuation estimates of different labeling regimes based on actual purchasing behavior in the market place. It further provides an innovative approach for analyzing information changes. Based upon the literature on welfare estimations of new product introductions, we define the consumer product as a bundle of product attributes. Product-specific information provision via labels is modeled as additional or complementary product attributes, which allows us to compute consumers' valuation or willingness to pay (WTP) for labeling information.

Data

AC Nielsen Homescan® data track individual purchases by participating households across all chosen food channels and provides household demographics for any product purchase. Data for one major metropolitan market and a four-year period (2000-2003) were analyzed. An indicator for organic claims and the USDA organic seal was included in the data set and information provided was verified by contacting processors. Information on rBGH-free labeling was added by the researchers. The analyzed sample approaches national averages and the sub-sample of households that buy milk does not differ significantly from the entire household sample.

The data consist of 40,341 daily purchases by 927 households, who chose among 182 different milk products (16 brands) in 21 stores. Only the actual milk choices by a given household are observed, such that we construct available alternatives from observed purchases of all other households. Since we confine the created alternative choices to the store in which the household purchased milk —mainly to ensure feasibility of the data analysis—we implicitly assume that the store choice is made prior to the decision regarding which milk product to purchase.

Hedonic Approach

The hedonic price method presents an approach often used when estimating consumer valuation of goods or product attributes for which no explicit market exists. It is based on the simple intuition that consumer valuation of a product is the sum of the values of each product attribute. A market of differentiated products therefore allows us to implicitly recover the contribution of each attribute. We estimate an equation that relates the price of milk to observable attributes of milk products, such as fat content and

Table 1: Estimated Consumer Surplus Measures (in cents)

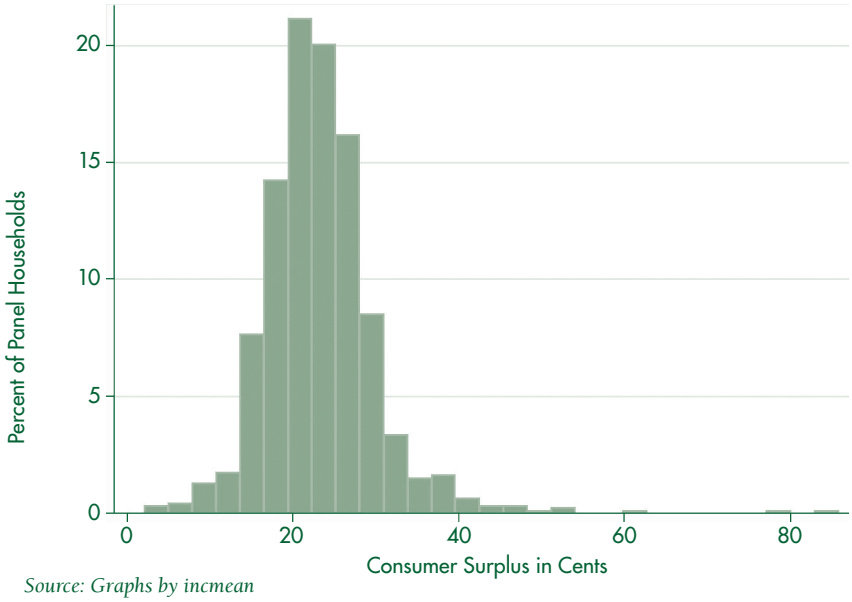
Estimated Average Consumer Valuation	Observations	Mean	95% Confidence Interval[2]	
Unrestricted consumer surplus	927	249.90*** 0.379	249.160	250.57
Restricted consumer surplus[1]	927	226.56*** 0.39	225.7928	227.33
Consumer surplus difference	927	23.34*** 0.20	22.95	23.74

*Note: Values are averaged across households, *, **, and *** denote values that are statistically different from 0 at the 10%, 5%, and 1% level.*

[1] These values correspond to the counterfactual that restricts the household choice by excluding organic milk carrying the USDA seal.

[2] Standard errors and 95% confidence intervals were computed using a nonparametric bootstrapping procedure with 20 repetitions.

Figure 1. Distribution of Estimated Consumer Surplus



Source: Graphs by incmean

container size, as well as unobserved product attributes such as organic. Estimated parameters can therefore recover the WTP for each individual product characteristic. The average WTP for changes in labeling regulations can be estimated directly, as the USDA organic seal is included as one additional relevant product attribute. We utilize variation of organic milk products in this regard, as all organic products had to be certified after the implementation of the NOP, but the display of the USDA seal is voluntary.

Our estimates of average WTP for product attributes indicate that consumers are willing to pay a premium for half gallon containers, whole fat content and lactose-free milk, as well as for all of the labels that address health and environmental-related concerns. Some consumers are willing to pay an extra $1.92 per gallon for organically-labeled milk, which increases to $2.24 in the period following labeling changes. These price premiums correspond to a 39.4 percent and a 45.8 percent price increase. Products that carry the USDA organic seal do not significantly differ in terms of price premiums from organic milk prior to the implementation of the NOP, but consumers are estimated to pay an extra 63 cents per gallon once the seal was added to milk containers. Although, the WTP for organic milk increased over time, this estimate is about twice as large as the estimated yearly organic time trend, and amounts to an 11.4 percent price increase. Milk that carries an rBGH-free label is estimated to sell at a price premium of 22 cents per gallon (9.6 percent) prior to the implementation of the NOP. This premium increases to 37 cents (14.3 percent) post introduction.

Random Utility Logit Approach

In this approach, we estimate a statistical model focusing on consumers' choices among milk products. The probability of choosing a specific milk product is estimated, with the underlying structural model based upon a random utility framework. Product attributes, product price, as well as a random term are assumed to linearly enter the utility derived from a specific product choice. A household is assumed to choose the milk product that yields the highest utility.

This specification also allows quantifying if and by how much (in monetary terms) consumers are better off by these labeling changes. This measure is computed using estimated regression coefficients and simulating consumer choice if labeling would have not taken place.

Results indicate that a one percent increase in price is estimated to decrease the probability that the milk product will be chosen by 0.59 percent. Labeling a milk product as organic has significant and very sizable effects. It increases the average choice probability by 12.0 percent. And while milk products that added the USDA labeling seal after the NOP went into effect were more likely to be chosen prior to these labeling changes (8.7 percent), this effect almost doubled to 16.1 percent when consumers could observe the seal on milk containers. Again, we see an increase in the probability of organic milk being chosen over time, but this difference in choice probabilities cannot be attributed to a general trend of increased organic purchases alone. Organic milk products that did not carry the USDA seal do not portray the

same increase. We also account for the fact that milk products carrying the USDA seal might have been more likely to be chosen prior to the implementation of the NOP. Milk products that were not labeled as organic but carried rBGH-free labels on the other hand were found to be less likely to be chosen in the time period we analyze. These results are contrary to earlier studies that also use earlier time periods and might indicate that consumers do not focus on these attributes as much or that they find information on organic production more reliable. USDA certified organic milk has to be rBGH-free, while the rBGH-free label is based on voluntary information provision by the processor only.

Table 1 summarizes estimated consumer benefits. On average, the estimates suggest that households value the USDA organic seal at 23 cents per gallon of organic milk purchased. However, the benefits for a specific consumer depend on whether and how frequently he purchases organic milk. When looking at the distribution of this measure across households (Figure 1), we find that this measure ranges from two to 86 cents, and therefore also includes the hedonic price function estimate of 63 cents.

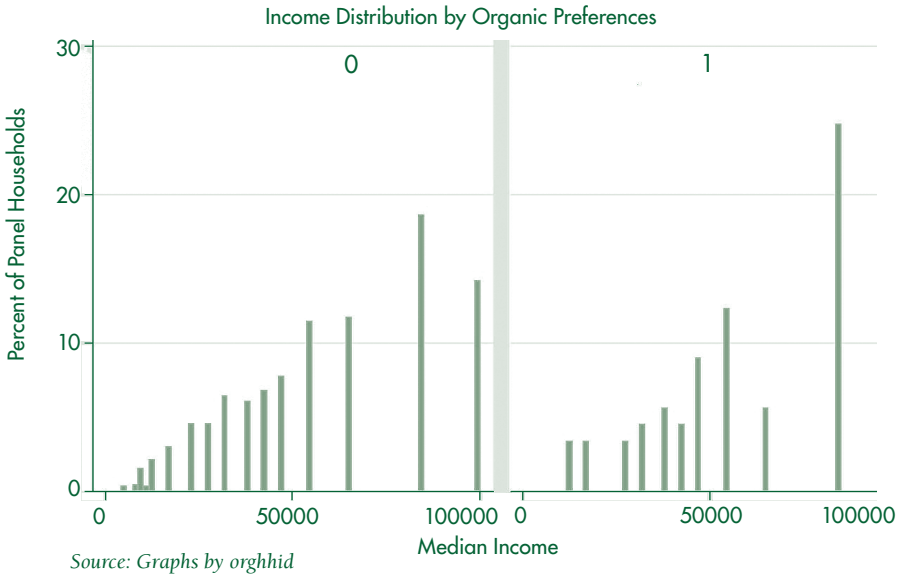
Preference Heterogeneity

Expanding on the idea, that some consumers might benefit more from these labeling regulations than others, we are also investigating observable differences across households that purchase organic versus conventional milk, as well as households that purchase organic milk in general and households that purchase organic milk products carrying the USDA seal. As a first step, demographics across households are compared graphically, with selective comparisons presented in Figures 2 through 4.

Income levels increase preferences for organic products as they allow a household to consider additional product characteristics beyond price and nutritional value. In figure 2, this is illustrated by taller bars (or a higher percentage of households) in the higher income brackets for households purchasing organic milk (right graph). Figure 3 shows significant differences regarding education levels. The proportion of households with a college-level education is significantly higher for households that purchase organic milk. Again, this is illustrated by taller bars for the *graduated college* and *post college grad* category in the right-hand graph.

Regarding labeling preferences, Figure 4 (page 8) shows potentially interesting differences that might relate to informational effects. With regards to household composition, single males are more likely to purchase milk with the USDA seal; however, this same difference is not detected for single females. Households that purchase milk carrying the USDA seal include a higher proportion of single mothers on the other hand, which could mean that they were less informed about organic production prior to the NOP due to time constraints.

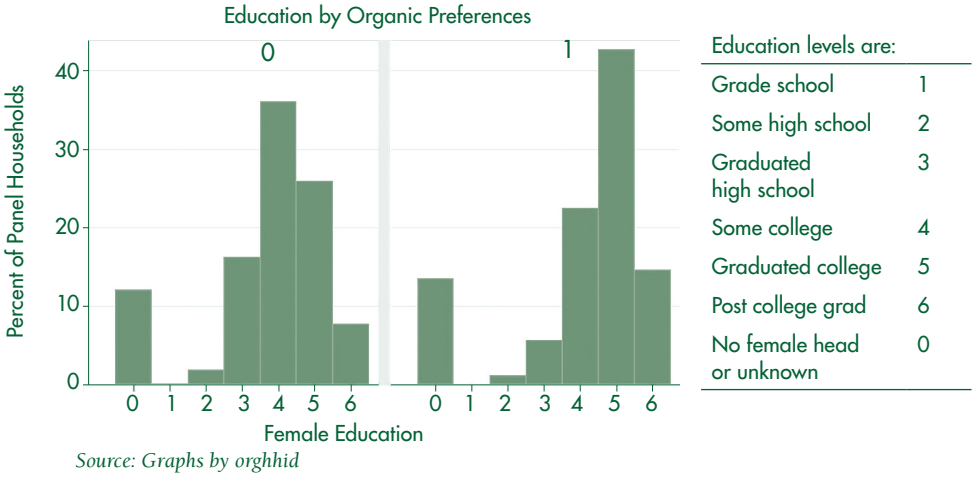
Figure 2. Income Distribution by Organic Preferences
(0 = conventional purchases, 1= organic purchases



Source: Graphs by orghhid

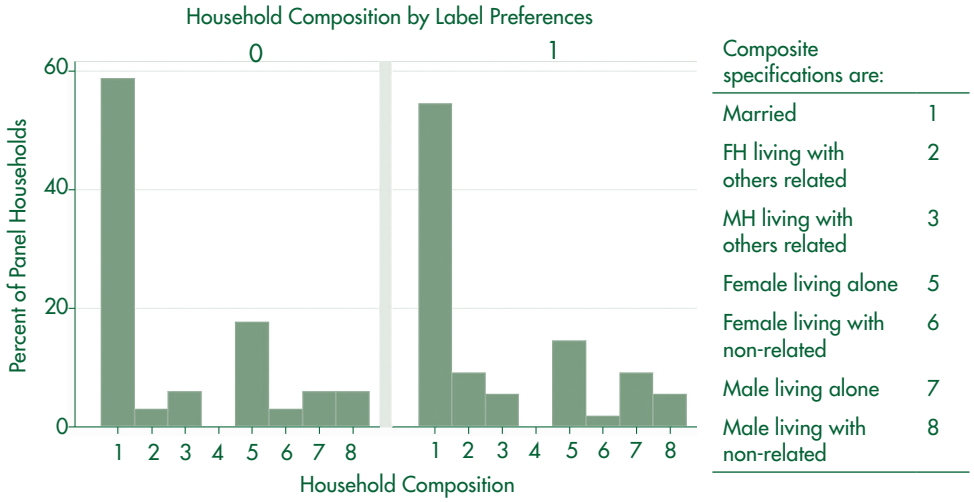
Note: Median income brackets are: 5000, 7500, 9000, 11000, 13000, 17500, 22500, 27500, 32500, 37500, 42500, 47500, 55000, 65000, 85000, 100000.

Figure 3. Levels of Education by Organic Preferences
(0 = conventional purchases, 1= organic purchases



Source: Graphs by orghhid

Figure 4. Household Composition by Label Preferences
(0 = organic purchases, 1= USDA organic seal purchases



Source: Graphs by usdahhid

The inclusion of observable household demographics in the statistical model only partially captures preference heterogeneity with regards to organic production and information changes due to labeling. This might be due to correlations of household demographics, but could also indicate the importance of unobserved differences across households such as beliefs and animal concerns.

Conclusions

The NOP and the appearance of the USDA organic seal on milk containers had an important effect on consumer milk purchasing choices. Estimated consumer valuation of the USDA seal ranges from two cents to 86 cents per each gallon, with an average valuation of 23 cents across all households.

In an alternative statistical model that focuses on price variation of differentiated milk products, the average willingness to pay for the USDA organic seal is estimated at 63 cents per each gallon of organic milk.

Graphical analyses further suggest that households with higher income, higher levels of education, small children and high time costs might have benefited relatively more from these regulatory changes. However, observable household demographics seem to only partially able to capture preference heterogeneity with regards to organic production and information changes due to labeling.

Aggregating the average estimated consumer valuation by an average purchase of 1.12 gallons of milk per shopping trip found in our data and applying the sample average annual consumption of 34.91 gallons of milk, or alternatively, the population average milk consumption of 23 gallons respectively yields an average annual benefit of $7.24 or $4.77 per household. Further aggregating this estimate by U.S. census population measures of 290,850,005 and average household size of 2.52 yields an estimate of annual consumer welfare of $857.42 million based on the sample average, or $550.40 million based on the population average. This sizable consumer benefit can be contrasted with the estimates of labeling regulations the USDA provided: The estimated costs of accreditation and labeling under the National Organic Program (NOP) alone were stated to approach $1 million and $1.9 million, respectively. A number of other potential costs such as enforcement, record keeping, and production and handling costs are also discussed but not quantified.

In conclusion, and as a result of this analysis, the estimated welfare-based consumer valuation of labeling changes alone seems to outweigh the costs incurred by this regulation. Our research therefore offers empirical support for the involvement of the USDA in developing uniform and standardized labeling guidelines.

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For additional information, the authors recommend the following:

K. Kiesel and S. B. Villas-Boas. 2007. Got Organic Milk? Consumer Valuations of Milk Labels after the Implementation of the USDA Organic Seal. *Journal of Agricultural & Food Industrial Organization* 5(4). http://www.bepress.com/jafio/