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Consumer attitudes towards organic versus conventional food with specific quality attributes

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ABSTRACT

This paper describes the findings from a consumer survey conducted as part of the EU-funded research project QualityLowInputFood (QLIF). The objective was to segment occasional organic consumers with regard to their preferences for organic, conventional and conventional-plus products, i.e., conventional products with a specific attribute that also applies to organic products. In other words, these conventional-plus products are placed between organic and conventional food products. In addition, we aimed at analysing differences between consumer segments regarding their price sensitivity and attitudes towards food. The survey used choice experiments to investigate occasional organic consumer preferences for the different types of products. In subsequent standardized face-to-face interviews we collected data on consumer attitudes towards food that could explain the observed preferences. The attitudes were summarized in attitude factors, using factor analysis. The responses from the interviews and choice experiments were analysed by latent class models. These econometric models were used to identify segments within a group of individuals for their preference structure and to relate membership in each segment to consumer characteristics. Two segments of occasional organic consumers were identified. Consumers in segment 1 strongly preferred organic products and were less price sensitive. Furthermore, consumers in this segment showed a significantly higher level of agreement with most of the investigated attitude factors than consumers in segment 2. The latter consisted of consumers who were significantly more price sensitive and preferred conventional-plus and conventional products rather than organic products. Communicating quality attributes represents a promising marketing tool of product differentiation and information for both organic and conventional food marketers. The price sensitivity of parts of occasional organic consumers suggests that the perceived price-performance ratio of organic products needs to be increased by targeted pricing and communication strategies integrating product-relevant information. If not, conventional-plus products, representing a cheaper alternative, might be preferred by parts of the occasional organic consumers.

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1. Introduction

Although the organic food market has grown continuously over the past decade, the total share of organic food[1] is still small compared with the total food market. The highest market shares are 5% and are reached in Denmark, Austria and Switzerland [2]. Earlier research has identified several factors that restrain consumers from buying (more) organic food. Apart from a lack of availability of organic products, a lack of trust in and awareness of organic food, and the price premiums of organic compared with conventional products are considered major barriers to the development of the organic food market [3–6]. Furthermore, several studies [5–14] provided evidence that consumer attitudes towards organic food significantly influence their choice. The most important attitudinal choice factors include health concerns, environmental concerns, taste preferences and preferred origin of food. Thus, purchasing organic food is assumed to depend on whether the consumer perceives a utility related to organic products that would compensate the commonly existing price premiums.

However, recently, conventional-plus food products are increasingly available on the food market. These are conventional food[2] products that communicate a specific attribute that also applies

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[1] Organic food is food produced and certified according to organic principles, e.g., defined by EU Regulation 834/2007 [1].

[2] In this paper the term conventional food refers to food that is not certified organic food.

to corresponding organic products. Examples of attributes communicated on conventional-plus products are 'free from artificial additives', and 'free-range'. Thus, conventional-plus products may be considered as products placed between organic and conventional products.

Given this overlap with respect to specific attributes, conventional-plus products could compete with organic products. Particularly consumers who occasionally buy organic food might be interested in conventional-plus products. In this paper, occasional organic consumers are defined as consumers who buy at least two organic products a month but not more than four organic products from different product groups more than twice a month.[3] This interest is expected because occasional organic consumers display a certain interest in food quality while being less focused on organic food compared with regular organic consumers.

Against this background, the objective of our survey was to identify segments among occasional organic consumers with respect to their preference for organic, conventional-plus or conventional products in Germany and Switzerland. Furthermore, we aimed at analysing the impact of different price levels and consumer attitudes on consumers' observed preferences.

We focused on three products: milk, yogurt and apples. The empirical research consisted of choice experiments combined with standardized face-to-face interviews. The latter addressed consumer attitudes that might explain consumer preferences. The responses from the interviews and choice experiments were analysed using latent class models [15]. These econometric models are used to identify segments within a group of individuals about their preference structure and to relate membership in each segment to consumer characteristics [15].

The following sections of this paper include a description of the theoretical framework for consumer preferences, the material and methods used in this research, and present the results, discussion, and conclusions.

2. Theoretical framework

The choice experiment approach is consistent with Lancaster's theory of consumer choice [16]. This theory postulates that consumption decisions are determined by the utility that is derived from the attributes of a good, rather than from the good per se. The econometric basis of the approach rests on the behavioural framework of random utility theory, which describes discrete choices in a utility maximizing framework [17,18]. Statistical analyses of the responses obtained from choice experiments are used to estimate the marginal values of attributes of a good. In this study, the analysis employs the latent class model [14] to estimate individual preferences for organic, conventional-plus and conventional food and also to investigate the presence of consumer segments with distinct preferences.

The premise of the latent class model (LCM) is that the population consists of a number of unobserved (or latent) groups of individuals (segments), each characterized by relatively homogeneous preferences. However, these segments are assumed to differ substantially in their preference structures. The main objective in the estimation of the LCM model is to identify the existence and

the number of segments, estimate the preference structure within each segment, and relate membership in each segment to consumer characteristics. Latent class models have long been applied in market research [19–22].

We briefly outline the specification of the LCM as applied in this research. It is assumed that an individual n faces a choice of selecting a preferred alternative from a set of $J = 3$ alternatives (plus a no-choice option). In this study the three alternatives were organic, conventional-plus and conventional of a specific product (milk, yogurt or apples). The attributes of alternative i faced by respondent n are collectively labelled as vector x_{in} (in this study the alternatives varied in terms of one attribute, i.e., price). Supposing that individual n belongs to segment s, then the individual's utility function associated with the preferred alternative i is:

$$U(in|s) = \beta'_s x_{in} + \varepsilon_{in|s} \qquad (1)$$

where β_s represents the segment-specific preference parameters to be estimated and $\varepsilon_{in|s}$ is a random term that is assumed to be independent and identically distributed according to an extreme value distribution. The probability that individual n chooses alternative i, conditional on belonging to a given segment s, is [16]:

$$P(in|\beta_s) = \frac{\exp(\beta'_s X_{in})}{\sum_j^J \exp(\beta'_s X_{jn})} \qquad (2)$$

The log-likelihood for the LCM with s latent segments is given by:

$$LL = \sum_n^N \ln\left[\sum_{s=1}^S P(s)P(in|\beta_s)\right], \qquad (3)$$

where $P(s)$ is the probability that individual n belongs to segment s and β_s is a vector of segment-specific coefficients to be estimated. Following Hensher and Greene [23], $P(s)$ is specified to have the standard multinomial logit form:

$$P(s) = \frac{\exp(\lambda_s z_n)}{\sum_{s=1}^S \exp(\lambda_s z_n)}, \qquad (4)$$

where z_n is a set of observed individual characteristics (in this study attitudinal factors), that are included in order to explain segment membership and λ_s is a vector of segment-specific parameters to be estimated that denote the contribution of the various attitudinal factors to the probability of segment membership. In our empirical application, the aim was to identify segments within the target group of occasional organic consumers that differ from each other with respect to attitude factors (case-specific variables) and behaviour towards higher prices (alternative-specific variable).

3. Materials and methods

3.1. Design

The choice experiments were carried out in laboratories in order to ensure a lower risk of interference and a higher internal validity than field experiments that observe real-life situations, e.g., food purchased in a shop [24]. Furthermore, we conducted laboratory choice experiments because the conventional-plus products did not exist on the market at that time.

The products tested in the experiments were organic, conventional-plus and conventional milk, yogurt and apples. Unlike a large number of studies on food choice, we used product dummies of real physical product packages for milk and yogurt that were designed by a company, and real apples (variety Gala in 1-kg batches). The packages for milk and yogurt resembled existing products but did not contain any food.

In order to avoid any bias, the product dummies did not carry a brand name. The general package design across all three prod-

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[3] We measured the intensity of organic food consumption by means of an index with a scale from 0 to 14 points. The participants were asked for their organic consumption intensity in seven different product groups with the standardized answer categories 'almost never' (0), 'sometimes' (1) and 'almost always' (2). The numbers in parentheses show the points assigned to the categories. For each participant, the points reached in the seven product categories were added up. Consumers with an index of 2–9 points were classified as occasional organic consumers. Consumers with a higher index were classified as frequent buyers of organic food and therefore not included in this research.

uct alternatives of milk and yogurt was the same, except that the organic and the conventional-plus alternatives were labelled. The Swiss organic alternatives were labelled with the 'Bud' ('Knospe') label of the Swiss organic farming association Bio Suisse and the German organic alternatives with the 'Bio-Siegel' (the government organic logo). The conventional-plus milk and yogurt were labelled with quality attributes communicated on the packages; for the conventional-plus apples, the attribute was written on a card placed in front of the apples. The conventional-plus attribute for milk was 'from pasture-raised cows' (cows that are kept on pastures during the whole year), for yogurt 'free from artificial additives and flavours' and for apples 'reduced use of pesticides'.

To test the effects of different price levels on occasional consumers' preferences for the different types of products, the price levels were varied in four scenarios. The organic and conventional price levels were determined according to actual market prices in the two study countries. We chose one price level for the conventional alternatives, which was invariant in all four scenarios. We chose two price levels for the organic alternatives, one average supermarket price level (A) and one average health food shop price level (B). Both organic price levels were higher than the conventional price level. In scenarios 1 and 2, the organic alternative showed price level A and in scenarios 3 and 4 price level B. The conventional-plus alternatives were priced between the conventional and organic price levels. In scenarios 1 and 3, the prices for the conventional-plus alternatives were set at about 50% of the price difference between the organic and the conventional alternative and at about 75% in scenarios 2 and 4.

Following the suggestions of Lusk and Schroeder [25], who found that willingness to pay is frequently overestimated in choice experiments that involve hypothetical payment, product choice in this study involved real payment. The consumers in Germany received 5 euros and in Switzerland 10 Swiss francs. This incentive was sufficient to cover all three food choices even when the most expensive alternatives were chosen.

Besides this, the consumers were interviewed using a standardized questionnaire aimed at identifying potential determinants of the previously observed choice behaviour. Taking into account the relevance of consumer attitudes towards food choice, the questionnaire contained 18 statements. The statements were selected with respect to the products investigated. As both unprocessed and processed products were tested, we included statements related to specific characteristics of production and processing that differ between organic and conventional farming systems. As animal products (milk and yogurt) were subject of investigation, statements related to animal husbandry and feeding regimes were selected. Apart from that, statements referred to the most relevant buying motive (health aspect) and barrier (price premiums) for organic products. Additionally, we included statements referring to the geographical origin of the products and statements describing the level of involvement with regard to food quality and nutrition. Consumer attitudes towards these statements were measured on a 5-point scale. Furthermore, we explored the consumers' real-life purchase preferences for milk, yogurt and apples (organic, conventional or 'other').

3.2. Data collection

Occasional organic consumers – here defined as consumers who buy at least two organic products a month but not more than four organic products from different product groups more than twice a month – were identified using a screening questionnaire that measured the purchase frequency of organic products in six product groups. Furthermore, target quotas were applied for a representative age and gender distribution within the sample. As earlier studies in Germany indicated that up to 70% of the food purchases are done by women [27], the target quota for women in this sample was 70%. In Switzerland, the participants were selected from population registers and approached by telephone in the German-speaking part of the country. In Germany, consumers were approached in public places in the central part of the country.

After having welcomed, informed and handed out the incentive, consumers were asked to purchase a conventional, a conventional-plus or an organic alternative for every product. Since Dhar and Simonson [26] found evidence that, if forced to choose, participants tend to choose alternatives with average attribute levels, a no-choice option was also offered. Consumers' buying decisions were noted down. After the choice experiments, consumers completed the standardized questionnaire.

4. Results

4.1. Sample

The total valid number of cases in this study was 293, consisting of 150 Swiss and 143 German consumers. The average age of the consumers was 45 years in Switzerland and 43 years in Germany, which agrees with the respective national averages. With an average of 2.69 persons per household, the Swiss sample roughly agreed with the mean household size in Switzerland (2.24 persons) [28]. In the German sample, the average household size of 1.43 persons was lower than the average German household size of 2.08 persons [29]. The proportion of participants with a college or university degree in the sample was above average. This corresponds with earlier studies showing above-average education of organic consumers [30].

4.2. Consumer attitudes relating to food quality

In all, 18 statements related to consumer attitudes with regard to food quality and production were assessed in the face-to-face interviews. To reduce the number of variables, we conducted a factor analysis [31], which involved principle component analysis and VARIMAX rotation. Only factors with an Eigenvalue greater than 1 were extracted. The Kaiser–Meyer–Olkin criterion value was 0.703, indicating a medium sampling adequacy. For interpreting the factors, only statements with factor loadings higher than 0.5 (absolute value) were used. We identified five factors: (1) concerns about food ingredient, (2) willingness to pay higher prices for higher food quality and organic food, (3) health concerns in relation to food production, (4) low involvement with food quality and nutrition, and (5) preference for domestic food. These factors were calculated from 14 out of the 18 attitudinal statements and are listed in Table 1. One statement was not considered in the factor analysis due to difficulties in understanding across the sample. Furthermore, three statements with factor loadings lower than 0.5 were excluded for the final solution.

4.3. Observed buying behaviour for conventional, conventional-plus or organic products

Comparing consumer preferences for organic, conventional-plus and conventional products in both countries, we found small but not statistically significant differences between the two countries (Pearson's chi-square tests for milk: $\chi^2 = 0.590$, $p = 0.459$; yogurt: $\chi^2 = 4.746$, $p = 0.191$; and apples: $\chi^2 = 2.434$, $p = 0.487$). On the other hand, the shares of the alternatives chosen by the participants varied significantly between the products (for milk versus yogurt: $\chi^2 = 72.905$, $p = 0.000$; for milk versus apples: $\chi^2 = 26.915$, $p = 0.001$; for yogurt versus apples: $\chi^2 = 19.655$, $p = 0.020$). In both countries more than 50% of the participants chose the organic

Table 1
Results of factor analysis with identified attitude factors and corresponding statements, factor loading, Eigenvalue and total variance explained.

Factor	Statement	Factor loading	Eigenvalue	Total variance explained
FA 1: Concerns about food ingredients	I only buy yogurt produced without artificial additives.	0.744	3.054	19.09%
	I generally do not buy products that include preservatives.	0.738		
	When I try new products, I do not usually check the list of ingredients.	−0.551		
FA 2: Willingness to pay higher prices for food quality and organic food	I think that organic products are too expensive.	−0.751	1.628	10.18%
	I am willing to pay considerably higher prices for food which has considerably higher quality standards.	0.720		
	I prefer to buy organic food.	0.706		
FA 3: Health concerns in relation to food production	Pesticide residues in fruit and vegetables are harmful to human health.	0.735	1.471	9.20%
	Genetically modified food is a danger to human health.	0.614		
	Artificial flavours and additives in food are harmful to human health.	0.594		
	Milk from cows kept at pasture in the summer is as healthy as milk from cows kept indoors throughout the year.	−0.565		
FA 4: Low involvement with food quality and nutrition	The taste of meals is more important that the ingredients.	0.793	1.289	8.055%
	I am bored by discussions about nutrition and health.	0.704		
FA 5: Preference for food from Switzerland/Germany[a]	I usually buy apples from Switzerland/Germany.	0.769	1.091	6.821%
	I trust food more if it was produced in Switzerland/Germany.	0.746		

[a] In the questionnaire, only the relevant country was mentioned.

alternatives. It is noteworthy that in both countries the shares of consumers who chose the conventional-plus milk and yogurt alternatives, were higher than the share of those who chose the conventional alternatives.

A comparison of the observed buying behaviour and the consumers' usual preferences in everyday life showed that the relatively large shares of choices of the conventional-plus milk and yogurt alternatives in the choice experiment could be ascribed mainly to consumers who usually buy conventional milk or yogurt.

4.4. Preference heterogeneity and prices effects

Table 2 shows the results of the latent class models (LCM) estimated separately for milk, yogurt and apples of the pooled sample across the two countries. An important issue in the empirical application of these models is the number of segments to be used in the analysis. Using the Bayesian information criterion (BIC), we found that the LCM with two classes (consumer segments) was the optimal specification. In this study, preference for conventional products was defined as the base category and normalization during estimation was done with respect to the parameters of the second segment (fixed parameters).

In all three models, the values of the McFadden's R^2 were above 0.3 and even above 0.4 in the case of apples. These values indicate a good model fit. In general, we found that in each of the three product models, consumers in segment 1 significantly preferred the organic alternative (ORG). Not surprisingly, these consumers of segment 1 were likely to be more concerned about the ingredients in food (FA1) compared with segment 2. In addition, in the three models they were willing to pay more for quality food (FA2) and were more motivated by health concerns (FA3) in their food choices. These factors were statistically significant or even highly significant in segment 1.

The most relevant factor to characterize segment 1 was FA2 (willingness to pay higher prices for higher food quality) as this factor was highly significant across all three products. Comparing the significance levels of FA1 (concerns about food ingredients) in segment 1 between the products, we found substantial differences. Regarding the processed product yogurt, FA1 was highly significant in segment 1, whereas this factor was significant regarding apples and even not significant regarding milk. On the other hand, FA3 (health concerns in relation to food production) was highly significant with regard to milk and apples, and significant with regard to the processed product yogurt.

In addition, the latent class models showed that the price levels of the alternatives (PRICE) did not significantly influence consumer preferences in segment 1. In other words, the price level was not a significant predictor for preference in segment 1 (preferences for organic products).

Consumers in segment 2, on the other hand, were highly price sensitive as indicated by the statistical significance of PRICE. Furthermore, these consumers were not likely to choose organic yogurt as ORG was negatively significant in this model. Compared with segment 1, segment 2 was more heterogeneous and consisted of consumers who either preferred conventional-plus or conventional products. However, as to apples, consumers in segment 2 predominantly preferred conventional products as ORG was not statistically significant and CONP even highly significant and negative. Although occasionally buying organic products in real-life, consumers in segment 2 were not likely to choose organic yogurt and apples in the choice experiment.

5. Discussion

Occasional organic consumers' preferences for the conventional-plus alternatives were relatively high in the choice experiments and even above the shares of the conventional alter-

Table 2
Results of latent class models of milk, yogurt and apples with parameters of explanatory variables and constants ($n = 293$).

Variables	Milk		Yogurt		Apples	
	Segment 1	Segment 2	Segment 1	Segment 2	Segment 1	Segment 2
PRICE[a]	−2.007	4.880***	1.354	6.429***	−1.419	1.796***
CONP[b]	−48.910	−0.349	0.247	0.094	7.378	−1.760***
ORG[c]	6.461**	−30.149	4.461**	−2.611***	10.065*	−30.280
FA1	0.232	f.p.[d]	0.737***	f.p.	0.347*	f.p.
FA2	0.990***	f.p.	1.185***	f.p.	1.408***	f.p.
FA3	0.469***	f.p.	0.302*	f.p.	0.759***	f.p.
FA4[e]	−0.137	f.p.	−0.574***	f.p.	−0.254	f.p.
McFadden's R^2	0.344		0.388		0.418	

*$P < 0.05$, **$P < 0.01$, ***$P < 0.001$.
[a] PRICE = parameter estimated for price level.
[b] CONP = constant of conventional-plus alternative.
[c] ORG = constant of organic alternative.
[d] f.p. = fixed parameter.
[e] FA5 was not significant in all three models and segments and is therefore not included in this table.

natives for milk and yogurt. It is striking that the conventional-plus products were mainly chosen by consumers who usually prefer the respective products of conventional quality. Two conclusions may be drawn from this: (1) communicating specific food quality attributes attracts occasional organic consumers; and (2) conventional-plus milk, yogurt and apples compete with conventional rather than with organic products.

The latent class models showed that occasional organic consumers are heterogeneous in their preferences: some are less price-sensitive and prefer organic products. Others are more price-sensitive and rather prefer conventional-plus or conventional products. This result agrees with the findings of Mondelaers et al. [34] and Enneking [35], who found that organic consumers are much less price-sensitive compared with non-buyers.

For parts of occasional organic consumers, the perceived price-performance ratio of conventional-plus products was obviously better than that of organic products. Nevertheless, if products other than milk, yogurt and apples were investigated, consumers of segment 1 could belong to segment 2 and vice versa, as occasional organic consumers are flexible and diverse regarding their preferences. Organic marketing should take into account the price sensitivity of parts of occasional organic consumers and increase the perceived price-performance ratio of organic products by means of suitable communication and pricing strategies.

Communicating quality attributes represents a promising marketing strategy for both organic and conventional food marketers. For conventional marketers, conventional-plus attributes may serve as a tool for conventional product differentiation. For organic marketers, highlighting single attributes in product-specific communication strategies may serve as information tool. Product-specific information about organic food is necessary because attributes that distinguish organic from conventional products mainly refer to food production or processing. These so-called credence attributes are not directly visible to consumers, resulting in a merely vague idea of what is meant with 'organic' at the product-level [32].

The strong relevance of consumer attitudes in explaining preferences confirms the results of earlier studies [5–14]. As consumers form their attitudes towards objects over long periods of time [33], short-term advertisements might not be sufficient to increase demand for organic food. Instead, more extensive and communication education and information based programmes and communication strategies could be successful in building up positive attitudes among consumers towards organic food. Given that the relevance of consumer attitudes varies between products, communication strategies should integrate product relevant information to improve the perceived utility of organic products.

Acknowledgements

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