ANALYSIS OF CONSUMER PREFERENCES AND WILLINGNESS-TO-PAY FOR ORGANIC FOOD PRODUCTS IN GERMANY

Rebecca Illichmann and Awudu Abdulai

rillich@food-econ.uni-kiel.de

Department of Food Economics and Consumption Studies,

Christian-Albrechts-University, Kiel, Germany

GEWISOLA 2013

Schriftlicher Beitrag anlässlich der 53. Jahrestagung der
Gesellschaft für Wirtschafts- und Sozialwissenschaften des Landbaues e.V.
**„Wie viel Markt und wie viel Regulierung
braucht eine nachhaltige Agrarentwicklung?“**

Berlin, 25.-27. September 2013

Abstract

This study employs a choice experiment approach to investigate consumers' preferences and WTP for organic food products. We use mixed logit models to examine preference heterogeneity. The results revealed significant heterogeneity in preferences for organic apples, milk, and beef product attributes among consumers. The willingness-to-pay (WTP) results obtained from mixed logit indicate gender-specific differences for the examined products of this study. Female respondents have a higher WTP for apple attributes, while higher WTP values for milk and beef attributes are observed for male respondents.

Keywords

Organic farming, choice experiment, preference heterogeneity, mixed logit

Zusammenfassung

In dieser Studie werden die Verbraucherpräferenzen und Zahlungsbereitschaften für Bio-Produkte mittels eines Choice Experiments untersucht. Es werden Mixed Logit Modelle verwendet, um heterogene Präferenzen zu analysieren. Die Ergebnisse weisen signifikante Präferenzheterogenität der Verbraucher für ökologische Äpfel-, Milch- und Rindfleischattribute auf. Die Zahlungsbereitschaften des Mixed Logit Modells zeigen geschlechtsspezifische Unterschiede für die Produktattribute dieser Studie. Frauen haben eine höhere Zahlungsbereitschaft für die Apfelattribute, während Männer bereit sind für Milch- und Rindfleischattribute mehr zu bezahlen.

Schlüsselbegriffe

Biologischer Landbau, Choice Experiment, Präferenzheterogenität, Mixed Logit

1 Introduction

In Germany, organic production and regional products represent an increasingly significant aspect of the national agricultural sustainability strategy. In 2011, sales of organic products were estimated at 6.59 billion Euros. Although there was an increase of about 9% in that year, the market share of organic food products remains quite low (AMI, 2012). Consumers are becoming increasingly aware of, and at the same time uncertain about the credence characteristics of food products. Both conventional and organic food industries have faced many food crises in the last two decades, resulting in a reduction in consumer trust and confidence in both types of food products (BMELV, 2012).

Several studies have investigated food attributes for conventional food (BURTON ET AL., 2001) as well as those for organic food (ENNEKING, 2004; SACKETT ET AL., 2011), using stated preference approaches. Most of these studies used ordered probit or multinomial logit models to analyze preference behavior. However, these models do not account for heterogeneity of preferences among consumers, and are therefore less useful in providing policy recommendations for different organic food product attributes. Other studies (CICIA ET AL., 2002; GAO and SCHROEDER, 2009) that employed mixed logit models to account for preference heterogeneity failed to examine whether WTP estimates are affected by gender-specific differences.

The main goal of this study is to examine preference heterogeneity among consumers, and their WTP for organic food products. In particular, we consider gender differences in analyzing both preferences and WTP for organic products. It uses a stated choice modeling approach for the economic values for organic food product attributes. Specifically, a mixed logit model is employed to investigate the existence of preference heterogeneity. Given the increase in organic food consumption, it is important that a better understanding of consumers' preferences for organic food products is achieved. This can then provide the basis for analysis of implications for future developments in organic food production.

2 Methodology: the choice experiment approach

CEs are derived under the assumption of utility-maximizing behavior based on LANCASTER's consumer approach (1966). This approach postulates that consumers are not interested in goods *per se* but in the function of attributes or characteristics shared by more than one good that give them utility.
CEs are based on the random utility model which assumes that consumers derive utility from consumption of organic food products as shown in equation 1:

$$U_{ni}=V_{ni}+ \varepsilon_{ni}, \quad (1)$$

where U_{ni} is the nth consumer's utility of choosing alternative i. V_{ni} is the observable, deterministic component of utility. It is usually measured as a function of several explanatory variables $V(X_{ni}, \beta)$, for example by regional attribute levels for alternative i. The unobservable component of utility is given by the random term ε_{ni}.
Given that the consumer is faced with three discrete choices in each choice set (alternative A, B or C), the probability that decision maker n chooses alternative i is equal to the probability that a sampled individual n will choose alternative i from a finite set of alternatives in choice set C_n if and only if the utility of this alternative i is associated with at least as much utility as any other alternative j within the choice set C_n (HENSHER ET AL., 2005):

$$\mathrm{P}(\mathrm{i}|C_n) = P\ [(V_{ni} + \varepsilon_{ni}) \ \geq (V_{nj} + \varepsilon_{nj}),\ \forall\ j \in C_n = 1, \ldots, J;\ i\ \neq j \quad (2)$$

The choice modeling specification

Discrete choice models are usually used to model the choices made by the sampled individuals from the CE.
Mixed logit is highly flexible and can approximate any discrete-choice model derived from random utility maximization. It was developed recently as a model that is less restrictive in its behavioral assumptions than conventional logit models. It allows for observed taste parameters in the distribution, for unrestricted substitution patterns implied by the Independence of Irrelevant Attributes (IIA) property, and for correlation in unobserved factors over time (TRAIN, 2003). The most widely used mixed logit model is based on the random utility model. Consumer n chooses a preferred organic food product out of a set of j organic food products with different attributes and attribute levels in a given choice situation t. A constant number of choice situations per individual and a linear utility function are assumed.

3 Survey Design and Data Description

The study is based on a CE survey that was conducted between September and December 2010, using three different products produced according to the guidelines of organic farming. The products included apples, milk and beef. For simple random samples, the minimum acceptable sample size for choice data is calculated by the method recommended by HENSHER ET AL. (2005). In order to identify the relevant organic product attributes for the CE, business leaders and organizations were consulted. Information from the consultation was complemented with a literature review of organic food. Four attributes with three attribute levels were identified separately for the organic options. The attributes for the organic apples were the reduction of pesticide residues and higher vitamin C content. The antibiotic residue reduction and the enhanced omega-3 fatty acids were included for the organic milk options, while the organic beef alternatives had a higher content of omega-3 fatty acids and the organic cattle were fed with organic feed. The price and the local region were considered for all three products. The attributes and attribute levels are presented in Table 1. The different price levels were based on real consumer prices in Germany in 2009 (AMI, 2010).

Table 1: Attributes and attribute levels used in the CE survey

	Organic apples	**Organic milk**	**Organic beef**
Pesticide residues	99.9% less; 95% less; 35% less	-	-
Antibiotic residues	-	99.9% less; 95% less; 75% less	-
Vitamin C	50% more; 25% more; 5% more	-	-
Omega-3 fatty acids	-	30% more; 15% more; 5% more	30% more; 15% more; 5% more
Feed	-	-	100% organic farm-grown feed; 100% organic feed, of which 50% is purchased organic feed; 95% organic feed, 5% conventional feed
Region	Local region; Germany; European Union	Local region; the state; Germany	Local region; Germany; European Union
Price	2.39€/kg; 2.49€/kg; 2.59€/kg	0.89€/l; 0.99€/l; 1.09€/l	4.99€/500g; 5.99€/500g; 6.99€/500g

Source: author's own presentation.

Attributes and their levels were combined according to an experimental design to create choice sets. The large number of choice sets (3^4=81) for each product, in a full factorial design in which all possible treatment combinations are enumerated, leads to an orthogonal main effects only design, combined with a blocking strategy that ensures seven choice sets for each product. Each choice set offered the respondent three alternatives: the first two alternatives were organic options, while the third alternative presented the conventional, non-organic option at the base price.

The survey included a variety of questions, including socio-economic characteristics and attitude items (for example trust and risk acceptances). A preliminary pilot study was conducted with a small sample of individuals (n=50) to test the questionnaire.

A total of 2520 questionnaires were originally mailed to households. However, a response rate of 46.9% was achieved, yielding a total of 1,182 useable questionnaires. Table 2 presents sample statistics of the respondents. Overall the sample constitutes a good representation of the German population.

Table 2: Descriptive statistics

	Mean	Std.Dev.
Female	0.54	0.49
Age	46.6	12.67
Per capita income/month(€)	1069.92	625.39
Education		
No education	0.00	0.06
Elementary and Secondary School	0.19	0.39
A-level	0.13	0.35
Professional education	0.42	0.49
University degree (incl. PhD.)	0.22	0.41

Source: author's own presentation.

4 Empirical Results

The mixed logit models were estimated using NLOGIT software version 4.0 (ECONOMETRIC SOFTWARE INC., 2007).

The simulated maximum likelihood estimates for mixed logit, that allows for correlated random parameters using 100 Halton draws, for all three products are reported in Table 3. The IIA test procedure developed by HAUSMAN and MCFADDEN (1984) has shown violations for the conditional model for apples, milk, and beef at the level of 1%. Mixed logit allows for unrestricted substitution pattern implied by the IIA property (Train, 2003). A likelihood ratio (LR) test and a zero-based (asymptotic) *t*-test are used to calculate the set of random parameters, as described by HENSHER ET AL. (2005). It is further assumed that the random parameters are drawn from a multivariate normal distribution, except for the purchase price which is assumed to have a triangular distribution to be bounded on both sides. The mixed logit model estimates a conditional logit to derive initial start values for each of the parameters. The relative performance can be compared by using a LR test. The results show that the mixed logit model with random taste variations fits the data better than the fixed parameters in the conditional logit model. The LRs decreases for apple (as well as milk and beef) and the LR tests reject the null hypothesis that the conditional logit model fits the data better than the mixed logit for all products.

Table 3 indicates a strong statistical significance of the mean coefficients for apple, milk, and beef attributes at the level of 1% (except pesticide residue reduction and organic farm-grown feed at the level of 10%). Model 1 indicates that consumers showed high preferences for locally produced apples, with low pesticide residues, higher vitamin C levels, as well as lower prices. The non-random parameters, a 95% reduction of pesticide residues and the region *Germany*, were positive and statistically significant, implying that respondents preferred products produced in *Germany* and low pesticides. The constant parameter represents the conventional option and is negative and statistically significant, indicating a preference for organic apples. For milk and beef products, it is observed that consumers prefer organic products with higher contents of omega-3 fatty acids, those produced in the region, and sold at lower prices (model 2 and 3). There is statistically significant preference for lower antibiotic residues in organic milk and a quite low but significant preference for the 100% organic farm-grown feed with regard to organic beef products. The magnitude of the estimated parameters suggest that origin of the product is more important than all other attributes considered by the respondents. This is probably because consumers trust more in products that are locally produced. The rationale behind localization is the protection of the local environment and the consideration of sustainability aspects.

The derived standard deviations of the random parameters calculated over 100 Halton draws represent the amount of spread that exists around the sample population (HENSHER ET AL., 2005). The standard deviations of all random parameters were significant at the level of 1% (except vitamin C for apples and omega-3 fatty acids for milk), indicating preference heterogeneity in the population.

The standard deviations of random parameters may be correlated with other random parameters and therefore not independent. To analyze the independent random parameter estimates, the Cholesky decomposition matrix unconfounds the correlation structure over the random parameters. Significant below-diagonal elements would suggest significant cross-parameter correlations. This would imply that most of the random parameters were actually independently heterogeneous in the population (HENSHER ET AL., 2005). The magnitudes of the diagonal value parameters are much lower than their reported standard deviations. Due to the fact that they are confounded with other parameters, these values represent the true variance related to that attribute. For example, the diagonal value for attribute 3 for apples (vitamin C) is not statistically significant, but the standard deviation is significant. The below-diagonal values in the Cholesky matrix reveal that the significant standard deviation resulted from the significant cross-correlations with other organic attributes (for example attribute 2 for apples: pesticide residue reduction).

Interaction terms formed by relating the random parameters (price) to other covariates (trust) in effect decompose any heterogeneity observed within the price parameter, thus providing an explanation for the heterogeneity. Significant interaction term results suggest that differences in the marginal utilities for the random parameter price can be explained by differences in personal trust levels (HENSHER ET AL., 2005). The heterogeneity in the mean parameter estimate for the price and trust variables implies that the sensitivity to prices related to trust decreases as the trust level increases, *ceteris paribus*. Hence, individuals with a higher trust characteristic were less price-sensitive because their marginal utilities were further from zero. The price parameters of individuals with a lower trust level were closer to zero, suggesting a higher price-sensitivity.

Table 3: Simulated maximum Likelihood estimates from mixed logit

	Apples (1)	Milk (2)	Beef (3)
Random parameters in utility functions			
Purchase price (€)	-9.0561*** (2.4169)	-5.6811*** (1.0217)	-0.7525*** (0.0677)
Attribute 2[a]	0.4489** (0.1893)	0.3193*** (0.0747)	0.0836** (0.0359)
Attribute 3[b]	0.8005*** (0.1936)	0.3157*** (0.0606)	0.1833*** (0.0348)
Local region	1.6814*** (0.3936)	0.4477*** (0.0828)	0.6082*** (0.0518)
Non-random parameters in utility functions			
Attribute 4[c]	0.6172*** (0.1252)	0.2056*** (0.0542)	-
Attribute 5[d]	0.4068*** (0.1123)	0.0989 (0.067)	0.2044*** (0.0379)
Constant	-9.8279*** (2.7272)	-1.1734*** (0.3493)	-0.7648*** (0.0965)
Heterogeneity in mean, Parameter: Variable			
Purchase price (€):Trustful	3.0352*** (0.8687)	3.1031*** (0.5015)	0.3788*** (0.056)
Purchase price (€):Rather trustful	3.2459*** (0.9041)	2.3387*** (0.4233)	0.408*** (0.0522)
Purchase price (€):Rather distrustful	1.8482*** (0.5703)	2.2986*** (0.4229)	0.3483*** (0.0514)
Diagonal values in Cholesky matrix, L			
Ts Purchase price (€)	18.5096*** (4.9415)	18.4472*** (2.6605)	1.7843*** (0.1851)
Ns Attribute 2[a]	1.2301** (0.4794)	0.4744*** (0.1713)	0.3986 (0.2605)
Ns Attribute 3[b]	0.602 (0.5003)	0.4148 (0.3566)	0.0383 (0.7484)
Ns Local region	1.7048*** (0.5223)	0.5381 (0.6596)	0.023 (0.8109)
Below diagonal values in L matrix. V=L*Lt			
Attribute 2[a]: Purchase price (€)	-3.8034*** (0.8763)	3.5354*** (0.5353)	-0.6269*** (0.2222)
Attribute 3[b]: Purchase price (€)	-1.1323 (0.7533)	0.5787 (0.3969)	-0.8456*** (0.2768)
Attribute 3[b]: Attribute 2[a]	-0.7167*** (0.2345)	-0.4537* (0.2275)	0.1146 (0.2209)
Local region: Purchase price (€)	-1.7053** (0.8143)	0.6805 (0.4848)	-1.6281*** (0.3049)
Local region: Attribute 2[a]	0.1143 (0.3332)	-1.3923*** (0.3408)	0.1881 (0.2421)
Local region: Attribute 3[b]	0.8058 (0.5063)	0.2613 (0.6612)	0.0975 (0.8001)
Standard deviations of parameter distributions			
Purchase price (€)	18.5096*** (4.9415)	18.4472*** (2.6605)	1.7843*** (0.1851)
Attribute 2[a]	3.9974*** (0.9154)	3.5671*** (0.5388)	0.7429*** (0.2257)
Attribute 3[b]	1.4691** (0.6278)	0.8443** (0.36)	0.8542*** (0.2816)
Local region	2.545*** (0.6028)	1.6611*** (0.5027)	1.642*** (0.3018)
Log likelihood at start values (MNL)	-8570.274	-8549.401	-8508.752
Simulated log likelihood at convergence	-7683.006	-8054.612	-7953.003
LR test *($X^2_{0.99}(17)=40.79$)*	1774.5	989.6	1111.5
McFadden R^2	0.1	0.06	0.07
Halton Draws	100	100	100
Number of observations	7801	7782	7745

Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

[a] Attribute 2: A1: Pesticide residue reduction of 99.9%; M2: Antibiotic residue reduction of 99.9%; B3: 100% organic farm-grown feed

[b] Attribute 3: A1: Vitamin C increase of 50%; M2, B3: Omega-3 fatty acids increase of 30%

[c] Attribute 4: A1: Pesticide residue reduction of 95%; M2: Omega-3 fatty acids increase of 75%

[d] Attribute 5: A1, B3: From Germany; M2: From the state

Source: author’s own presentation.

WTP estimates obtained from Mixed Logit

WTP estimates are the derivation of the marginal rate of substitution between attributes and purchase price. Constraining the distribution from which the random parameters are drawn derives behaviorally meaningful WTP values from the mixed logit (HENSHER and GREENE, 2003). Hence, it is possible to use conditional constrained random parameters.[1] The WTP estimates are presented in Table 4.

The results indicate that male and female respondents had a positive WTP (0.02 Euros - 0.23 Euros) for all organic apple attributes. Both, males and females had a negative WTP (-1.50 Euros and -1.35 Euros) for the conventional apple.

The results also indicate a positive WTP for organic milk attributes. In particular, females were willing to pay 0.35 Euros more for a higher omega-3 fatty acids content, 0.55 Euros more for milk from their region, and 0.57 Euros more for the reduction of antibiotic residues. Male respondents had a higher WTP for these attributes (0.58 Euros more for omega-3 fatty acids and local milk, and 0.98 Euros more for the antibiotic residue reduction). Furthermore, while female respondents had a negative WTP for the conventional option (-0.13 Euros), male respondents showed a positive WTP for the conventional milk (1.14 Euros).

Regarding the results for beef products (Table 4), females had a positive WTP for the organic beef attributes (0.26 Euros more for 100% organic farm-grown feed, 0.49 Euros more for omega-3 fatty acids, and 1.9 Euros more for beef from the region). Males had higher WTPs for the attributes omega-3 fatty acids (0.61 Euros) and the region (2.21 Euros). However, females valued a higher WTP for the organic product to avoid the conventional beef than males (2.34 Euros vs. 0.88 Euros).

Given different scale parameters in the choice models, the parameters cannot be compared directly in both samples. A direct comparison between the WTP estimates can be made by cancelling out the scale parameter (Train, 2003).

Table 4: Comparison of estimates obtained from mixed logit (apples, milk, and beef)

	Female		**Male**		ΔWTP
	Estimates	WTP [95% CI]	Estimates	WTP [95% CI]	($CI_{\_female}$ vs. $CI_{\_male}$)[a]
Apples					
Random parameters in utility functions					
Purchase price (€)	-12.8759*** (4.3435)		-10.362*** (3.4158)		
Pesticide residue reduction of 99.9%	1.2655*** (0.4211)	0.14 [0.02 - 0.25]	1.1077*** (0.3507)	0.14 [0.01 - 0.28]	-0.01***
Vitamin C increase of 25%	1.0422*** (0.3473)	0.11 [-0.05 - 0.27]	0.842*** (0.2725)	0.11 [0.02 - 0.2]	0
Local region	2.1217*** (0.6737)	0.23 [0.04 - 0.42]	1.5018*** (0.4428)	0.19 [0.03 - 0.36]	0.03***
Non-random parameters in utility functions					
Pesticide residue reduction of 95%	0.6724*** (0.1992)	0.07 [0.02 - 0.12]	0.2958*** (0.104)	0.04 [0.01 - 0.06]	0.03***
From Germany	0.2464** (0.1151)	0.03 [0.01 - 0.04]	0.1413 (3.5904)	0.02 [0.01 - 0.03]	0.01***
Constant	-14.001*** (4.8169)	-1.5 [-2.52 - -0.49]	-10.649*** (3.5904)	-1.35 [-2.29 - -0.42]	-0.15***

[1] This means that common choice-specific parameter estimates are conditioned on the choices that are observed to have been made by an individual.

	Female Estimates	WTP [95% CI]	Male Estimates	WTP [95% CI]	ΔWTP (CI_female vs. CI_male)[a]
Random parameters in utility functions					
Purchase price (€)	-2.2103*** (0.4891)		-1.0522** (0.4986)		
Antibiotic residue reduction 99.9%	0.335*** (0.0494)	0.57 [-0.83 - 1.97]	0.3199*** (0.0483)	0.98 [-2.14 - 4.09]	-0.41***
Omega-3 fatty acids increase of 30%	0.2045*** (0.0368)	0.35 [0.05 - 0.65]	0.1911*** (0.0371)	0.58 [-1.04 - 2.21]	-0.23***
Local region	0.322*** (0.0468)	0.55 [0.03 - 1.07]	0.1868*** (0.0475)	0.58 [-1.04 - 2.21]	-0.03**
Non-random parameters in utility functions					
Antibiotic residue reduction of 75%	0.3111*** (0.0557)	0.53 [0.07 - 0.99]	0.1811*** (0.0533)	0.55 [-0.98 - 2.08]	-0.02
From the state	0.0724 (0.0486)	0.12 [0.02 - 0.23]	0.1147*** (0.1909)	0.35 [-0.62 - 1.32]	-0.23***
Constant	-0.074 (0.1937)	-0.13 [-0.23 - - 0.02]	0.3748** (0.1909)	1.14 [-2.03 - 4.31]	-1.27***
Beef					
Random parameters in utility functions					
Purchase price (€)	-0.6455*** (0.0632)		-0.4855*** (0.0649)		
100% organic farm-grown feed	0.0878** (0.0372)	0.26 [-0.46 - 0.98]	0.0491 (0.0391)	0.19 [-0.3 - 0.69]	0.07***
Omega-3 fatty acids increase of 30%	0.1576*** (0.0333)	0.49 [0.1 - 0.87]	0.1538*** (0.0361)	0.61 [0.03 - 1.19]	-0.12***
Local region	0.616*** (0.0461)	1.9 [0.41 - 3.4]	0.5547*** (0.0488)	2.21 [0.11 - 4.31]	-0.31***
Non-random parameters in utility functions					
From Germany	0.1721*** (0.0369)	0.53 [0.11 - 0.95]	0.2062*** (0.0394)	0.82 [0.04 - 1.6]	-0.28***
Constant	-0.757*** (0.0941)	-2.34 [-4.18 - - 0.5]	-0.223** (0.097)	-0.88 [-1.73 - -0.04]	-1.46***

Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

[a] CI_female vs. CI_male denotes a *F*-test for equality of mean for the two WTP measures. *indicates significant WTP differences at 95% level, **at 99% level, and ***at 99.9% level.

Source: author’s own presentation.

Differences in WTP

The numerical differences presented in the far right column of Table 4 suggest that male respondents have a higher WTP for milk and beef attributes and a lower WTP for apple attributes. An analysis of the positive WTP differences for all three products indicates that female respondents have a higher WTP for apples, while male respondents have a higher WTP for milk and beef attributes. In addition, females are willing to pay a higher price premium to avoid the conventional alternatives for all three products than males.

For the purpose of detecting significant differences an *F*-test was used to test the null hypothesis of equality of means for the WTP measures in the two samples. The results indicate that, for all three products, there are significant differences in the WTP values between the two samples: the null hypothesis of equal WTP could be rejected in nearly all cases at the 1% level (except for vitamin C increase for apples and antibiotic residue reduction of 75% for milk). Hence, males and females have a different WTP. In the case of male respondents all apple attributes are valued lower. While lower WTP values for milk and beef attributes are observed for female respondents. Hence, the WTP results indicate gender-specific differences for the examined products of this study. This observation is consistent with that of EISINGER-WATZEL and HOFFMANN (2010) who found that the percentage of females who reported buying organic food was higher compared to males. They concluded that organic consumers, especially females, show a more favorable food consumption and therefore a healthier lifestyle than non buyers. The findings are also in line with other studies that show differences in preferences between males and females (ECKEL and GROSSMAN, 2008; CROSON and GNEEZY, 2009).

5 Conclusions

This study used mixed logit and latent class models to analyze consumers' preferences for organic food products in Germany. The results revealed significant heterogeneity in preferences for the examined products among consumers. In particular, consumers showed high preferences for locally produced apples, with low pesticide residues, higher vitamin C levels, as well as lower prices. For milk and beef products, it was observed that consumers preferred organic products with higher contents of omega-3 fatty acids, those produced in the region, with lower antibiotic residues, and sold at lower prices. The WTP results obtained from mixed logit indicate gender-specific differences for the examined products of this study. Female respondents have a higher WTP for apple attributes, while higher WTP values for milk and beef attributes are observed for male respondents.

The findings of this study summarized above indicate some useful information for producers of organic food, who could make good use of consumer segmentation, and for policy-makers trying to understand consumers' trust in credence goods.

Some consumer groups are willing to pay high price premiums for specific organic food products, and to some extent for locally produced food.

Due to the gender differences between the products, there is a need to adopt communication strategies that integrate product-relevant information. Product-specific information about organic food attributes may offer a second way of differentiating these products from conventional ones and therefore improving the perceived utility of organic food products.

References

AMI, Agrarmarkt Informations-Gesellschaft mbH (Ed.) (2012). *Bio-Umsatz in 2011um 9% gewachsen. Presseinformation,* retrieved July 30, 2012, from: *http://www.ami-informiert.de/uploads/media/20120214_AMI-Presseinformation_-_Bio_UmsatzDE.pdf.*

AMI (Ed.) (2010). Bio-Strukturdaten 2010 – Bodennutzung und Tierhaltung. *Ökomarkt Service* 7:5.

BMELV, Bundesministerium für Ernährung, Landwirtschaft und Verbraucherschutz (Ed.) (2012). *Ökobarometer 2012*, retrieved May 29, 2012, from: *http://www.oekolandbau.de/fileadmin/redaktion/dokumente/journalisten/Oekobarometer2012_Sheets_BA.pdf.*

BURTON , M., D. RIGBY, and T. YOUNG (2001). Organic production and ethical trade: definition, practice and links. *European Review of Agricultural Economics* 28:479-498.

CICIA, G., T. DEL GIUDICE, and R. SCARPA (2002). Consumers' perception of quality in organic food. A random utility model under preference heterogeneity and choice correlation from rank-orderings. *British Food Journal* 104:200-213.

CROSON, R., and U. GNEEZY (2009). Gender Differences in Preferences. *Journal of Economic Literature* 47:1-27.

ECKEL, C.C., and P.J. GROSSMAN (2008). Differences in the economic decisions of men and women: experimental evidence, in: Plot, C.R., and V.L. Smith (Eds.), *Handbook of experimental economics results*, Amsterdam: North Holland, 509-519.

ECONOMETRIC SOFTWARE (2007). LIMDEP and NLOGIT software. Available at www.limdep.com and www.nlogit.com.

EISINGER-WATZEL, M., and I. HOFFMANN (2010). Beschreibung der Untersuchungsgruppe, in: HOFFMANN, I., and A. SPILLER (Eds.), *Abschlussbericht. Auswertung der Daten der Nationalen Verzehrsstudie II (NVS II): eine integrierte verhaltens- und lebensstilbasierte Analyse des Bio-Konsums*, Karlsruhe: Max-Rubner-Institut, Institut für Ernährungsverhalten, Göttingen: Georg-August-Universität Göttingen, Abteilung Marketing für Lebensmittel,11-50.

ENNEKING, U. (2004). Willingness-to-pay for safety improvements in the German meat sector: the case of the Q&S label. *European Review of Agricultural Economics* 31:205-223.

ENNEKING, U. (2002). Analysis of food preferences using discrete choice modeling - the case of organic sausages. *Agrarwirtschaft* 52:254-267.

GAO, Z., and T.C. SCHROEDER (2009). Effects of Label Information on Consumer Willingness-to-Pay for Food Attributes. *American Journal of Agricultural Economics* 91:795-809.

HAUSMAN, J., and D. MCFADDEN (1984). Specification test for the multinomial logit model. *Econometrica* 52:1219-1240.

HENSHER, D.A., and W.H. GREENE (2003). The mixed logit model: The state of practice. *Transportation* 30:133–176.

HENSHER, D.A., J.M. ROSE, and W.H. GREENE (2005). *Applied Choice Analysis*, 1st ed. Cambridge: Cambridge University Press.

LANCASTER, K. (1966). A new approach to consumer theory. *Journal of Political Economy* 74:132-157.

SACKETT, H., R. SHUPP, and G. TONSOR (2012). *Discrete Choice Modeling of Consumer Preferences for Sustainably Produced Steak and Apples.* Paper presented at the AAEA/EEAE Food Environment Symposium, May 30-31, Boston, MA.

TRAIN, K.E. (2003). *Discrete Choice Methods with Simulation*, Cambridge: Cambridge University Press.