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The Willingness to Pay for Organic Attributes in the UK

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There has been almost no recent formal economic analysis of the WTP of British consumers for organic products.[1] Given the rising demand for organic products on one hand and the decline in the organically farmed area in the UK on the other hand, this is an important topic to address. The present paper analyses the demand for organic products using both stated and revealed preferences from exactly the same consumers. The stated preference model is based on the respondent's choice from hypothetical choice sets. Attributes in the stated preference model are based on the ranges of the actual levels of attributes found in shops and are presented to respondents using a fractional factorial statistical design. Three different hypothetical bias treatments are applied in order to reduce hypothetical bias. The stated preference results are validated with the help of actual consumption data from the weekly shopping of the same consumers. The results show that there exists a core of organic consumers of about 20-30% of the sample that have a positive willingness to pay for the organic label. However, consumers seem to be willing to pay more for other attributes such as a higher quality, environmentally friendly production and no chemical usage. Attributes such as animal welfare, and a longer expiry date do not seem to have the same relevance for the UK consumers.

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[1] To the best of our knowledge the only more recent papers (after 2005) that calculate WTPs for organic products in the UK are Wier et al. (2008), Zander and Hamm (2010) , Janssen and Hamm (2012) and Gerrard et al. (2013).

The Willingness to Pay for Organic Attributes in the UK

Non-Technical Abstract

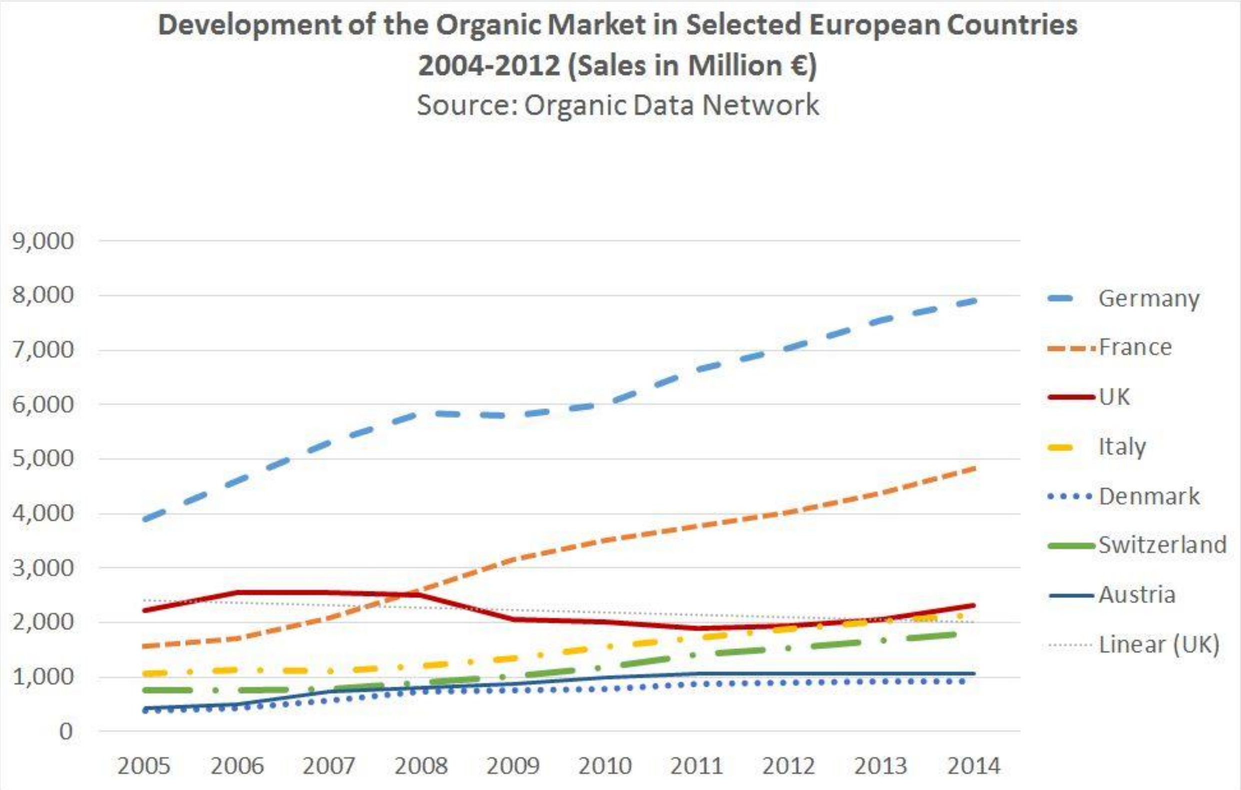
The main objective of the present project is to analyse and understand what drives purchases of organic food in the UK and how much UK consumers are willing to pay for organic food products so that new perspectives can be developed and proposed to policy makers. This is important since there has been almost no recent formal economic analysis of the willingness to pay for organic products in the UK. The existing organic markets in the UK allow us to understand real purchasing behaviour but this is limited to current market conditions. Stated preferences techniques allow to explore new, yet inexistent aspects of the market in a controlled, experimental way. However, by far the strongest criticism brought to stated preferences techniques is the hypothetical bias derived from the hypothetical nature of the experiment. The present study is intending to resolve this issue by collecting data on both real and hypothetical behaviour.

The analysis is important for the design of a strategic policy for the development of the UK organic food sector. The UK was one of the countries that recovered most slowly after the financial crisis with respect to organic sales. In 2013, while worldwide the sales of organic products were surging, the UK accounted a negative growth (Organic Market Report 2013). At present, the demand seems to have recovered and the organic food market seems to increase more than any other food market in the UK. However, the organically farmed area is still decreasing and UK organic farmers are converting back to conventional production (IFOAM 2012, DEFRA 2015, Organic market Report 2016). This implies that the organic food imports have increased which in return implies that the UK is missing important environmental and economic growth opportunities.

Introduction

Organic food sales in the UK had a slower recovery after the financial crisis than in most developed countries.[2] While in 2011 organic sales were worldwide surging, the UK accounted a negative growth (see Figure 1 below). At the present the demand for organic products has recovered and seems to grow stronger than any other food demand in the UK.[3] Despite of this, the organically farmed area in the UK is decreasing and organic farmers are converting back to conventional. The area under full organic production was in 2015 at a six year low implying that organic food imports are increasing and that the UK may be missing both the economic and the environmental benefits of organic production.[4]

Figure 1



The present study analyses which attributes of organic products are mostly valued by the consumers in order to inform UK producers which attributes they should develop stronger in their production. At the same time this analysis could inform retailers on which attributes of organic products they have to focus their advertising campaigns. Finally, the present analysis can be used for welfare analysis in order to estimate the economic value derived

[2] For extensive evidence related to the fall in organic expenditure shares after the credit crunch see Raychaudhuri and Wossink (2016).
[3] Soil Association Report 2015
[4] http://www.ruralbusinessresearch.co.uk

from changes in various attributes of organic products and from developing new products with these attributes.

Methods for valuing environmental amenities and attributes of organic products are traditionally categorized as stated and revealed. Revealed methods such as hedonic pricing method use actual choices made by consumers. They constitute revealed preferences over goods that can be actually purchased in the market and cannot differentiate between use and non-use values.[5] Stated methods directly ask consumers what they would be willing to pay or accept for a change in the various attributes of a specific good and therefore, can differentiate between use and non-use values. However, stated methods in general do not require individuals to make any real choices, they only state that they would behave in a specific manner in a given hypothetical situation. Therefore, they are subject to hypothetical bias, by far the strongest critique brought to stated preference techniques (Cummings et al., 1986; Mitchell and Carson, 1989, Murphy et al. 2005, Carson and Groves 2007). Nevertheless, stated preference methods are the only viable alternative for measuring non-use values and they are commonly used to elicit values in cases in which the environmental quality change involves a large number of attribute changes (Adamowicz et al. 1994). In the case of organic products there is a strong case to be made for both.

Organic products are not only appreciated for their use values such as taste and health but also for a large number of credence attributes such as environmental friendliness, animal welfare and often support for local production if the organic products are produced locally. Additionally to these Wier et al. (2008) identify two additional non-use values of organic products: altruistic value which refers to the utility derived from knowing that other people that value organic can buy it and vicarious values which refer to the utility derived from indirect consumption such as reading in the newspaper about local organic producers. To these existence, bequest and option value can be added. Because of the multitude of non-use values of organic products which could not be captured with revealed preferences methods, the use of stated preference methods in this case is crucial. Revealed preference methods avoid the criticism of being based on hypothetical behaviour, but cannot capture these values and contain a maintained hypothesis about the structure of preferences which may or may not be testable. Revealed preferences may also suffer on the grounds that the change in attributes of interest may be outside the current set of experiences or the current data range. Most importantly, revealed methods suffer from collinearity among attributes and

[5] **Non-use value** refers to the value that people derive from economic goods independent of any use and will be described in more detail for organic food products later.

therefore, the effects of each individual attribute often cannot be identified. Therefore, in the present study both stated and revealed preferences are used.

Stated preferences are collected using a choice experiment. In this experiment each individual completes a series of choice tasks that indicates a preference for the attributes of one alternative over the other. The levels of the attributes are chosen based on a statistical design which results in orthogonal attribute data and are chosen based on the actual ranges of attributes of products found in the shops in the UK. The ranges of actual values are used then to develop levels of the attributes. The use of efficient statistical designs has started with Goodman (1989) in a hedonic price example and has now become state of the art in the choice experiment literature (Balcombe et al. 2016a, Balcombe et al. 2016b, Burton et al. 2016, Rigby et al. 2016). In the present study, individuals are asked to choose one of the presented alternatives, making the process consistent with random utility theory. Moreover, the stated preference method employs a statistical design which eliminates collinearity among attributes. The model explains the choice of one alternative over the other as a function of the attributes which include price and quality attributes of the product. The revealed data includes information about the label of the product (organic or not) about prices and quantities, about the shop where the products have been bought and other characteristics of the products not identical but often similar to the stated data.

The main objective of this project is to analyse and understand which specific attributes drive purchases of organic food in the UK and how much UK consumers are willing to pay for them, so that new perspectives can be developed and proposed to policy makers. The results show that while there is a core of consumers that appreciate and are willing to pay for the organic label, more consumers are willing to pay for other attributes such as a higher quality, no chemical usage and environmentally friendly production. For example while the WTP for the organic label in the case of carrots is on average 0.23 £/kg, the average WTP for no chemical usage is 0.24 £/kg and the average WTP for a higher quality is 0.45 £/kg. In the case of chicken the average WTP for environmentally friendly production is 0.83 £/400 Gramm Pack and the WTP for a higher quality is 1.99 £/400 Gramm Pack.[6] Therefore, it may be commendable to emphasize these attributes stronger in production and advertising campaigns. The analysis is important for the design of a strategic policy for the development of the organic food sector in the UK. The larger vision would be to use the results of the present study in order to develop a National Organic Strategy that would help increase the demand for locally produced organic products and herewith make the organic sector in the UK grow as strongly as in other countries worldwide.

[6] Averages calculated over hypothetical bias treatments 1-3 from Tables XIII and XIV.

Choice Experiment Design

Stated preference models originate in the marketing and applied decision research literature and they can often be found under the names of 'experimental or stated choice analysis', 'choice experiments' or 'conjoint techniques'. They usually ask respondents to choose from a hypothetical choice set or to rank or judge attributes. The approach used here is developing choice sets in which the choices are described by bundles of attribute values usually but not exclusively associated with organic products.

Before designing the choice sets, a set of attributes affecting the choice of the food products was developed in order to reflect their actual characteristics. The list of the 7 attributes and the levels chosen for the analysis are presented in Table I in the Appendix.

Table I should be included around here

The attribute list in Table I contains also the way the levels of the attributes were communicated to the consumer on the choice cards. Since the Soil Association Organic Logo is more frequent in the UK than the EU Organic Logo, both logos were used to describe an organic product. Two products were considered: chicken breast and carrots. The analysis is focused on these two product categories because we would like to understand the differences between the most bought organic products (vegetables) and the least bought organic products (meat).[7] The prices chosen are actual prices that can be found in UK shops and local markets for the two products. The highest price is considered to be the price where most consumers would stop buying the respective product ('choke price'). Note that the attribute levels varied in the choice sets are discrete even though in some cases they reflect underlying continuous variables as it is often done in the literature (see for ex. Adamowicz et al. 1994). Discrete attribute levels are a consequence of the statistical design process used to create the choice sets. For most of the attributes only two levels have been chosen to make the design more feasible. Chemical usage can be average or it can be low reflecting low use of artificial pesticides and antibiotics for animals. Environmental friendliness refers to the use of environmentally friendly practices such as ecological processes, and recycling, rotating crops, fitting the cycles and maintaining the ecological balances in nature. Two levels exist: 'average' and 'high' with the high level symbolized by the 'Eco-Friendly' Logo. High animal welfare (which is an attribute available only for meat) is graphically symbolized by the 'Freedom Food' Logo available in the UK.

[7] Even though organic dairy products are also often bought, organic is mostly associated with produce.

The 'Freedom Food' standards are designed to ensure highest animal welfare and all farm animals have a good life and are treated with compassion and respect. For example chickens can be free range or kept indoors with plenty of space and natural light to move around and flap their wings. Objects like straw bales to peck at and a natural light help keeps them active and healthy. The product can come in two qualities ‘Average’ and ‘High’. Best before refers to the expiry date of the product. If the product expires in less than one week it carries the label ‘Soon (< 1 week)’ and is depicted graphically by a sign with ‘Hurry up’. If the product expires in one week or longer it carries the label ‘1 week or longer’ and is depicted graphically to the consumers by a yellow box containing the information ‘You can use this product one week or longer’. Even though there will be conventional products that expire before one week, in general they are assumed to last longer than organic products. We would like to understand how important this attribute is to the consumer. Even though clearly the attributes must not be correlated with each other it is easy to observe how an organic product may be more expensive, may be produced more environmentally friendly and may involve higher animal welfare than a conventional product. Therefore, it would be difficult if not impossible to use them together in a revealed preference model without encountering multicollinearity. The orthogonal factorial design in the choice experiment ensures that the attributes are not correlated with each other. In this way the impact of each attributed can be estimated independently.

The set of attributes and their levels are setting the space to be spanned in the choice experiment. If each attribute is treated as discrete, there are 2^5 X 3*2 (192) possible alternatives for chicken and 2^4 X 3*2 (96) alternatives for carrots. Obviously it is impossible to confront the consumer with all these alternatives therefore, a subset is chosen using a fractional factorial design. The problem of choice set construction can be viewed as sampling from the universe of possible pairs of organic and conventional products. The most important condition to be fulfilled is the IIA property. The respondent was faced with 3 non-labelled alternatives, the profile of two of which being drawn from the design, while the third option was ‘neither of these’ implying that they would not purchase the commodity that week. The minimum requirement for testing IIA is that the attributes of the choice alternatives be orthogonal within and between the alternatives. In the present paper we present only the results estimating the main effects model and we do not use interaction effects.[8] Moreover, we do not use a complete factorial design but we choose just a fractional factorial design. A fractional factorial design chooses a subset (fraction) of the full factorial design such that it enables the estimation of the parameters with as low as possible standard errors. The

[8] Even though products with interaction effects could in principle exist and it may be interesting to analyse them but it would complicate the design even further.

standard errors are predicted in our case by using priors. Priors contain prior information about the parameter estimates. In the present case the priors were obtained from a pilot study run with 60 individuals previously to the actual CE. The design strategy produces optimally efficient estimates of the parameters based on the notion of 'D-optimality'. A 'D-optimal' efficient design minimizes the 'D-Error' which employs the determinant of the asymptotic variance covariance matrix of a single respondent. The final design consists of 32 choice sets per product using the main effects design strategy. Figure 2 presents an example of a choice card/task for chicken to illustrate how the design was implemented into the survey.

Figure 2 should be included around here.

It is very unrealistic that individuals will respond all 2X32 choice sets in an interview setting. Consequently, we blocked the experiment into four sets of 8 choices for each product by using an additional four-level column as a factor in the design. The four blocks were chosen in such a way that the d-optimality condition was fulfilled for each one of them. Blocking the choice tasks in such a manner ensures that each block of choice sets is approximatively equivalent. Therefore, the respondents had to perform 16 randomly chosen choice tasks in the survey which is a large number of choices but is typically used in the literature (see Adamowicz et al. 1994, Balcombe et al. 2016a, Burton et al. 2016). Each respondent received a set of instructions for completing the survey and the choice task together with background information about organic and a detailed description of the attributes. Three different hypothetical bias treatments were employed. A rich set of socio-economic characteristics were elicited together with the choice tasks in the survey and will be described in more detail in the Data section below.

Data

The data for both the revealed and the stated preferences were obtained from an online survey performed UK wide by a professional data collecting company.[9] Originally 60 observations were collected for the pilot study from which priors were derived. After running the pilot around 520 observations were collected for the main survey from which 505 were maintained as valid and used in the further analysis. This number of observations should be representative on some criteria for a population of around 60 Million people such as the one of the UK (Thompson, 1987).

[9] Qualtrics.

The questionnaire consisted of three main parts. The first (A) about the actual purchases of the individuals (revealed preferences=RP), the second (B) about purchases in the experimental set up (Choice Experiment for elicitation of stated preferences=SP) and the last part (C) contains questions about socio-characteristics of the individuals and their lifestyle as lifestyle has been found to be correlated to organic consumption (Welsch 2012).

The first part contained background information and informed the consumer that their answers will help design supermarket pricing policy and may have consequences for the future trying to imply consequentiality of the project to the consumer. The person that does the shopping in the household was asked to complete the questionnaire and to answer as truthful as possible. Consumers were reminded that even if this is a hypothetical situation it is important that they try to answer as if in a real shopping situation. The hypothetical scenario involved a situation where the Government would be interested in encouraging the production and consumption of organic products and therefore would like to find out how much consumers pay for organic products if they buy any and how much they would be willing to pay for organic products even if they don't buy any now.

In the first part of the questionnaire consumers were asked if they bought chicken breast and/or carrots in the last month. If they did then consumers were asked about quantity bought (in kg), the shop where they purchased the product(s), whether the products were organic or not, whether they were a shop own brand or not and whether they would expire in less than one week or not. If the consumers did not buy any chicken breast or carrots in the last month they were excluded from the sample.[10] Other attributes such as environmentally friendliness, animal welfare and quality were not collected because they would have been to a large extent collinear to organic and because it would have made the revealed preference part of the questionnaire too long and complicated.[11]

The second part of the survey, concerning the stated preferences, contained a comprehensive description of the attributes, instructions how to answer the choice tasks and the choice tasks themselves. As hypothetical bias is the strongest criticism brought to stated preferences techniques, the present choice experiment contained 3 different hypothetical bias treatments. The first treatment was 'Cheap Talk and Budget Constraint Reminder'. Studies have shown that if consumers are made aware of the fact that people in general

[10] Which unfortunately, makes the stated and the revealed sample not perfectly compatible and therefore, impossible to join. Nevertheless, the information from the revealed part can be insightfully used in the stated part.
[11] In another pilot study run in the Canterbury area this part proved to be very tedious and to put off consumers from answering the questionnaire.

tend to overstate their true WTP, their overstatement will be reduced (Farrell and Rabin 1996, Cummings and Taylor 1999, Carlsson et al., 2005, Jacquemet et al. 2011, Silva et al. 2011, Tonsor and Shupp 2011). At the same time consumers were reminded that if they buy more of the present goods then they will have less money left in order to buy other goods. Therefore, they were reminded about their budget constraint. This is important since even in a CE which is designed to imply trade-offs consumers often forget that buying more in this hypothetical situation leaves them with less money to purchase other goods. The second treatment was 'Honesty Priming'. In this treatment consumers were asked to input into 10 questions, missing words. These missing words could be chosen from 2 options, a correct ('true') one (such as 'The earth is **round'**) and a wrong one (such as 'The earth is **square**'). By this, literature has shown (Maxwell et al. 1999, Chartland et al. 2008, De-Magistris et al. 2013), consumers are induced to answer truthfully in the following choice tasks. The method is borrowed from the social psychology literature where this conceptual priming technique is used to explore influences of category representations. Conceptual priming is the activation of a cognitive representation in one context to unconsciously influence an unrelated context (Bargh and Chartrand 2000). Consumers were randomly assigned to one of treatments, three containing the hypothetical bias treatments described above and one without any hypothetical bias as a reference base. By comparing the WTP between the four blocks it can be observed if the hypothetical bias treatments have worked in reducing hypothetical bias and an estimate of the hypothetical bias by comparing the WTP without any treatment with the WTP with the various treatments can be found. Questions regarding the ranking of the attributes according to their importance to the consumers and the attribute non-attendance concluded the stated preference part.

In the last part of the questionnaire a wealth of socio-economic characteristics, lifestyle variables, scales with reasons pro and against organic, green behaviour, fruit and vegetables consumption, exercise, self-assessed health and happiness were elicited. The set of questions was carefully constructed after consulting the most recent literature with respect to consumption behaviour regarding organic food (Hemmerling et al. 2015).

From the multitude of variables that we could statistically describe we chose just some important socio-economic characteristics related to consumption of environmental/organic goods to assess the representativeness of the sample which are described below.

Table II should be included around here.

Mean **Age** in our sample is around 50 with a median of 52 and a modal value of 59. This is above the UK predicted mean (median) age by the Office of National Statistics (ONS) of 40 and therefore, presumably our sample is not representative in terms of age. This is however, not necessarily relevant since studies have shown age to have in general no impact on organic purchase (Aertsens et al. 2009) or at most older people consume less organic because they do not know it, are sceptical about it and it is hard to change habits (Arbindra et al. 2005, Padel and Foster 2005) and therefore their WTP would be lower than the one of average UK population. This would mean that the value obtained for the WTP for organic and its attributes is a very conservative value mitigating for potential overstatement due to 'warm glow' and hypothetical bias. Moreover, as will be explained later we control for this bias.

Income is presented to the consumer in intervals of £1000 from below £500 (category 1) net per month until over 4500 £ (category 10). In category 11 the option was given to the respondents not to report their income. However, only 54 respondents (around 10%) chose this option.

According to the ONS statistics, the average salary in the UK for 2015/2016 was £27.600.[12] This corresponds to a net monthly disposable income of £1610 which is close to our sample average of £1524.95.[13] Calculating the T-test statistics[14] for comparison between population means yields a value of -1.77 which is smaller than the critical value of 2.6 for 100 degrees of freedom at 99% confidence level and therefore, we can accept the hypothesis that our sample mean is not different from the population mean. Hence, our sample appears to be representative in terms of income. Since income is maybe the most important characteristic determining the consumption of environmental and ethical goods such as organic, this is reassuring.

Education is divided in 8 categories corresponding to education levels starting with less than high school up to PhD. We present mean values for consistency however, the median and mode are more useful as this is a categorical variable. It can be observed that the average value is between 3 and 4 which are the categories corresponding to 'Some College' and a '2-year College Degree'. This corresponds to 13.5 years of education which is above the UNO statistics reported for the UK of 12.3.[15]

[12] https://www.incometaxcalculator.org.uk/average_salary.php
[13] 1610=27000*0.7/12, assuming an average tax rate of 30%.
[14] *T-Test Stat=(O-E)*(N)^0.5/σ,* O= Observed Average, E= Expected Average, N=sample population (505), σ = Standard Deviation of Observed
[15] http://hdr.undp.org/en/content/mean-years-schooling-adults-years

Performing a T-test for comparison of the means and employing the T-test statistic for comparison in population means we obtain a value of 16.96 which is above the critical value of 2.6 for 100 degrees of freedom at 99% confidence level and therefore we can reject the hypothesis that the sample average and the true population average are equal. This implies that we have a sample of over-educated people. Even if it is in general expected that higher educated people buy more organic and care more about attributes like animal welfare and environmentally friendliness, the results with respect to education are in general inconclusive in the literature (Aertsens et al. 2009). Therefore, we do not know in which direction this is likely to bias our results if at all since studies have found education to have no statistical significant influence on organic food purchase patterns contrary to what would be expected (Arbindra et al.2005) [16] Moreover, as it will be explained later we calculate our variables as deviations from the true population average education level and therefore, the bias if existent should be minimized.

Children is a variable that has often been found to be associated with consumption of organic or a healthy diet in general. Some articles find that the impact of children is positive because parents want to provide their children with healthy nutrition (Thompson and Kidwell 1998, McEachern and Willock 2004) others find that they impact negative mainly due to income effects (Loureiro and Hine 2002, Tiffin and Arnoult 2010).

The Office of National Statistics reports the number of families with dependent children according to the number of children (0, 1, 2, 3 or more). We have calculated the percentages and based on this the expected number of children in each category in our sample. Then we have employed a Chi^2 Test to compare the expected with the observed number of children for each category and it appears that the number of children living in the household in our sample is representative for the UK population.[17]

Small Children is a dummy taking the value of 1 if the age of the child is below 2 and 0 if it is 2 or higher.

Gender plays a significant role in food consumption in general and especially with respect to consumption of environmental and organic goods (Byrne et al. 1991, McEachern and McClean 2002, Lea and Wrosley 2005 , Arbindra et al. 2005, Radman 2005, Stobbelaar et al. 2007) . Therefore, the sample was chosen to consist of 60% women and 40% men in

[16] It is maybe expected that rather educated people participate in online surveys like the present one.

[17] The Chi^2 value is 8.10< <70.6 which is the critical value for more than 100 observations (we have 505) so, with 99% confidence level we can say that the sample is not significantly different to the UK population in terms of children.

order to reflect the fact that women not only are more responsible for food shopping but also buy more environmental goods.[18]

Methodology

The response to the choice between the three constructed choice alternatives (organic, conventional, no option) can be modelled in a random utility framework. The overall utility can be expressed as the sum of a systematic component, which is expressed as a function of the attributes presented, and a random component. This function can be expressed formally as follows:

$$U_{in} = v_{in} + e_{in} \qquad (1)$$

where U_{in} is the utility of individual n from choosing alternative i, v_{in} is the systematic utility component and e_{in} is the random component. Alternative i is chosen over alternative j if $U_{in} > U_{jn}$. *The* probability of person n choosing alternative i is given by:

$$\pi_n(i) = \Pr(v_{in} + e_{in} \geq v_{jn} + e_{ij}\,; \forall\, j \in C_n) \qquad (2)$$

where C_n is the choice set for individual n. If we consider v_{in} to be a conditional indirect utility function that has a linear form, we can write it as follows:

$$v_{in} = \beta_1 + \beta_2 x_{in2} + \beta_3 x_{in3} + \cdots + \beta_k x_{ink} + \alpha(Y - P_i) \qquad (3)$$

where x_{ink} are the attributes of the alternatives described above, Y is income, and P_i is the price of alternative i. Assuming that the error terms are Gumbel distributed with a scale parameter μ, the probability of choosing alternative i is given by:

$$\pi_n(i) = \frac{exp^{\mu v_{in}}}{\sum_{j \in C_n} exp^{\mu v_{jn}}} \qquad (4)$$

The scale factor μ is usually assumed to be equal to 1 but it is important when referring to setting stated and revealed datasets in relation.

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[18] Further variables used in the study are described in the Appendix in order to conserve space.

In the present study, standard Conditional Logit (CL) and Latent Class Model (LCM), have been employed. Conditional Logit is particularly appropriate in models of choice behaviour, where the explanatory variables include attributes of choice alternatives (for example price) as well as characteristics of the individuals making the choice (such as age, gender or income) as it is in the present case. While in the usual multinomial logit model, the expected utility is modelled in terms of the characteristics of the individuals, McFadden (1974) conditional logit models utility in terms of characteristics of the alternatives rather than attributes of the individuals. This model turns out to be equivalent to a log-linear model where the main effect of the response is represented in terms of the covariates. Conditional logit models are often used when the number of possible choices is large as is the case in the present analysis.

The Latent Class Model is a semi-parametric extension of the Multinomial Logit Model as well and was employed as it allows the investigation of heterogeneity on a class (segment) level and it relaxes the assumptions regarding the parameter distribution across individuals (Greene and Hensher, 2003). This approach has individuals endogenously grouped into classes of homogenous preferences (Scarpa and Thiene, 2005) and estimates their probability of membership to their designated class depending on their socio-economic characteristics (Kikulwe et al., 2011).

As a result, the class membership likelihood function is as follows (adapted from Boxall and Adamowicz, 2002):

$$M_{ns} = \lambda_s Z_n + \xi_{ns} \qquad (5)$$

Where Z_n denotes the observed characteristics, λ_s denotes the parameters of the specific segment and the error terms are assumed to be IID with a Gumbel distribution. Therefore, the probability of an individual, *n,* belonging to a specific class, *s*, is (adapted from Kikulwe et al., 2011):

$$Prob(s) = \frac{\exp(\lambda_s Z_n)}{\sum_{k \in S}(\lambda_k Z_n)} \qquad (6)$$

Where *k* denotes the number of classes. Given it is a probability function, the sum of all segment probabilities equals one.

This additional information assists in constructing a function that both reveals the probability of an individual*, n*, selecting option *i* over option *j* and accounts for heterogeneity (Boxall and Adamowicz, 2002). Hence the model can be represented similarly to equation (4), (adapted from Kikulwe et al., 2011):

$$Prob(\mathrm{i}|\mathrm{C,S}) = \frac{exp(\beta s X_{\mathrm{in}})}{\sum_{j\in C} \exp(\beta s X_{j\mathrm{n}})} \text{ X } \frac{\exp(\lambda_s Z_n)}{\sum_{k\in S}(\lambda_k Z_n)} \tag{7}$$

When examining the number of segments, the literature does not indicate a definite approach in selecting the correct number (Scarpa and Thiene, 2005; Greene, 2012). The standard specification tests used for maximum likelihood models appear to be inadequate (Greene, 2012) and therefore, other information criteria, such as the Akaike Information Criterion (AIC), the Bayesian Information Criterion (BIC*),* are suggested as well as the judgement of the researcher on the interpretation of the findings (Scarpa and Thiene, 2005).

Furthermore, Hensher et al. (2005) discuss that respondents may not always use all attributes when making their decision in choosing an alternative; some may, intentionally or not, be ignored. According to Mariel et al. (2013) respondents do not use all attributes when making their decision and if this information is not taken into account the estimate of their willingness to pay could be influenced. Campbell et al. (2008) explain that by using de-briefing questions this “Attribute Non-Attendance” (also referred to as discontinued preferences or ANA) can be identified and this was also done in the present study. In order to incorporate this information, a condition could be applied for the non-attendance of a particular attribute setting its parameter to zero if the respondent has indicated that it was not taken into account in his decision making (Campbell et al., 2011). Campbell et al. (2008) support that including this information provides a better fitted model and yields more accurate results. In the present study both LCM and ANA models have been employed.

One of the main aims of the present study is to quantify the individuals willingness to pay (WTP) for each attribute within the choice set. The WTP is calculated as the ratio of each attribute’s coefficient over the monetary value coefficient (Louriero and Umberger, 2007; Kerr and Sharp, 2009; Greene, 2012) and is interpreted as a change in value associated with an increase of the attribute by one unit. The ratio is given by the following formula:

$$WTP = -\frac{\widehat{\beta}_{attribute}}{\widehat{\beta}_{monetary\ value\ (price)}} \tag{8}$$

This measure can then be used in order to estimate the levels of welfare associated with various products and their attribute combinations in order to decide which one is most valued by the consumer.

Stated Empirical Results

Conditional Logit Results

The results of the Conditional Logit (clogit) analysis of the stated preference data are presented in Tables III and IV in the Appendix for the two products, chicken breast and carrots. The model for chicken has a Log Likelihood of -2828.155 and a Pseudo R2 of 0.19. The attributes that seem to impact significantly on the choice of chicken are: Environmental Friendliness, Organic Label, Quality and Price.

When discussing the impact of interaction terms between an attribute and a socio-economic characteristic it is important to mention again that even if some variables such as age and education may be not representative for the UK population in the present sample, they have been calculated as the deviation from the true population mean. Therefore, the coefficients of the attributes are giving the marginal utility for someone that has a zero value for these interaction variables, someone at the population average, and therefore for someone that is representative for the UK population. The results reveal that increased age reduces the marginal utility associated with organic. A negative relationship between organic and age has often been found in the organic literature (see for ex. Arbindra et al. 2005, Padel and Foster 2005). Even though older people could have the means to buy organic, they are more sceptical with respect to it and find it hard to change their habits of eating conventional food. Women do seem to care about animal welfare since the interaction term between gender (which in our case takes the value of 1 for women) and animal welfare has a positive and significant coefficient albeit only at 10%. People with higher income do seem to appreciate the organic label as the interaction term between the organic label attribute and the income has a positive and highly significant impact on the choice of chicken. Interestingly, unemployed people do seem to care about quality as the coefficient of the interaction term between quality and unemployed status impacts positively and significantly on the choice of chicken, albeit only at 10%. People that score highly on the reasons for buying organic scale and could be categorized as ‘Pro Organic’, seem to appreciate the organic label when buying chicken as might have been expected. And they also appreciate the environmentally friendly attribute, as their interaction terms with the organic label and the environmentally friendly attribute are positive and highly significant. Vegetarians actively dislike the attributes of meat and will therefore have a relatively high utility for the opt-out option (‘sq’) which doesn’t involve buying meat. Women do seem to appreciate a higher quality when buying chicken which confirms that in general they are more conscientious with respect to nutrition. Interestingly, people that have the employment status ‘Professionals’ do not seem to appreciate the organic label while vegetarians, do seem to appreciate a higher animal welfare when choosing chicken.[19] The important message from this analysis is the fact that the attributes that seem to be most valued by the consumer when choosing chicken are: the organic label, quality, environmentally friendliness and animal welfare and price as their coefficients are highly significant.

Table III should be included around here.

The results of the clogit analysis for carrots are presented in Table IV. The Log likelihood ratio of -3083.62 and a Pseudo R2 of 0.21. The attribute coefficients differ from the ones of chicken with respect to environmentally friendliness, best before and quality. People do not seem to appreciate the quality attribute for carrots maybe because the average quality of carrots is already high. On the contrary, people do seem to care about the expiry date ('Best Before'). The most surprizing result is however, with respect to environmental friendliness. People do not seem to appreciate carrots that are produced using environmentally friendly techniques. The coefficient of environmentally friendliness is negative and significant 5%. This is surprizing since carrots are root vegetables and therefore, the quality of the soil is reflected in their quality. Nevertheless, respondents do seem to appreciate the organic label since its coefficient is positive and highly significant.

Regarding the interaction terms with the socio economic characteristics, people that could be considered environmentalists do seem to appreciate the organic label when choosing carrots as the interaction term between the organic label and pro-environment is positive and significant. Similarly to chicken, the interaction term between age and the organic label has a negative and significant impact on the choice of carrots. People that consider themselves to be happy do seem to appreciate the organic label since the interaction term between 'Happy' and the organic label has a positive and significant impact on the choice of carrots. People that have a healthy lifestyle and professionals appreciate the 'environmentally friendly' attribute when choosing carrots.

The most important message from the model for carrots is the fact that the attributes that consumers seem to care most in their choice of carrots are 'Organic Label', 'Best Before' and 'Price'. Therefore, for both products the 'Organic Label' and the 'Price' are important

[19] They may buy them for their family.

attributes but while for chicken 'Quality' is another important attribute, for carrots it is 'Best Before'. [20]

Table IV should be included around here.

Latent Class Results

Using the clogit it has been established that the organic label is an important attribute in the choice of both meat and carrots. However, in what follows we would like to pursue the analysis in more depth and establish which class of people has a positive WTP for the organic label as well as for the other attributes. For this we are using the LCM described above. The analysis started with the simple one class model and increased the number of classes iteratively up to the point where the BIC, CAIC values started to increase. The optimal number of classes for both products seems to be five. Parameter values for latent class models for chicken are presented in Table V in the Appendix.

Table V should be included around here.

From the Table V it can be observed that both the BIC and the corrected version of the AIC (CAIC) would suggest 5 as an optimal number of classes as they start to increase after the 5th class. Therefore we chose the latent class model with 5 classes for the further analysis for chicken. We estimate the models using price interaction dummies for the 3 hypothetical bias treatments leaving the fourth group that had no treatment as a comparison base and we used as covariates to explain class membership BuyOrg (the dummy indicating if the person bought organic in the last 2 weeks), age, income and pro-organic status.

Moreover, we control for attributes that were not attended as attribute non-attendance (ANA). This can be a problem in CE where consumers are usually faced with a large number of choice within a short period of time (Mariel et al., 2013). With the help of debriefing question, the researcher elicits the attributes that were least attended by the respondents and tries to see how setting their coefficients to zero may influence the analysis. Table VI presents the answers to the debriefing questions with respect to attribute non-attendance.

Table VI should be included around here.

[20] The prices of the products where retrieved from the homepages of the shops where the products were bought in order to avoid potential mistakes in recollection and in order to have consistency.

According to the consumers, their most ignored attribute was ‘Chemical Usage’. Around 40% of people reported to have ignored this attribute. The next attribute reported as being most ignored is ‘Environmentally Friendly’. Around 36% of respondents reported to have ignored this attribute. About 30% of people reported to have ignored ‘Best Before’ and the ‘Organic Label’. A surprisingly high percentage of people (around 27%) claimed to have ignored the price attribute. This is in accordance with the LCM results for chicken and carrots, where the classes that ignored price consisted of about 30% of the respondents. The least ignored attributes seem to be ‘Animal Welfare’ and ‘Quality’. ‘Quality’ may not be surprising since it seems to be the attribute that is valued by most classes of people and since it seems to be the attribute with the highest WTP. Most notably, only around 15% reported to not have ignored any attribute. Therefore, estimating a model accounting for attribute non-attendance is important.

The way this is theoretically modelled is that for each class, the coefficients of the attributes that are ignored are set to zero in the utility function allowing for the price coefficients to be free in order to be able to estimate WTP, if necessary.

The general form of the class *k* utility functions for the 8 attributes (L=Organic Label, E=Environmentally Friendly, Q=Quality, B=Best Before, C=Chemical Usage, A=Animal Welfare, SQ=No Choice Option or Status Quo, P=price, P1=Price*HB1dummy, P2= Price*HB2dummy, P3= Price*HB3dummy) is:

$$U_k = \beta_{kL} * L_k + \beta_{kE} * E_k + \beta_{kQ} * Q_k + \beta_{kB} * B_k + \beta_{kC} * C_k + \beta_{kA} * A_k + \beta_{kSQ} * SQ_k + \beta_{kP2} * P2_k + \beta_{kP3} * P3_k + \beta_{kP1} * P1_k + \beta_{kP} * P_k$$

Given the number of attributes in the model, the number of possible combinations of ANA is large. Here we adopt the pragmatic strategy of identifying the insignificant attributes in the 5 class model estimated without restriction, and restricting these to zero. This gives the following model structure:

$$U_1 = \mathbf{0} * L_1 + \beta_{1E} * E_1 + \beta_{1Q} * Q_1 + \mathbf{0} * B_1 + \beta_{1C} * C_1 + \mathbf{0} * A_1 + \beta_{1SQ} * SQ_1 + \beta_{1P2} * P2_1 + \beta_{1P3} * P3_1 + \beta_{1P1} * P1_1 + \beta_{1P} * P_1$$

$$U_2 = \beta_{2L} * L_2 + \beta_{2E} * E_2 + \beta_{2Q} * Q_2 + \beta_{2B} * B_2 + \beta_{2C} * C_2 + \beta_{2A} * A_2 + \mathbf{0} * SQ_2 + \beta_{2P2} * P2_2 + \beta_{2P3} * P3_2 + \beta_{2P1} * P1_2 + \beta_{2P} * P_2$$

$$U_3 = \beta_{3L} * L_3 + \mathbf{0} * E_3 + \beta_{3Q} * Q_3 + \mathbf{0} * B_3 + \beta_{3C} * C_3 + \beta_{3A} * A_3 + \beta_{3SQ} * SQ_3 + \beta_{3P2} * P2_3 + \beta_{3P3} * P3_3 + \beta_{3P1} * XP1_3 + \beta_{3P} * P_3$$

$$U_4 = \mathbf{0} * L_4 + \mathbf{0} * E_4 + \beta_{4Q} * Q_4 + \mathbf{0} * B_4 + \mathbf{0} * C_4 + \mathbf{0} * A_4 + \beta_{4SQ} * X_{4SQ} + \beta_{4P2} * X_{4P2} + \beta_{4P3} * X_{4P3} + \beta_{4P1} * X_{4P1} + \beta_{4P} * X_{4P}$$

$$U_5 = \mathbf{0} * L_5 + \mathbf{0} * E_5 + \beta_{5Q} * Q_5 + \mathbf{0} * B_5 + \mathbf{0} * C_5 + \mathbf{0} * A_5 + \beta_{5SQ} * SQ_5 + \beta_{5P2} * P2_5 + \beta_{5P3} * P3_5 + \beta_{5P1} * P1_5 + \beta_{5P} * P_5$$

Table VII compares the statistics parameter for the latent class model with ANA and without:

Table VII should be included around here.

And it can be observed that BIC, AIC, AIC3, CAIC, SBIC are better (smaller) for the model accounting for attribute non-attendance than without and this is what it would be expected if a set of insignificant parameters is removed. The impact of LL is small compared with the number of existing parameters and it must increase in absolute value as parameters are restricted. Therefore, the model that accounts for the fact that some classes don't value (ignore) some attributes is an improvement.

The results of the model using the ANA restrictions for chicken are presented in Table VII. The parameters are presented for each of the 5 classes (coefficients and z-values) together with overall Wald, p-values and standard deviations.

The coefficients of the attributes are presented first followed by the ones of the interaction terms of the price and the hypothetical bias treatments. The coefficients of the covariates are displayed followed at the bottom of the table. It should be noted, that if the price coefficient is not significantly different from zero, theoretically, the WTP of this class is infinite. This seems to be the case for Class 2 and for Class 5 in our sample. Therefore, when calculating the WTP of these two classes, these values have to be excluded. Moreover, class 5 would have a positive price coefficient which would suggest that the marginal utility of consumers increases with the price. In the last row, the class size of each class is presented. Class 1 and Class 2 are the largest classes, each containing about 30% of the sample.

Table VIII should be included around here.

Class 1 seems to value most attributes with the exception of 'Organic Label' and 'Best Before'. It is highly sensitive with respect to price and consists about 30% of the sample.

Class 2 is the class of people that appreciates the organic attribute without considering the price as being an important deterrent as the price coefficient of this class is not significantly different from zero. This is important for this study but it also means that we won't be able to estimate WTPs of this class and therefore, the WTPs for organic chicken will be biased downwards. Moreover, Class 2 appreciates also all the other attributes related to organic such as low chemical usage environmentally friendly production and animal welfare. On the top of this, Class 2 appreciates the attributes 'Quality' and 'Best Before'. The probability to belong to this class is positively influenced by revealed organic consumption (BuyOrg), pro-organic and young age. This class of people consists about 30% of the population.

Class 3 is exactly the opposite. This class dislikes the organic attribute and ignores most of the other attributes. The only attribute that this class seems to appreciate is 'Quality'. However, this class is sensitive with respect to price as its price coefficient is negative and significant. People with high income do not seem to belong to this class as income influences negatively the probability to belong to this class. Nevertheless, this class is smaller than the previous ones consisting of about 20% of the sample.

Class 4 is similar to Class 3 in the sense that the only attributes that it really appreciates are 'Quality' and 'Price'. While 'Quality' influences the probability to buy chicken positively, the price influences it negatively. The only difference between Class 3 and Class 4 seems to be that while Class 3 dislikes the organic label, Class 4 is indifferent about it. The probability to belong to Class 4 is positively influenced by age and negatively influenced by pro-organic. This class consists about 16% of the population.

Class 5 is the smallest class, consisting of only 4% of the population. Like Class 3 and Class 4 the only attribute that this class seems to appreciate is 'Quality'. However, this class seems to be the class of people that chooses most frequently the opt out attribute ('sq') and has a positive price attribute which means that it derives positive marginal utility from paying a higher price. People that buy organic and have a high income seem to belong to this class.

What is most interesting to observe is, that the addition of the hypothetical bias interaction effects is significant and this suggests that the WTP has changed after the hypothetical bias treatments. In particular the interaction of price with the HB2 Dummy leads to a larger price coefficient in absolute value, so the WTP is smaller for that treatment compared to the baseline (no treatment).[21] This would suggest that using Cheap Talk and Budget Constraint Reminder has worked in reducing hypothetical bias. Even though the p-values suggest that all treatments are having an effect in aggregate, it does not necessarily mean that the treatment has to have a significant effect for each and every class. In the present case for Class 1, 2 and 5 no treatment has a significant impact while for Class 3 and 4 all treatments had a significant impact. Class 3 is also a class that is very sensitive with respect to price and was significant for the estimations of the WTPs. Therefore, we can conclude that the reduction in hypothetical bias was efficient for Class 3 and Class 4. Table IX presents the parameter values for latent class models for carrots.

Table IX should be included around here.

Results in table IX allow no unequivocal choice about the optimal number of latent classes in the case of carrots. While the BIC would suggest 5 classes as an optimal number, as in the case of chicken, the CAIC would suggest 4 as it starts to increase after the fourth class. The CAIC is a corrected version of the AIC that avoids overfitting in the case that the number of parameters in the model under consideration is large in comparison to the sample size. However, as in our case the number of parameters is not very large in comparison with the sample size and the increase in CAIC from the fourth to the fifth class is marginal we decide, for consistency to choose for carrots the 5 latent class model as in the case of chicken. The corresponding ANA utility functions for carrots can be found in the Appendix.Table X table compares the statistics parameter for the latent class model with ANA and without.

Table X should be included around here.

As in the case of chicken it can be observed that when insignificant parameters that were ignored are removed, the model improves. The results of the model using the ANA restrictions for carrots are presented in Table XI.

Table XI should be included around here.

Class 1 does not seem to appreciate environmentally friendliness, low chemical usage or quality and ignores the organic label but does seem to appreciate a long expiry date (attribute 'Best Before'). However, this class has a positive price coefficient which makes the interpretation of the WTPs for this class difficult. The attendance to this class is negatively influenced by age.

[21] The interaction term has the lowest p-value from all 3 HB treatments and is negative for all classes. This means that the price coefficient will be reduced for all classes and will therefore increase in absolute value (from -2 to -3 for example). When dividing the attribute coefficient by it, this will result in a lower.

Class 2 seems to appreciate the attributes 'Best Before' and 'Quality' but is indifferent to anything else. The coefficient of price is negative and significant which allows for a meaningful interpretation of the WTP of this class. Attendance to this class is negatively influenced by income. The fact that such a large class of people (36%) seems to appreciate the attribute 'Best Before' is consistent with the results of the clogit model, where the coefficient of 'Best Before' was also significant for carrots as opposed to chicken. Class 3 is a class of people that seem to appreciate the organic label and other environmental attributes such as environmentally friendly production, low chemical usage and also a higher quality but does not seem to appreciate a long expiry date. This class of people has a negative and significant price coefficient and consist of about 14% of the analysed population. Attendance to this class is positively influenced by revealed organic consumption ('BuyOrg'), pro-organic and a young age. Class 4 is indifferent about the organic label, and all other attributes except price. This class seems to be extremely sensitive with respect to price and maybe this is explained by the fact that attendance to this class is negatively correlated to income and positively correlated to age. This class consists of about 10% of the population. Class 5 seems to appreciate the organic label too but the price coefficient even though negative is not significant. This class is the smallest consisting nevertheless of 5% of the sample. Together, Class 3 and Class 5, the classes that appreciated the organic label make up to 20% of the sample. In general, when choosing carrots, respondents seem to care more about environmental attributes than when choosing chicken. Additionally, the attribute 'Best Before' seems to play a much more important role than in the case of chicken.

WTP Results

In what follows the WTPs will be presented and discussed for the attribute 'Quality' because this seems to be an attribute valued most classes in the case of chicken. The discussion will be performed by class under the four different hypothetical bias treatments.[22] The interpretation appears however, to be similar for all other attributes.

Table XII should be included around here.

It is important to note first that WTP for Classes 2 and 5 cannot be interpreted because the price coefficient is either not significant or positive. For Class 1 none of the price interactions are significantly different from zero so even if there are changes numerically, they do not have much significance. For Class 3, all price interactions are significant but there seem to

[22] The basis for these calculations are not the attribute and price coefficients in Table XI but the ones in a table where individual prices for each treatment have been used and therefore, the marginal utility from each treatment could be estimated (to be obtained upon request). The models are behaviourally equivalent.

be no real differences between HB1, HB2, and HB3. However, there is an effect on HB4 and therefore, a larger WTP (for the attributes 'Quality') is significant suggesting that having no hypothetical bias treatment may lead to a significantly larger WTP. Class 4 seems to have a significantly different price coefficient for HB2 (Cheap Talk and Budget Constraint), therefore, smaller values for WTPs (again for 'Quality) could be an effect of this HB treatment. However, this group is the one who mainly chooses on the basis of price as this was one of the few significant attributes for this class. Class 5 is the class of people that tends to choose the 'no option' as the coefficient of 'sq' is positive and significant and this is the only attribute that is significant for this class together with quality and price is never significant. Therefore, the interpretation of the HB treatments does not make much difference for this class, which anyway has an insignificant price coefficient. The strongest case can be therefore made for Class 3 where all HB treatments should cause the WTP to fall.

The results for the WTPs are reported separately for each treatment as well as the weighted average over the first 3 treatments in order to be able to compare the WTP before treatment (HB4) and after treatment.[23] The differences between the untreated and the treated WTP values (that could be interpreted as hypothetical bias) are presented in the last row for each attribute. It can be observed that the largest 'hypothetical bias' is for the attribute 'Quality'(0.42) followed by the one of 'Environmentally Friendly' (0.18) which may come as no surprize since people care about the environment, however they may not be able to afford the much higher prices of meat in general and especially involving environmentally friendly production. The largest average treated WTP per attribute are for the attribute 'Quality'. This is consistent with the results in Table XI, where 'Quality' is the only attribute that had a significant coefficient for all 5 classes and with the results of clogit from table III where the attribute 'Quality' had a positive and significant coefficient. Therefore, it appears that 'Quality' is one of the most valued attributes in the choice of chicken.

Further keeping in mind the aforementioned constraints it can be also observed that for the attributes that had a positive WTP the highest values are for HB4 which had no treatment against hypothetical bias. This result together with the fact that the price interaction dummies for the hypothetical treatment were significant, seems to suggest that our attempts to treat hypothetical bias were successful.

[23] The weights are given according to class sizes.

In what follows, individuals were attributed to classes according to their predicted class probabilities and a ‘true WTP’ (with HB treatments 1-3) and a WTP without hypothetical bias treatment (HB4) was estimated for each individual and for each attribute. As we cannot present the WTPs for each individual due to limit of space, we will present just the averages per attribute. Table XIII presents the results for chicken.

Table XIII should be included around here.

The values are not directly comparable with the values in Table XII because the averages are calculated per individual hypothetical bias treatment. The exact formulas for the average WTP and average treated WTP are given below:

Average untreated WTP$_{ai}$ = $\sum_{k=1}^{S}(WTP_{ak} * \mathrm{Pr}_{ik})$ *(9)*

where WTP_{ak} is the class *k* WTP for the attribute *a* and Pr_{ik} is the individuals *i* probability to be in that specific class. The sum is over all classes for each individual.

Average Treatment WTP$_{ait}$ =$\sum_{a}\sum_{k=1}^{S} WTP_{akt} * \mathrm{Pr}_{ik}$ *(10)*

with the main difference being that in (10) calculate the WTP per individual per hypothetical bias treatment.

The most important message from Table XIII being that the attribute ‘Quality’ seems to have the highest average individual WTP and the WTP for the attribute ‘Best Before’ is zero. In general the WTPs for HB4 (no treatment) seem to be higher than the WTP for HB1-HB3 where treatments have had some degree of success. It is also worth mentioning that there is a large class of people consisting of about 30% of the sample (Class 2) that appreciate the organic label and would probably have a high WTP for the organic label since this class of people does not seem to care about the price of these products (as the price coefficient for this group is not significantly different from zero). However, we cannot calculate this value.Table XIV presents the corresponding WTPs for Carrots.

Table XIV should be included around here.

When analysing the WTPs for the carrots attributes it has to be reminded that only the price coefficients for Class 2, 3, 4 were negative and significant and therefore, the WTPs sere calculated only for these classes. It has also to be reminded that the HB price coefficients were in general significant only for Class 4 and therefore, the HB treatments seem to have worked best in reducing HB for this class. However, this class was not relevant when estimating WTPs. For the estimation of the WTPs only Class 3 and sometimes Class 2 were relevant. Therefore, we do not expect that the hypothetical bias treatments have managed to reduce the WTPs in the case of carrots. We can observe that in fact in most cases HB1-HB3 have higher values than HB4 (no treatment). Moreover, the differences between the treated and the untreated WTPs are very small and not significant and what we seem to observe is simply 'noise'.

Keeping in mind the restriction mentioned above it seems that the WTP for the attribute 'Quality' is again highest (0.45) followed by the ones of 'Chemical Usage', 'Organic Label' and 'Environmentally Friendly' which are all around 0.2. The results are dominated by the WTPs of Class 3 that is the only class that had non-zero WTPs for all attributes. Class 2 had non-zero WTPs for 'Quality' and 'Best Before' but besides of this, all the WTPs were zero. Because Class 3 had a negative WTP for the attribute 'Best Before' which could be interpreted as the fact that these class of people does not want a long expiry date and prefers to buy the carrots fresh, the average WTP for the attribute 'Best Before' is negative. However, it has to be reminded here that in the case of carrots there is a large class of people consisting of 36% of the sample (Class 1) that appreciates the 'Best Before' attribute but which WTPs cannot be calculated due to a positive price coefficient. In general the WTP for environmental attributes like no chemical usage, environmentally friendly production and the organic label (which encompasses both) seems to be larger when choosing carrots than when choosing chicken. Maybe because chicken is already a more expensive product, the WTP for additional attributes is lower or maybe our respondents consider that these environmental attributes are more important for carrots than for chicken. Or perhaps people that buy carrots are also vegetarians and lead in general a more healthy life and therefore, appreciate more these attributes and are willing to pay more for them. This seems to be supported by the fact that the interaction terms 'Organic Label X Pro Environment', 'Organic Label X Happy' and 'Environmentally Friendly X Healthy Lifestyle' have impacted positively and significantly on the choice of carrots in the clogit regression as opposed to chicken and by the fact that there seems to exist a core of 'environmentalists' (Class3 and 5=20% of the respondents) in the latent class model that appreciates all these attributes.

The results for the averaged individual WTPs with hypothetical bias treatments for carrots are presented in Table XV.

Table XV should be included around here.

And it can be observed that for all HB treatments the highest WTP is for the attribute 'Quality' (around 0.4) followed by the WTPs for the attributes 'Chemical Usage', 'Organic Label' and 'Environmentally Friendly' which are all around 0.2 confirming the results that we obtained before at class level. HB treatments do not seem to have affected WTPs significantly in the case of carrots as HB1-HB3 deliver slightly higher values than HB4 but not significantly so. Maybe the most important message for our study is that in general the WTP for organic carrots seems to be higher than for organic chicken. We have to remember nevertheless, that there existed a quite large class of people that appreciated the organic label in the choice of chicken too, but for which we could not calculate the WTPs due to the insignificant price coefficient of this class (Class 2 ≈ 30%).

Revealed Preferences Results

Information on the actual choices of chicken breast and carrots was collected from the same individuals who provided responses to the stated preference survey. Indicative statistics for the revealed data are presented in Table XVI.

Table XVI should be included around here.

Around 30% of the people (173 people or 34.23%) bought in the last month either organic chicken or organic carrots. This percentage is similar to the percentages obtained in the LCM for the two products. From these, 54 (10%) respondents bought both organic chicken and organic carrots. There is therefore, a core of organic buyers within the sample. In general more people buy carrots than chicken and this is valid also for the organic variant of these products. This may reflect the fact that 22 people (about 4%) in our sample are vegetarians. The organic price is on average higher than the conventional price but people do not seem to buy on average a lower quantity of organic products as the average quantities bought are about equal between conventional and organic. While most of the bought conventional products are the shop own brand only about 20% of the organic products seem to be the shop own brand. This may reflect the fact that the shops do not have as many organic shop own brands as conventional. The percentage of products that expire soon is slightly larger among organic than among conventional and it does not differ significantly between the two type of products. Maybe this reflects the fact that organic products in general have a shorter shelf life than conventional. The shop where most of our respondents bought their product is Tesco. This is the supermarket chain with the largest market share retail of all foods in the United Kingdom (28% in 2015).[24]

A dummy variable called 'BuyOrg' indicating when a person bought organic was created and was interacted with the variable price in order to be used in the clogit estimations together with the attributes to explain the choice of the two products. Results for the impact of 'BuyOrg' on the 'choice of chicken are presented in the last row of Table III.

And it can be observed that the interaction term of the revealed behaviour dummy with the price has a positive and significant impact on the choice of chicken. This seems to be also true in the case of carrots. Results of the impact of 'BuyOrg' on the choice of carrots are presented in the last row in Table IV. The impact is positive and highly significant.

Therefore, it can be concluded that revealed behaviour does impact significantly on stated behaviour. Most importantly however, revealed purchase of organic products seems to explain class attendance for the classes of people that appreciate the organic label in the latent class models. As shown Table VIII and Table XI before, if the variable 'BuyOrg' is introduced as a covariate in the latent class model for chicken, it can be observed that it explains class attendance in Class 2 and Class 5, the classes of people that had a positive coefficient for the organic label and it explains attendance in Class 3, the class of people that had a positive coefficient for organic label in the case of carrots.

Therefore it can be concluded, that not only does revealed behaviour impact significantly on the choice of the two products but it also explains class attendance in the latent class models. Therefore, adding revealed data strengthens the validity of our results.

Conclusion

The findings of this paper should be of interest to economists and practitioners for several reasons. Firstly, because there has been almost no recent formal economic analysis of the WTP of British consumers for organic products and the present study not only estimates WTPs for the organic label but also for related attributes together with their estimated hypothetical bias. The analysis has been done for two different products representing two food categories: meat and produce on a large sample of British consumers.

[24] Available at: http://www.fooddeserts.org/images/supshare.htm

Secondly, because as a method of valuing non-market goods, the choice experiment approach has proven to be a superior variant of stated preferences techniques as it forces respondents to focus on a respondent task, to make trade-offs between attributes and offers consistency with the random utility model. Moreover, biases created by the order of the questions are avoided with the help of a random design. In addition, a WTP can be estimated for each specific individual attribute. We distinguish between 6 attributes for carrots (‘Organic Label’, ‘Environmentally Friendly’, ‘Quality’, ‘Best Before’, ‘Chemical Usage’ and ‘Price’), and 7 for chicken breast (‘Animal Welfare’ additionally to the attributes for carrots) and report WTPs for each of these attributes.

Moreover, the present study employs 3 different treatments against hypothetical bias, by far the strongest criticism brought to stated preferences techniques (Cummings et al., 1986; Mitchell and Carson, 1989, Murphy et al. 2005, Carson and Groves 2007). The study employs ‘Honesty Priming, ‘Cheap Talk’ and ‘Budget Constraint Reminder’ and shows that all treatments have been effective in reducing hypothetical bias. Therefore, the results are expected to be more accurate than the ones obtained without hypothetical bias treatments.

The results show that the WTP for organic attributes is on average larger for carrots than for chicken. However, an attribute that was more important in the choice of carrots was no chemical usage and an attribute that was more important in the choice of chicken was environmentally friendly production. For both products the attribute ‘Quality’ seems to have been important since it has the highest average WTP (0.45 £/unit for carrots and 1.99 £/unit for chicken). And the results stay the same even after excluding insignificant parameters and correcting for hypothetical bias. Therefore, even if in both cases a core of people consisting of about 20-30% of the sample exists that appreciates the ‘Organic Label’ per se, there are other attributes that consumers seem to appreciate more such as high quality, environmentally friendly production and no chemical usage. Even if products exist that have these attributes independent from organic products, as they are also part of them, setting the emphasis on these attributes both in local production and in retail of organic products, could increase the sales and help the organic sector in the UK to recover.

Finally, an advantage of the present study is the use of revealed preferences in order to improve the quality of the survey design and to validate the stated preferences results. Revealed data was collected from the same sample of consumers and was used in order to help design the experiment. Actual purchasing behaviour has been used in order to explain stated preferences both in the clogit regressions as well as in the latent class models. In both cases the impact was positive and significant suggesting consistency of the results.

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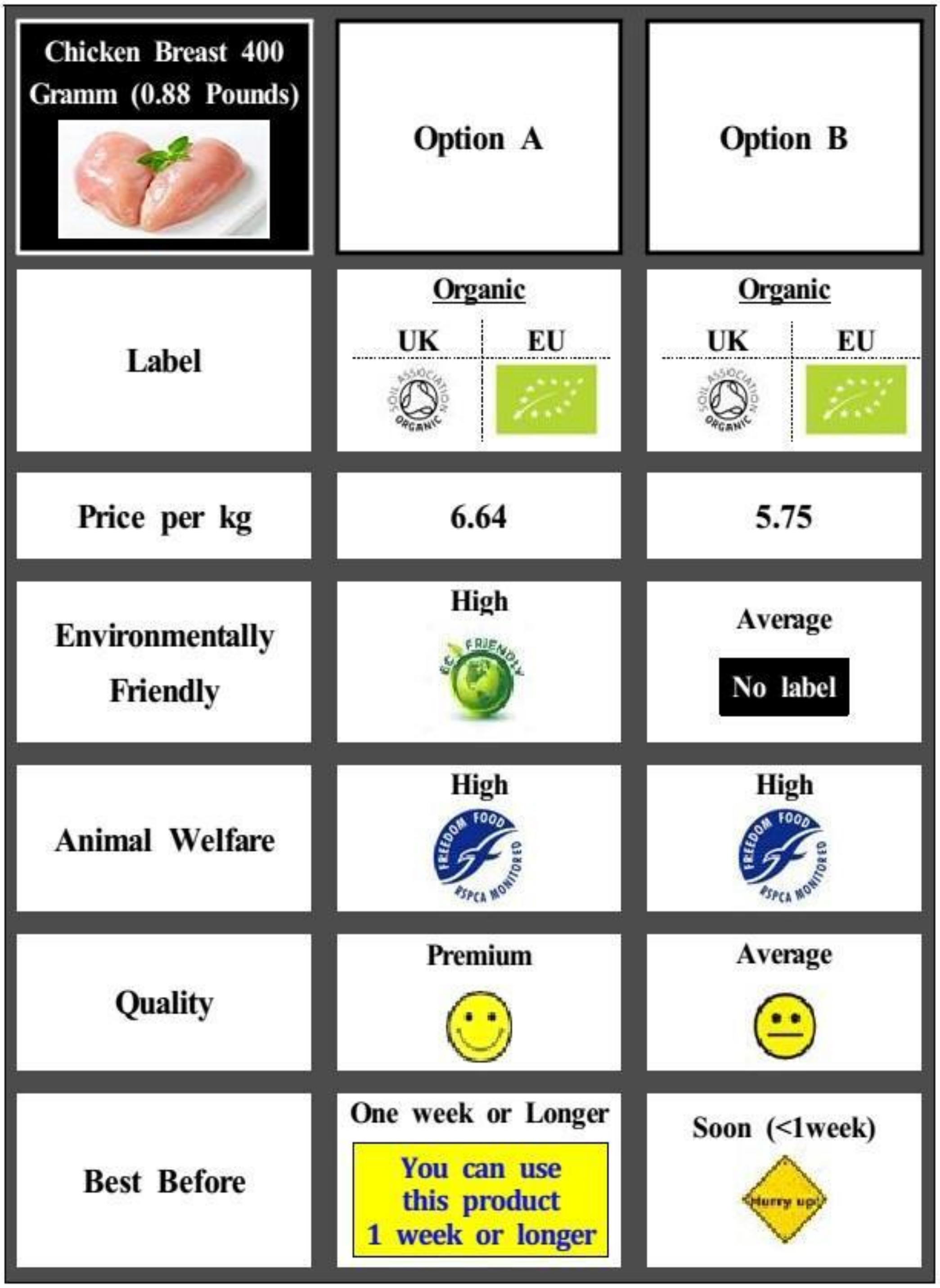
Appendix – Figures and Tables

Table I: Attributes

1. Label	**Two levels:** **EU** **UK** **Organic label** **Conventional** **no label**
2. Price (Price per unit in British Pounds £)	**Chicken Breast 400 Gramm (0.88 Pounds)** **1. 3** **2. 3.50** **3. 5.75** **4. 6.64** **5. 8.32** **6. 10.00** **Carrots 1kg (2.2 Pounds)** 1. **0.53** 2. **0.75** 3. **1.20** 4. **1.33** 5. **1.54** 6. **2.00**
3. Chemical Usage in Production (i.e. antibiotics for animals and artificial pesticides for carrots)	**Average (0)** 

	Low (1)
4. Environmentally Friendly	Average (0) no label High (1) production is based on ecological processes, and recycling, fitting the cycles and maintaining the ecological balances in nature
5. Animal Welfare (for chicken only)	No Freedom Food (0) no label Freedom Food (1)
6. Quality	Average (0) High (1)
7. Best Before	Hurry up! Less than one week: Soon! (0) You can use this product 1 week or longer 1 week or longer: Normal (No label) (1)

Figure 2 – Example of a Choice Task



Click to choose only one Option among three options as below

- ❍ Option A (1)
- ❍ Option B (2)
- ❍ Option C (No Choice) (3)

If you chose Option C, Please take one minute to explain why in the box below. Thank you.

Table II: Descriptive Statistics

Variable	*Mean*	*Median*	*Mode*	*Min*	*Max*	*St Dev*
Age	50.38	52	59	18	80	15.61
Income (£/month)	1524.95	1250	1250	1081.42	4750	1524.95
Education	3.78	4	3	1	8	1.59

Additional Data Description:

Green Behaviour (Pro Environment) was measured by summing up the answer to 10 different questions related to green behaviour such as recycling, energy saving, tap water saving, taking own bags while shopping and membership in environmental organisations. The respondents could rank their behaviour on a scale from 1 to 7 and could therefore achieve a maximum score of 70. The mean value was 54.47 with a minimum of 16 points and a standard deviation is 8.61. The question on which the respondents had on average the highest score was 'It is important to switch off lights in empty rooms'.

Pro Organic consists of a scale of 10 reasons for buying organic products. Consumers were asked to choose if they agree with these reasons on a scale from 1 (strongly disagree) to 7 (strongly agree). The catalogue contained reasons such as 'They are healthier', 'They taste better', 'They are safer ', and 'They involve higher animal welfare' up to 'I want to support the Organic Movement'. The average score was 44.37 with a standard deviation of 12.58 and a minimum value of 10. Compared to the Pro Environment scale, Pro Organic has both a lower mean, a higher standard deviation and a lower minimum value which may suggest that people care less about organic than about the environment even though these two variables are related. The reason for buying organic products that got the highest agreement is because they are more environmentally friendly.

Con Organic is constructed in a similar way to Pro Organic except that it contains a catalogue of 10 reasons for not buying organic. Reasons include are: 'They are too expensive', 'I do not trust the organic label', 'I cannot easily find and recognize the organic products', 'There are too many competing Logos', 'Organic products are not sufficiently advertised' up to 'I do not know much about organic products'. The average score was 40.37 with a minimum of 10 and a standard deviation of 10.38. By far the reason that got the highest scores (in terms of agreement) is the price. Definitively, consumers seem to perceive the price of organic products as too high and see this as the main barrier against buying organic products.

Healthy Lifestyle is a scale constructed similarly to the previous ones asking the respondent questions about their lifestyle regarding nutrition, exercise, drinks and smoking with the possibility to rank their behaviour on a scale from 1 to 7. The average value is 53.95 with a minimum of 15 and a standard deviation of 9.15. The question where respondents scored highest was the one about smoking. Respondents seem to strongly agree that smoking is unhealthy. Interestingly, the question about exercise did not receive such a high score as the one about nutrition. This could be related to the fact that we have more women in our sample than men.

The **Occupational** status was measured on a scale from 1 to 10 where individuals could choose between 7 different occupations[25], Retired (8), Unemployed (9) or other (10). Almost 21% (20.59) of people categorized themselves as Professionals (1) and this was also the most frequent occupation followed by Sales and Office (8%), 12% of people were unemployed and 26% of people were retired (above 65) confirming the finding that our sample age is above the UK average. It has to be emphasized once again though, that we correct for this by calculating our age variable as deviation from the true UK population (40).

The variable **Happy** was constructed using the answer of respondents on two different questions: 'Some people are generally very happy. They enjoy life regardless of what is going on, getting the most out of everything. To what extent does this characterization describe you?' and 'How satisfied are you with your life as a whole these days?' each scaled from 1 to 5. The mean of the first one is 3.5 and the one of the second one is 3.6 but they are not significantly different from each other, therefore we chose the first measure as a more conservative one.

Health was measured on a scale from 1 to 5 by asking people to self asses their health answering the following question: 'How is your health?' with options to choose from 'very bad' (1), 'bad' (2), 'fair' (3), 'good' (4), 'very good' (5). Several studies have shown nutrition and organic food to be related to health parameters (Vartanian et al. 2007, Palupi et al. 2012, Smith-Spangler et al. 2012, J.CBenbrook et al. 2013, Baranski et al. 2014, Srednicka-Tober et al. 2016) and we wanted to observe if the choice of organic products is associated with a better health. The mean value in the present study for self-assessed health is 3.63. The correlation between the variable health and revealed organic consumption is for both chicken and carrots positive and significant.

[25] 1=Management, Professional and related, 2= Service, 3=Sales and Office, 4=Farming, Fishing and Forestry, 5=Construction, Extraction, and Maintenance, 6=Production, Transportation and Material Moving, 7=Government

Finally, the variable **Exercise** was constructed using the answers to the question 'How much exercise (even a quick walk) do you do per week?' The average value is 3.5 corresponding to 3-4 hours per week or about half an hour a day.

Table III: Determinants of the Choice of Chicken – Stated Preference Model – Clogit Results

Attributes	*Description*	*Coefficient*	*Std. Err.*	*z-value*	*P>|z|*
Chemical Usage	Low=1, Average=0	-0.151	0.094	-1.61	0.108
Environmentally Friendly	High=1 Average=0	0.187***	0.043	4.31	0.000
Organic Label	Organic=1 Conventional=0	0.509***	0.149	3.42	0.001
Best Before (BB)	BB=1 product expires in ≥ 1 week BB=0 product expires in <1 week	0.037	0.044	0.84	0.398
Quality	High=1 Average=0	0.444***	0.068	6.56	0.000
Price	In £ per Kg	-0.257***	0.021	-12.37	0.000
Animal Welfare	Freedom Food=1 No Freedom Food=0	0.218**	0.097	2.26	0.024
SQ	Status Quo='No Option'	-1.630***	0.138	-11.83	0.000
Interaction Terms					
Organic Label X Age	Age=Deviation from true pop. average=40	-0.014***	0.005	-2.80	0.005
Organic Label X Income	Income=Dev from true pop. average=£1610	0.0003***	0.000	3.62	0.000
Organic Label X Pro Organic	Pro Organic=Deviation from the mean (44.37)	0.033***	0.006	5.18	0.000
Organic Label X Professional	Professional=1 if Occupation = Management, Professional and related, 0 elsewise	-0.314*	0.193	-1.62	0.01
Animal Welfare X Gender Fem	Gender=1 if woman Gender=0 if man	0.176*	0.106	1.66	0.098
Animal Welfare X Vegetarian	Vegetarian=1 Not Vegetarian=0	0.524**	0.247	2.12	0.034
Environ Friendly X Pro Organic	Pro Organic=Deviation from the mean (44.37)	0.012***	0.004	3.53	0.000
Best Before x Pro Environment	Pro Environment = Deviation from the mean (54.47)	-0.01**	0.005	-2.05	0.040
Quality X Unemployed	Unemployed=1 if unemployed Unemployed=0 if	0.217*	0.122	1.79	0.074

	employed				
Quality X Health	Health=Deviation from average (3.63)	-0.126*	0.049	-2.58	0.01
SQ X Con Organic	Con Organic=Deviation from the mean (40.37)	-0.009***	0.005	-1.84	0.066
Quality X Gender Fem	Gender=1 if woman Gender=0 if man	0.189**	0.083	2.27	0.023
SQ X Healthy Life	Healthy Life = Deviation from the mean (53.95)	0.012*	0.006	1.85	0.064
SQ x Married	Married=1 Not Married=0	-0.609***	0.114	-5.33	0.000
SQ x Vegetarian	Vegetarian=1 Not Vegetarian=0	1.062***	0.243	4.36	0.000
SQ X Income		0.0002	0.001	4.24	0.000
BuyOrg X Price	BuyOrg=1 if person bought organic, 0 else	0.069***	0.020	3.50	0.000
Observations	9.552				
Log Likelihood	-2821.838				
Pseudo R2	0.1933				

*=significance at 10%, **=significance at 5%, ***=significance at 1%

Table IV: Determinants of the Choice of Carrots– Stated Preference Model – Clogit Results

Attributes	*Description*	*Coefficient*	*Std. Err.*	*z-value*	*P>|z|*
Chemical Usage	Low=1, Average=0	-0.131	0.089	-1.48	0.139
Environmentally Friendly	High=1 Average=0	-0.195**	0.09	-2.16	0.031
Organic Label	Organic=1 Conventional=0	0.556***	0.137	4.05	0.000
Best Before (BB)	BB=1 product expires in ≥ 1 week BB=0 product expires in <1 week	0.112***	0.038	2.98	0.003
Quality	High=1 Average=0	-0.011	0.067	0.17	0.867
Price	In £ per Kg	-0.998***	0.092	-10.84	0.000
SQ	Status Quo='No Option'	-2.758***	0.142	-19.44	0.000
Interaction Terms					
Organic Label X Age	Age=Deviation from true pop. average=40	-0.017***	0.004	-3.80	0.000
Organic Label X Happy	Happy=Deviation from the average (3.5)	0.139*	0.079	1.77	0.077
Organic Label X Pro Environment	Pro Environment=∑ of Green Behaviour Scale	0.021***	0.008	2.63	0.008
Organic Label X Married	Married = 1 if married 0 elsewise	-0.246*	0.147	-1.68	0.093
Best Before X Children	Children=1 if individual has children =0 else	-0.092**	0.037	-2.50	0.012

Best Before X Small Child	Small Child=1 if person has children < 2 years, 0 elsewise	-1.068*	0.596	-1.79	0.073
Quality X Health	Health=Deviation from average (3.63)	-0.135**	0.059	-2.29	0.022
Envir Friendly X Healthy Lifestyle	Healthy Life = Deviation from the mean (53.95)	0.011*	0.006	1.95	0.051
Envir Friendly x Professional	Professional=1 if occupation = Management, Professional and related, 0 elsewise	0.404***	0.136	2.97	0.003
SQ X Happy	Happy=Deviation from the average (3.5)	0.179**	0.076	2.34	0.019
SQ X Exercise	Exercise=Deviation from the average (3.5)	0.127***	0.025	5.08	0.000
SQ X Education	Education=Deviation from 'true' average (12.3 years)	0.092**	0.039	2.32	0.020
SQ X Professional	Professional=1 if occupation = Management, Professional and related, 0 elsewise	0.526***	0.165	3.19	0.001
SQ X Children	Children=1 if individual has children =0 else	-0.351***	0.073	-4.78	0.000
SQ X Health	Health=Deviation from average (3.63)	-0.542***	0.083	-6.54	0.000
SQ x Married	Married=1 Not Married=0	-0.251**	0.128	-1.96	0.05
SQ x Vegetarian	Vegetarian=1 Not Vegetarian=0	-3.069***	1.009	-3.04	0.002
BuyOrg X Price	BuyOrg=1 if person bought organic, 0 else	0.581***	0.088	3.19	0.001
Observations	10.704				
Log Likelihood	-3061.458				
Pseudo R2	0.219				

*=significance at 10%, **=significance at 5%, ***=significance at 1%

Table V: Parameter Values for Latent Class Models for Chicken

	LL	*BIC(LL)*	*AIC(LL)*	*CAIC(LL)*	*Npar*	*L^2*	*df*
1-Class	-3277.5328	6622.2429	6577.0656	6633.2429	11	6555.0656	438
2-Class	-2979.3500	6123.5850	6012.6960	6150.5850	27	5958.6960	422
3-Class	-2784.6600	5831.9290	5655.3270	5874.9290	43	5569.3270	406
4-Class	-2696.2900	5752.9010	5510.5860	5811.9010	59	5392.5860	390
5-Class	-2629.6900	5717.4050	5409.3780	5792.4050	75	5259.3780	374
6-Class	-2581.5200	5718.7860	5345.0470	5809.7860	91	5163.0470	358

7-Class	-2545.2700	5743.9920	5304.5410	5850.9920	107	5090.5410	342

Table VI: Attribute Non-Attendance (ANA) Descriptive Statistics

Attribute	***%People ignoring***	***Ranking***
Chemical Usage	38.02	1
Environmentally Friendly	36.24	2
Best Before	33.66	3
Organic Label	31.88	4
Price	26.53	5
Animal Welfare	25.54	6
Quality	24.36	7
None	14.85	8

Table VII: Statistics for the model using ANA and without for Chicken

Model	***Cases***	***Nr. of Param***	***Degr. of freedom***	***BIC(L^2)***	***AIC(L^2)***	***AIC3(L^2)***	***CAIC(L^2)***	***SBIC(L^2)***	***LL***
5 Latent Class ANA =LCM ANA	449	59	390	2903.39	4505.13	4115.13	2513.39	4141.10	-2642.6
5 Latent Classes=LCM	449	75	374	2975.35	4511.38	4137.38	2601.28	4751.5	-2629.7

Table VIII: Latent Class Models for Chicken with ANA and covariates

Attributes	Class1	z	Class2	z	Class3	z	Class4	z	Class5	z	Wald	p-value	Mean	SDev.
Organic Label	0	.	0.861***	4.079	-14.30***	-4.396	0	.	0	.	35.55	0.00	-2.63	5.40
Environmentally Friendly	0.614***	5.711	0.449***	4.448	0	.	0	.	0	.	70.386	0.00	0.34	0.27
Quality	1.336***	9.278	0.340***	2.719	0.594***	2.674	0.548***	2.884	1.314	1.808	140.59	0.00	0.81	0.43
Best Before	0	.	0.248***	2.485	0	.	0	.	0	.	6.175	0.013	0.07	0.11
Chemical Usage	-0.495***	-2.56	0.528***	2.557	-0.805	-0.936	0	.	0	.	12.869	0.00	-0.20	0.50
Animal Welfare	0	.	0.934***	5.197	-0.065	-0.080	0	.	0	.	27.013	0.00	0.23	0.42
SQ	-3.353***	-9.74	0	.	-42.71***	-4.71	-3.57***	-8.693	5.404***	4.104	224.15	0.00	-9.99	16.47
Price	-0.243***	-4.23	-0.024	-0.507	-0.78***	-2.42	-0.54***	-8.436	0.283*	1.98	108.64	0.00	-0.31	0.30
Price X HB2	-0.027	-0.44	-0.02	-0.429	-3.407***	-3.687	-0.20***	-3.195	-0.789	-0.86	25.027	0.00	-0.76	1.33
Price X HB3	-0.052	-0.88	0.06	1.309	-1.802***	-2.773	0.030	0.455	-0.072	-0.44	10.600	0.06	-0.36	0.72
Price X HB1	-0.099	-1.62	0.055	1.093	-1.093***	-3.009	-0.06	-0.984	0.024	0.192	12.747	0.03	-0.43	0.79
Covariates														
BuyOrg	1.0695	1.045	1.781*	1.764	-1.792	-1.145	-3.43	-0.913	2.371**	2.186	12.853	0.012		
Age	-0.021***	-2.73	-0.024***	-2.931	-0.000	-0.046	0.032***	2.850	0.013	0.945	17.477	0.002		
Income	-0.000	-1.01	0.000	0.493	-0.000***	-2.565	0.000	0.5131	0.000***	2.028	9.372	0.052		
Pro-Organic	0.027***	2.55	0.044***	3.094	-0.017	-1.538	-0.04***	-2.869	-0.016	-0.874	18.192	0.001		
Class Size	0.314 (31%)		0.293 (29%)		0.196 (20%)		0.157 (16%)		0.041 (4%)					

Table IX: Parameter Values for Latent Class Models for Carrots

	LL	*BIC(LL)*	*AIC(LL)*	*CAIC(LL)*	*Npar*	*L²*	*df*
1-Class	-3134.97	6331.002	6289.931	6341.002	10	6269.931	439
2-Class	-2736.58	5625.845	5523.169	5650.845	25	5473.169	424
3-Class	-2554.65	5353.580	5189.300	5393.580	40	5109.300	409
4-Class	-2452.15	5240.184	5014.297	5295.184	55	4904.297	394
5-Class	-2399.64	5226.768	4939.276	5296.768	70	4799.276	379
6-Class	-2358.60	5236.293	4887.196	5321.293	85	4717.196	364
7-Class	-2317.34	5245.375	4834.673	5345.375	100	4634.673	349

Attribute Non-Attendance utility functions for carrots:

$$U_1 = \mathbf{0} * L_1 + \beta_{1E} * E_1 + \beta_{1Q} * Q_1 + \beta_{1B} * B_1 + \beta_{1C} * C_1 + \beta_{1SQ} * SQ_1 + \beta_{1P2} * P2_1 + \beta_{1P3} * P3_1 + \beta_{1P1} * P1_1 + \beta_{1P} * P_1$$

$$U_2 = \mathbf{0} * L_2 + \mathbf{0} * E_2 + \beta_{2Q} * Q_2 + \beta_{2B} * B_2 + \mathbf{0} * C_2 + \beta_{2SQ} * SQ_2 + \beta_{2P2} * P2_2 + \beta_{2P3} * P3_2 + \beta_{2P1} * P1_2 + \beta_{2P} * P_2$$

$$U_3 = \beta_{3L} * L_3 + \beta_{3E} * E_3 + \beta_{3Q} * Q_3 + \beta_{3B} * B_3 + \beta_{3C} * C_3 + \beta_{3SQ} * SQ_3 + \beta_{3P2} * P2_3 + \beta_{3P3} * P3_3 + \beta_{3P1} * P1_3 + \beta_{3P} * P_3$$

$$U_4 = \mathbf{0} * L_4 + \mathbf{0} * E_4 + \mathbf{0} * Q_4 + \mathbf{0} * B_4 + \mathbf{0} * C_4 + \beta_{4SQ} * X_{4SQ} + \beta_{4P2} * X_{4P2} + \beta_{4P3} * X_{4P3} + \beta_{4P1} * X_{4P1} + \beta_{4P} * X_{4P}$$

$$U_5 = \beta_{5L} * L_5 + \mathbf{0} * E_5 + \mathbf{0} * Q_5 + \beta_{5B} * B_5 + \mathbf{0} * C_5 + \beta_{5SQ} * SQ_5 + \beta_{5P2} * P2_5 + \beta_{5P3} * P3_5 + \beta_{5P1} * P1_5 + \beta_{5P} * P_5$$

Table X: Statistics for the model using ANA and without for Carrots

Model	*Cases*	*Nr. of Param*	*Degr. of freedom*	*BIC*	*AIC*	*AIC3*	*CAIC*	*SBIC*	*LL*
5 LCM ANA	505	40	465	2649.8	4614.2	4149.2	2184.8	4125.8	-2772.1
5 LCM	505	54	451	2717.0	4622.3	4171.3	2266.0	4148.5	-2762.2

Table XI: Latent Class Models for Carrots with ANA and Age, Income and Pro-Organic as covariates

Attributes	Class1	z	Class2	z	Class3	z	Class4	z	Class5	z	Wald	p-value	Mean	SDev.
Organic Label	0	.	0	.	1.408***	3.138	0	.	0.703**	1.97	13.682	0.00	0.233	0.497
Environmentally Friendly	-0.457***	-2.94	0	.	1.302***	2.858.	0	.	0	.	19.571	0.00	0.014	0.558
Quality	-0.462***	-2.35	0.519***	2.814	2.593***	5.770	0	.	0	.	81.339	0.00	0.372	0.983
Best Before	0.548***	5.53	0.318***	2.403	-0.403***	-2.516	0	.	-0.591**	-2.06	59.592	0.00	0.224	0.369
Chemical Usage	-0.615***	-3.42	0	.	1.460***	2.897	0	.	0	.	19.895	0.00	-0.02	0.658
SQ	-2.568***	-10.80	-12.24***	-8.951	-0.915**	-1.870	-8.82***	-7.07	0.90***	2.26	319.891	0.00	-6.12	4.97
Price	0.478**	2.11	-6.32***	-7.876	-1.267***	-3.663	-6.56***	-6.44	-0.246	-0.90	174.384	0.00	-2.84	3.20
Price X HB2	-0.267	-1.21	0.22	0.372	0.304	1.157	-1.62***	-2.78	-0.481	-1.14	12.05	0.03	-0.16	0.54
Price X HB3	0.353	1.68	0.55	0.785	0.429	1.386	-0.27	-0.36	0.23	0.80	7.309	0.20	0.37	0.23
Price X HB1	0.119	0.55	0.20	0.326	0.486	1.373	-0.97	-1.70	-0.36	-1.01	7.245	0.20	0.07	0.38
Covariates														
BuyOrg	0.283	0.84	-0.413	-1.132	1.022***	2.554	-1.52	-1.67	0.631	1.18	13.090	0.01		
Age	-0.025***	-3.47	0	-0.003	-0.024***	-2.313	0.03	2.12	0.023	1.63	19.805	0.00		
Income	0	0.53	-0.00**	-2.026	-0.000	-0.863	0	0.23	0.00)	1.54	6.258	0.18		
Pro-organic	0.016	1.46	-0.00	-0.372	0.051***	2.597	-0.04***	-3.27	-0.021	-1.29	18.307	0.00		
Class Size	0.365 (36%)		0.349 (35%)		0.1388 (14%)		0.095 (10%)		0.0528 (5%)					

Table XII: WTP (£/unit) by attribute, class and hypothetical bias treatment for Chicken ANA

Organic Label	***Class 1***	***Std Err***	***Class 2***	***Class 3***	***Std Error***	***Class 4***	***Std Err***	***Class 5***	***Weighted Average WTP /treatment***
Class Probabilities	0.31		0.29	0.20		0.16		0.04	
HB1	0	.	Insig Price	-5.16	0.54	0	.	Pos Price	-1.01
HB2	0	.	Insig Price	-3.42	0.25	0	.	Pos Price	-0.67
HB3	0	.	Insig Price	-3.96	0.75	0	.	Pos Price	-0.77
HB4 (untreated)	0	.	Insig Price	-6.73	3.15	0		Pos Price	-1.32
Average Class WTP (HB1-HB3)	0			-4.18		0			**-0.82**
Untreated-Treated (HB)									-0.5
Environmentally Friendly									
HB1	1.80	0.37	Insig Price	0	.	0		Pos Price	0.56
HB2	2.28	0.55	Insig Price	0	.	0		Pos Price	0.72
HB3	2.18	0.48	Insig Price	0	.	0		Pos Price	0.68
HB4 (untreated)	2.66	0.68	Insig Price	0	.	0		Pos Price	0.83
Average Class WTP (HB1-HB3)	2.09		Insig Price	0		0		Pos Price	**0.65**
Untreated-Treated (HB)									0.18
Quality									
HB1	3.91	0.69	Insig Price	0.21	0.08	0.91	0.30	Pos Price	1.41
HB2	4.96	1.04	Insig Price	0.14	0.05	0.74	0.25	Pos Price	1.70
HB3	4.61	0.86	Insig Price	0.3	0.08	0.93	0.35	Pos Price	1.65
HB4 (untreated)	5.62	1.27	Insig Price	0.51	0.25	0.92	0.33	Pos Price	2.01
Average Class WTP (HB1-HB3)	4.49		Insig Price	0.22		0.86		Pos Price	**1.59**
Untreated-Treated (HB)									0.42
Best Before									
HB1	0	.	Insig Price	0	.	0	.	Pos Price	0.00
HB2	0	.	Insig	0	.	0	.	Pos	0.00

			Price					Price	
HB3	0	.	Insig Price	0	.	0	.	Pos Price	0.00
HB4 (untreated)	0	.	Insig Price	0	.	0	.	Pos Price	0.00
Average Class WTP (HB1-HB3)	0		Insig Price	0		0		Pos Price	**0.00**
Untreated-Treated (HB)									0.00
Chemical Usage									
HB1	-1.45	0.66	Insig Price	-0.29	0.32	0	.	Pos Price	-0.51
HB2	-1.84	0.89	Insig Price	-0.19	0.22	0	.	Pos Price	-0.61
HB3	-1.66	0.79	Insig Price	-3.21	0.68	0	.	Pos Price	-1.15
HB4 (untreated)	-2.02	1.02	Insig Price	-5.46	2.69	0	.	Pos Price	-1.70
Average Class WTP (HB1-HB3)	-1.65		Insig Price	-1.23		0		Pos Price	**-0.76**
Untreated-Treated (HB)									-0.94
Animal Welfare									
HB1	0	.	Insig Price	-0.02	0.29	0	.	Pos Price	-0.00
HB2	0	.	Insig Price	-0.02	0.19	0	.	Pos Price	-0.00
HB3	0	.	Insig Price	-2.98	0.65	0	.	Pos Price	-0.58
HB4 (untreated)	0	.	Insig Price	-5.07	2.59	0	.	Pos Price	-0.99
Average Class WTP (HB1-HB3)	0		Insig Price	-1.01		0		Pos Price	**-0.20**
Untreated-Treated (HB)									-0.79

Table XIII: Individual WTPs by Attribute and HB Treatment for Chicken in £/400 Gramm Pack (Without Class 2 and Class 5 with insignificant/pos price coefficients)

Attribute	*HB1 (All Treatments)*	*HB2 (Cheap Talk Budget Constraint Reminder)*	*HB3 (Honesty Priming)*	*HB4 (No treatment)*
Organic Label	-3.66	-0.68	-0.79	-1.34
Environmentally Friendly	0.90	0.81	0.77	0.94
Quality	2.24	1.89	1.82	2.22
Best Before	0	0	0	0
Chemical Usage	-4.38	-0.69	-1.23	-1.81
Animal Welfare	-0.02	-0.00	-0.60	-1.01

Table XIV: WTP by attribute, class and hypothetical bias treatment for Carrots in £/kg

Organic Label	*Class 1*	*Class 2*	*Std Err*	*Class 3*	*Std Err*	*Class 4*	*Std Err*	*Class 5*	*Weighted Average WTP/ Attribute*
Class Probability	0.36	0.35		0.14		0.09		0.05	
HB1	Price pos	0	.	1.80	0.84	0	.	Price insg	0.25
HB2	Price pos	0	.	1.46	0.47	0	.	Price insg	0.20
HB3	Price pos	0	.	1.68	0.68	0	.	Price insg	0.23
HB4 (untreated)	Price pos	0	.	1.11	0.32	0	.	Price insg	0.15
Average treated Class WTP (HB1-HB3)	Price pos	0		1.65		0		Price insg	**0.23**
Untreated-Treated (HB)									-0.07
Environmentally Friendly									
HB1	Price pos	0	.	1.67	0.71	0	.	Price insg	0.23
HB2	Price pos	0	.	1.35	0.35	0	.	Price insg	0.19
HB3	Price pos	0	.	1.55	0.56	0	.	Price insg	0.22
HB4 (untreated)	Price pos	0	.	1.03	0.25	0	.	Price insg	0.14
Average Class WTP (HB1-HB3)	Price pos	0		1.52		0		Price insg	**0.21**
Untreated-Treated (HB)									-0.07
Quality									
HB1	Price pos	0.08	0.03	3.32	1.57	0	.	Price insg	0.49
HB2	Price pos	0.09	0.03	2.69	0.79	0	.	Price insg	0.40
HB3	Price pos	0.09	0.03	3.10	1.20	0	.	Price insg	0.46
HB4 (untreated)	Price pos	0.08	0.03	2.05	0.48	0	.	Price insg	0.31
Average Class WTP (HB1-HB3)	Price pos	0.03		3.04		0		Price insg	**0.45**
Untreated-Treated (HB)									-0.14
Best Before									
HB1	Price pos	0.05	0.02	-0.52	0.29	0	.	Price insg	-0.05
HB2	Price pos	0.05	0.02	-0.42	0.19	0	.	Price insg	-0.04
HB3	Price pos	0.06	0.02	-0.48	0.26	0	.	Price insg	-0.05
HB4 (untreated)	Price pos	0.05	0.02	-0.32	0.14	0	.	Price insg	-0.03
Average Class WTP (HB1-HB3)	Price pos	0.05		-0.47		0		Price insg	**-0.05**
Untreated-Treated (HB)									0.02

Chemical Usage									
HB1	Price pos	0	.	1.87	0.87	0	.	Price insg	0.26
HB2	Price pos	0	.	1.52	0.47	0	.	Price insg	0.21
HB3	Price pos	0	.	1.74	0.68	0	.	Price insg	0.24
HB4 (untreated)	Price pos	0	.	1.15	0.34	0	.	Price insg	0.16
Average Class WTP (HB1-HB3)	Price pos	0		1.71		0		Price insg	**0.24**
Untreated-Treated (HB)									-0.08

Table XV: Individual WTPs by Attribute and HB Treatment for Carrots in £/kg (Without Class 1 and Class 5 with positive/insignificant price coefficients)

Attribute	*HB1 All Treatments*	*HB2 Cheap Talk Budget Constraint Reminder*	*HB3 Honesty Priming*	*HB4 No treatment*
Organic Label	0.25	0.20	0.23	0.15
Environmentally Friendly	0.23	0.19	0.22	0.14
Quality	0.49	0.40	0.46	0.31
Best Before	-0.05	-0.04	-0.05	-0.03
Chemical Usage	0.26	0.21	0.24	0.16

Table XVI: Revealed Behaviour: Descriptive Statistics

	Chicken Breast		***Carrots***	
	Conventional	***Organic***	***Conventional***	***Organic***
Average Price (£)	4.74	7.60	0.74	1.42
Average Quantity (kg/month)	2.50	2.70	2.47	2.77
Nr of people buying it (%)	346 (67.13)	82 (16.2%)	385(76.2%)	91(18%)
Shop Own Brand	339 (97.9%)	21 (25.6%)	377(97.92%)	24(26.4%)
Product expires soon (< 1 week)	26 (7.5%)	7 (8.5%)	26(6.8%)	9(9.9%)
Top Shop where bought	Tesco (88=25.4%)	Tesco (21=25.6%)	Tesco (100=25.97%)	Tesco 26(28.6%)
Total	428(84.37%)		476(94.26%)	

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