

Information or Prices, Which Is Most Powerful in Increasing Consumer Demand for Organic Vegetables?

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Abstract

Based on a unique and very detailed panel dataset covering consumption of organically and conventionally produced vegetables in the years 2005 - 2007, we examine the effects of information about positive health effects of consuming organic vegetables and information about negative health effects of consuming conventional vegetables on demand for organic foods for six different segments of Danish households. Three of these segments are positive towards organics whereas the remaining three segments are negative or indifferent. Using the double hurdle model we estimate partial effects of both directly and indirectly obtained information as well as prices. The results show, that there are larger effects of information for households where the information is in accordance with initial knowledge and attitudes, hence the positive segments react more to information whereas the negative segments react more to prices. "New" consumers can be persuaded to buy organic vegetables by providing information about the negative health effects of consuming conventional vegetables since it increases the probability of an organic purchase. Once consumers have entered the organic market for vegetables, information that link health and the consumption of organic vegetables will increase consumption. The results are important for firms and producers who want to successfully target information to different consumer groups with the aim of increasing the market share for organic food.

Keywords: consumer response to information, direct and indirect information, double hurdle model, organic foods, panel data

1. Introduction

Some decades ago, organic foods were aimed at a small dedicated group of consumers with idealistic ideas who bought organic foods in speciality stores. Therefore the consumption of organic foods was low in Denmark with a general market share of organic foods less than 1 - 2 per cent (Hamm & Michelsen, 1996). The entry of the state endorsed and state controlled national organic label in 1989, and government subsidies for organic production together with advisory services to organic farmers during the conversion period, initiated a supply driven demand for organic foods (Hamm & Michelsen, 1996; Økologisk Landsforening, 2012). Finally, when supermarkets in 1993 initiated intensive marketing of organic products and lowered prices of organic products by 15 to 20 per cent, demand increased considerably and today organic foods constitute around 7.5 per cent of the total budget for food (Hamm & Michelsen, 1996; Økologisk Landsforening, 2012). The expansion of supply to include supermarkets and discount stores has introduced new consumers to the organic market (Richter, 2008; Padel et al., 2009; Lund et al., 2012; Gottschalk & Leistner, 2012). This entails, that the traditional image of the organic consumer as belonging to a very dedicated segment needs to be revised and expanded to include further less dedicated organic consumer profiles (Midmore et al., 2005; Hughner et al., 2007; Gottschalk & Leistner, 2012). It is important to identify differences in terms of attitudes to organics and food consumption in general between this new type of organic consumer and the traditional dedicated consumer. Studying differences in demand between lifestyle- and attitude-based consumer segments can give insight in the attitudes and motivations behind specific behaviour of various consumer groups (Nie & Zepeda, 2011). This might be helpful in order to successfully target marketing campaigns.

Despite that the Danish organic label is recognized and trusted by almost all Danish consumers and that it relies on well-defined properties of the organic standard (IFOAM, 2005) the organic attribute is a credence attribute. This implies that information about the attribute is asymmetric and that consumers have no possibilities to

control, taste or see whether the organic product they buy contains the expected characteristics (Nelson, 1970; Darby & Karni, 1973). The subjective nature of credence goods implies that the perceived quality of the product in question might change due to incoming new information (Verbeke, 2005). Our aim in this study is to estimate the effect of exogenous factors like information and prices on the demand for organic vegetables. As our analysis is based on a comprehensive panel dataset, including actual purchases, stated attitudes and actual information indexes, we are able to divide the panel into six different consumer segments and to estimate the effect of both prices and information for each of these. We use the number of newspaper articles to account for the level of exogenous information and divide it into two types of information; “negative” information about incidents of pesticides in conventional vegetables and “positive” information that link health and consumption of organic vegetables. Consumers receive information, process it and then potentially change behaviour if it is preferable for them to do so. Processing information is not costless, and it might be rational for consumers to ignore information, due to that the expected benefits from processing the information are smaller than the expected costs (Swinnen et al., 2005; McClusky & Swinnen, 2004). The more the information that the consumer receive differ from his initial beliefs, the larger is the processing costs and the more information that the consumer already have, the smaller is the benefit from new incoming information (McClusky & Swinnen, 2004). We therefore expect different reaction patterns from the six different consumer segments since they differ substantially in their initial knowledge about organic products and production methods and in their initial perceptions of what constitutes the organic attribute in particular and in their health orientation in general.

Knowing how to reach different consumer segments by information is important in marketing campaigns aiming at increasing organic food consumption (Nie & Zepeda, 2011). Furthermore, as our data comprise detailed information about the consumers’ media habits our study contributes to the literature by weighting the index according to whether the article is published in a newspaper that this particular household read regularly and to compare this type of “direct” information with the effect of “indirect” information based on information indices that are not weighted according to readership and as such represent disseminated information. Furthermore we use the double hurdle model in the analysis, which introduces the possibility that the decision to buy organic food is a two-step decision. The first decision is whether to be an organic purchaser or not (participation decision) and the second step is, conditional on being an organic purchaser, the amount to purchase (consumption decision).

2. Conceptual Model

As in Smed (2012) and following Heiman and Lowengart (2008) we take outset in the household production model by Becker (1965) and assume that households get utility from meals which they prepare from market goods (e.g. vegetables, oil, etc). In this paper we focus on the differences in the utility of using conventional versus organic vegetables when preparing meals, and assume that the input of other goods are unaffected by this choice. Since consumers’ choice of food commodities is mainly based on differences in health and sensory characteristics (see, e.g. Holm & Kildevang, 1996; Pearson et al., 2011), we let individual utility be given as (subscript t for time is suppressed for ease of notation):

$$U_i = u_i(s_i(y_i), h_i(y_i, I_i, (\theta_i))) \quad (1)$$

Where i denotes the individual household, y_{ij} is a vector of quantities of organic or conventional products (determined by j where $j \in (org, conv)$) and $y_i = (y_{i,org}, y_{i,conv})$ therefore is a vector of quantities of both organic and conventional products consumed by household i . The functions $s_i(\cdot)$ and $h_i(\cdot)$ measure the perceived content of sensory qualities (including taste, texture and other attributes) and health respectively. $I_i = (I_{i,org}, I_{i,conv})$ denotes a vector of exogenous information about organic and conventional products that the individual consumer receives about the health risks and benefits of consuming either the conventional or organic version of this particular product. The utility value of this exogenous information depends on initial knowledge and attitudes θ_i . This is based on Swinnen et al., (2005) and McCluskey & Swinnen (2007), who state that consumers prefer to inform themselves only up to a point where the marginal increase in utility from additional information is equal to the marginal cost, including opportunity costs, of using resources to read and process the particular news story. Consumers may have different attitudes towards health and sensory characteristics, and may therefore draw different conclusions even if they have the same level of initial knowledge. For a consumer with a specific attitude or ideology, processing a media story with a divergent ideology or attitude, may provide additional costs to the consumer in terms of disutility. This means that costs and benefits of processing news stories vary between consumers, depending on their initial level of knowledge, their attitudes and other characteristics.

This leads to the following maximization problem for consumer i :

$$\begin{aligned} \max_{y_i} \quad & U_i = u_i \left(s_i(y_{i,org}, y_{i,conv}), h_i(y_{i,org}, y_{i,conv}, I_{i,org}(\theta_i), I_{i,conv}(\theta_i)) \right) \\ \text{s.t.} \quad & X_i = \sum_{j \in \{org, conv\}} p_j y_{ij} \end{aligned} \quad (2)$$

Where X_i is the budget allocated to the category of interest (e.g. vegetables) and p_j is the price of the organic and the conventional variety of this category respectively. From (2) and from the additional assumption of additive utility of sensory and health attributes; $U_i = \pi_{is} s_i(\cdot) + \pi_{ih} h_i(\cdot)$ where π_{is} and π_{ih} are the marginal utilities of sensory and health qualities respectively we get the marginal rate of substitution between organic and conventional as:

$$\frac{MU_{i,org}}{MU_{i,conv}} = \frac{\pi_{is} \frac{\partial s_i(\cdot)}{\partial y_{i,org}} + \pi_{ih} \frac{\partial h_i(\cdot)}{\partial y_{i,org}}}{\pi_{is} \frac{\partial s_i(\cdot)}{\partial y_{i,conv}} + \pi_{ih} \frac{\partial h_i(\cdot)}{\partial y_{i,conv}}} = \frac{p_{org}}{p_{conv}} \quad (3)$$

where $MU_{i,org}$ and $MU_{i,conv}$ are the marginal utilities from the consumption of the organic and conventional variety. The content of the sensory attributes $\partial s_i(\cdot)/\partial y_{i,org}$ and $\partial s_i(\cdot)/\partial y_{i,conv}$ in the organic and the conventional variety respectively do not depend on the level of information, only on the level of $y_{i,org}$ and $y_{i,conv}$, but may vary between households. The content of the health attribute $\partial h_i(\cdot)/\partial y_{i,conv}$ and $\partial h_i(\cdot)/\partial y_{i,org}$ depend not only on the level of $y_{i,org}$ and $y_{i,conv}$ but also on the values of $I_{org}(\theta_i)$ and $I_{conv}(\theta_i)$. The consumers form expectations about the actual content of this attribute in the products dependent on obtained information. Whenever consumers read an article about e.g. the incidence of pesticides in the conventional variety, then, dependent on initial knowledge and attitudes, the consumer may choose to process the information and perhaps change perception about how healthy the conventional variety is relative to the organic, hence $\partial h_i(\cdot)/\partial y_{i,conv}$ may decrease compared to $\partial h_i(\cdot)/\partial y_{i,org}$. For unchanged relative market prices of the organic and conventional varieties, a decreasing marginal utility of the conventional variety will lead to an increased organic consumption in order to fulfil the optimization criterion (3). The opposite happens when the consumer read positive information about the healthiness of the organic varieties; hence both negative information about conventional varieties and positive information about organic varieties are therefore expected to increase the probability of choosing the organic variety as well as increasing the level of consumption.

3. Segmentation and Expected Reactions to Information

In the current paper we operate with the six different types (segments) of organic consumers constructed in Lund et al. (2012). Initially the segments are defined based on focus group interviews, in depth interviews and observations of consumers' shopping behaviour. The same segments are re-found using latent class analysis (LCA), on answers to a questionnaire issued to approximately 2000 consumers in 2007. We also have monthly observations of purchased staples during several years for the respondents to the questionnaires (Note 1). In Lund et al. (2012) the segments are identified according to their general food involvement, (Note 2) price sensitivity, (Note 3) trust in organic production, (Note 4) perception of the intrinsic qualities of organic foods and altruistic concerns in food provisioning (Note 5). The segmentation divide the Danish population in two equally sized parts; one half with positive attitude towards organics and another half which are either indifferent or sceptical. The positive segments represent 87 per cent of private organic purchases. The segments also differ in their general level of concern about pesticide residues and additives, in their capability of eating healthy as well as in their knowledge of and perceptions about organic food and in the importance the put on prices (see table 1 and 2).

Generally it is assumed that the higher the level of concern about pesticides and additives the stronger is the reaction to both negative and positive information due to an increased benefit from the information. Furthermore the stronger the capability of eating healthy the easier it will be to react to both types of information since it lowers the cost of reacting to the information. As mentioned in the introduction, initial perceptions are likewise assumed to have an influence on the expected reaction to information. Hence consumers that perceive organic products are healthier than conventional products are assumed to react more to information that link health and consumption of organics and consumers that perceive there are fewer pesticides and medicine residues in organic

products is assumed to react more to pesticide information. The strength of the reaction is assumed to diminish with the level of the perceived knowledge due to diminishing marginal return to information (Swinnen et al., 2005; McClusky & Swinnen, 2004). Likewise, stated knowledge of organic production methods and products (measured by the question “I don’t know a lot about organic products/production”) are assumed to decrease the reaction to information due to this diminishing marginal effect of information.

Table 1. Distribution of answers to questions about food and health in general

	General level of concern			Capability of eating healthy	
	Agree with “It is important that my food does not have additives”	Often or very often worried about pesticide residues in food	Disagree with “I seldom think about whether the food I eat is healthy”	Disagree with “I do not feel up to learning about how to eat healthily”	Agree with “Healthy food usually tastes better than unhealthy food”
Convinced	88%	67%	85%	88%	60%
Positive and food involved	62%	46%	82%	88%	52%
Positive and convenient	54%	44%	67%	63%	39%
Product focussed	52%	35%	69%	70%	40%
Indifferent	34%	28%	38%	44%	27%
Sceptics	52%	39%	61%	68%	39%
TOTAL	58%	43%	70%	73%	44%

Source: Own calculations based on the segments’ answers to the questions from the CONCEPTS questionnaire (For more on the questionnaire see Andersen, 2009).

Table 2. Distribution of answers to questions about perception and knowledge about organics and importance of prices

	Initial perception of organic products		Knowledge About organics	Price sensitivity, general and for organics in particular	
	Agree with “I think there are fewer pesticides and medicine residues in organic products”	Agree with “I think that organic products are healthier for me and my family than conventional products”	Disagree with “I don’t know a great deal about organic products/production”	Disagree with “Price is more important than quality”	Disagree with “I usually do not buy organic products because the price is too high”
Convinced	94%	100%	83%	83%	58%
Positive and food involved	89%	87%	63%	72%	27%
Positive and convenient	86%	83%	55%	49%	24%
Product focussed	59%	32%	27%	58%	10%
Indifferent	40%	16%	16%	17%	3%
Sceptics	41%	12%	28%	46%	3%
TOTAL	71%	57%	46%	58%	21%

Source: Own calculations based on the segments’ answers to the questions from the CONCEPTS questionnaire (For more on the questionnaire see Andersen, 2009).

Combining the generic profiles of the segments, as described in Lund et al. (2012) with the answers to the questions presented in table 1 and table 2 will give a hint about the expected reactions to information for the different segments. The negative segments; the *product focussed*, the *indifferent* and the *sceptics* have a rather low generic health orientation whereas the positive segments; the *convinced*, the *positive and food involved* and the *positive and convenient* have a high generic health orientation (Lund et al., 2012). Despite the low health orientation of the negative segments the majority of the households in each segment, according to table 1, worry about additives, think about whether the food they eat is healthy and want to learn how to eat healthily. An exception here is the *indifferent*. The *convinced* and to some extent the *positive and food involved* however single themselves out by having increased health awareness and to some extent a larger concern about pesticide residues in food. On basis of that we might expect a rather large reaction to information from all segments apart from the *indifferent*.

What splits up the respondents in terms of expected reaction to information is their perceptions of the organic products. According to Lund et al. (2012) the positive segments are all characterised by having high trust in the intrinsic qualities of organic foods and high trust in organic production even though only some of the benefits attributed to organic consumption are commonly recognized by the *positive and food involved*. The *positive and convenient* have a rather low food involvement. The *product focussed* have most of their attention directed towards the specific attributes of food products that can be assessed while shopping, so they are not concerned

with the production processes behind their products. Nevertheless they are concerned with the adverse effects of conventional agricultural production. The *sceptics* are characterised by having low trust in the intrinsic qualities of organic foods and in organic production whereas the two other “negative” segments are characterised by being indifferent to these issues. All three segments have no active search processes to look for organic products and for the two latter segments organic purchases are mainly coincidental, whereas the *product focussed* occasionally purchase organics for taste reasons.

From table 2 we see that the three positive segments perceive organic foods to contain fewer pesticides and medicine residues and to be healthier for them and their families. Hence largest reaction is expected to be from the positive segments since the information that they receive is in accordance with their initial beliefs which lower information processing cost. However, due to decreasing marginal benefit of information acquisition the perception that organic foods contains fewer pesticides and additives will only increase the reaction up to a certain point as knowledge of organic production and production methods might lower the expected reaction. In terms of expected reaction to prices the *convinced* generally devote considerable resources in terms of both time and money to find the organic variety instead of a similar conventional product, whereas the two other positive segments use fewer resources to obtain organic products. The *positive and food involved* are willing to pay extra for the organic attribute as long as they expect it to provide extra quality. The *positive and convenient* try to avoid pricy products; hence they are expected to have higher price elasticity than any of the two other positive segments. We expect the *convinced* to have a rather low price elasticity, especially since, according to table 2 two thirds of them are not limited in their organic purchases because of the price. Based on the above discussion the expected reactions to prices and to the two types of information for each segment is summarized in table 3.

Table 3. Expected reaction to information and prices for the different segments

	Information about:		Relative prices
	Pesticides in conventional vegetables	Organic is healthier	
Convinced	Medium	Medium to high	Low
Positive and food involved	High	Medium	Medium
Positive and convenient	Medium to high	Medium to low	High
Product focused	Medium	Low to medium	Low to medium
Indifferent	Low	Low	High
Sceptics	Low	Low	High

4. Data

The data we use in our estimations are provided by GfK ConsumerTracking Scandinavia (Note 6). About 20 per cent of the households leave the panel each year and are replaced by a similar type of household (Note 7). For each shopping trip the diary keeper reports purchases of foods and other staples, including the date and time of the day and total expenditure on the trip. For almost all goods in all periods the value and quantity of the product is registered as well as if the food is organically or conventionally produced. Vegetables are furthermore registered by type of vegetables. We use data on vegetable consumption for the period 2005 to 2007 and aggregate to monthly observations. Aggregate Törnquist price indices (Törnquist, 1936) are constructed for conventional and organic vegetables respectively. Additional to the purchase data, the households complete an annual questionnaire on their background, including social and demographic characteristics (family size, age, level of education, region, income etc.) media habits (e.g. preferred newspapers and magazines and frequency of reading) and several attitude questions. The mean and standard deviations of the variables that are used in the estimations are shown in table 4 below. Following e.g. Piggott and Marsh (2004), Kalaitzandonakes et al. (2004), Adhikari et al. (2006), Lusk (2004), Schmidt and Kaiser (2003) and Tonso and Olynk (2010) we base our information index on articles (unweighted or weighted by readership) in the popular press.

Information about pesticides in conventional vegetables and information that link consumption of organic vegetables with health are found by an extensive search in the database Infomedia, which covers articles in all Danish newspapers. The index on pesticides in conventional vegetables is based on search words: “Pesticide/crop spray/poison” in combination with “vegetables”. The health index is constructed using search words: “Organic vegetables” in combination with “healthy”. The constructed indices account in principle for positive and negative information similar to the analyses by e.g. Verbeke & Ward (2001) who analyse the effect of publicity in TV about BSE together with advertising expenditure for beef consumption or more recently Tonsor et al. (2010) who analyse the effect of different types of positive and negative information on food consumption. Furthermore, following Smed (2012), we construct two types of indices; an index aggregated of all

articles in all newspapers that account for indirect information (Note 8) and an index with direct information where the index is weighted according to whether the article appear in a newspaper that is read by this particular household. The weighting is done by first making specific indices for each newspaper, and then secondly to match these with the households that read the particular newspaper in question (Note 9). This leads to individual information indices for each household. As both the direct and indirect information indices are based on absolute numbers, we subtract the number of articles in the direct information index from the indirect information index to avoid double counting. Furthermore we account for the lagged effect of information by introducing one lag in our model to account for both lasting and diminishing effect. (Note 10)

Table 4. Mean (and std.dev.) of variables used in the regression (averaged over the years 2005 - 2007)

	Convinced	Positive and food involv.	Positive and convenient	Product focused	Indifferent	Sceptics	All
% of the sample	12.8	24.4	13.6	30.0	8.7	10.5	100
Organic quantity share, vegetables (0-1)	0.158 (0.266)	0.072 (0.180)	0.081 (0.199)	0.027 (0.108)	0.021 (0.098)	0.014 (0.075)	0.061 (0.174)
Monthly expenditure on fruit and vegetables (DKK/pers)	177.45 (397.06)	155.11 (319.66)	137.58 (298.65)	128.33 (262.59)	101.87 (225.19)	119.20 (245.59)	139.80 (300.78)
Age of main buyer (years)	60.8 (12.8)	57.1 (12.7)	58.8 (14.8)	58.4 (13.8)	61.7 (13.1)	60.8 (12.9)	59.1 (13.5)
Binary or categorical variables							
Purchase frequency of organic vegetables ¹ (0-1)	0.41 (0.49)	0.26 (0.44)	0.24 (0.43)	0.12 (0.32)	0.09 (0.28)	0.07 (0.26)	0.20 (0.40)
Children between 0 and 6 years	0.06 (0.23)	0.09 (0.28)	0.05 (0.22)	0.08 (0.27)	0.05 (0.21)	0.05 (0.21)	0.07 (0.25)
Children between 7 and 14 years	0.08 (0.27)	0.10 (0.29)	0.14 (0.34)	0.09 (0.28)	0.09 (0.28)	0.12 (0.33)	0.10 (0.30)
Adolescents betw. 15 and 20 years	0.08 (0.27)	0.10 (0.30)	0.11 (0.32)	0.08 (0.27)	0.07 (0.26)	0.12 (0.33)	0.09 (0.29)
Further education ²							
None	0.13 (0.34)	0.17 (0.38)	0.22 (0.42)	0.26 (0.44)	0.37 (0.48)	0.27 (0.44)	0.23 (0.42)
Vocational	0.39 (0.49)	0.36 (0.48)	0.36 (0.48)	0.38 (0.49)	0.38 (0.49)	0.38 (0.48)	0.37 (0.48)
Short	0.19 (0.40)	0.15 (0.36)	0.15 (0.36)	0.15 (0.36)	0.12 (0.32)	0.19 (0.39)	0.16 (0.37)
Medium	0.22 (0.41)	0.25 (0.43)	0.20 (0.40)	0.17 (0.38)	0.09 (0.29)	0.14 (0.35)	0.19 (0.39)
Long	0.07 (0.25)	0.07 (0.25)	0.07 (0.25)	0.04 (0.19)	0.04 (0.19)	0.02 (0.15)	0.05 (0.22)
Urbanization							
Capital	0.31 (0.46)	0.23 (0.42)	0.24 (0.42)	0.19 (0.39)	0.21 (0.40)	0.11 (0.31)	0.21 (0.41)
Town	0.27 (0.44)	0.37 (0.48)	0.38 (0.48)	0.32 (0.47)	0.30 (0.46)	0.36 (0.48)	0.33 (0.47)
Rural	0.42 (0.49)	0.40 (0.49)	0.38 (0.49)	0.49 (0.50)	0.49 (0.50)	0.53 (0.50)	0.45 (0.50)
Income quartiles ³							
0 – 25 %	0.34 (0.48)	0.30 (0.46)	0.38 (0.48)	0.36 (0.48)	0.53 (0.50)	0.38 (0.48)	0.36 (0.48)
25 – 75 %	0.42 (0.49)	0.41 (0.49)	0.43 (0.49)	0.41 (0.49)	0.32 (0.47)	0.44 (0.50)	0.41 (0.49)
75 - 100 %	0.23 (0.42)	0.29 (0.45)	0.19 (0.40)	0.23 (0.42)	0.16 (0.36)	0.18 (0.38)	0.23 (0.42)

Note: ¹ For the *convinced*, this implies that 59 % of all obs. consist of a non-purchase of organic vegetables. ² Vocational (e.g. carpenter, nursing aide), short education (e.g. policeman, technical educ.), medium education (e.g. nurse, primary school teacher), long education (e.g. university degree). ³ Originally income is recorded in brackets of DKK 50,000 (~€6,700). These are divided by the number of persons in the household, weighted by the OECD-modified scale i.e. 1 for the first adult, 0.5 for the next adults and 0.3 for children (OECD). Thereafter the panel is divided into income quintiles. 0 – 25 % comprise the 25 % of the households with the lowest income etc. Due to the discrete nature of the original income brackets it is not possible to obtain the exact quartiles.

Source: Own calculations based on the respondents answers to the annual questionnaire and on reported purchases in the data from GfK-Consumerscan Scandinavia.

5. Empirical Model

Usually zero observations are assumed to represent standard corner solutions in the participating consumers' purchase quantity problem which is captured empirically by the classical Tobit model (Tobin, 1958). The classical assumption in this model is, that zero consumption is only observed when, and only when, the optimal purchase quantity, given current prices and information loadings, is less than or equal to zero. This implies that any variable that increases the probability of non-zero consumption must also increase the mean of positive consumption. In the case of organic consumption this might not be the case as some zero observations might be attributed to some consumers who do not consider organic foods to contain superior health or quality attributes compared to conventionally produced alternatives (Jolly et al., 1989; O'Donovan & McCarthy, 2002). These consumers' non purchases are attributed, not to economic factors, but to the consumers' perception of the quality of the conventional product (Deaton & Irish, 1984; Jones, 1992). Other consumers believe that organic products have superior health attributes compared to conventionally grown alternatives (Vindigni et al., 2002; Pearson et al., 2011), but do not purchase them because they think that the price is too high, as price is often an inhibiting factor in organic consumption (Gottschalk & Leistner, 2011; Pearson et al., 2011).

Following Pudney's (1989) double hurdle model, this two-step decision can be written as (where *part* = participation, *non-part* = non participation):

$$U_i^{tot} = D_i(\cdot)U_i^{part}(\cdot) + (1 - D_i(\cdot))U_i^{non-part}(\cdot) \quad (4a)$$

Where the two utility expressions are written as:

$$U_i^{part}(\cdot) = U_i^{part}(s_i(y_{i,org}, y_{i,conv}), h_i(y_{i,org}, y_{i,conv}, I_{org}(\theta_i), I_{conv}(\theta_i)) | p_{i,conv} \cdot y_{i,conv} + p_{i,org} \cdot y_{i,org} = X_i)$$

$$U_i^{non-part}(\cdot) = U_i^{non-part}(s_i(y_{i,conv}), h_i(y_{i,conv}, I_{org}(\theta_i), I_{conv}(\theta_i)) | p_{i,conv} \cdot y_{i,conv} = X_i)$$

$D_i(\cdot) = D_i(I_{org}(\theta_i), I_{conv}(\theta_i))$, where D_i is an indicator of whether consumer i is a participant at the organic market or not. The utilities are observed with an error and therefore the dummy D_i is modelled by the classic binary Probit model where participation is determined by comparing the utility of choosing one alternative to the utility of choosing another alternative.

$$D_{it} = \begin{cases} 1 & \text{if } U_i^{part} > U_i^{non-part} \\ 0 & \text{if } U_i^{part} \leq U_i^{non-part} \end{cases} \quad (4b)$$

This means that the expected value of D_i in equation (4b) represents the probability that a person will choose to participate in the organic market. D_i is not determined within the utility maximization mechanism in (2) which implies that the choice between being a market participant or not can be considered to be unconnected with prices and income levels (Pudney, 1989). Hence, it is assumed that, in order to observe positive consumption, two separate hurdles must be passed. The consumer has to decide whether to be a market participant (*participation decision*) and, conditional on being a market participant, how much to consume (*consumption decision*). This means that the participation and consumption decisions are allowed to be determined by different sets of parameters (Atkinson et al., 2008).

We wish to investigate how prices and information influence the choice between organic and conventional vegetables. In order to simplify the model we use the quantity share of organic vegetables as our dependent variable, as we would otherwise need to estimate a system of two equation, one for organic and one for conventional. The two decision processes related to organic consumption can be formalized as:

The participation decision:

$$y_{i1t,org}^* = \alpha' w_{it} + v_{it} \quad (5a)$$

The consumption decision:

$$y_{i2t,org}^* = \beta' x_{it} + u_{it}$$

where $y_{i1t,org}^*$ is a latent participation indicator, indicating potential participation if $y_{i1t,org}^* > 0$, $y_{i2t,org}^*$ is latent consumption, indicating consumption of $y_{i2t,org}^*$ if $y_{i2t,org}^* > 0$, w_{it} and x_{it} are vectors of explanatory variables including information, α and β are vectors of parameters and v_{it} and u_{it} are idiosyncratic independent

normally distributed errors. The observed consumption $y_{it,org}$ relates to latent consumption such that:

$$y_{it,org} = \begin{cases} \beta' x_{it} + u_{it} & \text{if } y_{it1,org}^* > 0 \text{ and if } y_{it2,org}^* > 0 \\ 0 & \text{otherwise} \end{cases} \quad (5b)$$

where $y_{it,org}$ is the i 'th household's observed purchase of organic vegetables. If household i is not a market participant, then $y_{it1,org}^* = 0$. Under the assumption of independence (Note 11) of the error terms of the participation and the consumption equations and normality of the error term, the likelihood equation becomes (Jones, 1989; Cragg, 1971; Burke, 2009):

$$L_i = [1 - \Phi(\alpha' w_{it})]^{I(D_{it}=0)} \left[\frac{1}{\sigma_{it}} \varphi \left(\frac{y_{it,org} - \beta' x_{it}}{\sigma_{it}} \right) \Phi(\alpha' w_{it}) / \Phi \left(\frac{\beta' x_{it}}{\sigma_{it}} \right) \right]^{I(D_{it}=1)} \quad (6)$$

If no separate first hurdle exists, everyone is assumed to participate, i.e. $\Phi(\alpha' w_{it}) = 1 \forall i$ and the model reduces to the Tobit model. The actual equations estimated are shown below. Note that we use the same set of explanatory variables in the two hurdles, and that separate parameters for the intercept, trends, t and t^2 , prices (rel_price_t), expenditure ($monthly_exp_{it}$) and negative information about pesticides or positive information about health effects, direct as well as indirect, ($pest_dir_{it}$, $pest_dir_{it-1}$, $pest_indir_{it}$, $pest_indir_{it-1}$, $health_dir_{it}$, $health_dir_{it-1}$, $health_indir_{it}$ and $health_indir_{it-1}$) are estimated for each of the 6 segments (s account for segment). The effects of socio demographics, $socio_i$, are assumed to be the same for the different segments.

The participation decision:

$$\begin{aligned} y_{it1,org}^* = & \sum_{s=1}^6 (\alpha_{0s} + \delta_{1s}t + \delta_{2s}t^2 + \alpha_{1s}rel_price_t + \alpha_{2s}monthly_exp_{it}) \\ & + \sum_{s=1}^6 (\alpha_{3s}pest_dir_{it} + \alpha_{4s}pest_dir_{it-1} + \alpha_{5s}pest_indir_{it} + \alpha_{6s}pest_indir_{it-1}) \\ & + \sum_{s=1}^6 (\alpha_{7s}health_dir_{it} + \alpha_{8s}health_dir_{it-1} + \alpha_{9s}health_indir_{it} + \alpha_{10s}health_indir_{it-1}) \\ & + \sum_{k=1}^{23} (\alpha_k socio_i) + c_{1i} + v_{it} \end{aligned} \quad (7)$$

The consumption decision:

$$\begin{aligned} y_{it2,org}^* = & \sum_{s=1}^6 (\beta_{0s} + \eta_{1s}t + \eta_{2s}t^2 + \beta_{1s}rel_price_t + \beta_{2s}monthly_exp_{it}) \\ & + \sum_{h=1}^6 (\beta_{3s}pest_dir_{it} + \beta_{4s}pest_dir_{it-1} + \beta_{5s}pest_indir_{it} + \beta_{6s}pest_indir_{it-1}) \\ & + \sum_{h=1}^6 (\beta_{7s}health_dir_{it} + \beta_{8s}health_dir_{it-1} + \beta_{9s}health_indir_{it} + \beta_{10s}health_indir_{it-1}) \\ & + \sum_{k=1}^{23} (\beta_k socio_i) + c_{2i} + u_{it} \end{aligned} \quad (8)$$

where c_{1i} account for unobserved heterogeneity in the participation decision and c_{2i} account for unobserved heterogeneity in the consumption decision

6. Estimation and Results

A double hurdle models for vegetable consumption is estimated using the Craggit procedure in STATA 10 (Burke, 2009). We account for the panel structure in the data by using the correlated random effects (CRE) following Mundlak (1978) and Chamberlain (1984). Hence, we specify a model for the distribution of unobserved heterogeneity c_{1i} in equation 7 and c_{2i} in equation 8 as a linear function of the time averages of the explanatory variables, $\bar{x}_i$ and $\bar{w}_i$. We assume that the remaining unobserved heterogeneity is normally distributed and independent of the x 's and the w 's (the explanatory variables), (Note 12) hence $c_{1i} = \xi_1 \bar{x}_i + \gamma_{1i}$ and $c_{2i} = \xi_2 \bar{w}_i + \gamma_{2i}$, $\begin{pmatrix} \gamma_{1i} \\ \gamma_{2i} \end{pmatrix} \sim Normal \begin{pmatrix} 0, \sigma_1^2 \\ 0, \sigma_2^2 \end{pmatrix}$. Any time varying variable, including time trends, should be part of

$\bar{x}_i$ and $\bar{w}_i$, since we have an unbalanced panel (Wooldridge, 2010). Since the CRE estimator is a simple transformation of the time constant unobservable heterogeneity into a function of observable time-constants, which is then substituted into the primary equations in the model, this has no effect on the likelihood shown in (6).

A Likelihood ratio test is performed to test the Tobit model against the Double Hurdle model (Lin & Schmidt, 1984) which reveals a probability value of 0.0000, hence the hypotheses that the decision to buy organics consist of just one decision is rejected. An LR-test of the exclusion of prices in the first step reveals a probability value of 0.1510 implying that we cannot reject the hypotheses that prices can be excluded in the first step of the model. Another LR-test reveals that total expenditure has to be included in the first step. It seems reasonable to include total expenditure in the first step since the larger the expenditure on fruits and vegetables the larger is the probability that an organic purchase is made.

We therefore re-estimate the model excluding price in the first step. The variables in the first hurdle (x_i) and the second hurdle (w_i) therefore now differ. The parameters from the estimation are shown in appendix A. The calculated probabilities of observing a purchase, as well as conditional and unconditional expected quantity shares are shown in table 5 below. These are mainly used as a check of the model fit. The estimated probability of making an organic purchase in a month $P[y > 0]$ compare well with the calculated purchase frequencies from table 4 showing that the model does predict purchase frequencies rather precisely. Despite a smaller overvaluation of the quantity share for the *convinced*, the estimated unconditional quantity shares $E(y)$ are likewise equivalent to the observed organic quantity share from table 4.

Table 5. Probability of observing a purchase as well as conditional and unconditional expectations

	Convinced		Positive and food involved		Positive and convenient		Product focussed		Indifferent		Sceptics	
	Mean	Std.err	Mean	Std.err	Mean	Std.err	Mean	Std.err	Mean	Std.err	Mean	Std.err
$P[y > 0]$	0.429	0.1794	0.2564	0.1281	0.2616	0.1254	0.1200	0.0839	0.0889	0.0658	0.0692	0.0475
$E(y y > 0)$	0.414	0.1376	0.3180	0.1253	0.3516	0.1200	0.2703	0.1532	0.3137	0.1898	0.2413	0.1872
$E(y)$	0.178	0.0975	0.0785	0.0453	0.0881	0.0459	0.0300	0.0318	0.0235	0.0186	0.0149	0.0128

To evaluate the effect of prices and information we calculate the partial effects. These can be calculated on three levels; the partial effects on the probability of making an organic purchase, the partial effects on conditional volume shares i.e. the effect on consumers who are already purchasing organics and finally the partial effects on unconditional volume shares i.e. the effect on observed organic volume shares. Table 6 below shows the partial effects on the probability of making an organic purchase; hence it describes how we can get consumers to make an organic purchase. For comparative reasons we have calculated the Partial Effect on the Average (PEA). Average Partial Effects (APE) are shown in appendix C and the equations used to calculate the partial effects are shown in appendix B. The standard errors are calculated using the delta method and the calculated probability values are shown in parentheses. Bold indicate significance at the 5 per cent level.

Concerning the partial effect of information the largest effects are from direct current negative information about pesticides in conventional vegetables (table 6), whereas no lagged effects are found. As we expected, relatively strong reactions are found among the three positive segments with lowest reaction found among the *positive and convenient*. This makes sense as this is the segment with the lowest food involvement amongst the positive segments and they are also generally less concerned about pesticides and artificial additives in their food, and slightly less convinced that organic products in general contain fewer pesticides and medicine residues (see table 2). Among the “negative” segments, the *product focussed* stand out as 59 per cent of them perceive that there are fewer pesticides and medicine residues in organic products versus only 40 and 41 per cent of the *indifferent* and the *sceptics*. The fact that the *product focussed* has a rather strong reaction towards information about pesticides in conventional vegetables therefore confirms the theory that households react stronger to information which confirms their initial beliefs.

Even the *indifferent* and at the 10 per cent level also the *sceptics* increase the probability of an organic purchase when they learn directly that there are pesticides in conventional vegetables, but they do not respond to indirect information about pesticides. We therefore find that all households care enough about their own health to react to direct negative information, and that the segments who initially believed in a difference in pesticide levels in organic and conventional foods also react to indirect negative information, but that the effect of indirect

information is far smaller than the effect of direct information. As presented in table 2, the initial perception of positive health effects of organic products also varies a great deal among the segments, and especially between the three positive and the three negative segments. The positive segments are more likely to agree with the statement that organic products contain less pesticide and medicine residues than conventional products. This indicates that the 'fluffy' concept of 'organic is healthier' is not as easily conveyed as the physical measurements of pesticides and medicine residues. In Denmark organic products are generally talked about as being healthier, but the scientific evidence is lacking, while it is scientifically proven that organic vegetables contain fewer pesticides residues than conventional products whereas the negative health effects of the pesticides is still debated.

As expected only the most positive segments have a positive reaction towards information that connect health and organic consumption, which is due to the larger health orientation amongst those segments. Their initial positive attitude towards organic produce might also lower the information processing costs amongst these households. Furthermore, across all segments a significant negative reaction to indirect health information is observed. Health effects from consumption of organic vegetables are a matter of personal conviction rather than a scientific fact, and the effect of the opinion of others therefore depends strongly on whether one in generally agrees with these others, or not. If the papers you often read claim that organic is healthier you will think that it probably is, but on the other hand if the papers you do certainly NOT read claim that it is healthier it might actually reduce your own trust in positive health effects. The positive effect of expenditure on vegetables on the probability of making an organic purchase for the *sceptics* might be explained by that their organic purchases mainly are coincidental and more purchases in total increase the simple probability that one of the purchases in a given month are organic.

Table 6. Partial effects of information on the probability of observing a purchase

$\partial P[y > 0]/\partial x$ (probability values in parentheses). Bold indicates significant at 5% level						
	Convinced	Positive and food inv.	Positive and conv.	Product focussed	Indifferent	Sceptics
Pest_dir	0.0735 (0.0000)	0.0791 (0.0000)	0.0509 (0.0034)	0.0588 (0.0000)	0.0708 (0.0112)	0.0416 (0.0894)
Pest_indir	0.0157 (0.0000)	0.0148 (0.0000)	0.0094 (0.0141)	0.0068 (0.0368)	0.0100 (0.1354)	0.0057 (0.3003)
Pest_dir ₁	0.0239 (0.4099)	-0.0394 (0.0937)	-0.0073 (0.8090)	0.0100 (0.6888)	-0.0048 (0.9297)	-0.0411 (0.3730)
Pest_indir ₁	-0.0041 (0.1868)	0.0065 (0.0102)	0.0003 (0.9233)	-0.0041 (0.1404)	-0.0014 (0.8104)	0.0029 (0.5527)
Health_dir	0.0260 (0.0036)	0.0182 (0.0163)	-0.0102 (0.3096)	0.0098 (0.2508)	0.0123 (0.4751)	0.0152 (0.2989)
Health_indir	-0.0101 (0.0000)	-0.0055 (0.0000)	-0.0035 (0.0388)	-0.0048 (0.0012)	-0.0075 (0.0145)	-0.0050 (0.0458)
Health_dir ₁	-0.0074 (0.3889)	-0.0107 (0.2639)	-0.0076 (0.4252)	-0.0050 (0.7717)	-0.0260 (0.1301)	-0.0209 (0.1500)
Health_indir ₁	0.0009 (0.4863)	0.0010 (0.3710)	0.0008 (0.5623)	-0.0007 (0.5638)	-0.0025 (0.3088)	-0.0009 (0.6500)
Monthly exp	0.0238 (0.0000)	0.0126 (0.0000)	0.0073 (0.0246)	0.0073 (0.0102)	0.0067 (0.2296)	0.0138 (0.0037)

The partial effects on conditional volume shares (the organic volume shares for those consumers that have decided to make an organic purchase in a given month) are given in table 7. One striking result from this table is the large positive reaction from the three negative segments to indirect information that link health and consumption of organic vegetables. Due to their lower health orientation and lack of confidence in the health attributes from organic they were expected to have a rather small reaction. The explanation for this might be that we consider households that have decided to make an organic purchase for some reason (they have decided to be market participants) (Note 13) and they will react differently than the corresponding group of non-participants. This might support the hypothesis by Gottschalk and Leistner (2012) that repeated purchases might follow a

positive experience from a first time purchase. Comparing the reaction within the positive segments the size of the reaction is larger for the *positive and food involved* and the *positive and convenient* than for the *convinced*. This might be due to diminishing marginal effect of information. The effect is larger for the *positive and food involved* than the *positive and convenient* as anticipated due to a larger degree of health orientation.

Only the two most positive segments will increase their share of organic vegetables if they increase their total expenditure on fruits and vegetables. Reactions to price follow the expected pattern with largest price sensitivity from the *product focussed* and the *sceptics*. The *indifferent* seem not to react on prices, which are explainable due to their general ignorant attitude towards food. The *positive and food involved* and the *positive and convenient* exhibit, as expected, larger sensitivity towards prices than the *convinced*.

Table 7. Partial effect on the conditional volume shares

$\partial E[y y > 0]/\partial x$ (probability values in parenthesis). Bold indicates significant at 5% level						
	Convinced	Positive and food inv	Positive and conv.	Product focussed	Indifferent	Sceptics
Pest_dir	0.0190 (0.0453)	0.0089 (0.5040)	-0.0266 (0.0674)	0.0249 (0.4793)	-0.0646 (0.0177)	-0.0075 (0.8297)
Pest_indir	0.0009 (0.6897)	-0.0019 (0.5390)	-0.0036 (0.2435)	-0.0239 (0.0197)	0.0020 (0.7083)	-0.0060 (0.4000)
Pest_dir ₁	0.0056 (0.7407)	-0.0382 (0.1214)	-0.0287 (0.2477)	-0.0256 (0.6652)	-0.1704 (0.0009)	-0.0784 (0.2711)
Pest_indir ₁	0.0011 (0.5521)	0.0043 (0.1021)	-0.0020 (0.4491)	0.0056 (0.4060)	0.0091 (0.0647)	0.0011 (0.8785)
Health_dir	0.0085 (0.1294)	0.0060 (0.4434)	0.0024 (0.7629)	-0.0220 (0.2923)	-0.0311 (0.0437)	0.0151 (0.5168)
Health_indir	0.0032 (0.0006)	0.0076 (0.0000)	0.0053 (0.0001)	0.0209 (0.0000)	0.0121 (0.0001)	0.0106 (0.0060)
Health_dir ₁	0.0090 (0.0834)	0.0129 (0.0977)	0.0067 (0.3790)	-0.0776 (0.0032)	0.0321 (0.0226)	-0.0551 (0.0547)
Health_indir ₁	-0.0003 (0.6819)	-0.0008 (0.4393)	-0.0013 (0.2495)	-0.0038 (0.2288)	0.0018 (0.3792)	-0.0002 (0.9321)
Relative price	-0.3030 (0.000)	-0.4620 (0.0000)	-0.3858 (0.0000)	-1.1811 (0.0008)	-0.2928 (0.0762)	-0.7936 (0.0031)
Monthly exp	0.0147 (0.0000)	0.0090 (0.0008)	0.0029 (0.2617)	-0.0153 (0.0551)	-0.0013 (0.7803)	-0.0012 (0.8567)

In table 8 below we consider the partial effects on the unconditional market share, hence these effects of exogenous information and changing prices are the effects we will see on observed organic market shares. Generally we see the same pattern in prices as we observed on conditional volume shares with the largest reaction to the relative price between organic and conventional vegetables from the negative segments and the smallest reaction from the *convinced* and the *indifferent*. All of the positive segments increase their volume share of organic vegetables if they increase their expenditure on fruits and vegetables, and so do the sceptics, again probably because the organic budget share of the sceptics is mainly a result of random purchases. The effect of information is mainly limited to the positive segments which support the hypothesis that information which is in accordance with initial attitudes and believes lower processing cost and increase the reaction. The one exception is the *product focussed* segment which has a positive and rather strong reaction to information about pesticides in conventional vegetables which again might be attributed to their concern about the adverse effects of conventional agricultural production. Only the two most positive segments and the product focussed react to information that link health and the consumption of organic vegetables.

Table 8. Partial effect on the unconditional volume shares

$\partial E[y]/\partial x$ (probability values in parenthesis). Bold indicates significant at 5% level	Convinced	Positive and food inv.	Positive and conv.	Product focussed	Indifferent	Sceptics
Pest_dir	0.0276 (0.0000)	0.0270 (0.0000)	0.0099 (0.0421)	0.0243 (0.0005)	0.0074 (0.3857)	0.0114 (0.1884)
Pest_indir	0.0052 (0.0000)	0.0042 (0.0000)	0.0021 (0.0451)	-0.0034 (0.0788)	0.0036 (0.0632)	0.0004 (0.8259)
Pest_dir-1	0.0088 (0.2702)	-0.0213 (0.0039)	-0.0089 (0.3121)	-0.0028 (0.8154)	-0.0409 (0.0127)	-0.0311 (0.0660)
Pest_indir-1	-0.0010 (0.2269)	0.0031 (0.0001)	-0.0004 (0.7050)	0.0000 (0.9952)	0.0017 (0.3285)	0.0012 (0.5041)
Health_dir	0.0102 (0.0000)	0.0071 (0.0025)	-0.0027 (0.3633)	-0.0020 (0.6304)	-0.0033 (0.5203)	0.0083 (0.1281)
Health_indir	-0.0025 (0.0000)	0.0000 (0.9982)	0.0001 (0.8125)	0.0033 (0.0003)	0.0004 (0.6404)	0.0009 (0.3300)
Health_dir-1	-0.0003 (0.9101)	-0.0004 (0.8609)	-0.0009 (0.7604)	-0.0195 (0.0001)	-0.0008 (0.8795)	-0.0193 (0.0016)
Health_indir-1	0.0002 (0.5623)	0.0001 (0.7486)	0.0000 (0.9282)	-0.0011 (0.0749)	-0.0004 (0.5980)	-0.0003 (0.6239)
Relative price	-0.0511 (0.0000)	-0.0779 (0.0000)	-0.0650 (0.0000)	-0.1990 (0.0008)	-0.0494 (0.0762)	-0.1337 (0.0031)
Monthly exp	0.0109 (0.0000)	0.0060 (0.0000)	0.0030 (0.0017)	0.0012 (0.4297)	0.0018 (0.2624)	0.0041 (0.0147)

7. Discussion and Conclusion

As anticipated we found positive effects of information on the probability of purchasing organic and on organic volume shares. Furthermore the hypothesis of a larger effect of information for households where the information is in accordance with initial knowledge and attitudes are supported. We find a larger reaction from the positive organic segments who have initial positive attitudes towards organics, who have larger health orientation and who worry more about pesticides and additives in their food. These segments furthermore perceive organic varieties to contain smaller amounts of pesticides and additives. Generally negative information, i.e. information about incidents of pesticides in conventional vegetables is found to have a larger effect on unconditional organic volumes shares than positive information i.e. information that link health and the consumption of organic vegetables. This is a general result from the literature (Verbeke, 2005).

Basically we find that the market share for organic vegetables is influenced by both information about pesticides in conventional vegetables and information that link health and the consumption of organic vegetables but mainly for consumers that have initial attitudes in correspondence with the message i.e. only the positive segments. The effect of information about pesticides in conventional vegetables on the *product focussed* is here an exception, but as consumers in this segment generally are concerned with the adverse effects of conventional production this also supports the hypothesis. This also suggests that marketing which focuses on the absence of pesticides in organic vegetables should have a large effect on this segment.

However from a marketing perspective the most interesting results from this study is the diverging effect of information on each step of the purchasing procedure. Negative information i.e. information that focus on the incidence of pesticides in conventional vegetables, is found to increase the probability of an organic purchase within all segments. Hence “new” organic consumers can be formed by providing information about the adverse effect of conventional agricultural production or by focussing on the absence of adverse effects in organic production. If the experience of a first time purchase is positive these new consumers may be converted into regular organic purchasers. The large and positive effect of information that link health and the consumption of organic vegetables on conditional market shares then indicate that both these “new” organic consumers as well as the “old” organic consumers will increase their volume share of organic vegetables if they are exposed to information that focus on the positive health effects of consuming organic.

Basically the findings from this study underline the importance of targeting information to be in accordance with the initial attitudes of the target group and to provide different types of information to consumers at different stages of the purchasing process. Also, as we find large price elasticities for organic vegetables for the less

dedicated organic consumers, prices might be a barrier toward increasing the purchases of organic vegetables even though these consumers have been converted into organic purchases. Hence special offers or other ways of lowering the prices are likely to get those consumers to increase their consumption of organic vegetables to a larger extent than it is the case for the dedicated consumers.

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Notes

Note 1. For a more throughout description of the data see the data section below.

Note 2. Food involvement is a complex variable referring to expressed attitudes and reported or observed practices regarding shopping and cooking (Lund et al., 2012). In the latent class analysis food involvement is defined by reactions to the questions: 'I am not very interested in food and cooking', 'Food is an important part of the joy of life for me' and 'As far as possible I make food from scratch and avoid readymade meals'.

Note 3. In the LCA analysis price sensitivity refers to the answers to the general statement: 'Price is more important for me than quality'.

Note 4. In the LCA analysis trust in organic production is measured by the questions: 'Organic foods are just a fashionable fad' and 'Organic is a sales gimmick'.

Note 5. Intrinsic qualities of organic foods refer to general assessments of these products including such aspects as appearance, freshness, taste and health benefits, while altruistic concerns refer to consideration of the consequences of product choices for the environment, animal welfare or climate change (Lund et al., 2012). In the LCA analysis intrinsic quality are measured by the questions: 'I think that organic products are healthier for me and my family than conventional products' and 'Generally, organic products are of a poorer quality', while altruistic concerns are measured by the question 'It is important to consider the consequences of one's shopping on the outside world'.

Note 6. For more information on GfK ConsumerTracking Scandinavia see <http://www.gfk.dk/>, Andersen (2008) or Smed (2008).

Note 7. Data has been selected so the minimum length of stay in the panel is 12 months; the maximum length is 72 months.

Note 8. For other examples of this types of indices see e.g. Piggott & Marsh (2004), McGuirk et al. (1995), Schmidt & Kaiser (2003), Verbeke & Ward (2001), Tonsor & Olynk (2010) and Tonsor et al. (2010).

Note 9. A regular reader is here defined as a household that state that they read at least 3 out of 6 weekly editions of the particular newspaper.

Note 10. Introducing additional lags does not change the conclusions of the model and these additional lags are insignificant.

Note 11. Several studies have relaxed the independent error term assumption using the rationale that an individual's decision about whether to purchase and his decision about how much to purchase may be linked, thus generating dependent errors (Garcia & Labeaga, 1996). Studies that have compared the results from a model where independence in the errors is assumed, with the results from the same model where the assumption is relaxed, have found virtually identical coefficients and standard errors (Jones, 1992; Garcia & Labeaga, 1996).

Note 12. The CRE adjustment and the inclusion of a large number of socio-demographic variables are assumed to a satisfactory degree to control for the unobserved heterogeneity in the dataset especially because the literature shows that there is a large degree of correlation between the included socio-demographic variables and the size of the budget share for organic foods (Hughner et al., 2007).

Note 13. This group is however rather small for the *indifferent* and the *sceptics*.

Appendix A. Parameter Estimates

Table A1. Parameter estimates

	Participation equation (first hurdle, probit)			Consumption equation (second hurdle, tobit)		
	Coef.	Std. Err.	P>z	Coef.	Std. Err.	P>z
Constant, (Convinced is base)	0.0125	1.0418	0.9900	4.0070	0.9235	0.0000
Positive and food involved	-1.8333	1.1910	0.1240	-0.4286	1.2584	0.7330
Positive and convenient	-2.1078	1.3138	0.1090	-3.4916	1.1589	0.0030
Product focussed	-2.1171	1.2940	0.1020	7.6522	3.6106	0.0340
Indifferent	-2.8304	1.7725	0.1100	-4.3792	2.3261	0.0600
Sceptics	-0.8903	2.4117	0.7120	-0.9284	6.5347	0.8870
Trend_conv	-0.0095	0.0142	0.5040	-0.0027	0.0123	0.8240
Trend_pos_food inv.	0.0007	0.0120	0.9550	0.0099	0.0182	0.5890
Trend_pos_conv.	-0.0048	0.0158	0.7630	-0.0106	0.0161	0.5120
Trend_prod_foc	0.0085	0.0136	0.5310	0.0187	0.0601	0.7550
Trend_indiff	-0.0244	0.0264	0.3560	-0.0518	0.0270	0.0550
Trend_sceptic	0.0394	0.0236	0.0950	0.0779	0.0864	0.3670
Trend ² _conv	0.0005	0.0005	0.3650	0.0001	0.0004	0.8060
Trend ² _pos_food inv	0.0000	0.0005	0.9200	-0.0004	0.0006	0.5020
Trend ² _pos_conv	0.0002	0.0006	0.7920	0.0004	0.0006	0.4860
Trend ² _prod_foc	-0.0004	0.0005	0.4300	-0.0017	0.0019	0.3550
Trend ² _indiff	0.0009	0.0010	0.3550	0.0015	0.0011	0.1780
Trend ² _sceptic	-0.0015	0.0009	0.0980	-0.0010	0.0021	0.6400
Relative price_conv				-1.5641	0.3115	0.0000
Relative price_pos_food inv				-2.3849	0.4736	0.0000
Relative price_pos_conv				-1.9915	0.4425	0.0000
Relative price_prod_foc				-6.0963	1.8108	0.0010
Relative price_indiff				-1.5115	0.8516	0.0760
Relative price_sceptic				-4.0963	1.3816	0.0030
Pest_dir_conv	0.2919	0.0639	0.0000	0.0707	0.0488	0.1480
Pest_dir_pos_food inv	0.3143	0.0518	0.0000	0.0331	0.0685	0.6290
Pest_dir_pos_conv	0.2022	0.0688	0.0030	-0.0990	0.0749	0.1860
Pest_dir_prod_foc	0.2335	0.0561	0.0000	0.0929	0.1819	0.6090
Pest_dir_indiff	0.2815	0.1108	0.0110	-0.2407	0.1403	0.0860
Pest_dir_sceptic	0.1655	0.0973	0.0890	-0.0281	0.1811	0.8770
Pest_indir_conv	0.0624	0.0142	0.0000	0.0034	0.0118	0.7730
Pest_indir_pos_food inv	0.0587	0.0118	0.0000	-0.0071	0.0160	0.6570
Pest_indir_pos_conv	0.0374	0.0152	0.0140	-0.0134	0.0159	0.4000
Pest_indir_prod_foc	0.0271	0.0129	0.0370	-0.0889	0.0527	0.0920
Pest_indir_indiff	0.0396	0.0265	0.1350	0.0073	0.0270	0.7870
Pest_indir_sceptic	0.0228	0.0220	0.3000	-0.0225	0.0371	0.5430
Pest_dir.1_conv	0.0948	0.1150	0.4100	0.0208	0.0870	0.8110
Pest_dir.1_pos_food inv	-0.1566	0.0934	0.0930	-0.1422	0.1271	0.2630
Pest_dir.1_pos_conv	-0.0290	0.1198	0.8090	-0.1069	0.1280	0.4040
Pest_dir.1_prod_foc	0.0396	0.0989	0.6890	-0.0952	0.3047	0.7550
Pest_dir.1_indiff	-0.0189	0.2143	0.9300	-0.6350	0.2648	0.0160
Pest_dir.1_sceptic	-0.1633	0.1833	0.3730	-0.2921	0.3675	0.4270

	Participation equation (first hurdle, probit)			Consumption equation (second hurdle, tobit)		
	Coef.	Std. Err.	P>z	Coef.	Std. Err.	P>z
Pest_indir. ₁ _conv	-0.0164	0.0124	0.1870	0.0041	0.0096	0.6680
Pest_indir. ₁ _pos_food inv	0.0260	0.0101	0.0100	0.0159	0.0135	0.2370
Pest_indir. ₁ _pos_conv	0.0013	0.0130	0.9230	-0.0074	0.0135	0.5850
Pest_indir. ₁ _prod_foc	-0.0162	0.0110	0.1400	0.0209	0.0348	0.5480
Pest_indir. ₁ _indiff	-0.0055	0.0230	0.8100	0.0340	0.0255	0.1820
Pest_indir. ₁ _sceptic	0.0114	0.0191	0.5530	0.0041	0.0367	0.9120
Health_dir_conv	0.1031	0.0354	0.0040	0.0317	0.0290	0.2730
Health_dir_pos_food inv	0.0722	0.0300	0.0160	0.0223	0.0402	0.5800
Health_dir_pos_conv	-0.0406	0.0400	0.3090	0.0090	0.0415	0.8280
Health_dir_prod_foc	0.0390	0.0340	0.2510	-0.0822	0.1080	0.4470
Health_dir_indiff	0.0489	0.0685	0.4750	-0.1159	0.0795	0.1450
Health_dir_sceptic	0.0604	0.0581	0.2990	0.0562	0.1199	0.6400
Health_indir_conv	-0.0403	0.0060	0.0000	0.0121	0.0049	0.0130
Health_indir_pos_food inv	-0.0220	0.0051	0.0000	0.0282	0.0071	0.0000
Health_indir_pos_conv	-0.0140	0.0068	0.0390	0.0198	0.0069	0.0040
Health_indir_prod_foc	-0.0189	0.0058	0.0010	0.0780	0.0255	0.0020
Health_indir_indiff	-0.0298	0.0121	0.0140	0.0451	0.0154	0.0030
Health_indir_sceptic	-0.0198	0.0099	0.0460	0.0396	0.0199	0.0470
Health_dir. ₁ _conv	-0.0296	0.0343	0.3890	0.0335	0.0267	0.2110
Health_dir. ₁ _pos_food inv	-0.0426	0.0290	0.1420	0.0480	0.0401	0.2310
Health_dir. ₁ _pos_conv	-0.0304	0.0381	0.4250	0.0251	0.0396	0.5250
Health_dir. ₁ _prod_foc	-0.0198	0.0322	0.5390	-0.2893	0.1357	0.0330
Health_dir. ₁ _indiff	-0.1032	0.0681	0.1300	0.1197	0.0726	0.0990
Health_dir. ₁ _sceptic	-0.0829	0.0575	0.1500	-0.2052	0.1477	0.1650
Health_indir. ₁ _conv	0.0036	0.0051	0.4860	-0.0012	0.0041	0.7670
Health_indir. ₁ _pos_food inv	0.0038	0.0043	0.3710	-0.0032	0.0057	0.5760
Health_indir. ₁ _pos_conv	0.0033	0.0056	0.5620	-0.0048	0.0057	0.4050
Health_indir. ₁ _prod_foc	-0.0028	0.0049	0.5640	-0.0143	0.0164	0.3850
Health_indir. ₁ _indiff	-0.0100	0.0098	0.3090	0.0067	0.0105	0.5250
Health_indir. ₁ _sceptic	-0.0037	0.0081	0.6500	-0.0009	0.0145	0.9510
Age	-0.0203	0.0054	0.0000	-0.0074	0.0066	0.2600
Age ²	0.0002	0.0000	0.0000	0.0000	0.0001	0.6530
Capital	0.3007	0.0242	0.0000	0.0407	0.0290	0.1600
Town	0.0018	0.0224	0.9360	-0.0379	0.0306	0.2160
Children _{0_6_yrs}	0.0051	0.0415	0.9030	-0.0761	0.0520	0.1430
Children _{7_14_yrs}	0.0124	0.0343	0.7170	-0.0652	0.0468	0.1640
Children _{15_20_yrs}	-0.2070	0.0355	0.0000	-0.1737	0.0530	0.0010
Voc. educ.	-0.0660	0.0277	0.0170	-0.0554	0.0407	0.1740
Short educ.	0.1215	0.0323	0.0000	0.1959	0.0437	0.0000
Medium/long educ.	0.1572	0.0295	0.0000	0.2302	0.0418	0.0000
Monthly exp_conv	0.0947	0.0117	0.0000	0.0547	0.0099	0.0000
Monthly exp_pos_food inv	0.0499	0.0100	0.0000	0.0334	0.0137	0.0150
Monthly exp_pos_conv	0.0291	0.0129	0.0240	0.0107	0.0132	0.4180
Monthly exp_prod_foc	0.0291	0.0113	0.0100	-0.0572	0.0413	0.1660
Monthly exp_indiff	0.0266	0.0222	0.2290	-0.0047	0.0232	0.8400
Monthly exp_sceptic	0.0549	0.0188	0.0040	-0.0045	0.0347	0.8960
CRE parameters						
	Participation equation (first hurdle, probit)			Consumption equation (second hurdle, tobit)		
	Coef.	Std. Err.	P>z	Coef.	Std. Err.	P>z
Trend_conv	-0.0228	0.1061	0.8300	0.0768	0.1001	0.4430
Trend_pos_food inv	-0.0808	0.1017	0.4270	-0.0268	0.0927	0.7720
Trend_pos_conv	-0.0106	0.1015	0.9170	0.1109	0.0978	0.2570
Trend_prod_foc	-0.0177	0.1059	0.8670	-0.2941	0.1446	0.0420
Trend_indiff	0.0441	0.1129	0.6960	0.0567	0.1166	0.6270
Trend_sceptic	-0.0081	0.1168	0.9450	-0.1382	0.1592	0.3850
Trend ²	0.0004	0.0037	0.9170	-0.0024	0.0036	0.4970
Relative price_conv				-39.2257	6.3307	0.0000

	Participation equation (first hurdle, probit)			Consumption equation (second hurdle, tobit)		
	Coef.	Std. Err.	P>z	Coef.	Std. Err.	P>z
Relative price_pos_food inv				-22.3521	7.0697	0.0020
Relative price_pos_conv				-20.2244	4.1775	0.0000
Relative price_prod_foc				-8.6672	10.5265	0.4100
Relative price_indiff				-0.1948	8.0182	0.9810
Relative price_sceptic				39.2998	16.8736	0.0200
Pest_indir_conv	-0.2509	0.1265	0.0470	0.5914	0.1643	0.0000
Pest_indir_pos_food inv	0.0553	0.1359	0.6840	0.5239	0.2014	0.0090
Pest_indir_pos_conv	0.3095	0.1664	0.0630	0.5578	0.2045	0.0060
Pest_indir_prod_foc	-0.0182	0.1379	0.8950	-0.3601	0.4176	0.3890
Pest_indir_indiff	-0.2776	0.2927	0.3430	0.0763	0.2956	0.7960
Pest_indir_sceptic	-0.1013	0.2872	0.7240	-1.0906	0.6435	0.0900
Health_indir_conv	-0.3703	0.0869	0.0000	-0.4761	0.1006	0.0000
Health_indir_pos_food inv	-0.1518	0.0774	0.0500	-0.3209	0.1213	0.0080
Health_indir_pos_conv	-0.2587	0.0945	0.0060	-0.0502	0.0871	0.5650
Health_indir_prod_foc	-0.2231	0.0854	0.0090	-0.8288	0.3136	0.0080
Health_indir_indiff	-0.1124	0.1558	0.4710	0.2768	0.2212	0.2110
Health_indir_sceptic	-0.4684	0.2092	0.0250	0.1462	0.6059	0.8090
Monthly exp.	0.4461	0.0169	0.0000	-0.2468	0.0232	0.0000
Sigma						
Trend_conv	-0.0016	0.0022	0.4840			
Trend_pos_food inv	0.0000	0.0029	0.9860			
Trend_pos_conv	0.0006	0.0032	0.8440			
Trend_prod_foc	0.0061	0.0081	0.4560			
Trend_indiff	0.0029	0.0048	0.5360			
Trend_sceptic	-0.0120	0.0084	0.1540			
Positive and food involved	0.0221	0.0562	0.6940			
Positive and convenient	-0.0485	0.0552	0.3790			
Product focussed	0.1222	0.1220	0.3160			
Indifferent	-0.1735	0.0742	0.0190			
Sceptics	0.1187	0.1496	0.4270			
Constant, Convinced is base	0.4670	0.0346	0.0000			

Appendix B. Calculating Marginal Effects

The probability of being a market participant is the probability of passing the first hurdle, which is modeled by a probit model. It can therefore be calculated as: $P(y_{it1}^* > 0 | w_{it}) = \Phi(w\alpha)$ and the partial effect is calculated as:

$$\frac{\partial P(y_{it1}^* > 0 | w_{it})}{\partial x_k} = \alpha_k \varphi(w\alpha) \quad (B1)$$

for a continuous variable and

$$\frac{\Delta P(y_{it1}^* > 0 | w_{it})}{\Delta x_k} = \Phi(w\alpha^1) - \Phi(w\alpha^0) \quad (B2)$$

for a discrete variable.

Where $w\alpha^1 = w_1\alpha_1 + \dots w_{k-1}\alpha_{k-1} + 1 \cdot \alpha_k$ and $w\alpha^0 = w_1\alpha_1 + \dots w_{k-1}\alpha_{k-1} + 0 \cdot \alpha_k$

This number is interesting since it gives information about which variables have an influence on being a market participant.

The expected value of y_i given that the consumer purchases organic (i.e. the consumer has passed both the first and the second hurdle and therefore we observe a positive purchase) is calculated as:

$E(y_{it} | y_{it} > 0, x_{it}) = x\beta + \sigma \cdot \lambda\left(\frac{x\beta}{\sigma}\right)$ where $\lambda(c) = \frac{\varphi(c)}{\Phi(c)}$ is the inverse Mills ratio. From this we can calculate the

expected value for those households that are participating i.e. has passed the first hurdle

$$E(y_{it} | y_{1it}^* > 0, x_{it}) = P(y_{2it}^* > 0 | y_{1it}^* > 0, x_{it}) \cdot E(y_{it} | y_{it} > 0, x_{it}) \quad (B3)$$

$$= \Phi\left(\frac{x\beta}{\sigma}\right) \left(x\beta + \sigma \cdot \lambda \left(\frac{x\beta}{\sigma} \right) \right)$$

The partial effects for a continuous variable is:

$$\frac{\partial E(y_{it} | y_{1it}^* > 0, x_{it})}{\partial x_k} = \phi\left(\frac{x\beta}{\sigma}\right) \cdot \beta \cdot \left(\frac{x\beta}{\sigma} + \lambda \left(\frac{x\beta}{\sigma} \right) \right) + \Phi\left(\frac{x\beta}{\sigma}\right) \cdot \beta \left(1 - \lambda \left(\frac{x\beta}{\sigma} \right) \left(\beta x + \sigma \cdot \lambda \left(\frac{x\beta}{\sigma} \right) \right) \right) \quad (B4)$$

And for a discrete variable

$$\frac{\partial E(y_{it} | y_{1it}^* > 0, x_{it})}{\partial x_k} = \Phi\left(\frac{x\beta^1}{\sigma}\right) \left(x\beta^1 + \sigma \cdot \lambda \left(\frac{x\beta^1}{\sigma} \right) \right) - \Phi\left(\frac{x\beta^0}{\sigma}\right) \left(x\beta^0 + \sigma \cdot \lambda \left(\frac{x\beta^0}{\sigma} \right) \right) \quad (B5)$$

Where $x\beta^1 = x_1\beta_1 + \dots + x_{k-1}\beta_{k-1} + 1 \cdot \beta_k$ and $x\beta^0 = x_1\beta_1 + \dots + x_{k-1}\beta_{k-1} + 0 \cdot \beta_k \cdot w\alpha^0$ and $w\alpha^1$ are defined above.

The unconditional expected value can be calculated as:

$E(y_{it} | x_{it}, w_{it}) = P(y_{it} > 0 | x_{it}, w_{it}) E(y_{it} | y_{it} > 0, x_{it}) = \Phi(w\alpha) \Phi\left(\frac{x\beta}{\sigma}\right) \left(x\beta + \sigma \cdot \lambda \left(\frac{x\beta}{\sigma} \right) \right)$ and the partial effects for a continuous variable as:

$$\frac{\partial E(y_{it} | w_{it}, x_{it})}{\partial x_k} = \left(\alpha_k \phi(w\alpha) \Phi\left(\frac{x\beta}{\sigma}\right) + \frac{\beta_k}{\sigma} \phi\left(\frac{x\beta}{\sigma}\right) \Phi(w\alpha) \right) \left(x\beta + \sigma \cdot \lambda \left(\frac{x\beta}{\sigma} \right) \right) + \Phi(w\alpha) \Phi\left(\frac{x\beta}{\sigma}\right) \beta_k \left[1 - \lambda \left(\frac{x\beta}{\sigma} \right) \left(x\beta + \sigma \cdot \lambda \left(\frac{x\beta}{\sigma} \right) \right) \right] \quad (B6)$$

And for a discrete variable

$$\frac{\partial E(y_{it} | w_{it}, x_{it})}{\partial x_k} = \Phi(w\alpha^1) \Phi\left(\frac{x\beta^1}{\sigma}\right) \left(x\beta^1 + \sigma \cdot \lambda \left(\frac{x\beta^1}{\sigma} \right) \right) - \Phi(w\alpha^0) \Phi\left(\frac{x\beta^0}{\sigma}\right) \left(x\beta^0 + \sigma \cdot \lambda \left(\frac{x\beta^0}{\sigma} \right) \right) \quad (B7)$$

Where $x\beta^1$, $x\beta^0$, $w\alpha^0$ and $w\alpha^1$ are defined above.

Appendix C. Calculated Average Partial Effects

Table C1. Partial effects for first hurdle $dP[y>0]/dx$, (probability values in parenthesis). Bold indicate significant at 5% level

	Convinced	Positive and food inv.	Positive and conv.	Product focussed	Indifferent	Sceptics
Pest_dir	0.1021 (0.000)	0.0932 (0.0000)	0.0609 (0.0050)	0.0430 (0.0000)	0.0417 (0.0052)	0.0207 (0.0654)
Pest_indir	0.0218 (0.001)	0.0174 (0.0000)	0.0113 (0.0186)	0.0049 (0.0335)	0.0059 (0.1000)	0.0029 (0.2611)
Pest_dir ₁	0.0332 (0.4609)	-0.0464 (0.1089)	-0.0087 (0.8168)	0.0114 (0.5132)	-0.0028 (0.9226)	-0.0205 (0.3338)
Pest_indir ₁	-0.0057 (0.2375)	0.0077 (0.0140)	0.0004 (0.9265)	-0.0026 (0.1798)	-0.0008 (0.7915)	0.0014 (0.5194)
Health_dir	0.0361 (0.0092)	0.0214 (0.0216)	-0.0122 (0.3303)	0.0053 (0.3770)	0.0073 (0.4313)	0.0076 (0.2597)
Health_indir	-0.0141 (0.0000)	-0.0065 (0.0000)	-0.0042 (0.0477)	-0.0036 (0.0006)	-0.0044 (0.0071)	-0.0025 (0.0303)
Health_dir ₁	-0.0103 (0.4408)	-0.0126 (0.1605)	-0.0091 (0.4448)	-0.0075 (0.1960)	-0.0153 (0.0954)	-0.0104 (0.1183)
Health_indir ₁	0.0012 (0.5333)	0.0011 (0.3922)	0.0010 (0.5788)	-0.0009 (0.2761)	-0.0015 (0.2621)	-0.0005 (0.6225)
Monthly exp	0.0331 (0.0000)	0.0148 (0.0000)	0.0088 (0.0312)	0.0055 (0.0062)	0.0039 (0.1856)	0.0069 (0.0016)

Table C2. Conditional partial effects for second hurdle $E[y|y>0]/dX$, (probability values in parenthesis). Bold indicate significant at 5% level

	Convinced	Positive and food inv.	Positive and conv.	Product focussed	Indifferent	Sceptics
Pest_dir	0.0302 (0.1279)	0.0090 (0.5926)	-0.0369 (0.1552)	0.0132 (0.5078)	-0.0994 (0.0498)	-0.0061 (0.8281)
Pest_indir	0.0014 (0.7616)	-0.0019 (0.6228)	-0.0050 (0.3648)	-0.0126 (0.0290)	0.0030 (0.7572)	-0.0049 (0.3955)
Pest_dir ₁	0.0089 (0.8014)	-0.0386 (0.2149)	-0.0398 (0.3691)	-0.0135 (0.6854)	-0.2620 (0.0062)	-0.0634 (0.2667)
Pest_indir ₁	0.0018 (0.6513)	0.0043 (0.1904)	-0.0028 (0.5564)	0.0030 (0.4367)	0.0140 (0.1267)	0.0009 (0.8773)
Health_dir	0.0136 (0.2489)	0.0060 (0.5394)	0.0034 (0.8147)	-0.0116 (0.3242)	-0.0478 (0.0955)	0.0122 (0.5128)
Health_indir	0.0052 (0.0094)	0.0077 (0.0000)	0.0074 (0.0022)	0.0110 (0.0001)	0.0186 (0.0008)	0.0086 (0.0055)
Health_dir ₁	0.0143 (0.1881)	0.0130 (0.1848)	0.0094 (0.4942)	-0.0410 (0.0058)	0.0494 (0.0594)	-0.0445 (0.0525)
Health_indir ₁	-0.0005 (0.7554)	-0.0009 (0.5358)	-0.0018 (0.3709)	-0.0020 (0.2599)	0.0027 (0.4673)	-0.0002 (0.9314)
Relative price	-0.6688 (0.0000)	-0.6476 (0.0000)	-0.7417 (0.0000)	-0.8629 (0.0000)	-0.6238 (0.0424)	-0.8893 (0.0000)
Monthly exp	0.0234 (0.0000)	0.0091 (0.0071)	0.0040 (0.3831)	-0.0081 (0.0726)	-0.0019 (0.8177)	-0.0010 (0.8554)

Table C3. Unconditional partial effects for second hurdle $dE[y]/dX$, (probability values in parenthesis). Bold indicate significant at 5% level

	Convinced	Positive and food inv.	Positive and conv.	Product focussed	Indifferent	Sceptics
Pest_dir	0.0553 (0.0000)	0.0312 (0.0000)	0.0328 (0.0006)	0.0123 (0.0001)	0.0041 (0.4381)	0.0042 (0.1311)
Pest_indir	0.0097 (0.0011)	0.0049 (0.0005)	0.0026 (0.2007)	0.0000 (0.9957)	0.0018 (0.1114)	0.0003 (0.5899)
Pest_dir ₁	0.0176 (0.4447)	-0.0239 (0.0349)	-0.0129 (0.4330)	0.0005 (0.9268)	-0.0202 (0.0446)	-0.0084 (0.1167)
Pest_indir ₁	-0.0016 (0.5184)	0.0035 (0.0045)	-0.0006 (0.7527)	-0.0005 (0.4449)	0.0008 (0.4285)	0.0004 (0.5044)
Health_dir	0.0208 (0.0046)	0.0081 (0.0244)	0.0004 (0.6772)	0.0007 (0.7269)	-0.0016 (0.6180)	0.0024 (0.1599)
Health_indir	-0.0036 (0.0036)	-0.0002 (0.7928)	-0.0001 (0.8918)	0.0002 (0.5397)	0.0002 (0.7670)	0.0000 (0.9609)
Health_dir ₁	0.0019 (0.7866)	-0.0007 (0.8331)	-0.0008 (0.8732)	-0.0051 (0.0124)	-0.0005 (0.8599)	-0.0050 (0.0074)
Health_indir ₁	0.0003 (0.7798)	0.0001 (0.7805)	-0.0001 (0.8918)	-0.0003 (0.2210)	-0.0002 (0.6392)	-0.0001 (0.6186)
Relative price	-0.2882 (0.0000)	-0.1581 (0.0000)	-0.1445 (0.0000)	-0.0225 (0.0000)	-0.0463 (0.0318)	-0.0546 (0.0000)
Monthly exp	0.0101 (0.0000)	0.0022 (0.0059)	0.0010 (0.3765)	-0.0008 (0.0718)	-0.0001 (0.8074)	-0.0001 (0.8463)