

Perceptions, values and behaviour: The case of organic foods

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Abstract

This analysis of the Danish organic food market investigates the relationships between household purchasing behaviour and stated values, motives and concerns. Attention is also given to the importance of sales channels and the functions of labelling. We identify the specific attributes that induce consumers to purchase organic foods, distinguishing 'private' from 'public' valued attributes. Using household level information on stated values and concerns and data regarding real market purchases for approximately 2000 households during the period 1997-2001, the declared values and actual market behaviour of the same households are compared. We find that household propensity to purchase organic foods increases significantly with the declared importance accorded to 'private good' attributes, leading to the conclusion that these values determine the actual level of market participation. The weight that households assign to public good attributes does not contribute significantly to the explanation of household organic budget share. However, since almost all consumers who purchase organic foods do in fact acknowledge 'public good' attributes, these values may also constitute a prerequisite for purchasing organic products.

1. Introduction

Consumption of organic foods has been increasing throughout Europe, not least in Denmark (Giraud, 2003; Hamm, 2002; Wier and Calverley, 2002). Fifteen years ago, organic food was mainly perceived as offering ‘public good’ attributes such as being environmentally friendly and ensuring animal welfare (Beckmann, 2001). However, there are several indications that current demand is focussed upon ‘private good’ attributes, such as personal health, taste and other quality attributes. It is unclear at present to what extent these different priorities reflect the questions posed by researchers at different periods of time, differences in the characteristics of early and later adopters of organic food, or the fact that consumer priorities may themselves have changed (cf. Schifferstein & Ophhuis, 1998; O’Doherty Jensen *et al.* 2001). In addition, increasing concern about food safety, partly driven by the threat of food scandals during the 1990s and later, may play an important role (cf. Beckmann, 2001; Briz and Al-Hajj, 2003; Mitchell, 1998; Richter *et al.*, 2000, Storstad and Bjørkhaug, 2003). This view is supported by the finding that negative information about a conventional product affects consumers who have only an intermediate level of interest in organic foods (Grankvist *et al.* 2004), thereby encouraging more consumers to purchase organic products.

The question is to what extent the current high level of demand is primarily sustained by environmental and animal welfare concerns or by food safety and quality concerns. This is a crucial issue insofar as any assessment of market development rests upon the identification of underlying purchasing motives. If increasing demand is due to increasing food safety concerns, the recurrence of food scandals in conventional food production may be a determinant of future growth. Similar scandals in the organic sector might also have a serious impact on the level of demand. If, however, increasing demand is due to increasing environmental and animal welfare concerns, future growth in the organic sector may be vulnerable to expanding low-input farming in conventional food production. The Danish market for organic foods functions relatively well and does not suffer from serious supply shortages or other barriers to growth, often identified in other markets. For this reason, analysis of the Danish organic market may provide valuable information about prospects for organic food markets in other countries.

The study reported here reveals the underlying motives for purchasing organic foods in Denmark. It is possible to collect and analyse reliable and detailed data on the food purchases of Danish households. Our study distinguishes itself by being based upon household level observations of registered behaviour regarding a large number of organic and conventional foods during 1997-2001, and upon survey data from the same households reporting their stated values, motives and concerns. This combination of data enables us to explore relationships between reported views and actual behaviour. Some of the main barriers to purchasing organic food are identified and, since we had expected that trust would play a key role in this context, we also examine the manner in which trust in labelling and in different types of organic producers, suppliers and products are related to the demand for organic products.

Since data on observed market behaviour have not been available in any country until recently, almost no studies regarding estimations of the demand for organic foods based on actual purchases

have been published previously. The few exceptions are Armand-Balmat (2002), Brombacher (1992), Glaser and Thompson (1998, 2000) and Jørgensen (2001), who have used sales data from Marketing Research Institutes in Germany, USA and Sweden, respectively. Almost all previous studies on organic foods are based solely on postulated behaviour, i.e. stated willingness to pay (see e.g. Beharrell and MacFie, 1991; Bugge and Wandel, 1995; CMA, 1996; Coopers and Lybrand Deloitte, 1992; Drake and Holm, 1989; Fricke, 1996; Grunert and Kristensen, 1995; Jolly, 1991; Krämer et al., 1998; Misra et al., 1991). However, stated willingness to pay may not reflect actual behaviour (Cook 1991; Kramer 1990; Carson et al. 1996; Cummings et al., 1995; Frykblom, 1997; Hansen and Sorensen, 1993).

2. Methods, concepts and data

Consumer utility is derived from consumption of goods, or rather from specific characteristics or quality attributes of goods. According to Lancaster (1994), each good can be distinguished by different characteristics in different proportions, i.e. bundles of attributes. Some attributes are product specific (taste, freshness, texture, nutritional benefits, etc) and can only be enjoyed when eating a specific product. Other attributes, however, may be perceived as “general”, in the sense that they are offered by one good as well as another. In the case of organic goods, this may hold for attributes such as animal welfare, environmental attributes and to some extent health attributes. The consumer may wish to reduce environmental loading, for example, by purchasing both bread and apples from environmentally friendly production units.

In the following, we distinguish various types of product attributes or more general values or benefits. First, we distinguish between private and public goods. *Private goods* can only be consumed by one household (e.g. an organic potato can only be eaten once, in one household). In contrast, *public goods* can be shared (held in common), such that the utility of their consumption by any one household is independent of (and does not exclude) consumption by other households.

Second, consumers who actually purchase organic foods (buyers) may obtain ‘use values’, such as utility from taste, health and freshness, i.e. private good attributes, which can only be enjoyed by actually consuming (eating) the product. In our study, ‘non-use values’ are defined as public good values related to improved environment and/or animal welfare. Other non-use values, not directly treated in this study, are *existence value* (utility from knowing organic farming exists), *vicarious value* (utility from indirect consumption, e.g. reading about or watching a television program on organic farming), *bequest value* (utility from preserving organic farming for future generations), and *altruistic value* (utility from knowing other households are achieving utility). Finally, a further type of value is the ‘option price’, i.e. the value of having the possibility of consuming organic foods at some time in the future (Freeman, 1993).

In our demand modelling, we assume that households exhibit utility maximising behaviour. Differences in utility structure across households can be perceived as arising from differences in household characteristics, as reflected in socio-economic, demographic and attitudinal variables. Our study takes account of these differences by introducing household specific variables directly in the model.

We employ household panel data provided by a market research institute, GfK Denmark, encompassing more than 2000 households' purchases of daily necessities during 1997-2001. Approximately 20% of the sample is replaced each year, and the panel is continuously balanced to ensure a representative sample of Danish households. All data are self-reported. Each household fills in a shopping diary, which is collected and checked by GfK Denmark at regular intervals. The households report product characteristics at a detailed level (type, brand, scanner-code, volume, units, price, organic/non-organic), as well as store choice, date and time of purchase. In addition to these data, GfK registers background information regarding household composition, including the age, gender, education, occupation and income of all household members, as well as geographical location, type and ownership of the home. Further information about this data set is provided by Andersen (2001). For information about the distribution of socio-economic characteristics and representativeness of the households, see Andersen (2002).

Data regarding purchases are supplemented by survey data obtained by questionnaire (available at www.akf.dk/organicfoods) and addressed to all households in the same GfK panel. Information regarding attitudes, perceptions, values and food habits were obtained from 1609 households, corresponding to a response rate of 77%. The survey data focussed particularly on product perceptions, the valued attributes of organic foods as declared by respondents. It is the combination of these two sources of information from the same households that make our data set unique.

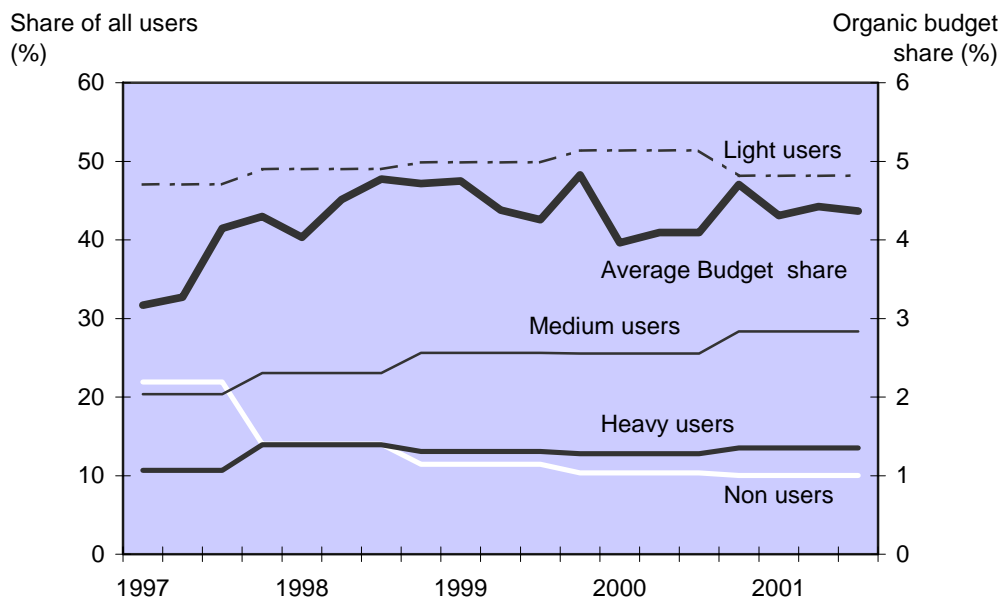
In the present study, we apply various statistical methods. To test significant differences between user-groups, we apply the Likelihood Ratio test for independence in the cross tabulation of responses to specific questions by buyer/non-buyer status. The test compares the observed distribution with the expected distribution under the assumption that the answers are independent of buyer/non-buyer status. To explain actual purchasing behaviour, we apply econometric household level demand modelling. Each household's expenditure function is represented by the AIDS-model (Almost Ideal Demand System, introduced by Deaton and Muellbauer, 1980), in which the optimal budget share for each commodity can be found as a function of relative prices and consumer budget (*cf.* Hansen, 2005). In the present paper, the main focus of analysis is upon household characteristics (stated values and socio-demographic variables). We employ two approaches to this analysis. First, we explain household organic budget share by household characteristics, assuming that all households within a region are offered an identical range of prices on that market. Second, we explain each household's deviation from the average organic budget share, estimated as part of the AIDS model, by household characteristics. In both cases, we apply the ordinary least squares estimator, since we are dealing with linear single equation models under the assumption of normal residuals. For more information on statistical methods and modelling, see Hansen (2005) and Wier *et al.* (2005).

3. The Danish organic food market

The average organic budget share (defined as the ratio of organic food expenditure to total food expenditure) of Danish consumers increased continuously until 1999, fluctuated for a couple of years and then settled

back at the 1998-level, as illustrated in Figure 1 (boldest line). Dividing consumers into four groups according to organic budget share provides additional information on differences between buyer groups. We define *heavy users* as consumers having an organic budget share (all food types) higher than 10%, *medium users* as consumers having an organic budget share between 2.5% and 10%, *light users* as consumers having an organic budget share lower than 2.5%, and finally *non-users* as consumers who do not purchase organic foods at all.

Figure 1. Average organic budget share and distribution of user types, 1997-2001



Note: Average organic budget share is calculated quarterly. Share of all users is calculated yearly.

Source: Own calculations based on GfK purchase data 1997-2001

Figure 1 shows that by 2001 almost every second consumer (48%) was a light user and 28% were medium users. Only 10% never purchased organic foods, while 14% had a very high consumption (heavy users). The share of non-users had decreased continuously during the period 1997-2001, while more consumers had become medium and heavy users during that period.

Market anatomy

Organic budget shares vary considerably between product types. The 25 most sold organic products in 2001 are shown in Table 1. The first column shows the average organic budget share by product types. The second column shows the average price premium for organic products compared to conventional variants

Table 1. Average organic shares by user types and product types (%), 2001.

Average

	Average price premium budget share	price premium (Mix corrected)*	Share of total organic sales	Organic budget shares by user types...			Total organic sales by user type...			
				Organic budget shares by user types... (%)			Total organic sales by user type... (%)			
	(%)			Light user	Medium user	Heavy user	Light user	Medium user	Heavy user	Total Sales
Milk	27.5	1.15	34	4.9	45.4	85.0	9	43	48	100
Oatmeal	24.7	1.15	1	8.8	32.4	67.4	17	38	45	100
Eggs	22.2	1.40	8	6.4	34.7	60.5	15	45	40	100
Carrots	18.8	1.46	3	6.7	22.6	48.4	17	37	46	100
Flour	13.8	1.72	1	1.7	14.8	55.3	6	29	65	100
Fresh pasta	12.1	1.46	0	5.4	13.9	21.0	18	38	44	100
Onions	8.8	1.47	1	2.7	9.1	29.8	15	31	53	100
Rye bread	7.1	1.42	4	2.2	10.0	25.3	17	37	46	100
Butter	6.0	1.39	3	0.3	3.6	38.5	3	15	82	100
Other vegetables	5.8	1.28	6	0.7	2.8	22.6	6	15	79	100
Dry pasta	5.0	1.75	0	1.2	4.2	18.3	12	22	66	100
Yoghurt	4.8	1.13	2	0.8	3.6	24.8	9	23	68	100
White bread	4.4	1.28	5	1.4	6.5	14.4	17	41	43	100
Potatoes	4.4	1.25	2	1.3	5.6	15.3	16	38	47	100
Coffee	4.2	1.29	3	0.3	3.8	27.1	3	25	72	100
Bisquits, Cakes etc.	3.1	1.31	2	1.2	4.2	9.0	22	38	40	100
Cheese	3.0	1.31	5	1.0	3.3	11.3	16	32	51	100
Fruit	2.9	1.53	5	0.5	1.6	12.4	9	17	74	100
Other cereals	2.7	1.13	1	0.7	3.6	8.6	13	35	52	100
Juice	2.2	1.76	1	0.3	2.4	12.1	7	29	64	100
Beef	2.2	1.09	3	0.2	0.9	14.2	5	12	83	100
Other meat	1.9	1.34	2	0.1	1.6	12.0	3	23	75	100
Pork	1.6	1.56	2	0.1	0.5	13.1	3	8	88	100
Frozen vegetables	1.0	2.15	0	0.2	1.1	5.0	14	29	57	100
Other foods	0.8	1.37	6	0.2	0.7	3.6	13	26	61	100
Total	4.4	1.31	100	0.9	5.2	18.1	11	34	56	100
Heavy user	18.1	1.3**	56							
Medium user	5.2	1.2**	34							
Light users	0.9	1.2**	11							
	4.4	1.3	100							

* Average price premium is corrected for differences in product mix between organic and conventional consumption within this product group. The price premium is estimated for the organic consumer basket. This adjustment is necessary, since a large number of conventional products are not available in an organic variant on the Danish market. However, average price premium is only *partly* corrected for differences in product mix between organic and conventional consumption within each product group, since some quality differences are not observable in our purchase data set.

**Average price premium is not mix corrected

Source: Own calculations based on GfK purchase data

of that product. These price premiums are mix corrected. That is to say, figures are corrected for differences in product mix between organic and conventional consumption within this product group (see table note). The third column shows the share of total organic sales by product type. The following three columns show organic budget shares according to user groups and, finally, the last 4 columns show shares of total organic sales by user groups.

In the main, the highest shares are observed for dairy and cereal products. However, the table reveals large differences between user groups. Thus, organic butter, coffee, flour, dry pasta, yoghurt, fruit, juice, frozen vegetables and in particular all types of meat, are primarily purchased by heavy users – the organic budget shares in the other user groups being so low that these groups are only responsible for a minor

fraction of the total consumption of these organic products. In contrast, medium and light users are responsible for more than half the consumption of organic milk, oats, eggs, carrots, fresh pasta, rye and white bread, as well as potatoes. These groups hold lower organic budget shares than heavy users, but since they also constitute a large fraction of all consumers, they contribute considerably to total consumption.

Organic price premiums vary considerably between product types. Highest premiums are observed for frozen vegetables, juice, dry pasta and flour – all of which are primarily purchased by heavy users. Lowest premiums are observed for milk, oats, potatoes, and white bread – all of which are primarily purchased by light and medium users. Thus, heavy users on average pay higher premiums for organic foods than do medium or light users (see lowest part of the Table).

Interestingly, some differences in the general diet pattern (organic as well as conventional products) can be observed between the four user groups (not shown in Table). Thus, demand for fruit and vegetables increases significantly with organic budget share, and correspondingly, demand for meat decreases. These differences may reflect a higher level of health concern among organic buyers. There is also some evidence suggesting that heavy users of organic food may finance some of their organic consumption by reducing consumption of expensive foods such as meat (O'Doherty Jensen *et al.*, 2001; Torjusen *et al.* 2004b).

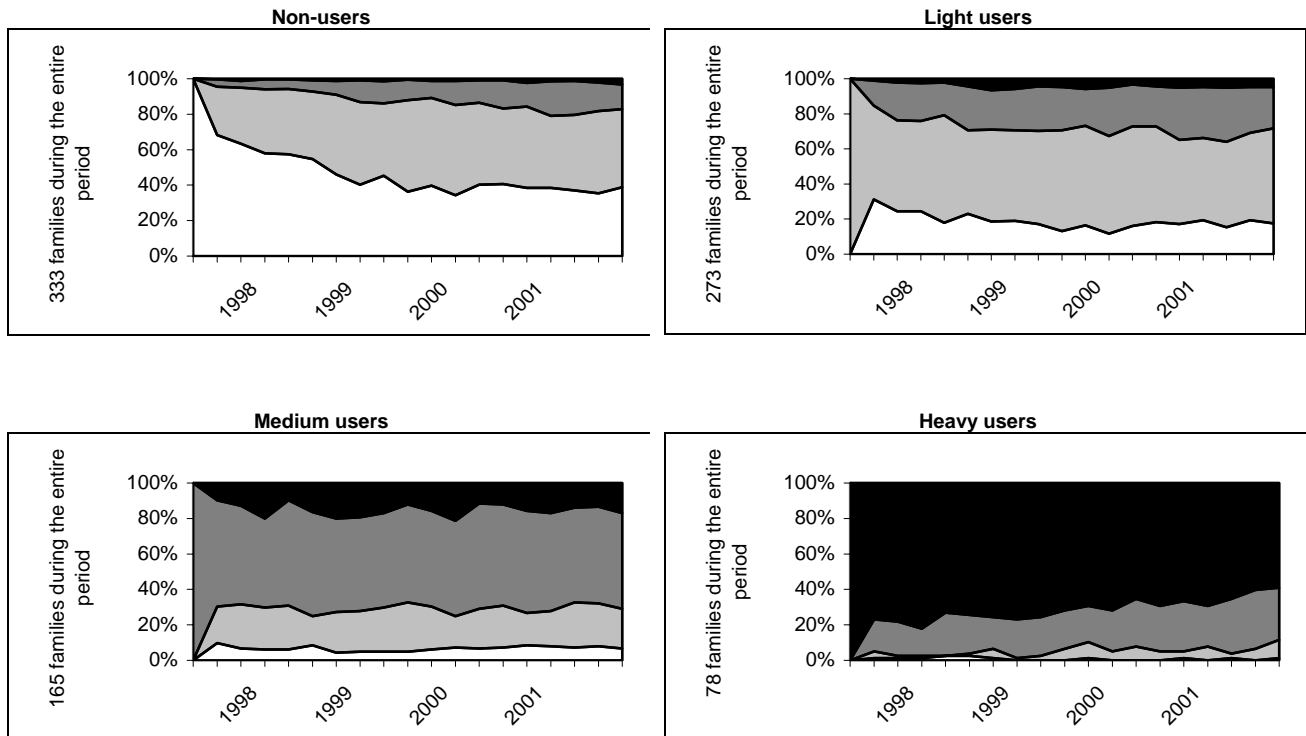
Stability of household demand

The average organic budget shares for all types of organic foods (aggregated) were relatively stable within each user group during the period 1997-2001. Underlying average aggregated developmental trends, however, shifts in product consumption and considerable differences between user groups can be observed. For example, the reduced overall organic share during 1999 was primarily due to decreasing demand for organic meat, bread and other cereal products, as well as such dairy products as butter, yoghurt and cheese. In contrast, the consumption of organic milk and coffee had increased, while demand for organic eggs, fruit and vegetables remained relatively stable during the period. Moreover, these changes in consumption can be broken down by changes in the behaviour of specific user groups. For example, increasing consumption of milk is primarily prevalent among light and medium users, while heavy users are mainly responsible for the growing demand for organic coffee.

However, very interestingly, each user group does not comprise the same households during the period and a significant number of households move from one group to another. Thus, approximately one third of those who were heavy users in 1997 had turned into medium users or (to a lesser extent) light users by 2001. In fact, the sub-group of households that were heavy users in 1997 is the sub-group that reduced their demand for organic foods most (as compared to other households in the panel). The households that left the heavy user group were in fact responsible for a considerable part of the decreasing organic demand during 1999. However, as new heavy users continuously turned up, the heavy user group constituted a slightly

increasing share of all consumers, and also exhibited a stable overall average organic budget share during 1997-2001.

Figure 2 Development in user types depending on base user type



Source: Own calculations based on GfK purchase data, April 1997 to December 2001. Only households that participated during the whole observation period are included.

Similarly, households that were non-users in 1997 increased their demand for organic foods considerably, such that more than half of these households had become light or even medium users by 1999. However, from 1999-2001, no such major changes occurred. In addition, demand increased steadily among households that had been light or medium users in 1997, such that a significant proportion had become new heavy users by 1999. But again, as new households entered the groups of light and medium users, they constituted an increasing proportion of all households, and average organic budget shares remained relatively stable for these groups.

Weatherell *et al.* (2003) suggest that consumers appear to change concerns and attitudes over time – and that consumer choices are capricious, as more pragmatic priorities and trade-offs are prevalent and frequently influence purchasing decisions. This pattern of changing purchasing behaviour is strongly confirmed in our study.

4. Trust: the importance of sales channels and labelling

Sales channels

Table 2 shows the total sales of the 25 main organic products by retail sales channels, revealing that the majority of products in most food groups are sold through supermarkets (58% on average). Discount stores comprise the second largest sales channel, accounting for 25% of all sales. Only 9% are purchased through direct sales channels (farm gate/shops, market stalls, box schemes, etc), while the remaining 8% are purchased through other sales channels such as specialty stores (baker, butcher, green grocer, health store), kiosks, small shops or tank stations.¹

Considerable differences can be observed between product types. Some products are almost exclusively sold through supermarkets (including discount stores). This holds for milk, oats, flour, dry and fresh pasta, butter, yoghurt and other cereals. In contrast, eggs, white bread, potatoes, other vegetables, fruits and in particular various types of meat are to a large extent sold through direct sales channels and specialty shops.

There are also some striking differences between user groups (see lower section of Table 2). Heavy users exhibit the highest propensity to purchase organic foods through direct sales channels, doing 14% of their shopping in this way. In fact, 77% of organic goods sold through direct sales channels are purchased by heavy users (not shown in Table 2). Nevertheless, heavy users do most of their shopping in supermarkets and discount stores (57% and 20% of purchases, respectively). Medium users and light users spend approximately two thirds of their organic budget in supermarkets and one third in discount stores.

Thus, supermarkets constitute the major sales channel for organic foods, including a considerable share of products sold in discount stores. This factor also appears to constitute an important precondition for achieving a high level of organic sales. A number of studies (Vogtmann, 1988; Haest, 1990; Sylvander, 1995; Bugge and Wandel, 1995; CMA, 1996; von Alvensleben and Altmann, 1986; Krämer et al., 1998; Menghi, 1997; Hack, 1995) note that one of the most substantial barriers to market penetration is the difficulty of locating and identifying organic products when only few products are regularly on sale in supermarkets. A considerable number of European markets for organic products suffer from insufficient supplies. However, the distribution of organic products in the EU is increasingly being taken over by conventional supply and distribution channels for sale in supermarkets (Produce Studies, 1998). This is especially true for Sweden, Denmark, Austria, Finland and the UK, in each of which relatively few conventional retail chains and organic food distributors dominate the market (Hamm et al; 2002). Furthermore, in these countries, price premiums are generally low, compared to other countries (Michelsen et al., 1999; Hamm et al., 2002). The indications are that increasing sales volume and increasing sales through supermarkets tend to lower the average price premium (Giraud, 2003; Michelsen *et al*, 1999). In contrast, other countries such as the Netherlands, Luxembourg and Germany are characterized by a quite different structure of distribution (Produce

¹ Quite interestingly, a comparison with the distribution of conventional foods by sales channels reveals that the distribution patterns are similar (not shown in Table). However, the fraction of sales through specialty stores, direct sales and other sales channels is moderately higher for organic foods as compared to conventional foods. Moreover, the fraction of sales through discount stores is moderately lower for organic foods as compared to conventional foods.

Studies, 1998; ITC, 1999; Hamm et al. 2002), Health food stores and direct sales channels have dominated the distribution of organic products for many years in these countries and are still powerful, although their growth is stagnating as compared to the growth of organic products sold through supermarket chains. Higher organic price premiums are also observed in these countries (Giraud, 2003).

Table 2. Average organic shares by product types, sales channels and user types, 2001.

	Share (%) of total organic sales sold in...				
	Supermarkets	Discounters	Direct sales	Other sales Channels	Total sales
Milk	64	35	0	1	100
Oatmeal	46	53	0	1	100
Eggs	57	31	11	2	100
Carrots	50	45	4	2	100
Flour	64	34	1	1	100
Fresh pasta	56	43	0	1	100
Onions	44	50	5	1	100
Rye bread	51	39	1	10	100
Butter	70	27	1	2	100
Other vegetables	22	6	51	22	100
Dry pasta	78	19	0	2	100
Yoghurt	86	12	1	1	100
White bread	73	8	0	18	100
Potatoes	44	35	18	3	100
Coffee	78	16	0	5	100
Biscuits, cakes etc.	75	10	0	15	100
Cheese	65	20	6	9	100
Fruit	55	14	21	10	100
Other cereals	66	32	0	1	100
Juice	68	14	4	14	100
Beef	20	7	53	20	100
Other meat	16	0	66	18	100
Pork	21	0	71	9	100
Frozen vegetables	91	3	0	6	100
Other foods	64	12	7	17	100
Total	58	25	10	7	100
Heavy users	57	20	14	9	100
Medium users	58	32	5	5	100
Light users	64	29	4	3	100

Source: Own calculations based on GfK purchase data

Our survey results indicate that Danish consumers' confidence in products is related to the sales channel through which food is purchased, but not however in unambiguous ways. A little more than half of all respondents state that their confidence is stronger when food products are bought at a specialty shop. Likewise, slightly more than one third state that their confidence is stronger when products are bought

at a farm gate. This viewpoint is significantly more widespread among organic buyers^{2,3}. Almost one fifth of all respondents, however, state that they have less confidence in such products. Likewise, approximately one fourth state that their confidence is stronger when products are bought at a market stall or delivered directly from the producer, while – on the other hand – as much as one fifth state that they have less confidence in products purchased in this manner. Finally, approximately one fifth of respondents state that their confidence is stronger when products are purchased at a supermarket (significantly fewer organic buyers state this), while barely one in fourteen state that their confidence decreases. These results indicate that consumer confidence varies across sales channels, but considerably heterogeneity in this variation is observed between households. Thus, although supermarkets constitute the main sales channel for organic food purchases in Denmark, this cannot be attributed to greater confidence in the sales channel, as such.

Information and labelling

There appear to be two ways in which producers can seek to increase the trustworthiness of products (and consumers can ensure authenticity). The first is by means of direct personal contact between the consumer and producer/seller, making it possible for the consumer to obtain specific points of information about producers and products. This is possible when foods are purchased at farm gates, market stalls or in specialty stores. The second way is by means of product labels and the provision of information on packaging (Torjusen *et al.*, 2004a). Three out of four respondents in our survey state that their confidence in the quality of food products is stronger when information about where and how the product is produced is provided on the packaging. This pattern holds to a greater extent among organic buyers.

For organic goods sold in supermarkets, which are most often sorted and packaged at large-scale industrial units, labeling is the only means by which consumers can identify organic goods. Since it is impossible for consumers to check the authenticity of these products, it is necessary to build up a control system with clearly defined rules regarding production methods and labeling of certified organic products (McCluskey, 2000). Earlier consumer studies have indicated that trustworthy labels guaranteeing organic production are very important to consumers, and that clear unmistakable labeling is an important pre-condition for choosing organic products (Tripp *et al.*, 1997; Hack, 1995; Sylvander, 1995).

Our survey results document that the national Danish organic label is well known to Danish consumers, being recognised by 93% of all respondents. In general, people have a good understanding of the organic

² This is tested using a Likelihood Ratio test for independence in the cross tabulation of responses to the specific question by buyer/non-buyer status. The test compares the observed distribution with the expected distribution under the assumption that the answers are independent of the buyer/non-buyer status. The degrees of freedom are: (number of possible answers - 1)*(number of possible states (2) - 1) = number of possible answers - 1. In all cases, significance is at least on the 5% level.

³ Buyers are in this context medium and heavy users, i.e. households having an organic budget share > 2.5. We have tested alternative buyer/non-buyer definitions, and in general, the observed differences are not sensitive to changing definition. Alternative definitions are related to other budget shares values (e.g. higher than 5%), budget shares for specific products, stated willingness to pay, or households with the 10% or 25% highest budget shares (the highest decile/quantile).

rules. Surprisingly, there are almost no significant differences between buyers and non-buyers in regard to their knowledge of the rules behind the organic label. Most respondents (59%) have general confidence in domestic products carrying the Danish organic label, although only 29% have general confidence in foreign products carrying the same label. Trust in organic products that do not carry this label is low – especially for foreign products. Thus, the Danish organic label – being trusted and well known – appears to function as an effective instrument of information provision to consumers, making it possible for them to distinguish organic from conventional products.

Respondents commonly think it important that the rules currently regulating the production and processing of organic foods should be stricter, especially with a view to protecting ground (drinking) water, the use of additives, pesticides and medicines. Next in line among consumer concerns are the use of gene technology, use of colouring agents in food processing, and animal welfare. Least important are protection of wildlife and nature, use of fertilisers, saving of energy resources and environmentally friendly packaging (in that order). Buyers are significantly more dedicated to raising the demands incurred by rules and regulations, as compared to non-buyers.

However, the majority of respondents (and significantly more among buyers) nevertheless believe that the rules of organic production are good enough to ensure the ‘public good’ attributes of animal welfare and a better environment. Only a few respondents (14-16%) disagree with statements to this effect. In regard to ‘private good’ attributes, 72% believe that organic products are healthier, and 44% also consider this attribute to be of some or even great importance; 64% think organic products taste better, and 36% also consider this characteristic important. Finally, 57% perceive organic foods as being fresher than conventional foods, and 31% consider this important. All of these ‘private good’ attributes are acknowledged by significantly more buyers than non non-buyers.

Generally, organic buyers have a significantly higher level of trust in several types of labelling. This pattern holds for the Nordic Swan label (an environmental label for non-food products), labels ensuring products to be salmonella- or campylobacter free, or labels carrying assurance of animal welfare. A majority of respondents (between 66% and 82%, depending on the label at issue) feel that the risk of falling ill, increasing environmental loading or lowering the level of animal welfare, is reduced when the product is labelled, and trust in these labels is significantly higher in all cases among buyers than non-buyers. However, consumers also tend to believe that the Danish organic label is more comprehensive than it actually is. For example, approximately 26% of respondents believe that a product carrying the organic label also carries a lower risk of bacterial contamination (from chicken) and mad cow disease (from beef), while only 3-4% believe these risks become greater. These results suggest that the rules of organic production are commonly perceived as ensuring enhanced food safety, even in regard to food safety risks that are not directly covered by these rules. This pattern suggests in turn that the organic label works in two ways. First, it functions as a distinctive label, enabling the identification of organic products and assurance of their specific benefits. Second, it appears to function in a broader and somewhat more vague manner, which is interpreted by consum-

ers as signifying more universally benign outcomes, such as generally enhanced food safety. These results thus lend support to the view that demand for organic food products is related to consumer concerns about food safety.

5. Valued attributes: stated values and actual purchasing propensity

In the present study, we identify stated valued attributes in various ways: for organic goods in general, and for four specific organic products (milk, rye bread, potatoes and minced beef).

Most studies show that health considerations play a major role in consumer preferences for organic foods. Other important attributes are environmental, animal welfare and quality attributes (Beckmann, 2001; CMA, 1996; von Alvensleben, 1998; Meier-Ploeger et al., 1996; Sylvander, 1995; Land, 1998; Byrne et al, 1994; Huang, 1996; Huang et al., 1990; Jolly, 1991). Somewhat surprisingly, most respondents in the present study state that improved animal welfare and environmental protection are the two most important features of organic production. Health attributes are rated as third most important, while taste and freshness are ranked as least important.

Most respondents who perceive organic products as being healthier believe they are healthier because of the absence of pesticide and medicine residues. Other (minor) reasons are absence of synthetic additives, colouring agents and GMOs. Least emphasis is given to the possibility of organic products having fewer bacteria or having a higher vitamin and mineral content. Thus, the health attribute appears to be primarily related to the product being free from pesticide and medicine residues (and consequently expected to be healthier). Interestingly, no major differences in valued product attributes are observable between product types.

When all organic attributes are aggregated either to use-values (defined as private good attributes only enjoyed when actually eating the product, e.g. such as health, taste, freshness, etc.), or non-use values (defined as public good attributes enjoyed independently of actually eating the product, e.g. animal welfare, environmental attributes, etc.; *cf.* section 3), some remarkable results emerge. Public good values are assigned approximately twice as much weight (importance) on the Likert scale as private good values (for exact weights and standard deviations, see Wier *et al.*, 2005). Approximately two thirds of total value can be assigned to public good values, leaving one third assigned to private good values. This result holds across product types, as well as for organic goods in general. Furthermore, the median and standard deviations indicate virtually identical distributions, since medians and standard deviations do not vary very much across product types (*cf.* Wier *et al.*, 2005).

Before jumping to the conclusion that people primarily purchase organic foods for environmental and animal welfare concern reasons, we undertook some additional analyses. To find out what stated values mean for actual willingness to pay on the real market, we combined information on stated values for organic goods with actual purchasing behaviour. Of the 1191 households who responded to the question on values associated with organic goods in general, we have purchase data for 1165 of these respondents for the year 2001. Interestingly, it transpired that households holding both public and private good values also maintain a high organic budget share on the real market. The respondents can be divided into 4 groups, as shown in Table 3. Households holding both types of values constitute 66% of all households and have an average organic budget share of 5.5%, households holding only public good values constitute 16% and display an average organic share of 2.5%, and households holding neither of these value types constitute a further 16% and spend an average organic share of 1.2%. The fourth group, households holding use-values only, is negligible (1%). It is noteworthy, that 98% of the households holding private good values also hold public good values. Thus, consumers can hold public good values without holding private good values, while the opposite does not hold true. Those who hold private good values with respect to organic foods, hold public good values as well.

Table 3. Perceived organic product attributes and average organic budget share, 2001

	Public good values (environmental and animal welfare attributes)	No public good values (no environmental or animal welfare attributes)
Private good values (health, taste & freshness attributes)	Average organic share: 5.5 (66% of all households)	Average organic share: 3.5 (1% of all households)
No private good values (no health, taste & freshness attributes)	Average organic share: 2.5 (16% of all households)	Average organic share: 1.2 (16% of all households)

Note: N=1165 households

Source: Own calculations based on own survey data and GfK purchase data

These results suggest that while non-use benefits are generally acknowledged, only those who also hold private good values actually purchase organic foods with considerable frequency. Households holding both types of values purchase more than twice as much organic foods as households holding public good values only. And again, these households (holding public good values only) purchase more than twice as much organic foods as households that hold neither private- nor public good values. A precisely similar pattern is observed in regard to specific product groups.

Modelling the effects from stated values on actual purchasing propensity

In order to explore this further, we undertook a regression analysis, using each household's stated importance (5 points scale) of various use and non-use attributes for organic goods in general to explain the household's average organic budget share for all food types. More specifically, the model explains average weekly organic budget share for each household during 1997-2001, using stated values (private and public good values), a variable measuring health risk perception in relation to pesticide residues, and main stated purchasing barriers as explanatory variables. These barriers were introduced to the analysis in order to measure the importance of lack of interest and lack of trust respectively. Some consumers, who assign values to organic product attributes, may at the same time be unresponsive or uninterested when it comes to actual shopping behaviour, either because they are not really dedicated or because they do not really trust organic goods. Finally, we control for the effect from household characteristics, such as income (approximated by total food expenditure⁴), urbanisation, age of the oldest person in the household, presence and age of children, and educational level of the most highly educated person in the household.

The estimation results are shown in Appendix A⁵, revealing that stated private good values have a significant effect on the organic budget share. Very interestingly, the contribution from stated public good values is not significant. The effect of private good values is significant even when controlling for various household characteristics, health risk concern and main stated purchasing barriers. We find that lack of trust in control, lack of interest in organic goods (i.e. feeling that there are many other things to spend money on), (stated) lack of knowledge about organic goods, and lack of trust in any health effect from eating organic goods (due to the existence of many other risk factors in everyday life), are all factors that significantly reduce organic shares. Health risk concern about eating foods with pesticide residues increases organic budget share significantly.

Higher disposable household income (approximated by total food expenditure), age and educational level all significantly increase organic budget share, as does the presence of children younger than 15 years old. Very remarkably, the presence of children aged 15 to 20 years (living at home) has the opposite effect: the presence of older children reduces organic shares. This difference indicates that health concern is more prevalent among parents of young children. Urbanisation also influences organic shares significantly. Household organic shares are higher in urban areas, especially in the capital and its surroundings, while the lowest shares are observed in the western areas of rural Denmark.

An important presupposition of this model analysis is that all households are confronted with the same relative prices within a given period, within a given region.⁶ However, this condition may not be

⁴ We have applied discrete income brackets as well and the results are not sensitive to alternative income measures.

⁵ Almost identical results are found when using Logit modelling (Millock et al, 2004), in which we estimate the probability of being in a specific buyer group using same explanatory variables.

⁶ The geographical variable probably captures some of the effects from relative prices, since organic price premiums vary somewhat across regions. For milk, (where corresponding prices for organic and conventional products of equal

fulfilled in practice since local prices may differ considerably within each region. This does not undermine the analysis providing that most consumers shop in a large variety of stores, because in that case it can be assumed that all households within a region are confronted with a similar range of prices. The vast majority (88%) of all households in the panel have in fact done their shopping in more than 5 stores during 2001, but there may, however, still be significant differences in relative prices between households. In principle, these differences could change the regression results, making several of the explanatory variables insignificant. In order to take account of the importance of relative prices, we also employed another approach. As part of our study, we estimated an AIDS model (see Section 2), using the GfK panel data (for documentation and results, *cf.* Hansen, 2005). We employ a micro-econometric demand model explaining organic budget shares, in which each household's deviation from the average demand for organic foods is estimated as household specific constant term (fixed effects), in principle capturing all differences due to variations in socio-economic characteristics and such factors as attitudes and values among households. In the following, we utilize results from the demand modelling to explain the household specific fixed effects with household specific characteristics. Appendix B shows estimation results analogous to the model presented in Appendix A. However, instead of explaining observed household specific organic budget shares, we now explain the household specific deviations from average organic budget shares (i.e. the fixed effects/ household specific constant terms). Thus, we employ the same explanatory variables as before, but now explicitly taking account of the effect of differences in relative prices by using the household specific constant terms. The household specific constant terms take the effects from price variations into account, since they are estimated in a traditional demand system specifically dealing with these price effects. Demand for three major food groups is modelled: dairy products, cereal and bread products, and other foods (including meat, fruit, vegetables, etc.).

The regression results presented in Appendix B reveal that this analysis of household specific constant terms changes the previous results significantly. The main conclusion holds: The households' stated private good values (assigned to organic goods) increase organic budget shares significantly, while stated public good values have a positive, but insignificant contribution. However, when relative prices are introduced in the model (through regressing on household specific constant terms) as presented in Appendix B, some stated barriers for purchasing organic foods, and most socio-demographic variables, are rendered no longer significant. This may be explained by some of the variation, otherwise explained by a number of characteristics, really being due to variations in relative prices. But it is also important to note that the number of observations included in the analysis presented in Appendix B is much lower than that in Appendix A,

quality can be compared as most quality differences such as fat content, dairy, etc are observable from the purchase data set), price premiums appear to be highest in western rural areas and lowest in the capital area, thus mirroring the regional differences in organic shares.

making it much more difficult to estimate significant parameters.⁷ By and large, each variable has the same influence (positive or negative), but generally not at a significant level.⁸

Consequently, for (almost) all types of organic food, we can conclude that even though households assign highest values to the non-use attributes, it is the valued *use attributes* that influence actual purchases. It is worth remarking, however, that public good attributes are widely recognised and valued. Public good attributes are acknowledged by 82% of all respondents and by almost all organic buyers. Thus, it is possible that the recognition of these attributes represents a prerequisite for buying. Consequently, we can conclude that assigning values to the non-use attributes may function as a necessary (but not sufficient) precondition for purchasing organic foods. However, assigning values to private good attributes appears to constitute both a necessary *and* a sufficient condition, determining the extent to which organic foods are actually purchased.

Further research is called for in the light of these findings with specific regard to the adequacy of the distinction between ‘public’ and ‘private’ attributes, as operationalised in the present study. There is ample evidence that consumers value health, taste, freshness and other quality attributes in connection with most food purchases, whether organic or conventional foods are at issue. The specific contribution of ‘public’ good attributes to preferences for organic foods therefore needs to be better understood. Moreover, the categorisation of ‘health’ as an attribute that belongs exclusively to the sphere of ‘private’ use values may not be an adequate way of conceptualising the health concerns of consumers. It is noteworthy that the ‘health’ concerns of respondents in the present study focussed upon the use of pesticides and medicines in agricultural production, practices that are closely related to environmental concern on the one hand and to animal welfare concerns on the other. It has been found that environmental and health concerns are closely interconnected in the minds of consumers (Torjusen *et al.* 2004a), a pattern that has also been identified in a recent study of heavy users of organic food in Denmark (O’Doherty Jensen, 2004).

6. Conclusions

The Danish organic food market is characterised by very high organic market shares. Our purchase data reveal that this holds true especially for organic dairy products, cereals and vegetables (in that order). Milk has the highest organic share and consumption of organic milk constitutes 27.5% of total milk sales and 34% of total organic sales. Together with organic oats, organic milk has the lowest price premium.

⁷ Number of observations has decreased since in the modelling presented in Appendix B we apply fewer time series observations (each period is aggregated to 14 weeks, 2001 not included), and fewer households (only households purchasing organic dairy products, organic bread and cereal products and other organic foods in the data period) are included.

⁸ Significant effects are, however, observed for urbanisation, presence of older children in the household and education, all of which have a significant effect on demand for organic bread and cereals – for education this holds for demand for other organic foods as well. The purchase barriers have mainly significant negative influence on demand for organic dairy goods, and concern about pesticide residues has significant influence on demand for other organic foods (including fruit and vegetables) only.

On average, heavy users purchase more than half of all organic products, but major differences between product types are also observed. Several significant differences in stated values, concerns and perceptions between organic buyers and non-buyers are observed. However, the buyer groups are not homogeneous, in the sense that large variations are observed within each group. This observation is also supported by the fact that a considerable fraction of households change their behaviour, moving from one buyer group to another, during the observation period.

One out of six respondents do not acknowledge any benefits in regard to organic foods. Furthermore, one out of six acknowledge environmental and animal welfare attributes only. However, a large majority – two thirds of all respondents – acknowledge and value organic goods for their environmental and animal welfare attributes (public good attributes), as well as for health, taste and freshness attributes (private good attributes). When combining household level information on stated valued organic product attributes with the actual market behaviour of these same households, it becomes evident that the propensity to purchase organic foods increases significantly with the weight assigned to private good values. The weight assigned to public good values is not significant. That is, households' acknowledgement of public good values does not explain the actual extent of market participation, as measured by the households' organic budget share. Nevertheless, since almost all households that purchase organic foods do in fact acknowledge public good values, these values may also represent a prerequisite for buying. The main conclusion, however, is, that even though most households assign values to public good attributes, it is the valued private good attributes that determine the extent to which they actually purchase organic foods.

The variation of organic shares and valued organic product attributes among family types is related to specific household characteristics. For example, higher disposable household income (approximated by total food expenditure), age and educational level all significantly increase the organic budget share, as does the presence of children younger than 15 years. Remarkably, the presence of children aged 15 to 20 years (living at home) has the opposite effect: the presence of older children reduces organic shares. Barriers that significantly influence the propensity to buy organic are lack of trust in control measures, lack of interest in organic goods, and lack of trust in any health effect from eating organic goods (due to the existence of many other risk factors in every day life). Not surprisingly, concern about health risk arising from eating foods that contain pesticide residues increases organic budget share significantly.

Our survey results suggest that product information is highly valued by respondents, and this holds for various types of information such as branding, labelling and information on packaging with regard to origin or other characteristics of producers or production methods. In the case of the Danish organic market, information provision is particularly important, because most sales take place through supermarkets and discount stores, in which it is not possible to establish a direct personal contact with either producers or sellers. When information cannot be obtained and trust cannot be established by means direct personal contact, standardised information provision is the alternative in practice. The most important information type con-

cerning organic food is labelling, and the well-known and trusted Danish organic label appears to constitute a key element in sustaining this market.

The Danish market for organic foods is concentrated, being dominated by relatively few supermarket chains, distributors and food processing industries. The concentrated structure ensures effectiveness, sufficient supplies of homogenous qualities and low price premiums, inducing consumers to purchase organic. However, further concentration and industrialisation may be perceived as contradicting organic principles and may tend to lower consumer confidence in the future (*cf.* Torjusen *et al.* 2004a). The current confidence of Danish consumers in organic foods relies heavily on information provision in general and on one single trusted organic label in particular. The heavy dependence of mainstream channels on trusted labelling schemes is also a factor that renders concentrated markets potentially vulnerable. If one or more of the major suppliers to such a market compromises notably with regard to the more important organic regulations, any tendency to consumer disapproval may rebound on the entire market, rendering its concentrated structure and heavy reliance on trusted labels highly vulnerable.

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APPENDIX A. Regression results, model explaining household organic budget share, 1997-2001

	All food types ¹		Dairy goods ²	Bread and cereals ²	Other foods ²
	Parameter	<i>Standard deviation</i>			
Intercept	2.40*	<i>0.93</i>	2.50	2.23*	2.12
<i>Stated values</i>					
-Stated private good values	1.06**	<i>0.11</i>	0.96**	0.90**	1.04**
-Stated public good values	0.07	<i>0.11</i>	0.09	0.26	0.13
<i>Purchasing barriers</i>					
-No trust in control of organic farming	-0.89**	<i>0.17</i>	-0.88**	-1.04**	-1.03**
-No interest in organic foods (many other things to spend money on)	-0.68**	<i>0.19</i>	-1.07**	-0.83**	-0.70**
-No trust in health effect from eating organic foods	-0.91**	<i>0.18</i>	-0.87**	-1.16**	-1.04**
-Not enough knowledge about organic foods	-1.20**	<i>0.17</i>	-1.40**	-1.17**	-1.32**
Pesticide/medicine residue health concern	0.85**	<i>0.15</i>	0.90**	0.70**	0.94**
<i>Regions, western rural area is base</i>					
-Capital area	1.89**	<i>0.36</i>	1.54**	1.61**	1.76**
-East Denmark (except from capital area)	0.59	<i>0.34</i>	0.42	0.62	0.53
-Western towns and uplands	1.38**	<i>0.34</i>	1.25**	1.38**	1.47**
<i>Education length, lowest level is base</i>					
-Short	0.80*	<i>0.20</i>	0.67	0.62	0.65
-Medium	1.95**	<i>0.30</i>	2.12**	1.89**	2.29**
-Long	1.72**	<i>0.48</i>	1.47*	1.88**	1.63**
Age of oldest person in household (categories)	0.20*	<i>0.10</i>	0.22	0.33*	0.23*
<i>Presence of children</i>					
-Children between 0-14 years	0.86**	<i>0.31</i>	0.96*	0.85*	1.03**
-Children between 15-20 years	-0.85*	<i>0.34</i>	-0.52	-0.59	-0.82*
Log (Total weekly food expenditure per consumption unit)	0.93**	<i>0.27</i>	0.56	1.04**	0.74*

Notes:

1. Observations from all families in the sample

2. For reasons of comparability, only observations from families included in model estimates shown in Appendix B.

* Significant at 5% level

** Significant at 1% level

APPENDIX B. Regression results, model explaining household specific constant terms from model for demand for organic goods, 1997-2000

	Dairy goods		Bread and cereals		Other foods	
	Parameter	Standard deviation	Parameter	Standard deviation	Parameter	Standard deviation
Intercept	35**	4.14	16.77**	3.14	1.48	1.00
<i>Stated values</i>						
-Stated private good values	1.71**	0.60	0.89*	0.42	0.28*	0.14
-Stated public good values	0.18	0.63	0.26	0.46	0.13	0.15
<i>Purchasing barriers</i>						
-No trust in control of organic farming	-2.53**	0.97	-1.26	0.70	-0.51*	0.23
-No interest in organic foods (many other things to spend money on)	-2.84**	1.04	-1.50*	0.73	-0.40	0.25
-No trust in health effect from eating organic foods	-1.39	0.99	-1.12	0.71	-0.40	0.24
-Not enough knowledge about organic foods	-2.10*	0.98	-0.96	0.70	-0.59*	0.23
Pesticide/medicine residue health concern	0.27	0.83	-0.31	0.60	0.55**	0.20
Regions, western rural area is base						
-Capital area	1.18	1.95	4.09**	1.44	0.67	0.48
-East Denmark (except from capital area)	-0.31	1.92	1.46	1.38	-0.03	0.47
-Western towns and uplands	-1.02	1.90	0.30	1.42	0.62	0.47
Education length, lowest level is base						
-Shorter	1.00	1.76	-0.36	1.24	-0.30	0.42
-Medium	3.32	1.74	4.68**	1.26	1.09**	0.41
-Long	4.77	2.50	2.61	1.87	0.61	0.60
Age of oldest person in household (categories)	0.56	0.51	0.56	0.39	0.17	0.12
Presence of children						
-Children between 0-14 years	2.39	1.72	-1.64	1.26	0.50	0.42
-Children between 15-20 years	0.34	1.85	-2.71*	1.29	-0.54	0.45
Income (discrete income categories per consumption unit)	0.56	0.49	-0.05	0.35	-0.01	0.11

Notes:

* Significant at 5% level, ** Significant at 1% level