

**Willingness to Pay for Organic Foods:
A Comparison between Survey Data and Panel Data from Denmark**

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Abstract

We present a project aiming at estimating the willingness to pay for organic foods through panel data and a survey. The panel data is based on weekly reporting of household purchases by 2000 Danish households with information on their demographic and socio-economic characteristics. Detailed information on organic foods exist from 1997. A questionnaire asking consumers to distinguish and rank various food attributes will be sent out to all households in the sample in June 2002. For survey purposes, organic foods are defined as products carrying the Danish state label guaranteeing public control and certification of organic production. The food product attributes include environmental concerns, animal welfare, and food safety (health concerns). Here we present the results from the pilot study sent out in 2001 to 400 randomly chosen households, representatively distributed on geographical regions however. Among the results we note that the order of valued attributes do not differ across organic product types and that avoidance of chemicals is the highest valued attribute. We also present some preliminary estimations on purchase data in order to compare the contingent valuation results with observed willingness to pay. Both valuation methods entail uncertainty, and a comparison may indicate the magnitude of this.

1. Introduction

Demand for organic foods has increased considerably during the past decade, though organic consumption still only constitutes a few percent of total food consumption in most countries. This growth has been especially high in Denmark, which is estimated to have the highest per capita consumption in the world (Wier and Calverley, 2002). The Danish market is especially well suited for consumer analyses, because the Danish market for organic foods is relatively mature, meaning that it does not suffer seriously from the supply shortages and barriers which dominate most of the markets outside Denmark. This holds especially for organic dairy and cereal products, since these products exhibit higher budget shares than other organic products, and to a lower extent for meat products. This means, that the Danish organic market may offer information about future markets of organic foods in other countries. The well-functioning Danish market makes it possible to collect and analyse reliable data on purchases. As such data is not found in any country until recently, almost no studies on the estimation of the demand for organic foods based on actual purchases have been published previously. The few exceptions are Brombacher (1992), Glaser and Thompson (1998, 2000) and Jørgensen (2001), who all use sales data from Marketing Research Institutes from Germany, USA and Sweden, respectively. Our study distinguishes itself by being based on observations of stated as well as actual purchasing behaviour of a large number of organic as well as conventional foods. Almost all previous studies on organic foods are based solely on postulated behavior, i.e. stated willingness to pay. Several studies (Beharrell and MacFie, 1991; Bjerke, 1992; 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; Scan-Ad, 1998) report consumer interviews about their willingness to pay for organic foods, and thus hold information on this issue. However, stated willingness to pay may not reflect revealed behaviour (Cook 1991; Kramer 1990). The literature on contingent valuation (CV) has studied the issue of strategic bias in depth. For quasi-public goods, Carson et al. (1996) undertook a large meta-study of 616 estimates from 83 studies where CV estimates were compared to revealed preference estimates for the same good. Based on the sample of 616 comparisons, the mean CV/RP ratio was 0.89. Other studies typically find that hypothetical (stated) willingness to pay exceed revealed willingness to pay (Cummings et al., 1995; Frykblom, 1997). In our particular context, Hansen and Sorensen (1993) conducted both (in-store) interviews and (in-store) experiments on purchases of organic products. When comparing results from these two different approaches, they found

that elicited willingness-to-pay has a tendency to be overestimated in comparison to “real” willingness-to-pay from experiments.

2. The Danish Market

2.1. Budget shares, price premiums and growth of organic products

Figure 1 shows the development in budget shares and organic price premiums (four-weekly observations) of 3 aggregated organic products between April 1st, 1997 and December, 31st, 2000. The budget share is defined as the ratio of budget of organic on total foods, and average price premiums are calculated as the mean of individual price premiums within the group, using individual good budget shares as weights.

[Insert Figure 1 about here]

Dairy products hold the highest budget share, followed by cereal products. The Danish market for organic foods has been growing until recently. There is a steady upward trend in the budget shares for dairy products and cereal products (bread, flour, cereals, pasta, rice, etc) until late 1999. From the middle of 1999 and onwards, budget shares were decreasing somewhat for these two food groups. Analogously, average price premiums have decreased continuously for dairy products and cereals until the middle of 1999. From mid-1999 onwards, no clear trend in development of price premiums can be observed.

The group of ‘other foods’ (including meat, fruit and vegetables) has much lower budget shares and much higher price premiums than the dairy and cereal products do, and no clear trend can be observed.

Within the aggregated food groups, a large variation in budget shares can be observed. Table 1 shows various estimates for the 5 most established products within each food group for the period of April 1st 1997- December 31st 2000. For each product, the table shows the average budget share and the average percentage organic price premium (and the corresponding standard deviations), the average organic consumption in EURO per family per week, and the average annual growth in this weekly consumption. Milk and eggs hold equally high budget shares at 23 per cent, followed by carrots, rye bread and pasta. The lowest price premiums are observed for cereals, various dairy products, rye bread and eggs. The highest price premiums are observed within the group of other foods, for oil, carrots and onions. This group also encompasses meat products (not shown in Table 1, as no meat products reach top

5), where lamb holds the highest budget share (budget share 5.8 per cent, price premium 22 per cent), followed by minced beef (budget share 2.2 per cent, price premium 58 per cent).

During the whole period, the highest growth is experienced for products in the bread and cereal group, as many of these products have been introduced during the period 1997-2000. Consumption of organic oil, cream, cheese and potatoes have actually decreased. Carrots and onions, which have been supplied since the 1980's, have experienced low growth rates too. Looking at annual growth rates (not shown in Table), a general pattern of decreasing growth rates can be observed for almost all food types. Until 1998, the organic consumption was still booming, but negative growth rates are observed from 1999 and onwards for many products.

A large variation (see standard deviations in the table) in average price premiums can be observed, due to variations in product types and qualities within the product group, variations due to differences in sales channels and geographical location, and variations due to differences in observation time. The lowest variation is observed for the dairy group. The highest variation is observed in the group of other foods, where there are large quality differences – for example due to seasonal variation in the quality of carrots and potatoes.

[Insert Table 1 about here]

2.2. Is the Danish market different?

There are substantial differences between the European countries in their consumption of organic foods (Wier and Calverley, 2002; Michelsen et al., 1999) and these differences cannot be explained solely by differences in consumer preferences. Wier and Calverley (2002) argue that differences across countries are not only due to differences in consumer demand for organic foods, but also to market barriers, which prevent the potential demand being fulfilled.

Most studies show that consumers primarily buy organic food because of health considerations (CMA, 1996; von Alvensleben, 1998; Meier-Ploeger et al., 1996; Sylvander, 1995; Infood, 1997, 1998; Land, 1998; Scan-Ad, 1998; Coopers and Lybrand Deloitte, 1992; Byrne et al, 1994; Huang, 1996; Huang et al., 1990; Jolly, 1991). German consumers, for example, are very concerned about health and food safety (Kafka and von Alvensleben, 1998). Brunsoe (1996) and Brunsoe and Bredahl (1997) compare consumer segments in various European countries, and show that German consumers are more interested in organic food than Danish consumers. But the market share of organic food in Germany is

considerably below the market share in Denmark where, in spite of having the world's highest consumption of organic food per capita, consumers are not very concerned about health and food safety (Kafka and von Alvensleben, 1998).

In Denmark, consumption of organic foods was low until 1993, the general market share of organic foods being less than 1 - 2 per cent. Until 1993, the main driving force behind the expansion of the organic foods market was government subsidies and advisory services to organic farmers during the conversion period (Hamm and Michelsen, 1996). However, consumption began to increase in 1993, when supermarkets lowered the prices of organic products by 15 to 20 per cent, increased supply considerably, and initiated intensive marketing of organic products (Hamm and Michelsen, 1996).

The current Danish market fulfills three important conditions for a well-functioning market. First, in Denmark, organic foods are primarily sold through conventional supermarkets, ensuring stable supplies and promotion of organic products where most of the consumers do their shopping already. Second, Denmark has a very well functioning and trustworthy labeling and certification program. Third, price premiums for organic products are in most cases relatively low. In most other countries, at least one of these barriers is prevalent (Michelsen et al., 1999).

Distribution and sales channels

Several 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 the penetration of organic goods is that it is difficult for consumers to locate and identify the organic commodities, and that only a few organic products are offered regularly in supermarkets. A considerable part of the European markets for organic products suffers from insufficient supplies.

However, the distribution of organic products in the EU is, to an increasing extent, being taken over by conventional supply channels (Produce Studies, 1998). This is especially true for Sweden, Denmark and the UK, where relatively few conventional retail chains and organic food distributors dominate the market. 85 percent of all organic goods in Sweden and Denmark are distributed through conventional sales channels and 75 per cent in the UK, and the majority (85-95 per cent) of these sales pass through supermarket chains.

In contrast, the Netherlands and Germany for example, are characterized by a completely different sales structure (Produce Studies, 1998). In these countries, health food stores and direct sales have dominated the distribution of organic products for many years and

are still powerful, even though their growth is stagnating compared to the growth of organic products in supermarket chains.

Labelling

Since it is impossible for consumers to check the authenticity of organic products, it is necessary to build up a control system with clearly defined rules for production methods and labelling of certified products (McCluskey, 2000). Previous consumer studies suggest that trustworthy labels guaranteeing organic production are very important for the consumers. The results indicate that clear and unmistakable labelling is an important condition for buying organic foods (Trijp et al., 1997; Hack, 1995; Sylvander, 1995). In many countries, however, there are many competing labels. This has been a problem in Germany, for example, where consumers have had great difficulty identifying the authenticity of organic products (Hamm and Michelsen, 1996; Krämer et al., 1998; CMA, 1996).

The Danish certification label, which is controlled by the Danish state, is well known by a majority of all consumers, and consumers in Denmark have great confidence in the Danish control system (Infood, 1998; Scan-Ad, 1998; Bjerke, 1992). Preliminary results of our own suggest that in 2000, 96 per cent of Danish consumers recognize the Danish label, and 64 per cent state that they, in general, trust the label. A large majority have a good understanding of the rules of organic production; 96 per cent know that application of synthetic pesticides is not allowed in organic production, 90 per cent know that fertiliser application is not allowed, and 71 per cent know that organic production encompasses requirements for animal welfare. In general, however, consumers believe that the standards of the Danish label is more comprehensive than it actually is: 20 per cent believe organic production has a requirement of energy conservation, and 35 per cent believe that packaging of organic products must be environment-friendly.

Price premiums

High price premiums for organic goods limit demand. Results from Glaser and Thompson (1998, 2000) and Wier, Hansen and Smed (2001) indicate high price sensitivity in demand. These studies modelled substitution between various (organic and non-organic) food types, using the AIDS system on actual purchase data. In these studies, a similar pattern appears: Demand for organic products are much more price-elastic than demand for conventional products. In contrast to these results, however, Jørgensen (2001), who estimated demand for

various cereal products and coffee using an “ad-hoc” specification and Swedish GfK data, found comparatively low price elasticities for certified organic products.

In addition, several studies evaluate consumers’ willingness to pay, most often based on interviews. For a review, see Thompson (1998) or Wier and Calverley (2002). Based on consumers' own statements, Fricke and von Alvensleben (1997), Krämer et al. (1998), Meier-Ploeger et al. (1996), Haest (1990), Hack (1995), and Jolly (1991) point to high price premiums to be one of the most important reasons for not buying organic foods.

In Denmark, price premiums are in general low, compared to other countries (Michelsen et al., 1999). Results from Michelsen et al. (1999) suggest that the average price premium is reduced by increasing volumes and increasing sales through supermarkets.

2.3. Danish consumers

The elaboration of results from the test sample indicate the following characteristics of the Danish consumers:

- Salmonella, pesticide and medicine residues are top food safety concern for foods in general. Cholesterol and mad-cow-disease are ranked lower.
- Avoidance of chemicals is a top concern and top valued product attribute for organic foods.
- The order of valued attributes does not vary across organic product types.
- Stated main barriers for not purchasing organic foods are too high price premiums, poorer appearance, and lack of trust in control.
- 64 per cent of consumers lack confidence in imported organic foods.
- 25 per cent of consumers state that large supply of organic foods is a main reason for store choice.
- 66 per cent state that even if organic standards were totally obeyed, organic agriculture would make no difference to the environment. 57% state it would make no difference to the health for consumers eating organic.
- 35% of the consumers that are willing to pay more for all types of organic products have been members of an organization that protects nature. In comparison, 18% of consumers, not willing to pay more for any organic product, have been members of an organization that protects nature.

3. The Data

The data used in our study is provided by a marketing research company, GfK Denmark, part of the GfK Group (www.gfk.com). GfK Denmark registers the consumption of approximately 2300 households of (certified) organic and conventional foods and the corresponding prices (www.gfk.dk). 20% of the households are exchanged every year, partly because of households leaving the survey, and partly in order to ensure that the panel is representative of the Danish population. The panel is representative with respect to the location and size of the household, as well as age of the consumer. The consumers respond by recording their weekly purchases in a diary. This record encompasses a large variety of commodities, representing 80% of the consumer's budget for grocery shopping. Data for organic foods exist for the period from the beginning of 1997 and onwards. For this paper, data were available until the end of 2000.

In addition to these data, we will mail the panel a questionnaire (in June 2002), in order to reveal information on attitudes, values and food habits, with special attention to valued food attributes and perceived food safety risks. We also ask the panel member of stated willingness to pay making it possible to compare stated (revealed from questionnaire data) and actual (revealed from purchase data) willingness to pay for the same individuals in the panel.

For the present paper, the questionnaire data is not available yet. Instead, we use pre-test data from a sample of 400 randomly chosen respondents, representatively distributed across geographical regions.

4. Preliminary Results from the Pilot Study

The pilot study was mailed to 400 randomly chosen households and had a response rate of 31 per cent. The characteristics of the sample are shown in Table 2. In an attempt to maximise the response rate, we did not ask for the respondents' income, because this question may make some respondents feel uncomfortable (the answers would also be more uncertain than answers to questions on e.g. the number of persons in the household). Data on income will of course be available for the final sample, where this information is part of the household characteristics in the GfK panel data. Instead, given the available data, we choose to focus the analysis on the interaction between attitudes towards the environment, health and nutrition.

The questionnaire consisted of four sets of questions (see Wier and Mørch Andersen, 2001): questions on purchase habits and food culture (choice of store, important product

characteristics, statements on risks from eating certain foods), questions on organic food production (identification of the Danish O-label, statements on organic production and its effects), questions on habits and environmental attitudes (use of recycled toilet paper, aluminium foil, membership of environmental associations, statements on the consumer's role in environmental protection), and finally questions on willingness to pay for four different products (milk, ryebread, potatoes and minced beef). The respondent had to indicate whether (s)he agreed with the attitudinal questions on a scale from 1 to 5. The wtp questions were formulated as:

1) Conventional milk costs 6 DKK per litre. Would you pay more than 6 DKK for a litre of organic milk?

2a) If yes, how much?

2b) If no, why are you not willing to pay more for organic milk?

The respondents who stated a positive willingness to pay were asked a follow-up question asking them to rate whether different characteristics of the organic product were more or less important in their decision to pay more for the organic product (taste, absence of pesticide residue, environmental concerns, good conscience).

4.1. Characteristics of the sample

The proportion of female respondents is 61% and the age distribution is somewhat biased towards individuals in their 20s and 30s. Average household size is 2.6 with the largest part (42%) consisting of 2-person households without children. Households without children represent almost 80 % of the sample while 10% of the sample have 1 child and 10% have two children. 33% of respondents come from the metropolitan area of Copenhagen. Compared to the Gfk sample on purchase data (figures in parentheses in Table 2), the pilot survey sample over-represents the proportion of males and young people.

[Insert Table 2 about here]

4.2. The importance of attitudes towards the environment and health

Table 3 shows that a large part of the pilot sample are willing to pay more than the stated conventional market price for milk (59%), potatoes (48%), rye bread (51%) and minced beef (41%). Average willingness to pay is 1.07 euro for a litre of milk, 1.89 euro for a kilo of potatoes, 2.48 euro for a kilo of rye bread, and 5.58 euro for 500 g of minced beef. The corresponding price premiums are 32.1% for milk, 40.2% for potatoes, 23% for rye bread and

18.5% for minced beef. Note that these estimates result from the use of open-ended questions with a risk of anchoring around a stated conventional price which was judged to be quite high.

[Insert Table 3 about here]

As part of the analysis of the pilot study, we performed logistic maximum likelihood estimates on the probability of being a BUYER, defined as willing to pay more for all four organic products in the survey. 32% of the pilot sample were indeed willing to pay more for all four organic products. We used the attitudinal information in the questionnaire to construct indicator variables for environmental behaviour and awareness (the answers to questions on membership in environmental organisation and use of non-bleached coffee/tea filters), health risk concern, nutrition concern, good conscience from buying organic products, price sensibility, and the attitude towards the statement that environmental problems are exaggerated. We also constructed an indicator variable based on attitudes towards three statements on the impact of consumer behaviour on the environment.

The estimated model seems to generate good predictions of buyer behaviour, with the model correctly predicting buyer rate for 78% of the sample. As can be seen from Table 4, the probability of being willing to pay for the organic products decrease with age. Among the significant variables, price consciousness and the belief that environmental problems are exaggerated decrease the probability of being willing to pay for the four products by about 100%. Based on this limited sample, we did not find any significant impact of the presence of children, or the indicator variables on health, nutrition and environmental awareness.

[Insert Table 4 about here]

5. Revealed Preferences for Organic Food

Table 5 shows average price premiums actually paid by consumers (revealed willingness to pay) estimated from purchase data during June 1st 1999-May 31st 2000. The average price premium for each of the four products is calculated as average organic price premium¹ across all households actually paying more for the organic version of the product.

¹ Average price premiums at the product level may be calculated in 3 ways, depending on purpose:
(A) prices for the same (corresponding conventional) product, purchased by the same household, in any store at any time, using all prices, including prices for products sold as special offers.

55 and 35 per cent, respectively, of the total household panel sample are actually paying more for organic milk and organic rye bread; these products are continuously supplied in various qualities. Fewer (14 per cent) are actually paying more for organic potatoes. That may partly be explained by limited supply of potatoes, as organic potatoes are mostly available in the large supermarket chains, and they are supplied in fewer qualities. Finally, only 6 per cent are actually paying more for organic minced beef. This low share may partly be explained by the fact that organic minced beef is not regularly supplied, especially not in low-fat versions, and partly because of the relative high price of the product.

A comparison with stated willingness to pay from Table 3 shows that the consumers are on average actually paying less for organic milk than they state they are willing to pay. For the other products, the opposite holds: In the cases of organic potatoes, rye bread and minced beef, consumers are actually paying more than they state they are willing to pay - for potatoes, consumers are only paying slightly more, however.

A priori, we would expect two effects, each working in opposite directions, to prevail:

- (1) Stated willingness to pay is often presumed to be overestimated (see discussion previously in this paper) compared to real willingness to pay. This effect seems to dominate in the case of milk.
- (2) In the case of the other products, another effect wins through: This effect is due to the fact that, except for milk, we have a large share of consumers that are willing to pay more for organic products, but not willing to pay as much as the market price. Comparing Table 3 with Table 5 shows that the share of consumers stating they are willing to pay more, exceeds the share of consumers actually paying more. This is because some of the consumers, stating they are willing to pay more, are only willing to pay a smaller price premium than the current market price premium. These consumers state a positive willingness to pay, but do not buy any organic products at current prices and are thus not registered in purchase data. Consequently, a priori, we expect average stated willingness to pay for the organic version of

(B) prices for the same (corresponding conventional) product, purchased in the same week, in the same store, by any household, using all prices, including prices for products sold as special offers.

(C) as (A), but not including prices for products sold as special offers.

In Table 1, we have followed approach (A), as we wanted to reveal the average price premium for a given organic product that each household is facing, when considering all stores supplying the product. This holds information on the average price premium taking the whole range of stores into consideration.

In Table 5, we have followed approach (C), as we wanted to reveal the willingness to pay (average price premium) for a given organic product, at a given point in time, in a given store. This is the price premium each household is facing when store choice has been done, corresponding to the scenario in the contingent valuation questions in the questionnaire. This way we hope to control for unobservable differences in size, quality and variety in store supply across stores. Furthermore, prices for products bought as special offers are not included, as organic products on special offer may in fact be cheaper than the corresponding conventional product. Please also note that in Table 1, the prices are from a much longer period compared to Table 5.

the product to be lower than the price premium they are actually paying, as the low bids from consumers willing to pay more, but only willing to pay less than the current market price premium, are included in the estimate of stated willingness to pay – but not in the revealed willingness to pay estimated from purchase data.

Milk is an exception to this, as most of the consumers stating they are willing to pay more (59 percent of all households, cf. Table 3), are also willing to pay the market price premium (55 percent of all households, cf. Table 5). Here we find that stated willingness to pay exceeds revealed.

For minced beef, in contrast, only 6 percent (cf. Table 5) of all households actually purchase organic beef and thus reveal a willingness to pay the market price premium. However, according to the pilot study (cf. Table 3), 41 percent of all consumers state that they are willing to pay more for organic beef. Thus, the share of consumers that are willing to pay more for organic beef, but have a lower willingness to pay than the market price, however, is not included in the estimate of revealed willingness to pay – this estimate is based on 6 percent of consumers only. Conversely, the estimate of stated willingness to pay is based on the 41 percent of the consumers willing to pay more, including consumers willing to pay less than the market price making the stated willingness to pay lower than the revealed one.

This holds for potatoes and rye bread too; the difference between actual average price premium paid and stated willingness to pay is quite small for potatoes and quite large for rye bread, but again, actual payment exceeds stated willingness to pay. However, for rye bread, as well as for potatoes, there are many product characteristics or quality differences due to season, type, consistency and taste, which we cannot observe from purchase data. For minced beef and milk, we do not have the same data problem: main quality differences (apart from organic or not) are due to fat content, which we can observe.² Thus, the unobservable quality differences for potatoes and rye bread make the estimates based on purchase data highly uncertain.

[Insert Table 5 about here]

6. Future Research

During 2002-2005, we will continue our research on demand for organic foods. The project aims at modelling the individual household's consumption of organic foods, and its

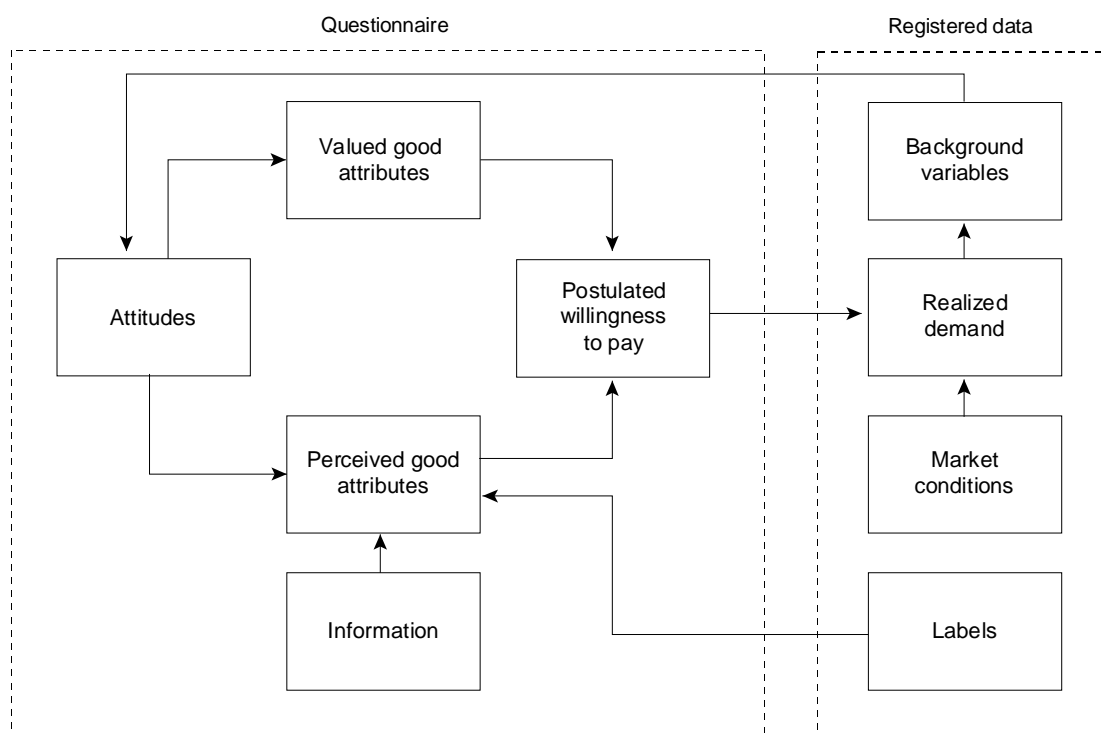
² Almost all milk and most beef have Danish origin, and homogenisation of milk is related to organic production and fat content.

dependence on important factors such as prices, household income, geographic location, consumer's occupation, age, number of children, etc. This will be done both for individual goods and aggregated commodity groups of Danish as well as foreign consumers, including estimates of price and income elasticities. Identifying differences in demand parameters for different types of households is both important as part of understanding the willingness to pay (for organic foods as compared to conventional foods) of different consumer segments and as part of an evaluation of the market potential.

The project applies information at the individual household level (panel data) as described in Section 3 above, which makes possible a detailed and informative approach. Furthermore, as the GfK Group has household panel data from several other European countries, we will be able to make comparisons based on data from other countries as well. Finally, as described in Section 4 above, the modelling is supported by a questionnaire, surveying households in the very same panel as applied in the model estimations. An essential feature and ultimate strength of the project is that it can examine differences between revealed and postulated behaviour and enlarge the analysis by information on attitudes, values, food habits/eating patterns and food interests.

The core of the project is to establish the parameters of a utility based model of household preferences for organic food incorporating explicit representation of valued product attributes and relevant underlying attitudes. Data for parameterisation can be divided into nine types and will be collected through two vehicles, according to Figure 2.

Figure 2



The detailed demand modelling at household level makes it possible to estimate aggregate demand as a function of economic variables like prices and income, and as a function of the share of different types of households. This will enable us to evaluate the effect of policy instruments such as subsidies, labelling, information, etc. on total consumption as well as on individual consumer segments. It is of particular interest to examine differences in consumers' confidence in organic product labelling, differences in food culture (attitudes towards imported goods, preferences for prepared/unprepared products), and differences in sales channels (supermarkets, direct sales, health-food shops, etc) among countries and among different consumer groups within the individual countries.

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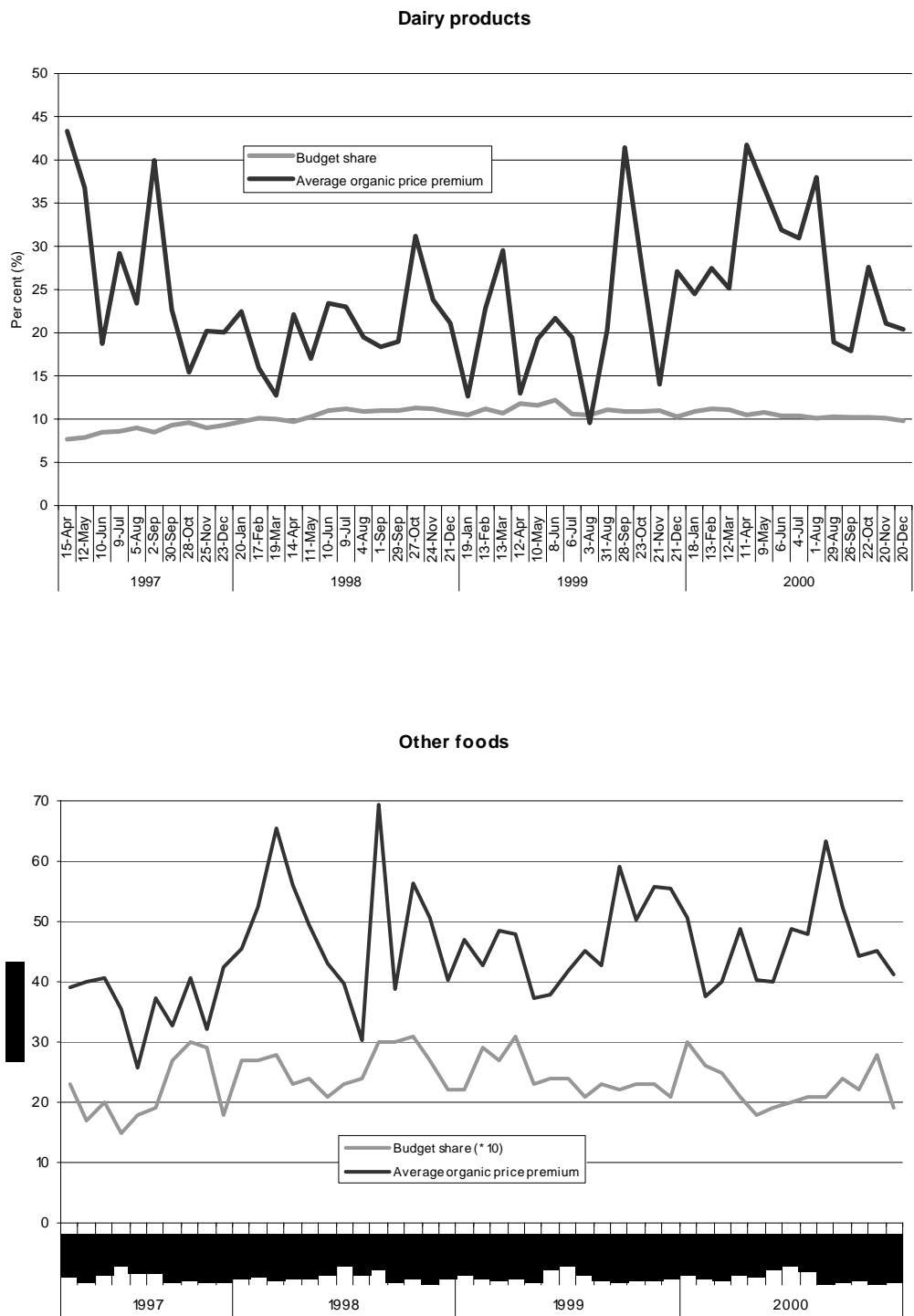
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Figure 1. Development in market share and average price premiums for 3 aggregated organic product groups.



Cereals

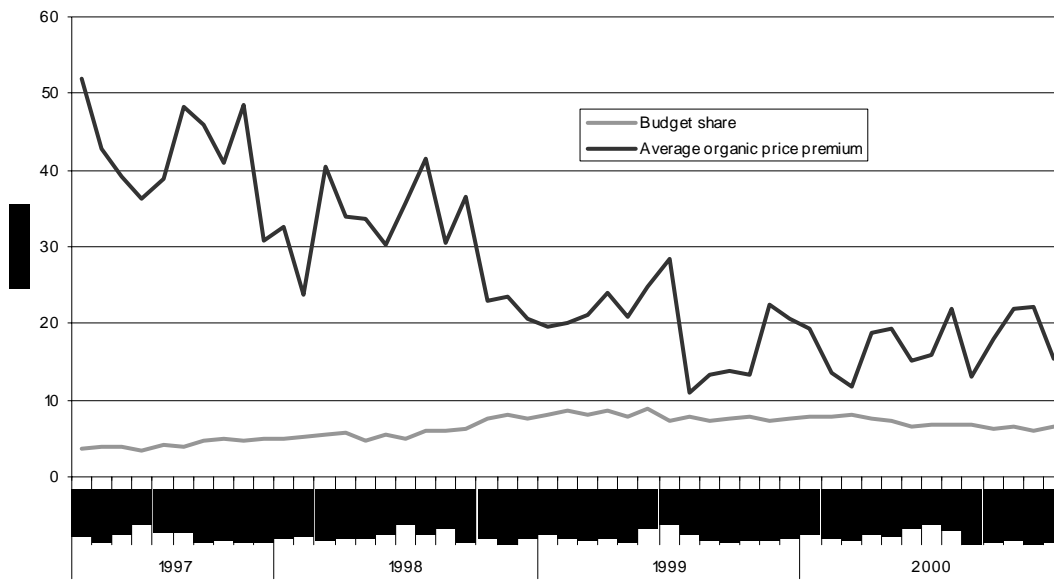


Table 1. Top 5 within each aggregated food group, April 1997 - December 2000.

| | Budget share | Average price premium | | Average organic consumption | Average annual growth rate |
|-----------------|--------------|------------------------|---------|-----------------------------|----------------------------|
| | (%) | Standard deviation (%) | | per family per week* (EURO) | (%) |
| Dairy products | | | | | |
| Milk | 23.00 | 22.53 | (2499) | 0.57 | 8.23 |
| Yogurt | 7.30 | 12.87 | (1936) | 0.06 | 11.53 |
| Cream** | 6.20 | 13.35 | (1566) | 0.03 | -6.40 |
| Butter | 5.60 | 5.62 | (2409) | 0.05 | 21.17 |
| Cheese | 2.40 | 22.30 | (3194) | 0.05 | -3.47 |
| Cereal products | | | | | |
| Flour | 13.40 | 50.62 | (6151) | 0.03 | 15.70 |
| Rye bread | 9.40 | 18.10 | (3599) | 0.10 | 12.97 |
| Pasta | 9.30 | 40.59 | (7422) | 0.02 | 43.77 |
| Cereals | 7.10 | 5.91 | (3618) | 0.04 | 8.70 |
| Rice | 6.20 | 53.82 | (6824) | 0.01 | 24.10 |
| Other foods | | | | | |
| Eggs | 23.00 | 19.74 | (4667) | 0.16 | 9.40 |
| Carrots | 20.70 | 62.28 | (10954) | 0.05 | 1.27 |
| Onions | 9.00 | 59.32 | (4685) | 0.01 | 5.90 |
| Oil*** | 6.70 | 115.50 | (12820) | 0.01 | -17.60 |
| Potatoes | 6.00 | 43.64 | (8124) | 0.04 | -1.60 |

* The Danish Kroner/Euro rate was 743.40 on April 30, 2002.

** Includes observations from June 1st 1999 to June 1st 2000 only.

*** Includes observations from July 1st 1999 to Dec 31st 2000 only.

Please note, that price premiums are calculated from all prices, including special offers.

Table 2. Characteristics of the pilot sample.
(with Gfk purchase data distribution in brackets)

| Variable | Brackets | Percentage distribution |
|-----------------------|----------------------|--------------------------------|
| Gender | Male | 39 (23) |
| | Female | 61 (77) |
| Age | < 39 yrs | 42 (32) |
| | 40-59 yrs | 37 (39) |
| | > 60 yrs | 21 (29) |
| Household size | 1 person | 16 (34) |
| | 2 persons | 42 (36) |
| | 3 persons | 17 (14) |
| | 4 persons | 19 (12) |
| | 5 persons or more | 6 (4) |
| Number of children | No children | 77 (70) |
| | 1 child | 10 (14) |
| | 2 children | 10 (13) |
| | 3 or more children | 3 (4) |
| Geographical location | Metropolitan area | 33 (24) |
| | Rest of East Denmark | 28 (30) |
| | West Denmark | 39 (46) |

Table 3. Stated willingness to pay for the four products.

| | Milk | Potatoes | Ryebread | Minced beef |
|--|------------------|-----------------|-----------------|------------------|
| Anchor price (price of corresponding conventional product in euro) | 0.81 (per liter) | 1.35 (per kilo) | 2.02 (per kilo) | 4.71 (per 500 g) |
| <i>Percentage distribution</i> | | | | |
| Not willing to pay more | 41 | 52 | 49 | 59 |
| Willing to pay more | 59 | 48 | 51 | 41 |
| Total | 100 (n=128) | 100 (n=128) | 100 (n=128) | 100 (n=128) |
| | | | | |
| Mean wtp in euro (std dev.) | 1.07 (0.13) | 1.89 (0.34) | 2.48 (0.24) | 5.58 (0.46) |
| Mean wtp in per cent (std dev.) | 32.1 (0.16) | 40.2 (0.25) | 22.9 (0.12) | 18.5 (0.10) |
| <i>Percentage distribution on price premiums for those willing to pay more</i> | | | | |
| Less than 25% more | 30 | 26 | 62 | 77 |
| Less than 50% more | 50 | 38 | 35 | 23 |
| Less than 100% more | 20 | 31 | 3 | 0 |
| More than 100% | 0 | 5 | 0 | 0 |
| Total | 100 (n=74) | 100 (n=61) | 100 (n=65) | 100 (n=52) |
| | | | | |

Table 4. Results from logit estimation of being willing to pay for all products. n=91.

| Explaining variable | Coefficient | Odds ratio | Statistical significance |
|--|--------------------|-------------------|---------------------------------|
| Constant | 12.87 | | 0.00 |
| Gender=woman | -1.92 | 0.15 | 0.02 |
| Age 30-39 yrs | -1.86 | 0.16 | 0.06 |
| Age 40-49 yrs | -2.24 | 0.11 | 0.07 |
| Age 50-59 yrs | -2.57 | 0.08 | 0.05 |
| Age 60 yrs and above | -3.88 | 0.02 | 0.02 |
| Children<10 yrs in household | -0.09 | 0.91 | NO |
| Environmental awareness/action | 0.70 | 2.00 | NO |
| Health aspects important | 0.87 | 2.38 | NO |
| Price consciousness | -3.63 | 0.03 | 0.00 |
| Good conscience factor | 1.24 | 3.47 | NO |
| Consumer behaviour can make a difference | -4.95 | 0.01 | 0.02 |
| Environmental problems are exaggerated | -4.75 | 0.01 | 0.00 |
| Nutrition aspects important | -0.09 | 0.91 | NO |

Pseudo R²=0.4232. Prob>Chi(square)=0.005. 78% correctly classified.

Table 5. Actual willingness to pay for the four products, June 1st 1999- May 31st 2000.

| | Milk | Potatoes | Rye bread | Minced beef |
|---|-----------------|-----------------|-----------------|---------------------|
| Anchor price (price of corresponding conventional product in euro) | 0.81(per liter) | 1.08 (per kilo) | 1.75 (per kilo) | 4.04 (per 500 gram) |
| Willing to pay more (%) | 55 | 14 | 35 | 6 |
| Total | 100 (n=2135) | 100 (n=2001) | 100 (n=2043) | 100 (n=1249) |
| Mean wtp in per cent (std dev.) | 24.1 (8.13) | 44.8 (36.26) | 37.9 (21.50) | 30.0 (26.05) |
| Percentage distribution on price premiums for those willing to pay more | | | | |
| Less than 25% more | 62 | 34 | 31 | 58 |
| Less than 50% more | 36 | 35 | 43 | 22 |
| Less than 100% more | 2 | 22 | 25 | 17 |
| More than 100% | 0 | 9 | 1 | 3 |
| Total | 100 (n=1183) | 100 (n=280) | 100 (n=714) | 100 (n=69) |

NOTE:

Please note that average price premiums are calculated from ordinary prices, that is, all products (conventional as well as organic) sold as special offers are not included. Also, only households having positive WTP for organic products are included, that is, households purchasing organic but not having positive WTP are not included.