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Abstract

The Danish market for organic foods is especially well suited for consumer analyses because it is relatively mature, meaning that it does not suffer seriously from the supply shortages and barriers which dominate most of the markets outside Denmark. The well-functioning Danish market makes it possible to collect and analyse reliable data on purchases. 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. The project applies information at the individual household level (panel data), which makes possible a detailed and informative approach. The panel data were provided by a marketing research company. In addition, the modelling is supported by a questionnaire, surveying households in the very same panel as applied in the model estimations. An essential feature and the ultimate strength of the project is that it can reveal differences between actual and postulated behaviour and enlarge the analyses by information on attitudes, values, food habits/eating patterns and food interests. In the paper, preliminary results from the project are presented.

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Introduction

Demand for organic foods has increased considerably during the past decade, though organic consumption still only constitutes a small percentage of total food consumption in most countries. Consumption has especially increased in Denmark, which today is estimated to have the highest per capita consumption of organic food in the world (Wier and Calverley, 2002). The Danish market is especially well suited for consumer analyses because it 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, and these products exhibit higher budget shares than other organic products. Consequently, 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. Very few studies on the estimation of 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 market researchers in Germany, the United States 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 behaviour, 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 (RP) 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 exceeds 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-topay from experiments.

The Danish market

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 1 April 1997 and 31 December 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.

Dairy products hold the highest budget share, followed by cereal products. There was 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 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 three aggregated food groups, a large variation in budget shares can be observed. Table 1 shows various estimates for the five most established products, within each food group for the period 1 April 1997 to 31 December 2000. For each product, the table shows the average budget share and the average percentage organic price premium, the average organic consumption in euros per family per week, and the average annual growth in this weekly consumption. Milk and eggs hold equally high budget shares at 23%, 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 the top five), where lamb holds the highest budget share (budget share 5.8%, price premium 22%), followed by minced beef (budget share 2.2%, price premium 58%).

Figure 1.

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Table 1.

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

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%. 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 15-20%, increased supply considerably, and initiated intensive marketing of organic products (Hamm and Michelsen, 1996).

The current Danish market fulfils three important conditions for a well-functioning market. First, 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. Secondly, there is a very well-functioning and trustworthy labelling and certification program. Finally, 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 organic commodities, and that only a few organic products are offered regularly 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, to an increasing extent, being taken over by conventional supply channels (Produce Studies, 1998). This is especially true for Sweden, Denmark and the United Kingdom, where a relatively small number of conventional retail chains and organic food distributors dominate the market. In Sweden and Denmark, 85% of all organic goods are distributed through conventional sales channels (75% in the UK) and the majority (85-95%) of these sales pass through supermarket chains.

In contrast, the Netherlands and Germany for example, are characterised 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% of Danish consumers recognise the Danish label, and 64% state that, in general, they trust the label. A large majority have a good understanding of the rules of organic production; 96% know that application of synthetic pesticides is not allowed in organic production, 90% know that fertiliser application is not allowed, and 71% know that organic production encompasses requirements for animal welfare. In general, however, consumers believe that the standard of the Danish label is more comprehensive than it actually is: 20% believe organic production has a requirement of energy conservation, and 35% believe that packaging of organic products must be environmentally 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 as 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.

The data

The data used in our study are provided by a market research company, GfK Denmark, part of the GfK Group (www.gfk.com). GfK Denmark registers the consumption of approximately 2 300 households of (certified) organic and conventional foods and the corresponding prices (www.gfk.dk). Every year, 20% of the households change, 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 the 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 from the beginning of 1997 and onwards. For this paper, data were available until the end of 2000.

The modelling is supported by a questionnaire, surveying households in the very same panel as applied in the market research. An essential feature and ultimate strength of the project is that it can reveal differences between revealed and postulated behaviour and enlarge the analysis by information on attitudes, values, food habits/eating patterns and food interests. In summer 2002, we mailed the panel a questionnaire in order to reveal information on attitudes, values and food habits, with special attention to valued food attributes and perceived food-safety risks. In addition, we asked the panel members their 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.

Comparing stated and revealed preferences

For the present paper, questionnaire data are not yet available. Instead, we use pre-test data from a sample of 400 respondents. The pilot study was mailed to 400 households, representatively distributed across geographical regions and within each region, randomly chosen. The response rate was 31%. The questionnaire consisted of four sets of questions: 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 organic milk. The respondent had to indicate whether (s)he agreed with the attitudinal questions on a scale from 1 to 5. The respondents who stated a positive willingness to pay were asked a follow-up question requiring 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). For more details, cf. Millock et al. (2002) or www.akf.dk/organicfoods. The elaboration of results from the test sample indicates the following characteristics of the Danish consumers:

_ Salmonella, pesticide and medicine residues are the top food safety concerns for foods in general. Cholesterol and mad-cow disease ranked lower.

_ Avoidance of chemicals is a top concern and the most highly-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% of consumers lack confidence in imported organic foods._ 25% of consumers state that a large supply of organic foods is a main reason for store choice.

_ 66% 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 of consumers eating organic.

_ 35% of consumers 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 organisation that protects nature.

A large part (59%) of the pilot sample stated a willingness to pay more than the conventional market price for organic milk. Average stated willingness to pay is a price premium of 32% for a litre of milk. In comparison, purchase data during 1 June 1999-31 May 2000 shows that on the market, 55% of all consumers in the household panel are willing to pay more for organic milk. The average price premium (revealed willingness to pay) — estimated from purchase data — is 24% for organic milk. Thus, the consumers are on average actually paying less for organic milk than they state they are willing to pay. This may indicate two things. First, consumers may state that they are willing to pay more than they actually are, suggesting that contingent valuation may be associated with uncertainty. Alternatively, the results may indicate a considerable consumer surplus, as consumers would be willing to pay more than they actually are.

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 organic milk in the survey (cf. Millock et al., 2002). We used the attitudinal information in the questionnaire to construct indicator variables for environmental behaviour and awareness, 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 82% of the sample. 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%. The presence of small children in the household has a positive significant influence on the probability of being willing to pay more. However, based on this limited sample, we did not find any significant impact of the indicator variables on health, nutrition and environmental awareness.

Price and income sensitivity in demand

A demand model system based on purchase data from the beginning of 1997 to the end of 1999 has also been developed (cf. Wier and Smed, 2000; Wier, Hansen and Smed, 2001; Wier and Smed 2002). Results from these studies suggest that price sensitivity in demand for organic products is high, compared to other food demand studies. An important reason for the high elasticities is that the organic and conventional products are close substitutes. Furthermore, it appears that organic products respond much more to price changes than conventionally produced products. This is partly due to the high budget share of conventional products, and indicates that organic products, often newly introduced on the market, may be subject to more price comparison. Similar results can be found in other studies on demand for organic foods (Glaser and Thompson, 1998; 2000).

In the preferred model specifications, the budget elasticity was set to unity. However, if this restriction is relaxed, the budget elasticity for organic products is larger than 1. This indicates that organic foods are luxury goods, as the budget share increases with the budget.

Organic products are demanded in all types of households. However, some household characteristics are associated with higher propensity to buy organic foods. Previous studies have found

that household size is positively correlated with buying propensity for organic foods. This result cannot be confirmed in our study, as it is the age of children in the household and not the mere presence of children that yields higher volume shares. Thus, families with small children have a higher buying propensity than families without children or with teenage children. Some studies find that urbanity is positively correlated to organic buying propensity, and this is partly confirmed in our study. The highest organic budget shares are found in the metropolitan area and the lowest in rural areas in western Denmark. Households in eastern rural Denmark are an exception to this rule, however. Regarding consumer age, previous Danish studies conclude that younger consumers have a higher buying propensity. Most studies on countries other than Denmark confirm this, but in addition some studies find that also the oldest consumers have a high buying propensity. In our study, we find that younger consumers, especially between 30 and 40 years, exhibit higher organic budget shares than other consumers. The dependence of age, however, varies somewhat across product type.

Price sensitivity of demand varies across different household types. This implies that reducing the price premium for organic foods will cause an increase in consumption, but this will, however, primarily happen in some household types. In general, households with low organic budget shares show the highest price elasticity in demand and vice versa. This indicates that the price premium is an important reason for not buying organic foods in some households, and policies aimed at reducing price premiums will be highly effective with respect to these households. In contrary, other household types will respond more to other policy measures.

Current and future research

At present, we are developing and improving the demand modelling on household purchase data from 1997-2001. We are currently applying micro-econometric estimation of demand for aggregated food groups, utilising the panel nature of data. In the model, the individual household's consumption of organic foods is modelled, and its dependence on important factors such as prices,

household income, geographic location, consumer's occupation, age, number of children, etc. In the current modelling work, we hope to confirm our previous results, described under Price and income sensitivity in demand, in addition to accomplishing new insights.

Three main approaches are followed: first, we have had good results when modelling demand for the aggregated food groups of dairy goods, bread and cereals, and other foods (including meat, vegetables and fruit). Another approach — also with good preliminary results — is modelling demand for various meal types. The meal types are breakfast and lunch (bread, filling and spread for sandwiches, cereals, etc.); dinner (meat, fruit and vegetables); basic foods, i.e. food types that may appear in any meal type (flour, milk, sugar etc) and, finally, additional food, i.e. food consumed in addition to ordinary meals (coffee, wine, candy, cakes, fruit). The third approach is modelling revealed preferences, i.e. modelling demand for (and implicitly valuing) products' characteristics like fat content, with/without organic label, small/large producer, convenience and origin. At the current stage this is done for the milk market. At present, however, it is too early to evaluate the contributions from these estimations.

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. The GfK Group has household panel data from several other European countries and in the project we will apply data from other countries as well. Data for parameterisation can be divided into nine types and will be collected through two vehicles (Figure 2).

Figure 2

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The detailed demand modelling at household level 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. 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.

Conclusions

Today, Denmark probably has the highest consumption of organic products per capita in the world. This high consumption of organic foods in Denmark is not due to higher consumer interest in organic products, because this interest is just as strong in many other countries. The preconditions for this high consumption are as follows: first, Denmark has a relatively well-functioning and reliable certification and labelling system; secondly, the majority of organic foods are sold in supermarkets, ensuring stable supplies; finally, price premiums for organic products are low, compared to other countries. In most other countries, at least one of these barriers is prevalent. Consequently, the Danish market is a well functioning market, where consumers in general have easy access to the organic foods, trust the authenticity of organic products, and can afford to pay for them.

Econometric estimations reveal that price sensitivity in demand for organic products is high, compared to other food demand studies. Thus, it appears that organic products respond much more to price changes than do conventionally produced products. This may be due partly to the fact that the organic and conventional products are close substitutes, and may partly indicate that organic products, often newly introduced on the market, may be subject to more price comparison. In addition, the budget elasticity for organic products is larger than 1, indicating that organic foods are luxury goods.

What can be learned from the Danish market? Our results suggest the following:

_ It is crucial that consumers can identify the food as organic or else they will not be willing to pay a premium for it. Thus, establishing a well-known and trusted labelling system is essential.

_ Future expansion requires increased supply in supermarkets, which are able to reach a wider range of customers, especially the busy, urban consumers, who do not have time to shop in speciality shops or at farms.

_ A substantial fall in price premiums is likely to increase sales. Higher prices today are mainly due to an immature market, hindered by inefficiency and a costly processing and transport sector. Gradually, as markets mature and more production is initiated, processing and transport will be possible on a larger scale, and prices will, in all probability, stabilise at a lower level.

_ Wherever the consumption of organic food is very price sensitive, policy measures affecting price premiums will be highly effective. Thus, our study indicates that measures such as subsidies to organic products or production, levies on conventional agricultural products, or levies on pesticides or commercial fertilisers may have remarkable effects on the consumption of organic foods.

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