Part III.

Policy Approaches To Organic Agriculture

Chapter 8.

Conversion and Support Payments

FROM CONVERSION PAYMENTS TO INTEGRATED ACTION PLANS IN THE EUROPEAN UNION

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Abstract

Organic farming is an approach to agriculture that emphasises environmental protection, animal welfare, sustainable resource use and social justice objectives, utilising the market to help support those objectives and compensate for the internalisation of externalities. Although organic farming as a concept has existed for over 80 years, only since the mid-1980s has it become the focus of significant attention from policy-makers, consumers, environmentalists and farmers in Europe. In 1991, the EU introduced legislation to define organic crop production (EC Reg. 2092/91) followed by livestock production in 1999 (EC Reg. 1804/1999). Consumer demand for organic food has risen sharply, leading to the active involvement of multiple retailers and substantially higher prices at the farm gate than those received in the conventional sector. A more widespread application of policies for supporting conversion to nd continued organic farming came into effect in 1992 when support to organic farming was included as one measure in the agri-environment programme (EC Reg. 2078/92), an accompanying measure of CAP reform. This has been continued under the Agenda 2000 rural development programme (EC Reg. 1257/1999). As a result, policy support for organic farming is now widely available across Europe, in recognition of its contribution to surplus reduction, environmental and rural development policy objectives. These factors have contributed to substantial growth in supply, helping market development by increasing availability of products and raw materials, but in some cases also leading to oversupply problems and downward price pressures. As a consequence, more emphasis is now being placed on the development of action plans at local, national and EU levels, integrating supply-push and demand-pull policy measures. This paper documents the development of the organic sector, reviews the support policies in the various EU countries prior to and after the reforms of the CAP in 1992 and 2000, and discusses likely future directions in policy development. [2]

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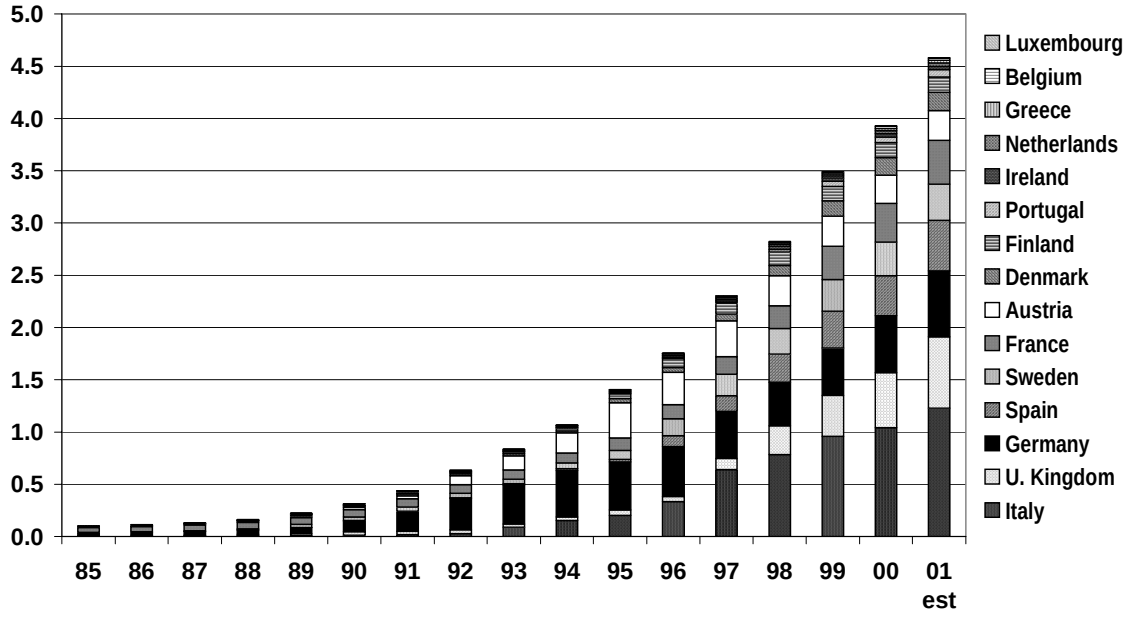
2. This is a modified and updated version of a paper previously published as Lampkin *et al.* (2000). Part of the research reported in this paper was carried out with financial support from the Commission of the European Communities' Agriculture and Fisheries (FAIR) specific RTD programme, Fair3-CT96-1794, Effects of the CAP Reform and possible further development on organic farming in the EU. It does not necessarily reflect the Commission's views and in no way anticipates the Commission's future policy in this area.

Methodology and data sources

The paper is based on work carried out as part of a wider research project on organic farming and the Common Agricultural Policy (CAP) of the European Union (EU). The overall objective of the project was to provide an assessment of the impact of the 1992 CAP Reform and possible future policy developments on organic farming, as well as the contribution that organic farming can make to EU agricultural and environmental policy goals (Lampkin *et al.*, 1999; Foster and Lampkin, 2001). Data collection was based on standardised questionnaires and national experts in each EU country utilising various published and unpublished data sources, and where appropriate consultations with key individuals in specific fields. Where possible the data were confirmed from other sources (Lampkin, 1996; Willer, 1998; Deblitz and Plankl, 1997; various EU Commission documents). A provisional updating for 2001 has been undertaken, but this will be subject to revision as part of a new EU research programme on the development of organic farming policy in the EU and CEE candidate countries starting in autumn 2002.[3]

Figure 1. Organic and in-conversion land area in the EU, 1985-2001
(million ha)



Source: Own data; see: www.organic.aber.ac.uk/stats.shtml.

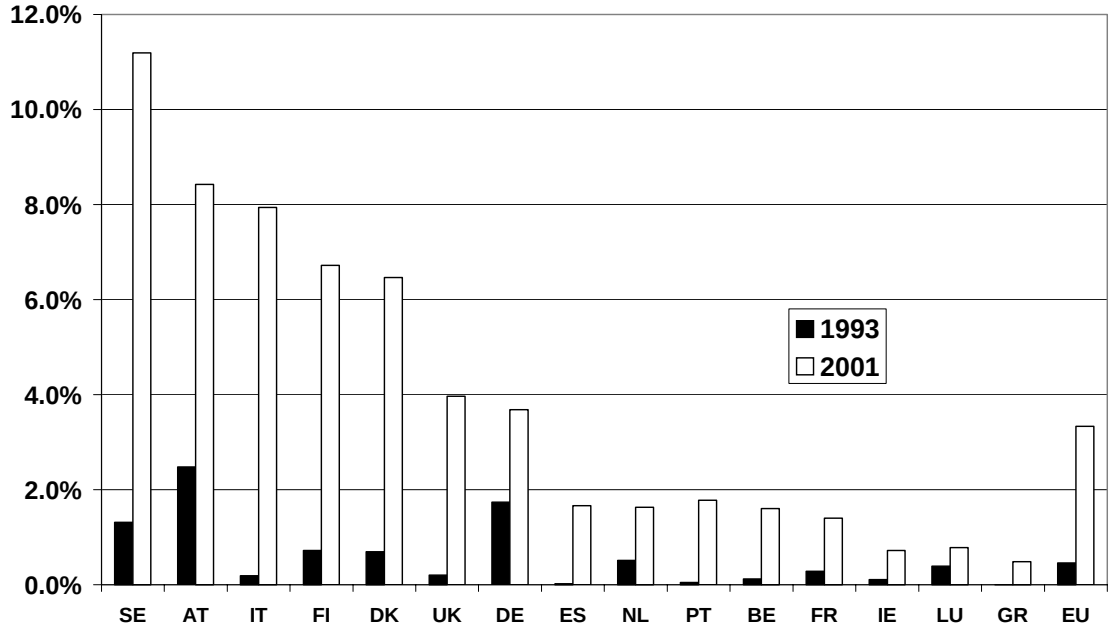
The growth of organic farming in Europe

Recent years have seen very rapid growth in organic farming. In 1985, certified and policy-supported organic production accounted for just 103 000 ha in the EU, or less than 0.1% of the total agricultural area. By the end of 2001, this had increased to almost 4.5 million ha, or 3.25% of the total agricultural area (Figure 1). In the same period, the number of organic holdings has increased from 6 000 to 156 000. These figures hide great variability within and between countries. Several countries

3. "Further development of organic farming policy in Europe, with particular emphasis on EU enlargement", QLRT-2001-00917 EU-CEEOFP.

have now achieved 6-12% of their agricultural area managed organically, and in some cases more than 30% on a regional basis (Figure 2).

Figure 2. Organic and in-conversion land area as a proportion of total utilisable agricultural area in the European Union (by member State)



Source: Own data; see: www.organic.aber.ac.uk/stats.shtml.

Alongside the increase in the supply base, the market for organic produce has also grown significantly, but statistics on the overall size of the market for organic produce in Europe are still very limited (Hamm *et al.*, 2002). Some recent estimates have suggested that the retail sales value of the European market for organic food was of the order of EUR 8-10 billion in 2000 (ITC, 2001).

Major growth of the sector (90% of the expansion in the land area) has taken place in the last decade since the implementation in 1993 of EC Regulation 2092/91 defining organic crop production, and the widespread application of policies to support conversion to and continued organic farming as part of the agri-environment programme (EC Reg. 2078/92).

Although growth trends in individual countries have varied considerably, with periods of rapid expansion followed by periods of consolidation and occasionally decline (*e.g.* Austria), overall growth in Europe has been around 25% per year during the 1990s. Although relative growth rates in the last two years have fallen, absolute growth rates are continuing at a similar pace (ca. 15 000 holdings, 0.5 million ha per year). Projecting these growth rates forward suggests that 10-20% of EU agriculture could be managed organically by 2010 (10% of EU agriculture represents nearly 14 million ha and 700 000 farms). This level of growth has significant implications for the provision of training, advice and other information to farmers, as well as for the development of inspection and certification procedures. It also has major implications for the development of the market for organic food, as it progresses from niche to mainstream status, with a possible retail sales value in 2010 of EUR 20-30 billion.

Policy support for organic production

Policy makers have been interested in supporting organic agriculture for two main reasons (Dabbert *et al.* in MFAF, 2001). Firstly, as a public good, where organic farming is recognised as delivering environmental, social and other benefits to society that are not, or only partly, paid for through the normal price of food. Secondly, as an infant industry, support for which can be justified in terms of expanding consumer choice and allowing the industry to develop to a point at which it is able to be independent and compete in established markets and make a positive contribution to rural development. Although both justifications can be seen to be utilised in most countries, the first is more typical of some Scandinavian and Central European countries (*e.g.* Sweden, Finland, Austria) while the second approach is reflected in the Dutch focus on supply chain initiatives (MLNV, 2000) and the UK's unwillingness historically to support farms beyond the initial conversion phase (Lampkin *et al.*, 1999).

These main justifications for supporting organic farming can be seen to be linked to the general issue of market failure, although unlike other agri-environmental policy measures, organic farming has developed a strong reliance on markets and consumer willingness to pay in support of its broader objectives. In recent years, it can be argued that this strategy has been so successful that there may be significant risks associated with the market for organic products becoming an end in itself, rather than a means to achieve broader goals of benefit to society as a whole. The challenge for policy makers has become the development a mix of policies that can make effective use of the market, while at the same time allowing organic agriculture to remain true to its original aims, thus maximising the broader benefits to society.

Support initiatives prior to 1992 CAP reform

The positive perceptions of the potential of organic farming led to the introduction of support programmes in various European countries starting in the late 1980s (Lampkin *et al.*, 1999). The pioneering Danish scheme, introduced in 1987, covered financial assistance to producers during the conversion period as well as the development of a market and extension and information support. Germany was the first country to introduce in 1989 support for conversion to organic farming in the context of the EU's extensification policy (EC Reg. 4115/88). France and Luxembourg introduced smaller programmes under the same regulation in 1992. Austria, Sweden and Finland had national conversion support programmes prior to their accession to the EU in 1995. The Swedish and Finnish programmes included support for a state advisory service for organic producers and Sweden was unique at that time in providing support for continuation of organic production.

Support initiatives under the 1992 agri-environment programme

Under the agri-environment regulation (EC Reg. 2078/92), introduced as part of the 1992 CAP reform, aid was available for farmers who (among other options) introduce or continue with organic farming methods, subject to positive effects on the environment. The majority of organic farming schemes under this regulation were implemented in 1994 (with some regional variations in Italy and Germany). Austria, Finland and Sweden followed in 1995 on accession to the EU. Greece and Spain did not start until 1996 and Luxembourg only implemented its organic farming scheme under 2078/92 in 1998. Most countries have a uniform national policy, but several (Finland, France, Germany, Italy, Spain, Sweden and the United Kingdom) have significant regional variations in rates of payment and requirements.

Table 1. Uptake, public expenditure and average payments for organic farming schemes under EC Reg. 2078/92 compared to all agri-environment options (1997 data)

Country	Land area (ha)	Farms x 1 000	Public expenditure (MECU)	Lowest conversion payment	Highest conversion payment	Average (conversion and continuing)
	(% of total 2078/92 area)	*(% of all 2078/92 agreements)*	*(% of total 2078/92)*	*(ECU/ha)*	*(ECU/ha)*	*(ECU/ha)*
AT	246 000 *(7.7%)*	18.5 *(4.2%)*	65.03 *(13.0%)*	217 (forage)	723 (hortic.)	264
BE	3 401 *(17.9%)*	0.15 *(8.0%)*	0.88 *(23.7%)*	180 (cereals)	838 (fruit)	259
DE	229 486 *(4.17%)*	8.42 *(1.5%)*	23.27 *(6.0%)*	127 (cereals)	713 (fruit)	101[a]
DK	50 281 *(46.9%)*	1.45 *(18.2%)*	9.44 *(58.2%)*	87 (forage)	140 (high N)	188[b]
ES	50 000 *(6.05%)*[c]	1.5 *(5.0%)*	2.91 *(3.9%)*	90 (forage)	362 (fruit)	58[c]
FI	89 403 *(4.5%)*	4.16 *(4.7%)*	21.07 *(7.6%)*	280 (cereals)	1 056 (fruit)	236[d]
FR	41 976 *(0.6%)*	1.55 *(0.9%)*	4.02 *(1.4%)*	106 (forage)	711 (fruit)	96[a]
GB	29 127 *(2.1%)*	0.3 *(1.3%)*	0.82 *(1%)*	20 (LFA)	101 (lowland)	28
GR	42 600 *(12.2%)*	0.89 *(37.6%)*	4.25 *(31.7%)*	182 (cereals)	1 217 (fruit)	100
IE	nd	nd	nd	337 (cereals)	398 (hortic.)	nd
IT	308 367 *(19.1%)*	17.12 *(14.1%)*	102.90 *(25.6%)*	185 (cereals)	1 235 (fruit)	334
LU	n/a	n/a	n/a	173 (all)	(from 1998)	0
NL	4 640 *(14.2%)*	0.27 *(3.6%)*	0.34 *(0.85%)*	226 (cereals)	837 (hortic.)	73[a]
PT	9 938 *(1.8%)*	0.23 *(0.2%)*	1.18 *(1.93%)*	217 (cereals)	723 (fruit)	119
SE	205 185 *(11.7%)*	10.87 *(14.5%)*	25.13 *(17.1%)*	104 (crops)	254 (livestock)	123
EU-15	1 272 064 *(5.1%)*	65.40 *(3.9%)*	261.24 *(10.7%)*	181 (cereals)	1 208 (fruit)	205

nd = no data; n/a = not applicable.

a. Lower payments for continuing organic farming.

b. Includes other forms of support.

c. Estimated.

d. Excludes payment for main agri-environment protection scheme.

Source: European Commission and national agricultural administrations summarised in Lampkin *et al.*, 1999.

Nearly all countries (except France and the United Kingdom) supported not just the conversion period, but also continuing organic production, often with lower payments, recognising the particular costs of conversion. However, Austria, Greece, Sweden and most regions of Italy did not offer higher payments for conversion. Austria adopted this policy so as not to encourage entrants who were solely interested in the available subsidies (Posch, 1997).

Average rates of support for in-conversion and organic land in 1997 are presented in Table 1. Payment rates varied widely between countries and within countries where regional variations existed. By October 1997, more than 65 000 holdings and nearly 1.3 million ha were covered by organic farming support measures at an annual cost of more than ECU 260 million. Organic farming's share of the total agri-environment programme amounted to 3.9% of agreements, 5.0% of land area and nearly 11% of expenditure, the differing shares reflecting in part the widespread uptake of baseline programmes in France, Austria, Germany and Finland.

There are reports from several countries that the types of farms converting were skewed towards moderate to low intensity livestock farms, particularly milk production in marginal areas, and farms with mixed cropping (Schneeberger *et al.*, 1997; Schulze Pals *et al*., 1994). Specialist cropping farms (arable and horticulture) as well as intensive pig and poultry producers, seemed to be less attracted by the available payment rates. To address this problem, Denmark introduced in 1997 a supplement of 230-266 ECU/ha/year for three years for arable farms without milk quota and pig farms.

Requirements and eligibility conditions

Most schemes (except for Germany and Ireland) allowed staged conversions during which experiences can be gained and the risk of financially and environmentally damaging mistakes thus minimised. All schemes required organic management of crops to be maintained for at least five years. In nearly all cases (except Sweden and some regions in Germany and Italy) organic crop production had to be controlled according to EC Reg. 2092/91. The intention in Sweden was to maintain a clear distinction between certified organic production for the market, and organic farming supported for agri-environmental policy reasons. Livestock production requirements were more complex because the EC Reg. 2092/91 had not yet been extended to cover this aspect.

In a few countries (*e.g.* Greece, Portugal, Spain and parts of Italy), the payments were restricted to specific crops and, more commonly, permanent grassland and/or set-aside was excluded from the schemes. Some countries (Austria, Denmark, Finland, Germany, Ireland and Italy) introduced additional environmental requirements. In Ireland and Finland, participation in the main agri-environment programme was compulsory, for which additional payments were made (included in the payment levels shown in Table 1). In the United Kingdom, additional environmental restrictions were incorporated into national organic production standards.

Other restrictions in the eligibility conditions were related to the principle of avoiding double payments for the achievement of the same objective under different agri-environment and mainstream measures, resulting in considerable variation between the schemes.

Effects of the 1992 CAP reform commodity measures

The impact of the reformed commodity measures on organic farming is a topic that has received relatively little attention from policy makers, despite the potential for conflict between these measures and the agri-environmental measures. In many cases, the assumption is made that there is no difference between organic and conventional producers in terms of eligibility, and that therefore any

impacts are likely to be negligible. Very few studies have attempted to quantify any possible impacts, so that the following analysis is unavoidably qualitative in nature.

In most countries, the mainstream commodity measures of the CAP reform were seen as beneficial for the organic sector. Even though organic farmers don't contribute as much to surplus production, set-aside has the potential to support the fertility-building phase of organic rotations during conversion and on arable farms with little or no livestock. This is confirmed by the higher use of set aside on organic than on conventional farms in some countries. However, in most countries farm size is such that organic producers could qualify for the simplified scheme for arable area payments without the need to set land aside.

Only in a few cases have significant adverse impacts of other mainstream measures on organic farmers been identified and in some cases, special provisions have been made to reduce these. The implications are different for existing organic producers as compared to producers in conversion and effects vary according to farm types.

Implication for existing organic producers

Existing organic crop producers typically gained, because aid for crops was no longer linked to output, but to the areas of different types of crops grown. Previously, price support and selling into intervention were of little relevance to producers operating in an under-supplied premium market. Area aid calculated on the basis of regional average yields represented a bonus to many organic producers, particularly given that organic crop prices did not fall as much as conventional prices as a consequence of the reforms. The higher level of support payments for protein crops such as beans and peas was also of benefit to organic producers, given the contribution which these crops can make to the nitrogen and livestock feed requirements of the farm system.

However, in some cases the benefits gained may have been at the cost of setting land aside which might otherwise have been producing cash crops that were in demand, given that on most organic farms the fertility building phase of the rotation is utilised by livestock. In addition, dairy and horticultural producers, who represent a relatively high proportion of organic production in most countries, saw few benefits from the CAP reform measures, as their crops, grassland and dairy cows were not eligible for support. To the extent that CAP support under the mainstream measures has been incorporated into land and rental values, the impacts may even have been negative.

For many producers operating rotational systems that included periods of fertility-building leys lasting longer than five years, the definition of eligible arable area according to land not in permanent grass (*i.e.* >5 years old) at the end of 1991 meant that some of the rotational land would not qualify for support payments when it came back into production. In some countries (*e.g.* United Kingdom, Ireland), this issue appears to have been resolved by allowing producers to rotate eligible area around the farm or higher flexibility about the permanent/temporary nature of fodder area (Belgium) so that farmers could choose the optimum basis for the support regime.

Existing organic livestock producers, who had reduced livestock numbers before 1992, in many cases received lower livestock quota allocations than would have been the case had they remained under more intensive, conventional management, with a potentially adverse impact on asset values. At the same time, they benefited (as other producers, but to a lesser extent given lower stocking rates) from the increases in headage support payments. The adverse impacts relating to lower stocking rates might have been less significant if support for livestock producers were also allocated on an area basis. However, organic producers would not have been as severely affected by the

reductions in eligible stocking rates in the early years of the reforms. Indeed, many organic producers benefited from the higher beef extensification payments for stocking rates less than 1.4 LU/forage ha.

There is no indication that the environmental cross compliance measures that had been implemented as part of CAP reform in a few countries had any special impact on organic producers. Similarly, the overall impact of capping mechanisms on the organic sector has been limited, even though some examples of an effect have been reported (*e.g.* forage maize in the United Kingdom).

Impacts on farmers converting to organic production

Negative effects might have occurred for farmers converting to organic farming because arable area payments differentiated by crop types and livestock aid eligibility quotas tend to freeze current production patterns and levels of intensity. This does not go well with the enterprise restructuring which conversion to organic farming entails.

In their aim to diversify the rotation, arable farmers converting could lose eligibility for some arable area payments, without compensation, but only get access to some livestock premiums through quota purchase. In some areas, even quota purchase may not be possible because of the regional basis of quota allocations.

Livestock farmers converting were likely to receive livestock payments on fewer animals, yet will not be entitled to arable area payments for any new arable land introduced, although this may be offset by quota sales. There is therefore an active disincentive to producing cereals for livestock feed on the holding itself, in line with organic principles, when crops that have received support can be purchased relatively cheaply from elsewhere. On the other hand, the ability to trade quotas has facilitated the restructuring process during conversion and for many producers the ability to lease out quotas during conversion has proved to be an important means of financing the conversion.

These blockages were seen as more of a problem in countries and regions with larger farm sizes, as the farms were too big to qualify for the simplified scheme, but in many cases creative use of the support measures could reduce the extent of the impacts significantly.

Special provisions for organic producers

In order to mitigate negative impacts of CAP reform on organic producers, several countries made special provisions for organic producers or used investment aids and national/regional measures to provide additional assistance. Measures included:

- less restrictive requirements compared with conventional producers, *e.g.* later cutting or cultivation dates (*e.g.* the United Kingdom), exceeding of the maximum allowance of legume content for set-aside mixtures (Sweden, the UK, although in most other EU countries no restriction on the use of legumes in set aside mixtures apply);
- priority in allocation or free access to quota from the national reserve, *e.g.* suckler-cow and sheep annual premium quota from the national reserve (United Kingdom), and flexibility in choosing the reference time for milk quota (Sweden) and additional allocation of milk quota for organic and in conversion producers (Denmark);
- supplementary payments per LU or per ha for producers receiving aid under the organic option under 2078/92 to less favoured area (LFA) payments under EC Reg. 950/97 (one region in Italy since 1998).

- rotation of eligible arable area land around the farm, if the total area of eligible arable land on the farm remains the same (United Kingdom, Ireland) or higher flexibility about the permanent / temporary nature of fodder area (Belgium).
- priority status with respect to farm investment grants and loans (two regions in Italy).

In the Netherlands, special provisions existed with respect to the manure law that imply that, if organic farms had trouble meeting the standards for NH_4 emissions, especially in poultry and pig-keeping, they would not have to farm within these norms. This exemption was related to the fact that certain animal housing systems in organic farming (with advantages concerning animal health and well-being), may lead to higher NH_4 emissions than in conventional systems.

Other support measures

Support for organic farming under the 1992 CAP Reform was not solely restricted to direct financial support under the agri-environmental and commodity measures. Support for market and rural development initiatives, and support for information initiatives (research, training and extension) also played an important role and can be seen as important balancing components determining the success or otherwise of direct financial support measures in individual countries. They are only reviewed briefly here, as they are beyond the scope of this paper, but further details can be found in Lampkin *et al.*, 1999.

Production standards and regulations

One of the most important initiatives has been the introduction of EU-wide legislation covering organic crop production (EC Reg. 2092/91) and organic livestock production (EC Reg. 1804/1999). Production standards for organic agriculture promote consumer confidence and prevent the undermining of the market through fraudulent trading, but in situations where several competing initiatives exist, this may not be achieved. The introduction of legislation defining organic agriculture was seen as a means to avoid confusion among consumers, protect the producer and hence assist the development of the market for organic food. However, even after the implementation of the EU regulations, there has been wide differences between countries in the implementation of these initiatives, including the role of the state compared to private organisations, the number of agencies involved (which if too high can undermine both consumer and producer confidence), and the use or otherwise of generic national or EU logos to support consumer recognition of organic products.

Marketing and processing

The development of the marketing structure and establishment of new retail outlets is of key importance if the sector is to be able to deal with the supply-led expansion and if premium prices are to be maintained (Hamm and Michelsen, 1996). Policy support for marketing and processing in organic farming varies considerably. A number of countries have legislation, grants and/or support programmes available on a national level through which organic enterprises can and have received funding, for example Austria. Germany and Denmark have national programmes that specifically target organic farming. On an EU level, one of the established priorities for the application of EC Regulation 866/90 on improving the processing and marketing conditions for agricultural products and subsequent regulations through to the Rural Development regulation 1257/1999 has been investments relating to organic farming products.

Regional development and structural policy

Organic farming can help to meet many of the goals of regional development programmes, combining a sustainable model of agriculture with the encouragement of local production, processing and consumption patterns and local marketing networks, leading to an increase in the 'economic value' of a region (Vogtmann, 1996). Organic farming projects received support under Objectives 5b and 1 of the EU Structural Funds up to 1999 and this support has continued under Agenda 2000. These projects cover a variety of activities, including direct marketing, promotion of regional products, research, technical advice and training. Some regional development schemes include support for marketing and processing activities in the organic sector, mainly aimed at small-scale projects. Such schemes have been particularly successful in Germany in helping develop regional marketing networks, overcoming the problems of a small organic sector and encouraging the entry of new operators. The impact of grant aid on the organic sector and consequently the development of the region can be significant as evaluations of the Irish Objective 1 programme have shown (Fitzpatrick, 1997).

Information support

The provision of information and advice about organic farming is very important, as in organic farming, similar to other low input systems, inputs are replaced through management (Lockeretz, 1991). Only with access to suitable information can farmers who are considering conversion make an informed choice about the implications for their particular circumstances. Organic producers and their organisations are an important source of information to those interested in organic production, and in seven countries the producer organisations receive public support in recognition of this role. Regional groups of producer organisations operating in ten countries facilitate the sharing of experience among organic farmers, act as a focal point for regional market development and give social support to the producers. Support has also been given to information and advisory services and demonstration farm networks under national advisory support systems, mainly with the aim to increase the uptake of conversion support. Specific conversion information programmes in Sweden (under EC Reg. 2078/92) and the United Kingdom (national programme) have proved very popular. In addition, indirect support to the information provision has been given through training and research programmes including the second, third and fourth framework programmes from the European Union.

Trade and WTO implications of support policies

The development of the market for organic products relies significantly on international trade, and therefore it is to be expected that policies to support organic farming will come under the scrutiny of the World Trade Organization. Organic farming standards and regulations are generally acceptable within the WTO framework, as in principle at least they are governed by Codex Alimentarius agreement on organic food standards, but bilateral issues remain, not least between the US and EU. Potentially more contentious is the availability of financial incentives to encourage conversion to organic production and to stimulate demand for locally produced food, both in Europe and North America. Direct support of this type currently comes within the WTO's Green Box, which is justifiable given the environmental and other public good benefits of organic farming. The current US/EU agreement to leave Green Box measures intact would suggest that these support payments are secure for the foreseeable future, but the increasing emphasis on the market for organic products as an end in itself, rather than a means to support the environmental objectives, could undermine this, particularly if some countries feel their producers are being discriminated against. The answer may lie in quantifying the broad range of public good outputs of organic farming and developing holistic measures of total environmental costs, but higher transaction costs would inevitably be involved.

Developments under Agenda 2000

Support for organic farming under Agenda 2000 has yet to be analysed in depth, but will be the focus a new EU-funded research programme co-ordinated by the author starting in autumn 2002. The Rural Development regulation (1257/1999) provides the means for the continuation of direct support to organic producers through the articles relating to agri-environmental measures. Examples of current payment rates are shown in Table 2. A more comprehensive analysis is to be conducted by the author in 2003.

Table 2. Comparison of organic farming support payments for arable crops in selected countries, 1997 and 2002

Status	**Conversion**		**Organic**	
Year	***1997***	***2002***	***1997***	***2002***
Austria	327	327	327	327
Germany*	150	285	100	160
Belgium	180	180	112	112
England	80	290	0	50~

* Lower Saxony; ~ proposed.
Source: Lampkin *et al.* (1999) and own data (2002).

In addition, the Rural Development regulation integrates several other relevant measures, including support for marketing and processing, training, farming in less-favoured areas, animal welfare initiatives and young farmers. This integrated approach to rural development forms the second pillar of the CAP and, in theory at least, provides member States with the opportunity to support fully integrated rural development plans suited to their specific needs. (In practice, many of the measures reflect previously existing regulations and have continued to be implemented independently because of the different agencies responsible.) Perhaps of greater significance for the development of the organic sector is the potential the Rural Development regulation offers to support integrated action plans that achieve a better balance between supply-push and demand-pull policies.

Agenda 2000 did not introduce fundamental changes to the main commodity regimes, reinforcing rather than substantially progressing the reforms started in 1992. To the extent that these measures were advantageous to organic producers previously, they have remained so subsequently. One area of movement, however, has been that of exemptions from compulsory set-aside requirements for organic producers. As indicated above, it can be argued that organic farmers should be exempted from compulsory set-aside, because the market is under-supplied and production is in any case reduced as a result of the farming system applied, but the option of voluntary set-aside should be retained as it can be used to support the fertility-building phase of the rotation in the absence of livestock. In 2001, the EU Commission introduced a special exemption to allow organic producers to utilise set-aside land for the feeding of livestock, but a complete exemption remains an issue for the mid-term review of Agenda 2000. There is a need for this process to be continued, and for other production constraints, such as quotas, to be re-examined on similar grounds.

The European Commission has put forward proposals for the mid-term review of Agenda 2000 (EC, 2002), which are currently the focus of intensive debate between member States. In essence, the proposals aim to complete faster than originally envisaged the process of reforming market support mechanisms, decoupling direct payments from production, introducing compulsory

modulation and increasing support for the second pillar rural development measures, including agri-environment, animal welfare, food quality and organic farming schemes.

Viewed in their totality, there are many elements of these proposals that are likely to be beneficial to organic producers, in particular the decoupling and modulation proposals, which favour smaller, more labour-intensive producers and remove the penalties that producers converting to organic production previously faced when altering enterprise mix and reducing stocking rates and production intensity. However, organic farming does not receive detailed explicit attention in the proposals, and some of the earlier proposals from the Commission to exempt organic producers from compulsory set-aside do not yet appear to be reflected in the reform plans.

Action plans

A key problem facing policy-makers is the balancing of supply (push) and demand (pull) initiatives to achieve sustainable development of organic agriculture in support of environmental and rural development goals. Some countries (*e.g.* Denmark, England, Finland, France, Germany, the Netherlands, Norway, Sweden and Wales) have developed integrated action plans to achieve a better policy mix (Lampkin *et al.*, 1999). The range of approaches adopted, however, illustrates the problems, and the political pressures, inherent in achieving this.

The organic farming action plans normally include targets for adoption (typically 5-10% by 2000/2005 or 10-20% by 2010) and a combination of specific measures including: direct support through the agri-environment/rural development programmes; marketing and processing support; producer information initiatives; consumer education and infrastructure support. The more detailed plans contain evaluations of the current situation and specific recommendations to address issues identified, including measures to ameliorate conflicts between different policy measures.

Denmark has the longest history of policy support for organic farming, with the first measures introduced in 1987. The first Danish Action Plan of 1995 covered the period until 1999. Its 7% by 2000 target was almost achieved, with 6% of agricultural land in Denmark certified in 2000. Action Plan II (MFAF, 1999) aims for an increase of 150 000 ha, to ca. 12% of agricultural land, by 2003. The plan was drawn up by the Danish Council for Organic Agriculture, a partnership between government, organic producer organisations, conventional farming groups, trade unions, consumer and environmental groups. It is characterised by an in-depth analysis of the situation in Denmark and represents the best-developed example of the action plan approach, containing 85 recommendations targeting demand and supply, consumption and sales, primary production, quality and health, export opportunities as well as institutional and commercial catering. The plan has a specific focus on public goods and policy issues, with recommendations aimed at further improving the performance of organic agriculture with respect to environmental and animal health and welfare goals, including research and development initiatives, administrative streamlining and policy development.

The situation in Germany has a more overtly political basis. The fall-out from the BSE crisis in Germany in 2000 led to a goal of 20% organic farming by 2010 being set. This was heavily criticised by farming unions and agricultural economists, in part because of the absence of specific measures to achieve the goal. However, the payment rates for the federal German organic farming scheme were increased and a unified symbol for organic products introduced (following the failure of private sector initiatives to achieve a similar goal). Marketing and processing support initiatives continue through the rural development plan. The German "Federal Programme for Organic Agriculture" (BMVEL, 2001) is not strictly an action plan as it does not aim to integrate or modify policy measures that are already in place, but seeks instead to create a new information programme

targeting all elements of the supply chain, from the input suppliers through producers, distributors, processors and retailers to consumers. Substantial funding (EUR 70 million in 2002/2003) is directed at the key elements, including web-based information resources, research, training and demonstration activities, with the major share of funding targeted at consumer information campaigns.

In contrast to the mixed approach in Denmark with an emphasis on both market development and the delivery of public goods and the dominant information focus of the German action plan, the most recent action plan in the Netherlands (MLNV, 2000) "*An organic market to conquer*" reflects the very strong demand/supply chain focus of Dutch policy, which targets 10% by 2010. The plan aims to improve the functioning and efficiency of the supply chain, to reach new, less ideological consumers, and to retain consumer confidence through effective certification procedures, but it also recognises the need for continuing research and information dissemination initiatives. In contrast to other countries, the policy includes the phasing out of supply measures including direct payments, with support for conversion available for the last time in 2002.

In the United Kingdom, action plans have been produced in Wales and in England. The Welsh action plan (WAFP, 1999), published in 1999, aims for 10% of Welsh agriculture to be organic by 2005 and for organic farming to play a key role in agricultural/environmental policies as well as exploiting market opportunities at home and abroad. This is to be achieved by increasing the supply of organic products from Wales, developing markets for Welsh organic products, and addressing specific bottlenecks that might occur. An integrated approach combining three main types of activities was envisaged: effective utilisation of existing measures and development of new policy initiatives; marketing measures (including market analysis and development, marketing and processing/RDP grants, and related training and business advice; and information measures, involving a co-ordinated information strategy and the establishment of an organic centre for excellence. The recently-published English action plan (DEFRA, 2002) does not include targets, but does for the first time introduce the concept of maintenance payments for organic producers (as available elsewhere in Europe). It also includes a series of supply chain initiatives, including reform of the certification system and improved statistical and bench-marking data, as well as increased funding for research, the establishment of an institute to support the accreditation and information needs of advisors, and a range of other training and extension initiatives linked to existing programmes for conventional producers.

At the European level, a strategic focus for policy support for organic agriculture is needed, given its potential significance in coming years. Although the implementation of measures to support organic farming is primarily a matter for member States, it is important that the enabling regulatory framework is adequate to provide the right policy mix, including the minimisation of conflicts between individual initiatives. As organic farming grows, the size of the sector will begin to impact on the overall supply and market situations for agricultural products in the EU, and this will need to form part of the considerations for ongoing reform of the main commodity measures. Therefore, while the EU may hold back from setting a global target for organic production, some consensus on the longer-term potential of the sector is still desirable. In addition, there is a need for certain actions at an EU-wide level, for example a common, non-discriminatory identification symbol (also applicable to non EU-products). The development of a European action plan for organic farming is now the subject of study by the EU Commission, a process initiated by the European conference on organic farming held in Copenhagen in May 2001 (MFAF, 2001), and subsequently supported by the Council of Agricultural Ministers in June 2001. A draft action plan is expected to be presented to the Council by the end of 2002.

Conclusions

Organic farming has developed rapidly in Europe since 1993, against the background of significant policy support, mainly in the form of direct payments under agri-environmental support and indirectly through support for marketing and processing activities, certification, and information-related activities. The prospects are for continued growth, which may lead to 10-20% of EU agriculture managed organically by 2010. The Agenda 2000 mid-term review proposals for continued reform of the CAP from 2004 look likely to provide the basis for further support to this process, allowing organic farming to move from "niche markets" to become a mainstream part of the agricultural sector. However, in order to achieve this, integrated policy support in three key areas (production support, support for regional and market development, and support for knowledge networks) is essential. Longer term, the Agenda 2000 package will be replaced by further new policy measures from 2007, reflecting the substantial enlargement of the European Union from 15 to 27 countries and the outcomes of the current WTO round. The EU action plan for organic food and farming and the new policy research programme will have a key role to play in this process.

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THE INFLUENCE OF THE EU COMMON AGRICULTURAL POLICY ON THE COMPETITIVENESS OF ORGANIC FARMING

Frank Offermann[1]

Abstract

The Common Agricultural Policy (CAP) strongly influences the economic framework of agriculture in the European Union (EU), contributing to a significant share of farm receipts. Organic farms tend to receive higher total payments than comparable conventional farms due to support from agri-environmental programmes. However, due to differences in production structures, they receive fewer payments from the general schemes like arable area payments and livestock headage premia, which were introduced as part of the 1992 CAP reform. As yields in organic farming are lower, organic farms are also likely to gain less from the still widespread use of price support measures. Still, the CAP reforms have significantly increased the competitiveness of organic farming relative to conventional farming. While the introduction of direct support to organic farming in all EU member States was probably the single most important change, modifications of the general support schemes also play a decisive role in this development. The replacement of price support by partly decoupled payments favours extensive farming systems. The introduction of premiums for set-aside has especially benefited organic arable farms. Initial calculations indicate that further decoupling as envisaged in the current discussion of future reforms of the CAP, such as grassland premiums or general uniform area payments, will considerably increase the financial attractiveness of organic farming in the EU.

Introduction

The CAP has been influencing the economic and regulatory framework for agriculture in the European Union in numerous ways for decades. The OECD calculates the Producer Support Estimate (PSE) to be 40% of gross farm receipts for the period 1998-2000 (OECD, 2001). Market price support policies and area and headage payments are still the main policy instruments, but payments based on input constraints have been gaining in relevance. The objective of this paper is to identify and quantify CAP support for organic farms in comparison to conventional farms, and to assess the impact implemented and planned reforms of the CAP have had or could have on the relative competitiveness of organic farming.

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Importance of the CAP for organic farms

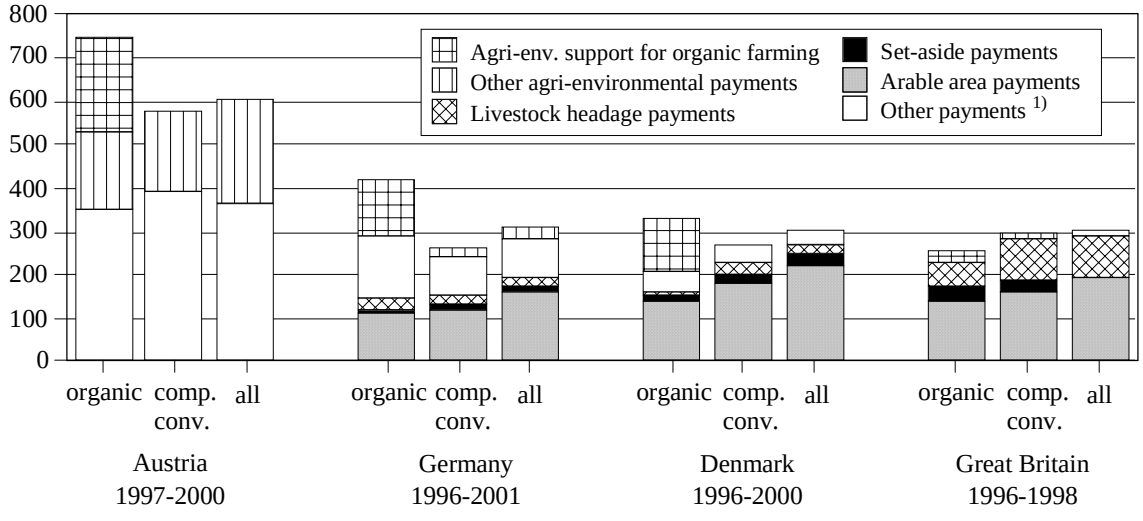
Direct payments

In the EU, direct payments generally account for a significant share of income in agriculture. The most important payments are made on the basis of

- the area planted with specific crops (arable area payments);
- the number of animals held or slaughtered (headage payments); and
- the participation in agri-environmental programmes.

Payment levels often vary regionally, and eligibility is subject to a number of constraints and requirements (*e.g.* set-aside, stocking rates, minimum and maximum levels, budget constraints, etc). Actual farm receipts can therefore only be determined on the basis of farm level data. Suitable data were available for four countries (Austria, Denmark, Germany and the United Kingdom) from national farm accounting data networks.[2] Farm samples include between 30 and more than 120 organic farms each, and all figures represent the average of at least three years of observations to eliminate the influence of any annual fluctuations that might occur.

Figure 1. Importance of the CAP: direct payments to farms



1) Austria: incl. CAP compensatory payments. OF_2002-08-20

comp. conv. = comparable conventional farms

all = sample representing all farms in the country

Source: Own calculations based on BMLF, BMVEL, DIAFE, Fowler et al.

An overview of total direct payments per ha in organic, comparable conventional[3] and all farms in the countries analysed is given in Figure 1. In three of the four countries, organic farms

2. In the United Kingdom, supplemented by data collected on organic farms.

3. The comparable conventional farms are of similar size as the organic farms. For a detailed description of the concept of comparable conventional farms, see the paper by Nieberg and Offermann, "The Profitability of Organic Farming in Europe", in Part I, Chapter 3.

receive higher total payments than conventionally managed farms, due mainly to the support for organic farming practises within the agri-environmental programmes. The notable exception is the United Kingdom, where organic farming has been supported only for a conversion period, and the payments therefore have little importance in the sample analysed.[4]

Payments made within all the other categories are often higher for conventionally managed farms, especially with respect to the payments introduced as part of the CAP reform of 1992:

- Arable area payments are made for certain crops only (so-called "*Grandes Cultures*", *i.e.* cereals including maize for silage, oilseeds and pulses), of which organic farms often grow less due to the need for a broader crop rotation and the use of leys for fertility building.
- Most livestock payments are linked to the number of animals held, and, even though some schemes exist that reward low stocking rates, this leads to livestock payments being significantly lower on organic farms.
- Set-aside payments do not differ significantly. While the obligatory set-aside area is somewhat lower on organic farms, voluntary participation in set-aside schemes is higher as this land can be used for fertility building.

Price support

Price support measures are still the most important instruments of agricultural protection in the EU (OECD, 2001). The influence on individual farm receipts depends on the products covered and quantities produced. Both aspects make these instruments much more beneficial to conventional than organic farming systems. In the EU, yields are generally higher under conventional management (Offermann and Nieberg, 2000), and many of the products with the highest price support[5] (*e.g.* barley, sugar, beef) are more often produced on conventionally than on organically managed farms.

Impact of the CAP reforms on the relative competitiveness of organic farming

The 1992 CAP reform was characterised by a reduction in price support coupled with compensatory payments and obligatory set-aside, and the introduction of agri-environmental programmes. All three elements had an impact on the relative competitiveness of organic farming.

Agri-environmental payments

The CAP reform of 1992 introduced the large-scale promotion of environmental objectives with voluntary participation in agri-environmental programmes (EC Reg. 2078/92).[6] Within this framework, all EU member States now offer support for organic farming, and even though the support to other extensive farming systems is often competitive, these payments are probably the single most important change that the CAP reform of 1992 made for organic farming. A detailed discussion of the

4. Note that in 2002 the United Kingdom announced it would begin paying direct payments to organic farmers after the conversion period.

5. Measured by the producer Nominal Protection Coefficient (NPC).

6. With the implementation of Agenda 2000, agri-environmental measures are financed within the framework of the Rural Development Regulation (EC 1257/99).

role of conversion and support payments is given in the paper by Lampkin (Part III, Chapter 8). This paper will therefore only concentrate on the impact of the general measures of the reform.

Compensatory payments for reduced price support

While the analysis presented in Figure 1 demonstrates that organic farms receive less direct payments per hectare from the general CAP schemes introduced as part of the 1992 CAP reform, it would be rash to denounce the reform as having disadvantaged organic farming systems. Actually, the 1992 CAP reform (as well the subsequent reform, Agenda 2000) has generally reduced the discrimination against extensive farming systems by lowering the level of price support for a number of products, compensating farms for losses of revenue via direct payments. For arable area crops, payments are made depending on the area cropped, with the per hectare level of the compensatory payments based on regional historical average yields. This has generally favoured extensive farming systems, since farms with lower yields were less affected by price reductions but get the same level of compensatory payments.

However, since organic produce is generally sold at premium prices, the impact of the shift in the support system on organic farms is more difficult to assess and depends on the effects of the change in the EU market price support mechanisms on the prices for organic products. Looking at a few stylised relationships between organic and conventional farm gate prices provides an insight in the general mechanisms:

Case a) Organic and conventional prices are independent from each other

In this case, the fall in conventional prices does not affect organic producers, and the compensatory payments will directly increase the returns to organic farms.

Case b) The premium paid for organic products is constant in absolute terms

Then, the absolute price decrease for the organic product is similar to the price decrease for the conventional product, but revenue reductions will generally be lower in organic than in conventional farming due to the yield difference. Decoupled compensatory payments will increase the relative competitiveness of organic farming. This is also the case if an organically produced product is sold conventionally.

Case c) Organic products receive a constant premium relative to conventional products

If the relative price decrease for the organic product is similar to the relative price decrease for the conventional product, then revenue reductions may be either higher or lower than in conventional farms, depending on the revenue in the base situation: If base revenues per ha are lower under organic than under conventional management, then this change in policy regime will increase the relative competitiveness of organic farming, and *vice versa*.[7]

Little information exists on the exact relationship between organic and conventional farm gate prices, but impressive empirical evidence of the positive impact of the decoupling of agricultural support is provided by the development of organic farming in the Scandinavian countries following

7. Using typical figures for cereals, with yields in organic farms lower by 40% and prices higher by 100%, revenues per ha are higher by 20% in organic farming. In this case, if prices of organic cereals are defined relative to conventional prices, relative competitiveness of organic farms would decrease.

the EU accession in 1995. In Finland, for example, conventional producer prices fell by up to 40% "overnight" with the adoption of EU agricultural policy, which significantly increased the relative competitiveness of organic farming systems, and in turn, was one of the main reasons for the doubling of the organically managed area within a single year (Koikkalanen and Vehksalo, 1997).

Price support was also reduced for livestock products (mainly beef and sheepmeat), but as compensatory payments are paid per head, the benefit to extensive systems (which differ from intensive systems mainly by lower stocking rates and longer fattening periods) was small, if any. In addition, at least in the 1990s, often a significant share of organically produced livestock products had to be sold conventionally, and thus the decreased price level did directly affect organic farms as well.

Set-aside schemes

To limit the excess production of certain arable crops, the CAP reform has introduced the instrument of the obligatory set-aside, with set-aside land being eligible for a payment. Organic farms are subject to the same obligatory set-aside rate as conventional farms, even though they already contribute to a reduction of surplus products through reduced yields and a different cropping pattern. Still, the impact of the set-aside schemes on organic farming is generally assessed to have been neutral or positive, as organic farms can often use the set-aside for fertility building by including legumes in set-aside-mixtures. In particular, arable farms with little or no livestock and farms in countries that allow a cumulation of set-aside payments and payments for organic farming have benefited from the set-aside schemes.

Overall impact

The overall impact of the CAP reforms on the economic situation of organic farms can be illustrated using the example of Germany. There, organic farms were eligible for specific support before 1992 and therefore the effects of the CAP reforms were not influenced by the introduction of support to organic farming within the new agri-environmental programme. A survey of 150 organic farmers found that the impact of the CAP reform on the economic situation was positive, especially for organic arable farms (Table 1).

Outlook: the impact of possible future developments

The latest reform of the CAP, Agenda 2000, is continuing the gradual shift from price support to direct payments. Especially price protection for livestock products will decrease in the future. However, since payments will continue to be paid per head (or, in the case of milk, will possibly even be directly coupled to production), the impact on the relative competitiveness of organic farming will be marginal.

Table 1. Impact of the general measures of the CAP reform on the economic situation of organic farms in Germany

	Former federal states			New federal states
Economic situation	**All farms**	**Arable farms**	**Grazing livestock farms**	**All farms**
Worse than before	11%	3%	17%	2%
Slightly worse	15%	13%	18%	0%
No change	37%	37%	37%	28%

Slightly better	22%	32%	15%	60%
Better	15%	16%	13%	9%

Note: Survey of 107 organic farms in the former federal states and 43 organic farms in the new federal states in Germany in 1995. Farmers were asked how the CAP reform had affected the economic situation of their farms. Farms have been eligible for organic support schemes before the CAP reform, and thus the introduction of EC Reg. 2078/92 was not taken into account.
Source: Nieberg (1998).

In contrast, other options discussed as part of the mid-term review of the Agenda 2000, *e.g.* a uniform payment for all land, or a transformation of headage payments to grassland payments, may considerably alter the competitiveness of organic and conventional farming systems. Initial calculations for Germany indicate that a transformation of all milk and headage payments to a uniform grassland premium would increase the income of organic farms by approximately 15% (EUR 60/ha) compared to comparable conventional farms (Offermann and Nieberg, 2001), highlighting the importance the general policy framework has for the relative competitiveness of organic farming.

Conclusions

When evaluating the policy and regulatory framework for organic farming, the emphasis is often on specific regulations and support programmes for organic farming. However, in the EU the general framework of the CAP is one of the main determinants of the relative competitiveness of organic farming. In this respect, recent reforms have, in general, been positive for organic farming systems. Future developments which aim at a further decoupling of agricultural support and expanding payments for the provision of environmental goods could continue this trend.

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NORWEGIAN EXPERIENCE WITH CONVERSION AND SUPPORT PAYMENTS FOR ORGANIC FARMING

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Abstract

The development of organic farming is an integral part of Norwegian agricultural policy. Governmental conversion and support payments to organic farmers have been, and still are, important tools to reach the political goals established for organic farming in Norway. Norwegian experiences with conversion and support payments directed towards organic producers will be the main focus of this paper. The paper describes how the subsidy system in Norway has emerged and the impact support payments have had on the development of organic farming. The subsidies are especially effective in increasing acreage demanding productions, but are not effective in enhancing acreage-intensive productions. Conversion and support payments can be effective tools to steer the development in the right direction but they are not effective if used as the only development tools.

Organic farming as a part of Norwegian agricultural policy

Objectives of Norwegian agricultural policy

Norwegian agricultural policy has several objectives, the most important being to:

- secure farmers an income and living standard corresponding to the remainder of the population;
- secure the production of high-quality, safe food;
- secure agriculture's contribution to the production of public goods like food security, settlement in rural areas and cultural landscapes (agriculture's multifunctional role).

As a consequence of the latter objective, it is a goal to maintain farming activities throughout the entire country. In addition, it is an overall goal that agricultural production, as far as possible, should develop in an environmentally friendly and sustainable direction.

The development of organic farming has been an increasingly important part of agricultural policy in Norway since 1990. In 2000, the Norwegian Parliament debated a White Paper regarding agriculture and food production. A large majority supported the further development of organic farming, aiming for an increase in the agricultural area under organic cultivation to 10% by 2010,

1. Ministry of Agriculture, Norway.

provided there is a functioning market for organic food products. The development of organic agriculture is regarded as an important part of agricultural policy because it can contribute to several of the objectives mentioned above, for example:

- Organic farming is environmentally friendly, *e.g.* in terms of effective resource utilisation, and no use of synthetic pesticides or chemical fertilisers. Research, and especially the development of new technologies, done in connection with organic farming can also be used in conventional farming. Thus organic farming can contribute to a more sustainable Norwegian agricultural production as a whole.
- It is a political goal to increase the variation in the food-sector and the consumer's possibility to choose between different food qualities. Organic production contributes to this goal.
- Surveys show that the consumers are interested in organically produced food and that they are willing to pay more for these products. To secure domestic agricultural production, it is important to meet the demand for organically produced food with Norwegian production as far as possible.

Agricultural policy instruments

In order to achieve the objectives of Norwegian agricultural policy, a number of measures have been employed, including economic instruments as well as laws and regulations. The main economic instruments in Norwegian agricultural policy are: *a)* border protection and market price support; *b)* target prices; *c)* market regulations; *d)* direct support and *e)* fees and excise taxes.

In this connection, the direct support system is of main interest. The direct support system consists of several support measures that can be divided into:

- direct support (product-specific support and non-product-specific support);
- investment support;
- indirect support via research, education and extension services.

The direct support subsidies are partially differentiated according to production, geographical region and farm size. Development of, and support to organic farming is an integrated part of the direct support system.

In Norway, the two farmers' associations[2] have the right to negotiate with the Government on prices and other measures in the annual agricultural negotiations, resulting in The Agricultural Agreement.[3] The total annual support given through the Agricultural Agreement over the last few years has been about NOK 12 billion (USD 1 607 billion). In 2002, NOK 125 million (USD 16.7 million) was set aside to enhance the development of organic agriculture. About 50% of this sum represents direct conversion and support payments to organic farmers. The other 50% are used for measures through the whole food chain, including advisory services, research, market development actions and information activities.

2. The Norwegian Farmers' Union and the Norwegian Farmers' Smallholders' Union.

3. The Agricultural Agreement, which is ratified by the Norwegian Parliament, covers a large number of items including subsidy programmes via the national budget and changes in market prices (target prices).

Experience with conversion and support payments directed to organic primary producers will be the main focus of this paper. Because of the complexity of the Norwegian support system, it is difficult to describe and isolate one integrated part of the system. An attempt will be made, however, to show how the subsidy system for organic farming has emerged, and the influence the conversion and support payments have had on the development of organic farming in Norway.

Subsidies to organic farmers

Organic farmers have been granted subsidies from the Norwegian government since 1990. The subsidies are given as an extra payment on top of the general support system, and the subsidy levels are established on an annual basis, through the Agricultural Agreement. In 1990, two types of subsidies were introduced: a one-time conversion subsidy and a yearly acreage subsidy. Because the subsidies are debated on a yearly basis, both the level and shape of the subsidies have changed several times since 1990, reflecting developments in the organic sector as a whole and public opinion. Table 1 shows the support system as it will be from 1 January 2003.

Table 1. Norwegian support system for organic farmers from 2003

Product grown/ Animal	**Conversion payment** (USD per hectare, one-time subsidy)	**Acreage payment** (USD per hectare per year)	**Payments for organic animal production**** (USD per animal per year)	
			Eastern and Southern Norway	Western and Northern Norway and mountain areas
Grain, potatoes, vegetables, fruit and berries	1 000	333		
Green fertilising*	1 000	733		
Pasture and other organic areas	1 000	74		
Dairy cows			84	117
Other cattle			25	37
Goats and sheep			9	12

* Maximum 50% of area used for grain, potatoes, vegetables, fruit and berries.
** New subsidy in 2001.

There are three main goals for granting subsidies to organic farmers:

- Stimulate more farmers to convert to organic farming;
- Give partial compensation for the extra expenditures connected with organic production;
- Encourage farmers to maintain organic production after the conversion period.

At the same time, it is an important principle that higher prices in the market should cover some of the extra expenditures connected with organic production. In other words, consumers must be willing to pay some of the extra costs of supplying the market with organic products.

The “stimulation part” is to a great extent put on the conversion subsidy, which is set at a relatively high level compared to the actual extra expenditures occurring during the conversion

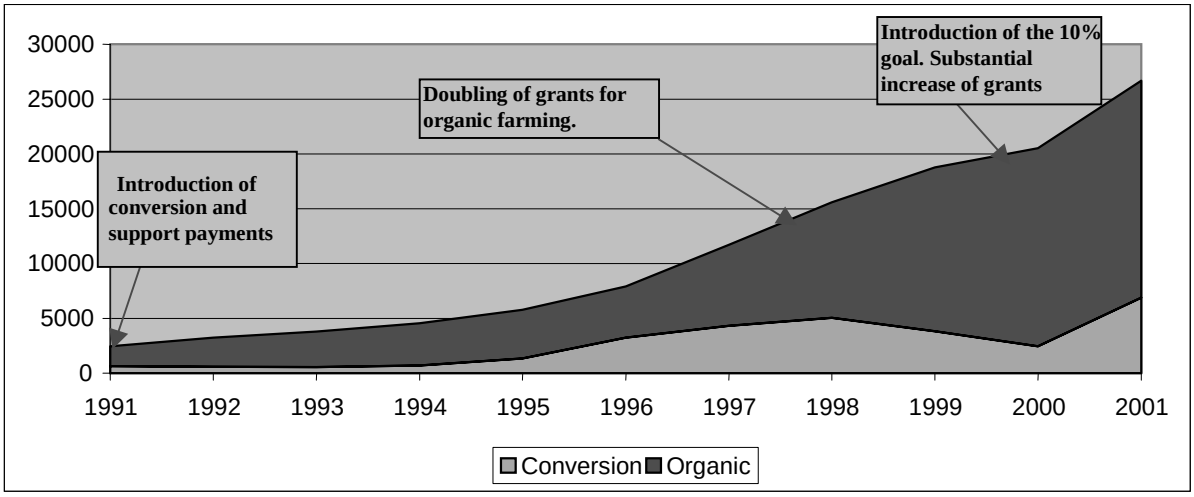
period.[4] This is practical because the conversion support is a one-time subsidy, and consequently a high subsidy level will have limited influence on market prices. On the other hand, the acreage subsidies, which are granted on an annual basis, are set at a more sober level aiming for a partial coverage of the higher production costs of organic farming.

Setting subsidies at a level greater than the extra costs in order to stimulate a wanted action has been successfully used to reach other political goals in Norwegian agriculture, *e.g.* more environmentally friendly farming. In general, such subsidies are held at a high level until farmer attitudes towards the wanted action have positively changed, then the subsidy is stabilised at a lower level. Subsidies to organic farming will probably also be stabilised at a lower level once the 10% goal has been reached.

Development after the introduction of conversion and support payments

As Figure 1 shows, there has been a steady growth in the area under organic cultivation since the introduction of support payments in 1990. Most of the organic area converted in this period has been pasture, while the development in acreage-intensive productions, like vegetable or fruit production, has almost stood still since 1989. The lack of development of organic horticulture production is unfortunate as surveys show that consumers' willingness to pay is highest for organic vegetables and fruit. That subsidies have had a low impact on encouraging this type of production is, however, not surprising, as the subsidies are acreage-based thereby favouring acreage demanding productions. Actions to enhance the development of acreage-intensive organic production therefore need to be found outside the direct support payment system. More research, good advisory services and developing "farm-to-fork" projects will probably be among the most important measures.

Figure 1. Development of organic area and area under conversion from 1991-2001
(in hectares)



4. Farmers receiving a conversion subsidy are committed to organic farming for a minimum of five years after the conversion period is over.

Steering the development

The yearly review of the subsidy system through the Agricultural Agreement makes it possible to steer subsidies in different directions based on how the organic sector is developing and the sectors reaction to the support system. The development of organic grain production may serve as a good example.

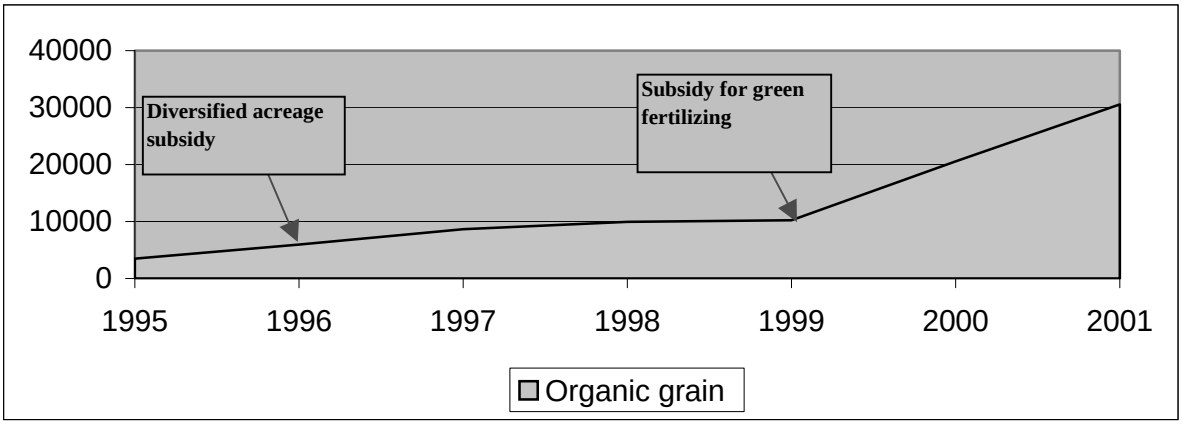
Increasing organic grain production

The introduction of conversion and subsidy payments clearly had a positive influence on the development of organic production. However, it soon became obvious that very few grain producers were converting to organic farming.

This can be explained by the general agricultural policy in Norway, locating animal production in the western and northern parts, and grain production in the eastern parts of the country. As a consequence, there is little animal manure available in the grain producing areas, which makes it especially challenging and costly to produce organic grain in Norway compared to grass production. Consequently, the subsidy levels were too low to give a proper incentive for grain producers to convert.

Work on developing an EU regulation on organic animal husbandry began around 1996, and it soon became clear that one probable result of this regulation would be a claim that fodder used in organic animal husbandry should be 100% organic by 2005. This made it pressing to rapidly increase organic grain production, and so in the 1997 Agricultural Agreement the acreage subsidies were diversified, granting a higher subsidy for arable crops.

Figure 2. Development of area used for organic grain production from 1995–2001
(in hectares)



Even though the number of grain producers converting to organic farming increased after this, the development was far too slow to meet the future need for organic grain, so during the next few years the subsidies for arable crops were increased several times.

As knowledge about organic grain production in areas with no animals improved, it showed that the costs of having to use green fertilising was high because it reduced the production area by about one-third. In 1999, a new subsidy especially directed towards grain producers with few or no animals was introduced, aiming to compensate for the extra expenditures of having to set aside area for green fertilising. This led to substantial growth in the organic grain area. Figure 2 shows the

development of organic grain area form 1996 to 2001. Both evaluations and several surveys show that most organic grain producers emphasise the changes in support policies as especially important for their decision to convert.

The importance of other measures

Even though subsidies for organic farmers have a positive influence on the conversion rate it is clear that subsidies alone are not enough to improve development.

Words are never enough — but they are important!

Converting to organic farming is an important and long-term decision, both economically and personally. Farmers, therefore, need to know that signals from politicians and the government are serious and predictable. Experiences from the development of the organic sector in Norway clearly show how important this is. The many changes in the organic subsidy system from 1998 to 2000 created uncertainty about the system. Consequently, many farmers did not take the risk of converting, resulting in a low conversion rate (Figure 1).

In 2000, the Norwegian Parliament set a goal that 10% of the total agricultural area should be under organic cultivation by 2010. This was followed by a substantially higher allocation of money for organic farming, mainly increasing efforts directed towards market development and projects activity. Direct support payments to farmers have to a great extent been held at the same level since 2000, but it was strongly emphasised that they will remain stable throughout the 10-year period. While the 10% goal did not result in any marketable economic consequences for the farmers, there has been a substantial growth in the number of farmers converting to organic production (Figure 1). The setting of the political goal has also had a positive influence on retailer's and the food-processing industry's attitude towards organic agriculture.

Throughout the food chain

While there has been a very positive development of organic farming in Norway since 1990, production volumes are still low and the Norwegian market for organic products is at a very early stage of development. The support payments give organic farmers an important economic base. But as they also need to cover some of the extra costs connected with organic farming through the market, development of the market for organic products is just as important. Further, support payments are not effective to enhance development of all types of production, like acreage-intensive productions.

Conversion and support payments are therefore not effective if used as the only tools for development. Efforts need to be made throughout the whole food chain from "farm-to-fork" including market development, advisory services, research and information. And the measures must work simultaneously to secure highest efficiency and a balanced development.

Conclusions

It is clear that development and changes in other parts of the Norwegian agricultural policy are of at least the same importance for the development of organic farming as the organic support system. Even so, the special conversion and subsidy payments have made a substantial contribution to the positive development of organic farming, the conclusion being that:

1. Governmental conversion and support payments to organic farmers have been, and still are, important tools to reach the political goals for organic farming in Norway.

2. Acreage-based subsidy payments are especially effective to increase acreage-demanding production, but not effective to enhance acreage-intensive production as, for example, vegetable production.

3. Support payments can effectively be used as a tool to steer the development in the right direction.

4. Conversion and support payments are not effective if used as the only development tools:

   – Words are not enough, but they are important! Clear and binding political goals and long-term focus are central factors for success.

   – Work needs to be done throughout the whole food chain from "farm-to-fork". Measures directed towards production, research, advisory services, information and development of the market need to proceed simultaneously.

DO SUPPORT PAYMENTS FOR ORGANIC FARMING ACHIEVE ENVIRONMENTAL GOALS EFFICIENTLY?

Lars-Bo Jacobsen[1]

Abstract

Concerns about the impact of modern agriculture on the environment have in the past few decades resulted in strict legislation concerning the leaching of nitrogen from Danish farms and their use of pesticides. An often-heard argument in recent years is that conversion to organic farming is a solution to many environmental problems. Hence, in the late 1990s several initiatives to support the development of organic farming have been taken, including permanent direct support for producing organically. This was made possible by the 1992 reform of the common European Agricultural Policy (CAP) that allowed for specific subsidies for environmentally friendly production. This paper discusses the cost efficiency of two alternative policy measures for obtaining an overall reduction in the use of nitrogen and pesticides in Danish agriculture. The first policy measure is a subsidy for producers who produce organically and thus reduces the use of nitrogen and abandons the use of pesticides. The other policy measure is the use of taxes levied on fertilisers and pesticides. Using an Applied General Equilibrium (AGE) model the two policies measures are compared. The paper concludes that an overall reduction in the use of pesticides and fertilisers is most efficiently obtained by taxing those agents using these inputs. The size of the organic sectors should be determined by consumers' willingness to pay for organic products.

Introduction

Concerns about the impact of modern agriculture on the environment have in the past few decades resulted in strict legislation concerning the leaching of nitrogen from Danish farms and their use of pesticides. An often-heard argument in recent years is that conversion to organic farming is a solution to many environmental problems. Hence, in the late 1990s several initiatives to support the development of organic farming have been taken.

Until the mid-1990s, organic farmland was held at a stable level of around 1% of the total cultivated area. From 1994/95, increased demand for organic products and favourable support for organic production led to a significant growth in organic farmland. Today, organic farmland accounts for 5% of the total agricultural area, and 6.6% if land under conversion is included. Organic milk is the most important product accounting for around 80% of the total value of production. The rapid increase in organic production has, however, not been followed by a similar increase in demand. After a significant preference shift towards organic products in the mid-1990s consumer tastes have only

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changed slowly in the most recent years. This has resulted in a situation where approximately 60% of current organic milk production is used for non-organic purposes.

Frandsen and Jacobsen (1999*a*) show that the cost to society of a complete transformation of Danish agriculture into organic production would be around 2-3% of real GDP, whereas the cost of a complete or partial ban on pesticides would amount to 0.82% and 0.35% of real GDP respectively (Frandsen and Jacobsen, 1999*b*).[2]

While the above-mentioned analyses focused on pesticides and organics separately, this paper addresses both issues simultaneously and also addresses the use of fertilisers in the agricultural sector. Moreover, the scenarios in this paper are less radical. Scenarios resulting in the same reduction in the use of pesticides and nitrogen are compared, by using two different policy instruments, namely subsidies to organic farmers in the first case, and taxes on fertiliser and pesticides in the other.

In all scenarios, positive environmental effects from organic farming are measured by changes in the use of pesticides and nitrogen. An obvious critique is to argue that organic farming generates many other positive benefits to society, and that it would be wrong to merely choose between two alternative scenarios based on this measure of success alone. Yet it is important to keep in mind the overall goal of a policy. In the case of Denmark, for example, it would be fair to conclude that there is a general concern about the effects of the use of pesticides and the effects of nitrogen leaching. Observing the policy initiatives taken within the past two decades reveals these concerns.[3] Other concerns have also been voiced: animal welfare, biodiversity, healthy and safe food etc. Clearly, less or no use of pesticides is good for the environment to the extent the environment is being harmed by present practices, and since pesticides are not used in organic farming at all, it is clear that organic farmers do not harm the environment by this one indicator.

It is not entirely clear, however, that organic farmers do better on animal welfare (Kristensen and Thamsborg, 2000). Nor has it been proved that organic food is healthier than conventional food (Jensen *et al.*, 2001). There also lacks a discussion on whether in fact there is a biodiversity problem in relation to organic and conventional farming and, furthermore, it is not clear-cut that organic farmers do better on this front either. Comparing conventional and organic farming shows an increase in the number of earthworms and springtails but also a decrease in the number of skylarks (Langer *et al.*, 2002).

It is clear that organic farming changes the biodiversity on the arable land, but it is not clear from practical policy work that this is necessarily a change for the better from the point of view of society at large, or that organic farming is the best way to achieve a certain amount of biodiversity. In fact the Wilhjelm Committee[4] (2001) concluded:

> *Denmark is one of the European countries with the fewest natural areas in relation to total land area.*

2. A governmental committee commissioned to analyse pesticide use in Denmark used both reports. (The Bichel Committee, 1999).

3. The Danish Aquatic Programme 1 and 2 implemented in 1987 and 1998 (see Jacobsen, 2002). Taxes on pesticides (13-27%) were introduced in 1996 and increased by approximately 100% in 1998.

4. The Danish government in March 2000 appointed the Wilhjelm Committee. The task of the Committee was to prepare a report as a basis for a government action plan on biodiversity and nature conservation.

Furthermore,

> *The quality of Denmark's nature and biodiversity has never been so poor. This is due to the fact that natural habitats are too constricted, contain too many nutrients and too little water, and that natural areas are fragmented and overgrown. Furthermore, the poor quality is also caused by the inability of nature and natural habitats to cope with both contemporary intensive farming, and the widespread decline of extensive farming.*

Consequently, the Wilhjelm Committee suggested the following measures: enhancement of nature management, securing natural forest, consideration of nature in grant schemes, establishment of buffer zones around vulnerable nature, establishment of national natural areas, more nature around watercourses, and nature monitoring and quality planning. That is, the Wilhjelm Committee suggest that improved biodiversity is mostly achieved through increases in and protection of existing natural areas. In this light the relation between conventional and organic farming on arable land play a minor role although the Committee also notes that the committee supports the continuation of initiatives to promote organic farming within the market framework.

The scenario is calculated using Danish Research Institute of Food Economics' Agricultural Applied General Equilibrium model (AAGE) of the Danish economy. The advantage of using the AAGE approach is that this modelling framework covers the interdependencies between the individual industries, interaction between industries and consumers and between domestic and foreign agents. The model thus covers the whole Danish economy and is characterised by a requirement that there should be equilibrium in all markets. The model therefore calculates long run results of a given policy scenario.

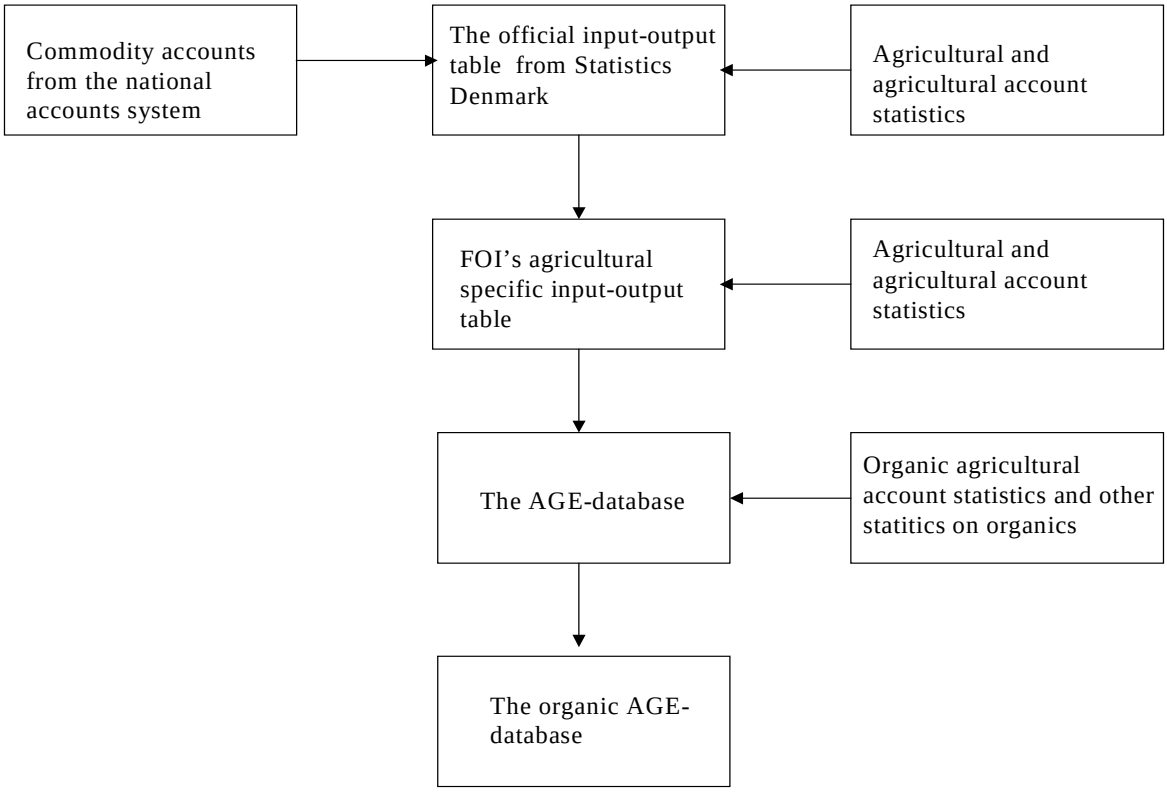
The next section describes the construction of the database that is used in the AAGE-model and is followed by a description of the AAGE-model. The scenarios are then described and the results analysed. The paper finishes with some conclusions.

Construction of the input-output data

Analysing organic farming in an AAGE modelling framework requires a database that explicitly describes the production structures of each organic sector as well as the distribution of organic products for intermediate and final use. The Danish Research Institute of Food Economics has produced agricultural specific input-output tables for the Danish economy for many years. In order to analyse the development of organic farming extensions of this work have been undertaken, resulting in a detailed description of organic farming as well as the processing of the primary products. The process of expanding the original database is illustrated in Figure 1.

Starting from the top, the first two levels illustrate the construction of the standard AAGE-database without the specific description of organic production. Initially the agricultural specific input-output table of the Danish economy is constructed. Disaggregating those commodity accounts that are used by Statistics Denmark for constructing the agricultural sector in their official input-output table basically does this. This disaggregation is done by extensive use of various agricultural statistics and sector specific farm accounts. The second level illustrates how the agricultural specific input-output table together with agricultural and sector specific farm accounts comprises the basis for construction of the AAGE-database. This work involves the disaggregation of farm income into components related to the rental of capital, the return to land and the farmer's own labour input. Moreover, some additional adjustments and aggregations to the sector specification of the AAGE-model are performed.

Figure 1. Constructing the organic AAGE-database



The third level in Figure 1 shows that the organic AAGE-database is constructed from the existing database. A main part of this work is the calculation of organic mark-ups that represent as percentage changes the change in input use of producing one unit of organic production compared to one unit of conventional production. The continued expansion of the organic production and improvement in the collection of primary statistics to cover organic production (the commodity accounts) will determine whether these calculations will move up to the top level of this data construction process.

The general AAGE-database describes the Danish economy using an industry and commodity aggregation with 50 industries and 56 commodities of which 10 industries and 12 commodities related to the primary agriculture. In the organic version, the database is expanded with similar organic sectors and commodities (excluding fur farming) thus leading to 19 primary industries and 23 commodities. Moreover, a number of processing industries are also disaggregated into organic and conventional sectors, resulting in a total of 18 organic industries and 20 organic commodities. The final database thus covers 68 industries and 76 commodities.

The organic mark-ups used in the third level for selected industries shown in Table 1. In the vegetable sectors, for example, production takes place without the use of chemical, fertiliser or pesticides (-100%). Instead these sectors generally use more of other inputs compared to conventional production (positive percentage changes). For organic cereal production, for example, demand contract operations is 2.5 times higher than for conventional production, potato production demands twice as much, while the production of roughage requires just 32% more contract operations compared to conventional production.

The table also reveals large variation in the demand for land. Organic cereal production needs 61% more land to produce one unit compared to conventional production while the production of organic roughage needs 25% more land than its conventional counterpart.

The last two columns in Table 1 show the changes in demand for inputs in the organic cattle and pig sectors. Generally, the organic pig sector needs more inputs compared to conventional pig production, although the input of electricity and other energy is 45% lower in organic production. Compared to organic pig production, the organic cattle producers generally show moderate percentage changes in their input demand per unit produced compared to conventional cattle production.

Table 1. Organic mark-ups for selected industries
(%)

	Cereal	**Potatoes**	**Roughage**	**Cattle**	**Pigs**
Seeds for sowing/Roughage	115.0	311.0	15.0	6.1	
Concentrates				-13.0	56.0
Manure	8.5	120.0	-16.4		
Chemicals and fertiliser	-100.0	-100.0	-100.0		
Pesticides	-100.0	-100.0	-100.0		
Intermediates	165.0	351.0	55.0	11.0	71.0
Contracts operations	242.0	215.0	32.0	-3.0	72.0
Fuel	57.0	145.0	-9.0	4.0	58.0
Electricity and other energy	120.0	153.0	41.0	14.0	-45.0
Equipment	84.0	126.0	18.0	19.0	62.0
Automobile cost	223.0	343.0	73.0	42.0	135.0
Construction	116.0	150.0	60.0	40.0	211.1
Service	108.5	261.1	37.5	9.6	66.7
Capital	78.7	165.2	24.5	9.2	10.2
Labour	84.0	152.0	-11.0	2.0	93.0
Land	60.5	81.8	25.4		
Unit cost	68.3	132.6	3.8	9.4	63.0

At the bottom of the table all the percentage changes are weighted together yielding the percentage change in unit cost. This reveals that the cost of producing one unit of organic cereal is 68% higher than cost of producing one unit of the conventional product. In potato production the unit cost is 133% higher, while the two tightly connected roughage and cattle sectors show moderate increases in unit costs compared to their conventional counterparts. In other words organic production is generally more resource demanding than conventional production, and thereby leading to relatively higher output prices.

The AAGE-model

There are five types of agents in the AAGE-model: industries, capital creators, households, governments, and foreigners. The current database of the model identifies 68 industries producing 76 commodities (Appendix 1). For each industry there is an associated capital creator, each producing capital specific to the associated industry. There is a single representative household and a single

government sector. Finally, there are foreigners, whose behaviour is summarised by export demand curves for Danish products, and by supply curves for imports.

The nature of markets and prices

AAGE determines supplies and demands of commodities through optimising behaviour of agents in competitive markets. Optimising behaviour also determines industry demands for labour and capital. The assumption of competitive markets implies equality between the producer's price and the marginal cost in each industry. Demand is assumed to equal supply in all markets other than the labour market (where excess supply conditions can hold). The government intervenes in markets by imposing sales taxes on commodities. This places wedges between the prices paid by purchasers and prices received by the producers. The model recognises margin commodities (*e.g.* retail trade and freight) that are required for each market transaction (the movement of a commodity from the producer to the purchaser). The costs of the margins are included in purchasers' prices.

Demands for inputs to be used in the production of commodities

AAGE recognises two broad categories of inputs: intermediate inputs and primary factors. Firms in each industry are assumed to choose the mix of inputs, which minimises the costs of production for their level of output. They are constrained in their choice of inputs by nested production technologies (Appendix 2). For the land-using industries (Appendix 1), AAGE specifies nested substitutions between: capital, labour, energy and herbicides (CLEH); land, fertiliser and insecticides (LFI); CLEH and LFI (CLEHLFI); and CLEHLFI and an aggregate of remaining intermediate inputs. For non-land using industries substitution is allowed between capital, labour and energy (CLE) and between CLE and aggregate non-energy intermediate inputs.

Household demands

The representative household buys bundles of goods to maximise a utility function subject to a household expenditure constraint. The bundles are combinations of imported and domestic goods.

Demands for inputs to capital creation and the determination of investment

Capital creators for each industry combine inputs to form units of capital. In choosing these inputs, they cost minimise subject to technologies similar to that used for current production; the only difference being that they do not use primary factors. The use of primary factors in capital creation is recognised through inputs of the construction commodity.

Government's demands for commodities

The government demands commodities. In AAGE, there are several ways of handling these demands, including: a) endogenously, by a rule such as moving government expenditures with household consumption expenditure or with domestic absorption; b) endogenously, as an instrument which varies to accommodate an exogenously determined target such as a required level of government deficit; and c) exogenously. In the computation in this paper government demand changes follow household consumption expenditures.

Foreign demand (international exports)

Two categories of exports are defined: traditional, which are the main exported commodities, and non-traditional. Traditional export commodities face individual downward-sloping foreign

demand schedules. The commodity composition of aggregate non-traditional exports is treated as a Leontief aggregate. Total demand is related to the average price via a single downward-sloping foreign demand schedule. Contrary to many conventional agricultural products all organic products are assumed to be traditional export commodities.

Demand for foreign imports

For all industries, AAGE includes the standard Armington specification for imported and domestically produced inputs. This assumes that users of a given commodity regard the domestic and the imported varieties of this commodity as imperfect substitutes. The Armington assumption is also used in input demands for industry investment and in household demands for consumption.

Computing solutions for AAGE

AAGE is a system of non-linear equations. It is solved using GEMPACK, a suite of programs for implementing and solving economic models. A linear, differential version of the AAGE equation system is specified in syntax similar to ordinary algebra. GEMPACK then solves the system of non-linear equations as an Initial Value problem, using a standard method, such as Euler or midpoint. For details of the algorithms available in GEMPACK, see Harrison and Pearson (1996).

Scenarios

A baseline is constructed to introduce all ongoing policy developments and known shocks to the economy so as to ensure that the policy shocks are undertaken in an economy where all known developments and shocks are accounted for.

We introduce four alternative scenarios. First, the preference scenario is introduced, where domestic and foreign consumers of Danish products change their preferences in favour of organic products. The preference scenario is then compared with three policy scenarios in the absence of the assumed consumer preference change.

The first two policy experiments (Sub-A and Sub-B) use subsidies to agricultural land in the organic sectors to induce a movement of land into organic production to achieve a positive environmental effect. The first policy experiment (Sub-A) is designed so as to achieve the same share of organic land as obtained in the preference scenario. This does not automatically result in the same reduction in the use of harmful inputs. Therefore, the second policy experiment (Sub-B) uses such subsidies to achieve the same effects on the environmental indicators as obtained in the preference scenario.

The third policy experiment (tax) imposes environmental taxes on fertiliser and pesticide use to achieve the same effects on the environmental indicators as in the preference scenario and Sub-B. The idea is to compare two different policy instruments, namely subsidies to land and input taxes that achieve the same effect on the use of environmentally harmful inputs (fertilisers and pesticides). The policy implication would be to choose the policy that achieves the same goal at the lowest cost to society.

Expected results from the analysis

The introduced subsidies lower the cost of using land in the organic sectors (the purchasers' price of land is reduced), thereby yielding pure profit in the organic sector and hence stimulating entry to organic production. This leads to an increase in the demand for land, with an upward pressure on

the basic price of land as a result. The subsidy also changes the relative price of land thus leading to a substitution effect resulting in an extensification of organic production. In other words, more land and less capital and labour is used per produced unit. Subsidies are thus expected to increase the production of organic products but are also expected to lead to an extensification of organic production. The exact extent of these two effects depends on how demand for organic products is affected.

The environmental taxes imposed on the use of fertilisers and pesticides increases the unit cost of production. Substituting taxed inputs with other inputs can moderate this increase in unit cost. The substitution elasticity controls the extent to which this can be done. A higher unit cost requires a higher product price if profits are to remain unchanged. Yet a higher product price tends to lower demand. A decline in production releases resources to be used in other sectors of the economy and tends to lower the prices and required rental of these resources because of the increase in supply. Since the taxes are levied on conventional land- using sectors and land is only used in the agricultural sectors (whereas labour, capital and other inputs are also used in the rest of the economy), land is expected to bear the greatest burden of the levied taxes in the form of lower returns to land. Relative lower returns to land will also results in a substitution effect where the land-using sectors will substitute other inputs, especially capital and labour, for land.

Results

This section presents selected results of the calculated scenarios, including the effects on production, exports, consumption, land and labour use and the environmental indicators and concludes by presenting the macroeconomic impacts. The presentation focuses on the results for the primary agricultural and associated processing sectors. Since the main issue addressed is the comparison of the results from applying the two different policy instruments this will be the focus of the analysis.[5]

Production and organic land

In the baseline aggregate organic production in the primary agricultural sector increases annually by an average of 5%. This results in 5% of total land being used for organic production (Figure 2) and almost 6% of the total production volume arising from organic production.

Figure 2 also shows that the assumed changes in preference scenario have significant effects on both the organic share of land (8.7%) and its share of the total agricultural production volume (10.7%). Aggregate organic production increases by 84.4% whereas conventional production falls by 4.7% (Appendix 3). The last three scenarios are to be compared with the preference scenario: since scenario Sub-A results in the same share of land allocated to organic production whereas scenarios Sub-B and tax result in the same reduction in the use of nitrogen and pesticides.

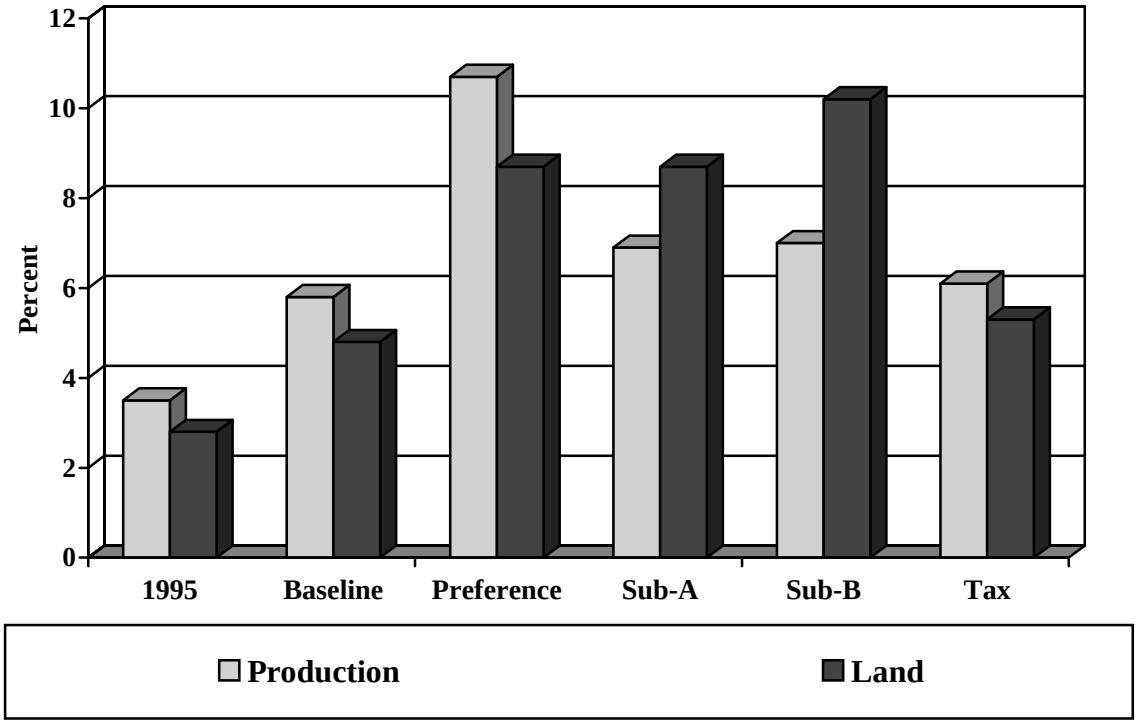
The land subsidies lower the purchaser's price of land, thereby lowering the unit price of organic products and stimulating demand. Lower land prices also stimulate a substitution of all other inputs in favour of land thus leading to an extensification of organic production. Comparing with the preference scenario it is clear that it is the land substitution effect that dominates in Sub-A and Sub-B. In scenarios Sub-A and Sub-B, the share of land is higher than or equal to the land shares in the preference scenario, whereas the increase in production is much smaller [organic production increases

5. A more thorough presentation of the *baseline* and the *preference* scenario can be found in Jacobsen (2001).

by 17% (Sub-A) and 18% (Sub-B) compared to 84 in the preference scenario, see Table A3.2 in Appendix 3].

In the last scenario (tax), environmental taxes are imposed on inputs used only in the conventional sector in a magnitude that insures the same aggregate effect on the input of nitrogen and pesticides as in the preference scenario and Sub-B (Figures 5 and 6).

Figure 2. The organic sector's share of the total agricultural production volume and land usage



Note: Details can be found in Table A3.1 in Appendix 3.

In the preference scenario it is the movement of land into organic production that achieves the aggregate reduction in the use of nitrogen and pesticides. In fact, conventional farmers use these chemicals more intensively in this scenario due to a substitution effect generated by a slight increase in land prices. The taxes achieve the same effects on the environmental indicators without the same increase in organic sector's share of total land and production. The reason is straightforward: the environmental taxes generate a substitution effect in the conventional agricultural sector. Since conventional farming is still the largest sector only small changes in the behaviour of conventional farmers are required to achieve the same overall reduction in the environmental indicators that was the result of the preference scenario.

Organic consumption and exports

The representative household determines its composition of total consumption to maximise a given utility function. In the top nest, the consumer system determines the composition of a number of aggregate goods by a Stone-Geary linear expenditure system. The expenditure system identifies four

broad food commodities; Bread and flour, Meat, Dairy and Other.[6] Beneath this nest, a CES function determines the composition of organic and conventional products using econometrically estimated elasticities.[7] At the bottom of the nesting structure, a CES function controls the domestic and foreign composition of all commodities. In the CES nest between conventional and organic products a "twist" variable is built in to allow for cost-neutral changes in the composition of organic and conventional consumption.

Consumption decisions are influenced by changes in income and relative prices, but in both the baseline and the preference scenario, the exogenous twist variable also plays an important role. It is this variable that is shocked and the results show that most of the changes in organic consumption directly reflect the shock to the twist variable.

Changed relative prices also affect the consumption decision of the consumer, but the resulting consumption shares of organic products are in both the baseline and in the preference scenario mostly explained by the assumed changes in preferences, *i.e.* the exogenous shock to the twist variable explained above. In the preference scenario, the consumption of organic dairy products amounts to 27% of total consumption in this category while for the other three categories, organic consumption amounts to around 15%. At the aggregate level, organic food consumption amounts to 17% of the total in this preference scenario (Table A3.3 in Appendix 3).

When compared to the baseline results (Figure 3), it is apparent that the consumption decisions are not markedly influenced by the introduction of the subsidies and taxes in the last three scenarios. As explained earlier, changes in consumption are explained primarily by income changes and consumers' responsiveness to changes in relative prices. In the last three scenarios only moderate effects are seen compared with the baseline results even though all three experiments change the price structure in favour of organic products and higher elasticities in the demand for organic products.[8] The reason is that the large price effect is seen most directly on the primary product. When the products have been processed, the price effect is smaller due to the fact that the primary product only accounts for a fraction of total costs in the processing industries.

In the baseline, the share of organic exports is calculated to increase from practically zero in the initial situation to somewhere around 1-6% (Figure 4). In the preference scenario there is an assumed change in foreigners' demand curves in favour of organic products at the given prices. Meat exports declines even though the demand curve is shifted. This is a result of the increased domestic demand pressuring prices upwards, thereby resulting in lower export demand. In other words, the price effect dominates the shift in the export demand schedule. As with the domestic consumption, only moderate effects are seen in the last three scenarios and for the same reasons. For dairy products, stronger effects are seen due to an assumed higher elasticity in the export demand function.

Results for both domestic consumption and exports show that both land subsidies and the environmental taxes affect demand. Yet, keeping in mind that either land use or the effect on the environmental indicators is the same as in the preference scenario (depending on which scenario we are examining), it is evident that these policy instruments can affect land use and input choices, but they do relatively little to overall demand and production.

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6. Mostly vegetables.

7. Wier and Smed (2000).

8. The cross-price elasticity between conventional and organic products varies between 1.5 and 2.2 in the four consumption groups.

Figure 3. Organic consumption shares, volume index

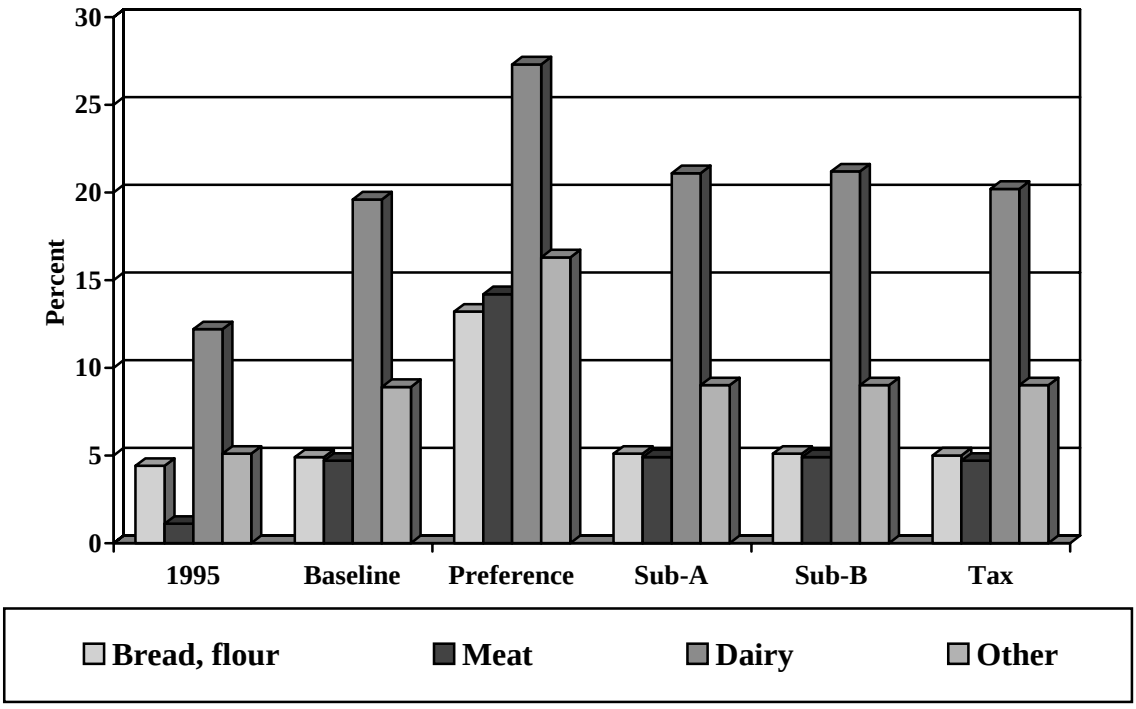
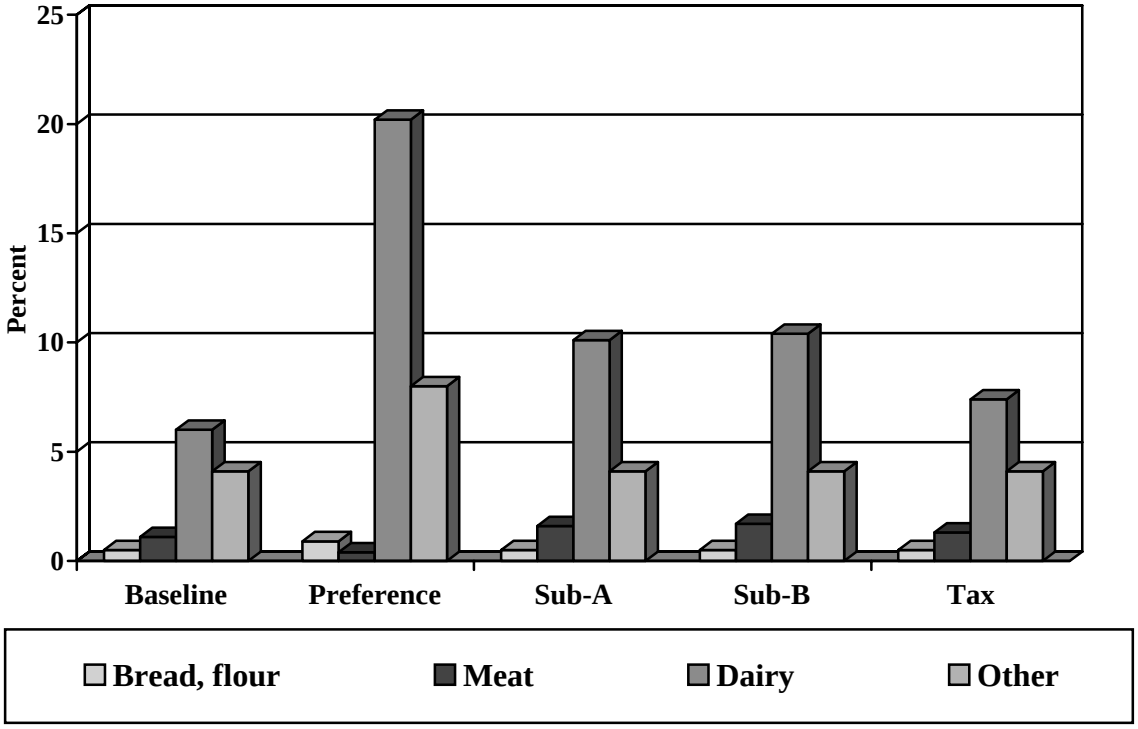


Figure 4. Organic export shares, volume index



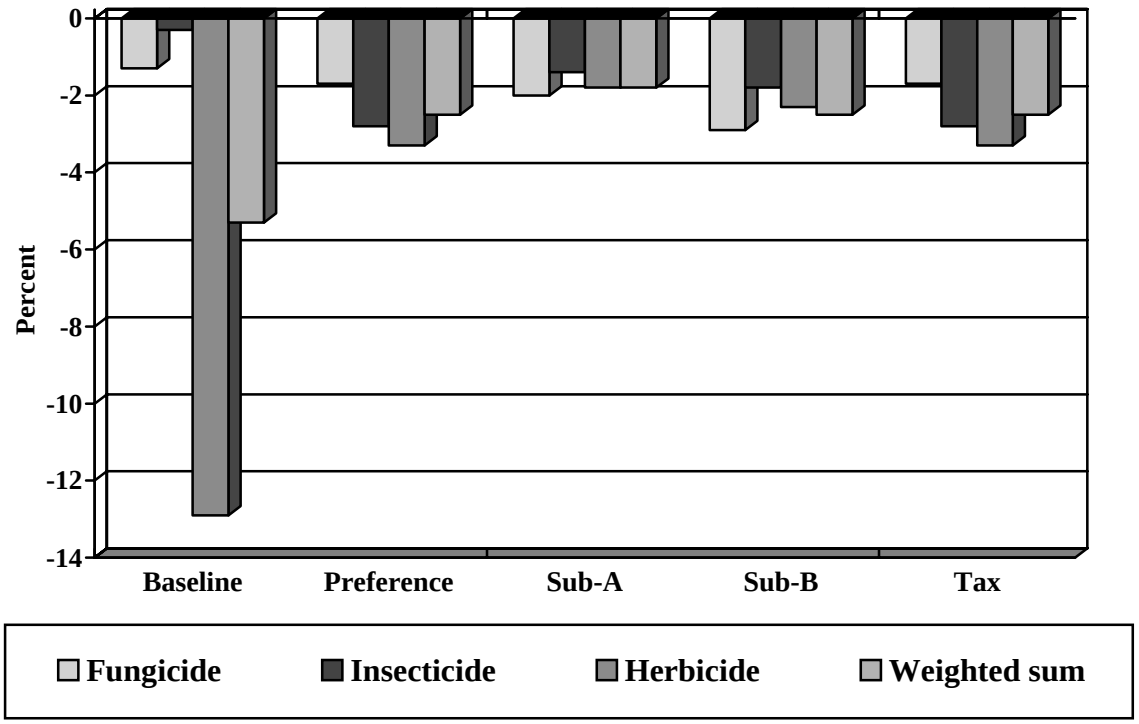
Note: Bread, flour is an aggregate of 8 commodities: meat and other is an aggregate of 6 and 3 commodities.

Environmental indicators

The baseline shows a decrease in the use of pesticides (Figure 5) because of an increase in the taxes on pesticides during the base case period. The use of nitrogen, on the other hand, increases during the baseline. This is mainly due to increased production of manure (pig production increases by more than 30%). In the preference scenario, the movement of land into organic production results in decreases in the use of both pesticides and nitrogen.

Introducing subsidies to organic land that ensure the same organic area as in the preference scenario is not enough to achieve the same reduction in the use of pesticides (Sub-A). As Figure 5 shows, the decrease is less than 2% measured by the weighted sum. The reason is that the use of land in conventional production changes to a more pesticide intensive allocation than was the case in the preference scenario. In scenario Sub-B these subsidies to organic land are increased to attract more land, thereby resulting in the same reduction in the weighted sum of pesticides as in the preference scenario.[9] In the tax scenario, taxes are introduced to exactly match the reduction in the preference scenario. Total pesticide use falls by 2.5% in this scenario.

Figure 5. Changes in the use of pesticides

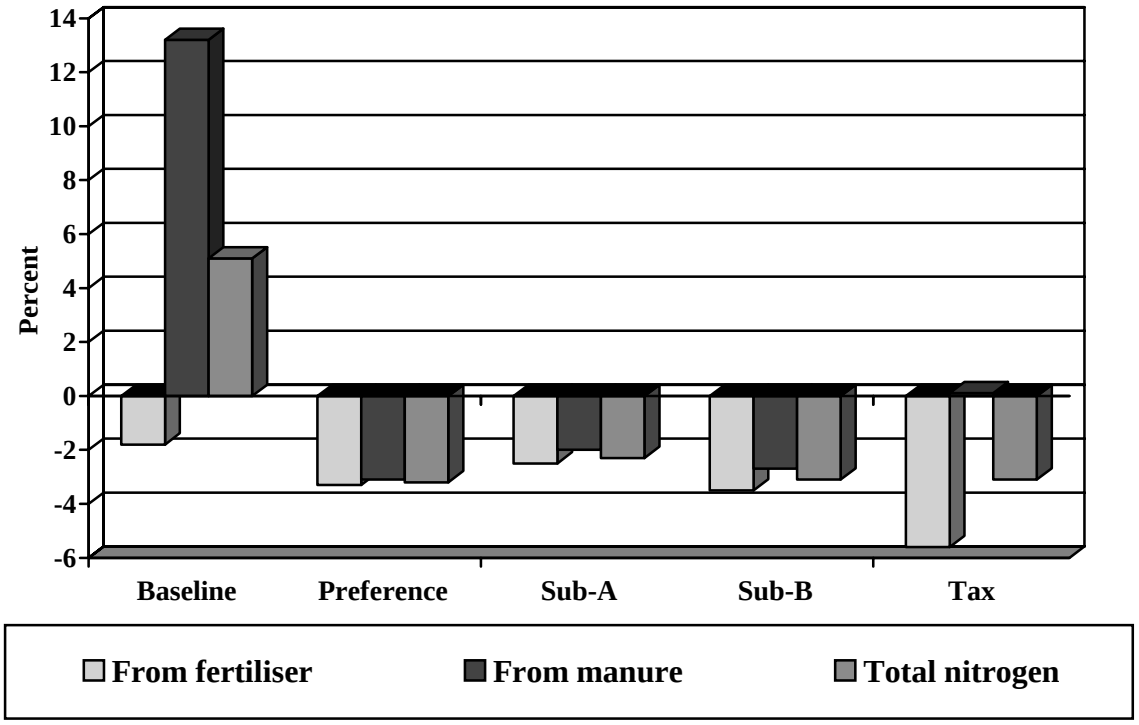


As with pesticides, introducing subsidies to organic land (Sub-A) that insure the same organic area as in the preference scenario, is not enough to achieve the same reduction in the use of nitrogen. The decrease is slightly more than 2% (Figure 6). The reason is that the allocation of land in conventional production changes to a situation where more fertiliser is used than was the case in the preference scenario. In scenario Sub-B, these subsidies to organic land are increased to attract more

9. The weighted sum is used since there is only one policy variable to alter (the subsidy to land).

land, thereby resulting in the same reduction in the use of nitrogen. In the tax scenario environmental taxes are introduced that result in the same reduction in the total use of nitrogen whereas the composition is quite different. In the tax scenario the total change is a result of a decrease in the use of fertilisers. In fact, there is a small increase in the use of manure due to a slight increase in the animal production.[10]

Figure 6. Changes in the use of nitrogen



Employment

In the baseline, the total number of full time workers in primary agriculture falls by almost 13 000 persons (Table 2). This is mainly due to structural development and increases in labour productivity. In the preference scenario, the demand shift from conventional to organic commodities is also reflected in the employment result. The total number employed in the conventional sectors thus falls by 3 211 persons while employment in the organic sectors increases by 3 100 full-time employees. Thus net employment in the primary agricultural sectors falls by just 111 persons.

Both subsidy scenarios work in the same way, with the strongest effects being in Sub-B. Employment in the conventional sectors falls by almost 1 200 persons in this scenario while 600 more persons are employed in the primary organic sectors. In the tax scenario, the effects are more moderate, with 163 persons leaving the conventional sectors and 179 entering the primary organic sectors.

10. The reason is that there is an increased demand from slaughterhouses (pigs) due to a fall in their unit cost. The scenario results in lower returns to capital and labour and this fall dominates the increase in pig price.

In the two subsidy scenarios it is mainly the movement of land that explains the results. Land moves out of conventional production resulting in less production and less use of labour. The released land moves into organic production, but since demand does not follow the inflow of land, this results in an extensification effect in organic production: all other inputs are to some extent substituted by land in the organic production.

In the tax scenario, the taxes result in both lower conventional production and thereby also less demand for inputs of land, labour and capital, but also in a substitution effect where taxed inputs are substituted with other inputs (especially labour). The result is a more labour-intensive conventional production. For organic producers, the tax scenario first of all results in lower land prices, pressuring the unit prices to decline and thus stimulating demand and production. Yet the lower land prices also result in a minor substitution effect between land and other inputs. As can be seen from Table 2, the tax scenario results in a minor net increase in the use of labour in the primary agricultural sector.

Table 2. Employment, number of full-time persons

			Deviation from Baseline			
	1995	**Baseline**	**Preference**	**Sub-A**	**Sub-B**	**Tax**
Primary, conventional	84 978	71 521	-3 211	-961	-1 198	-163
Primary, organic	2 837	3 608	3 100	547	600	179
Total primary agriculture	*87 815*	*75 130*	*-111*	*-414*	*-599*	*16*
Processing, conventional	33 197	25 815	-1 281	-640	-865	-12
Processing, organic	582	819	803	171	186	59
Total	121 594	101 764	-589	-883	-1 278	63

Macroeconomic consequences

The macroeconomic consequences of all four preference and policy scenarios are small (Table 3). The effect on real GDP varies between a fall of 0.01% and 0.08%, *i.e.* the consequences for the economy as a whole are small. But the magnitude of change in the different scenarios does reveal that there are differences in the relative cost to society.

In the preference scenario, real GDP and consumption fall by 0.07% and 0.14% respectively, but these declines cannot be interpreted as a situation in which society is worse off since they are a result of changed consumer preferences. If consumers change their preferences in favour of a product that is produced at a higher cost, (thus lowering the total real consumption potential) it must be because they are better off by this choice. In other words, the new consumption bundle yields a higher utility to the consumer.

At first sight, it seems somewhat contradictory that the aggregate capital stock decreases (0.04%) while aggregate investments increases (0.04%). This is nevertheless an effect of assumed fixed investment/capital ratios in each industry and the fact that a decline capital stocks in industries with relatively low investment/capital rates weigh more in the total result than increasing capital stocks in industries with relatively large investment/capital ratios.

The three other scenarios, on the other hand, are a result of policy intervention, and the results must be interpreted as costs to society. If these scenarios result in the same effects on the policy objective, these figures may also guide us to the most cost-effective policy of those analysed. Finally,

a policy instrument should only be used if the benefit to society is higher than the cost. In this context it should be noted that all potential benefits are not a part of this analysis.

Comparing the two subsidy scenarios (Sub-A and Sub-B), it is clear that the cost in terms of real GDP is higher the more land is shifted into organic production. The reason for this is of course that more land is being used in a less productive sector, thus lowering the total production possibility of the economy. Lower productivity results in lower returns to capital and labour and thus also lower income and lower consumption possibilities. For the agricultural sector as a whole though, the subsidies increase the returns to land resulting in increase land price of (9.6% and 14.1%).

The tax scenario results in exactly the same reduction in the total use of pesticides and nitrogen as subsidy scenario B (Sub-B) but at a lower cost. In terms of GDP, the cost of the tax scenario amounts to 0.01% of GDP. Achieving the same reduction in nitrogen and pesticide use by using subsidies (Sub-B) costs almost seven times more.

Table 3. Macroeconomic consequences

	1995-Level	Preference		Sub-A		Sub-B		Tax	
	Billion DKK	Million DKK	Percent	Million DKK	Percent	Million DKK	Percent	Million DKK	Percent
Real GDP	1037.7	-728	-0.07	-617	-0.06	-859	-0.08	-128	-0.01
Real private consumption	511.1	-740	-0.14	-392	-0.08	-557	-0.11	40	0.01
Real public consumption	260.3	-360	-0.14	-190	-0.08	-271	-0.11	19	0.01
Real investments	189.3	82	0.04	-190	-0.10	-272	-0.15	-17	-0.01
Real stocks	39.3	0	0.00	0	0.00	0	0.00	0	0.00
Real exports	296.0	320	0.11	171	0.06	194	0.06	-159	-0.05
Real imports	258.3	-22	-0.01	-7	0.00	-96	-0.04	45	0.02
Real capital stock			-0.04		-0.09		-0.13		-0.01
GDP deflator			-0.13		-0.14		-0.18		-0.03
Consumer price index			-0.08		-0.09		-0.13		-0.01
Price of investment goods			-0.12		-0.16		-0.22		-0.05
Terms of Trade			-0.06		0.01		0.01		0.02
Nominal wage rate			-0.25		-0.33		-0.44		-0.11
Price of agricultural land			0.34		9.55		14.07		-17.75

The reason for this difference is that in the tax scenario the majority of farmers (namely the conventional) face the imposed environmental tax and they only reduce their use of the taxed input by approximately 3%. These first units of input are relatively easily substituted with other inputs, and total production is only affected slightly. Society can thus achieve the same overall reduction in the use of pesticides and nitrogen by using two different policy instruments. Imposing environmental taxes that affect the majority of farmers turns out to be the most cost-effective instrument.

There is a small increase in real consumption in the tax scenario. This is not a generic result of taxing pesticides and fertilisers. Real consumption increases because the income loss in this scenario is so small that the falling consumer prices allow for this small increase in real consumption. If the scenario was specified with higher taxes or taxes that applied to a larger part of the economy, the income loss would dominate and result in a fall in real consumption. Real public spending also increases. This is a result of the model closure where the percentage change in real public spending is set equal to the change real private consumption.

Concluding remarks

This paper analyses the economy wide implication of two different policy instruments targeted at reducing the overall use of pesticides and fertiliser. The analysis shows that in absence of consumer preference changes, subsidies (Sub-A and B) can be used effectively to change the relative profitability between organic and conventional production, thereby resulting in a shift of land into organic production of the same magnitude as that resulting from changed consumer preferences. Although the aggregate land use is the same, the increase in production is almost five times higher in the preference scenario compared with the Sub-B scenario. The results also show that subsidising the organic sectors leads to a situation in which the conventional sectors use pesticides and fertilisers more intensively.

The implications for land prices are also different in the two scenarios. While the land subsidies result in land price increases and thus higher returns to landowners, the tax scenario results in lower prices of land.

Even though the macroeconomic consequences of the analysed scenarios are small, the relative magnitudes are clear. In terms of real GDP, the cost of reducing the aggregate use of fertilisers and pesticides is seven times higher when using subsidies to organic farming compared to taxing the use of these inputs. If society is concerned about the overall use of environmentally harmful inputs these inputs should be taxed or regulated in a similar way. The size of the organic sector should be determined by the consumers' willingness to pay.

Cost analysis such as the one presented could be compared with expected economy-wide benefits of the introduced policies. These benefits have not been a part of this analysis and only if the benefits are calculated or assumed to exceed the cost should such policies be introduced.

Naturally, the results found should be evaluated in light of the assumptions applied. Compared with other more partial economic analysis the present analyses takes into account the economic linkages between the individual agricultural sectors and between the agricultural sectors and the industrial sectors, consumer preference or willingness to pay. Furthermore, the analysis has taken into account the derived cost and price effects and the implications of explicitly representing the overall macroeconomic budgetary restrictions. The simulations have also been undertaken with a national AAGE-model assuming unilateral Danish policy initiatives.

Appendix 1.

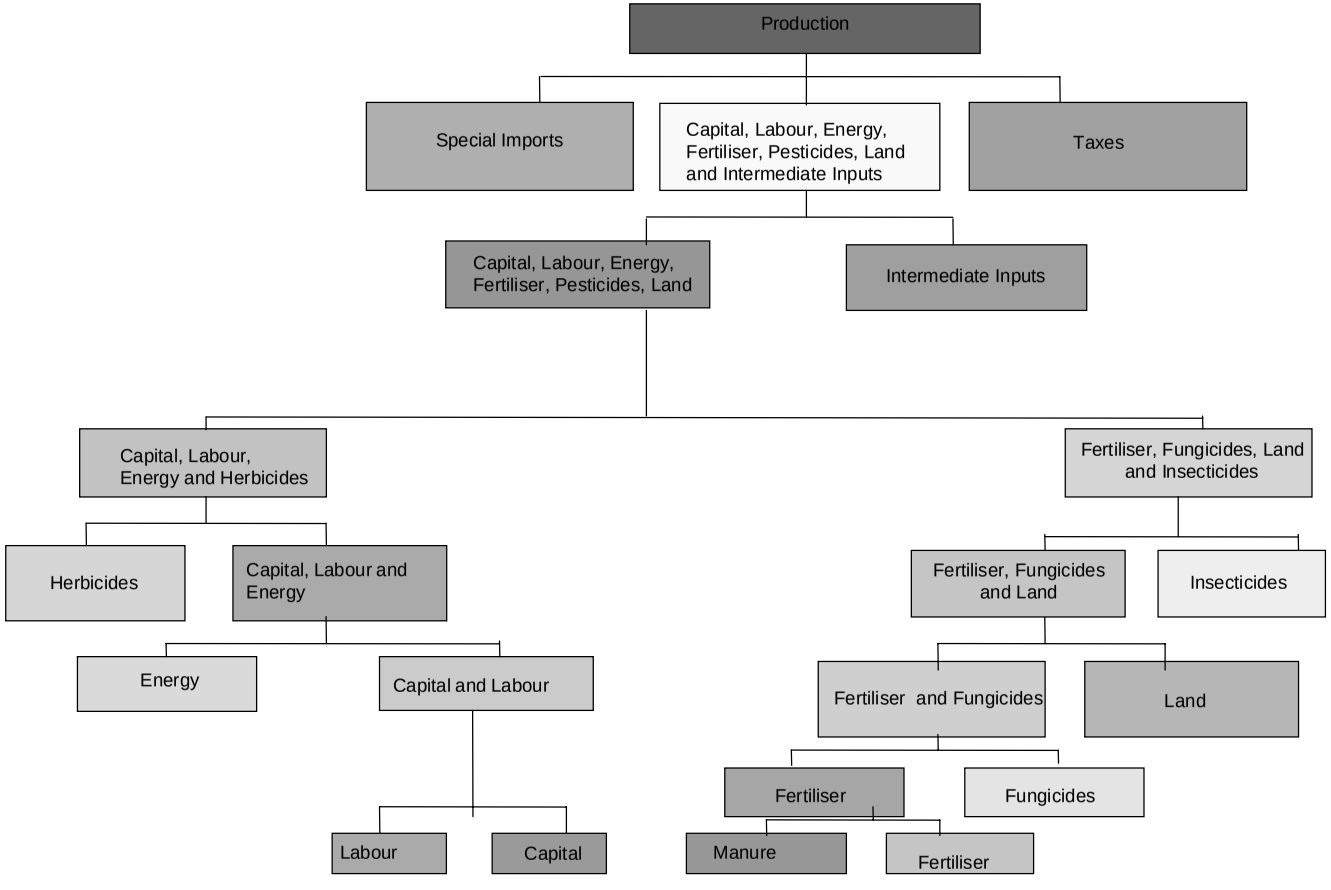
Table A1. Industries and commodities in organic-AAGE

		Industries			Commodities
*#	1-2	Cereal	*	1-2	Cereal
*#	3-4	Oil seeds	*	3-4	Oil seeds
*#	5-6	Potatoes	*	5-6	Potatoes
*#	7-8	Sugarbeet	*	7-8	Sugarbeet
*#	9-10	Roughage	*	9-10	Roughage
*	11-12	Meat cattle and milk producers	*	11-12	Meat cattle
*	13-14	Pigs	*	13-14	Milk
*	15-16	Poultry	*	15-16	Pigs
	17	Hunting and fur farming, etc.	*	17-18	Poultry
*#	18-19	Horticulture		19	Hunting and fur farming, etc.
	20	Agricultural services, etc.	*	20-21	Horticulture
	21	Forestry		22	Agricultural services, etc.
	22	Fishing		23	Forestry
	23	Extraction of coal, oil and gas		24	Fishing
*	24-25	Cattle-meat products		25	Extraction of coal, oil and gas
*	26-27	Pig-meat products	*	26-27	Cattle-meat products
*	28-29	Poultry-meat products	*	28-29	Pig-meat products
	30	Fish products	*	30-31	Poultry-meat products
*	31-32	Processed fruit and vegetables		32	Fish products
	33	Processed oils and fats	*	23-34	Processed fruit and vegetables
*	34-35	Dairy products		35	Processed oils and fats
*	36-37	Starch, chocolate products, etc.	*	36-37	Dairy products
*	38-39	Bread, grain mill and cakes	*	38-39	Starch, chocolate products, etc.
*	40-41	Bakery shops	*	40-41	Bread, grain mill and cakes
*	42-43	Sugar factories and refineries	*	42-43	Bakery shops
	44	Beverage production	*	44-45	Sugar factories and refineries
	45	Tobacco manufacture	*	46-47	Beverage production
	46	Textile, wearing apparel and leather		48	Tobacco manufacture
	47	Manufactured wood and glass products		49	Textile, wearing apparel and leather
	48	Paper products and publishing		50	Manufactured wood and glass products
	49	Oil refinery products		51	Paper products and publishing
	50	Basic chemicals		52	Oil refinery products
	51	Fertiliser		53	Basic chemicals
	52	Agricultural chemicals nec		54	Fertiliser
	53	Non-metallic building material		55	Agricultural chemicals nec
	54	Metal products		56	Non-metallic building material
	55	Machinery and non-transport equipment		57	Metal products
	56	Transport equipment		58	Machinery and non-transport equipment
	57	Electricity		59	Transport equipment
	58	Gas		60	Electricity
	59	Steam and hot water		61	Gas
	60	Construction		62	Steam and hot water
	61	Motor vehicles service		63	Construction
	62	Wholesale trade		64	Motor vehicles service
	63	Retail trade		65	Wholesale trade
	64	Freight transport		66	Retail trade
	65	Financial and property services		67	Freight transport
	66	Transport and communication services		68	Financial and property services
	67	Public services		69	Transport and communication services
	68	Dwelling ownership		70	Public services
				71	Dwelling ownership
				72	Coal imports
				73	Manure
				74	Fungicide
				75	Insecticides
				76	Herbicide

* Both conventional and organic product/production. # Land using industries.

Appendix 2.

Nesting structure



Appendix 3.

Detailed results tables

Table A3.1. Organic share of land and value of production

	1995	Baseline	Preference	Sub-A	Sub-B	Tax
Production value	3.5	5.0	9.5	5.5	5.6	5.0
Production volumes	3.5	5.8	10.7	6.9	7.0	6.1
Agricultural land	2.8	4.8	8.7	8.7	10.2	5.3

Table A3.2. Changes in production, percentage changes

	Baseline	% per annum	Preferences	Sub-A	Sub-B	Tax
Conventional production	20.6	1.3	-4.7	-2.3	-3.0	-0.4
Organic production	107.1	5.0	84.4	17.1	18.4	5.9
Total	23.6	1.4	-0.2	-1.3	-1.9	-0.1

Table A3.3. Organic consumption shares

	1995	Baseline	Preference	Sub-A	Sub-B	Tax
Bread, flour	4.4	4.9	13.2	5.1	5.1	5.0
Meat	1.1	4.7	14.2	4.9	4.9	4.7
Dairy	12.2	19.6	27.3	21.1	21.2	20.2
Other*	5.1	8.9	16.3	9.0	90	9.0
Total	5.1	8.8	17.0	9.2	9.2	8.9

* Other is mainly vegetables.

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Chapter 9. **Research, Information and Communication**