Social Benefits of Multifunctional Agriculture in Finland

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Abstract

This study aims at assessing the costs and benefits of multifunctional agriculture, and it is one of the very first studies using a quantitative approach to this new subject. The starting point is that if current farm subsidies are regarded as means to maintain the multifunctional characteristics of agriculture, what happens if subsidies are reduced. The effects of the decline in agricultural support on multifunctional characteristics of agriculture in Finland are estimated using the cost-benefit analysis (CBA). Only a part of the consequences can be assessed by the CBA due to lack of data on the economic value of many elements of multifunctional agriculture. Hence, the results should not be generalised too strongly, but they still provide useful information for the political decision-making. Concerning further research, we should study, inter alia, what the so-called correct level of compensation for the adequate supply of public goods would be, and what kind of means of agricultural policy are the most efficient to unambiguously enhance the multifunctional character of agriculture.

Key words: multifunctional agriculture, non-market benefits, externalities, cost-benefit analysis, Finland

Introduction

Multifunctional agriculture is a crucially central element of the European Model of Agriculture, which the European Union (EU) plans to use as a key argument to protect European agriculture and its subsidies in the new negotiation round of the World Trade Organisation (WTO) (see e.g., EuroChoices 2001). Agriculture is still highly dependent on public support, especially in the EU. A reform of the agricultural policy is needed due to both internal and external pressures. Within the EU such pressures are due to, among other things, budgetary discipline, negative externalities of agriculture, eastern enlargement and the WTO. The reform of the agricultural policy is characterised by the wish to emphasise that, if support is still being used, it must not distort the market or international trade. Consequently, price support has recently to an increasing extent been replaced by direct support of a more and more decoupled nature, as for example in the Agenda 2000 reform of the CAP (*common agricultural policy*) of the EU. Apparently, there is a need to find new reasoning and contents for agricultural support, preferably based on widely approved objectives. These objectives have been defined for the first time in the so-called green box of the WTO Agreement on Agriculture. The green box includes measures which have no, or at most minimal, impact on trade. The EU is striving to include multifunctional agriculture in the green box, and hence validate the EU agricultural support system in a new way.

The objectives of this paper are to identify, describe, and measure at a general level the costs and benefits of multifunctional agriculture. The qualitative, let alone quantitative, analysis of these is a very challenging task, in which both the availability of applicable data and the choice of an appropriate method are decisive for guaranteeing the reliability and robustness of results. The cost-benefit analysis is a method that can be used to evaluate the effects of non-market goods produced by agriculture on the total welfare of society. The so-called net present value (*NPV*) can be deduced from the difference between the benefits and costs. NPV represents the social profitability of a policy. The cost-benefit analysis is usually applied to compare different policy options, and the results of the analysis provide the decision-makers with quantitative economic grounds for the selection of new policies and policy means.

The multifunctionality of agriculture consists of non-market goods jointly produced by agriculture. The aspects of the multifunctionality of agriculture often include food security, environmental considerations and securing the viability of rural areas. Environmental issues are considered in a wider sense, including the maintenance of rural landscapes in addition to conventional nutrient emissions, inter alia. The EU has also introduced animal welfare and food safety in the discussion on multifunctionality. The most recent definitions of multifunctionality are stricter. According to OECD (2001) it is controversial whether rural employment and food security should be considered as elements of multifunctional agriculture. Correspondingly, Lankoski and Ollikainen (2001) focus mainly on environmental aspects, like landscape amenities, biodiversity issues together with nutrient and pesticide runoffs in their study on policy design for multifunctional agriculture.

In the WTO context the so-called non-trade concerns (NTCs) consist, at least to some extent, of the same elements as multifunctional agriculture. It was agreed in the WTO Uruguay Round Agreement on Agriculture, that NTCs would be taken into account in the forthcoming negotiations on freeing the agricultural trade. The latest discussion on NTCs is connected with the Fourth Session of the WTO Ministerial Conference organised at Doha, Qatar on 9-14 November 2001. During the WTO Ministerial Conference 40 members and observers (including the EU, Norway, Switzerland, Japan and Russia together with various developed countries, economies in transition and developing countries) of the WTO discussed non-trade concerns. These countries focused on three main concerns, namely rural development, food security and protection of the environment. There was a consensus about the important role of agriculture in preserving or developing the economic and social environment obligatory to sustain rural population. It was also agreed that every nation should guarantee food security for its citizens through a mixture of domestic production, imports and public stock holding. Furthermore, all countries found agriculture important for conservation of biodiversity and maintenance of rural amenities. It was emphasized that NTCs are public goods and, hence, are not fulfilled through market mechanisms. Therefore, domestic agricultural support is needed to maintain production of the NTCs on adequate level. (LD 2001.)

Australia together with other Cairns Group members agreed that support maintaining production of NTCs could be recognised in the WTO negotiations, provided that these measures are WTO-consistent, targeted and transparent that do not distort production of trade (Cairns Group 2001). The Ministerial Declaration of the Fourth Session of the WTO Ministerial Conference includes food security and rural development in the negotiations concerning further liberalisation of agricultural trade, but only with regard to special and different treatment for the developing countries. Furthermore, on NTCs it is stated "*We take note of the non-trade concerns reflected in the negotiating proposals submitted by Members and confirm that non-trade concerns will be taken into account in the negotiations as provided for in the Agreement on Agriculture.*" (WTO 2001.) This declaration leaves room for further negotiations on defining the NTCs and measures used to maintain them.

Agricultural support in Finland

Finland became a member of the European Union in the beginning of 1995, and since then the common agricultural policy of the EU has been applied also in Finland. As a result of the EU membership Finnish market prices of agricultural products fell by about 40% in the first year of membership (Kettunen 1996, p. 49). Prior to the EU membership price support constituted the most important form of agricultural support. According to the CAP, price support is paid

at the guaranteed intervention price, which is the minimum price a farmer gets for the products. However, not all agricultural products have an intervention price, and the prices of these products are more clearly determined on the market. After the Agenda 2000 CAP reform, most of the support to agriculture in the EU is now paid as direct support. The most important support measures in the CAP are direct support based on the arable area or livestock units, agri-environmental support and support for less-favoured areas (LFA).

Direct support from the EU is financed from the EU funds in full, while environmental and LFA support are part-financed by the EU. In addition to the support financed fully or in part by the EU, during the EU membership Finland has applied national support, including the aid for northern regions, the aid for Southern Finland, the transitional aid, and certain other aids. The transitional aid was paid for a five-year period until the end of 1999 in the whole country for all of the main agricultural products (MMM 1999, p. 16–17). In the CAP reform of Agenda 2000, Finland received two special support measures, grain drying and grass silage support, both fully funded by the EU. In addition, the LFA support was extended to cover 100% of Finland (formerly 85%). In 2001, the total support of agriculture in Finland is EUR 1.7 billion (1.6 bill. in 2000). The support based on the CAP is in 2001 about EUR 1,102 million (FIM 6.6 bill.; FIM 4.8 bill. in 1996) and the entirely nationally financed support EUR 589 million (FIM 3.5 bill.; FIM 4.3 bill. in 1996). Since 1996, the amount of direct support has grown, and the share of the either fully or partly EU-funded CAP-based support has increased.

Cost-benefit analysis

The cost-benefit analysis measures the economic changes due to changes in the use of resources. In connection with public finances, cost-benefit analysis is generally used to determine the changes in net social benefit due to a government measure (Boadway and Wildasin 1984, p. 187–188). Thus, the cost-benefit analysis provides additional information to the political decision-makers in a situation, in which there is a choice of several alternative models of action. Cost-benefit analysis helps to find out, which alternative is the best from the perspective of society. The socially preferential alternative produces the highest benefit at the total level (Dasgupta and Pearce 1978, p. 20).

The objective of cost-benefit analysis is to maximise the difference between the benefits and costs. This difference, called net benefit, indicates the efficiency of the measures applied. The greater the net benefit, the greater is the benefit produced by the measures (Brent 1996, p. 6–7). Pareto improvement occurs if the benefits from a project are higher than the costs. Pareto optimum is reached when the net benefit of any possible measure is no longer positive. Society is continuously striving to achieve Pareto improvements and to reach a situation that is as close to Pareto optimum as possible (Varian 1993). If Pareto optimum is reached, the public policy has been perfectly efficient. However, due to the continuously changing operating environment and the inability of the theory to capture the real world, reaching Pareto optimum is possible only in theory.

According to Mishan (1976, p. 11–12), the use of cost-benefit analysis is justified because it provides a means for examining the impacts on the whole operating environment caused by a single actor. This is why cost-benefit analysis is particularly well suited for the study of the environmental effects of agriculture. The production of goods that have no price on the market requires public support. Without any support the production quantities remain at the

level reached in a normal production activity, which is not always the optimal outcome from the perspective of society. The externalities may also be negative, and according to the theory the producers should pay for the production of negative externalities to society. One such negative externality of agriculture is water pollution. In practice society often tries to reduce the production of negative externalities. One example of a policy measure aimed at reducing the negative externalities of agriculture, such as nutrient leaching, is agri-environmental support in the CAP.

The cost-benefit analysis has been used in agricultural economics, for example, to determine the profitability of environmental support in respect of the whole society (Vehkasalo 1999), to compare the efficiency of different measures for reducing nitrogen emissions (Hanley 1991), and to examine the effects of the direct payments used in the agricultural policy on the national economy (Koester and Tangermann 1977).

Welfare effects of direct income support

One reason for using direct income support instead of price support in both Finland and the EU is controlling the structural overproduction. This overproduction due to administrative high prices has continued for a long time and caused significant costs to society. The determination to control the overproduction is a consequence of both public economy related factors and international pressure (GATT/WTO). Different border protection measures have been used to maintain producer prices above the world price level. Hence, EU agricultural exports have not been competitive in the world markets, and the EU has had to use considerable export subsidies since the late 1970s.

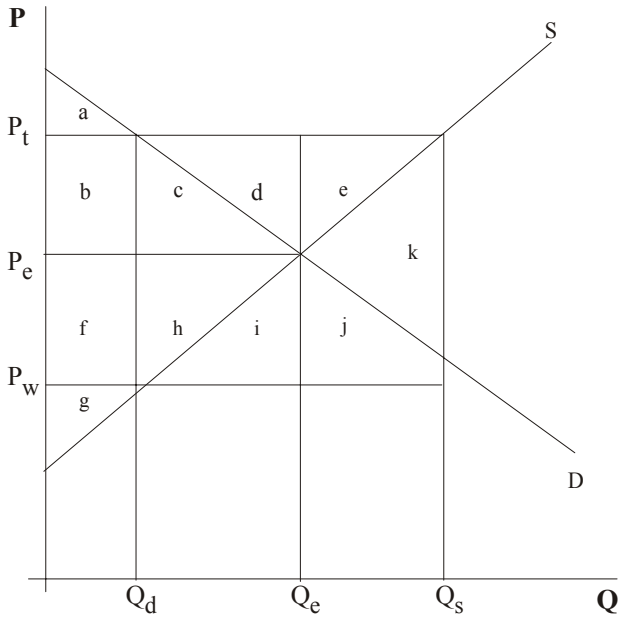

Fig. 1. Welfare economic effects of transfer from price support to direct income support.

The aforementioned administrative price system and its impacts are depicted in Fig. 1. In the market equilibrium product price is P_e and demanded quantity is Q_e. Producer surplus (PS) in equilibrium is area f + g + h and consumer surplus (CS) is area a + b + c. To improve the income level of farmers, or to increase the PS, the administrative target price P_t ($P_t > P_e$) is set.

In this case production increases to Q_s, but consumption declines to Q_d as a result of an increase in price. Hence, PS_t is area f + g + h + b + c + d + e and ΔPS = b + c + d + e. CS_t is now area a and $\Delta CS = -(b + c)$. At this stage there is no deadweight loss because $|\Delta PS| > |\Delta CS|$. Nevertheless, there will be $Q_s - Q_d$ of overproduction in the market. If world market price P_w is lower than the domestic target price P_t, like usually in Finland and the EU, overproduction causes costs to public economy because of export subsidies (or storing or even destroying the products). At the world market price P_w the costs of exporting the overproduction for the state are equal to the area of c + d + e + h + i + j + k [$= (P_t - P_w)(Q_s - Q_d)$], which corresponds to the increased tax burden for taxpayers. Combining the effects of ΔPS, ΔCS and increased tax burden, the social net welfare loss is area h + i + j + k.

Both the CAP reform in year 1992 and Agenda 2000 reform of the EU strive to alleviate the problem of overproduction by decreasing agricultural producer prices closer to the world market prices and compensating the emerged income losses of farmers by direct support. The product price is lowered from target price P_t back to equilibrium price P_e (Fig. 1). Hence PS and CS equal PS_e and CS_e: compared to the price support scenario producers lose and consumers gain. There will be no overproduction and the state saves export expenses. But the EU, consistent with CAP objectives, aims at ensuring the farmers' income level. Therefore the EU at least partially (like in Agenda 2000) compensates a decrease in producer prices by direct support. The costs of direct income support are area b + c + d that is substantially smaller than the costs of export subsidies as a consequence of price support, i.e., area c + d + e + h + i + j + k. As producers are not entirely compensated for the reduction in producer prices, they lose area e. The transfer from price support to direct income support generates total welfare gain of area h + i + j + k, which consists of ΔPS (–e), ΔCS (+ b + c) and reduction of tax burden (tax burden of direct income support b + c + d vs. tax burden of price support c + d + e + h + i + j + k).

According to the welfare analysis, direct income support is a preferable policy to price support. It is even possible to compensate producers' welfare loss (area e) by the achieved welfare gain. The welfare gain represents saved public funds. In addition, producers are supposed to receive to a full extent the direct income support, unlike in the case of price support, a part of which often leaks to intermediaries. This would also improve both producers' income situation and policy efficiency in terms of income redistribution. Moreover, price support has typically led to situations, in which the state has to pay export subsidies. Those can be avoided by using direct income support instead of price support. Hence, direct income support does not distort international trade, provided that it is totally decoupled from production. Price support as well as deficiency payments, like those formerly used in the USA, cause overproduction and increase subsidised exports, and consequently distort the world markets. Hence, it is possible that unit cost of direct income support is lower than that of deficiency payments, or export subsidy as a consequence of using price support, because there will be no pressure to lower world market price (OECD 1995). Furthermore, depressed world market prices tend to create a need for domestic compensation by additional subsidies. These claims can also be avoided by using direct income supports.

It can be concluded that direct income support, in its purest form, does not impact production, consumption, export quantities or world market prices, or cause income transfers to foreign countries. There will be no domestic deadweight loss in welfare economic changes of either producers or consumers, and other countries do not suffer from distortions, when direct income support is used instead of price support or deficiency payments.

Costs and benefits of reducing agricultural support

The cost-benefit analysis can be used to find out the impacts of changes in agricultural policy on social welfare. In most cases the analysis is concerned with the different kinds of effects of a policy change or reform on society as a whole and on the different interest groups in the country in question or internationally (e.g., agricultural producers, food industry, consumers and taxpayers). Instead of the absolute total welfare levels, more sensible and meaningful results can be achieved in the study of the effects of a certain policy change.

Consequently, we concentrate on the effect of the reduction in agricultural support on the production of the different elements of multifunctional agriculture and the possible social welfare changes in Finland. The reduction of support is set at 30%. In monetary terms the total support is reduced from EUR 1,598 million in 2000 to EUR 1,119 million, and it is solely realised in the nationally funded part of the farm support.

We assume that if less money than earlier were used for agricultural support, the income level of farmers and production volumes would fall, and the joint production of non-market goods, i.e., multifunctional agriculture, would also be affected. The production of certain elements, in particular environmental protection benefits, of multifunctionality might actually increase as a result of the reduction in the support and production of agriculture, but as a whole the production of non-market goods is likely to fall.

The reduction of agricultural support would have various kinds of repercussions on the welfare of society. The most obvious direct impact would be the decrease in the costs to society by the amount of the reduction in the support. This benefit can be considered to be fully directed to taxpayers, given that the amount in question is not used to cover expenditures for some new policies. Correspondingly, the welfare of farmers would decline by the amount of the reduction in agricultural support. The increase in welfare achieved by taxpayers is the same as the welfare loss suffered by farmers. There is no social net loss, and thus the policy change can be regarded as socially acceptable. The 30% reduction in nationally funded agricultural support would also lead to a considerable increase in the EU contribution to the financing of the support, which could lead to a more favourable public opinion towards agriculture and its support.

In jargon, the reduction in agricultural support would have the following impacts (Fig. 2):

- Decrease in agricultural production
- Reduction in the number of farms and employment opportunities
- Changes in rural environment and landscape
- Accumulative effects in the food chain
- Impacts on food safety, animal welfare and production ethics.

Fig. 2 gives a more illustrative idea of the several causes and consequences related to the linkage between agricultural policy and support and impacts. Simultaneously, Fig. 2 shows the complexity of tracing the welfare effects due to agricultural support and, for example, maintaining an adequate food supply. There are also many uncertainties related to the potential benefits of public goods provided by agriculture. The causal relationships are not unambiguous and we want to emphasise that this will be taken into account when making the actual analysis, interpreting results, and drawing conclusions on them.

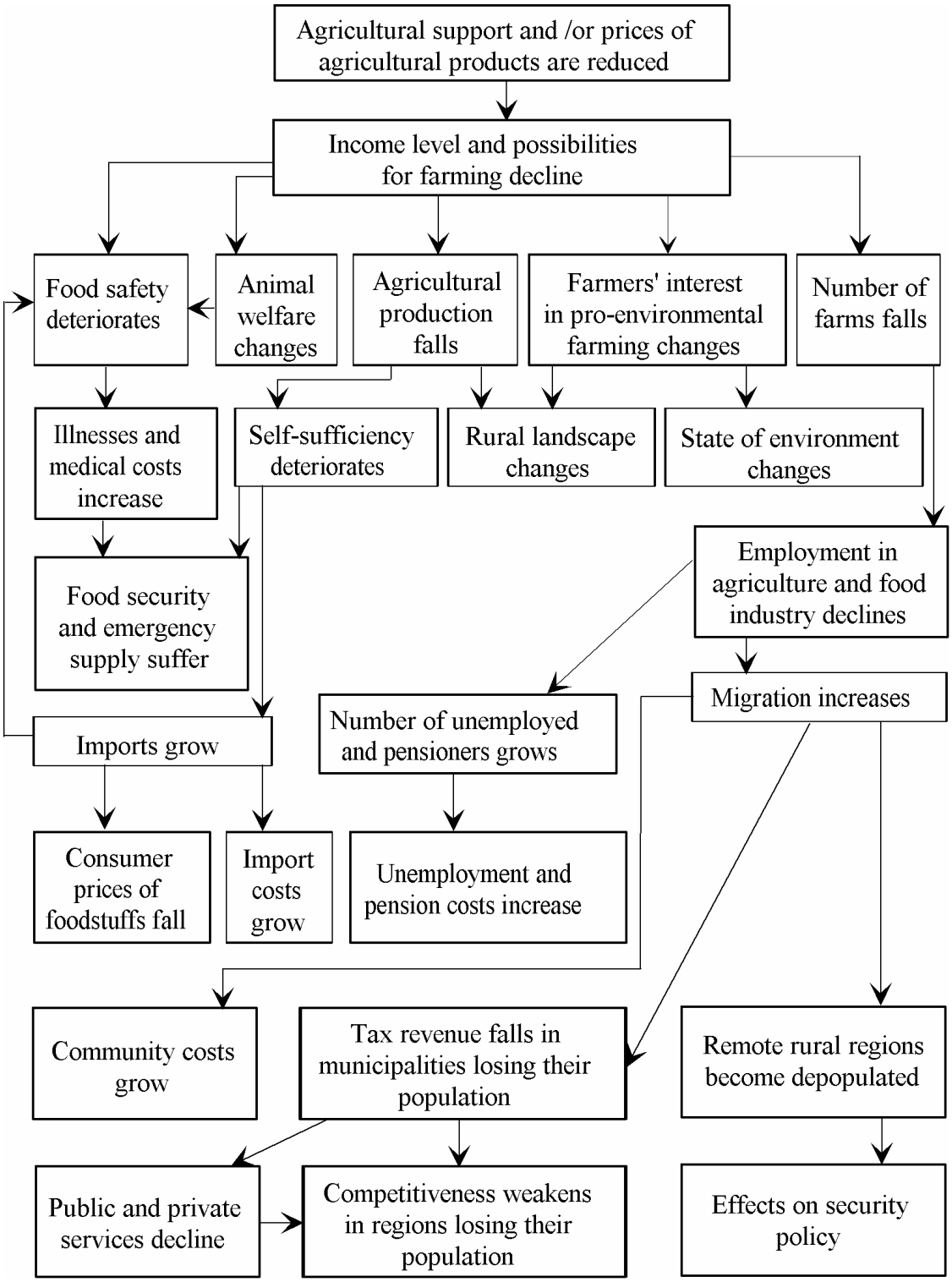

Fig. 2. Welfare effects of the reduction in agricultural support and/or prices of agricultural products.

Decrease in agricultural production

The weakening of the profitability of agriculture would lead to a reduction in the production. The continuous increase in efficiency and productivity would, however, to some extent slow

down the reduction in the production. In the long run, however, a considerable reduction in support would also lead to a considerable reduction in the production, because the number of production factors would decrease relatively more rapidly than the efficiency increases. The structure of production might also change due to the changes in the relative profitability of the different production lines and regions.

In terms of foreign trade it should be noted that even at present there is a need to import certain foodstuffs in order to satisfy the domestic demand. For example, the production of mutton and beef in Finland is too small to meet the consumption. As a result of a decrease in the production, the domestic production of some of the products in which Finland is at present self-sufficient might fall to such a low level that it would no longer satisfy the domestic demand. Especially in the case of those production lines with the lowest profitability, self-sufficiency might decline to a level that could be considered a risk to food availability and security. Thus, maintaining adequate food supply would require the increase of imports from the current levels.

The increase in imports would directly raise the import expenditures and weaken the trade balance. The reduction in the production of agriculture and food industry would also have significant multiplier effects on the national economy, e.g., the employment and tax income. Although the price levels are quite uniform in the EU Single Market, the increase in food imports might lead to a slight reduction in the consumer prices of foodstuffs due to increased competition, or threat of competition. It would increase consumer welfare. However, growth in food imports would also have considerable indirect negative impacts on the national economy, as money flows abroad instead of remaining within the national economy.

Reduction in the number of farms

The decrease in the farm income resulting from the fall in support would also lead to a reduction in the number of farms. This, together with the decrease in the production, would result in a decrease in agricultural labour. Part of the people employed in food processing and agricultural input industries as well as in transportation might also be left unemployed as a result of the reduction in agricultural support.

Labour released from agriculture and food industry might retire, remain unemployed, or migrate to population centres to find employment opportunities. All of these alternatives would cause costs to society. Society pays unemployment benefits to those who are out of work, and an increase in the number of unemployed would lead to an increase in the compensations to be paid. Similarly, the growing number of pensioners results in increasing costs to society. Both unemployment and pension payments are made at the cost of taxpayers.

The concentration causes so-called community costs to the municipalities and the government. Houses and traffic networks have to be constructed for the people moving to the area, and public and private services and their production capacity have to be expanded. Costs are also due to the corresponding infrastructure that remains unused in municipalities suffering from population loss. Despite their temporary nature the community costs may be considerable (Kangasharju et al. 1999, p. 3).

Loss of population in rural, farming-dominated areas leads to considerable reductions in both the public and private services due to poor profitability of the services. The decrease in the tax

revenues of municipalities as a result of the population loss may also cause pressures to terminate or cut some public services. The problems and inherent costs caused by the population loss, also in relation to the region-based defence policy in Finland, are very difficult to value in monetary terms. However, these cannot be completely ignored in the discussion on the role of agriculture in the socio-economic development of the rural areas.

Rural environment

The decrease in the profitability of agriculture may also be reflected in the attitudes of farmers to environmental issues. Environmental support, which is partly financed by the EU, would stay at the present level despite a reduction in the national agricultural support. However, due to the decrease in the profitability of agriculture, the willingness of farmers to pro-environmental actions might be restricted to the measures necessary to meet the eligibility criteria for environmental support. If economic benefit could be achieved by evading the terms for environmental support, the willingness to comply with the terms might also suffer. This could be called a moral hazard. In Finland this could cause a considerable negative effect, because over 90% of farms are currently included in the agri-environmental support system.

The rural environment produced by agriculture consists of a number of different aspects, such as the rural landscape, bio-chemical processes maintaining the life of ecosystems, as well as economic, socio-cultural and ecological factors (Aakkula 1999). Aspects of multifunctional agriculture produced by pro-environmental agriculture include at least the rural landscape, maintaining biodiversity, as well as some socio-economic factors in rural regions. The decline in the production of these as a result of the weakening of the profitability of agriculture and changes in the environmental attitudes of farmers would also be reflected in the state of the rural environment.

Reduction in agricultural support would lead to significant changes in rural landscape. Due to the decline and increased efficiency in agricultural production, the cultivated arable area would decrease, and in general the cultivated landscape is considered more attractive than one that is completely in its natural state. Thus, given the assumption that the reduced agricultural support is not substituted by any new support, the benefit from rural landscape experienced by consumers would be smaller, if agricultural support were reduced from the current levels. In addition to positive externalities, we also need to pay attention to negative externalities caused by agricultural production in terms of environmental protection.

Food safety, animal welfare and production ethics

The fall in the income level of farmers might weaken their interest or capability in the production of high-quality, pure and safe foodstuffs. This could result in an increase in various kinds of residues and pathogens in foodstuffs, which would be reflected as an increase in the food-borne diseases and their medical costs in Finland.

The medical and other related (e.g., loss of working days) expenses due to the increase in the food-borne diseases would largely be faced by society and, through this, by taxpayers. Thus the welfare of taxpayers can be considered to decrease by the amount of the increase in the medical expenses. Again, like for the environmental issues, this would make a big difference

in Finland in particular, as animal health situation is very good.

Animal welfare might also suffer and the production ethics in general might develop into a more negative direction as a result of a decrease in the income level in agriculture. The weakening of animal welfare may also be reflected in lower food safety. However, it is very difficult to estimate the welfare economic effects of the changes in the welfare of production animals, and production ethics in general.

Results of the quantitative cost-benefit analysis

The effects of the decline in agricultural support measures on the multifunctional agriculture were estimated by the cost-benefit analysis (CBA). In this chapter we refer to and use the results gained in some other studies, methodological details of which cannot be comprehensively described here due to space limitations, but we advise readers to consult the indicated references of e.g., Aakkula (1999), Lehtonen et al. (1998), Kangasharju et al. (1999) and Vehkasalo (1999). The basic assumptions of the study are as follows: the 30 per cent decline in the agricultural support causes either 30 or 20 per cent decrease in the agricultural production. The elements of multifunctional agriculture that were taken into account in the CBA were environmental state, employment and food security. The results are compared to estimated structural changes in Finnish agriculture (Lehtonen et al. 1998). In this so-called "base scenario" both production and amount of farms will decline by 2006 according to a historic trend, even though prices and farm support are set to remain at their 1998 levels. In the analysis and results, the decline in farm employment and food security represent costs for taxpayers. Respectively, changes in environmental concerns characterise the changes in consumers' utility.

As a consequence of the 30% decline in agricultural support, from EUR 1,598 to 1,119 million, taxpayers would gain EUR 479 million. Farmers would lose the same amount, ceteris paribus. Hence, there would be no change in total welfare as producers' loss approximates taxpayers' gain. On the other hand, it is possible that, for example, input use may also change due to decline in support, and this may cause some alterations in welfare effects, too. But the evidence of such development is not available for the time being, and, consequently, we maintain the aforementioned, in the economics literature also commonly applied, assumption.

The valuation of environmental state is based on consumers' willingness to pay (WTP) for pro-environmental farming (Aakkula 1999) and social benefits of the reduction in agricultural nutrient leaching to surface and groundwater (Vehkasalo 1999). WTP defines how much the consumers are willing to pay for specified issues. Hence, a decline in WTP means a loss of welfare. Aakkula applied the method of contingent valuation to acquire the WTP levels. The decline in agricultural production as a consequence of 30 per cent decline in agricultural support would decrease the consumers' WTP for pro-environmental farming by EUR 37 to 55 million compared to the base scenario in 2006 or EUR 50 to 75 million if comparing present situation to the situation in 1998. Nevertheless, it is difficult to value environmental and landscape benefits (Aakkula 1999), or to estimate the decline in negative externalities of agricultural production as a consequence of extensification or fall in agricultural production. However, if the Swedish consumers' WTP for Swedish agricultural landscape (Drake 1999) was used instead of Aakkula's WTP levels, the consumers' welfare loss would differ only slightly (2 to 7 per cent). In the total welfare level the effect would be even less significant. The aforementioned studies are not the optimal sources for the purpose of our study in terms

of their different, more specific, or narrower, objectives and approaches. Yet, they are the most suitable ones available at the moment.

Vehkasalo (1999) approximated social benefits of the decline in agricultural phosphorus and nitrogen leakages with the averting expenditures valuation method. In calculating the welfare effects of reduced agricultural nutrient leakages we modify Vehkasalo's (1999) overall social benefits of decline of either 20 per cent or 10 per cent in nutrient leaching to better reflect annual changes in social welfare. Moreover, it is assumed that decrease of 30 per cent in agricultural production would cut agricultural nutrient leakages by 20 per cent, and 20 per cent reduction in production by 10 per cent. The decline in agricultural nutrient leakages would generate a social benefit of EUR 47 to 72 million if comparing the situation in 2006 to the base scenario, and EUR 23 to 45 million at present compared to the base scenario.

Put together the decrease of consumers' WTP and social benefits of the reduction in agricultural nutrient leakages, the social welfare gain compared to the base scenario in 2006 is EUR 10 to 17 million. Total social welfare would fall by EUR 27 to 30 million, if the present state is compared to the situation in 1998 as a consequence of 30 per cent cut in agricultural support.

The deterioration of food security due to lower domestic production can be calculated more straightforwardly than environmental issues via the increase in the import of foodstuffs. The increased imports would bring additional costs of EUR 304 to 455 million in 2006 if compared to the base scenario. Because of the current overproduction, it is assumed that the decline of 30 per cent in agricultural production would increase the imports of foodstuffs by 20 per cent of the market value of agricultural production in 1998, and a 20 per cent decline in agricultural production would increase imports by 13 per cent of the market value of agricultural production in 1998. Under these assumptions social cost, as a result of decline in agricultural support, is EUR 222 to 341 million.

Increase in unemployment and pension costs together with migration from the countryside would cause social cost of EUR 137 to 206 million compared to the base scenario in 2006, and EUR 292 to 438 million if comparing the present situation to the 1998 state. Taxpayers would have to bear community costs caused by farm workers, and other rural residents, moving into the cities. It has to be mentioned that the community costs caused by the migration from the countryside are multiple to the increase in employment and pension costs as a consequence of the faster declining amount of farm workers. Miettilä and Okko (2001) approximated the social costs of empty dwellings in the areas losing their population to vary from EUR 1930 to 2690 million. Only 8 of the 20 Finnish provinces were included in this estimate. Considering that all provinces were included, the social costs would increase to a large extent. The social costs of empty dwellings in the areas losing their population were not included in this cost-benefit analysis.

To reduce agricultural support by 30 per cent would cause a total social welfare loss of EUR 431 to 644 million compared to the base scenario in 2006. Correspondingly, 30 per cent reduction in agricultural support causes EUR 540 to 809 million welfare loss at present (Table 1). These welfare losses are results of changes in the supply of the elements of multifunctional agriculture. It has to be emphasised that figures in Table 1 characterise social costs. Therefore, negative figures actually mean social benefits.

Table 1. Changes of social costs in multifunctional agriculture as a consequence of decline in

agricultural support measures.

Elements of Multifunctional Agriculture	①	②		③	
	Base [EUR million]	Base [EUR million]	Base [EUR million]	1998 [EUR million]	1998 [EUR million]
		(prod. –30%)	(prod. –20%)	(prod. –30%)	(prod. –20%)
Environment	31	-17	-10	30	27
Employment	97	206	137	438	292
Food security	188	455	304	341	222
Total	315	644	431	809	540

① Comparison: The base scenario in year 2006 ↔situation in year 1998
② Comparison: 30 and 20 per cent decline in production in 2006 ↔The base scenario in year 2006
③ Comparison: 30 and 20 per cent decline in production at present ↔situation in year 1998

According to the results of the CBA, ensuring adequate supply of food is the most valuable element of the multifunctional agriculture if comparing the situation in 2006 to the base scenario. Respectively, if the present state is compared to the situation in 1998, employment and pension costs aggregated with the community costs as a consequence of migration represent the best-valued element of multifunctional agriculture. Weight of environmental and landscape characteristics is weak in all cases. Even the negative figures, i.e., social benefits, if comparing the present situation to the base scenario do not change the total welfare substantially.

When interpreting these results it is useful to remember that this calculation is based on a considerable amount of assumptions and results derived in other studies. These results and approaches do not necessarily suit the use if the CBA, or the definitions of multifunctionality, perfectly. In addition, there are many factors that are not included in this calculation, which, however, may affect social welfare. These factors include, inter alia, accumulative effects of the changes in the agricultural tax revenue on the national and regional economies, effects of structural changes in agricultural production on food industry and consumer prices of food, medical and other related costs due to the deterioration of food safety and security, and changes in animal welfare and production ethics as a whole. Furthermore, the only negative externalities of agricultural production included in this calculation are agricultural nutrient leakages. Others could be e.g., loss of biodiversity and impacts on climate change due to the modern, intensive, large-scale agriculture.

Conclusions and Further Research Needs

Conclusions

This paper assessed, for the first time in a quantitative economic manner, impacts of the reduction in agricultural support on public goods and inherent benefits jointly produced by multifunctional agriculture. Although the reduction in agricultural support would save taxpayers' money, it would also cause welfare losses via changes in infrastructure investments, pension and unemployment expenditures, and imports of foodstuffs, in addition to farmers' income losses. The changes in the environmental state are both positive (decline in water pollution) and negative (decline in landscape amenities) also in terms of economic welfare. As a whole, the reduction of agricultural support by 30 per cent would cause a net social loss of EUR 431 to 809 million according to our cost-benefit analysis. These sums do not include e.g., changes in medical costs due to lower food safety, or consumers' lower utility due to deteriorating animal welfare and production ethics. Due to data limitations, at

the moment many effects of multifunctionality cannot be valued in a cost-benefit analysis at all, or, even at the best, they contain many assumptions. There are also many uncertainties related to the potential benefits of public goods provided by agriculture. The causal relationships are in some cases quite ambiguous. These deficiencies and uncertainties have been taken into account in our analysis, interpretation of the results, and conclusions here.

Further Research Needs

The results are indicative and useful for agricultural policy-making and provide a basis for further quantitative analyses, as well as general discussion and debate. Future research needs should focus on five issues: (*i*) what the so-called correct level of compensation for the adequate supply of public goods would be, (*ii*) what kind of means of agricultural, and rural, policy are the most efficient to enhance multifunctionality, (*iii*) what elements of multifunctionality are the most valued by consumers, and (*iv*) what other industries are also jointly producing public goods and can they do it more effectively and especially more cost-efficiently than agriculture, and (*v*) what is the true relationship between various public goods and multifunctional agriculture.

In order to make a more precise analysis a new research project started in the summer of 2001 under the subject "Multifunctional Agriculture: Supply, Demand and Policy". The project is co-operation between Department of Economics and Management at the University of Helsinki and MTT Agrifood Research Finland, Economic Research. In other words, this project aims at giving further information on the above mentioned questions.

Given that there are no markets for elements of multifunctional agriculture, the elements have to be evaluated using a valuation method. Several methods have been developed for valuing non-market amenities in monetary terms consistent with the values of marketed goods. These methods are based on individual preferences, which means that they are supposed to reflect preferences of individual consumers. Aggregating these preferences with other consumers' preferences obtain the demand for non-market amenities. (Navrud 2000.)

The most widely used method in environmental valuation has been contingent valuation or CV method (e.g. Bonnieux et al. 1998; Kotchen and Reiling 2000; Kontogianni et al. 2001). Recently, more emphasis has been given to choice experiment, or CE method. In a CE study the respondents are asked to choose one of alternative bundles of attributes. Instead of asking respondents how much they are willing to pay for a change from present situation, like in CV, in a CE survey they are asked to choose between different cases illustrated by attributes. Different bundles of characteristics constitute the scenarios of which the respondents are asked to choose one. The preferences of the respondents towards the attributes can be derived from their responses. (Adamowicz et al. 1998.)

Only a few studies have compared CV with CE. Boxall et al. (1996) studied changes in hunters' willingness to travel as moose population is changed with both contingent valuation and multiattribute choice question. CV options differed only in terms of moose population and the distance to a hunting site while multiattribute choice included total of six changing factors. The WTP figures derived with either method were almost similar if only moose population and distance to a hunting site were measured. On the other hand, the WTP figures were drastically lower in multiattribute choice model if all the possible option were used. This difference is probably due to inability of the respondents to consider all the alternatives.

Adamowicz et al. (1998) measured passive use values for conserving old-growth forests, which maintain the caribou population in Alberta, Canada. The respondents answered to both CV and CE questionnaires. The results obtained from different methods were not significantly different. WTP levels derived from CE were both higher and lower that those derived from CV. However, since CE provide for examining values of attributes, CE approach has considerable merit in measuring passive use values.

Even though the WTP figures do not differ drastically between CV and CE studies, a CE approach may be more suitable for demand analysis of multifunctional agriculture than a CV. In a CE study consumers' preferences are divided into components associated with the attributes constituting the valued good. Therefore, it is possible to investigate relative weights of different attributes and compare various mixtures of attribute levels. (Bennett and Adamowicz 2001.) Given that multifunctional agriculture consists of various elements, choice experiment is considered to be an appropriate method for valuing multifunctional character of agriculture in monetary terms.

References

Aakkula, J.J. 1999. Economic Value of Pro-Environmental Farming - A Critical and Decision-Making Oriented Application of the Contingent Valuation Method. *Agricultural Economics Research Institute*. *Publications* 92. Helsinki. 210 p. + appendices 17 p.

Adamowicz, W., Boxall, P., Williams, M. & Louviere, J. 1998. Stated Preference Approaches for Measuring Passive Use Values: Choice Experiments and Contingent Valuation. *American Journal of Agricultural Economics* 80: 64-75.

Boadway, W.B. & Wildasin, D.E. 1984. *Public Sector Economics*. 2nd ed. Boston: Little, Brown and Company. 571 p.

Bennett, J. & Adamowicz, V. 2001. Some Fundamentals of Environmental Choice Modelling. In: Bennett, J & Blamey, R. (eds.) *The Choice Modelling Approach to Environmental Valuation*. Cheltenham: Edward Elgar. P. 37-69.

Bonnieux, F., Rainelli, P. & Vermersch, D. 1998. Estimating the Supply of Environmental Benefits by Agriculture: A French Case Study. *Environmental and Resource Economics* 11: 135-153.

Boxall, P. Adamowicz, W., Swait, J, Williams, M. and Louviere, J. 1996. A Comparison of Stated Preference Methods for Environmental Valuation. *Ecological Economics* 18: 243-253.

Brent, R.J. 1996. *Applied Cost-Benefit Analysis.* Cheltenham: Edward Elgar. 336 p.

Cairns Group 2001. *Communique of the Cairns Group XXIIIrd Ministerial Meeting*. Available: http://www.cairnsgroup.org/meetings/min23_communique.html. Referred: 18.1.2002.

Dasgupta, A.K. & Pearce, D.W. 1978. *Cost-Benefit Analysis: Theory and Practice.* London: MacMillan. 270 p.

Drake, L. 1999. The Swedish Agricultural Landscape – Economic Characteristics, Valuations and Policy Options. *International Journal of Social Economics* 26, 7/8/9: 1042–1060.

EuroChoices 2001. *Multifunctionality & European Agriculture. The M Word.* Premier Issue. Uckfield: The Agricultural Economics Society and The European Association of Agricultural Economists. 60 p.

Hanley, N. 1991. The Economics of Nitrate Pollution Control in the UK. In: Hanley, N. (ed.). *Farming and the Countryside. An Economic Analysis of External Costs and Benefits.* Wallingford: CAB International. p. 91–116.

Kangasharju, A., Kataja, J.-P. & Vihriälä, V. 1999. Tarvitaanko aluepolitiikkaa? *Pellervon taloudellisen tutkimuslaitoksen työpapereita* 18:1999. Helsinki. 41 p.

Kettunen, L. 1996. Finnish Agriculture in 1995. *Agricultural Economics Research Institute. Research Publications* 79a. Helsinki. 61 p.

Koester, U. & Tangermann, S. 1977. Supplementing farm price policy by direct income payments: Cost-benefit analysis of alternative farm policies with a special application to German agriculture. *European Review of Agricultural Economics* 4, 1: 7–31.

Kontogianni, A., Skourtos, M. S., Langford, I. H., Bateman, I. J. & Georgiou, S. 2001. Integrating Stakeholder Analysis in Non-Market Valuation of Environmental Assets. *Ecological Economics* 37: 123-138.

Kotchen, M. J. & Reiling, S. D. 2000. Environmental Attitudes, Motivations, and Contingent Valuation of Nonuse Values: A Case Study Involving Endangered Species. *Ecological Economics* 32: 93-107.

Lankoski, J. & Ollikainen, M. 2001. Policy Design for Multifunctional Agriculture. *MTT Agrifood Research Finland, Economic Research (MTTL). Working papers* 6/2001. Helsinki. 32 p.

LD 2001. *Non-Trade Concerns: 40 WTO Members and Observers Meet in Doha*. Oslo: Lantbruksdepartmentet. Available: http://odin.dep.no/ld/mf/news/020031-210002/index-dok000-b-n-a.html. Referred: 18.1.2002.

Lehtonen, H., Linjakumpu, H., Knuuttila, M. & Marttila, J. 1998. Maatalouden rakennekehitys vuoteen 2008. *Maatalouden taloudellisen tutkimuslaitoksen tutkimuksia* 232. Helsinki. 137 p.

Miettilä, A. & Okko, P. 2001. Tyhjät asunnot rakennemuutoksen kustannuksena. *PTT-katsaus* 2/2001. p. 12–20. Helsinki.

Mishan, E.J. 1976. *Elements of Cost-Benefit Analysis.* 2nd ed. London: Allen and Unwin. 151 p.

MMM 1999. *Agriculture in Finland*. Helsinki: Ministry of Agriculture and Forestry. 36 p.

Navrud, S. 2000. *Valuation Techniques and Benefit Transfer Methods: Strenghts, Weaknesses and Policy Utility*. In: OECD. Valuing Rural Amenities. OECD Proceedings. pp. 15-38. Paris.

OECD 1995. *Adjustment in OECD Agriculture: Issues and Policy Responses.* Paris: OECD. 123 p.

OECD 2001. *Multifunctionality. Towards an Analytical Framework.* Paris: OECD. 159 p.

Varian, H.R. 1993. *Intermediate Microeconomics. A Modern Approach.* 3rd ed. New York: Norton. 623 p. + appendices 36 p.

Vehkasalo, V. 1999. Ympäristötuen yhteiskunnallinen kannattavuus. In: Maatalouden ympäristöohjelma 1995–1999:n taloudellinen analyysi. Ympäristötukijärjestelmä ja tulevaisuus -tutkimuksen loppuraportti. *Maatalouden taloudellinen tutkimuslaitoksen julkaisuja* 90. Helsinki. p. 42–77.

WTO 2001. *Ministerial Declaration. Ministerial Conference. Fourth Session. Doha, 9-14 November 2001.* Geneva: World Trade Organization. 10 p.