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AN EVALUATION ON THE IMPACT OF NORDIC AID SCHEMES IN NORTHERN FINLAND AND SWEDEN

REPORT

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EXECUTIVE SUMMARY

This report evaluates the impacts of the national Nordic Aid scheme, applied in northern Finland and Sweden over the period of 1995-2005. It presents the results from an 8 months study conducted in Sweden and Finland investigating the impact of the Nordic Aid scheme.

Nordic Aid Scheme

Following Article 142 of the Act of Accession to the European Union of Austria, Finland and Sweden, the Commission has authorised Finland and Sweden to grant *"long-term national aid with a view to ensuring that agricultural activity is maintained in the northern regions."* The regions cover agricultural land situated to the north of the 62nd parallel in addition to some adjacent areas south of that parallel affected by comparable climatic conditions, rendering agricultural activity particularly difficult. The measures under the Nordic Aid scheme were approved by Commission Decision 1995/196/EC for Finland and by Commission Decision 1996/228/EC for Sweden. The regions were determined by the Commission, based on existing national classifications of regions with severe conditions for agriculture, taking into consideration in particular:

- low population density (lower than or equal to 10 inhabitants per square kilometer);
- share of agricultural land in the areas (utilized agricultural area (UAA) per square kilometer considered to constitute 10% or less of the overall surface area of the municipality);
- proportion of the UAA devoted to arable crops intended for human consumption (less than or equal to 20%);
- municipalities surrounded by others within before mentioned areas (even where they do not satisfy the same requirements).

In Sweden the area of Nordic Aid reaches from latitude 59^{o} to 69^{o} whereas in Finland the corresponding latitudes are 62^{o} and 70^{o}.

The aid should in particular be granted in order to (Act concerning the conditions of accession 1994, Article 142(3)):

- to maintain traditional primary production and processing naturally suited to the climatic conditions of the regions concerned;
- to improve the structures for the production, marketing and processing of agricultural products;
- to facilitate the disposal of the said products;
- to ensure that the environment is protected and the countryside preserved.

The rationale for the scheme is that the natural handicap, such as climatic and topological conditions, and population density in these regions pose special problems for the agricultural economy. In large parts of the respective countries the growing season is less than 180 days per year, implying low agricultural output, and high costs of production. Topological conditions often prohibit large interconnected fields, resulting in a structure of small farms with scattered plots. Population density is in several regions less than 10 persons per km^2, restricting the development of local markets and, consequently, implying that distances to markets are long and transports of agricultural products, as well as inputs, become costly.

When Finland joined the EU, due to a national price support mechanism and import restrictions, Finnish agricultural prices were 40-60% above the corresponding market prices within the EU. Therefore, it was considered in Finland that the available support measures within CAP would not suffice to cover the income losses for the farmers without additional national aid. In Sweden, the

situation was different since a substantial agricultural policy reform had been undertaken in the early 1990s. An overriding concern for both countries was that Accession should not worsen the economic conditions for the farmers. Hence, in the Accession negotiations both countries aimed at retaining the total level of the pre-accession agricultural support to northern areas.

Nordic Aid is granted based on the level of production or the number of production factors, such as reference quantity of milk, head of livestock or number of land hectares depending on the type of product. Aid is also granted for the transport of cow's milk between the place of production and the first collection point in both Finland and Sweden, and for the transport of livestock to slaughter houses in Finland.

In Finland, the Nordic Aid scheme comprises payments for agriculture, horticulture and reindeer husbandry, transport aid for milk and meat, storage aid for horticultural products, wild berries and mushrooms and aid for young farmers. Some 1.4 million hectares, which is 55.5% of the utilized agricultural area (UAA) in Finland, is eligible for the Aid. The total expenditure for the Nordic Aid scheme was about 328 MEUR in 2005, of which 50%, or 159 MEUR, went to milk production and 101 MEUR to livestock.

In Sweden, Nordic Aid is granted for fewer agricultural products than in Finland. It covers cow's milk, pigs, goats, piglets, eggs and soft fruits and vegetables. The sub-regions cover almost 2/3 of the total land area, including approximately 0.5 million hectares of UAA which corresponded to 11% of Sweden's total UAA in 2006, but 14 % in 2004. This change is due to the CAP reform. As in Finland, the main part of the Nordic Aid scheme is directed to milk production. Together with the transport aid for milk, milk production receives more than 90% of the total allowable aid in Sweden. In total, some 32 MEUR was paid in Nordic Aid in 2005, of which 29 MEUR was directed to milk production.

Evaluation approach

The overall purpose of the evaluation is to analyze

- to what extent the objectives of the scheme have been met,
- if the aid scheme has led to any side effects, and
- whether the instruments applied under the scheme are still appropriate and justified.

A further goal is to analyze the effectiveness of how the scheme is implemented, the efficiency of the measures under the scheme, and the relevance of the scheme in relation to the particular situation of the regions in the two Member States. These analyses are carried out in the light of the observed developments in the Nordic agricultural sectors and in the development of the agricultural policy measures. In addition to the Nordic Aid payments, the analyses account for other agricultural policy measures, such as the CAP and RDP measures.

The report consists of two main parts: a descriptive part and an analytical part. The descriptive part includes a full inventory of the implementation of the Nordic Aid scheme in northern Finland and Sweden. It starts with describing the Article 142, and then looks at the structure of beneficiaries of the aid and further describes the impacts of these aids in a static, descriptive setting. The descriptive part also lists other policy areas and programs to which the Nordic Aid Scheme is linked. Particular attention is paid to the reforms and gradual adjustments in other policy programs that have taken place over the evaluation period.

The second part highlights the evaluation approach and includes the economic impact analyses in addressing each of the ten evaluation questions within the five broader evaluation themes. Both surveys and quantitative models are used. The surveys give stated preferences about the performance of the Nordic Aid scheme as experienced and understood by the supported farmers, their stakeholders and those administrative officers, who are responsible for agricultural administration.

The quantitative models rely on observed data and they have the objective to produce either revealed preferences or normative information on farmer response to the Nordic Aid as well as the dynamic and indirect effects of the aid. The quantitative analyses involve three types of economic modelling approaches: *mathematical equilibrium models (1), econometric farm models (2), and input-output model (3)*. Mathematical equilibrium models (1) are partial equilibrium models developed and maintained by the contractors. In this evaluation project, they are employed and simulated to assess the effects of Nordic Aid scheme on input use, land use, animal production, farm structures, investments and agricultural income in different regions. Information about certain environmental effects of Nordic Aid schemes is also received.

Econometric farm models (2) are used, as statistical tools, to identify and test for the

(i) spatial productivity differences in agricultural production between different sub-regions
(ii) determinants of farm land allocations and
(iii) determinants of farm successions, *i.e.* factors affecting farm transfers from elderly farmers to the next generation.

Input-output (I-O) model (3) is used to estimate the importance and spill-over effects of agricultural production and agricultural holdings in local industries and economies.

Impacts

Agricultural activity, regional handicaps and structures

The evaluation results suggest that the Nordic Aid Scheme has contributed to maintaining the agricultural activities, production and land use in the Nordic Aid regions. The impact is particularly evident within the Finnish sub-regions but not so evident in the Swedish sub-regions, where the support rates are smaller. These general results hold, in particular, to the milk production, which is the most important production line and also the agricultural activity best suited for the conditions in the Nordic Aid region. Nevertheless, the northernmost sub-regions (sub-region 1 in Sweden and sub-region C4 in Finland) have been loosing production to the more southern sub-regions. In the Finnish sub-regions, the dairy and livestock production has been concentrating to sub-region (C2) and towards the western coastal line. The spatial concentration and increase of production volumes have been the most evident in the Finnish pig meat and poultry sectors. The production of beef has remained quite stable in the Nordic Aid region.

The Nordic Aid reflects differences in regional handicaps, when the natural handicap is measured by dairy farms' physical productivity, *i.e.* by the ratio of physical farm output to physical farm input. When the support payments are accounted for in the regional comparisons, the farms located in the Nordic aid regions have either worse or almost equal competitive position in the common market as compared to their equally sized counterparts located in more productive regions in Denmark. The competitive position has remained the worst and behind other regions in the northern most Swedish sub-region. Even if the Nordic Aid measures have decreased the spatial differences in natural handicaps, the market has continued to concentrate production within the aid regions, as

described above. This suggests that exogenous constraints for expanding production have been smaller in the southern than in the northern aid areas.

The results indicate that Nordic Aid scheme has not impeded structural development, which has been faster in the Nordic Aid regions than elsewhere in Finland and Sweden. A rapid drop in the number of farms has, nevertheless, been avoided in the Finnish regions where producer prices declined by 40-60 % at the entry in the EU. The average annual exit rate for the number of farms in all Nordic aid areas was 3.5%, whereas the total number of farms in whole Sweden and Finland decreased at the rate of 2.5%. The development has been the fastest in certain northern most sub-regions, where more than eight percent of all farms have quit annually. At this speed, the number of farms is cut to a third in every ten year period. The evaluation results suggest, however, that without Nordic Aid, farm exit rates would have been higher as Nordic Aid has kept medium size farms active more than would be the case without the support.

Processing and marketing

The spatial distribution of the processing industries has not been directly addressed or maintained by the Nordic Aid Scheme, and the market driven developments have been two fold. Amongst the largest companies, the efficient commodity and capital markets have been concentrating, specializing, and relocating processing plants. These developments have been feasible, because food processing is not directly linked to spatial distribution of natural resources. Nevertheless, new small entrants have also been emerging in the market (*e.g.* in the Finnish meat processing).

The environment and viability in rural areas

Nordic Aid scheme does not explicitly include targeted environmental measures, but it indirectly contributes to European agri-environmental programs and regulatory framework concerning the Nordic agricultural regions. The results support the view that Nordic Aid, together with the conditions in the CAP and RDP, has had a positive effect on the arable land area kept under active cultivation. The statements of the administrators, in particular, support the view that, if the Nordic Aid had been lower, more land would have been left idle in the most remote Nordic Aid regions, where land rents are approaching zeros.

The impact of Nordic Aid on maintaining mosaic and biodiversity value was found to be negligible. Instead the allocation of land was affected. Nordic Aid in combination with investment support have resulted in a greater area of intensive land uses (cereals and arable grass) at the cost of less extensive land uses (arable pasture and grazing land).

The functioning of the internal market

Under an assumption of efficient market, the price supports and other support measures that are coupled to farms' output levels are trade distorting by definition. Nevertheless, the data do not seem to support the view that Nordic Aid has caused more distortions in interregional trade, as compared to the pre-accession situation. Both countries have witnessed a substantial increase in agri-food trade, such that both exports and imports have increased, since the accession in 1995. Nevertheless, neither Sweden nor Finland has increased their net exports of products eligible for the Nordic Aid during the period of 1995-2005. In fact, both countries exhibit increased deficits in agri-food trade with the EU. Model results suggest, nevertheless, that without the Aid, Finland would have imported more and exported less agri-food products, which would have converted Finland from a net-exporter to a net-importer of dairy products. Furthermore, the results indicate that without

Nordic Aid, overall domestic trade flows would have decreased by 10 – 20 % in Finland. In Sweden, on the other hand, the scheme does not seem to have caused significant distortions in domestic trade or trade between Sweden and other countries even if we compare the current situation with a situation without Nordic Aid.

Coherence and efficiency

The Nordic Aid measures, such as the price supports for milk and the headage payments for live animals, are coupled to farm production. The results suggest that these measures have been efficient in maintaining primary agricultural production, as compared to partially de-coupled arable land payments or fully de-coupled payments. The weight of price supports in maintaining agricultural production has further increased after the recent CAP reform, which de-coupled most of the CAP support payments from production into the Single Farm Payment.

Nevertheless, decoupled support would be more transparent and efficient to fulfil income support objectives, but it would result in lower production, especially after 2003 CAP reform policy framework. So, depending on whether the objective is income transfer or maintenance of production, different measures are the most efficient. The overall purpose of the CAP reforms has been to increase market orientation and competitiveness with support not longer coupled to production and defined for specific commodities. In this respect, incoherency between the Nordic Aid measures and the CAP measures has likely increased.

Relevance of Objectives

With regards to the primary agricultural production and food distribution oriented situation of the Nordic agricultural sectors, such as the persisting natural handicap, low productivity, long distances and decreasing population densities, the relevance of the Nordic Aid Scheme has remained. The evaluation results suggest that productivity of farms located in the Nordic Aid regions has remained significantly lower than productivity of the corresponding farms of equal size in Denmark. The distances from the agricultural holdings to the food processors and logistic centres have increased as food processing industries and logistic centres have been concentrating into fewer and fewer locations in the southern sub-regions. Further, migration has gradually decreased population densities in the Nordic Aid regions. Agriculture has remained an important source of vitality in rural economies, but it has not been able to maintain vitality of local economies in areas where population densities have initially been low and where economic pressures on other economic activities have resulted in migration and decreasing services.

Hence it may be concluded that the natural and economic disadvantages faced by the Nordic regions remain and the identified needs are still relevant. However, it may be questioned, whether operational objectives of the scheme comprising of a large number of coupled and commodity specific support programmes are still appropriate. Under a more production neutral support mechanism the regions would have more potential to specialize in production lines exhibiting comparative advantage at the regional level. Furthermore, such a change of the scheme would be more in line with the development of the CAP at large. Moreover, the importance of agriculture for the vitality of the rural economies is likely to decrease further with declining number of farms and declining farm employment. A different set of measures may in the future be needed to ensure that the environment is protected and countryside is preserved.

Recommendations

It is expected that maintaining agricultural activity in the Nordic areas will be a challenge also in the future even if the ongoing rapid and productivity enhancing structural development is expected to continue. The market will spatially concentrate agricultural production and processing industries further and agricultural employment will continue to decline. The role of agriculture for protection of environment and preservation of the countryside will, accordingly, change. Therefore, there is scope to increase the relevance of the objectives of the Scheme by broadening the goal of maintaining agricultural activity from primary production more towards sustainable land management practices, provision of environmental services and rural development programmes. Targeted measures broadening the scope of the scheme, *e.g.* in protecting the artic environment, would be valuable development options to be incorporated also in the Nordic Aid Scheme.

Notwithstanding the positive contributions of agricultural support policies to rural economy, the payments concentrated to agriculture cannot solve the problems of sparsely populated rural areas and rural heartland areas. The logic of remunerating the multifunctional role of agriculture also calls for better consideration of factors like the rural territory, the environment, the landscape, rural communities and rural employment. The results signal that, in particular, if the goal of maintaining agricultural activity is shifted from intensive agricultural production (e.g. milk and meat) more towards extensive land management and environmental services, there is likely space for simplifying the rich set of coupled support measures. Simplification would also allow for a more efficient allocation of resources between the individual production activities such that allocations would be steered more by the market signals than locked in by the specific support measures.

The separate administrative restrictions concerning monetary payments, quantity of production factors and production volumes, are not all necessary for reaching the goals of the Nordic Aid Scheme. The restrictions on production factors and volumes have been, for the most part redundant. The monetary budget constraints would be sufficient regulations (in addition to the economic incentives provided by the payments) for reaching the goals of the Nordic Aid Scheme. This simplification, in fact represents the practices already adopted in both countries.

1 Introduction

This report evaluates the impacts of the national Nordic Aid scheme, applied in northern Finland and Sweden over the period of 1995-2005. It presents the results from an 8 months study conducted in Sweden and Finland investigating the impact of the Nordic Aid scheme. The overall purpose of the evaluation is to analyze

- to what extent the objectives of the scheme have been met,
- if the aid scheme has led to any side effects, and
- whether the instruments applied under the scheme are still appropriate and justified.

A further goal is to analyze the effectiveness of how the scheme is implemented, efficiency of the measures under the scheme, and the relevance of the scheme in relation to the particular situation of the regions in the two Member States. These analyses are carried out in the light of the observed developments in the Nordic agricultural sectors and in the development of the agricultural policy measures.

The report consists of two main parts: a descriptive part and an analytical part. The descriptive part includes a full inventory of the implementation of the Nordic Aid scheme in northern Finland and Sweden. It starts with describing the Article 142, and then looks at the structure of beneficiaries of the aid and further describes the impacts of these aids in a static, descriptive setting. The descriptive part also lists other policy areas and programs to which the Nordic Aid Scheme is linked. Particular attention is paid to the reforms and gradual adjustments in other policy programs that have taken place over the evaluation period. All together, the inventory of the implementation of the aid scheme and the description of the evaluation approach feed into and provide the context of the analytical evaluation work.

The second part includes the description of the evaluation approach and the economic impact analyses in addressing each of the ten evaluation questions within the five broader evaluation themes. The economic impact analyses base on the key terms and indicators that can be identified in the observed data. Both surveys and a collection of quantitative models are used. The surveys will give stated preferences about the performance of the Nordic Aid scheme as experienced and understood by the supported farmers, their stakeholders and those administrative officers, who are responsible for agricultural administration. The collection of quantitative models, on the other hand, are essential in identifying the dynamic, indirect effects of the aid measures, and in obtaining unbiased results and quantitative signals on how efficient the payments have been with respect to reaching different policy objectives. And, more importantly, how do they reflect the issues raised in the specific evaluation questions. The quantitative models rely on observed data and they have the objective to produce either revealed preferences or normative information on farmer response to the Nordic Aid as well as the dynamic and indirect effects of the aid.

The data and information gathered by the surveys are not entered, as such, in any of the quantitative models. Instead, the observed development patterns in the data, the survey results and the modeling results are all used as complementary information making judgments and conclusions with regards to the impacts, efficacy and efficiency of the Nordic Aid scheme. Qualitative assessment is used, when the data are not informative enough for quantitative impact identification and when the quantitative models do not support reliable and conclusive results.

2 The Nordic Aid scheme

2.1 Objectives of the Nordic Aid scheme

The Nordic Aid scheme aims at supporting agricultural production in certain regions in Finland and Sweden. Objectives of the Aid scheme are (Act concerning the conditions of accession 1994, Article 142):

- to maintain traditional primary production and processing naturally suited to the climatic conditions of the regions concerned;
- to improve the structures for the production, marketing and processing of agricultural products;
- to facilitate the disposal of the said products;
- to ensure that the environment is protected and the countryside preserved.

The grounds behind the scheme is that climatic and topological conditions and population density in these regions pose special problems for the agricultural economy. In large parts of the respective countries the growing season is less than 180 days per year, implying low agricultural output, and high costs of production. Topological conditions often prohibit large interconnected fields, resulting in a structure of small farms with scattered plots. Population density is in several regions less than 10 persons per km^2, restricting the development of local markets and, consequently, implying that distances to markets are long and transports of agricultural products, as well as inputs, become costly.

2.2 General conditions of the Nordic Aid scheme

Following Article 142 of the Act of Accession to the European Union of Austria, Finland and Sweden, the Commission has authorized Finland and Sweden to grant long-term national aid with a view to ensuring that agricultural activity is maintained in the northern regions." The regions cover agricultural land situated to the north of the 62^{nd} parallel in addition to some adjacent areas south of that parallel affected by comparable climatic conditions, rendering agricultural activity particularly difficult. The measures under the Nordic Aid scheme were approved by Commission Decision 1995/196/EC for Finland and by Commission Decision 1996/228/EC for Sweden. The regions were determined by the Commission, based on existing national classifications of regions with severe conditions for agriculture, taking into consideration in particular:

- low population density (lower than or equal to 10 inhabitants per square kilometer);
- share of agricultural land in the areas (utilized agricultural area (UAA) per square kilometer considered to constitute 10% or less of the overall surface area of the municipality);
- proportion of the UAA devoted to arable crops intended for human consumption (less than or equal to 20%);
- municipalities surrounded by others within before mentioned areas (even where they do not satisfy the same requirements).

The aid granted under the scheme may be related to physical factors of production, such as hectares of agricultural land or heads of animal taking account of the relevant limits laid down in the common organization of the market, as well as the historical production patterns of each farm, but must not:

- e linked to future production;
- or lead to an increase in production or in the level of overall support compared to the pre-accession reference period.

A basic condition for Nordic Aid is that neither agricultural production nor the amount of aid is to increase in comparison with pre-accession levels. Several measures are used to control the total maximum limits for the production volumes and production factors according to which the payments are determined. With respect to cow's milk, the level of production is controlled by the quota system provided under the Common Agricultural Policy (CAP). The number of animals/LU´s and hectares are controlled by an upper limit stated as a reference quantity, and the total payments of aid and per product is stated as a reference amount. If any of the reference quantities for production is exceeded, the aid has to be reduced proportionally during the following year for the product concerned.

2.3 Structure of the Nordic Aid scheme

2.3.1 Overview of aid measures

Nordic Aid is granted based on the level of production or the number of production factors, such as kilo milk, head of livestock or number of hectare depending on the type of product. Aid is also granted for the transport of cow's milk between the place of production and the first collection point in both Finland and Sweden, and for the transport of livestock to slaughter houses in Finland. The objective with the latter support is to facilitate the sale of the involved products by covering part of the transport costs.

In Finland, the Nordic Aid scheme comprises payments for agriculture, horticulture and reindeer husbandry, transport aid for milk and meat, storage aid for horticultural products, wild berries and mushrooms and aid for young farmers (Table 2.1). Some 1.4 million hectares, which is 55.5% of the utilized agricultural area (UAA) in Finland, is eligible for aid. The total expenditure for the Nordic Aid scheme was about 328 MEUR in 2005, of which ca. 50%, or 159 MEUR, went to milk production and 101 MEUR to livestock.

In Sweden, Nordic Aid is granted for fewer agricultural products than in Finland. It covers cow's milk, pigs, goats, piglets, eggs and soft fruits and vegetables. The sub-regions covers almost 2/3 of the total land area, including approximately 0.5 million hectares of UAA which corresponded to 11% of Sweden's total UAA in 2006. As in Finland, the main part of the Nordic Aid scheme is directed to milk production. Together with the transport aid for milk, milk production receives more than 90% of the total allowable aid in Sweden. In total, some 32 MEUR was paid in Nordic Aid in 2005, of which 29 MEUR was directed to milk production (Table 2.1).

Table 2.1. Nordic Aid measures in Finland and in Sweden 2005 (Article 142 of the Act of Accession, 2002/404/EC, 96/228/EC)

FINLAND	SWEDEN
Aid for cow's milk (per milk kg)	Aid for cow's milk (per milk kg)
Aid for transport of milk	Aid for transport of milk
Aid for transport of meat	–
Aid for animal products (per livestock unit or animal): o Bovine animals (suckler cows, bulls, heifers) o Ewes o She-goats o Swine (sows, boars, slaughter pigs) o Poultry (laying hens, chicken, breeding hens, turkeys, ducks, mallards, pheasants) o Horses o Reindeers	Aid for animal products (per livestock unit or animal): o – o – o She-goats o Swine (sows, slaughter pigs) o Poultry (laying hens) o – o –
Aid for crop products (per hectare): o Sugar beet o Potatoes for starch production o Cereals (oat, barley etc.) o Payment per ha UUA (pasturage, set-aside, etc.)	Aid for crop products (per hectare): o – o – o – o – o –
Horticulture (per cubic meter or kg): o Under permanent shelter (vegetables, flowers, plants) o Field scale vegetables, apples o Aid for storage (with or without heat control, wild berries, mushrooms)	Horticulture (per cubic meter or kg): o – o Field scale vegetables, soft fruit o –
Young farmers' aid (per hectare)	–
Total level of support 2005: 328 MEUR - of which to milk production: ca. 50% Agricultural land (UUA) in the area (ha):1 181 327 Share of Finnish UAA in Nordic Aid area: 55% Number of farms in the Aid area: 39 131	**Total level of support 2005**: 32 MEUR - of which to milk production: ca. 90% Agricultural land (UUA) in the area (ha): 355 017 Share of Swedish UAA in Nordic Aid area 11% Number of farms in the Aid area: 14 672

As can be seen, in both countries aid to cow's milk is the single most important part of the scheme. Further, both the coverage of the Nordic Aid scheme and the level of support differ substantially between the countries. For instance, the total amount of aid in Sweden is only a tenth of the aid in Finland and fewer products are eligible for support. The larger total amount of aid is partly explained by the fact that there are almost three times as many farms in the Finnish sub-regions of the Nordic Aid area compared to the Swedish sub-regions, and partly, of course, by the larger product coverage (Table 2.1). In addition, the level of support per product unit or production factor is in some cases higher in Finland than in Sweden. In addition, the Nordic Aid area and it's share out from the country's total land area is much larger in Finland than in Sweden; more than half of the agricultural land in Finland is located in the Finnish sub-regions while the corresponding figure

for Sweden is a tenth. There is also more than three times as much agricultural land in the Finnish sub-regions than in the Swedish ones.

2.3.2 Background regarding special agricultural support to the northern parts of Finland and Sweden

Special support to agriculture in the northern parts of Sweden and Finland has a long tradition which dates back before the accession to the EU. As will become evident below, the amount of Nordic Aid, the coverage of production lines and the delimitation of the sub-regions therefore partly depend on the pre-accession situation in Finland and Sweden.

Government intervention in the Swedish agricultural sector started in the late nineteenth century whereas in Finland the foundations and the continuum of the agricultural policy interventions started with the large land reforms after the Second World War. In both countries, the agricultural policy strived to safeguard the nation's self-sufficiency in food, insure adequate compensation and income of farmers and to balance regional disparities in farmer income. Later on, agricultural policies had a goal to develop a competitive structure of the agricultural sector. The overall weak economic development in the Nordic areas, with declining population and high unemployment rates have been increasingly important in motivating both agricultural and structural support to the areas.

During World War II special agricultural support to the northern regions were introduced in Sweden due to defense policy reasons. It was judged important to populate the northern parts of the country and agriculture was regarded as main potential livelihood for those residing there. Because of the harsh production conditions prevailing in the north compared to the southern parts, the support aimed at compensating for higher production costs in northern Sweden. In Finland the same kind of agricultural policy for the northern areas is also valid. A notable institutional difference in Finland, as compared to other Nordic countries, was created by the unique and extensive land reforms after World War II. They increased the number of farms from about 210,000 in 1945 to about 290,000 in 1960. Until 1980's, the agricultural policies also involved a social income target and a preference to provide higher income supports for small farms than large farms. Therefore, the current farm structure and small farm size, as well as a relative large number of farms in the Nordic areas, still originate to the structures established at the land reforms after World War II.

When Finland joined the EU, Finnish agricultural prices were substantially above the corresponding market prices within the EU due to the Finnish agricultural policy. As a result, prices on the Finnish market fell substantially when the national policy was substituted with the CAP; the average price fall was 38% (change in the producers' price index in average, Statistics Finland). The price of milk decreased with 32%, beef with 38-43%, pork and chicken with 52%, eggs with 68%, bred cereals 63% and fodder cereals with 58%. It was ascertain in Finland that the available support measures within CAP would not suffice to cover the income losses for the farmers. In Sweden, the situation was different since a substantial agricultural policy reform had been undertaken in the early 1990s. Thus any large price falls on the Swedish market were not expected since Swedish market prices were closer aligned to the market prices within the EU prior to accession than the Finnish market prices.

An overriding concern for both countries was that the accession should not worsen the economic conditions for the farmers. Hence, in the accession negotiations Finland aimed at compensating the farmers for the fall in prices caused by the introduction of CAP. In Sweden, there was less concern for price compensation, instead the negotiators aimed at retaining the total level of the pre-accession agricultural support to northern areas (Proposition 1994/95:19 and Proposition 1994/95:75). The

reason was that although Sweden became eligible for support measures within the CAP to support less favored areas, most importantly the compensatory allowance payments and the environmental support measures, those new measures were regarded as insufficient in replacing the old support regime directed to the northern part of Sweden.

Both countries were subsequently authorized by the Commission to introduce national aid.

A consequence of the Finnish membership was hence that a significant amount of price supports were abolished and the resulting income losses were to be partially compensated by CAP support and national aid. Looking at the Total Gross Return, which comprises the market production, subsidies, compensations and supports, it is possible to get an indication of the degree of compensation. It can be seen that the Total Gross Return decreased with approximately 13% (Table 2.2) compared to the years prior to accession. The figures in Table 2.2 concern the whole country, but it is likely that the Total Gross Return has changed approximately in the same relation in the Finnish Nordic Aid sub-regions as in the whole country.

Table 2.2. Total Gross Return for Finland before and after the accession (MEUR).

	1993/94	1995
Total Gross Return	4 065	3 531

Sources: Finnish agriculture 1997

In addition to Nordic Aid, Finland was allowed to pay Transitional Aid to the agricultural production during the transitional period of 1995-1999 to further smooth adjustment to the CAP. The Transitional Aid decreased every year during the transitional period and the EU covered part of the costs until 1998. At the same time, Nordic Aid increased gradually, compensating for the phasing out of the Transitional Aid in the Nordic Aid region.

In Sweden, national support was added on top of the compensatory allowance and environmental support to make up for the difference between the pre- and post-accession support structure, this top-up being the Nordic Aid. As a reference period to determine the level of pre-accession national support, the years 1993/94 were chosen. In Table 2.3, it can be seen that the level of Nordic Aid in 1995 almost correspond to the difference between the northern national support in 1993/94 before accession and the EU measures available in 1995 to support less favored areas. The loss in total support level was 8.2 MEUR meaning that the compensatory allowance payments, the environmental aid and the Nordic Aid together equals roughly 90% of the pre-accession support level in the northern parts of Sweden.

Table 2.3. Specific agricultural support to the northern areas in Sweden before and after the EU membership (MEUR)

	Pre-accession support 1993/94	Compensatory allowances 1995	Environmental aid 1995	Nordic aid 1995	Post-accession support 1995	Difference pre- and post-accession support
Sub-region 1-3	75.0	12.3	13.7	40.5	66.5	-8.2

Sources: Sweden Submission (Final version) May 1995. Note that the post-accession support is the sum of the compensatory allowances, the environmental aid and the Nordic Aid.

The total amount of Nordic Aid was then distributed per sub-region and production line in each country. In Sweden, the basic criterion was that the average farm in each Nordic Aid sub-region should receive the same amount of income as a comparable farm outside the less favoured northern areas. The "average farm" used in the Swedish calculations was not an average farm in a strict statistical sense but rather a representative farm, which in the case of milk production consisted of a farm with 21 milk cows. For such a representative farm, the production costs were compared with a similar farm in the southern parts of Sweden (more exactly region 9m Mälardalen – which is not a less favoured area nor the most productive agricultural region in Sweden but a medium region with regard to production conditions). The resulting level of aid was, with exception of minor adjustments, retained during the whole period 1995-2005.

Altogether, the total amount of Nordic Aid that the Finland and Sweden were entitled, reflected the support levels that the countries had to the northern parts prior to accession. I addition, the Nordic Aid scheme was constructed in a similar way as the pre-accession support to the northern areas in Sweden, the same production lines were covered and the structure of the support was alike. In Finland, the support structure changed more since price support was replaced with support to production and production factors. The pre-accession national support to cover additional transport costs due to long distances between farms and the first point of collection was also prolonged in both countries. This support was based on the total distance between the farms and the processing industries compared to the situation for the processing industries in the southern parts of the countries. The support covers milk in Sweden and milk and meat in Finland.

2.3.3 Sub-regions in the Nordic Aid area

Finland and Sweden are divided into sub-regions for the purposes of the agricultural policy programs, regulations and subsidy payments. Payments of CAP supports, environmental supports, compensatory allowances and the Nordic Aid are stratified according to these sub-regions. Finland, as a whole, has been divided into seven (7) aid areas and the five (5) northernmost areas are eligible for the Nordic Aid (Figure 2.1).The areas are indicated by the acronyms; C1, C2, C2P (C2 north), C3, and C4. The northernmost sub-regions, C3 and C4, are further divided into smaller sub-regions, P1-P5, for the purposes of adjusting the aid measures. In Sweden, three (3) LFA areas are eligible for Nordic Aid; these are area 1, 2 and 3, where area 2 is divided into two (2), namely area 2a and 2b (Figure 2.1). In Sweden the area of Nordic Aid reaches from latitude 59^{o} to 69^{o} whereas in Finland the corresponding latitudes are 62^{o} and 70^{o}.

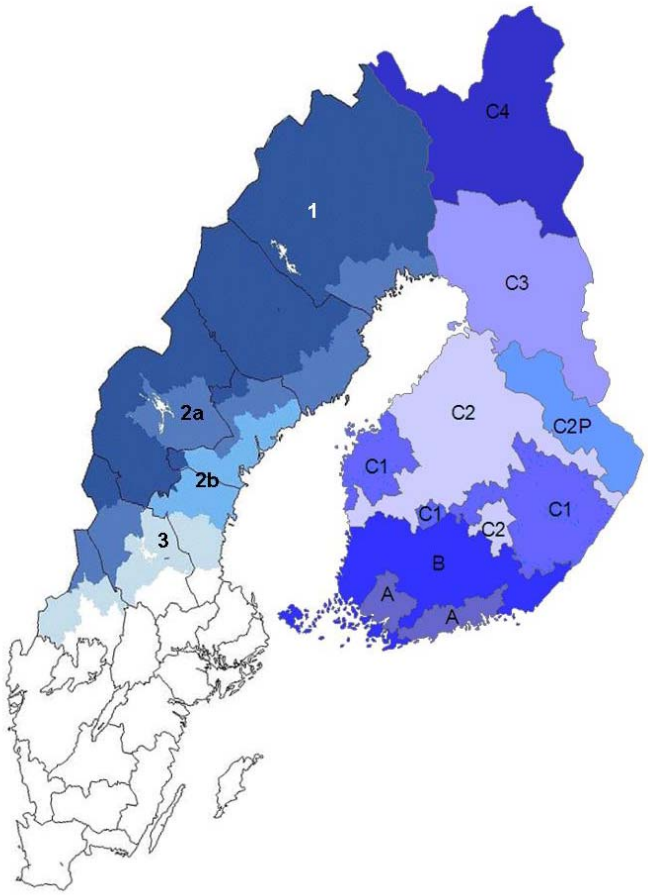


Figure 2.1. The Nordic Aid area and its sub-regions in Sweden and Finland.

The level of aid is differentiated between the sub-regions in order to reflect the significance of the natural disadvantages for agricultural production. In Sweden, the most favourable agricultural production conditions in the sub-regions are found along the eastern coastal line, where the majority of the farms are situated, while the interior mountainous areas bordering Norway (especially sub-region 1) have the most difficult agricultural conditions.

Broadly stated, the Finnish geographical conditions are like a mirror image to the Swedish conditions. At given latitude, the eastern regions in Finland represent more difficult agricultural conditions than the western coastal lines. Particularly in the eastern parts, the landscape is fragmented and the small sized arable land parcels are divided by lakes, wetlands and forests. In the western parts, on the other hand, the small and fragmented parcel size originates to the past land ownership institutions which split the existing parcels amongst siblings. Fragmented parcel structure has prevailed also in the coastal lines because the current and ongoing structural change has not been improving the parcel structure even if the farm size has been increasing through land sales and land leasing. Institutional land restructuring programs have been required for re-shaping the parcel structure and increasing the parcel size (Myyrä 2004).

It can be noted that sub-region 1, 2 and 3 in Sweden correspond to support areas that existed in northern Sweden prior to the EU membership. Just as the Nordic Aid measures to a large extent replaced an old aid structure, the areas covered by aid remained intact. Therefore, the boundaries are not outlined in 1995 but instead based on old investigations with some studies dating back to the 1970s. Differences in production costs were the main criteria and efforts have been made to understand how the area grouping originally was constructed. According to the Swedish Board of

Agriculture, though, "it is not possible to reconstruct the present delimitations of regions in the Northern Sweden from a model analysis".

In Finland the boundaries of the aid areas were determined on the basis of the Commission Decisions concerning e.g. the population density on the area and the natural and socio-economical conditions concerning agricultural production. The last mentioned factors have been studied for the needs of national agricultural support scheme by Nikula (1985) and the present boundaries of the aid areas originate to quantitative "Nikula"-index. This index includes factors describing natural production conditions and socio-economical factors. The indicator for production conditions was defined as the sum of the effective temperature, quality of soil and average yield of barley. For the socio-economic situation indicators were agricultural income from taxation, unemployment rate on average, migration rate on average and an index describing distances. In computing the aggregate index, the above mentioned sub-indices were aggregated and weighted by standard indexing techniques. Recently, MTT Economic Research has started a new study about foundations for boundaries of the aid areas for the needs of the reform of compensatory allowance aid scheme. Modern data sources and research methods available give better possibilities to determine uniform areas on the basis of natural disadvantage in agriculture than earlier. The results of this study are not, however, available yet for this evaluation.

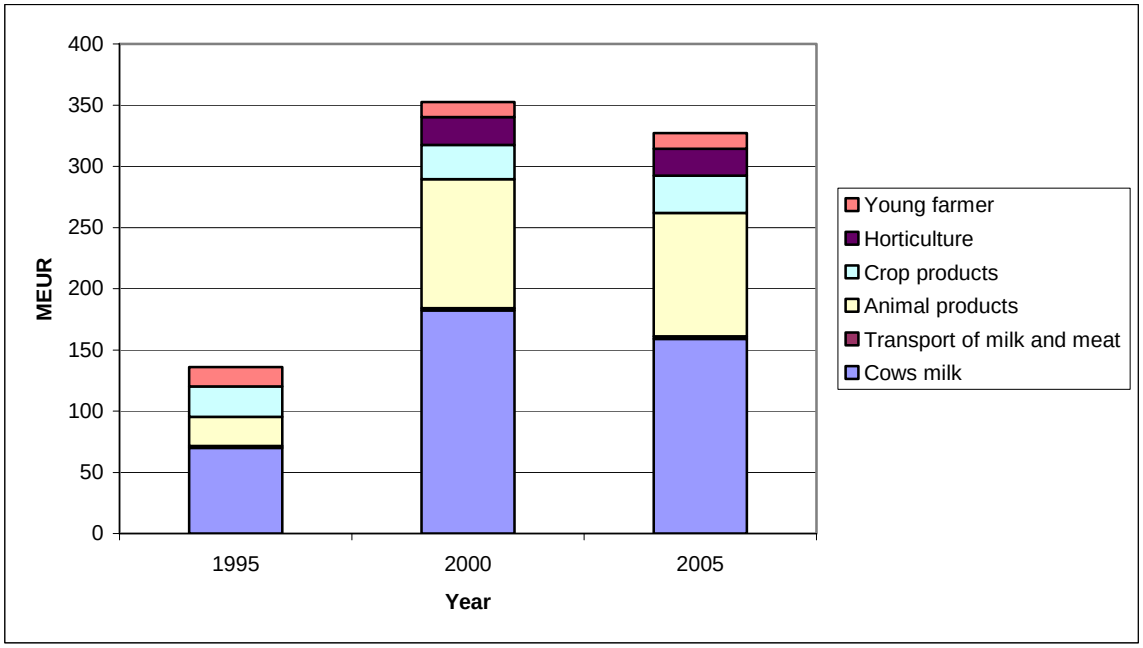
2.4 Nordic Aid per line of production

2.4.1 Overview

The amount and the division of Nordic Aid over time can be seen in Figures 2.2 and 2.3 for Finland and Sweden respectively. Note that it is the total amount actually paid by the countries, not the reference amount. It can be seen that the Nordic Aid is much more significant in Finland than in Sweden. In 2005 the Nordic Aid paid in Finland totalled about 328 MEUR, while in Sweden the funds allocated for Nordic Aid totalled to about 32 MEUR.

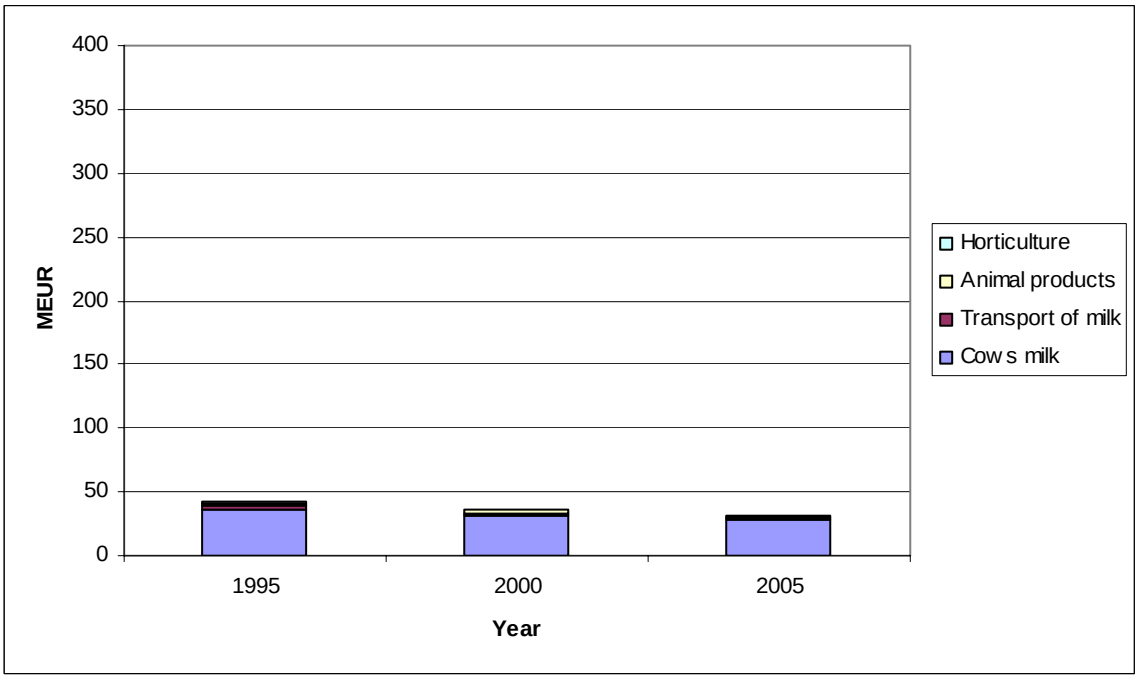
The dominance of aid to milk production in the scheme for both countries can clearly be seen. It has to be noted also that over the period of 1995-2000 the increasing Nordic Aid substituted for the transitional aid that was decreasing gradually. Transitional Aid is not incorporated in Figure 2.2.

In 2005 the most significant single aid measures in Finland were the production aid for milk amounting to 159 MEUR and Nordic Aid based on the livestock units, 101 MEUR which together accounted for almost 80% of the total Nordic Aid paid in the country. In Sweden, the milk aid amounted to 28 MEUR and transport aid for milk to 1.8 MEUR, which together was 93% of the total Nordic aid payments in Sweden. Aid to slaughter pigs was the third most important support measure with 1.4 MEUR. All other Swedish Nordic Aid support measures summed to 0.7 MEUR in total.



Source: Ministry of agriculture and forestry in Finland. 1996, 2001, 2006

Figure 2.2. Total amount of Nordic Aid per production line to the Nordic Aid sub-regions, 1995, 2000, 2005, in Finland (MEUR).



Source: SJV 2001, 2006

Figure 2.3. Total amount of Nordic Aid per production line, 1995, 2000, 2005, in Sweden (MEUR).

2.4.2 Animal production - reference levels and utilized aid

As described above, the Nordic Aid area was divided into sub-regions according to for instance different climatic conditions, and consequently the support levels were stipulated to adjust for the regional disadvantages. In Table 2.4 the permissible support per unit, which was established when

the Nordic Aid scheme was introduced in 1995, as well as the initially concerned animal production lines are shown per sub-region.

The number of animal production lines initially involved in the Nordic Aid scheme differs; eight production lines for Finland and five for Sweden. Only four are completely overlapping, that is milk production, swine, laying hens and she-goats. (For Sweden, "poultry" consists only of laying hens, and there is no support to ewes in Sweden). The most disadvantaged area in respective country is showed in the shadowed field in the table (C4 and 1), the regions are then sorted in increasing order so that the least disadvantaged areas (C1 and 3) are found at the far left and right, respectively. The support to cow's milk, the most important production line in both countries, was about twice as high in the most disadvantaged sub region in Finland compared to Sweden (C4 compared to 1) when the scheme was introduced. Also concerning the less disadvantaged sub regions the difference is clear, the level of support being three times higher in C1 than in 3.

Table 2.4. Aid per unit when introducing the aid scheme in 1995, EUR/ unit.

Animal products	FINLAND					SWEDEN			
	C1	C2	C2north	C3	C4	1	2a	2b	3
per LU									
Suckler cows	17	25	101	177	362				
Male bovine	109	118	193	572[1)]	1,009[1)]				
Heifers	77	79	131	178	276				
Ewes, she-goats	109	118	193	622[2)]	1,067[2)]	97	97	97	97
Sow's						131	68	68	16
Swine			99	99	151	105	67	67	11
Poultry			99	151	320	112	112	112	-
Horses									
per head									
Reindeer				27	27				
per kg									
Cow's milk	0.03	0.03	0.05	0.12[3)]	0.25[3)]	0.11	0.08	0.05	0.01

Sources: (95/196/EC, 2000/405/EC, 2002/404/EC and Ministry of Agriculture and Forestry 1996, 2001, 2006), (97/557/EC, 2000/411/EC and 2004/291/EC)

[1)] Intervals, 488-572 and 757-1,009 depending on sub regions within the area. [2)] Intervals, 521-622 and 807- 1,076 depending on sub region within the area. [3)] Intervals, 0.08-0.12 and 0.17-0.25 depending on sub region within the area.

The situation in 2005, ten years later, is shown in Table 2.5. In Sweden the aid level per unit has in principle remained the same as it was in 1995, except for support to sows in the whole area and to goats and milk in sub-region 1, where it increased in 2004. The support levels in Finland show a quite different pattern, because of different transitional arrangements during the first years of EU membership.

Table 2.5. Aid per unit when introducing the aid scheme in 2005, EUR/ unit.

Animal products	FINLAND					SWEDEN			
	C1	C2	C2north	C3	C4	1	2a	2b	3
per LU									
Suckler cows	357	365	441	517	702				
Male bovine	502	510	586	964[1)]	1,402[1)]				
Heifers	551	563	641	708	843				
Ewes, she-goats	536	544	620	1,049[2)]	1,503[2)]	114	96	96	96
Sow's						160	98	98	66
Swine	433	442	522	522	601	104	67	67	11
Poultry	433	442	522	601	796	112	112	112	49
Horses	420	420	420	420	420				
per head									
Reindeer				27	27				
per kg									
Cow's milk	0.115	0.117	0.135	0.208[3)]	0.341[3)]	0.12	0.08	0.05	0.01

Sources: (95/196/EC, 2000/405/EC, 2002/404/EC and Ministry of Agriculture and Forestry 1996, 2001, 2006), (97/557/EC, 2000/411/EC and 2004/291/EC)
[1)] Intervals, 880-964 and 1,149-1,402 depending on sub regions within the area. [2)] Intervals, 948-1,049 and 1,234-1,503 depending on sub region within the area. [3)] Intervals, 0.166-0.208 and 0.253-0.341 depending on sub region within the area.

In Table 2.6 the reference amounts of the Nordic aid, that is the maximum amounts that are allowed, are shown in MEUR for 1995 and 2005 together with the corresponding utilized share of the aid in those years. The share of the aid in 2005 has been in all cases well below 100 %, except for laying hens in Sweden.

Table 2.6. Reference amount of support (MEUR per product) and utilized share in 1995 and 2000.

Animal products	FINLAND			SWEDEN	
	Year	Reference amount of support	Utilized share %	Reference amount of support	Utilized share %
Bovine animals[1]	1995	25.3	-		-
	2005	91.2	60		-
Ewe and she goat	1995	1.2	78	0.12	95
	2005	3.5	93	0.13	80
Sow's	1995			0.32	81
	2005			0.47	42
Swine & poultry	1995	0.7	74		
	2005	61.3	60		
Swine	1995			1.38	79
	2005			1.53	89
Laying hens	1995			0.26	99
	2005			0.26	110
Horses	1995	-	-		
	2005	2.52	88		
Cow's milk	1995	67.8	103	29,9	115
	2005	225.22	71	29.71	93

Sources: (95/196/EC, 2000/405/EC, 2002/404/EC and Ministry of Agriculture and Forestry 1996, 2001, 2006), (97/557/EC, 2000/411/EC and 2004/291/EC).

[1] From 2002 the upper limits were defined only for the bovine animals total excluding the milk cows, and swine and poultry (2002/404/EC).

Also the production factors, measured in LU, heads, hectares or tons, are limited to certain quantities per sub region as a condition for the Nordic Aid scheme. For some products the limits have been exceeded, this is particular the case for milk production both in Sweden and in Finland. However, since 2003 the aid has not been granted in Finland any longer on the basis of the quantities produced, but on the basis of production factors within the total limits laid down in the Decision 2002/404/EC. In contrast, in Sweden reference quantities are no longer valid from 2004, only reference amounts in EUR have to be within the limit (Table 2.7).

Table 2.7. Reference quantities and utilized share of the Nordic aid (ton and LU) in 1995, 2000 and 2005.

Animal products	Year	FINLAND		SWEDEN	
		Reference quantity	Utilized share, %	Reference quantity	Utilized share, %
Cow's milk, ton	1995	1,720,000	100	484,937	102
	2000	1,750,863	105	484,235	96
	2005	1,776,765	103	484,235[1)]	89
Horses, LU	1995				
	2000	6,000	132	-	-
	2005	6,000	129	-	-

Sources: (95/196/EC, 2000/405/EC, 2002/404/EC and Ministry of Agriculture and Forestry 1996, 2001, 2006), (97/557/EC, 2000/411/EC and 2004/291/EC)

[1)] From year 2004, reference quantities are no longer valid for Sweden, only reference amounts in EUR.

2.4.3 Crop production - reference levels and utilized aid

Also concerning support to crop production, the Nordic aid scheme involves more production lines in Finland than in Sweden (Table 2.8). Other differences between Sweden and Finland are the payment per hectare of UAA and the support for young farmers. Aids of this kind have not been included into the support scheme in Sweden at present or before the accession. During the transitional period of 1995-1999, the Nordic aid per unit gradually increased in Finland, because it substituted for the gradually decreasing Transitional Aid. Later on, the changes in the level of Nordic Aid have been minor. In case of certain products (cereals, horticulture, for example), only Transitional Aid was paid in 1995 and 1996, whereas the Nordic aid payments were initiated at 1997 (Table 2.9).

Table 2.8. Nordic aid (EUR per unit) in 1995 in Finland and in Sweden.

Crop production	FINLAND					SWEDEN			
	C1	C2	C2north	C3	C4	1	2a	2b	3
Sugar beet, EUR/ha	84	118	118	-	-				
Potatoes for starch, EUR/ha	67	101	101						
Cereals - barley, oats, EUR/ha		34	34	67	135				
- other , EUR/ha		34	34						
Horticulture under shelter									
- flowers 7 months, EUR/m^2									
- flowers 2-7 months, EUR/m^2									
Field scale, EUR/ ha		34	34	67	135				
- vegetables									
- apples	34	34							
- soft fruit and vegetables						309	309	309	211
Payment per UAA, EUR/ha		34	34	67	135				
Young farmers, EUR/ha	34	34	34	34	34				

Sources: (95/196/EC, 2000/405/EC, 2002/404/EC and Ministry of Agriculture and Forestry 1996, 2001, 2006), (97/557/EC, 2000/411/EC and 2004/291/EC)

Table 2.9. Nordic aid (EUR per unit) in 2005 in Finland and in Sweden.

Crop production	FINLAND					SWEDEN			
	C1	C2	C2north	C3	C4	1	2a	2b	3
Sugar beet, EUR/ha	354	390	390	-	-				
Potatoes for starch, EUR/ha	177	213	213						
Cereals									
- barley, oats, EUR/ha		36	36	70	137				
- other , EUR/ha	140	176	176						
Horticulture under shelter									
- flowers 7 months, EUR/m^2	14	14	14	14	14				
- flowers 2-7 months, EUR/m^2	7	7	7	7	7				
Field scale, EUR/ha	416	452	452	486	553				
- vegetables									
- apples	163	199	199						
- soft fruit and vegetables						307	307	307	199
Payment per UAA, EUR/ha		36	36	70	137				
Young farmers, EUR/ha	36	36	36	36	36				

Sources: (95/196/EC, 2000/405/EC, 2002/404/EC and Ministry of Agriculture and Forestry 1996, 2001, 2006), (97/557/EC, 2000/411/EC and 2004/291/EC)

In the same way as for animal production, upper budget restrictions have been set in order to counteract an increase in production. Realization of the production in 2005 has been in all cases well below 100 per cent of the upper limits (Table 2.10). As for the limits of production factors in tons and hectares, the reference quantities have not been exceeded in 2005, and there has been a clear negative trend in the utilization of the permitted aid mainly for the development of the farm structure (see the chapter 3, description of the structural trends).

Table 2.10. Reference amount of the Nordic aid (MEUR) and utilized share (per cent) of the upper limits in 1995 and 2005.

Crop production	Year	FINLAND		SWEDEN	
		Reference level of support, MEUR	Utilized share %	Reference level of support, MEUR	Utilized share %
Sugar beet	1995 2005	0.34 1.34	85 28		
Potatoes for starch	1995 2005	0.32 1.24	141 52		
Cereals and other crop	1995 2005	9.54 15.14	72 85		
Horticulture under permanent shelter	1995 2005	- 24.69	 87		
Field scale vegetables and apples	1995 2005	0.03 0.90	 71		
Soft fruits and vegetables	1995 2005			0.22 0.22	86 62
Payment per ha	1995 2005	26.47 27.87	66 59		
Young farmers	1995 2005	80.00 16.66	20 76		

Sources: (95/196/EC, 2000/405/EC, 2002/404/EC and Ministry of Agriculture and Forestry 1996, 2001, 2006), (97/557/EC, 20007411/EC and 2004/291/EC).

2.4.4 Aid for the young farmers

In Finland the Nordic Aid for the young farmers has totalled in 1995 about 16 MEUR and in 2005 12.5 MEUR. The aid has been about 75% of the maximum limit in the Nordic Aid scheme (Table 2.6 above). In the Nordic Aid area, about 500-700 farm successions have been implemented annually, which accounts for about 1.3-1.8 % of the number of farms in the area. During the last few years, the number of farm successions has varied annually between 800 and 1,200 in the whole country.

2.4.5 Reindeers - reference levels and utilized aid

In Finland, support for reindeers as a part of Nordic Aid Scheme is paid in areas C3 and C4. The aid paid per animal was in 1995 about 24 EUR, in 2000 it was 19 EUR, and in 2005 it was 22.5 EUR per head. Also in Sweden some support is paid to reindeer breeding, but not as a part of Nordic Aid Scheme (see the chapter 4). The share of the total amount of aid has been well below 100 % of the upper limit in every year, and so has been also the share of the number of heads (Table 2.11).

Table 2.11. Reference amount of the Nordic aid (MEUR), number of reindeers and utilized shares in 1995, 2000 and 2005.

Reindeers	FINLAND				
	Year	Reference level amount of aid	Utilized share %	Reference level number of heads	Utilized share %
	1995	6.2	49	229,000	68
	2000	6.2	46	229,000	67
	2005	6.16	57	229,000	68

Sources: 95/196/EC, 2000/405/EC, 2002/404/EC and Ministry of Agriculture and Forestry 1996, 2001, 2006.

2.4.6 Storage - reference levels and utilized aid

Aid for storage is paid only in Finland. The maximum support is limited to 0.34 EUR/kg for cloudberries, 0.10 EUR/kg for other wild berries and 0.42 EUR/kg for wild mushrooms (2002/404/EC). Support for storages with heath control has been at maximum 20 EUR/m^3 and support without heath control 13 EUR/ m^3 per year in sub-regions C1-C4. From the year 2002, the support is 20.2 EUR/m^3 for the heated storages and 13.5 EUR/m^3 for the storages without heating. Upper limits and realization of the support is presented in Table 2.12. The utilized share of permitted amount is every year well below 100%.

Table 2.12. Reference amount (MEUR) and utilized share of the aid for storage in 1995, 2000 and 2005.

Storage	FINLAND		
	Year	Reference amount of support, MEUR	Utilized share %
Aid for storage, of which	1995	2.52	0
	2000	2.52	42
	2005	2.86	35
— wild berries and mushrooms, kg/year	1995 2000 2005	0.34	44

Sources: 95/196/EC, 2000/405/EC, 2002/404/EC and Ministry of Agriculture and Forestry 1996, 2001, 2006.

2.4.7 Transportation of meat and milk - reference levels and utilized aid

Aid for transportation is paid for milk and meat production in the northernmost parts of Finland. In Sweden the aid for transportation is paid only for milk. The amount of support depends on the amounts of the production transported from the farms to the dairies and in Finland also to the slaughterhouses (Table 2.13).

Table 2.13. Unit aid reference level (MEUR) and utilized share of support for transportation, 1995, 2000 and 2005.

Transport	Year	Reference amount of support, MEUR	Utilized share %
FINLAND: Milk and meat	1995	2.27	73
	2000	2.27	66
	2005	2.27	95
SWEDEN: Milk	1995	1.87	104
	2000	2.20	95
	2005	2.20	89

Sources: (95/196/EC, 2000/405/EC, 2002/404/EC and Ministry of Agriculture and Forestry 1996, 2001, 2006), (97/557/EC, 20007411/EC and 2004/291/EC).

2.5 Preconditions per product and amendments to the Nordic Aid scheme

2.5.1 Preconditions

The main features of the preconditions for the Nordic Aid scheme in each product line in 2005 have been examined in the following. Most notable amendments which have been implemented during the period in the scheme have been examined in subsequent section.

General conditions: To be eligible for the Nordic aid a farmer has to have at least three hectares of agricultural land (arable and pastureland including fallow land) in active use. For the production of vegetables and berries half of hectare is the minimum. The farmer shall be below the age of 65. If the Nordic Aid is applied for the animal production, a farmer has to have the financial responsibility for the animals. For the animal production Nordic aid is granted on the basis of production factors per livestock unit or animal head, except for cow's milk which is paid per kg on the basis of milk quota. Minimum amount of the aid per farm is 55 EUR in Sweden and 84 EUR in Finland. There is a limit for the number of livestock units per farm up to which the Nordic aid is paid. In Finland the upper limit per farm is valid for all production lines except laying hens which has limitations of its own. The limits are as follows in the Finnish sub-areas: C2P 300 livestock units, C3 200 livestock units and C4 100 livestock units.

Aid for transport of milk: The aid is paid to dairies in both countries. In Sweden all dairies in the area of Nordic aid are allowed to receive the aid, whereas in Finland only milk collected in the north-east area (Kainuu and Koillismaa) and in Lapland is eligible for the aid.

Aid for transport of meat: The aid is paid to the slaughter houses only in Finland. Aid is paid only for the meat produced in Province of Lapland and collected by the local slaughter houses.

Milk production: In Sweden, the milk producer shall have at least two cows, and the milk quantity shall be within the producer's milk quota, *i.e.* the reference quantity. Aid is granted for the milk quantity delivered to the dairy or sold within the producers' quota for direct marketing to consumers. In Finland the aid is granted only for the milk delivered to the dairy. From 2005 the aid has been paid for the milk produced and sold up to the farms' milk quota. Until 2005 the aid was paid also for the milk produced and sold over the milk quota of the farm, provided the national aggregated milk quota was not exceeded. If the national quota was exceeded, an equal share of the milk production on the farms with too small quotas was left out of the aid.

Bovine animals: The Nordic aid is paid for suckler cows, suckler cow heifers older than 8 months and male bovine animals older than 6 months per livestock unit as well as for heifers for slaughter. The aid is paid once per animal. The total number of animals on the farm is limited to a stocking density of two livestock units (LU) per hectare of forage area. This limit was changed at 1.1.2006 in Finland, when the single farm payment of the CAP scheme was established.

Ewes and she-goats: The aid is paid per livestock unit in Finland and per number of animals in Sweden. Aid for she-goats is granted for animals older than one year or after the first lactation period. The farmer has to have at least five goats to be eligible for the aid, and the animals shall be kept on the farm at least for two months.

Swine: The aid is paid per livestock unit in Finland and per number of animals in Sweden. To be eligible for the aid, slaughter pigs have to be kept on the same sub-region at least for three months.

Aid is paid for a minimum of 40 and a maximum of 2,500 slaughter pigs per farmer. To be eligible for the aid for piglet production the farmer must have at least two sows. Aid is given to a maximum of 120 sows per farmer. The animals must be kept on the farm at least for two months.

Poultry: For laying hens the aid is granted in Sweden per replacement hen, once in a lifetime. Aid is granted only for the number of replaced hens that exceeds 1,000 per calendar year. In Finland the aid is paid per livestock unit. Limitations are in sub-areas C1 - C2north 260 livestock units, C3 200 livestock units and C4 100 livestock units.

Reindeers: The aid is paid only in Finland in sub-areas C3 and C4 on the basis of the number of reindeers. Aid is paid for reindeers kept over the winter in herds of at least the minimum size required for the support. The minimum herd size eligible for the support has grown from 25 in 1995 to 50 in 2000 and to 80 in 2005.

Aid for young farmers: The aid is granted in the whole area C in Finland on the basis of cultivated hectares including the fallows. Either the farmer or the spouse has to be younger than 41 years at the beginning of the calendar year. Preconditions for the aid concern the definitions for protection of environment according to the CAP support scheme.

Potatoes: The Nordic Aid per hectare is paid to starch potatoes in Finland.

Cereals and other arable crops: The aid is paid for barley, oats, mixed cereals per hectare in Finland in sub-regions C2-C4 (so called general hectare aid). For the other cereals and crops (incl. horticulture) as well as for the field area which is fallowed according to the CAP support scheme, the aid is paid per hectare in sub-regions C1, C2 and C2north.

Payment per ha UAA: The aid is paid for the average number of hectares in sub-regions C2-C4 which, in the period 1989 to 1991, were covered by arable crops or were left as fallow (in accordance of the compensatory scheme, see Article 2(2) of Council Regulation (EC) No 1251/1999 (Commission decision 2002/404/EC).

Aid for greenhouses: The aid is paid to greenhouses with a total area exceeding 300 m^2. For the greenhouses, which are in use annually 2-7 months, the aid is defined on the basis of their area used in cultivation, and for the greenhouses used over 7 months per year on the basis of growing period of different plants. All generally cultivated vegetables and ornamental plants and their seedlings in Finland are eligible for the aid.

Vegetables and apples: The aid is paid per hectare of vegetables in sub-regions C1-C4 and apples in sub-region C1 in Finland.

Soft fruit and vegetables: The aid is paid per hectare allocated to these crops. In Sweden the individual parcels that can be accounted for into the total aid area, have to be at least 0.1 hectares, and the cultivated total area allocated to these crops shall be at least 0.3 hectares. In Finland the corresponding minimum size is 0.5 hectares.

Aid for storages of horticultural products: The aid is granted to the selected products of the perishable production and to the production based on the agreements between the producers and the processing industry. The aid is paid according to the volume of products in storage between October and December. The aid is higher for storages with mechanical heath control than for other storages.

Aid for storages of wild berries and mushrooms: The aid is paid according to the quantities of products in storages in the end of June. The products can be stored as frozen, dried, puree or juice. Mushrooms can also be salted. Aid for storage is defined per kilos held in storage, separately for arctic berries, other wild berries and for mushrooms.

2.5.2 Amendments to the Aid scheme

The measures under the Nordic Aid scheme were approved by Commission Decision 1995/196/EC for Finland and by Commission Decision 1996/228/EC for Sweden (Table 2.14). Until 2005 a large number of amendments have been made to the Nordic Aid Scheme, although some of them deal with minor details.

Table 2.14. Legal documents for the Nordic Aid scheme.

FINLAND		SWEDEN	
Decision		Decision	
1995/196/EC	Approval of the scheme	1996/228/EC	Approval of the scheme
1997/297/EC	Amending Decision 95/196/EC	97/557/EC	Amending Decision 1996/228/EC correction of minor errors
2000/405/EC	Amending Decision 95/196/EC	2000/411/EC	Amending Decision 1996/228/EC
2002/404/EC	Remuneration of 95/196/EC	2004/291/EC	Amending Decision 1996/228/EC

Starting with Finland, the first amendment, Decision 97/279/EU, concerns the production of starch potato and the aid for cow's milk in particular. An increase in the area of potatoes for starch production was approved and with respect of cow's milk it was decided that within the limit of the reference quantity for the regions concerned, aid for milk in the northern regions may be paid to each producer according the realized milk production. In other words, unused reference quantities may be reallocated to those producers exceeding their reference quota during the 12-month period concerned.

The next amendment, Decision 2000/405/EC, mainly concern animal production and changes after 1999; the Nordic Aid was balanced between the sub-areas and raised on the longstanding level. For the poultry sector some flexibility in the number of livestock units and the aid payable was approved because of increased consumption of poultry. For the she-goats the aid was paid per livestock unit instead of partially paying for the goat milk production. According to Decision 1995/196/EC the upper limit for the number of suckler cows and male bovines per farm was 90 animals per farm, but as "Finland had decided not to apply this upper limit, it appeared appropriate to remove it" according to the Decision. For suckler cows and male bovines the livestock density of two livestock units per hectare of forage area was applied as an upper limit of the total number of animals.

As the Decision 95/196/EC had been substantially amended a number of times, it was remunerated with a new decision, Decision 2002/404/EC. One of the most essential changes stated in Decision 2002/404/EC concerned production control. The aid was not any longer granted on the basis of the quantities produced, but due to the common organization of the markets (CMO) on the basis of production factors (livestock units or hectares) with the total limits laid down in the new decision. However, some flexibility is still allowed in the number of units covered within certain production sectors or sub-sectors to reflect the change in consumption patterns since this is in conformity with the principles of the aid scheme. In respect of cow's milk, any increase in production is controlled by the quota system in each sub-region and individual farm. The unused reference quantities, 'SLOM' quantities are taken into account in the allocation of the milk quantities as in the earlier

amendments. A transitional period of three years was allowed for the changes needed and adjustment to the EU policy. From the beginning of 2005, the Nordic Aid is paid only for the maximum reference quantity of sold milk in an individual farm.

In Sweden, the Nordic aid scheme has been amended three times. The first amendment, Decision 97/557/EC, corrected some material errors, allowed aid for milk at farm level to be paid to the total amount of milk in accordance of Article 2(1) of Regulation (EEC) No 3950/92 and increased slightly the aid for pig meat (as a result of more accurate data). In the second amendment, Decision 2000/411/EC, some of the support to the Swedish milk production was transferred to the milk transport aid instead, and the reference level for support to milk production was consequently decreased, from 29.77 MEUR to 29.67 MEUR (retaining total budget neutrality). In addition, the annual reporting deadline was postponed from April to June and some flexibility was allowed between the swine and egg sectors meaning that when calculating livestock units eligible for support the sectors got a common reference level.

In Decision 2004/291/EC, the total reference amount was increased to 34.4 MEUR. The support to piglets was subsequently increased in all sub-regions and the support to milk production and goats was increased in sub-region 1. The reference level for production (kg or heads) was abolished, and from this date and on only a reference level in MEUR per year is valid in Sweden.

3 Structure and production of the beneficiaries of Nordic Aid

In this section, the farm structure and its development within the Nordic Aid area is described both at an aggregate level and according to production lines and farm size, where farm size is measured by the farm's arable land area and by the number of livestock units maintained on the farm.[2] The structural statistics are based on so called active farm, i.e. farms of a certain minimum size actively engaged in agriculture. In Finland, an active farm is defined as having at least one hectare of land in agricultural use, while an active farm in Sweden is defined to have at least two hectares of arable land in active use. Only the development of production lines that are covered by Nordic Aid is outlined, meaning that the development of for example reindeer breeding is only given for Finland since Sweden has no Nordic Aid to reindeers. Since milk and beef production are the most important production lines in the Nordic Aid area and transport support is given within Nordic Aid framework for milk and meat, the structural development for dairies and slaughter houses are also briefly outlined. The section begins, though, with a description of the general economic development in the aid area and the climatic conditions prevailing in the area.

3.1 Overview of the rural situation in the Nordic Aid area

3.1.1 Climatic and agricultural conditions

Sweden is one of the largest countries in Europe. Being extended in the north-south dimension with roughly half of the land area covered by forest and more than a third by mountains, marshland and lakes, the conditions for agriculture vary substantially between areas; especially between the northern and southern parts of the country. Most of the farms and the agricultural land are situated in the southern and central parts, where fertile plains are found and the climatic conditions are the most favorable.

Approximately 90% of the land area in Finland is covered by forest and marshland. Finland is a smaller country than Sweden and do not extend as far south as Sweden do, meaning that a major share of the country's agricultural land is located north of the 60nd parallel. Therefore, the difference between north and south is less pronounced in Finland although the conditions for farming are notably less favorable in the Nordic Aid area compared with the rest of the country. In both countries the growing season is shorter, the average temperature lower and distances longer in the Nordic Aid area than in the rest of the country.

The main physical factors underlying the agricultural production conditions in the Nordic Aid area, with regards to the feasible crop mix, yields and production costs, are the length of the thermal growing season and the effective temperature sum (Figures 3.1 and 3.2). The thermal growing season lasts at most 180 days on mainland Finland. In Sweden, the 180-day growing season curve runs from the heights of Gävle through the north part of the Great Lakes region to Norway in the vicinity of Oslo. In the northernmost parts of the Nordic Aid area the length of the growing season is 2-3 months. The differences in growing seasons between the northern and southern parts of the countries are notable. For instance, the growing season is 100 days shorter in the north of Sweden (Karesuando) than in the south (Lund). In Finland the growing season is 165-180 days in the southern parts and 110-145 in the northern parts of the country. As a comparison, the average growing season in central Europe is 260 days. The short summer season is however intense, with many effective hours of sun.

[2] The definition of livestock units is based on Commission Decision 1995/196/EC and 2002/404/EC.

In the Nordic Aid area, the effective temperature sum is less than 1,200^{o} C and it decreases quickly from south to the north. Elsewhere in Europe, the curves for effective temperature sum below 1,200 °C are found only in the northern parts and mountains of Scotland, where the growing season, however, is longer than in the Nordic Aid area.

In the densely forested countries, farming and forestry are often combined. Farming is also complemented by other income sources making part-time farming common. Nearly all farms in both countries are family farms and most of the work is done by the family members.

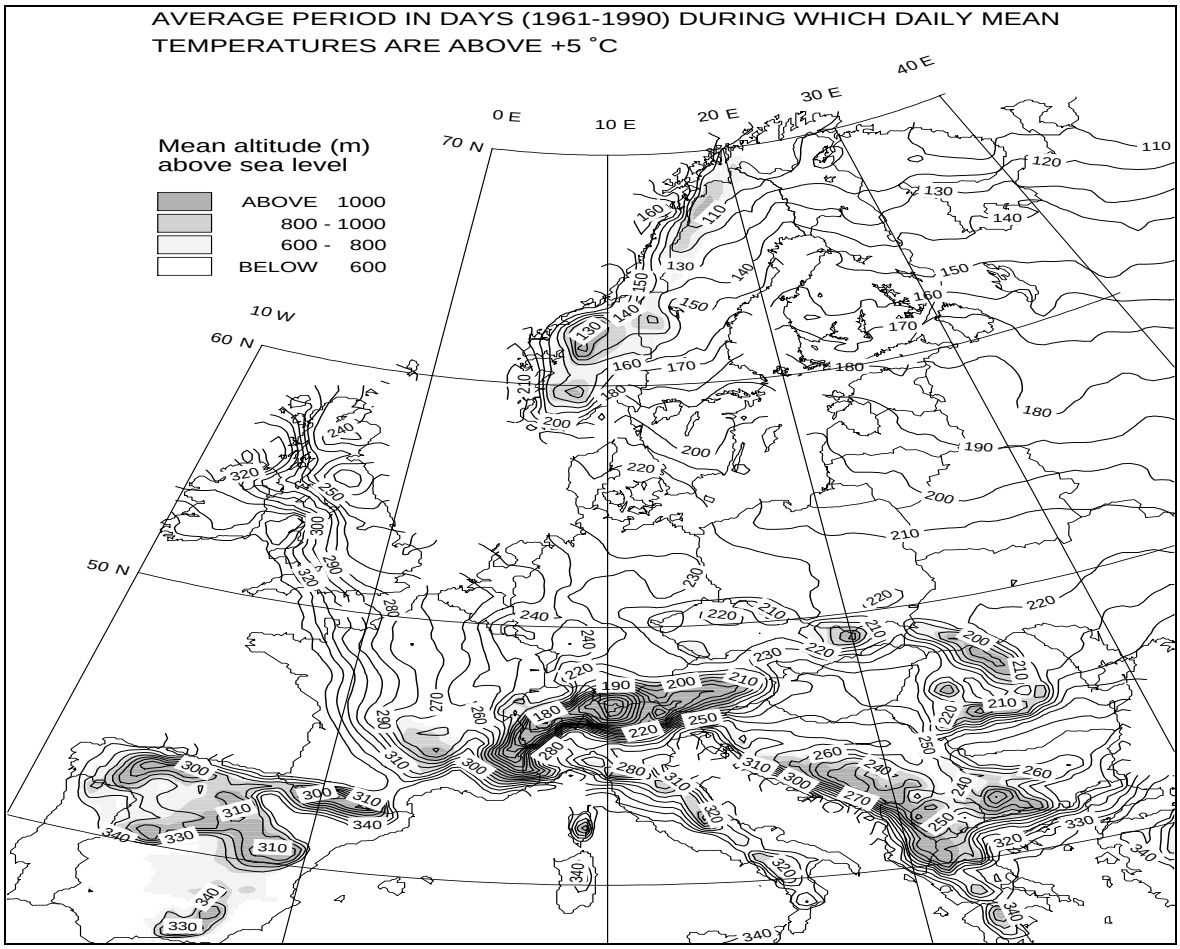


Figure 3.1. Length of the thermal growing season in different areas of the European Union. (Finnish Meteorological Institute 2007, MTT 2007).

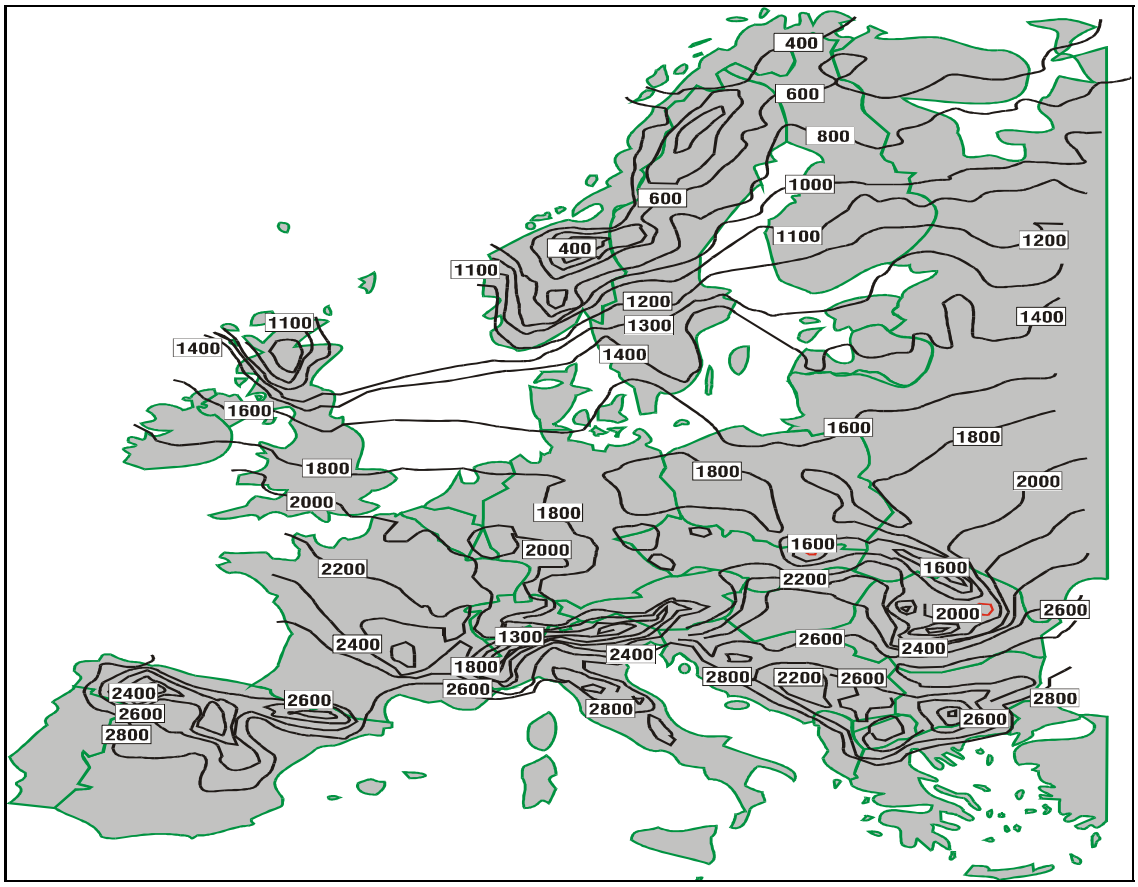


Figure 3.2. The effective temperature sum of growing season in the European Union area. (Finnish Meteorological Institute 2007, MTT 2007).

3.1.2 Population density

Finland and Sweden both combine small populations with wide areas. The population is unevenly scattered and mainly concentrated to cities in the south while the northern parts of the countries are very sparsely populated; in Finland also the eastern part has a low population density. The northern half of Sweden has an average density of 2,2 inhabitants/km^2 while more than 80% of the land area in Finland has a density below 5 inhabitants/km^2. In comparison, the average EU population density is 115 inhabitants/km^2.

3.1.3 General economic development trends

In both Finland and Sweden, the population has been increasing in the urban areas and urban-adjacent rural areas while in the rural areas and especially in the northern sparsely populated rural areas the population is diminishing. This is also true for the eastern parts of Finland. This is the continuation of a long trend, and although net migration has been negative for a long time of period, the current decline is also due to low birth rates and an ageing population. The situation is particularly negative in the remote rural areas. In the rural areas also the share of women in the population is smaller than in the countries on average. The disappearance of women from the countryside weakens the future prospects, viability and development possibilities in the rural areas.

Due to the general economic conditions, jobs in Finland and Sweden in the primary production have decreased considerably, while the service sector is becoming an important employer. In the rural areas most of the jobs are in the production activities: agriculture, forestry and fishing, but the service sector is growing in the countryside as well. Employment opportunities are moving to the large centres, the remote rural areas and other areas with undiversified production have been losing both jobs and population. Rates of unemployment are higher in the sparsely populated rural areas than in other parts of the countries. The population in the urban areas has higher income/capita than the population in rural areas. The northern most counties in Sweden are found amongst the counties with the lowest average income per capita in Sweden, while internal differences in incomes are growing Finland.

When a severe recession hit Finland at the beginning of the 1990s, the number of jobs fell fairly evenly throughout the country and reached its lowest levels in 1994 when there were, on average, 20% fewer jobs than in 1990. Since the crisis the recovery of the Finnish economy has been fast. Helsinki region and the growth centers were the most rapid areas to recover from the recession. The number of jobs in the growth centres reached the 1990 level in 2000 and has been rising rather steadily during past years. The number of jobs in regional centres and industrial centres has also been rising since 1993 and had, on average, reached 90 per cent of the 1990 level. In rural service centres and especially in sparsely populated rural areas the situation has however remained at its worst. The number of jobs in sparsely populated rural areas has remained under 80% per cent and in rural service centers under 85% of the 1990 level.

The position of Finland in the north-eastern corner of the EU has influenced the economic development of especially eastern Finland a great deal. Most of eastern Finland is sparsely populated, and it is lagging behind the other parts of the country, measured by almost all socio-economic indicators. Economic development over the period 1995-2005 has been the poorest in eastern Finland, clearly below the average in the whole country. Southern Finland is by far the leader in economic development, while both western and especially northern Finland are below the national average.

Measured by all indicators, the economic viability of eastern Finland is declining. Eastern Finland is losing the most in the population numbers, while in northern Finland the population trend is more even. Table 3.1 shows the regionally differentiating trends. The share of over 65-year-olds is also the highest (18%) in eastern Finland, while in northern Finland it is the lowest (14%) and below the average in the whole country (15.3%). Furthermore, the level in the employed labour force is the lowest in eastern Finland, while northern Finland is close to the national average.

The development indicators for northern Finland are therefore somewhat more positive; however, both the settlement and industrial basis are very thin. The more stable situation in northern Finland is mainly due to the growth of the Oulu region in Northern Ostrobothnia with its thriving IT-industry, which makes the statistics more positive, while the situation is much weaker in the other northern regions. To conclude, both eastern and northern Finland represents the large, sparsely populated rural regions faced with very difficult structural change.

Table 3.1. Development of the rate of unemployment and net migration in 1995, 2000 and 2005 in the provinces in sub-region C from south to north.

	Year	Southern and Middle Ostro-bothnia	Middle F-land and South. Savo	Northern Savo and Northern Karelia	Northern Ostro-bothnia	Kainuu	Lapland
Rate of unemployment in the area:							
	1995	13-16	17-19	18-20	17	22	21
	2000	8-12	12-14	12-15	12	19	18
	2005	6-8	10-12	10-13	10	17	14
Net migration:							
	1995	-2,421	-902	-1,670	-33	-869	-1,527
	2000	-2,308	-809	-2,365	787	-1,232	-2,703
	2005	-1,149	-621	-1,394	-54	-771	-1,014

Source: Statistics Finland

Turning to Sweden, the economic active population is in an overall decline in the sub-regions, except in the rural areas close to urban centers (Table 3.2). The sparsely populated rural areas in the sub-regions experience a faster decline than corresponding rural areas in the rest of the country. Both small and large cities in the aid sub-regions experience a decline in population aged 16-64, although the decline is most prominent in the small cities. Hence, both the rural areas and the small cities in the sub-regions experience a diminishing economic active population.

Table 3.2. Economic active population (age 16-64) per area category.

	Individuals in 1995		% change 1995-2004	
	Sub-region 1-3	Rest of Sweden	Sub-region 1-3	Rest of Sweden
Sparsely populated rural areas	178,506	178,771	-5.8	-1.0
Urban-adjacent rural areas	182,602	1.355,936	0.0	5.4
Cities with 1 000-10 000 inhabitants	131,608	153,137	-9.2	-5.0
Large cities	278,607	2.672,106	-0.8	7.3
Sum	771,323	4.359,950	-3.2	5.9

Source: SJV 2006

Also employment growth lag in the Nordic Aid sub-regions compared with the rest of the country as can be (Table 3.3). Over the period, the employment growth in the rest of Sweden amounted to 10% compared to 1% in the sub-regions. The decline in employment in agriculture, forest, fishing and hunting is, however, slightly slower in the Nordic sub-regions than in the rest of the country, -19% and -20% respectively, over the 1995-2003 period.

Table 3.3. Employment growth in sub-region 1–3 compared with the rest of Sweden.

Variables	Sub-region 1–3	Rest of Sweden
Employment growth 1995 – 2004 %	1	10
Employment growth in agriculture, forest, fishing and hunting 1995 – 2003 %	-19	-20

Souce: SJV (2006)

3.2 Development of farm structure and production in the Nordic Aid area

3.2.1 Number of farms and hectares of arable land

In Sweden, approximately 20% of the number of farms and 10% of the agricultural land is located in the Nordic Aid sub-regions. In Finland, the corresponding shares are about 60% for farms and 50% for land. One reason why the Nordic Aid area accounts for a larger share of farms than of arable land compared with the rest of the countries is that the agricultural landscape in the northern parts to a greater extent consists of small farms where animal husbandry dominates, which is not as common in other areas of Finland and Sweden. The main share of the farms in the Nordic Aid area is located in Finland. In 1995, about three quarters of all farms in the Nordic Aid area were located in the Finnish sub-regions, the share being slightly higher in 2004 (Table 3.4).

The total number of farms in the Nordic Aid area was about 77,200 in 1995 and it decreased to approximately 52,000 in 2004. That is, the number of farms has been reduced by a third during a nine year period with an average annual exit rate of 4.3%. In the Finnish regions, the decreasing trend continued in the statistics further between 2004 and 2005, but in the Swedish regions the installation of the Single Farm payment in CAP turned the trend on farm numbers, as recorded in the statistics temporarily upwards.[3] Therefore, the figures concerning the total development of the farm numbers over the evaluation period of 1995-2005 is augmented for the Swedish regions by the figures concerning the period of 1995-2004.

Both in Finland and Sweden, the number of farms has decreased faster in the Nordic Aid area than elsewhere in the countries. In Finland the average annual rate of decline rate has been -3.8% in the Nordic Aid sub-regions and it has exceeded the corresponding rate of whole country by 0.8%-points. In Sweden the annual rate of decline rate has been -6.0% in the Nordic Aid sub-regions and the difference to the corresponding rate of decline rate in the whole country has been 2.3%-points (Table 3.4).

Similar tendency applies also within the Nordic Aid area such that the number of farms has decreased faster in the north than in the south. More than half of the farms quit production in the Swedish sub-region 1 and Finnish sub-region C3 during the ten year period of 1995-2005 and the magnitude of the annual exit rates exceeded in these areas 8%. The northern Finnish sub-region C4, with a relatively low farming population, makes an exception to the spatial tendencies, because the number of farms has decreased there at a slower rate than in other areas (Table 3.4).

As the share of farms has been falling more rapidly in the Nordic Aid areas than in the rest of the country in both Finland and Sweden, the share of farms receiving Nordic Aid to all farms in both countries combined has decreased; from 41% in 1995 to 37% in 2004. It has been characteristic for the development that small farms have quit livestock production and turned either into part-time crop farming, or traded their land through leasing or selling to larger farms.

[3] The Single Farm payment in the 2003 reform led to a structural break in the Swedish data series on farm numbers and arable land areas. More holdings applied for support and these new entrants in the aid scheme were often small-sized holdings. This led to an increase in the total number of agricultural holdings and an increase in the area of agricultural land. Therefore, the farm data for 2005 are not wholly comparable with earlier years when looking at the structural development. Finland implemented the 2003 reform one year later than Sweden and therefore do not have a corresponding statistical break for 2005.

Table 3.4. Number of farms in the Nordic aid area and in the country as a whole in Finland and Sweden, 1995-2005.

FINLAND	Sub-region						Total of Finland	C1-C4 as % total Finland
Year /Area	C1	C2	C2north	C3	C4	C1-C4		
1995	23,823	25,896	3,207	4,392	798	58,116	93,847	62
2000	18,984	20,675	2,363	3,299	741	46,062	80,081	57
2004	17,134	18,942	2,047	2,148	661	40,932	72,056	57
2005	16,629	18,371	1,972	1,886	619	39,477	69,134	57
2005 of 1995, %	70	71	61	43	78	67	74	
Annual rate of decline rate %	3.5	3.4	4.7	8.1	2.5	3.8	3.0	

SWEDEN		Sub-region					Total of Sweden	1-3 as % of total Sweden
Year /Area	1-3 as % of total S&F	1	2a	2b	3	1–3		
1995	25	2,937	6,859	4,810	4,764	19,370	92,546	20
2000	27	1,779	5,093	3,682	3,439	13,993	78,262	18
2004	21	1,374	4,010	2,786	2,810	10,980	65,801	17
2005	27	2,106	5,179	3,726	3,661	14,672	74,863	20
2004 of 1995 %		47	58	58	63	57	71	
Annual rate of decline rate %		8.1	5.8	5.9	1.8	6.0	3.7	
2005 of 1995 %		72	76	77	100	77	81	
Annual rate of decline rate %		3.3	2.8	2.5	0.0	2.6	2.1	

Sources: Tike 2006, SJV 2006, SJV 2003

Turning to agricultural land, it can be seen that the fall in land is less than the reduction in number of farms over the time period, reflecting that the remaining farms have become larger. The average farm size in the region grew from 19 to 31 hectares in the Nordic Aid area. Sweden, in total, shows a very small decrease in the amount of agricultural land: 98% of the area cultivated in 1995 still remains in 2004 (Table 3.5). In sub-regions 1 and 2b, around 15% of the agricultural land has been withdrawn since 1995 to 2004. The reduction in sub-region 2a and 3 is smaller, 7% and 5% respectively. In Finland, the area of agricultural land has increased over the time period, both in the country as a whole and in the sub-regions, the exception being C2north which shows a minor decrease of 1%. In addition, sub-region C2 displays a larger increase in agricultural land, 9%, than the country as a whole, 5%.

Table 3.5. Agricultural land (ha) in the Nordic Aid area and the country as a whole in Sweden and Finland, 1995-2005.

SWEDEN	Sub-region					Total of Sweden	1-3 as % of total Sweden
Year /Area	1	2a	2b	3	1–3		
1995	41,993	149,613	98,632	84,256	374,494	3,258,796	11
2000	32,832	135,772	87,568	79,538	335,710	3,181,164	11
2004	35,413	138,865	85,052	79,912	339,242	3,184,021	11
2005	41,171	145,051	89,125	84,364	359,711	3,215,582	11
2004 of 1995 %	84	93	86	95	91	98	

FINLAND	Sub-region						Total of Finland	C1-C4 as % total Finland
Year /Area	C1	C2	C2north	C3	C4	C1-C4		
1995	459,998	534,846	55,091	69,047	8,905	1,127,887	2,153,304	52
2000	450,937	531,939	50,279	64,876	8,911	1,106,942	2,205,203	50
2005	460,385	584,804	54,631	71,487	10,020	1,181,327	2,257,860	52
2005 of 1995 %	100	109	99	104	113	105	105	

Source: SJV 2006, SJV 2003, Tike 2006

Altogether, the Nordic Aid area has experienced a strong decline in the number of farms during the time period but roughly maintained the amount of agricultural land in total, with a reduction of land in the Swedish sub-regions and an increase in Finland. As a consequence, the average size of the farms in the Nordic Aid area has increased.

3.2.2 Milk production

Nordic Aid is granted for milk production in both Finland and Sweden.

Farm structure

In 1995, the number of dairy farms in the Nordic Aid area was 26,980 and in 2005 it has decreased to 14,063. In other words, just half of the number of farms remains. The structural change has been pronounced; the number of milk farms with less than 50 cows has decreased by 50%, while the number of larger milk farms has increased nearly 6 fold. The majority of the dairy farms in the Nordic Aid area are located in the Finnish sub-regions (Table 3.6); there were more than 12,000 dairy farms in Finland and less than 2,000 dairy farms in Sweden in 2005.

Table 3.6. The number of dairy farms according to farm size in the Nordic Aid area and in Finland and Sweden, 1995 and 2005.

SWEDEN AND FINLAND	Sub-region 1-3 Sweden	Sub-region C1-C4 Finland	Nordic Aid area 1-3 C1-C4	Sub-region 1-3 of total in Sweden %	Sub-region C1-C4 of total in Finland %	Nordic of total in S&F %
Under 50 cows						
1995	3,446	23,429	26,875	22	76	57
2005	1,421	12,029	13,450	22	78	61
Over 50 cows						
1995	92	13	105	5	46	6
2005	307	306	613	12	69	20
Total						
1995	3,538	23,442	26,980	20	76	55
2005	1,728	12,335	14,063	19	77	56
2005 of 1995, %	49	53	52			

Sources: Tike 2006; SJV 2007

Even if the herd size has been increasing, a small herd size is still characteristic for the Nordic Aid area dairy sector. The average herd size across the Nordic Aid area was in 1995 13.4 and in 2005 21.2 cows per farm. Further, the number of very large herds has remained relatively small. In 2005 the number of the milk farms with more than 50 cows was 613 and their share of all milk farms in the Nordic Aid area was only 4.4%. In the southern parts of the countries, the share of the milk farms with more than 50 cows was in Sweden 30.5% and in Finland 3.9% of all milk farms in that area in 2005.

Within the Nordic Aid area, the herd size decreases from southern sub-regions to the northernmost sub-regions (Tables 3.7.a-b). The similar tendency also applies outside the Nordic Aid area such that the average herd size is substantially smaller in the Nordic Aid area compared to the southern production areas in both Sweden and Finland. Also, the dairy herds are larger in Swedish sub-regions as compared to the sub-regions located in Finland. In 2005, the average herd size in the Swedish sub-regions was 33.3 cows whereas the corresponding average in Finnish sub-regions was 19.5 cows (Tables 3.7.b).

Table 3.7.a. Average herd size in milk production in the Nordic Aid area and in southern Sweden, 1995 and 2004.

SWEDEN	Sub-region, cows/ farm					Southern
Year/area	1	2a	2b	3	Sum 1-3	Sweden
1995	14.6	22.3	21.2	19.5	20.3	28.9
2004	26.1	35.2	34.5	31.6	33.3	47.0

Source: SJV 2007

Table 3.7.b .Average herd size in milk production in the Nordic Aid area and in the southern parts of Sweden and Finland, 1995 and 2004, 2005.

SWEDEN AND FINLAND	Sub-region 1-3 Sweden	Sub-region C1-C4 Finland	Southern Sweden	Southern Finland
1995	20.3	12.3	28.9	12.6
2004	33.3	n.a.	47.0	n.a.
2005	n.a.	19.5	n.a.	19.8

Sources: SJV 2007, Tike 2006

Production

The Nordic Aid area has a significant role in milk production of Sweden and Finland, accounting together for 41% of the total milk production of these countries. In Finland, more than three quarters of the total milk production (77%) is concentrated in the Nordic aid areas. In Sweden the corresponding share is 14%. Most of the milk production amongst the Nordic Aid regions is located in the Finnish sub-regions that account for 81% of the total milk production in these areas.

The aggregate milk production in the Nordic Aid area was 2,183 million tons in 1997 and it increased to 2,257 million tons in 2005. The production increased slightly between the years 1997 and 2000. Thereafter, the aggregate production volumes have remained stable. Over all, the aggregate production of milk across all Nordic Aid sub-regions has been maintained at the pre-accession levels of 1995. In the Finnish sub-regions the production has been stable, whereas the production has decreased slightly in the Swedish sub-areas.

The development of milk production within the Finnish and Swedish sub-regions has similar tendencies. The northern most sub-regions, i.e. region 1 in Sweden and region C4 in Finland, have lost production volumes, as production has been moving gradually towards the south. Particularly, within the Finnish sub-regions, milk production has been concentrating to sub-region C2 (+14%), where milk production was already concentrated in 1995. Correspondingly, milk production has increased in sub-region 2a in Sweden. Also, the southernmost region in Sweden, sub-region 3, has lost production volumes (Table 3.8 a and b).

Table 3.8.a. Supported milk production (tons) in the Nordic Aid area and in the whole country in Finland in 1995-2005.

FINLAND	Sub-regions, milk tons					Sum	Total in Finland
Year/area	C1	C2	C2north	C3	C4	C1-C4	Mill. tons
1995	517,153[1)]	903,369[1)]	105,745	168,915	23,750	1,718,932	2.363
2000	526,961	1,018,021	104,820	173,331	23,218	1,846,351	2.440
2004	503,797	1,021,068	104,450	169,477	20,980	1,819,771	2.367
2005	500,808	1,029,627	104,209	170,618	20,577	1,825,840	2.358
2005 of 1995, %	97	114	99	101	87	106	100

[1)] Incl. goat milk in C1 area 105,5 l and C2 area 35,2 l.

Sources: 95/196/EC, 2000/405/EC, 2002/404/EC, Ministry of Agriculture and Forestry, Tike 2007.

Table 3.8.b. Supported milk production (tons) in the Nordic Aid area and in the whole Sweden 1997-2005.

SWEDEN	Sub-regions, milk tons					Total in Sweden	Total in FI & SW
Year/area	1	2a	2b	3	Sum 1-3	Mill.tons	Mill. tons
1997	49,832	213,438	116,943	83,936	464,153	3.258	5.621[2)]
2000	…	…	…	…	…	…	…
2004	43,253	220,676	114,299	71,862	450,091	3.229	5.600
2005	41,703	230,181	90,596	69,017	431,496	3.163	5.523
2004 of 1997, %	87	103	98	86	97	99	100

[2)] FI in 1995

Sources: SJV 2006, SJV 2003

Hence, although the number of dairy farms has fallen substantially between 1995 and 2005 in the Nordic Aid area, the level of milk production remains intact, with a slight fall in the Swedish sub-regions and an increase in the Finnish sub-regions. One reason is that the average herd size has grown so that more milk is produced per farm, and another reason is that the productivity of milk cows has increased during the time. Structural change has overall been more pronounced in the Swedish sub-regions, were the average herd size is considerably larger than in Finland.

3.2.3 Beef production

Nordic Aid is granted for beef production in Finland.

There are no sub-regional data on production of beef, but the production volumes can be roughly approximated by the number of cattle. It has to be noted, however, that the development in the number of cattle and production volumes are not one-to-one mappings, because the beef production based on suckler cows has been substituting the production based on calves from milk production. The beef production requires more animal stock when it is based on suckler cows compared to the production based on calves originating from the dairy farms. The reason for this common trend is in the weakened supply for calves supplied from the milk producers. The number of cows has decreased over time as the yield per cow has increased.

In Finland, the production of beef has gradually decreased from 96 million kilos in 1995 to 87 million kilos in 2005, implying an average annual rate of decline rate of 1.0%. The number of cattle on the cattle farms, other than those specialized in milk production, was in the Finnish Nordic Aid sub-regions 110,353 in 1995 and it increased to 137,438 in 2005 with an annual average growth rate of 2.2%. According to these numbers, it is likely that the specialised beef production has either slightly increased from, or at least maintained at the pre-accession level in the Finnish Nordic aid areas. Since beef production has decreased in Finland in total, this means that the share of the Finnish beef production located in the Nordic Aid area has increased over time.

3.2.4 Swine, poultry and egg production

Nordic aid is granted for swine production and laying hens in both Finland and Sweden. Finland also grants Nordic Aid to chicken, breeding hens and other poultries.

In Finland, the share of pork production in the Nordic Aid sub-regions was above 40% of the total production of pork in the country in both 1995 and 2005. In Sweden, the corresponding share is much lower. The number of sows in the sub-regions amounts to approximately 3% of the total number of sows in the whole country over the time period, while the corresponding share for fattening pigs is slightly above 4% (Table 3.9).

Similarly to the beef production, the developments of pig meat and broiler meat production are available only for the country level. In the whole countries, the development of pig meat production differs between the countries. In Finland, the production has increased by 21.5% between 1995 and 2005, implying an average annual growth rate of 2.0%. At the same time, the production of pig meat decreased in Sweden by 11%, at an annual rate of decline rate of 1.1%. The poultry meat production in Finland has doubled from 1995 to 2005 with an annual growth rate of 7.4%. One reason for the increasing pig meat and poultry meat production in Finland has been an increasing demand for the white meat qualities.

Accompanying the strong growth in pig meat production in Finland has been a substantial structural change. The number of piglet farms has decreased by 53% and the number of farms with fattening pig with 46%. At the same time, the average size of the pig farms has grown from 32.2 sows to 81.4 sows, and the size of the fattening pig farms have grown from 113 places to 238 places.

Within the Nordic aid regions, the production of pig and poultry meat can be approximated by the number of live animals. The number of pigs suggests that the production volume has decreased in the Swedish sub-regions from 1995 to 2005 by 5%, while it has increased in the Finnish Nordic aid areas by 15%. As production has increased in Finland as a whole, the share of production in the Nordic Aid sub-regions remains constant over time. The decline in the Swedish sub-regions has however been slower in the Swedish sub-regions than in the country as a whole. 97% of the places for fattening pigs and 83% of the sows remain in area 1-3, compared to 86% and 81% in Sweden as a whole. A clear exception is sub-region 1 which shows a substantial decrease; only 16% of the sows and less than a third of the places for fattening pigs remain in 2004 compared to 1995. In contrast, the number of pigs has increased in sub-region 2a over the period.

Turning to poultry meat, both the number and the size of broiler farms has increased in the Finnish sub-regions over time. Farms with broiler production had about 20,800 broilers in 1995 and in 2005 28,200 broilers in average. At the same time the number of broiler farms in the Nordic Aid sub-regions in Finland has increased from 33 to 55 (Table 3.9).

Table 3.9. The number of pigs in the Nordic Aid area in Sweden and Finland and broiler production in Finland 1995 and 2004, 2005.

SWEDEN AND FINLAND		Sub-region 1-3 Sweden (number of places)	Sub-region C1-C4 Finland (number of animals)	Sub-region 1-3 of total in Sweden %	Sub-region C1-C4 of total in Finland %
Sows	1995	7,860	34,648	3.3	41
	2004	6,535	n.a.	3.4	
	2005	n.a.	41,663		45
	2004 of 1995 ,%	83			
	2005 of 1995, %		120		
Fattening pigs	1995	51,960	156,290	4.1	44
	2004	50,507	n.a.	4.7	
	2005	n.a.	178,123		45
	2004 of 1995, %	97			
	2005 of 1995 ,%		114		
Total	1995	59,820	190,938		
Total	2004	57,042			
Total	2005		219,786		
2004 of 1995, %		95			
2005 of 1995 ,%			115		
Broiler farms	1995		33		22
	2005		55		31
	2005 of 1995,%		167		
Broilers			688,470		22
	2005		1,549,800		32
	2005 of 1995,%		225		

Sources: SJV 2007, Tike 2006

In the Finnish sub-regions, the number of egg farms has decreased rapidly from 700 farms in 1995 to 200 farms in 2005. At the same time, the average size has doubled, and in 2005 the average size was about 3,000 hens. In Sweden only a few of the egg producing farms in the sub-regions obtain Nordic Aid. The number of farms has fallen from 35 farms in 1996 to 18 farms in 2005. The majority of farms with support for egg production are located in sub-region 2 (13 of 18 in 2005). Just two farms with support are located in sub-region 1 and three farms in sub-region 3. Despite of the reduction in number of farms, the total number of laying hen with Nordic Aid support has increased over time (Table 3.10).

Table 3.10. Egg production in Sweden and Finland 1995/1996 and 2005.

SWEDEN		Sub-region 1-3 Sweden	Sub-region C1-C4 Finland	Sub-region 1-3 of total in Sweden %	Sub-region C1-C4 of total in Finland %
Egg production	1995	n.a.	739		43
	1996	~ 970	n.a.	11	
	2005	614	200	12	38
	2005 of 1995 %		27		
	2005 of 1996, %	63			
Hens	1995	182,840	1,095,520	n.a.	38
	2005	243,520	598,010	n.a.	26
	2005 of 1995 %	133	55		

Sources: SJV 2006, 2002/404/EC, Tike 2007.

3.2.5 Goat milk

Nordic Aid is granted for she-goats in both Sweden and Finland. Nearly a hundred farms obtained support for goat milk production in 2005 in the Swedish sub-regions. About 90% of the number of goats remained in 2005 compared with 1996. In Finland the goat farms are fewer and goat milk has mainly local importance. In 1995-2005 the number of eves and she-goats has varied between 4,500-5,900.

3.2.6 Reindeer husbandry

Nordic Aid is granted for reindeer husbandry in Finland. The area of reindeer husbandry extends across some 114,000 km² which is 36% of the entire surface of Finland, including almost the entire area of the Province of Lapland and part of the Province of Oulu. The northern-most area is so called "fell land" where trees are found only sparsely growing in the lowest areas. The southernmost and south western part of the reindeer husbandry area is flatland, of which more than 60% is marshland.

In Finland, reindeer husbandry is practiced through a system of reindeer herding cooperatives. There are 56 such cooperatives in the area. The cooperatives have strictly defined boundaries and they vary in size and numbers of reindeer. They are profit making reindeer husbandry units whose members, or shareholders, are reindeer owners. A reindeer herding cooperative has its own council with a manager and other personal needed.

The Ministry of Agriculture and Forestry regulates the numbers of reindeer by confirming the largest permissible numbers of living reindeer for each cooperative, i.e. the number of reindeer to remain over the coming winter. The maximum number of living reindeer for the entire reindeer husbandry area for the current ten-year period is 203,700 animals (Table 3.11). The number of reindeers has had large annual variation but the series does not signal either downward or upward sloping trend. The number of reindeer owners has, nevertheless, decreased by about 25% during the evaluation period. The number of reindeers varies annually depending on the natural conditions. A part of the variation of the number of reindeers can be realized and a part of the variation can be due to difficulties to gather the animals and get the number of animals calculated exactly when the weather conditions are difficult. The number of reindeer has remained stable over the years, although the number of reindeer owners has decreased by some 25%. The largest permissible number of reindeer owned by a reindeer husbandry entrepreneur is 300 animals in the southern region of the reindeer husbandry area and 500 animals in the northern region of the area. The Reindeer Herding Law and Statute governs the basic matters of reindeer husbandry, which a reindeer owner must comply with when practicing his or her profession (Reindeer Herders' Association).

Table 3.11.The number of reindeer owners and reindeers.

Year	Reindeer owner	Counted reindeer left alive	Reindeer for slaughter
1995	6,920	212,851	120,702
2000	5,682	185,731	86,300
2004	5,134	207,157	115,576

Source: Tike 2006.

3.2.7 Crop and plant production

Nordic Aid is granted for crop and plant production in Finland (Table 3.12). The production structure in the north is dominated by cattle husbandry, which implies that a large share of arable

Table 3.12. Number and distribution of the crop and plant growing farms in the area of the Nordic Aid Scheme in Finland in 1995, 2000 and 2005.

FINLAND	Distribution and number of farms, %			Distribution (%) of land and farm size (ha per farm)		
	1995	2000	2005	1995	2000	2005
Grain farms						
Under 20 ha	69.7	61.7	53.1	41.2	31.9	23.5
20-29 ha	15.9	17.4	19.3	21.2	19.5	18.4
30-39 ha	6.7	9.3	10.8	12.8	14.8	14.4
40-49 ha	3.5	4.5	6.0	8.6	9.2	10.3
50-99 ha	3.6	6.1	8.9	12.8	18.7	23.2
100- ha	0.5	1.0	1.9	3.5	5.9	10.1
Total/average	10,474	11,065	12,520	18.2	21.7	25.8
Special plant farms						
Under 20 ha	59.8	45.6	45.7	30.9	18.8	16.8
20-29 ha	19.3	19.9	17.2	22.1	16.8	13.3
30-39 ha	9.9	13.1	12.3	15.9	15.7	13.5
40-49 ha	4.7	7.0	7.8	9.8	10.9	11.0
50- ha	6.3	144	171	21.3	37.7	45.4
Total/average	1,568	1,443	1,500	21.4	28.6	31.5
Other farms						
Under 20 ha	92.2	86.2	82.1	75.4	59.9	48.5
20-29 ha	5.3	7.9	10.5	12.8	15.3	16.9
30-39 ha	1.3	2.8	3.7	4.6	7.8	8.4
40-49 ha	0.7	1.2	1.4	3.0	4.2	4.1
50- ha	0.6	1.9	2.3	4.1	12.7	22.0
Total/average	7,663	7,283	6,846	9.8	12.6	15.1
Open field vegetable farms						
Under 20 ha	90,5	86.5	83.6	67.1	55.9	51.2
20-29 ha	5,1	75	9.8	12.7	16.1	18.9
30- ha	43	6.0	6.6	20.2	28.0	29.9
Total/average	1,268	1,112	1,094	9.6	11.5	12.6
Glasshouse farms				m^2	m^2	m^2
Under 1 000 m2	36.0	281	24.5	1.7	8.0	6.2
1 000-2 499 m2	46.9	47.7	47.4	40.2	34.6	30.3
2 500-5 000 m2	12.3	17.5	195	21.5	26.1	25.7
5 000- m2	4.9	6.7	8.6	25.5	31.3	37.8
Total/average	1,068	942	825	2,003	2,223	2 558
Plant growing farms and and other farms total	22,041	21,845	22,785	15.8	19.5	23.3
Distribution (%) and total number of farms in the Nordic aid area						
Under 20 ha	62.1	48,6	44.2	3.9	20.6	15,5
20-29 ha	20.5	19,8	18.0	25.9	18.7	14,3
30-39 ha	9.6	12,8	123	17.0	16.9	13,8
40-49 ha	4.2	7,5	8.5	9.7	12.8	12,2
50-99 ha	3.3	10.1	14.1	10.8	25.1	30,6
100- ha	0.3	1.2	2.9	1.8	6.0	13,6
Total /average	58,116	46,062	39,477	19.3	26.2	31.1

Source: Tike 2006.

land is grassland. In 2005, 44% of the utilized agricultural area was under cereals, 40% was under grass, 6% was under other crops and 10% was set aside in Finland. Between 2000 and 2005 the cereal and set-aside area increased and the area under grass decreased. This change was mainly caused by the fact that many farms, especially in the southern parts of sub-region C, quit livestock production and continued in production of fodder cereals and other crops or leased their land to expanding farms. Livestock farms also increased the use of cereals in animal feeding ratios.

In the Finnish sub-regions, the number of crop producing farms has stayed roughly at the same level as in 1995, but the average size has grown from 16 hectares to 23 hectares. In 2005 a half of these were grain farms, the number of which has increased by 20% and average farm size has grown from 18 hectares to 26 hectares. Many of the small farms of animal husbandry have continued as grain farms, and that is why the small grain farms with less than 30 hectares in 1995 were about 85% of all grain farms, and in 2005 they were still over 70% of all grain farms in the area. The share of Nordic aid areas out from the total Finnish production of barley and oats is 45%. The corresponding share in wheat production is 14%. Most farms in the farm group of special plant production are specialized in production of potatoes. The number of them has stayed the same over the period, but the average size of farms has grown from 21 hectares to 32 hectares.

The group of other farms includes many kinds of plant production farms and organic production as well as sheep, goat and horse farms and farms specialized in farm tourism. In 2005, the share of these other farms was 17 per cent of farms in the area C. Their farm size is about 15 hectares which is smaller than average. The number of horticulture farms specialized in open field plants has stayed unchanged and the structural change has been quite small. The number of green houses has decreased about 20 per cent during ten years, and their size has grown over 25 per cent to 2,560 square meters.

3.2.8 Soft fruit and vegetables

Nordic Aid to soft fruit and vegetables is granted in Sweden. The number of farms receiving support has decreased from 172 in 1995 to 123 in 2005 (Table 3.13). Also the number of hectares receiving support has declined. The major share of the farms is located in sub-region 2.

Table 3.13. Production of soft fruits and vegetables: Number of the holdings in the area of the Nordic Aid Scheme in Sweden in 1996-2005.

SWEDEN		Sub-region			Sub-region 1-3 Sweden
		1	2	3	
Farms	1995	n.a.	n.a.	n.a.	172
	2000	n.a.	n.a.	n.a.	139
	2004	15	85	12	112
	2005	15	95	13	123
	2005 of 1995,%				72
Hectares	1995	76	498	98	671
	2000	60	316	62	437
	2004	90	301	19	410
	2005	84	336	25	445
	2005 of 1995,%	111	67	26	66

Source: SJV 2006

3.2.9 Storage of horticultural products, wild berries and mushrooms

Nordic Aid is paid for storage of horticultural products, wild berries and mushrooms in Finland. In 1995, the storage area for horticultural products with aid was about 55 300 m^3 (74% with mechanical heath control and 26% without heat control). In 2000 the storage area with aid amounted to 67 000 m^3 (86% with mechanical heath control) (Table 3.14).

Table 3.14. Nordic Aid for storages: Supported quantities of products (m^3, kg) in the area of the Nordic Aid in Finland.

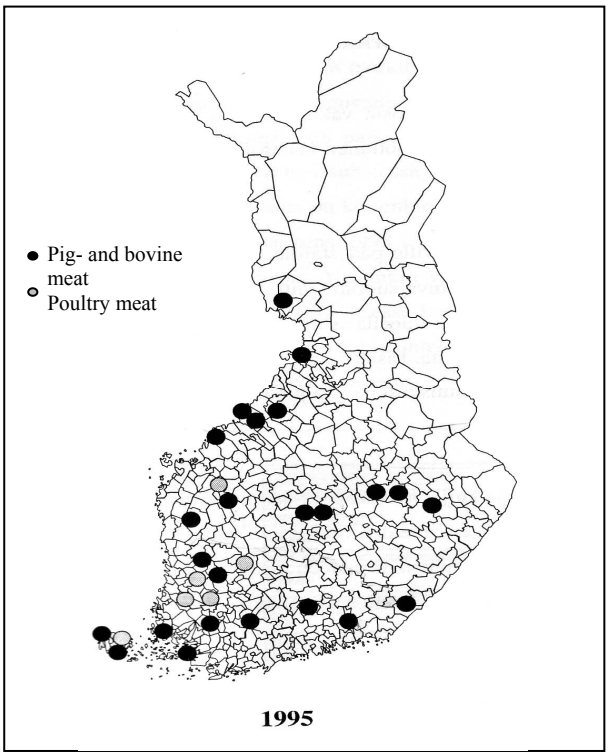
Year	With heating control, m^3	Without heating control, m^3	Wild berries and mushrooms, kg
1995	43,891	11,388	
1997	55,597	12,052	1,604,431
2000	57,318	9,719	1,934,426
2005			622,939

Source: Tike 2007.

Aid for storage of wild berries and mushrooms was initialized in 1997. The main purpose is to stimulate the usage of wild berries and mushrooms. The berries and mushrooms must be both gathered and stored in the area to be eligible for support. In 1997 aid for storage was paid in total to about 1.600 million kg, in 2000 to 1.900 million kg, and in 2005 to about 0.600 million kg.

3.3 Dairies and slaughterhouses in the Nordic Aid area

The ongoing structural change during the last decades has reduced the number of dairies and slaughterhouses and increased the size of other processing plants in Finland. In 1995-2005, the number of large slaughterhouses decreased slightly in the Nordic Aid sub-regions in Finland, and about half of the dairy processing plants have closed down (Figure 3.3 and 3.4). Overall, the food industry has also concentrated closer to the population centers.



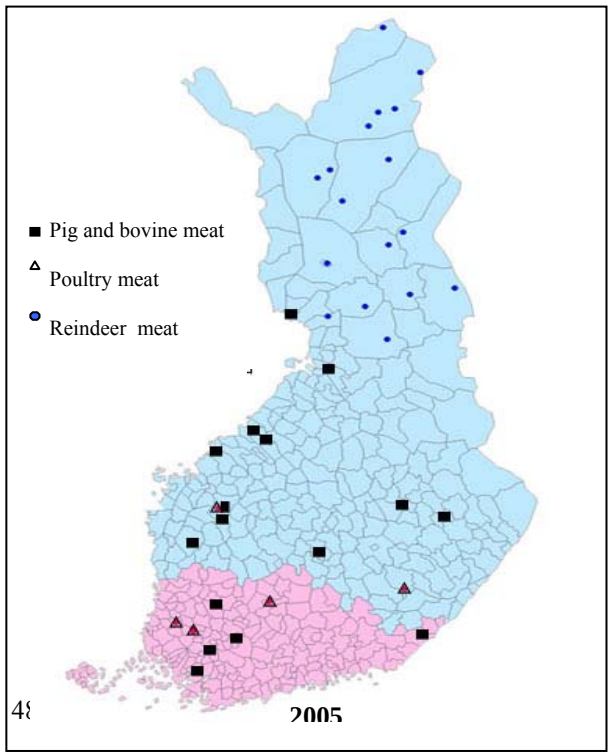


Figure 3.3. Slaughterhouse facilities in Finland, 1995 and 2005.

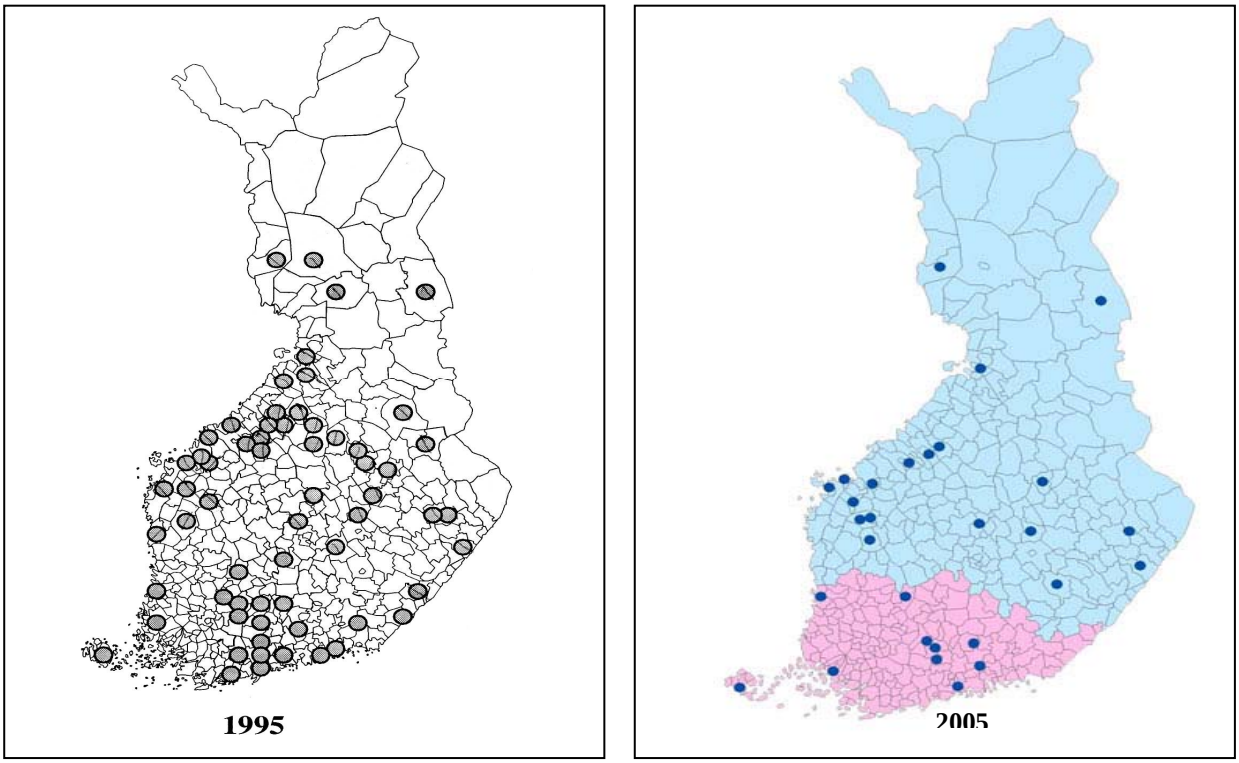


Figure 3.4. Dairy house facilities in Finland, 1995 and 2005.

In Sweden, there were altogether 82 slaughterhouse facilities in 1994. 22 facilities were located in the Nordic Aid area of which 11 where situated inland (Figure 3.5). In 2005, a total of 35 of the original slaughterhouse facilities had been closed down. Closures seem to have been particularly frequent in the Nordic Aid area where 18 of the 22 original facilities had been closed, among them all but two of the 11 inland facilities. On the other hand, 31 new facilities have been opened during the period, implying that there were only 4 facilities less in 2005 than in 1994. In some cases, new facilities had even opened in the same locations as original facilities had closed. However, most new facilities had opened in the southern part Sweden.

Turning to the dairies, there were six major dairy companies in Sweden in 1995. Of these, only three had facilities in the Nordic Aid area. There were also 9 smaller dairy companies present of which two were situated in the aid areas 1 – 3 (Figure 3.6). Altogether there were 56 dairy facilities in Sweden, of which 12 where located in the Nordic Aid area. During the period from 1995 to 2005, 20 of the original dairy facilities were closed down and three new facilities opened; none of the latter in the Nordic Aid area. Of the dairy companies, *Arlamejerier* experienced the largest number of closures (11 facilities closed), none of them situated in the Nordic Aid area. *NNP- and Milkomejerier* closed 2 facilities (one belonging to the Nordic Aid area), while *Norrmejerier* closed 2 facilities (both belonging to the Nordic Aid area). Interestingly, the two smaller diary companies based in the Nordic Aid area did not close any facilities. Hence, it does not seem as if the Nordic Aid area experienced a larger number of closures than the rest of Sweden. Nevertheless, given the limited number of facilities in the Nordic Aid area at the beginning of the period, distances may still have been affected more by the closures than in other parts of the country.

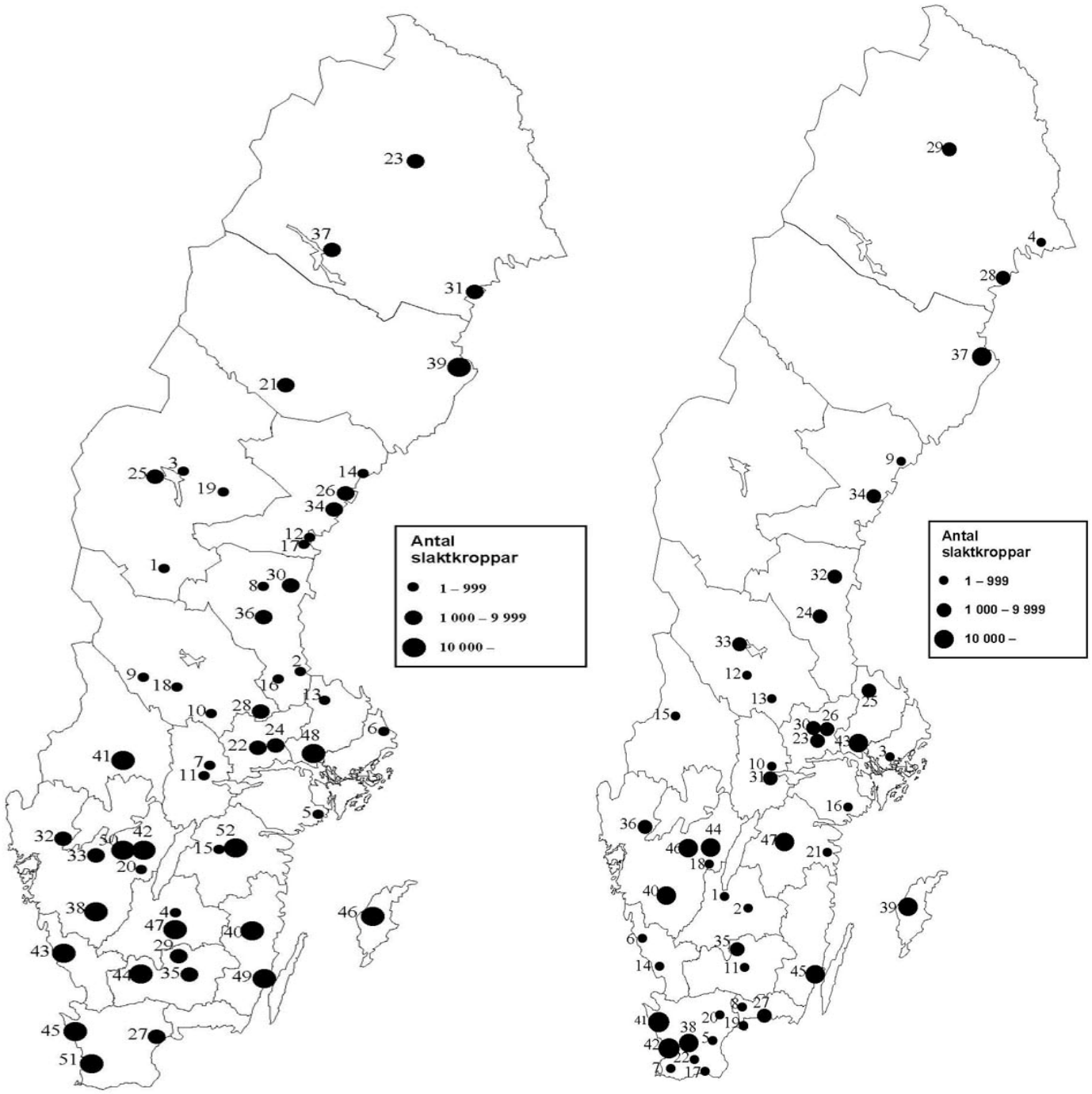


Figure 3.5. Slaughterhouse facilities in Sweden, 1995 and 2005. “Antal slaktkroppar” means number of slaughters.

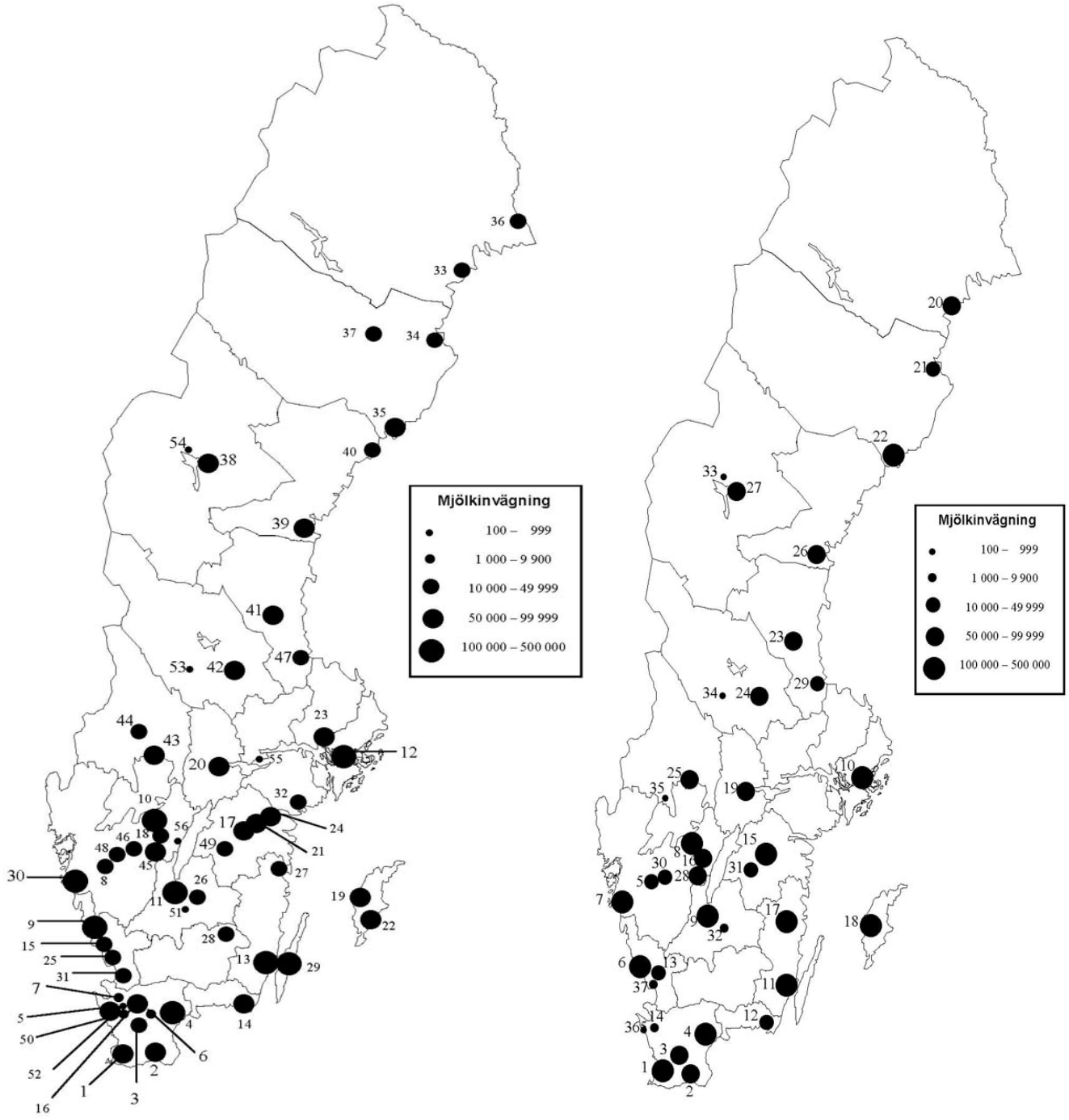


Figure 3.6. Dairy house facilities in Sweden, 1995 and 2005. “Mjölkinvägning” means delivery of milk to dairies (kg).

4 Other policy areas and support schemes

4.1 Overview of additional support

In addition to the Nordic Aid scheme, agriculture in the Nordic Aid region in Finland and Sweden receive support from the schemes under the Common Agricultural Policy (CAP, Pillar I and Pillar II), as well as from some National schemes of minor importance. Table 4.1 shows a stylized picture of the amounts received in each country from these support programs.

Table 4.1. Support other than Nordic Aid received by agriculture in the Nordic Aid region.

	Finland			Sweden*		
CAP Financed by the EAGGF (guarantee section)	**1995** Price supports[1]	**2000** Price supports[1] Arable land paym. Animal headge LFA-support Environ. sup.	**2005** Price supports[1] Arable land paym. Animal headge LFA-support Environ. sup. Single farm paym.	**1995** Price supports[1]	**2000** Price supports[1] Arable land paym. Animal headge LFA-support Environ. sup.	**2005** Price supports[1] Arable land paym. Animal headge LFA-support Environ. sup. Single farm paym
Million EUR	N.a.	178	219	N.a.	121.21 + Price sup.	136.18 + Price sup.
CAP Financed by the structu-ral funds i.e. the EAGGF (guidance section)	**1995** LFA-support Environ. sup. Investm. sup. Start aid Human cap. inv. Rural dev.	**2000** Investm. sup. Start aid Human cap. inv. Rural dev.	**2005** Investm. sup. Start aid Human cap. inv. Rural dev.	**1995** LFA-support Environ. sup. Investm. sup. Start aid Human cap. inv. Rural dev. Marketing and proc. Envir. sup. forestry Leader	**2000** Investm. sup. Start aid Human cap. inv. Rural dev. Marketing and proc. Envir. sup. forestry Leader	**2005** Investm. sup. Start aid Human cap. inv. Rural dev. Marketing and proc. Envir. sup. forestry Leader
Million EUR	N.a.	359[2]	398[2]	N.a.	3.68	12.23
National support other than Nordic Aid	**1995** National aid for crop production	**2000** National aid for crop production	**2005** National supplem. to LFA support National supplem. to environ. sup.	**1995** Potatoes for consumption Reindeer prod.	**2000** Potatoes for consumption Reindeer prod.	**2005** Potatoes for consumption Reindeer prod.
Million EUR	N.a.	29	95	N.a.	9.95	10.34

[1] Price supports entail the total effect on the prices of farm produce from the Common Market intervention programs (import duties and quotas, intervention purchases, national quotas, and export subsidies), the size of which is very difficult to estimate. Hence, the figures for support from CAP Pillar I only include the value of the direct support measures Arable land payments, Animal headage and the Single farm payment. [2] This support is co-finance by the EU and Finland

Sources: Finnish Agriculture and Rural Industries, Swedish Yearbook of Agricultural Statistics (SJV), and data specially supplied for this study by SJV

In Finland the support under the EAGGF guarantee and guidance sections to the Nordic Aid areas totalled about 617 MEUR in 2005. This consisted of the CAP support for arable crops and livestock (219 MEUR), compensatory allowances for less-favoured farming areas (235 MEUR) and environmental support (163 MEUR). The supports are funded either by the EAGGF alone or co-financed by the EAGGF and Finland. In addition to the above mentioned aids, the Finnish farms located in the Nordic Aid region have received support from the EAGGF guidance section (for example investment support, start aid to young farmers, early retirement program, support to human capital investment and support to rural development).

In Sweden, environmental support, investment support, start aid to young farmers, support to human capital investment, support to rural development, support to the marketing and processing of agricultural produce and support to environmental measures in forestry are financed by the EAGGF guarantee section in Nordic Aid regions outside Objective 1 regions and by the EAGGF guidance

section in Nordic Aid regions inside Objective 1 regions. Since only a minor part of the Swedish Nordic Aid region is situated outside the Objective 1 region, all these measures have been listed under support financed by the EAGGF guidance section. LFA-support was financed by the EAGGF guidance section until 1999 and by the EAGGF guarantee section thereafter.

These support schemes listed in Table 4.1 and their contributions to farmer income are discussed in more detail in subsequent sections.

4.2 CAP measures financed by the EAGGF guarantee section

During the period 1995-2005, these measures consist of price supports, arable land and animal headage payments, LFA-support and, finally, the Single Farm Payment (SFP). The composition is a result of the *McSharry reform* in 1992, the *Agenda 2000 reform*, and the *Mid Term Review* in 2003.

The McSharry reform implied a gradual change from price supports resulting from the Common Market intervention programs, to direct support measures (arable land and headage payments). The Common Market intervention programs involve both officially set intervention prices and intervention purchases to sustain these prices. An essential part of the reform was to decrease the excess supply of agricultural products and, thus, the costs of the programs. Farmers were to be compensated for income losses by the direct support measures. The arable land payments are crop specific and determined according to the discrepancy between the pre- and post-reform prices, multiplied by the reference yields. Because the reference yields decrease from central to northern Europe, the arable land payments also do so. The headage payments are equal across Europe and paid according to the number of suckler cows, male bovines, and ewes. Payments to male bovines and suckler cows also involve an extensification premium, which is the highest for farms having less than one Livestock Unit (LU) per hectare of arable land. Farmers with more than 1.4 LU per hectare are not eligible for this premium.

The Agenda 2000 reform resulted in the division of the CAP in the two pillars[4] and that the financing of the LFA- and the environmental supports were transferred from the guidance section to the guarantee section of the EAGGF. The LFA-supports are higher in northern than in central Europe, while the environmental supports are either higher in the north or equal all over the EU. The reform also implied further withdrawal of market interventions by reductions in the number of commodities involved in the programs as well as reductions in intervention prices for the remaining commodities. Farmers were again to be compensated by direct payments coupled to production.

The CAP reform of 2003 gave member states the opportunity to substitute direct support measures with the so called Single Farm Payment (SFP) which is de-coupled from production. De-coupled payments are expected to result in less resource mis-allocations than the traditional price supports and direct support measures, which were tied to the crop production and to the number of animals on the farm. Thus, the SFP functions as an income transfer to farmers (provided that they adhere to the cross-compliance terms) and is expected to increase farmer incentives to respond to the market price signals and weaken the excess supply of agricultural commodities. However, in the high cost areas, in particular, the reform may increase farmer incentives to quit production (Lehtonen 2004). From the Nordic perspective, an important component of the CAP reform was the decision to decrease the intervention prices and the intervention purchases for butter and milk powder, which is

[4] *Pillar I*, including Price supports, Arable land payments, and Animal headage payments. *Pillar II* including LFA-support, Environmental support, Investment support, Start aid, Support to human capital investment, Rural development measures, Support to marketing and processing of agricultural produce, Support to environmental measures in forestry, and Leader.

expected to decrease the producer price for milk. The SFP also includes a compensation to milk producers for these reductions in the intervention price and purchases. Most member states, among them Sweden, chose to implement the SFP in 2005. Finland, on the other hand, waited until 2006. The LFA- and the environmental supports are not included in the SFP and, in addition, the member states can choose to keep some of the direct measures coupled to production. Finland has chosen to de-couple 90% of all arable land and headage payments, keeping only the male bovine and suckler cow premiums tied to the number of animals at the farm. Sweden has de-coupled all of the arable land payments and almost all of the headage payments (only 75% of the male bovine premium and 68.5% of the milk support remain coupled). The member states were also given a choice of how to construct the SFP.[5] Both in Finland and Sweden the SFP scheme was implemented on the basis of the hybrid model. Former CAP payments were converted into payment entitlements which consist of a regional flat-rate payment and possible farm-specific top-ups.

The arable land support per hectare (exclusive of the LFA- and environmental supports) is given by sub-regions in Table 4.2, below. In Sweden, the regional differences in the Arable land payments do not follow the Nordic Aid sub-regions, but the corresponding CAP area refers to Zone V. Even if the subsidy rates significantly decreases from south to the north, Arable land payments still contributes to a large share of farms' gross returns and farmer income also in northern regions (Table 4.2).

Table 4.2. Arable land payments, EUR/ha by sub-regions of the Nordic Aid scheme in 1995, 2000 and 2005 and reference yields (1,000 kg/ha).

All farms in average	Sub-regions, Finland [1]				Sub-regions, Sweden		
	C1	C2	C3	C4	Zone V[2]		
Reference yield, t/ha	2.8	2.3	2.3	2.3			
Subsidy rates							
1995	150	124	124	124	180		
2000	217	178	178	178	170		
2005 [3]	243	200	200	200	118		

[1] For land allocated to feed grains.
[2] Corresponds to Nordic Aid areas 1-3
[3] Excluding the de-coupled payments paid previously for animal heads and special crops.

Agriculture in the northern regions of Finland is highly dependent on income supports paid to agriculture. In Finland the subsidies funded by the EAGGF range from 22 to 39 % of Gross Returns with the highest share in Northern Finland. In Northern Sweden the share declined form 28 % in 1995 to 17 % in 2004. The share of subsidies in FNVA counted in Finland from 62 % to 93 %. In Sweden the share of subsidies in FNVA is very high because the absolute value of FNA has remained low and even negative (Tables 4.3 and 4.4).

[5] The SFP could either be constructed according to a *regional model* (where the payment is homogenous throughout an entire region and determined by the average production in that region during a reference period), according to a *farm model* (where the payment is determined by the farm's production during a reference period), or according to a model that is a *hybrid of the regional and the farm model* (i.e. with a regionally homogenous base payment coupled with a farm specific supplement).

Table 4.3. The share of subsidies funded by the EAGGF guarantee section, exclusive of LFA- and environmental support (c.f Table 4.1), in Gross Returns and in Farm Net Value Added (FNVA) according to the northernmost FADN-regions in all FADN-farms in Finland and Sweden in 1995, 2000 and 2004.

All FADN farms	FADN-regions, Finland			FADN-regions, Sweden
	Central-Finland (680)	Central West-F. (690)	Northern Finland (700)	Northern County (730)
% from Gross Returns				
1995	33.7	35.0	38.8	27.5
2000	22.2	23.2	28.6	24.0
2004	25.1	24.9	28.4	16.7
% from FNVA				
1995	90.0	93.0	84.7	n.a.
2000	70.6	79.5	61.9	166.5
2004	87.3	89.8	81.1	117.9

Table 4.4. The share of subsidies funded by the EAGGF guarantee section, exclusive of LFA- and environmental support (c.f. Table 4.1), in Gross Returns and in Farm Net Value Added (FNVA) according to the northernmost FADN-regions in dairy farms in Finland and Sweden in 1995, 2000 and 2004.

Dairy farms	FADN-regions, Finland			FADN-regions, Sweden
	Central-Finland (680)	Central West-F. (690)	Northern Finland (700)	Northern County (730)
% from Gross Returns				
1995	32.2	33.1	38.0	23.5
2000	22.1	23.6	29.6	23.4
2004	23.6	24.8	30.7	16.3
% from FNVA				
1995	78.9	88.3	77.9	94.8
2000	66.8	80.2	59.9	115.1
2004	71.8	91.7	71.3	95.2

Compensatory allowance, i.e. the LFA-support is intended to secure the continuation of agriculture in the less favoured areas and maintain the rural population. Until 1999 the LFA support was based on either livestock units or the arable area, but from 2000 the payments are based on the arable area only. As part of the agreement on the national aid, Finland got a permission in 2005 to pay a national supplement to the LFA-support. This national LFA supplement is also paid according to the farms' arable land area, but differentiated between arable crop farms and animal husbandry farms. The basic supplement paid for the arable area may not exceed 20 EUR/ha in sub-region C1 and 25 EUR/ha in sub-regions C2–C4. A raise for livestock not exceeding 80 EUR/ha is paid for the arable area of livestock farms. In 2005 the payments totalled 93.7% of the maximum according to the hectares. The total amount of the compensatory allowances part-financed by the EU and the national supplement may not exceed the average of 250 EUR/ha. It should also be noted that 50% of the national LFA premium granted in the Finnish sub-regions was included in the maximum aggregate sum of Nordic Aid. Thus, after the national LFA premium of 76.2 MEUR was installed, the maximum amount for support under the Nordic Aid scheme was decreased by 38.1 MEUR in

Finland. In the Swedish less favoured areas, the LFA-support is granted for arable grass, semi natural grass and potatoes. In sub-regions 1-3 the support is also granted for cereals. The total amounts of LFA-support paid in the Finnish and Swedish sub-regions are given in Tables 4.5 and 4.6. In Finland the amount of LFA-support has been at the same level during 2000-2005, whereas in Sweden the LFA-support has slightly increased from 2000 to 2005, but the seemingly large increase in the statistics, as indicated by the figures in Table 4.5, is due to annual sequencing of the payments. That is why the LFA-support per field area in dairy farms has been essentially lower in 2000 than in 2004. Year 2000 was also the first year in the FADN system, when the LFA-support was marked to its own code.

Table 4.5. LFA-support in Finland and in Sweden (MEUR).

Support/year	1996	2000	2004	2005
LFA-support in the Finnish Nordic Aid area	170	225	235	235
LFA-support in the Swedish Nordic Aid area [1)]		14.1	31.4	32.9

[1)] Approx 15 % of the amount for year 2005 is due to modulation

Table 4.6. LFA-support EUR/ha in dairy farms and in all farms according to the FADN regions in Finland and Sweden in 2000 and 2004.

	FADN-regions in Finland			FADN-region in Sweden
	Central-Finland (680)	Central West-F. (690)	Northern Finland (700)	Northern County (730)
Dairy farms				
2000	198	204	207	(7)
2004	201	196	203	100
All farms				
2000	199	203	206	(4)
2004	200	194	204	85

The contribution of LFA-supports to the farms' gross returns and farmer income is given in Table 4.7. The LFA support has accounted for about 7-8% of gross returns in the Finnish FADN-farms, on average, over the period 2000-2004. The ratio between the LFA-support to the farm net value added (FNVA) has ranged between 0.2-0.3. In Sweden the corresponding figures have been considerable lower than in Finland in 2000 due to the low level of the LFA-support. Also the Farm Net Value Added has been lower in Sweden than in Finland.

Table 4.7. LFA-support as percentage of the farms' Gross Returns and of the Farm Net Value Added (FNVA) according to the northernmost FADN-regions in all farms in Finland and Sweden in 1995, 2000 and 2004.

	FADN-regions in Finland			FADN-region in Sweden
	Central-Finland (680)	Central West-F. (690)	Northern Finland (700)	Northern County (730)
% from Gross Returns				
2000	7.6	7.6	8.2	0.2
2004	8.1	8.3	7.7	4.6
% from FNVA				
2000	21.2	23.2	22.8	1.6
2004	26.1	29.1	24.3	32.5

Environmental supports are targeted payments to encourage environmentally friendly and sustainable farming systems and to provide environmental services in addition to the standards set for good farming practices. Thus, the support is, for the most part, compensation for the costs a farmer incur either when adjusting production practices to meet certain environmental goals, or when providing certain services to meet these goals. Environmental payments for preserving the open agricultural landscape are of significant importance to the northern sub-regions. In Finland environmental support consists of basic measures, additional measures and special measures. The main emphasis is on water protection, but efforts are also made to reduce the emissions into the air and risks due to the use of pesticides and to take care of rural landscapes and biodiversity. The funds allocated to environmental support in the Nordic Aid sub-regions in Finland are given in Table 4.8.

The amounts paid for the preservation of the open landscape in Sweden are given in Table 4.8, below. Support is granted for arable grass land and pastures, conditional on the presence of animals at the farm. The level of the support is significantly higher in the Nordic Aid sub-regions than in other parts of the country. Still the level of the support has been notably lower in 1995-2000 than thereafter. In order to receive the environmental supports, the farmer is obliged to fulfill certain conditions for a period of five years. It is primarily the same farmers that receive environmental payments for the open agricultural landscape and compensatory allowance for arable grass and semi natural grass.

Table 4.8. Environmental support (MEUR) in the Nordic Aid area in Finland and support for preserving the open landscape in Sweden.

Support	1995	2000	2001	2005
Agri-environmental support, Finland	127	155	157	163
[1)]Preserving of the open landscape, Sweden	15.2	16.1	29.0	29.0

[1)] Only this measure in the Swedish Agri-environmental scheme is presented. For the program period 1995-1999, the measure was named "environmentally friendly agriculture".

The environmental support per hectare of arable land is summarized in Table 4.9. In Sweden the level of the environmental support has varied between 80 and 221 euros per hectare and its share out form the farms' gross returns has large annual variation (Table 4.10.). In Finland the corresponding subsidy rate has been more stable and it has varied between 121 and 151 euros per hectare. The share of these supports out from the farmer income has, nevertheless, large spatial and annual variation.

Table 4.9. Environmental support EUR/ha on dairy farms and on all farms according to the FADN-regions in Finland and Sweden in 2000 and 2004.

	FADN-regions in Finland			FADN-region in Sweden
	Central-Finland (680)	Central West-F. (690)	Northern Finland (700)	Northern County (730)
Dairy farms				
1996	122	149	131	80
2000	138	142	150	221
2004	139	140	149	111
All farms				
1996	129	120	122	73
2000	146	151	151	182
2004	149	145	151	110

Table 4.10. The environmental support as percentage of the farms' Gross Returns and of Farm Net Value Added (FNVA) in all farms according to the northernmost FADN-regions in Finland and Sweden in 1995, 2000 and 2004.

	FADN-regions in Finland			FADN-region in Sweden
	Central-Finland (680)	Central West-F. (690)	Northern Finland (700)	Northern County (730)
% from Gross Returns				
1996	5.2	4.8	4.7	8.1
2000	5.6	5.7	6.0	10.6
2004	6.0	6.2	5.7	6.0
% from FNVA				
1996	13.4	12.3	12.3	n.a.
2000	15.6	17.3	16.7	73.8
2004	19.4	21.8	18.0	42.1

n.a. not available, FNVA is negative.

4.3 Investment supports and other aids for the structural development

These measures are funded by the EAGGF guarantee section outside objective 1 region, and by the EAGGF guidance section inside objective 1 region (c.f. Council Regulation 1260/1999). Their general objectives are to compensate for the handicaps caused by natural disadvantages, to develop farming structures that improve the productivity and environmental sustainability of agricultural production and to encourage adoption of new technologies. The goal is to get farms out of the stagnation and low productivity trap. An important goal is also to encourage farm successions and enhance family farming. In Finland, the main support measures are equal across the sub-regions, while they in Sweden increase from the south to the north.[6] However, this will change from 2007

[6] Outside Objective 1 regions in Sweden, the measures Investment support and Support for the marketing and processing of agricultural produce are limited to a maximum of 30% of the costs incurred. Inside Objective 1 regions these measures follow a regressive sliding scale, implying that, in the southern part of Objective 1, costs up to 0.19 MEUR may be subsidised by 50%, costs from 0.19 to 0.36 MEUR by 35%, and cost from 0.36 to 0.40 MEUR by 30%. In the northern coastal part of Objective 1, costs up to 0.27 MEUR may be subsidised by 35%, costs from 0.27 to 0.36 MEUR by 25%, and cost from 0.36 to 0.40 MEUR by 15%. In the northern inland part of Objective 1, costs up to 0.19 MEUR may be subsidised by 50%, costs from 0.19 to 0.36 MEUR by 40%, and costs from 0.36 to 0.40 MEUR by 30%(c.f. SFS 2000:577).

when all these measures will by part of the RDP-program and financed by the new fund EAFRD (c.f. Council regulation No. EC 1698/2005).

Investment supports consist of interest supported loans, investment allowances and loan pay back guarantees. They are the main instruments in encouraging new investments of agricultural production facilities, such as cow barns. State loans, in which also the loan principal is provided by the government, are applicable only in negligible and northernmost cases, such as investments in reindeer husbandry in the Finnish Lapland. In the Finnish sub-regions, young farmers (below the age of 41), who have started farming less than six years ago, are entitled to a premium subsidy of 5 percentage points when they invest in production facilities. When measured at present value, the standard investment allowances and interest support for loans to young farmers account for up to 55% until May 2004. In May 16th 2004 the rate of investment aid for dairy, beef, sheep and goat production facilities was increased up to 65%, and for the young farmers up to 70% (Commission Decision 14/VII/2004). The supports are the highest for investments in dairy and beef cattle production facilities and the lowest for purchases of arable land. Since 2004, the support for land purchases has been 5% of the price paid.

In Finland, in 2000-2005, the largest number of funding decisions concerned loans for land purchases. In addition to the typical purchases of additional land, these cases included also the purchases of farmers' first farm (*i.e.* farm successions). The volume and the amount of investment aid is, on the other hand, the biggest in the constructions of cow houses. In 2005, about 50 million euros were granted for investments in cow houses and 17.5 million euros for investments in beef production facilities (Figure 4.1). In the pig sector, investment aid was banned in 2002. In May 2004 the ban was partially lifted so that funds were allocated only to the renovations of existing piggeries and to new investments in the piggeries of young farmers, who had recently started farming. In spring 2006 also these aids were taken into the ban. In the poultry production, the ban concerned mainly the egg production using cages.

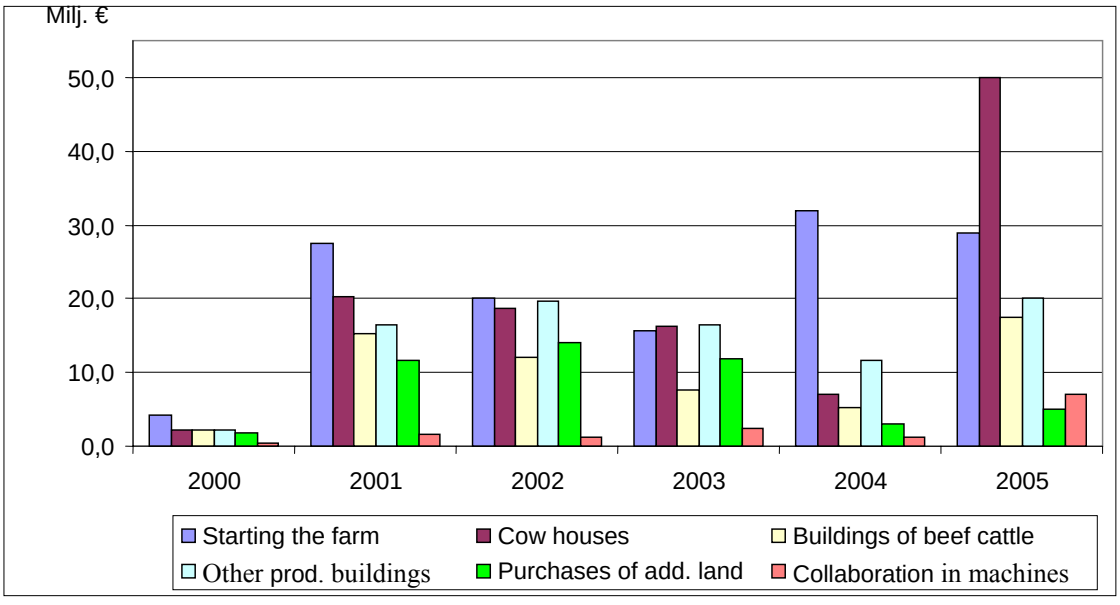


Figure 4.1 Amount of the investment aid granted to the most typical investment targets (mill. €) in the area of Nordic Aid in Finland in 2000-2005. (Tike 2006).

The amount of investments in the most typical targets is presented in the Figure 4.2. In 2005 the amount of investments has grown notably from the previous years. Purchasing of additional land

has been the biggest investment target and the cow houses the second biggest one. In 2005 the investments in the set up of farming has been as big as a year earlier. About 500 farmers have applied the aid for setting up (starting) farming, which accounts for 1.3 per cent share of all farms in the C-area.

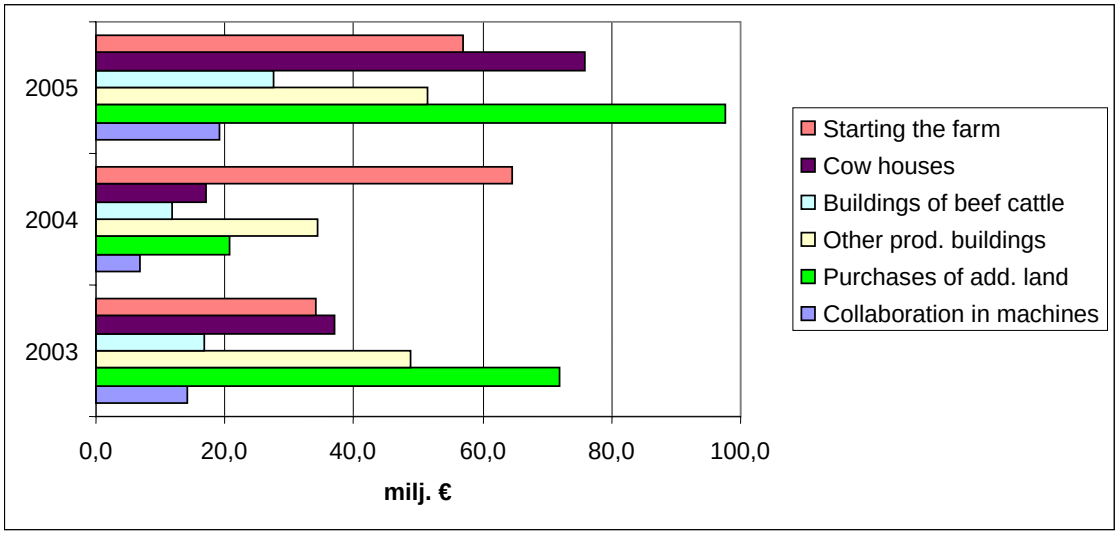


Figure 4.2. The total investment budget (mill. €) in the most typical investment projects which have received investment aid in 2003-2005 (Tike 2006).

The *start aid* has a goal of encouraging new entrants to take over farming business and, hence, provide continuity in the economic activities. New entrants, who are younger than 41 years and take over a farm for the first time, are in the Finnish sub-regions entitled to an allowance and interest supported loan for financing the purchase of their farm. The standard allowance is 25 000 EUR and the present value of the interest support of the loans is at the maximum of 25 000 EUR. Thus, the total support can add up to 50 000 EUR. In the case of animal husbandry farms and green house enterprises, the total amount of the support is 60 000 EUR, which consists of allowance 30 000 EUR and 30 000 EUR worth of interest support.

Early retirement programs are also linked to the farm succession and start aid. Since 1995, Finland has carried out farmers' early retirement programs within the EU framework for these programs (EC Council Regulation 1257/1999). At the beginning of Finland's EU membership, a special aid for the termination of agricultural production in the southern parts of the country was also applied. According to the regulations, the lower age limit for retiring farmers in farm successions was 55 years until 2005, when the age limit was raised to 56 years. When retiring by selling the land to another farmer, the age limit has been one year higher, 57 years. During the years 2004-2006 it was also possible for farmers aged 60-64 years to retire by renting out the fields. The early retirement benefits are farmer specific and depend on the level of pension insurance that the farmers have purchased over their active farming years. The payments also depend on the farm size and production line (Mela, 2003). Early retirement programs have not been applied in Sweden.

In Sweden, the funding for the programs for Norra Norrland and Södra Skogslänsregionen for the period 2000 – 2006, each amounted to about 1 000 MEUR in total. In Norra Norrland the EU contribution was 391 MEUR, while it was 356 MEUR in Södra Skogslänsregionen. Table 4.11, below, indicates how these funds have been allocated to agriculture in the northern part of Sweden during the years 2000, and 2005.

Table 4.11. Support funded by the EAGGF guidance section granted to the Swedish agriculture (MEUR) 1995, 2000, and 2005.

	Area	1995	2000	2005
Investment support	Norra Norrland Södra Skogslänsregionen	…	0.51 1.19	2.50 3.45
Start aid	Norra Norrland Södra Skogslänsregionen		0.17 0.28	0.53 0.44
Support for marketing and processing	Norra Norrland Södra Skogslänsregionen		0.00 0.00	0.75 1.00
Support to human capital investment	Norra Norrland Södra Skogslänsregionen		0.51 1.02	1.63 1.28

Source: SJV 2006.

As the table shows, the investment support is the most important of the different aids. During the program period 2000-2005 approximately 5.91-5.92 MEUR per year has been paid to beneficiaries in objective 1. Support for setting up young farmers and support for improving processing and marketing of agricultural products are not of significant importance in the Swedish sub-regions.

4.4 National support other than Nordic Aid

In addition to the above mentioned aids, the Finnish farms, also those located in the Nordic Aid region, have received support for producing starch potatoes, seed potatoes, seeds for grains, seeds for grass crops and honey. Immediately after Finland joined the EU, farmers, who had invested at the edge of the entry and had large debts relative to their assets, received an option to make excess tax deductions. The goal of these excess tax deductions was to improve farmers leverage ratios and ease their adjustment to decreased producer prices.

In Sweden, farmers in the Nordic Aid region receive national support for the growing of potatoes for consumption. In addition, national support is paid to reindeer producers, primarily to compensate for losses caused by accidents and predation. These support schemes amounted to 9.95 and 10.34 MEUR in total for the years 2000 and 2005, respectively.

To our knowledge, farmers are not entitled to any other significant tax waives or income transfers outside agricultural policy programs in addition to those mentioned above such that these tax waives or income transfers would differ from those paid or received by other entrepreneurs or workers.

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II ANALYSIS PART

1 Evaluation Approach

1.1 Introduction

The study follows an ex-post evaluation approach to investigate the direct and indirect effects of the Nordic Aid scheme. *Direct effects* refer to short term, immediate effects. They are often called static effects. An example is the short term contribution of Nordic Aid payments to farmer income. *Indirect effects*, on the other hand, refer to medium or long term effects. They are often called dynamic or behavioral effects. An example is the scheme's contribution to the maintenance of agricultural activity in the Nordic rural communities and it's implications for structural development in the agri-food sector. Indirect effects are, in particular, important for addressing the effects on sustainability of the results of the scheme. The indirect effects are also crucial for the efficiency of the measures in reaching the policy objectives that are set for the program. However, it is a challenge to identify and separate the effects of a certain policy measure from the common economic trends that would have occurred without the policy intervention, or that could not have been fully avoided even if policy intervention was at present.

The evaluation approach consists of four sequential steps; structuring, observing, analyzing and judging. The *structuring step* frames out the issue and intervention logic for the policy measures included in the Nordic Aid scheme. Since it is a mix of alternative policy measures, the measures are grouped according to their economic characteristics and according to their logic to intervene in farming and food processing businesses. These groups are defined and explained below. The structuring phase also takes into account that the sub-regions, in which the Nordic Aid measures are applicable, constitute a rich set of different natural, cultural and socio economic conditions. The importance of the Nordic Aid, amongst other agricultural policy programs, is particularly significant in the northernmost and most remote production areas, where the natural handicaps and constraints confronted by farmers are the most severe.

The *observing step* constitutes of the collection of data needed for addressing the 10 specific evaluation questions, which fall under five broader evaluation themes. The observing step involves both qualitative and quantitative aspects of the evaluation questions.

The objective of the *analytical step* is to identify the effects of the Nordic Aid scheme on agricultural activity. However, it is a challenge to identify and separate the effects of the policy intervention from the common economic trends that would have occurred anyway, or that could not have been fully avoided even in the absence of the scheme. In the absence of empirical data related to the counterfactual state of the policy (the outcome without the scheme), this evaluation utilizes a collection of quantitative economic models (e.g. the DREMFIA, the CAPRI, and the AgriPoliS) and a survey to identify and investigate the effects of the Nordic Aid scheme. The quantitative models are, except in the case of the FADN data, based on sub-region specific data that are sufficient for consistent examination of the contribution of the Nordic Aid scheme to certain economic behavior that affects the structure in the agri-food sector. The different models complement each other providing results from different perspectives to help answer the evaluation questions and help cross-check these answers. Contrary to the survey, the analytical models cannot be explicitly designed to address a specific evaluation question alone, or to cover issues of all evaluation questions, but they are essential in providing information that aid in addressing the evaluation questions.

In addition, it is judged to what extent, or under what assumptions, the evaluation questions can be answered. It is clear that, given the heterogeneity of data sources between Finland and Sweden, data are not fully consistent and do not allow one-to-one-mappings across the countries. This has to be accounted for in the evaluation. Therefore, the sub-region specific data should be understood as samples within which we can consistently observe and test certain empirical hypotheses. Sub-regions and farm locations are exogenous to the individual agents (the farmers) and using sub-region specific samples does not bias the results for the analysis. Nevertheless, the limitations and possibilities to generalize these results are discussed separately for each analysis later on.

The final step – *judging* – assesses to what extent the policy measures are implemented in effective and efficient way as well as the extent to which the objectives of the Scheme are relevant with respect needs. This phase makes the synthesis that is based on the observed data and the results of the quantitative analyses. The final step concludes with recommendations.

The analyses cover both Finland and Sweden, since the Nordic Aid scheme is applied (only) in these countries. The evaluation period starts from 1995, i.e. when Finland and Sweden joined the EU and the scheme was implemented for the first time, and extends to year 2005 when the data make it feasible. As the real purpose of an evaluation is to look forward, and CAP has undergone a fundamental revision by the decoupling of supports, also a future development scenario is

1.2 Rationale of the Nordic Aid Scheme

The European Council meeting in Luxembourg on December 1997 (European Council 2007) defined the European model of agriculture in the following way:

> *"European agriculture must, as an economic sector, be versatile, sustainable, competitive and spread throughout European territory, including regions with specific problems."*

Thus, the overall goal of EU is to provide opportunities for maintaining sustainable and competitive agricultural activities all over Europe. This general principle also applies to the northernmost areas in Europe. The primary tool for the achievement of this goal is the Common Agricultural Policy (CAP), for which the objectives have been specified as:[7]

(a) to increase agricultural productivity by promoting technical progress and by and by ensuring the rational development of agricultural production and the optimum utilization of the factors of production, in particular labour;
(b) thus to ensure a fair standard of living for the agricultural community, in particular by increasing the individual earnings of persons engaged in agriculture;
(c) to stabilize markets;
(d) to assure the availability of supplies; to ensure that supplies reach consumers at reasonable prices

However, the Commission has authorized Finland and Sweden to grant long-term national aid in addition to the measures under the CAP in specific regions (i.e. regions north of the 62nd Parallel and some adjacent areas south of that parallel affected by comparable climatic conditions). From the Community perspective, these national aids have, nevertheless, a secondary role. Thus, they are

[7] Treaty on European Union (2002/C 325/01 Title II Agriculture Article 33).

justified when the common European wide policies are insufficient for maintaining the common goals in the local economies.

The reason for the Nordic national aid is that these regions face natural disadvantages – short sowing, growing and harvesting seasons, and adverse topological conditions – rendering agricultural activity particularly difficult. The short seasons and the adverse topological conditions (resulting in small and scattered plots) decrease yields. Small and scattered plots also decrease utilization rates of fixed and quasi-fixed inputs, implying that new production technologies become less attractive. Now, the CAP, rather than remedying the effects of the natural handicaps, actually discriminates against the north. Until the introduction of the Single Farm payment in 2005, the arable land payments (being determined by regional reference yields) significantly decreased from the south to the north while the headage payments were the same all over the EU. After the CAP-reform, the Single Farm payment still remains correlated with the reference yields. Discrimination of the north is smaller though, since hectares allocated to pasture (which are larger in the Nordic Aid region) increase the payment.

The measures for rural development (pillar II of the CAP) do compensate the north for parts of the natural handicaps through the LFA-supports. However, the evidence at hand when Finland and Sweden joined the EU suggested that the amount of support from these measures would not suffice to compensate farmers in the Nordic Aid region for the loss of national support measures that had existed prior to the accession. Hence, without additional support, agricultural activities in the region could decline. This, in turn, may have further negative effects on the prosperity of the local communities since their low population densities and long distances to population centers suggest that it would be difficult to substitute agriculture with other gainful activities. In addition, it may be noted that a policy that maintains agricultural activity also links to environmental policy objectives. Accordingly, a case for extra resources (Nordic Aid) can be made from the above mentioned disadvantages and summarized as in Figure 5.1.

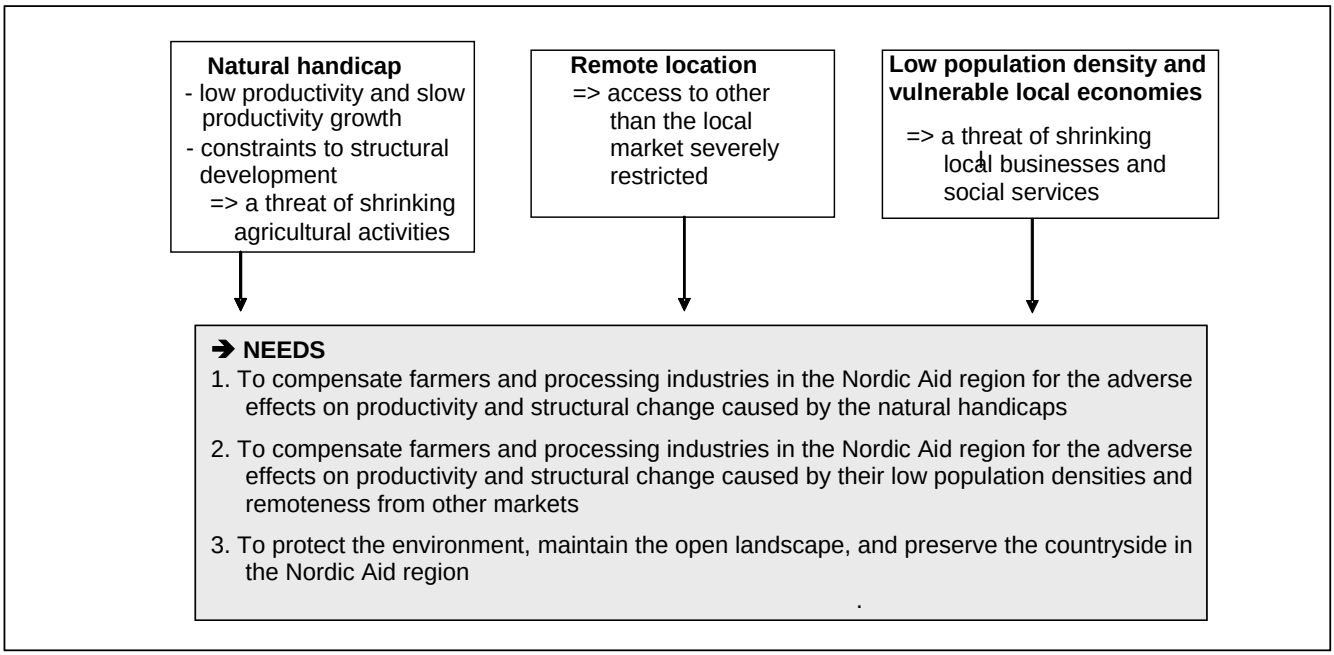


Figure 5.1. Agricultural needs as a basis for Nordic Aid.

1.3 Intervention logic –objectives, expected impacts and the results

Whether the Nordic Aid scheme is adequate or not depends on the measures contained (c.f. Table 2.1 in section 2 above). To aid in establishing this, the Commission has developed a generic model for the assessment of the so called *intervention logic* of policy measures. The process starts from the *needs* that have been identified. From these needs, a set of *general objectives* to be achieved by the policy are specified. The general objectives may be thought of as affecting the general structure of a specific sector or region. In the case of the Nordic Aid scheme the general objectives have been defined as (c.f. Act concerning the conditions of accession 1994, Article 142):

- to maintain traditional primary production and processing naturally suited to the climatic conditions of the regions concerned;
- to improve the structures for the production, marketing and processing of agricultural products;
- to facilitate the disposal of the said products;
- to ensure that the environment is protected and the countryside preserved.

Next, the general objectives are broken down into *specific objectives* to be achieved by specific measures contained in the policy. These may be thought of as affecting individual decision makers (persons, households, firms, etc.) who operate within the sector or region targeted by the policy. In the case of the Nordic Aid scheme, the specific objectives may, with due reference to the restrictions in the Commission Decisions 1995/196/EC (for Finland) and 1996/228/EC (for Sweden) be defined as:

- to enhance productivity and productivity development of farms and processing industries in the Nordic Aid region;
- to enhance the level and growth of rural incomes in the Nordic Aid region;
- to enhance the environmental sustainability of farming practices, e.g., intensity of production and the amount of fertilizer applications.

Finally, the specific objectives are used to construct a set of *operational objectives* to guide the administrators in their implementation of the intervention policy. That is, the operational objectives determine the rules of implementation needed to fulfill the specific- and general objectives. In the case of the Nordic Aid scheme, the operational objectives may be formulated as:

- to support farmers and processing industries in their application for aid-measures from the Nordic Aid scheme;
- to provide appropriate amounts of support to farmers and processing industries according to the conditions of the Nordic Aid scheme.

The *inputs* constitute the means by which the objectives are to be obtained, that is, the various measures contained in the intervention policy and the rules governing their application. In the case of the Nordic Aid scheme, the inputs consist of:

- the eligibility criteria for support from the Nordic Aid scheme;
- the budget for the Nordic Aid scheme and its allocation between the various measures;
- the administrative resources for the Nordic Aid scheme.

At each level, the policy measures undertaken are to be evaluated in terms of their *effectiveness* (a measure of the extent to which a specific objective is met) and *efficiency* (whether or not the policy measure is the best way to obtain the objective). Hence, corresponding to each set of objectives, a set of indicators that may be useful in this context is to be selected. For the operational objectives, natural indicators – termed *output indicators* – are in the case of the Nordic Aid scheme:

- the number of beneficiaries from each support measure;
- the amounts paid under each support measure.

Similarly, for the specific objectives, natural indicators – termed *result indicators* – are in the case of the Nordic Aid scheme:

- changes in the investment volumes of farmers and processing industries in the Nordic Aid region;
- changes in the sales volumes of farmers and processing industries in the Nordic Aid region;
- changes in farmer incomes in the Nordic Aid region;
- changes in the number of hectares cultivated with environmentally friendly and sustainable methods in the Nordic Aid region.

Finally, the general objectives, which concern the overall structure of agricultural activities in the Nordic Aid region, should be evaluated against indicators suitable for the assessment of structural change – termed *impact indicators*. In the case of the Nordic Aid scheme, the impact indicators may be defined as:

- changes in the number of farmers and processing industries in the Nordic Aid region;
- changes in the production patterns of farmers and processing industries in the Nordic Aid region;
- changes in the locations of farms and processing industries in the Nordic Aid region;
- changes in the area of arable land kept in active production in the Nordic Aid region;
- changes in the area of land with high environmental quality in the Nordic Aid region.

When proceeding from the needs to the general, the specific, and the operational objectives, it should be ascertained that they are *relevant* (i.e. that objectives are pertinent to the needs, problems and issues that are to be addressed at each level). Care should also be taken to assure that they are *coherent* (i.e. that they do not work against each other), not only within the Nordic Aid scheme but also with regards to the objectives of other schemes (such as the CAP). Coherence is a necessary, though not sufficient, condition for efficiency. Similarly, in order to attain effectiveness and efficiency of the policy measures applied, a prerequisite is that their outcomes are *consistent* (that is, that they progressively contribute to the realization of the impacts and the fulfillment of the needs). The final issue is that of *sustainability*, which relates to whether the policy measures applied result in durable and lasting benefits or not. Accordingly, the generic model, as applied to the Nordic Aid scheme, may be summarized as in Figure 5.2:

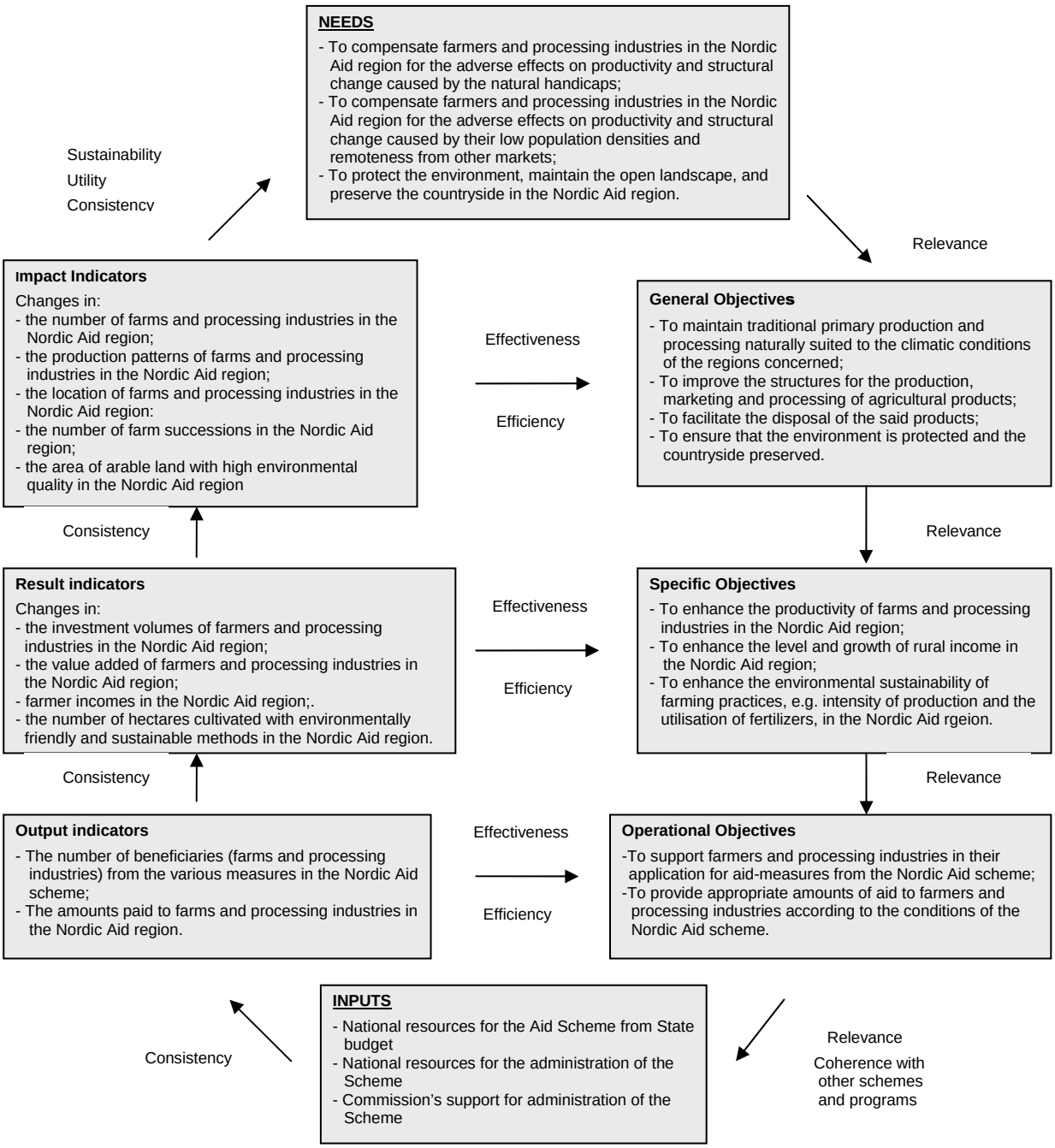


Figure 5.2. The generic model for the intervention logic applied to the Nordic Aid scheme.

In order to assess whether the Nordic Aid scheme satisfies the requirements of the generic model of intervention logic, the next section discusses the policy measures contained against the background of economic theory.

1.4 Economic theory and the link between the objectives and the policy measures of the Nordic Aid scheme

First, it may be noted from Table 2.1 that the Nordic Aid scheme contains measures targeted at several different production lines making it a colorful mix of interventions. However, they all share the common feature that they are coupled to production in some way. In this respect they are similar

to the measures applied under the CAP until 2005, when the de-coupled Single Farm Payment was introduced in Sweden as a substitute for the coupled crop-specific payments in Pillar I. In fact, as is apparent from the discussion in chapter 4 above, until 2005, most of the measures applied under the Nordic Aid scheme were also applied under the CAP. Only the transportation and storage supports and some crop specific supports, which do not play a dominant role in the spending, are unique as such for the Nordic Aid scheme. Nevertheless, since the mechanism through which these payments work is similar to that of other measures coupled to production, their expected effects are also similar.

The logic behind measures that are coupled to production in some way – either to the level of farm outputs, farm inputs, to the distribution of output or to production capacity – is that they increase the marginal net returns of production. Therefore, by increasing producer incentives, these measures are expected to facilitate the achievement of the specific objectives of developing and expanding agricultural and rural production activities which, in turn, are important conditions for achieving the general objective of maintaining primary production and processing naturally suited to the climatic conditions of the regions concerned.

However, the effects of the measures contained in the Nordic Aid scheme and the CAP on production quantities are a bit more complicated. The reason is that several of them are subject to quantitative restrictions. This is, for example, the case for the aid to milk production, the headage payments to bovine animals, to swine, and to poultry. The existence of quantitative restrictions may, if they are binding, result in the support being capitalized in quota rents with no effect on production quantities.

Figure 5.3 illustrates the theoretical impacts of measures coupled to production. For the sake of simplicity only the effects of the *price support* for cow's milk in the Nordic Aid scheme and the CAP, and the *investment support* contained in the rural development program of the CAP, are shown (the impact of the other measures can be analyzed in a similar fashion). The price support for milk consists of a supplement paid to the farmer at delivery. The investment support includes investment allowances, support for loan interest payments and pay back guarantees for loans. As noted in chapter 4, this support is based on a regressive sliding scale implying that large investments receive relatively little support. Hence, the investment support reduces the relative profitability of larger scale investments. The figure shows a simplified model of the regional market for milk as it functions in the Nordic Aid region. Naturally, the policy environment is very complex and this is captured in the analytical models applied in the analytical part of this report, but is not practical or desirable to show here.

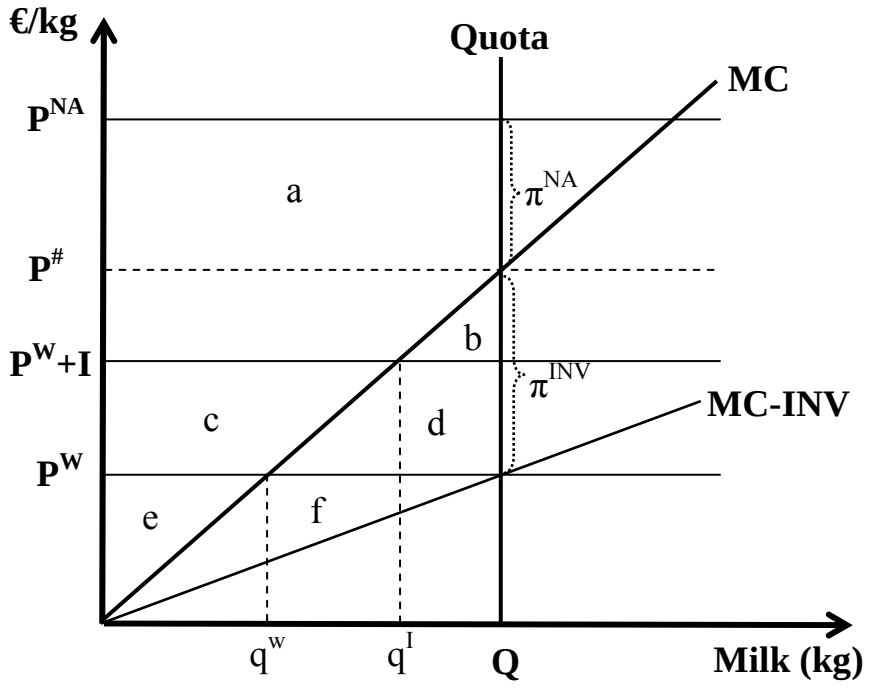


Figure 5.3. Aid and the market for milk.

The line *MC* represents farmers' marginal cost of production (MC), or supply function. The line p^W represents the world market price for milk. With a deregulated agricultural sector, farmers would face price p^W and produce quantity q^W. In reality, farmers receive price support for milk, which implies the relevant price for their production decisions is the price line, π^{NA}, with the level of price support represented by the amounts *I+NA*. The first component of price support represents EU's normal intervention price for milk, *I*, and the second, the additional support from the Nordic Aid scheme *NA*. To limit output, price intervention has been complemented with an output quota which is represented by the vertical line Q. Hence, Nordic farmers produce quantity *Q* to price π^{NA}. In addition farmers also receive investment support which has the effect of reducing the cost of production. This is illustrated by the marginal cost function shifting to the line *MC- INV* which lies below the true cost function *MC*.

With this simple model it is possible to analyze the economic impacts of Nordic Aid as well as the interaction between this scheme and other policy instruments that are part of CAP. Price support results in an increase of production. However, the increase in production cannot exceed the quota and is, hence, limited. Price support combined with a production quota results, moreover, in increased farmer profits (i.e., producer surplus) compared to the deregulated situation by areas a+c. Investment support results in additional profits equal to areas f+d+b because farmers do not bear the full cost of investment expenditures. Overall the different schemes result in increased welfare for Nordic farmers of a+b+c+d+f compared to a theoretically deregulated sector where their surplus would be area e: the difference between revenues at world market price p^W and production costs represented by *MC*. These are of course the direct and intended effects of Aid.

A secondary and less desirable impact of this policy package – that combines support to milk production with an output quota – is the quota rents. That is, the additional profits that farmers earn from the price and investment support capitalize into the value of quota via the milk quota market.

Since farmers need quota to be able to produce milk, the higher the profits from milk production, the higher the cost of purchasing quota and, hence, of becoming a milk producer or expanding output. In terms of Figure 5.3, the marginal quota rent is equal to $\pi^{INV} + \pi^{NA}$, whereby π^{INV} is the rent attributable to investment support and π^{NA} to price support (note, the relative magnitudes shown in the diagram are only meant to convey principles and not to be reflective of reality which is an empirical question).

The existence of quota rents has two important implications for the analysis they create; a) a capital asset for existing farmers: the value of their milk quota on the quota market, and b) a production buffer: an initial reduction in aid or prices will result in reduced quota rent rather than reduced output. That is, production will only be affected once quota rents fall to zero, after which farmers will reduce output (in response to further reductions in profitability) until the marginal cost of producing milk is equal to its price, given profit maximizing behaviour. In terms of Figure 5.3 a marginal reduction in p^{NA} (i.e., caused by reduced Nordic Aid) would result only in a reduction in the size of the quota rent π^{NA}, whilst output would still remain at the level of the quota (the buffering effect). However if the price of milk falls below $p^{\#}$, the bite price (ignoring investment support to illustrate principles), the quota rent π^{NA} will fall to zero and farmers will respond to further reductions in aid by reducing output. In the case of a 100% reduction in aid, the producer price would fall to the CAP intervention level p^W+I, and output from Q to q^I. Of course if the relevant supply curve for farmers is *MC-INV* then elimination of aid would have no impact on output. Hence, it is not self evident that support from the Nordic Aid scheme has the intended effects on production and rural incomes. In theory, it might all have ended up in higher quota prices. Whether or not this is the case, depends on if the quantitative regulations on production have been binding, which is an important empirical question to be addressed in the evaluation.

Now, if production levels do increase as a result of the coupled support measures, then the use of inputs will also be higher, both of variable inputs such as fertilizers, pesticides and feed, and of production factors such as land and labour. This, in turn, has implications both for the natural environment and for rural development. Higher use of pesticides and fertilizers is believed to be detrimental to the environment but the effect may vary considerably according to local conditions. Maintenance of the "open" landscape is, on the other hand, expected to have a positive environmental effect. The extent of these effects will be analyzed by use of agricultural sector models.

It should also be underlined that Figure 5.3 illustrates only, in a simplified way, how the aid operates in principle. The actual effect of the removal or reduction of the Nordic Aid scheme will depend on local conditions: the slope of the supply curve, which varies across regions reflecting natural handicaps and the level of aid which is differentiated across the regions. Accordingly, it is possible that the effect could be different for different regions/commodities. This is again an empirical matter and will be addressed by the use of the agricultural sector models explained later on in the chapter. Though the figure only includes some of the measures which are used in the Nordic Aid scheme and the CAP, it does illustrate the interaction of different types of measures. Regarding production quantities, the price support for milk from the Nordic Aid scheme reinforces the effect of the general price support for milk within the framework of the first pillar of the CAP, and the effect of the investment support in the RDP. The milk quota, though, limits production expansion and hence operates in the opposite direction. Including remaining measures would make the interaction more complicated to follow. This is facilitated by the use of agricultural sector models applied in the evaluation below.

2 Evaluation tools for the quantitative analyses

The quantitative analysis involves a collection of quantitative studies that have the power to identify the economic and behavioral implications of the Nordic Aid. Different approaches and models are used and the issues are looked at from different perspectives, because quantitative identification of the effects of a certain mix of policy tools, such as the Nordic Aid scheme, from common economic trends and systematic shocks poses a challenge. Static data descriptions do not reveal the behavioral implications caused by the policies.

A collection of quantitative models are used to identify the different effects of fully decoupled, partially decoupled (e.g. entitled to certain land use) subsidy payments, and traditional price supports (e.g. premium subsidy for milk price). Thus, the models enable us to judge the effectiveness of different policy instrument in reaching the goals of the Nordic Aid scheme and also to address their effects on markets, which is crucial to judge the implications that these programs have on economic efficiency. The results of the quantitative analyses establish strong grounds for answering the evaluation questions.

Broadly stated the quantitative impact analyses involve the utilisation of three types of economic models and modeling approaches: *mathematical equilibrium models (1), econometric farm models (2), and input-output model (3)*. Each of these three modeling approaches is described below. The mathematical equilibrium models and econometric models are described in a general manner, scientific documentation can be found in the provided references. The general description highlights motivation and the main characteristics of the modeling approach at questions.

Please note that the data and information generated by the surveys and case studies (see chapter 7 below) is not entered, as such, in any of the quantitative models. Instead, these survey results are used as complementary information making judgments and conclusions with regards to the impacts, efficacy and efficiency of the Nordic Aid scheme.

2.1 Mathematical equilibrium models

Mathematical equilibrium models are partial equilibrium models developed and maintained by the contractors. In this evaluation project, they are employed and simulated to assess the effects of Nordic Aid scheme on input use, land use, animal production, farm structures, investments and agricultural income in different regions. Information about certain environmental effects of Nordic Aid schemes is also received.

A modelling approach is valuable for the evaluation of the impact of Nordic Aid because there is otherwise no knowledge of how agriculture would have developed in the absence of Nordic Aid. Modelling allows this to be done in a scientific manner. Models used in this evaluation have been calibrated to observed production levels, farm structure etc in using official data sources (i.e., reflect conditions in the analysed areas during the period the aid was paid). Both CAP and Nordic Aid instruments have been used in the calibration procedure. Hence the influence of Nordic Aid on current farm structure, activity levels and the environment can be evaluated by varying Aid parameters whilst holding other policy parameters constant. When structural change is analysed, the analysis is done in a dynamic context because structural change is a dynamic process.

Optimization approach in partial equilibrium modeling of agricultural sector is traditionally strictly based on neo-classical equilibrium theory which assumes perfect rationality, i.e. producers maximise profit and consumers maximise their utility. In the basic standard form of optimisation of consumer and producer surplus, perfect competition is assumed (Hazell and Norton 1986, p. 164-168, 178). Policy analysis using static mathematical programming partial equilibrium models is performed as follows.

1. First a model is solved and validated for a given base year. The outcome of the model with given base year level of production, input use and prices should correspond to base year supply and demand, as well as product and input prices (if endogenous). The known base year is assumed to correspond to an economic equilibrium where economic agents have adjusted optimally to prices of inputs and products through their production and input use decisions. As a result the market clearing prices in the model replicates observed product prices. Differences between the actual base year and the model outcome are made as small as possible by model validation, i.e. checking the model structure and values of some behavioural parameters and other not fully captured by official statistical sources. Positive mathematical programming approach taken in the CAPRI model creates exact validation to a base year utilising non-linear cost functions.

2. Policy scenario is determined by given values for policy parameters or some other economic or technical parameters in the model. The model is solved for the policy scenario. A new set of supply, demand and prices are obtained as a solution.

3. The outcomes of base run and policy run are compared and conclusions of the effects of alternative agricultural policies or other changes are made based on this comparison. In optimisation approach, marginal values of some constraints, representing land or quota prices, for example, can be compared. The method of analysis is comparative statics.

Production technology, support systems, fixed production factors and resource constraints and capacity levels can also be modeled directly. Physical linkages between crop and animal production can be modeled explicitly, together with production quotas and set aside regulations.

Explicit optimization of producer and consumer surplus produces the efficient allocation of consumption and production. Comparing different outcomes when running the optimisation model for different policy scenarios, for example, is consistent with standard economic theory. Comparing results of different policy scenario outcomes with the base year outcome one may make conclusions concerning the effects of agricultural policy on production volume, production allocation, and farm income.

Three different mathematical equilibrium models are used in the analysis:

- Dynamic regional sector model of Finnish agriculture (DREMFIA), (Coverage: Finland)
- an agent-based spatial model AgriPoliS, (Coverage: Sweden)
- the Common Agricultural Policy Regional Impact model (CAPRI) (Coverage: Sweden).

DREMFIA, CAPRI and AgriPoliS have been developed previously involving a substantial effort and many man-years of work. The models represent state of the art in the research on agricultural sector modeling. Due to the complexity of the models and the limitation of space it is not possible to give a full description of the technical details involved. Presentation below focuses, instead, on the main features of the models and, in particular, on the issue how the models will be used in the evaluation work. A comprehensive scientific documentation can be found in the reported reference literature, (see References). All three models have previously been applied to analyse issues that can be deemed similar to the questions posed by this evaluation, for instance, the impact of agricultural policy reforms. References to those applications are also given. The main features of the

mathematical equilibrium models used in the evaluation of the Nordic Aid scheme are summarized in Table 6.1.

Table 6.1. The main features of the mathematical equilibrium models in a comprehensive fashion.

Panel A	**Type of model**	**Coverage**	**Commodities included in production**	**Commodities in consumption**	**Agricultural policy instruments modelled**
DREMFIA	Dynamic recursive spatial price equilibrium model	Finland divided in 18 regions, 14 of which in Nordic Aid region	Major agricultural commodities, milk and sugar processing, no sheep, no horticulture	18 processed milk products. Domestic and imported products treated as imperfect substitutes	Exact specification of support regions and policy instruments: CAP, LFA, Nordic Aid, other national aid and environmental support
CAPRI	Comparative static, partial equilibrium, non-linear programming model	250 regions in EU27 of which 8 in Sweden, 3 in Nordic Aid. 15 country aggregates ROW	All major agricultural commodities, milk and sugar processing	4 processed milk products. Domestic and imported products treated as imperfect substitutes	Direct payments and all market instruments included in the CAP, Nordic aid to milk
AgriPolis	Agent-based spatial simulation model	Two separate regions in Sweden, one in Nordic Aid region and one outside	Most important production activeties in the regions	Not applicable	CAP price support, investment support, Nordic aid to milk
Panel B	**Objective function, restrictions**	**Time framework**	**Special features**	**Data sources**	**Output variables**
DREMFIA	Maximisation of producer and consumer surplus subject to arable land and feed requirements, production quotas	Dynamic model, steady state equilibrium in a 10-15 years period	Model of technology diffusion facilitating endogenous technical change. Trade of milk quotas and milk quota pricing	Official national statistics, Extension service organisation (Pro Agria), FADN	Land use, number of livestock, production volumes, yields, consumption, exports, imports, domestic prices, farm income, land and quota values, nutrient balances, biodiversity indicators
CAPRI	Maximisation of producer and consumer surplus subject to arable and grassland, feed requirements, NPK balances, production quotas	Trend projections from the base year to the simulation year	Positive mathematical programming, calibration to base year	EUROSTAT, FAO, expert data	Land use, number of livestock, production volumes, yields, consumption, exports and imports, farm income, welfare, land and quota values, nutrient balances, green house emissions
AgriPolis	Profit maximisation from agents interacting on factor and product markets	Dynamic model	Modelling of structural change, individual farms represented	FADN, regional statistics, national expert data	Number of farms, farm size, land use, livestock numbers, farm income, land rental prices, nutrient balances, biodiversity indicators

2.1.1 DREMFIA

This is a dynamic recursive model which simulates rational economic behavior and the effects of various agricultural policies on land use, animal production, farm investment and farmers' income. The model consists of two major parts:

(1) a technology diffusion model which determines sector level investments in different production technologies, and
(2) an optimisation routine which simulates annual production decisions (within the limits of fixed factors) and price changes, i.e., supply and demand reactions, by maximising producer and consumer surpluses subject to regional product balance and resource (land and capital) constraints.

The optimisation model in DREMFIA is a typical spatial price equilibrium model (see e.g. Cox and Chavas 2001) except that no explicit supply functions are specified (i.e. supply is a primal specification). Furthermore, foreign trade activities specific to 4 main regions are included in DREMFIA. The Armington assumption (Armington 1969), which is a common feature in international agricultural trade models but less common in one-country sector models, is used. Imported and domestic products are imperfect substitutes, i.e., endogenous prices of domestic and imported products are dependent. There are 18 different processed milk products and their regional processing activities in the model. Milk fat, protein and casein are used in production in 18 different dairy products.

Technical change and investments, which imply evolution of farm size distribution, are modeled as a process of technology diffusion. Investments are dependent on economic conditions such as interest rates, prices, support, production quotas, and other measures imposed on farmers. The use of variable inputs, such as fertilisers and feed stuffs, is dependent on agricultural product prices and fertiliser prices through production functions. The nutrients from animal manure are explicitly taken into account in the economic model. Feeding of animals may change provided that nutrition requirements, such as energy, protein, phosphorous and roughage needs, are fulfilled.

Calibrating the unobserved parameters of the investment model is a significant part of the overall validation of the model. Price changes in 1995–2005 have been validated through calibrating the unobserved parameters in the Armington system and in export cost specification (see Lehtonen 2001, 2004 for details). The model is built to reach a steady-state equilibrium, in terms of production volume and regional location of production, in a 10–15 year period given no further policy changes. While certain features in the model facilitate adjustments of both fixed and variable factors of production, fixed production factors and animal biology make immediate adjustments costly. However the role of optimisation and hence the equilibrium properties of DREMFIA are strong and the production structure may change substantially over time since also fixed production factors may adjust policy changes.

2.1.2 CAPRI

Common Agricultural Policy Regionalised Impact (CAPRI) is a multi-purpose modeling system for EU's agriculture. The system has been designed to allow for a broad spectrum of policy analyses, including changes in market policies and premium systems. CAPRI is a partial equilibrium non-linear mathematical programming model for the EU25 agricultural sector, plus Bulgaria and Romania, composed of interlinked supply and market modules (see details in Britz 2005). The CAPRI model has been used for numerous policy analyses (see for instance Ekman 2005). The SLI team has previously conducted analyses of removal of the milk quota and of the impact of the MTR reform, (Jansson 2002, Bäckstrand 2003).

The CAPRI model is solved by iterating supply and market modules. The supply side module consists of 250 separate, regional, non-linear programming models. Each NUTS II region has its own model. Resource allocation in the regions is based on profit maximising behavior. A two-stage decision process is applied, where farmers first determine the optimal variable input coefficients per hectare, or head, for given yields, and then determine the profit-maximising bundle of crop and animal activities, at the same time as minimising feed and fertiliser costs. Supply for each product is modeled using non-linear cost functions, where the nonlinear part is calibrated to exogenous supply elasticities. The cost functions are also calibrated to a base year, to make the model represent observed behavior. The existence of land-, fodder and young animal balances contribute to interconnecting production activities across sub sectors and regions, thus distributing the effects of policy changes both spatially and over different sub-sectors via capitalization and price effects. The constraints comprise of arable and grass land, feed requirements (energy, protein, and fiber), N, P, K balances, set-aside obligations and production quotas. The objectives account for revenues from selling products, costs from buying variable inputs, (fertilizer, plant protection, feed etc.) and costs for other production factors (capital, labor, information).

For non-EU regions, supply is modeled slightly differently, using a normalised quadratic profit function and a simpler model structure based on elasticities borrowed from other sources. The basic behavior of the function is, however, similar to the behavior of the quadratic programming models in the EU.

The market module consists of a multi-commodity world market with bilateral trade flows, and attached prices, between 14 aggregates of major trade blocs, plus the EU. In addition to bilateral tariffs, the market module incorporates producer and consumer subsidy equivalent prices wedges, and for EU15, intervention stocks, tariff rate quota (TRQ) mechanisms and export commitment restrictions under the WTO are modeled. Demand is modeled using a Generalised Leontief Expenditure system (Ryan and Wales 1996) combined with an Armington approach (Armington 1969). A central feature of this approach is that intra-industry trade can be taken into account by letting consumers view domestic and imported goods as less than perfect substitutes, and the Armington assumption is commonly used in Computable General Equilibrium Models (see for example Bowen et al. 1998).

2.1.3 AgriPoliS

AgriPoliS is a spatial and dynamic agent-based simulation model of structural change in agriculture (Balmann 1997; Happe et al. 2006). The core idea is the understanding and modeling of an agricultural system as an agent-based system (ABS) in which farms are interpreted as individual agents. Thus in an ABS it is possible to represent individual farms—as in reality—as heterogeneous agents that are situated in an environment in which they interact, co-operate, and exchange information with other agents that have possibly conflicting aims (e.g., competition for land). Farm agents are assumed to maximize profits (or net farm income from farm and off-farm labour). In this way it is possible to develop a stylized picture of the agricultural sector in a specific region (for the purposes of the evaluation Västerbotten county in Sweden) in a one-to-one manner as a computer model, which can then be used to simulate changes in the composition of the region being modeled.

AgriPoliS maps the key components of regional agricultural structures: heterogeneous farm enterprises and households, space and landscape, markets for products and production factors. These are embedded in the technical and political environment (i.e., parameters of the model). An additional advantage of the agent-based modeling approach is that it is possible to avoid some limitations of more traditional modeling approaches (such as partial or general equilibrium models,

econometric models, and pure mathematical programming models) which neglect or only partially represent a number of potentially important characteristics of the agricultural sector, for instance; the immobility of land, heterogeneity of farms, interactions between farms, space, dynamic adjustment processes as well as dynamics of structural change. As AgriPoliS is a spatial model it is also well suited for analysing environmental impacts such as biodiversity, landscape mosaic and use of polluting inputs. Most recently AgriPoliS has been used for evaluating the impacts of decoupled agricultural support in a large number of representative regions across the EU-25 (Brady et al. 2007; Sahrbacher et al. 2007)

2.1.4 Choice of scenarios and evaluation questions addressed

As indicated previously the use of the models in an analysis of the effects of certain policy, in our case the effects of the Nordic Aid, consists of a comparisons between the baseline version of the respective model, which represent the historical situation, and an alternative scenario(s). In order to assure comparability of the results, similar scenarios were simulated for Sweden and Finland. Ideally, the scenarios should be identical. However, due to the fact that the models differ with respect to the time framework this was not fully possible. Moreover, in case of Finland, where support accounts for a considerably higher share of the incentive price/payments a scenario with a lower reduction of support (50%) was simulated in addition to the scenario with a removed support. This scenario can be seen as a check of the robustness of the results.

An analysis of the effects of the Nordic Aid implies a comparison between a situation with Nordic Aid and without such an aid for the period 1995 to 2005 where the Nordic Aid was in place alongside with other policy instruments included in the CAP during this period. However, the CAP has undergone a fundamental revision, a decoupling of the support, which has been implemented from 2005 or 2006 onwards. Due to this revision conclusions which will be arrived at while analyzing the period 1995-2005 are not longer valid for the judging effects of the Nordic Aid at present and in the future. Because a real purpose of any evaluation is to look forward, this is a serious drawback. Accordingly, in order to investigate the present and future effects of the Nordic Aid additional scenarios were introduced, where the CAP payments were decoupled. This scenario represents the CAP that is now applied. The scenarios are summarized below.

1. **Baseline scenario**: 1995-2005 with actual Nordic Aid payments and actual CAP payments (i.e. fully implemented Agenda 2000). In case of Finland, the DREMFIA model can be applied directly to this period. In Sweden, CAPRI, which is a comparative static model, uses year 2009 as proxy for the period in question. AgriPolis uses period 2001-2009 as a proxy.

2. **No support scenario**: as above but with Nordic Aid totally removed.

3. **Low support scenario**: 50% of Nordic Aid removed, and only in Finland

4. **Future development scenario**: period beyond 2005 and forward (depending on the time framework of the respective model), with removal of Nordic Aid and decoupled CAP payments fully implemented by the 2003 reform.

5. **Additional special scenarios**: removal of investment support (in AgriPoliS) and decoupling of Nordic Aid (in DREMFIA)

In Table 6.1, Panel B and last column, output variables of the different models are described. This indicates which evaluation question can be answered by respective model. In Table 6.2, placed at the end of this chapter, all the quantitative tools that will be used while evaluating the Nordic Aid scheme are addressed to relevant questions within different Themes.

2.2 Econometric farm models

Econometric farm models are used, as statistical tools, to identify and test for the

(iv) spatial productivity differences in agricultural production between different sub-regions
(v) determinants of farm land allocations and
(vi) determinants of farm successions, i.e. factors affecting farm transfers from elderly farmers to the next generation.

These econometric farm models provide valuable pieces of information and important contribution in the evaluation task, in addition to the above described mathematical equilibrium models. Specific phenomenon, such as the economic effects of certain farm support payments, cannot be separately identified by looking at the unconditional patterns and trends in the observed data, because economic phenomena often move hand-by-hand with the passage of time. Econometric models, on the other hand, have the power to identify separately and make inference about the effects of farm support payments, as observed in the data, by keeping other economic factors constant (*ceteris paribus*). In statistical terms, the econometric models allow us to estimate conditional means for the objective variables and, more importantly, the response of these conditional means with respect to conjectured changes in the farm support policies. It has to be noted, however, that the econometric estimates hold best around the sample means of the data and, therefore, the results should be interpreted as implications caused by marginal changes in support policies and other model variables for representative farms.

In addition to the behavioural implications of the support schemes, the productivity analysis is a powerful tool to address the extent and spatial differences of natural handicap and, therefore, the grounds for the Nordic Aid scheme.

Overall the results of econometric analyses provide valuable information, in particular, for addressing Theme 1 *"maintaining agricultural activity and improving structures"* and especially the evaluation questions 2 and 3.

The analyses are carried out by using the modern and advanced estimation techniques, which meet the international scientific quality standards. With regards to the productivity analysis, the authors have published the results based on similar models in different contexts in high quality scientific journals (e.g. Kuosmanen et al. 2004; Kuosmanen et al. 2006; Sipiläinen & Ryhänen 2004). Also the farm succession analysis draws in extensive analyses published in highest ranked agricultural economics journals (Väre 2006, Pietola et al. 2003) and in a large set of specifications published in the monograph of Väre (2007). Interested readers are recommended to look at this literature. Technical appendices covering the quantitative analyses are also available from the authors upon request.

2.2.1 Productivity analysis

Productivity is a physical measure that measures the ratio of farm outputs to farm inputs:

$$\text{Productivity} = \text{Farm Outputs} / \text{Farm Inputs}$$

In other words, productivity measures the ratio on how the farm inputs are converted to the farm outputs. The larger the amount of farm outputs is at a given farm input level, the higher is the productivity of that farm.

The first goal of the productivity analysis is to estimate the spatial productivity differences across Sweden, Finland and Denmark. The second goal is to estimate on how much the different support measures have shrunk down the spatial productivity differences and, further, are there signals that Nordic Aid scheme provides excess compensation for the farms located in the northern areas. Excess compensation would imply that the Nordic Aid would be larger than the spatial productivity differences and, thus, provide better competitive position for those farms that are eligible for the Nordic Aid as compared to those farms that are not eligible for the aid.

The most important factors that determine farm productivity are natural conditions, the size of the farming operation, and farmers' managerial goal to optimize farm input usage. Especially natural conditions usually referred to as the natural handicap, play a significant role in the Nordic agricultural production. Spatial productivity differences between the farms located in different sub-regions are, therefore, amongst the most important criteria to judge the economic grounds and implications of the Nordic Aid scheme.

It is known that policies affect farmer behaviour, such as farm input choices, adoption of new technologies and mix of farm outputs, which in turn have implications to the productivity of farm production as a whole. Therefore, the implications of the farm size and farmers' managerial goal to optimize are controlled for, when the extent of natural handicap from the spatial productivity differences is estimated.

The effect of farm size is controlled for and factored out in the analysis such that, for example, the productivity difference between farms in Nordic Aid regions and Denmark is estimated at the farm size that is equal across the compared regions. The general principle of the productivity estimation and regional comparisons, in terms of region 1-3 specific production functions, are highlighted in Figure 6.1 The farmers' managerial goal to optimize, on the other hand, is controlled by using pre-determined (lagged) model variables. Therefore, the spatial variation in farm size and farmers' optimization behaviour do not bias our results concerning the spatial variation in the extent of natural handicap.

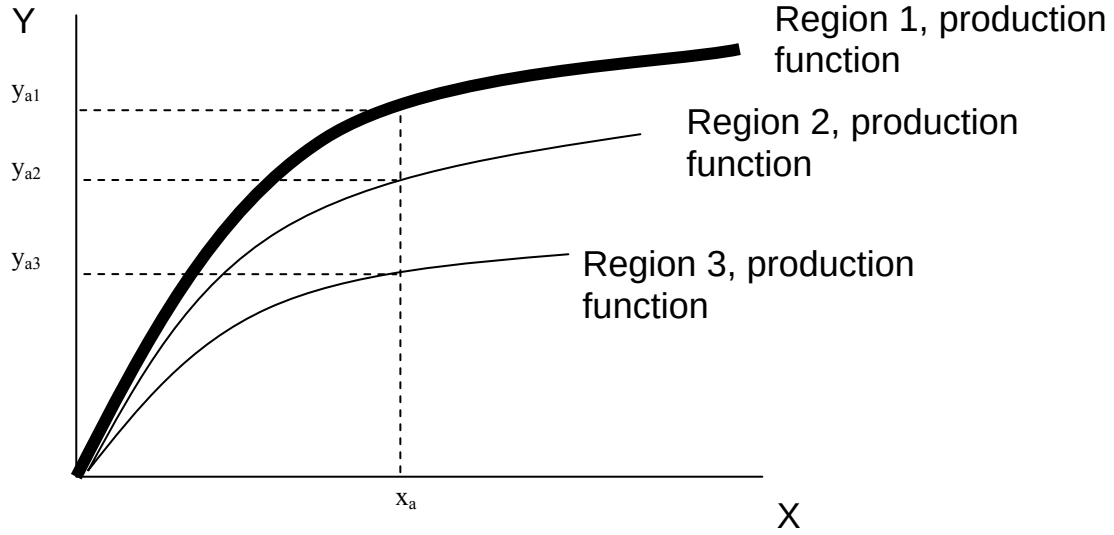


Figure 6.1 A schematic figure on measuring output (Y) differences between artificial regions 1-3, at given input level (X). Any point of input x usage (x_a) could be chosen for measuring the output on the region's estimated production function.

The productivity analysis involves estimating production functions and frontiers, which describe the physical input-output relations on the farms as highlighted in figure 6.1. In addition to applying conventional inputs (e.g. fertilizers, purchased feed, labour), our model specification allows the production technology to be affected by subsidies. Subsidies involve arable land payments, animal headage payments and price supports for milk. The support payments can be thought to artificially increase farm output and, therefore, they can be identified as factors shrinking down the spatial productivity differences.

The data are the FADN dairy farms of three Nordic countries: Denmark, Finland and Sweden. Although only in Finland and Sweden there are regions that are entitled to Nordic Aid, Denmark, Southern Finland, and Southern and Central Sweden serve as benchmarks for the evaluation of the productivity estimates. The number of farms in the analysis is altogether 7502 and the sample period under study covers 1997 – 2003.

2.2.2 Land allocation effects of subsidies on dairy farms

With respect to supply, market, and environmental effects, the FADN dairy farm data are used to estimate the response of land allocations with respect to commodity specific market supports (e.g. in milk) and alternative schemes that include direct income supports. It is a justified option to estimate supply response through land allocations, because in the most northern areas of Europe supply shocks caused by the exceptional weather conditions may dominate the effects of endogenous farmer choices in farm supplies. The models will be defined consistently and comparably for Nordic Aid and other areas.

The same FADN data of 7 502 dairy farms are applied in the analysis of land allocation responses to changes in prices and subsidies. The data are complemented with the necessary information about prices and/or price indices. Land allocation decisions are estimated jointly with the demand for purchased feed. As above, potential bias caused by farmer optimization behaviour is controlled for by using pre-determined (lagged) values.

In practice several constraints slow down the farmer's ability to fully adjust to price or policy changes. Thus, land allocation decisions are modelled as a function of constraints, current prices and subsidies. The constraints cover fixed factors like the technology and the total land area.

2.2.3 Farm successions - transfers from elderly farmers to the new generation

The farming household's decision between farm closure and succession is one of the most important factors in steering the long term structural development in agriculture. Thus, the analysis on farm successions has a goal to estimate the impact of Nordic Aid on the structural development and continuity of family farming in the North.

An econometric farm household model is used to simulate the effects of arable land subsidies and market price supports on the likelihood (probability) and timing of farm closures and farm successions. A farm closure is realized if the farmer retires and closes his/her farm as an independent operation either by selling or by leasing his agricultural resources (land etc.) to a neighbouring farmer who expands his/her farming operation. Farm succession, on the other hand, is realised if the elderly farmer retires and transfers the farm to the next generation. In this case, the farm continues as an independent farm and economic unit.

The timing of farmer retirement is modelled as the optimal timing to stop farming and to start collecting the retirement benefits. For those elderly farmers, who meet the age requirements in the retirement programs and retirement is a feasible option; the optimal retirement time depends on the

difference between returns from farming and retirement. The farmer's returns to farming are augmented, in addition to farm characteristics and other exogenous variables, by two separate farm support variables. The first variable is the de-coupled direct income supports, normalized by the farm's arable land area. The second support variable is the price index for farm output, measured at farm gate prices. It includes the price supports for milk and is also indirectly affected by other market intervention programs that maintain the producer prices above their open market equilibrium levels. Thus, both of these farm support variables consist from the sum of Nordic Aid and other support measures. The marginal effects of changing Nordic Aid schemes, while keeping other support measures unchanged, can be inferred from these model variables.

Recall that the de-coupled arable land payments are expected to be de-coupled from most short term production decisions. However, they are not expected to be de-coupled from decisions on farm successions and from the long term structural development of Nordic agricultural sectors. It may be further expected that farmer expectations with regards to the price supports and de-coupled supports differentiate and, hence, these two support measures may have different effects on farm successions and continuity of family farming.

The models are estimated using representative pension insurance data, and due to extensive data requirements this analysis is feasible only in Finland. The sample period runs from 1993 to 1998. A detailed, technical description of the model and the data are found in Väre (2007).

2.3 Input-output matrices

Input-output (I-O) models are used to estimate the importance and spill-over effects of agricultural production and agricultural holdings in local industries and economies. These methods link the agricultural input and output processing industries in the analysis. I-O analysis is especially useful in looking at the role of agriculture and processing industry in a regional economy and the secondary effects that may spin off from a change in agricultural activity. I-O analysis with sophisticated model modifications (Knuuttila & Vatanen 2003) enables detailed information to be produced also on the effects of Nordic Aid schemes on local economies. The regional input-output matrices required for the analysis are available only for Finland and, thus, the analysis restricted to Finland.

The Input-Output methodologies used to estimate the spill-over effects of agri-food sector follow two approaches: the final demand approach and the sector definition approach (total-flow perspective). The final demand approach begins by estimating the consumption (final demand) of food and fiber and then works back through the sectors using an input/output table to determine the amount of output from other sectors required to produce the final demand. In contrast, the sector definition approach begins with the value of raw farm material produced. Then, the value of the inputs required to produce the raw material as well as the value added in the food and fiber processing and distribution sectors are accounted for (Szyrmer 1986, 1992).

I-O analysis uses a matrix representation of a region's economy to predict the effect of changes in one industry on others and by consumers, government, and foreign suppliers on the economy. The quantities of input and output for a given time period are entered into an input-output matrix within which one can analyze what happens within and across different sectors where growth and decline takes place and what effects various subsidies may have. Changes in the supply of agricultural raw materials will induce changes in activity levels in the corresponding processing industries (meat, milk, grain milling etc.) with potentially significant employment and income effects.

Following the I-O analysis, there are three distinct effects that occur as money flows through an economy: direct; indirect; and induced. The activity directly tied to agricultural production and processing (*direct effect*) shows only part of agricultures contribution to the state economy. The *indirect effect* is the production by other sectors of goods and services used in the production of food and fiber; *the induced effect* is the impact on household spending of income earned in direct and indirect production. The direct, indirect, and induced effects are incorporated into the *multiplier effect*. The multiplier effect is defined as the relationship between some initial change and all the succeeding economic activity that is generated as a result of that initial change. An economic impact analysis is based on the concept of the multiplier effect and traces the spending that occurs as a result of some initial activity, in this case agricultural production, throughout the economy.

2.4 Summing up the quantitative evaluation tools

In Table 6.2 all the quantitative tools that will be used while evaluating the Nordic Aid scheme are addressed to relevant questions within the different Themes. Please not that one **x** indicates a partial answer or indirect evidence for answering the question while **xx** indicates a direct answer to the question. As could be seen, not all questions and themes are addressed by the quantitative tools; this is especially the case regarding Theme 2, 4 and 5, implying that also a qualitative approach is necessary, see further in Chapter 7.

Table 6.2 Quantitative models used, addressed to relevant Themes and Questions, while evaluating the Nordic Aid scheme.

	DREMFIA	**CAPRI**	**AgriPoliS**	**Econometric models**	**I-O models**
Theme 1. Maintaining agricultural activity and improving structures					
Q 1: Contributed to maintaining agricultural activity…	**xx**	**xx**	**xx**		
Q 2: Reflecting disadvantages in the different sub-regions…				**xx**	**xx**
Q 3: Contributed to changes in farm structure…	**xx**		**xx**	**xx**	
Theme 2. Effects on processing and marketing					
Q 4: Contributed in maintaining processing industries…	**x**	**x**	**x**		
Q 5: Improved structure for marketing and processing					
Theme 3. Impacts on the environment					
Q 6: Ensure that the environment is protected and countryside preserved…	**xx**		**xx**		
Theme 4. Coherence and complementarities with other policies					
Q 7: Effects on the functioning of the internal market in respect of competition for: farmers, down stream industries and interregional trade	**x**	**x**			**xx**
Q 8: Proved efficient relative to other existing support and income schemes…	**xx**	**xx**	**xx**		
Q 9: Worked in synergy with CAP and RDP measures					
Theme 5. Administrative impacts					
Q 10: Implications of current limitations re. quantities and amounts					

X: Provides partial answer or indirect evidence
XX: Provides direct answer

3 Evaluation tools for the qualitative analyses and information sources

Survey results are used as complementary information to the quantitative models in making judgments and conclusions with regards to the impacts of the Nordic Aid. Also historical data are needed in order to conduct the evaluation and address answers to all questions. Those evaluation tools and data are also necessary to measure the efficacy and efficiency of the Nordic Aid scheme.

3.1 Data from official sources

In addition to the data sources listed in Annex I – *Statistics and data bases available in DG AGRI* – this study utilises information obtained from official national registers in each country.

In Finland, data on the amounts paid under the Nordic Aid scheme, and their allocation according to sub-regions, production lines and farm types, are obtained from the *Information Centre for the Ministry of Agriculture and Forestry* (*TIKE*). Data on investment volumes and investment aid for young farmers are obtained from the *RAHTU*-register at the ministry of agriculture and forestry. Data on other national supports and fiscal instruments are obtained from taxation statistics (*Official Statistics Finland*) and regulations concerning possible tax shields. Administration of the programs is described according to the information received from the ministry of agriculture. Information on farmers' retirement decisions and pensions are obtained from the Finnish Farmers' Social Insurance Institution (Mela). The data consist of a sample of 963 farms and covers the period 1993 – 1998. The sample is a good representation of the population of elderly farmers in Finland, since the purchasing of pension insurance from Mela is mandatory for all farmers.

For Sweden, data on the value and distribution of support from the Nordic Aid scheme is obtained from the Swedish Board of Agriculture (SJV), which also provides information regarding the administration of the programs as well as data and information on other agricultural supports from the CAP and national schemes other than Nordic Aid.

In both countries, data from the European Farm Analysis Data Network (FADN) will be used extensively. The economic results of the Swedish FADN cover the years 1995-2004, whereas in Finland, the uniform data available cover the years 1998-2005. The results are presented in euros per farm, per hectare of arable land, or livestock unit (LU). With regards to the production lines, only the farms specialized in milk production are presented separately because the data are too sparse for similar analysis in other production lines.

In Finland, the data are stratified according to the sub-areas C1-C4 in the Nordic Aid scheme. In Sweden, the data are available from the FADN standard results, where the regional division is available only according to the FADN areas (Figure 7.1). The Swedish FADN area 730, "Lan i Norra" is the closest approximation for the Nordic Aid areas. It may be expected that the economic results of "Lan i Norra" are expected to be slightly upward biased estimates of the Nordic Aid areas because, a larger proportion of "Lan i Norra" –area, compared to the Nordic Aid areas, is located in the favourable coastal line.

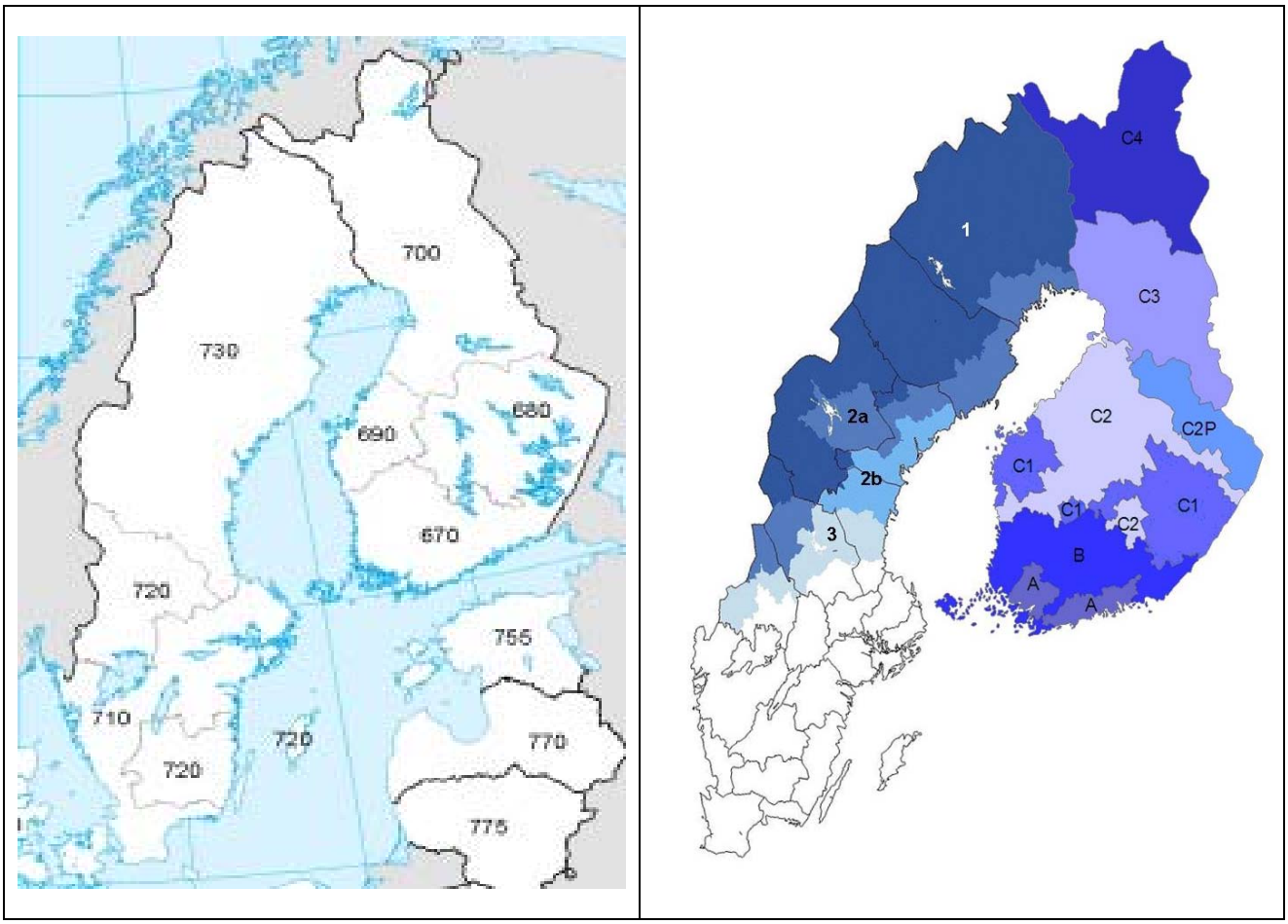


Figure 7.1. The FADN –areas and the sub-areas of the Nordic Aid in Finland and in Sweden.

In the Finnish regions, the data on Nordic Aid was available in the national accounts that are more detailed than the standard FADN results. In Sweden the aid figures have been available from the FADN standard results as the Balance of current subsidies and taxes, which includes in addition to the Nordic Aid, also the CAP payments, the compensatory allowance and the environmental aids as well as the balance of Value Added Taxes on the farms. The share of the Nordic Aid has been approximated on the basis of the individual FADN farms as arithmetic means, which have been available from years 2002-2004. Thus, in the Swedish results, the Nordic Aid has been calculated as a per cent share of the Balance of current subsidies and taxes: in 1995-2002 the share of Nordic Aid out from all direct income supports was estimated at 22 %. In 2003 and in 2004 the corresponding shares were 21% and 28 %.

In Finland, the major part of the national aid paid in area C is the Nordic Aid. Other national aids have been a national premium of the compensatory allowance, aid for potatoes in human use, aids for seed production and bees, and in 1995-1999 the transitional aid, which was gradually substituted by the Nordic Aid Scheme. In 1998-1999 the share of the Nordic Aid out from all national aids varied in the range of 53-68 %, whereas between 2000 and 2004 the corresponding share was between 79-88 %. From the farmer perspective it is the sum of these two aid measures that is crucial, not either of them separately even if they have, from the administrative perspective, different earmarks.

The economic indicators used, are based on FADN concepts and standards. For the most part the role of Nordic Aid in farm economies is described as the percentage share of aid out from the

Agricultural Gross Returns and *Farm Net Value Added* (FNVA, SE415). Agricultural Gross Returns have been calculated from the FADN concepts by summing up *Total Output* (SE131) and *Balance of Current subsidies and taxes* (SE600). In the farmer surveys, the concept of Agricultural gross returns was replaced by *agricultural turnover*, because it is commonly used concept by the farmers and known also by those farmers who do not belong in the FADN.

In addition to producing descriptive statistics, the FADN-data are used for estimating productivity differences, subsidy effects and land allocation decisions amongst the farms eligible for Nordic Aid. These analyses are limited to dairy farms since this is the only farm type in the FADN that is sufficiently well represented in the Nordic Aid region. For benchmarking purposes (i.e. estimation of productivity differences between farms in the Nordic Aid region and central EU), the data are extended to cover individual dairy farms in three Nordic countries – Denmark (representing central EU), Finland and Sweden – during the period from 1997 to 2003. The number of observations in this analysis is 7 502, of which 2 772 are from Denmark, 2 418 from Finland, and 2 312 from Sweden.

3.2 Survey data

The information from the official data sources are complemented by data generated by a survey conducted specifically for this study. The survey utilized a postal questionnaire to elicit the opinions on the effectiveness and efficiency of the Nordic Aid scheme of different categories of stakeholders (farmers, other beneficiaries, and administrators from local government). Hence, a representative sample of stakeholders in the Nordic Aid region in both countries was selected. In Sweden, this was complemented with a control group consisting of farmers, other beneficiaries and local government from adjacent regions outside the Nordic Aid region. In Finland, the selection of a control group was considered unfeasible since agriculture outside the Nordic Aid region also is subject to substantial national support measures. The themes of the survey, and codes in numbers of questions, correspond to the evaluation questions (Tender Specification- Tender No AGRI/2006-G4-02).

In Finland, a random sample of 1 200 farms was drawn from the Farm Register (TIKE). The sample was stratified according to the sub-regions of the C-area, farm size (European Size Units; 4 size classes under 8 ESU and 5 over 8 ESU) and 8 production lines according to the farm typology (Table 7.1). To ensure a sufficient number of responses also from the northernmost sub-regions, the probability of being selected for the survey was increased by a factor of 2.5 for farms in sub-regions C3 and C4, and a factor of 1.5 for farms in sub-region C2P, compared to farms in sub-regions C1 and C2. In addition, a random sample of pure reindeer farms was selected from the register of the Reindeer Herders' Association and from the profitability bookkeeping of reindeer farms for national purposes coordinated at MTT Economic Research. For the sample for administration and other stakeholders 100 respondents were selected as follows: *Administration of the Aid Scheme* – one person from each Employment and Economic Development Centers (9 persons in total covering roughly the C-area), 5 persons responsible for the Nordic Aid scheme at the Ministry of Agriculture and Forestry, one person from each sample municipality (total 65); *Other stakeholders* – one person form each Pro Agria Rural Advisory Centers and corresponding Swedish-speaking centers (in total 10 persons covering roughly the C-area), two persons from organizations of horticulture and Reindeer Herders' Association, two persons from the Finnish Farmers' Union MTK, one person from the headquarters of each of the largest food processing industries and input deliverers (total 7). In Sweden, a stratified random sample of 332 *dairy farms* in the Nordic Aid sub-regions 1 – 3 was selected (41 in sub-region 1, 168 in sub-region 2a, 68 in sub-region 2b, and 55 in sub-region 3). Producers of sows, fattening pigs, eggs, goat milk, and soft fruits and vegetables are very few in the

Swedish Nordic Aid region. Hence, stratification of the sample according to sub-region in several cases implied that all the targeted producers were selected. For instance, all *producers of sows* in sub-region 1 (8 producers), sub-region 2 (15 producers) and sub-region 3 (13 producers) were selected. All producers of *fattening pigs* in sub-regions 1 (6 producers) and 3 (13 producers), were also selected, while a random sample of 18 producers were selected in sub-region 2. All *egg producers* (2 in sub-region 1, 13 in sub-region 2, and 3 in sub-region 3) and all producers of *goat milk* were selected (15 in each of the three sub-regions). Finally, all *producers of soft fruits and vegetables* in sub-region 1 (15 producers) and 3 (13 producers) were selected, while a random selection of 19 producers were selected in sub-region 2. The sample also included 87 *other stakeholders* in the Nordic Aid region (processing industries, banks, the largest supplier of agricultural inputs (Lantmännen), the Swedish Farmers' Association, County Boards, and the Swedish Board of Agriculture). It was considered unfeasible to stratify the selection of stakeholders according to sub-region since several of them are not represented in all Nordic Aid sub-regions. The controls consisted of a random sample of 75 dairy farms and 47 other stakeholders in regions adjacent to sub-regions 1 – 3.

Table 7.1. Respondents selected for the survey.

	Finland					Sweden		
Nordic Aid sub-region	C1	C2	C2P	C3	C4	1	2a + 2b	3
Farmers	366	498	87	216	33	87	316	112
Local Dairy facilities	3					7		
Local Slaughter Houses	2					15		
Other local Processing Industries	-					22		
Local Bank offices	-					8		
Local Agricultural Advisors	13					6		
Local representatives for Lantmännen (Sweden) / input industry (Finland)	2					13		
Local representatives for the Finnish/Swedish Farmers' Ass.	2					8		
Representatives of local Administration	65 + 9 =74					7		
The Finnish/Swedish Board of Agriculture	5					1		
Control group (Sweden only)						Regions adjacent to the Nordic Aid region		
Farmers						75		
Local Dairy facilities						3		
Local Slaughter House Facilities						9		
Other local Processing Industries						14		
Local Bank offices						6		
Local Agricultural Advisors						4		
Local representatives for Lantmännen						3		
Local representatives for the Swedish Farmers' Ass.						4		
Representatives for County Boards						4		

The questionnaire was compiled by Finland and Sweden in cooperation with the Commission during December and January and translated into Swedish and Finnish, respectively. In Finland, the questionnaires were mailed from MTT to farms and other stakeholders at the end of January with one reminder in February. In addition to the possibility to respond by traditional mail, an internet service with electronic answering possibility was offered. Responses were recorded immediately upon reception. In Sweden, the questionnaires were also posted at the end of January, and a reminder was sent to non-responding farmers (both groups) in 13 February with the deadline set to 23 February. The response rate for the farmers within the Nordic Aid region was high (61% on average for all sub-regions), while the response rates in the other groups were lower (Table 7.2). Some important non-responding stakeholders were contacted by phone during March in order to improve the response rate among them.

Table 7.2. Response rates in the survey (number of respondents in parentheses).

	Finland					Sweden		
Nordic Aid sub-region	C1	C2	C2P	C3	C4	1	2a + 2b	3
Farmers	49 % (179)	46 % (230)	41 % (36)	57 % (123)	48 % (16)	57 % (50)	63 % (198)	37 % (41)
Local Dairy facilities	67 % (2)					100 % (7)		
Local Slaughter Houses	-					33 % (5)		
Other local Processing Industries	-					18 % (4)		
Local Bank offices	-					38 % (3)		
Local Agricultural Advisors	77 % (10)					17 % (1)		
Local representatives for the input industry	-					15 % (2)		
Local reps. for the Finnish/Swedish Farmers' Ass.	100 % (2)					88 % (7)		
Representatives of local Administration	71 % (46) + 78 % (7) = 72 % (53) (municipals + T&E-Centres)					86 % (6)		
The Finnish/Swedish Board of Agriculture	80 % (4)					0 % (0)		
Control group (Sweden only)						Regions adjacent to the Nordic Aid region		
Farmers						45 % (34)		
Local Dairy facilities						33 % (1)		
Local Slaughter House Facilities						33 % (3)		
Other local Processing Industries						21 % (3)		
Local Bank offices						0 % (0)		
Local Agricultural Advisors						0 % (0)		
Local representatives for the input industry						0 % (0)		
Local reps. for the Finnish/Swedish Farmers' Ass.						33 % (1)		
Representatives of local Administration						50 % (2)		

3.3 Case studies

In both Finland and Sweden, one farm from each Nordic Aid sub-region was selected for more in-dept personal interviews. In Finland main features of the case farms were the following:

Sub-region C1: An enlarged modern farm specialised in beef cattle rearing, with 280 animals and 145 hectares field. The farm is larger than an average cattle farm in the area. Earlier the farm was specialised in milk production. Because of the large farm size, and the young farmer and spouse managing the farm, we can presume that the farm represents such cattle farms which have a goal of being competitive in the future.

Sub-region C2: A pig farm with 77 sows and 77 hectares of arable land is also larger than average. The farm has modern production technology in use and it has extensive collaboration with other farms in the neighborhood.

Sub-region C3: A milk/cattle farm from C3-area with 45 cows, 50 cattle and 67 hectares field.

Sub-region C4: Dairy farm from C4 area with 22 cows and 18 heads other cattle and 27 hectares of field.

In Sweden, a milk farm from each one of the three sub-regions (1. 2 and 3) was chosen for the case studies. Apart from being the most important production line in the Swedish Nordic Aid region, a

focus on milk in all three areas enables us to compare in more detail the three regions' production condition, constraints, development processes and the importance of the Nordic Aid for comparable farms with different geographical locations. For instance, in such a framework the relevance of the present demarcation lines between the aid sub-regions can be more thoroughly addressed. This is of importance since the level of support varies substantially between sub-regions. In addition, the process of structural change varies between sub-regions.

Researchers involved in the evaluation of the Nordic Aid scheme visited the case farms and did the personal pre-structured interviews using the same questionnaire form that was used for the postal survey.

3.4 Summing up of quality evaluation tools

Historical data is necessary and of course used in all Themes and for all evaluation questions. The questionnaires were conducted in a way that all evaluation questions were addressed, and thereby all Themes. The case studies mainly contribute to Theme 1 (Maintaining agricultural activity and improving structures), but indirectly also to the other Themes.

THEME 1: MAINTAINING AGRICULTURAL ACTIVITY AND IMPROVING STRUCTURES

Introduction

The first evaluation theme addresses the maintaining of agricultural activity and improvement of agricultural structures, which are the most important goals of the Nordic Aid Scheme. With regards to this theme, the assignment includes three specific evaluation questions (Q1-Q3). The first question (Q1) focuses directly on how the scheme has maintained agricultural activity that is naturally suited in the Nordic production conditions. The second question (Q2) focuses on the extent of natural disadvantage in different sub-regions and how the differences between the regions are reflected by the amounts of Nordic Aid payments. The third question (Q3) addresses how the Nordic Aid payments have contributed to the structural development and, in the long term perspective, to maintain economic activities in the Nordic regions.

Each of the three evaluation questions are introduced, analysed and answered below. The concluding remarks are first drawn for each question separately and, then at the end of the chapter, conclusions with policy recommendations are given concerning the full theme.

The focus in Theme 1 will be on the historical context, and conclusions will concentrate on how Nordic Aid has affected agricultural activity and structure in the 1995-2005 period. However, the impact of Nordic Aid is also considered in light of the 2003 CAP reform which decoupled most of the EU payments to arable crops and livestock from production. This differentiation is important because decoupling of the CAP payments is expected to change the degree of interaction with Nordic Aid and, hence, the validity of the historical context for the future of the Aid. The discussion regarding how the coherence, efficiency and synergies between Nordic Aid and CAP support differ depending on whether CAP support is coupled or not, will be raised in Theme 4.

Maintaining agricultural activity (Q 1)

Question 1: To what extent have the Nordic Aid payments in general as well as for individual farms and different farm types contributed to maintaining the agricultural activity naturally suited to the climatic conditions of the regions concerned?

Interpretation and judgement criteria

In Article 142(3) of the Act of Accession to the European Union, it is declared that the Nordic Aid scheme in Finland and Sweden must be granted in order, among others, "to maintain traditional primary production and processing naturally suited to climatic conditions of the regions concerned". The wording in Question 1, however, differs slightly; it is asked whether Nordic Aid has contributed to "maintaining the agricultural activity". This latter wording is found in Article 142(1) where it is stated that "The Commission shall authorize Finland and Sweden to grant long-term national aids with a view to ensure that agricultural activity is maintained in specific regions. This wording could be interpreted as having a wider meaning than "maintaining primary production". Nevertheless, we interpret Question 1 as having the goal to evaluate whether the objectives of Nordic Aid has been met. Hence, in Theme 1 the goal of *"maintaining agricultural activity"* essentially relates to the amount of agricultural production and to the area of cultivated land.

The concept of "*agricultural activity naturally suited to the Nordic area",* is interpreted to consist of those agricultural production lines which have been typical to the area already before 1995 and which are stated in the Nordic Aid Scheme (listed in Appendix II in before mentioned Decisions). These production lines are:

In Finland:

Animal husbandry: Milk production, other cattle, ewes and goats, swine and poultry, (all in C1-C4 areas) and reindeers (C3-C4 areas)

Plant production: Sugar beet and potatoes for starch production (C1-C2 areas), cereals and other arable crops, horticulture under permanent shelter as well as field scale vegetables and apples (with some exceptions in all C1-C4 areas). Production of wild berries and mushrooms is also notable in the whole area.

In Sweden:

Animal husbandry: Milk production, goats, pigs and laying hens (1-3 areas)

Plant production: Soft fruits and vegetables (1-3 areas).

The quantitative analyses have been feasible for the most part only for those production lines that are represented through out the Nordic Aid regions. The most extensive analyses focus on the livestock and milk sectors that are the most important sectors both in terms of the aggregate support payments and the number of supported firms.

With regards to the Nordic sugar sector it is sufficient to conclude already at this stage of the evaluation that the Nordic Aid is dominated by the CAP sugar policies. The CAP sugar policies have undergone major reforms since the evaluation period. The market access of Nordic sugar beet growers' has been decreased by closing down sugar processing plants and the sugar production has been concentrating elsewhere in Europe.

A necessary but not a sufficient condition for maintaining agricultural activity is that farm income is sufficient for sustaining the living of farming households. The scope of agricultural activities is also linked to production structures, such as the development of the number of farms and the size of production units. These structural issues are, nevertheless, omitted for the most part under this first question, because they are addressed and analysed in detail under question 3 that focuses on production structures.

The aim of *maintaining* primary production in the area requires a reference level to which production levels could be compared. In our interpretation a natural reference level is the level of agricultural production at the time of accession. In the evaluation conducted below, the actual impact of Nordic Aid on production is also estimated conditional on certain hypotheses (for example Nordic Aid was not paid). In this case no *a priori* level is set as a target. When answering the question whether production has been maintained or not, the yard stick is the level of production at the time of accession. This is not because we judge this to be the way the concept "*maintain*" should be rigorously interpreted. It is simply one way to give an idea of how strong the impact of Nordic Aid on production is predicted.

The concept of *"the level of Nordic Aid payments"* covers all Nordic Aid payments and all sub-regions. The Nordic Aid payments *"for individual farms"* are defined as the amount of support (from each measure contained in the scheme) that each farm has received. These quantitative data are obtained from the FADN-database. The Nordic Aid payments *"for different farm types"*, on the

other hand, refer to the farm groupings according to the production line and the size of farms in the Nordic area and sub-regions.

The farm size is measured by the farm's arable land area and the number of animals. The number of different animals is aggregated to the number of animal units (AU) that are computed according to the Commission Decision of the Nordic Aid (1995/196/EC and 2002/404/EC).

Analysis

The analysis proceeds in two stages. The first, and primary analysis, has a historical perspective where the aim is to determine the impacts that Nordic Aid has had on agricultural production and land use. This is done by analysing Nordic Aid within the Agenda 2000 framework, where Pillar I forms of support are coupled to production. In the second stage, the future impact of Aid is considered in light of the 2003 CAP reform or "decoupling" reform of Pillar I support. The objective with introducing the decoupled scenario is to investigate whether there are any differences in the effects of Nordic Aid compared with the policy framework implemented during the evaluation and the new policy framework after the 2003 CAP reform.

A note: different history and has implications to results

The extent to which Nordic Aid has influenced agricultural development and the environment in Finland and Sweden over the evaluation period is influenced by differences in the policy framework at the time of accession to the EU in 1995, *i.e.* significant path-dependency exists. There are two important issues that cause path dependency in the results. First the farming structures and farmers' resource endowments differ for historical reasons. In Finland the major land reform after the Second World War significantly decreased the farm size and increased the number of farms in the Nordic Aid regions. The largest existing farms were split and new farms were established in Finland, while in Sweden the structural development was gradually proceeding towards larger and more competitive farms.

Second crucial difference is that Sweden started to significantly deregulate its agricultural sector by domestic policies already in 1980's, while in Finland the corresponding deregulations were at that time modest. In Sweden, a large portion of agricultural supports were deregulated in 1990. The Nordic regions however maintained Nordic support that was, in principle, converted to Nordic Aid on accession to the EU. At the same time farmers also became eligible for CAP support. As a result the profitability of farming in Swedish Nordic regions became somewhat higher on EU-accession compared to the early 1990s. For example the total milk price in the Northern Nordic region was 0.363 SEK/kg in 1992 and 0.394 SEK/kg in 1995.

In Finland, EU accession implied that prices to farmers declined sharply, in average by almost 50%, at the time of the accession. Nordic Aid was designed to compensate farmers the resulting income losses but the change in the policy regime resulted in decreased farmer income. The adjustment into the Common agricultural policy and the decreased producer prices was also promoted by structural adjustment programs, which had a goal to increase farm size and transfer production resources from exiting farms to expanding farms.

As a result of the different state of agricultural sectors in 1995, the impacts of Aid on agriculture, the environment and countryside are expected to be more significant in Finland than Sweden. This is due to a path dependency caused by two factors a) Sweden's deregulation of their agricultural sector some years prior to EU accession and b) historical support levels and Nordic Aid per output

unit being considerably higher in Finland. Since Finland's dependency on support payments was much greater on accession to the EU than Sweden's, it is reasonable to expect that the effects of removing it would also be stronger. These fundamental differences in the policy framework, as well as the differences in farm size and production efficiency, are also represented in the models to be used for evaluating Aid: AgriPoliS for Sweden and DREMFIA for Finland. The expected differences in results are thus not a matter of inconsistencies between the models but the differences in the policy framework or starting points on EU accession in Sweden and Finland.

(1) Quantity of animal production

(1.1) Historical developments

The most important agricultural activity and production in the Nordic Aid area is milk production. The Nordic Aid regions account all together for 41% of the total milk production of Sweden and Finland. In Finland, more than three quarters of the total milk production (77%) is concentrated in the Nordic Aid areas. In Sweden the corresponding share is 14%.

Most of the milk production amongst the Nordic Aid regions is located in the Finnish sub-regions that account for 81% of the total milk production in these areas.

The total aggregate milk production in all Nordic Aid regions was 2,183 million tonnes in 1997 and it increased to 2,257 million tonnes in 2005. The production increased slightly between the years 1997 and 2000. Thereafter, the aggregate production volumes have remained stable. Over all, the aggregate production of milk across all Nordic Aid areas has been maintained at the pre-accession levels of 1995. In the Finnish sub-regions the production has been stable, whereas the production has decreased slightly in the Swedish sub-areas.

The development of milk production within the Finnish and Swedish sub-regions has similar tendencies. The northern most sub-regions, *i.e.* region 1 in Sweden and region C4 in Finland, have lost production volumes, as production has been moving gradually towards South. Particularly, within the Finnish sub-regions, the milk production has been concentrating to region C2 (+14%), which was initially, already in 1995 the most intensive milk production area in Finland. In Sweden, all sub-regions, except 2a where production has increased from 0.215 million tonnes in 1995 to 0.230 million tonnes in 2005, have experienced decreasing production volumes. In sub-region 1, milk production declined from 0.053 to 0.047 million tonnes (–11%) from 1995 to 2005. In sub-region 2b, milk production declined from 0.120 to 0.090 million tonnes (–25%) and in sub-region 3, finally, milk production declined from0.475 to 0.432 million tonnes (–9%) during the same period.

In Finland, the production of beef has been gradually decreasing from 96.0 million kilos in 1995 to 86.5 million kilos in 2005, implying an average annual rate of decline 1.0%. In Sweden the development pattern has been similar. The production has decreased from 140.1 million kilos in 1995 to 131.4 million kilos in 2005, which corresponds to an average annual rate of decline 0.9%. There are no sub-regional data on production of beef, but the production volumes can be roughly approximated by the number of cattle. It has to be noted, however, that the development in the number of cattle and production volumes are not one-to-one mappings, because the beef production based on suckler cows has been substituting for the production based on calves from milk production. The beef production requires more animal stock when it is based on suckler cows compared to the production based on calves originating from the dairy farms. The reason for this common trend is in the weakened supply for calves supplied from the milk producers. The supply for cows has been weakening over time because the yields per cow have been increasing and the number of milking cows has been decreasing.

The number of cattle on the cattle farms, other than those specialized in milk production, was in the Finnish Nordic Aid regions 110,353 in 1995 and it increased to 137,438 in 2005 with an annual average growth rate of 2.2%, which corresponds to a 24.5% increase over the ten year evaluation period. The number of cattle on other than dairy farms is partially explained by the increased specialization of dairy and beef cattle operations and a search for efficiency gains in production. Calves originating from dairy cows were traditionally also reared on dairy farms, but they are nowadays transferred to specialized beef production farms. Nevertheless, it is likely that the beef production has either slightly increased from, or at least maintained at the pre-accession level in the Finnish Nordic Aid areas. Thus, the share of the Nordic Aid areas has been increasing out from the gradually shrinking beef production of Finland. In Sweden, beef production is not eligible for Nordic Aid.

Similarly to the beef production, the statistics on the developments of pig meat and broiler meat production are available only for the country level. In the whole countries, the development of pig meat production differs between the countries. In Finland, the production has increased by 21.5% between 1995 and 2005, implying an average annual growth rate of 2.0%. At the same time, the production of pig meat decreased in Sweden by 11%, at an annual rate of decline 1.1%. The poultry meat production figures are available only for Finland where the production has doubled from 1995 to 2005 with an annual growth rate of 7.4%. Within the Nordic Aid regions, the production of pig and poultry meat can be approximated only by the number of live animals. The number of pigs suggests that the production volume has decreased in the Swedish Nordic Aid areas from 1995 to 2005 by 5%, while it has increased in the Finnish Nordic Aid areas by 15%.

The animal numbers approximating the poultry meat production are available only for the Finnish Nordic Aid areas, where the number of broilers increased by 28% between 1995 and 2005, implying an average annual growth rate of 2.5%. Nevertheless, the expansion of production in the Nordic Aid areas has been slower than in average in the whole country.

The number of reindeers has varied but in 2005their number is almost equal to that in 1995.

(1.2) Modelled developments

To assess the contribution of the Nordic Aid in the observed production and land use developments it is necessary to compare the current policy framework with a counterfactual hypothetical situation with no aid. This is done, as previously stated, by the use of mathematical equilibrium models. In the case of Finland also a removal of half of the Aid is analysed for better reflecting the marginal effects of the Aid. Further, the impact of the removal of the aid is studied both for the CAP prior and past the 2003 CAP reform, because it may be expected that the 2003 CAP reform has changed the broader policy framework and also the contribution of Nordic Aid.

Sweden

The CAPRI model is used to analyse the impact of Nordic Aid milk price support on production in Sweden. The regions in CAPRI are somewhat different from the regions defined for Nordic Aid. Therefore, average Nordic Aid in the NUTS 2 regions used in CAPRI has been estimated.[8]

[8] Average Nordic Aid to milk calculated for the NUTS 2 regions are: 0.092 EUR in Ovre Norrland (Norrbotten and Vasterbotten counties) which is the northernmost part, 0.065 EUR in Mellersta Norrland (Jamtland and Vasternorrland counties) which is situated central part of the Nordic region and 0.011 EUR in Norra Mellansverige (Varmland, Dalarna and Gavleborg counties) which is the southernmost part.

The results indicate that the impact of the Nordic Aid is markedly different in the periods before and after the 2003 CAP reform. Before 2003, *i.e.* under the Agenda 2000 policy, the model cannot identify Nordic Aid having significant effect on production (Table T1.1 and Table T1.2). This result is partly explained by the existence of a regional milk quota in the Common Market Organisation for milk applying to the Nordic Aid area, and partly by the presence of CAP milk price support. Nordic milk aid and CAP milk support are both price support, raising the price of milk. To ensure that milk output does not exceed "market demand" as a result of support, it is regulated by a regional output quota. Farmers can in turn buy and sell quota on the quota market to meet their demands. When the quota is binding, that is when it is not possible to expand production any more, additional milk price support in the short run turns into an income support, increasing farmers' profit (see 5.3 in the Descriptive Part). Over time, the increased profit will capitalise into a higher quota price. Since farmers need quota to be able to produce milk, the higher the profits from milk production, the higher the cost of purchasing quota will be. If the market for milk quotas is efficient and the market does not exhibit significant uncertainties, the quota price is expected to reflect the net present value of the stream of future quota rents. In this case, positive quota rents would imply that initial reductions in milk aid will be absorbed by reductions in rents rather than in production levels.

When Nordic Aid is removed in the model simulation in the Agenda 2000 framework, the reduction of dairy farmers' revenues is fully absorbed by falling milk quota rents. The only market impact in this case is falling milk quota prices. Any further reduction of the total support levels would, though, have a negative impact on the number of dairy cows since quota rents are low after the removal of the Nordic Aid (i.e. the milk quota has only a marginal impact on production levels without Nordic Aid). Thus, the model results suggest that Nordic Aid has had no impact on the level of production in combination with coupled CAP support since CAP milk support has been sufficient to fill the available milk quota.

Table T1.1. Simulations of a removal of the Nordic Aid to milk production in 2009 with respect to the herd size in Norrbotten and Västerbotten (the northernmost part of the Swedish Nordic Aid area)

	Agenda 2000 scenario	2003 CAP reform scenario
Dairy cows	+/-0	-6.7 %
Suckler cows	+/-0	+6.0 %
Other animals than cattle	+/-0	+0.8 %

Table T1.2. Simulations of a removal of the Nordic Aid to milk production in 2009 with respect to the herd size in Jämtland and Västernorrland (the central part of the Swedish Nordic Aid area)

	Agenda 2000 scenario	2003 CAP reform scenario
Dairy cows	+/-0	-2.6 %
Suckler cows	+/-0	+4.1 %
Other animals than cattle	+/-0	+1.2 %

After the 2003 CAP reform, CAP support coupled to milk production is considerably lower than within the Agenda 2000 framework. The 2003 CAP reform implies a reduction of milk quota rents compared with Agenda 2000. A removal of the Nordic Aid to milk, on top of the 2003 reform, wipes out quota rents entirely in the two northernmost regions and leads to a reduction in the number of dairy cows in these regions. Tables T1.1. and T1.2. show that the impact of abolished Nordic Aid is larger in the northernmost region (Norrbotten and Vasterbotten counties) than in the central part of the Nordic Aid area (Jamtland and Vasternorrland). In the southernmost part of the Nordic Aid area, a removal has no impact on production levels (but the Nordic Aid to milk is very

small in this region). The fact that the impact is the largest in the region with the highest level of Nordic Aid support per kg milk, indicates that the level of Nordic Aid reflects regional differences in the economic conditions for milk production.

Not only milk production is affected by a removal of Nordic Aid after the 2003 CAP reform. Reduced feed demand from dairy production lessens the demand for agricultural land (a large share of the agricultural land in northern Sweden is used to produce feed to dairy cows). This means that suckler cow production increases due to less competition for arable and grazing land. Some resources are also moved into production of other animals than cattle. Also, Nordic Aid for milk crowds out beef production, which has no corresponding support, by increasing the relative profitability of milk production. The crowding out –effect between the production lines decreases correspondingly when the milk support is removed.

Tables T1.3., T1.4. and T1.5. show how the policy scenarios are predicted to affect aggregate production volumes. Under the 2003 CAP reform settings, the total milk production at the Swedish level is projected to fall by 0.55% if the Nordic Aid to milk production is abolished (Table T1.3). The northernmost region accounts for about two thirds of the reduced production volume in this case (Tables T1.4. and T1.5). The impact on the quantity of meat produced is different in the two regions which are affected (Tables T1.4 and T1.5). Production volumes increase in the central part of the Nordic Aid. In the northernmost regions, though, reduced crowding out of beef and less competition for land is not enough to expand beef production to compensate for the fall in calves recruited from dairy production because of fewer cows. Nevertheless, the impacts of these scenarios on the supply for meat are predicted small at the Swedish country level (Table T1.3).

Table T1.3. Simulations of a removal of the Nordic Aid to milk production in 2009 with respect to the total supply of agricultural products in Sweden

	Agenda 2000 scenario	2003 CAP reform scenario
Milk	+/-0	-0.55 %
Meat	+/-0	+0.01 %

Table T1.4. Simulations of a removal of the Nordic Aid to milk production in 2009 with respect to the supply of agricultural products in Norrbotten and Västerbotten (the northernmost part of the Swedish Nordic Aid area)

	Agenda 2000 scenario	2003 CAP reform scenario
Milk	+/-0	-7.0 %
Meat	+/-0	-0.2 %

Table T1.5. Simulations of a removal of the Nordic Aid to milk production in 2009 with respect to the supply of agricultural products in Jämtland and Västernorrland (the central part of the Swedish Nordic Aid area)

	Agenda 2000 scenario	2003 CAP reform scenario
Milk	+/-0	-2.8 %
Meat	+/-0	+0.5 %

In the outline of the historical development above, it was noted that milk production had increased slightly in sub-region 2a, remained almost unchanged in sub-region 2b but declined substantially in sub-regions 1 and 3 over the 1995-2005 period. In the analysis, an attempt was made to approximate sub-region 1-3 by dividing the Nordic Aid area in a northern, central and southern part,

thereby making it possible to have separate results for the sub-regions. The results suggest that the northern part, approximating sub-region 1 where the compensation is the highest, also is the most sensitive to reductions in Nordic Aid. However, it is difficult to have a more elaborate differentiation of the results as the model is calibrated for the whole region, meaning that the results are representative for the *average* Nordic Aid region. The overall result for the historical evaluation period – that the combination of CAP support and Nordic Aid has maintained milk production, although CAP support has been sufficient to fill in the quota – can be said to be valid for sub-region 2a and 2b. On the other hand, the support schemes have not managed to maintain milk production in sub-region 1 and 3, where an actual decline has taken place over the 1995-2005 period. In these regions, the decline is likely to have been faster without Nordic Aid.

Finland

Analysis performed using the sector model DREMFIA shows that Nordic Aid has had a significant role in maintaining milk production in Nordic Aid regions in Finland under the Agenda 2000 policy framework. The results suggest that without any Nordic Aid, the milk production volume would have been 30% less in the Finnish Nordic Aid region, on the aggregate, than observed in 2005, and approximately 25% less than the volume observed in 1995 (Table T1.6 and Figure T1.1). If Nordic Aid had been 50% lower in 1995-2005 than was actually the case, the production level would have been only 5% smaller than in 1995, and 7% smaller than what was realized in 2005. This is because a 50% reduction in Nordic Aid would have still provided economic surplus after deduction of variable costs at larger and efficient farms and hence incentives for investments. Gradually production would have concentrated to larger farms and to the relatively more competitive regions, especially on C2 region in Ostrobothnia. Decreasing overall milk production volume would also imply a slight increase in producer prices of milk which would partly compensate the losses of decreasing Nordic Aid and promote investments on large and relatively efficient farms (Figure T1.2.). It can be noted that the 50% reduction of Nordic Aid in Finland resulting in 5% decline in production until 2005 compared with 1995, seems to correspond to the Swedish result above. That is, close to no or relatively small impact on the level of production of the aid under the evaluation period. For Finland, however, this conclusion holds only until 2005 and for a half of the Nordic Aid milk price support, not to the long-term impact of the Nordic Aid.

Table T1.6. Simulations on total milk production (million litres) in Nordic Aid regions including sub-regions Central Finland, Ostrobothnia and Northern Finland 1995-2020.

	Baseline	No Nordic Aid	Nordic Aid 50%
1995	1641	1641	1641
2000	1665	1586	1661
2005	1682	1167	1559
2010	1519	747	1105
2015	1573	770	998
2020	1576	847	1117

However, the full effect of Nordic Aid on production volume of milk is not restricted to a period of 1995-2005. This is partly because the support levels of the Nordic Aid were increasing up to 2000, when the set-up phase of Nordic Aid was gradually replacing the transitional supports in 1995-1999. The Nordic Aid has been paid at the full observed level only since 2000. Hence the full impacts of the aid, after full adjustment of all factors of production, as assumed in static equilibrium

analysis, are not likely to be observed at 2005. The sluggish adjustment of capital and production structure in the short-term, taken into an account in DREMFIA model, implies that without any Nordic Aid, production would decline up to 2010, where after the production volume would stabilise at a level which is about 50% of the 1995 level. Reducing Nordic Aid by 50% would gradually result in a production level which is 65-67% of the observed production level in 1995-2005. Overall, the results suggest that the milk sector in the Finnish Nordic Aid regions is capable of adapting to marginal reductions in Nordic Aid and maintaining production level through changes in farm size structure and spatial location of production. However, changes in farm size structure and spatial location of production would not be sufficient in maintaining the 1995 production level in the long run after 50% cuts or full abolition of Nordic Aid, due to a small number of large and efficient dairy farms.

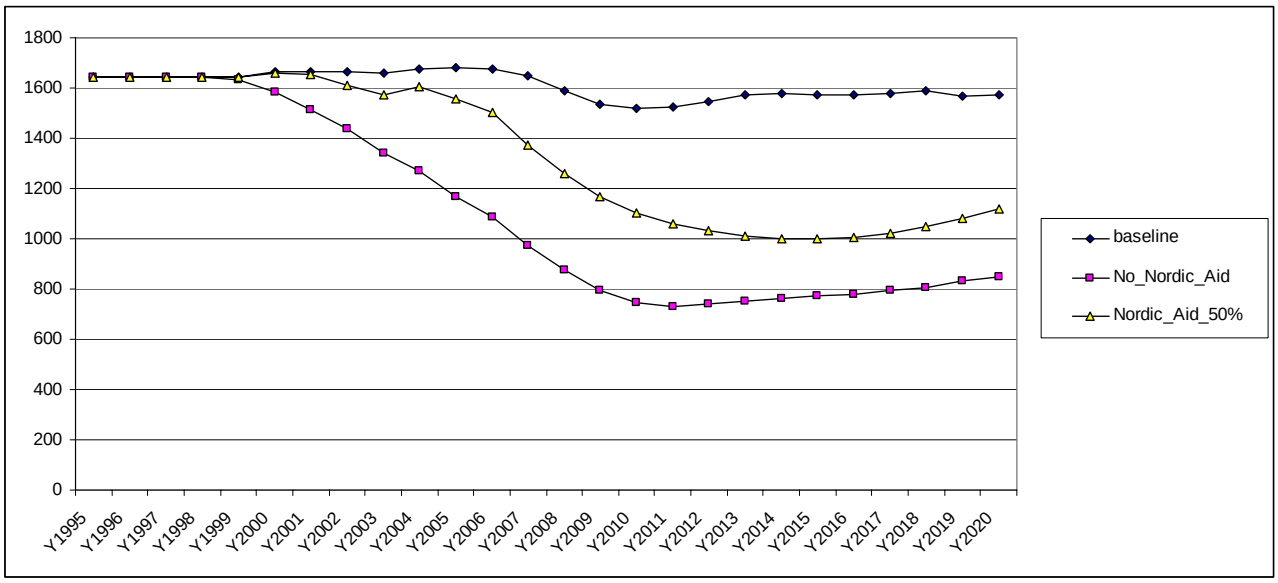


Figure T1.1. Simulated milk production (million litres) in total in Central Finland, Ostrobothnia and Northern Finland 1995-2020 when assuming historical levels of Nordic Aid (baseline), no Nordic Aid (No_Nordic_Aid) and 50% of historical level of Nordic Aid (Nordic_Aid_50%).

When evaluating the results of the DREMFIA model one needs to be aware that the model simulates the entire development path of agricultural production, investments and structural change. This means that the role of Nordic Aid is cumulative in the DREMFIA model. In other words, decreasing or abolishing Nordic Aid is not realised instantaneously as a one single shock. Instead, the DREMFIA model tries to capture the effects of policy shocks also to investments in new and more efficient production techniques. As indicated above, decreasing Nordic Aid would still maintain economic incentives to invest, but less so than with the existing supports. Decreasing support would result in fewer investments and, hence, less efficient production technologies and a smaller economic surplus available for investments in the next time period. In a dynamic context such a scheme produces most likely larger medium run (up to 5 years) and long run (over 10 years) responses to policy changes than static equilibrium models where production technology is assumed independent from the policy change.

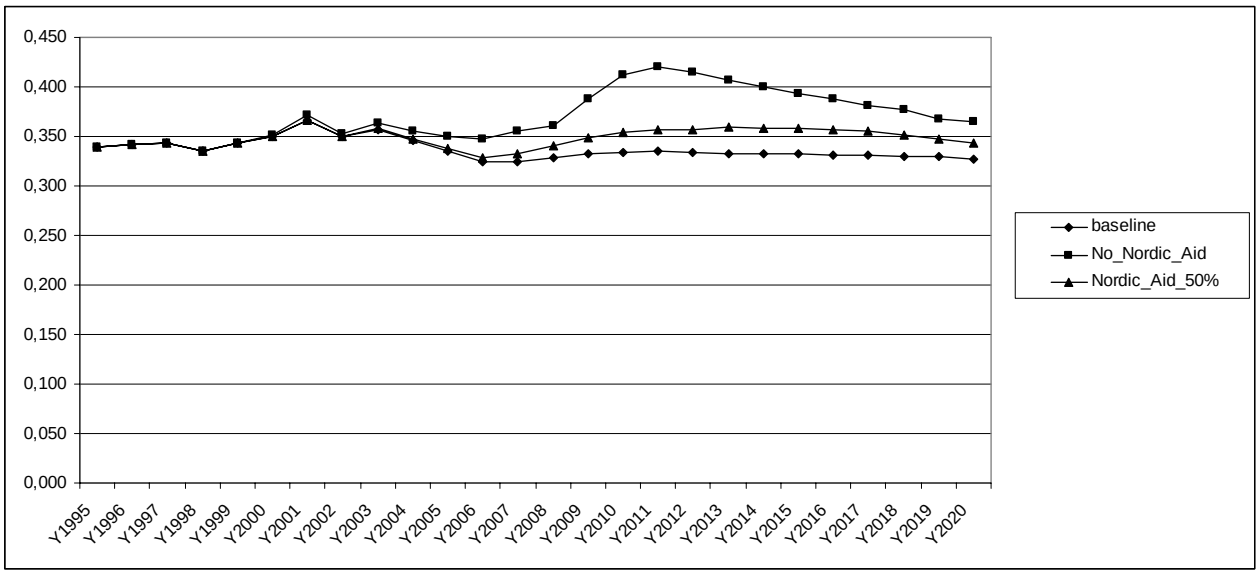


Figure T1.2. Producer price of milk (eur/litre) in Finland in 1995-2020. Source: MTT's DREMFIA model simulations.

The DREMFIA simulation also suggest that adjustments of the Nordic Aid scheme are strongly linked to other policy measures applied either within the Nordic Aid regions or more broadly in the European agricultural sectors. In particular, the CAP-reform in 2003, which partially decoupled the animal headage and arable land payments from production, has changed the economic role of the Nordic Aid. The full abolition of Nordic Aid at 2008, for example, is predicted to decrease milk production in Nordic Aid regions by almost 50% until 2015. This result, however, is influenced by the CAP-reform. Without the CAP-reform, *i.e.* keeping the CAP milk payments linked to the production quotas instead of de-coupling them, the abolition of Nordic Aid results to a 30% decrease (instead of 50% decrease) in milk production in Nordic Aid region. This result shows that the CAP-reform has increased the vulnerability towards the cuts of Nordic Aid, though the structural change development mitigates the vulnerability to smaller cuts in Nordic Aid level.

These results indicate that milk production volume is strongly reliant on Nordic Aid price support in Finland while milk production volume in Sweden is hardly at all affected by Nordic Aid. This is due to the fact that the EU accession increased (supported) milk prices received by farmers in Sweden while the supported prices of milk slightly decreased in Finland due to the EU accession, despite the Nordic Aids. Hence the quantitative results from both models are consistent to the starting points and policy contexts concerning the Finnish and Swedish regions. Nevertheless, both models signal that de-coupling of the CAP-support payments has increased the significance of Nordic Aid payments in maintaining production.

Under the Nordic production systems, the beef production is strongly linked to the level of milk production through the supply of calves. The downward sloping trend of beef production is predicted to continue, even if the price of beef slightly increases and the amount of beef production based on suckler cows increases (Table T1.7). Because the share of suckler cow based production is currently only 10% out from the total beef production, the alternative policy scenarios are not expected to reverse the aggregate decreasing trend in beef production.

Table T1.7. Bovine animal units (1,000 livestock units) in Northern aid regions in Finland 1995-2020. Source: DREMFIA model simulations.

	Baseline	No Nordic Aid	Nordic Aid 50%
1995	458	458	458
2000	420	387	403
2005	398	261	345
2010	345	160	237
2015	345	156	206
2020	341	166	219

Pigmeat production in Nordic areas is also sensitive to reductions in Nordic Aid. The model results suggest that without Nordic Aid, pig meat production volume in the Nordic Aid region would have been 31% less than the 1995 production and 39% less than production in 2005 (Table T1.8). If Nordic Aid had been 50% lower in 1995-2005 than was actually the case, the production level in 2005 would have been 26% smaller than in 1995, and 36% smaller than what was realized in 2005. The DREMFIA analysis also suggests that pigmeat production in Nordic Aid regions is gradually concentrating to Ostrobothnia, while it is decreasing in other Nordic Aid sub-regions.

Table T1.8. Pig animal units (1,000 livestock units) in Nordic Aid regions 1995-2020. Source: DREMFIA model simulations. Source: MTT's DREMFIA model simulations.

	Baseline	No Nordic Aid	Nordic Aid 50%
1995	94	94	94
2000	87	80	85
2005	107	65	69
2010	89	53	56
2015	87	44	46
2020		36	37

Poultry production has doubled in Finland in 1995-2005, but it has increased relatively less in Nordic Aid regions (+28%) than elsewhere in the country. In the Nordic Aid regions, the role of poultry out from the total agricultural production is still very small. The DREMFIA model includes only a rough representation of poultry production in Nordic Aid regions and is not able to replicate the increasing production. However, the model result suggests that abolition or decrease in Nordic Aid would reduce poultry production in Nordic aid region and increase production in Southern Finland.

(2) Utilised Agricultural Area (UAA) and land use

Land is a vital asset for agricultural activity naturally suited for the climatic conditions of the Nordic Aid regions, such as milk and beef. In addition, well managed land contributes directly and indirectly to regional and local economic prosperity by creating diverse landscapes, contributing strongly to the identity of places and the products and services they offer.

(2.1) Historical developments

The total utilized land area within all Nordic Aid regions was 1.5 million hectares in 1995 and in 2005 it had increased by 2% to 1.54 million hectares. The land area was decreasing in both Finland and Sweden until 2000, after which it shows an increasing trend. About three quarters (75-77%) of

the total UAA under the Nordic Aid was located in Finnish sub-regions and a quarter (25-23%) in Swedish sub-regions.

The development of the land area diverged in Sweden and Finland. Between the years 1995 and 2005, the land area increased in Finnish sub-regions by 4.7% but it decreased in Swedish sub-regions by 3.9%. The arable land area decreased the most in Swedish area 2b, where land area decreased by 9,500 hectares (9,6%).

The land area increased the most in the Finnish sub-regions C4 and C2, where it increased by 12% and 9% over the ten year period. In absolute terms, the increase was about 1,000 hectares in area C4 and 50.000 hectares in area C2.

Most of the arable land in the Nordic Aid regions is allocated to production of forage (grass) (Table T1.9). The area of grass cultivation has, nevertheless, decreased in Finland in area C more than 10 % between the years 1995 and 2005. In Northern Sweden, the area of grass production has decreased quite strongly in late 90's, and even if it had increased in the later part of the period it is still smaller than in 1995. The decreasing trend of the grass area in the both countries is due to the decreasing number of dairy cows and other ruminants in the area. A large number of dairy farms have also switched from milk production to the grain production and other plant production. The increase in grain area has been mainly feed grain. However, the underlying mechanism driving up feed grain area in Nordic Aid regions has been CAP area payments 1995-2005 which provided significantly higher support level per hectare of grains than for grasslands. Nordic Aid has provided little support for feed grain. Part of the increased grain area is also explained by the fact that the use of grain has been increasing in the feeding of bovine animals since grain prices decreased approximately 50% in the EU accession in Finland while grasslands have received less support per hectare than grain.

Table T1.9. Cultivated areas (hectares and % distributions) in 2000, 2003 and 2005 in area C in Finland and in the Northern Sweden. (Tike, SJV).

	1995 ha	2000 ha	2005 ha	Distribut. 2005 %	Change, % 1995-2000	Change, % 2000-2005	Change, % 1995-2005
C area total	1,127,800	1,134,900	1,183,200	100.0	0.6	4.3	4,9
Grains	421,200	487,280	516,990	43.6	15.7	6.1	22,7
Grass	542,500	516,540	476,900	40.2	-4.8	-7.7	-12,1
Others	52,090	55,660	74,850	6.3	6.9	34.5	43,7
Fallow	112,100	75,450	116,580	9.8	-32.7	54.5	4,0
Northern Sweden: Grass	230,460	184,000	219,110		-20.2	19.1	-4,9

(2.2) Modelled developments

Finland

The simulations suggest that the overall utilised UAA is not as sensitive to marginal adjustments in Nordic Aid as compared to the animal production in Finland. This is partly due to the constraints in both CAP and LFA supports. Farmland is to be kept in good agricultural and environmental conditions in order to receive CAP support. Uncultivated farmland is eligible to CAP payments

only if it is grassland, or green set-aside. Further, LFA support is cut if a farm allocates more than 50% of land to set-aside.

However, the Nordic Aid has such a strong role in farm income that up to 25% of farmland would be idled in Nordic Aid regions, in the very long-term (up to 2015-2020), if no Nordic Aid were paid in 1995-2020. 10-15% of farmland would be idled if the Nordic Aid was cut by 50%. In this latter case, the 2003 CAP reform promotes the maintenance of farmlands and hence the effect of abolishing Nordic Aid is far less than without the reform. This means that a smaller than 50% reduction in Nordic Aids would affect UAA most likely by less than 10%. Hence one can conclude that UAA is not sensitive to a marginal reduction in the level of Nordic Aid.

Sweden

The CAPRI model is also used to analyse the impact of Nordic Aid milk price support on land use. It can be noted that the results correspond to the ones obtained for animal production; i.e. the impact of Nordic Aid differs under Agenda 2000 and under the 2003 CAP reform, and the results suggest that Nordic Aid did not have a significant impact on land use under the Agenda 2000 policy, that is under the evaluation period 1995-2005 (Tables T1.10 and T1.11). The reason is the same as above: the presence of quota rents and hence higher quota price act to buffer output levels against the fall in profitability caused by the removal of Nordic Aid. As milk production remains unchanged after a removal of Nordic Aid in the Agenda 2000 framework, no indirect effects on land use arises either.

Table T1.10. Impact of a removal of the Nordic Aid to milk production on hectares in Norrbotten and Västerbotten (the northernmost part of the Swedish Nordic Aid area).

	Agenda 2000 in 2009	2003 Reform in 2009
Cereals	+/-0	-0.6 %
Grass silage	+/-0	-3.0 %
Set-aside and fallow land	+/-0	+16.3 %
Cereals	+/-0	-0.6 %

Table TI.11. Impact of a removal of the Nordic Aid to milk production on hectares in Jämtland and Västernorrland (the central part of the Swedish Nordic Aid area).

	Agenda 2000 in 2009	2003 Reform in 2009
Cereals	+/-0	+3.7 %
Grass silage	+/-0	-0.4 %
Set-aside and fallow land	+/-0	+1.7 %
Cereals	+/-0	+2.6 %

The results suggest that a removal of Nordic Aid after the 2003 CAP reform has a considerable impact on land use, due to the estimated fall of dairy production, since a large share of the agricultural land in northern Sweden is used to produce feed to dairy cows. Suckler cow production increases due to less competition for arable and grazing land. In fact, the percentage increase in the number of suckler cows is higher than the percentage decrease in the number of dairy cows. However, the area of grass silage (the main feed ingredient in cattle production) falls since the number of dairy cows is 10 times higher to start with. Cereal production falls in the northernmost region but increases in the central part (Jamtland and Vasternorrland counties). Cereal production is affected in two ways by the reduction of dairy cows. Firstly, the reduced demand for feed to dairy cows lessens the demand for agricultural land and gives room for an expansion of cereals. Secondly, cereals are part of the feed for the dairy cows, so fewer cows leads to a lower demand for cereals. In the central part, the first effect dominates while the second effect dominates in the northernmost part. These differences can be explained by the different climatic conditions, the conditions for cultivating cereals are the least favourable in the north. Instead, there is a particular

increase in set-aside and fallow land in the northernmost region, although it increases in the central part too. Finally, evaluated at the Swedish level, the impact on the supply of cereals is small (Table T1.12).

Table T1.12. Impact on the supply of agricultural products in Sweden of a removal of the Nordic Aid to milk production.

	Agenda 2000 in 2009	2003 Reform in 2009
Cereals	+/-0	-0.01 %

In summary, during the period with coupled CAP supports (1995-2004), a removal of Nordic Aid would have had no effects on the UUA in Sweden. After 2004, when several CAP supports are de-coupled, a removal of Nordic Aid would lead to a reduction in the area dedicated to cereals and grass-silage, while the area of set-aside and fallow land would increase.

Land allocation estimation for Finland and Sweden

An econometric land allocation model estimated using FADN data is used for both countries. The results suggest that marginal adjustments in arable land payments do not have a significant effect on the allocation of land between cereals and forage crops in the Nordic aid regions. Elsewhere in Finland and Sweden (in the non-Nordic aid regions) increasing arable land payments, on the other hand, significantly shift the allocation of land from forage to cereals. In these regions, especially in Denmark and Sweden, the direct payments have favoured cereal production instead of forage crops. The results suggest that within the Nordic Aid regions land allocations are affected more by the derived feed demand from the animal production and the response is, therefore, more sluggish at the margin than in other regions.

Survey Responses

An assessment of the impact of the Nordic Aid on the development of the Utilised Agricultural Area (UAA) was asked from the administrators/stakeholders. The question was formulated as

> *What is your opinion about the development of the Utilised Agricultural Area (UAA) over time in your area, if the Nordic Aid had been about half of the present?*

In Finland more than half of the respondents stated that the whole land area would have stayed in agricultural use as present even if the Nordic aid had been about half of the present. Statements about the changes in the use of land were quite similar. About 75% of the respondents stated that the land of the smallest farms on most remote areas would have been left out of active use. Over 40 % of the answerers stated that also the best land on the rural core areas would have been left out of active use. Only few of the respondents thought that the farmers had cleared new land in order to compensate with additional hectares the lower level of the aid (Table T1.13). The respondents of administration of the aid scheme referred to even more significant reductions in the Utilised Agricultural Area than the results of the DREMFIA model, if the Nordic aid had been half less than present.

Table T1.13. Development of the UUA during the last ten years, if the Nordic aid had been about half of the present (distribution of the statements, %). Answers to the questionnaire for administration and stakeholders of the Nordic Aid Scheme in Finland.

	Strongly agree	Mildly agree	Unsure	Mildly disagree	Strongly disagree
a) Whole land area would have stayed in agricultural use as present.	14.3	41.4	2.9	30.0	11.4
b) Use of land would have changed, but the whole land had stayed in agricultural use.	22.5	23.9	10.0	36.6	7.0
c) Lands of the smallest farms on most remote areas would have been left out of active use.	40.0	34.3	4.3	15.7	5.7
d) Also part of the best lands on the rural core areas would have been left out of active use.	8.6	34.3	5.7	25.7	25.7
e) New land would have been cleared much more than present.	1.5	4.3	7.3	30.4	56.5

In Sweden, most of the stakeholders (86%) believe that UAA would have been lower without Nordic Aid in the 1995-2005 period. Of those, 72% believe that also part of the best agricultural land in the area would have been abandoned.

Table T1.14. Development of the UUA during the last ten years, with no Nordic Aid. Answers to the questionnaire for administration and stakeholders of the Nordic Aid Scheme in Sweden.

	Share of respodnent (%)
a) Whole land area would have stayed in agricultural use as present	1
b) Use of land would have changed, but the whole land had stayed in agricultural use	0
c) Lands of the smallest farms on most remote areas would have abandoned	14
d) Also part of the best lands would have been abandoned	72
e) New land would have been cleared	3

(3) Capacity of storages and their use (cubic metres)

The Nordic aid is paid for the storage of horticultural products, wild berries and mushrooms only in Finland. In 1995, the storage capacity, utilized and eligible for the support, was 55,300 cubic meters and in 2005 it was increased to 67,000 cubic meters. In relative terms, the increase in the storage capacity was 21% over the ten year period, which equals to an annual average growth rate of 1.9%. The capacity growth concentrated solely to the storages with heat control (+31%), whereas the amount of storages without heat control decreased by 15%.

It is expected that the overall tendency of increasing demand for horticultural products, fruits and vegetables have increased the production and storage volumes. Thus, the aid scheme together with the market effects has maintained the existing storage capacity and even increased it at an annual rate of 1.9%.

Conclusion

The Nordic Aid scheme has contributed to maintaining agricultural activities in the Nordic Aid regions but the magnitude of the supports as well as their effects differ between Sweden and Finland. In Sweden the Nordic Aid plays an overall smaller role than in Finland, and Nordic Aid has not unambiguously contributed in all Swedish sub-regions to maintain production. The reason is that in sub-region 2a reductions in aid would likely have been buffered by a fall in quota prices instead of a decrease in production. In sub-region 1 and 3 milk production has declined during the 1995-2005 period. In these sub-regions, Nordic Aid combined with CAP support has not sufficed to maintain production at the pre-accession level, and the analysis results suggest that the decline in production would have been faster without Nordic Aid. Especially in sub-region 1, which has the highest level of aid, Nordic Aid has likely had an effect on production although the level of aid has been too low to maintain production compared with the 1995 level. In sub-region 3, the level of aid is very low, so the effect on production is likely to have been small. However, if the changed policy framework due to the 2003 CAP reform is taken into account, the abolishment of Nordic Aid is estimated to have a negative impact on milk production, and indirectly lead to increased beef production and changes in land use towards more set-aside and fallow land.

Within the Finnish regions, the Nordic Aid scheme has more clearly contributed to maintaining agricultural activities at their pre-accession levels. This main result holds in particular for milk, which is the most important agricultural product in these areas. Capacity increasing investment subsidy and the income support measures, such as Nordic Aid, have together contributed to increasing production volumes in the pig and poultry sectors.

Among the specific sub-regions, the tendencies in Sweden and Finland are similar. In neither country has Nordic Aid been able to counteract the spatial concentration of production to the southernmost sub-regions, meaning that the northernmost sub-regions, sub-region 1 in Sweden and sub-region C4 in Finland, have been loosing animal production to the southern sub-regions. Particularly, in the Finnish sub-regions, the dairy and livestock production has been concentrating into the sub-region (C2) and towards the western coastal line. Already from the start, these regions had the most intensive production, and the production volumes have further increased over the evaluation period. Spatial concentration of production has been the strongest in pig meat and poultry production.

Regarding arable land use, the agricultural support system, as a whole, has to a larger extent maintained arable land area in active use the Finnish Nordic Aid regions than in the Swedish Nordic Aid regions. In two Finnish regions, the arable land area has even increased. In Sweden, the arable land area exhibits a downward sloping trend: This is most visible in sub-area 2b where the arable land area has decreased by 10% percent over the ten year evaluation period. An explanation for the difference is that there is no Nordic Aid payments linked to land use in Sweden. However, the results show that the arable land area under active cultivation is not very sensitive to adjustments in the Nordic Aid since the cross compliance requirements in the CAP and the environmental programs encourage the keeping of land open and in good condition. Nevertheless, the results also support the view that, if the Nordic Aid had been lower, more land would have been left idle in the most remote Nordic Aid regions.

The price supports for milk and the headage payments under the Nordic Aid scheme, which are coupled to production, are efficient instruments for maintaining agricultural production, as compared to more de-coupled arable land payments. The results further support the view that the weight of price supports has increased after the Mid Term Review of the CAP, which de-coupled a significant part of CAP payments from production into the Single Farm Payment.

Reflection of disadvantages (Q 2)

Question 2: To what extent are the amounts of payments fixed by the two Member States reflecting disadvantages in the different sub-regions; at the time of establishing of the levels as well as when changing the levels (e.g. to specific investment needs, higher operating costs etc).

Introduction and interpretation

The main concern of the question is the differences in natural conditions between the regions and, further, the extent of which the Nordic Aid reflects and reduces the economic implications of these differences.

"*Disadvantages in different sub-regions"* are expected to cause productivity differences, differences in total costs of production and in the gross returns of the farms. Economies of scale and size are expected to decrease the unit production costs with increasing farm size. Nevertheless, natural disadvantage is likely to constrain farmer options and potential to realize the benefits from increasing the farm size in the Nordic Aid areas.

"At the time of establishing of the levels as well as when changing the levels" implies that the measures under scrutiny are the initial amounts of payments, as established in 1995, and the adjustments made in amounts thereafter. A further concern is the extent to which the ongoing technological development, adoption of new technologies and investments has changed the economic implications of the disadvantages in different sub-regions.

Analysis and the judgement criteria

The judgement of on how much the Nordic Aid payments reflect the variation in disadvantages between different sub-regions starts with the farm level estimation of differences in physical productivity, *i.e.* differences in physical farm output/farm input –ratios. The estimates of physical productivity are also adjusted by the direct income supports and by the price supports for milk so that these support payments artificially increase farm output in the model. This way it can be analysed to what extent the supports reflect and reduce the spatial productivity differences.

Natural disadvantages can affect the agricultural production and productivity in two ways: 1) they can decrease production and thereby productivity at given inputs, and 2) they can increase input use and production costs at a given production level. In addition, the farm gate prices for farm inputs and farm outputs can also be affected, for example, by lower quality adjusted prices and higher transportation costs. Therefore, the effects of Nordic Aid on farm gross returns (turnover) and net income are also analysed. Further, economic rents for fixed factors and asset values are measured by land prices and milk quota prices. These rents provide information on regional differences in the capitalization of farm support programs in asset values.

In addition, the farmers and their stakeholders were asked in the survey whether they found differences in support levels "fair" in relation to differences in conditions between sub-regions and production lines.

(1) Regional productivity differences

Productivity is a measure of the physical ratio of farm outputs over farm inputs. Productivity differences are estimated between Denmark and the FADN regions in Finland and Sweden using FADN data for the years 1997-2003. Denmark, as well as those regions in Sweden and Finland that are not entitled to Nordic Aid, are used as benchmark regions in the analysis. Denmark is included as an agricultural region where production conditions are more favourable and farmers are not faced with natural disadvantages to the same extent as the farmers in the Nordic Aid regions. In addition, the possible country effect can be controlled for by taking a benchmark outside Sweden and Finland.

The productivity analysis covers only dairy farms, because the data for other production lines in the Nordic Aid regions are sparse and, hence, insufficient for the analysis. As milk production represents one of the production lines, best suited to the conditions in the Nordic Aid regions, we could expect that the analysis of dairy farms produces a lower bound for differences in regional productivity.

The results suggest that, in addition to structural differences, there are considerable differences in productivity between equally sized dairy farms located in different regions even when the size effect is factored out in the comparisons.

An average Danish farm produces 3.5 – 4 times the output of an average Finnish farm and 2.0-2.5 times the output of an average Swedish farm. More than two thirds (2/3) of the output differences are related to larger farm size, measuring the size by the farm's input usage, but the Danish technology is also more productive than the Swedish and Finnish technology, when the productivity is measured at an equal farm size across the regions. This productivity difference covers all effects like resource endowments, natural conditions, managerial abilities *etc*.

Table T1.15 presents the relative farm productivity in each region keeping the productivity of Danish farms as the benchmark, i.e. normalizing the Danish productivity to value 1. The results suggest that Danish technology is dominating the technologies over other regions such that the productivity is the highest on Danish farms. Closest to the productivity level of Danish technology are the farms located in southern and central Sweden with about 80% of the Danish productivity. In all Finnish sub-regions, except northern Finland, the productivity level is about 70% of the Danish productivity. In Northern Finland the corresponding figure is 61%. The productivity is the lowest in the northernmost region of Sweden, reaching only 58% of the Danish productivity. These spatial productivity differences have been slightly reducing over time, because technological change has been slightly faster in Sweden and Finland than in Denmark.

Table T1.15. Average productivity ratios between regions on dairy farms. The productivity level of Danish technology is normalized to the value 1.0.

Region	Productivity ratio
Denmark	1.00
Southern Finland	0.71
Central Finland	0.70
West Central Finland	0.70
Northern Finland	0.61
Southern Sweden	0.81
Central Sweden	0.80
Northern Sweden	0.58

Figure T1.3 presents the distribution of productivity ratios for farms in each region as Box whisker plots. The results indicate that in Northern Finland (NF), for example, the achievable farm output would be in average 61% of the output achievable on Danish technology, evaluated at the average farm size in Northern Finland. The arithmetic mean is indicated by the plus sign in the middle of the small box. Half (50%) of these Finnish farms would achieve 58-64% of the output of Danish technology, *i.e.* be within the small box in the figure. The minimum output would be 42% and the maximum 97% of Danish output, again at an average farm size within the Finnish (NF) region. These extreme values are indicated in Figure T1.3 by the lowest and highest values along the vertical lines.

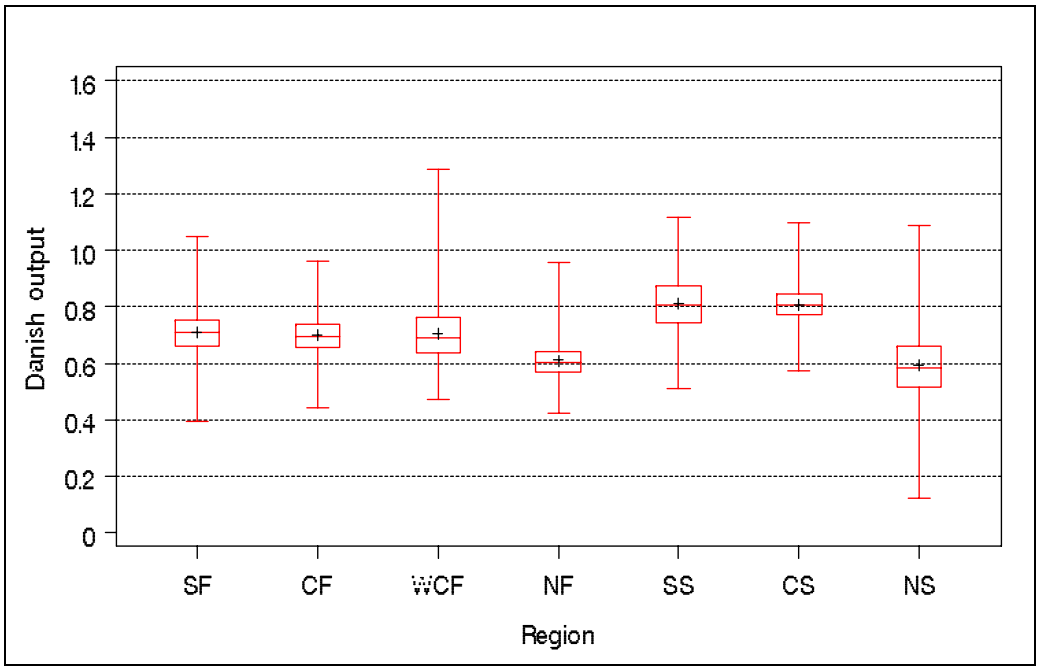


Figure T1.3. Relative output of farms when compared to Danish production technology. Estimates are based on regional production functions (SF, Southern Finland; CF, Central Finland; WCF, West Central Finland; NF, Northern Finland; SS, Southern Sweden; CS, Central Sweden; NS, Northern Sweden).

The contribution of subsidies on relative returns of farms is illustrated in Table T1.16. As above, the comparisons between technologies are made for each region at the respective region's input level but the outputs of each region are artificially adjusted by subsidies. When the effects of all subsidies for milk farms are accounted for in the analysis so that they artificially increase farm output, the adjusted productivity differences between the Finnish and Danish regions are significantly reduced. The subsidy adjusted productivity ratio varies between 0.92 and 0.97 for the Finnish regions and from 0.83 to 0.87 for the Swedish regions. Thus, the support systems in Sweden and Finland have reduced the competitive disadvantage caused physical productivity differences. The results suggest that the support schemes have provided Finnish farms with returns that are much closer to those of the Danish farms than the returns provided by the support schemes for Swedish farms. The Finnish farms lag behind their Danish, equally sized counterparts by 3-8%. Within the Swedish regions, the corresponding range evaluated at the Swedish average farm size is ten percentage points lower and it lies within 13-17%. It is likely that the regional differences in farm size widen the estimated productivity differences from those given above.

Further, the subsidy adjusted productivity estimates indicate similar spatial patterns within Sweden and Finland. In both countries, the central sub-regions have the best competitive positions and their subsidy adjusted productivity levels exceed the corresponding levels both in the northernmost and

the southernmost parts of the countries. In the Finnish case, the regions "Central Finland" and "West Central Finland" receive the best competitive position within all Nordic Aid regions. These two regions approximately correspond to the southernmost sub-regions eligible for the Nordic Aid in Finland, *i.e.* sub-regions C1 and C2. In other words, the current subsidies paid to farms in these areas provide almost equal opportunities to compete with Danish farms of equal size, even if their physical productivity is 30% lower than that of the Danish farms. The farms located in the northernmost regions of Finland and, especially, in Sweden do not have so good competitive position in the market even when the subsidies are accounted for in the comparison.

Table T1.16. Average subsidy adjusted productivity ratios between regions on dairy farms. The productivity level of Danish technology is normalized to the value 1.0.

Region	Productivity ratio	Subsidy adjusted productivity ratio, all subsidies	Contribution of all subsidy payments (points)
Denmark	1.00	1.00	n.a.*)
Southern Finland	0.71	0.93	0.22
Central Finland	0.70	0.95	0.25
West Central Finland	0.70	0.97	0.27
Northern Finland	0.61	0.92	0.31
Southern Sweden	0.81	0.83	0.02
Central Sweden	0.80	0.87	0.07
Northern Sweden	0.58	0.83	0.25

*) The Danish case also involves subsidies but it is normalized to one in all simulations and the difference is zero by definition.

The price support for milk is one of the most important support measures in the Nordic Aid scheme. Therefore, Table T1.17 presents a subsidy adjusted productivity ratio that excludes the milk price support. The ratios show the importance of the milk price support in reducing the differences in returns at given input levels caused by differences in productivity.

Table T1.17. Average subsidy adjusted productivity ratios between regions on dairy farms, conditional on alternative subsidy adjustments. The productivity level of Danish technology is normalized to the value 1.0.

Region	Productivity ratio	Subsidy adjusted productivity ratio, all subsidies	Subsidy adjusted productivity ratio, price support for milk excluded	Contribution of price support for milk (points)
Denmark	1.00	1.00	1.00	0
Southern Finland	0.71	0.93	0.81	0.12
Central Finland	0.70	0.95	0.80	0.15
West Central Finland	0.70	0.97	0.83	0.14
Northern Finland	0.61	0.92	0.72	0.20
Southern Sweden	0.81	0.83	0.83	0.00
Central Sweden	0.80	0.87	0.85	0.02
Northern Sweden	0.58	0.83	0.74	0.09

After this artificial quantity adjustment, which only accounts for acreage and per head payments, the 'productivity' of Swedish and Finnish regions lag behind the Danish productivity by 20%. For Northern Finland and Sweden the lag is more than 25%. Comparing the productivity ratios we can conclude that the price support for milk reduces the regional productivity differences by 9-20 percentage points. The contribution of the price supports is the highest in the northernmost sub-region of Finland.

It could be claimed that the productivity wedge between the regions is affected and caused by differences in farms' technical inefficiencies. This is, nevertheless unlikely. The results suggest that the region specific average technical efficiencies vary within a narrow range of 0.81-0.82 and do not deviate significantly between the regions. This means that the average technical inefficiency is of similar magnitude in every region, from Denmark to Northern Finland and Sweden. The farms should on average be able to produce approximately 18 percent more output given their inputs in all regions.

(2) Subsidy rates by Nordic Aid regions

In Finland, the scrutiny based on the FADN data in sub-areas C1-C4 includes all national aids paid in the area of Nordic aid. In Sweden the share of the Nordic aid has been estimated from the FADN data of individual farms to be in average about 20-30 % of the balance of current subsidies and taxes. The subsidy rates of the Nordic aid scheme, *e.g.* per livestock units and hectares, increase significantly from South to North as a reflection of increasing natural disadvantage and decreasing productivity. In Finland the sum of all national aids in dairy farms, when it is normalized per livestock unit, is clearly scaled to increase from the south to the north. In sub-region C2 the aid per field hectare has been about 10-22 % higher than in sub-region C1. In sub-region C3 the aid has been roughly double and in sub-region C4 the aid has been 3-4 times the rate in sub-region C1. In the Swedish northernmost FADN area "*Lan i Norra*" the Nordic aid was estimated to be 40-80 per cent of that in Finnish sub-region C1. The regional differences of the support payments on dairy farms have also similar patterns when the payments are normalized per hectare of arable land (Table T1.18).

Similar tendencies are observed when we take all production lines into an account (all farms) and compare the Nordic aid received by these farms to the farms arable land areas. In 2004, the average aid per hectare of land was € 235 in sub-region C1, and about € 1,100 per hectare in sub-region C4. In "*Lan i Norra*" in Sweden, the support was only € 142 per hectare. Hence, in the northernmost sub-region C4, the support rate was about five times the support rate in area C1. In "*Lan i Norra*" the amount of the aid per hectare has varied within the range of 42-60% of the aid in sub-region C1 (Table T1.18).

For Finland, it can be seen that the differences in support levels correspond roughly to the differences in productivity lag. That is, the sub-regions with a relatively larger physical productivity gap to Denmark have higher support levels. In the Swedish sub-region "*Lan i Norra*" the support rates have remained low compared to its physical productivity lag compared to Denmark. In other words, our conclusion is that, when the regional handicaps are measured by farms' physical productivity, the Nordic Aid payments reflect the regional variation in natural handicaps elsewhere but not in the northernmost Swedish sub-region.

Table T1.18. The Nordic Aid on the dairy farms normalized per livestock unit (LU) and hectare of arable land, and on all farms normalized per hectare of arable land. Ratios: The aid compared to the corresponding aid in the southernmost Finnish sub-region C1, which is normalized to 100. (Source: MTT FADN farms in Finland, FADN Standard Results in Sweden).

	1998	1999	2000	2001	2002	2003	2004	2005
Dairy farms, aids per LU:								
C1 area, €/LU	248	323	402	441	442	446	497	408
Ratios: C1	100	100	100	100	100	100	100	100
C2	124	120	122	112	118	110	118	119
C3	259	242	233	217	218	219	225	222
C4	369	398	348	325	367	370	310	418
C in aver.	132	129	128	120	125	120	124	125
Lan i Norra	80	65	51	45	47	40	43	n.a.
Dairy farms, aids per ha:								
C1 area, €/ha	211	271	344	374	376	366	431	351
Ratios: C1	100	100	100	100	100	100	100	100
C2	125	116	115	104	106	104	105	107
C3	276	253	227	213	202	215	206	200
C4	403	383	339	298	343	395	301	405
C in aver.	133	127	124	115	116	115	115	116
Lan i Norra	46	37	47	40	42	36	37	n.a.
All farms, aids per ha:								
C1 area, €/ha	136	188	225	226	228	230	235	205
Ratios: C1	100	100	100	100	100	100	100	100
C2	161	140	140	134	136	135	145	139
C3	396	356	321	356	329	305	323	306
C4	626	553	517	495	564	532	472	645
C in aver.	151	139	136	133	133	132	139	135
Lan i Norra	58	42	59	56	59	51	60	n.a.

(3) Gross returns and the share of aid in the gross returns

Farm Gross Returns and the share of aid in these returns are used as economic indicators to describe on how much the Nordic Aid Scheme reflects regional disadvantages in the farms income generating processes. For meaningful regional comparisons the returns are normalized by the quantity of farms' production factors, such as the hectares of land and the number of livestock unit (*LU*).

Gross return per hectare and per Livestock Unit describes the intensity of production in economic terms and it is used to investigate the size of regional discrepancies observed in farm returns, normalized by the farms arable land area and number of livestock units. *The share of the aid in the gross return* is used to analyse how much the aid contributes to the farm returns in relative terms. These results complement the physical productivity analysis and the productivity analysis in which the productivity measures were adjusted by the support payments. As above, the analysis concerns mainly *the dairy farms* stratified by sub-regions, but are extended also to the figures concerning all farms by sub-regions. In Sweden, the analysis is limited to the FADN region "*Lan i Norra*".

Gross returns per hectare of arable land exhibit large annual variations, in particular, for dairy farms located in the northern sub-regions (Table T1.19). The per hectare returns are the lowest in the Swedish region "*Lan i Norra*" and the highest in the Northernmost Finnish sub-region C4. In Finland the gross returns increase per hectare of land from south to north. Regional differences are also similar when the gross returns are normalized per livestock unit. But when the Gross returns are measured per farm, regional differences have been smaller and the returns have been the highest in "*Lan i Norra*". The difference between "*Lan i Norra*" and the Finnish Nordic aid regions has been more than 50%.

Table T1.19. Relative regional levels of Gross return per hectare of land (€/ha), per Livestock Unit (€/LU) and per farm (€/farm) on the dairy farms. The southernmost sub-region C1 is the benchmark and normalized to 100. (Source: MTT FADN farms in Finland, FADN Standard Results in Sweden).

	1998	1999	2000	2001	2002	2003	2004	2005
Gross returns, € / ha:								
C1 area, €/ha	2,425	2,437	2,538	2,712	2,871	2,816	2,964	2,890
Ratios: C1	100	100	100	100	100	100	100	100
C2 area	99	98	100	96	92	95	93	96
C3 area	109	112	116	114	108	116	113	107
C4 area	131	125	135	122	132	145	121	140
C in aver.	100	100	102	99	96	99	97	98
Lan i Norra	52	53	85	73	71	79	73	n.a.
Gross returns, € / LU:								
C1 area, €/LU	2,843	2,901	2,971	3,198	3,376	3,430	3,422	3,351
Ratios: C1 area	100	100	100	100	100	100	100	100
C2 area	98	100	106	103	102	101	104	106
C3 area	102	107	119	116	116	119	123	119
C4 area	120	130	139	133	142	136	125	145
C in aver.	99	101	106	104	103	103	105	106
Lan i Norra	91	93	91	81	80	87	85	n.a.
Gross returns, € /farm:								
C1 area, €/farm	67,900	73,100	81,200	89,500	97,600	104,200	106,700	112,700
Ratios: C1 area	100	100	100	100	100	100	100	100
C2 area	105	106	108	107	106	106	108	104
C3 area	93	108	112	107	108	107	107	99
C4 area	94	92	89	89	97	94	91	90
C in aver.	102	104	106	105	104	104	105	102
Lan i Norra	150	150	142	133	149	166	157	n.a.

The main reason for the notable differences between the countries is the difference in the farm size. In "*Lan i Norra*" Total Utilized Agricultural Area per farm has been 1.8-2.9 times as large as for Finnish farms in areas C1-C4. The average number of livestock units per farm in average is 1.8 times as large as for farms in the Finnish sub-regions C1 and C2, and 2.1-2.5 times as large as for farms in sub-regions C3 and C4 in Finland.

The average share of the Nordic Aid in the farms' gross returns in each region has varied amongst all farm types within a range of 10%-35% during the period of 1998-2005 (Table T1.20, Figure T1.4). In the dairy farms, the share has been the lowest in the Swedish region "*Lan i Norra*" (6-8%) and the highest (27-36 %) in the northernmost Finnish sub-region C4. From the year 2000 the share of Nordic Aid out from the gross returns has remained stable or increased slightly with the passage of time in all areas.

Table T1.20. The share of the Nordic Aid in the Gross return (%) on dairy farms and on all farms. (Source: MTT FADN farms in Finland, FADN Standard Results in Sweden).

	1998	1999	2000	2001	2002	2003	2004	2005
Dairy farms:								
C1area	8.7	11.1	13.5	13.8	13.1	13.0	14.5	12.2
C2 area	11.1	13.3	15.6	15.0	15.2	14.2	16.5	13.6
C3 area	22.2	25.1	26.5	25.8	24.6	24.0	26.5	22.8
C4 area	26.8	34.2	34.0	33.6	33.9	35.5	36.1	35.1
C in aver.	11.6	14.2	16.4	16.0	15.8	15.2	17.2	14.4
Lan i Norra	7.7	7.8	7.5	7.6	7.7	6.0	7.3	n.a.
All farms:								
C1	6.6	8.7	10.5	10.4	9.9	10.5	10.2	9.2
C2 area	10.2	12.0	14.0	13.2	13.4	13.1	14.9	12.6
C3 area	20.3	23.7	23.8	26.5	23.0	22.3	24.8	23.1
C4 area	26.8	34.2	34.0	33.6	33.9	35.5	35.8	35.8
C in aver.	9.6	11.7	13.6	13.1	12.8	13.0	14.0	12.1
Lan i Norra	7.6	8.0	7.7	7.7	7.9	6.1	7.7	n.a.

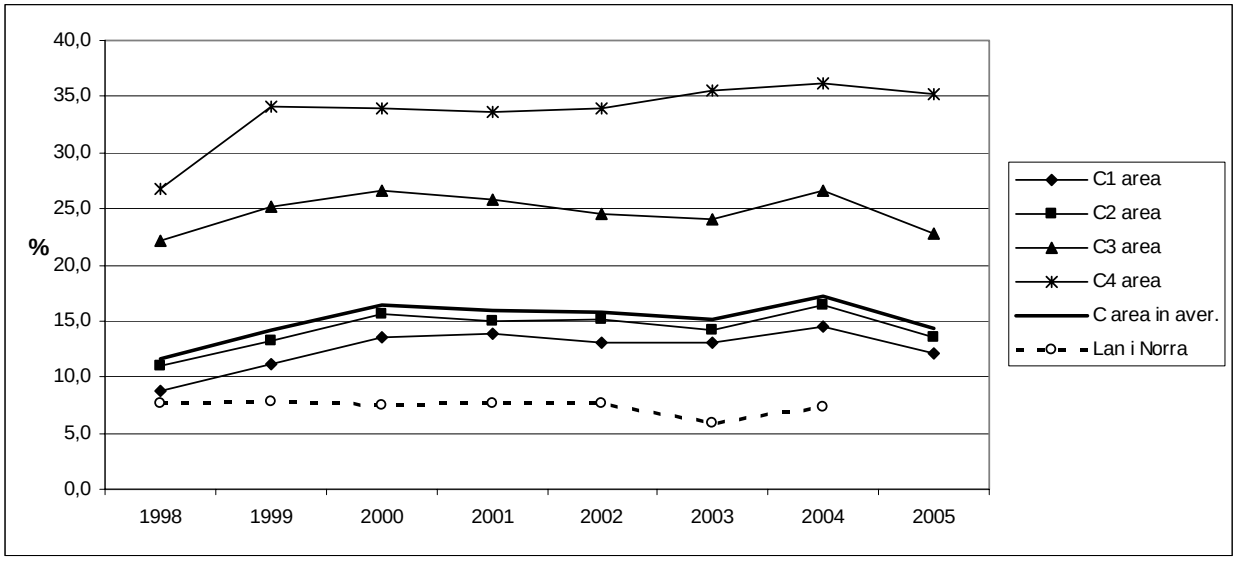


Figure T1.4. The average share of aid out from Gross returns in dairy farms by the sub-regions. (Source: MTT FADN farms in Finland, FADN Standard Results in Sweden).

(4) Farm Net Value Added (FNVA) and the share of aid in FNVA

Farm Net Value Added *(FNVA)* is used as an economic indicator to describe on how much the Nordic Aid Scheme reflects regional disadvantages and how much regional discrepancies and variation have remained in farmer income. For regional comparisons the FNVA measure is normalized by the quantity of farms' production factors, such as hectare of arable land. *On the dairy farms* the rate of the FNVA per hectare has been the highest in the northernmost Finnish sub-region C4, with an exception of year 2004, and the lowest in the Swedish region "*Lan i Norra*" (Table T1.21). The rate in the Swedish "*Lan i Norra*" region deviates the most from the corresponding rates in other regions. The difference between FNVA in "*Lan i Norra*" and the Finnish C-regions is partially explained by the differences in the depreciation cost, which have been about Euro 10,000 larger in the Swedish region. The property subject to depreciation is evaluated in different ways in Finland and Sweden and, therefore, a higher cost of depreciation is estimated in Sweden (Forsman 2005).

Table T1.21. Relative regional levels of Farm Net Value Added per hectare (FNVA/ha) and per livestock unit (LU) on the dairy farms. The southernmost sub-region C1 is the benchmark and normalized to 100. (Source: MTT FADN farms in Finland, FADN Standard Results in Sweden).

Ratios	1998	1999	2000	2001	2002	2003	2004	2005
FNVA / ha:								
C1 area, €/ha	786	877	938	976	1,044	957	1,011	921
Ratios: C1	100	100	100	100	100	100	100	100
C2	108	99	99	99	87	98	91	98
C3	118	112	124	124	112	141	122	110
C4	132	117	130	118	146	155	95	125
C in aver.	107	101	102	102	94	104	97	100
Lan i Norra	29	34	47	42	47	50	37	n.a.
FNVA / LU:								
C1 area, €/LU	921	1,044	1,098	1,150	1,228	1,165	1,167	1,067
Ratios: C1	100	100	100	100	100	100	100	100
C2	107	102	105	106	97	104	103	109
C3	111	107	127	126	121	144	133	122
C4	120	121	133	129	157	146	97	129
C in aver.	105	102	106	107	101	108	105	108
Lan i Norra	51	61	50	46	53	55	43	n.a
FNVA / farm:								
C1, €/ farm	22,000	26,300	30,000	32,200	35,500	35,400	36,400	35,900
Ratios: C1	100	100	100	100	100	100	100	100
C2	115	107	107	110	100	108	105	107
C3	101	108	120	116	112	130	115	101
C4	94	86	85	86	108	101	71	80
C in aver.	109	105	106	107	101	108	104	104
Lan i Norra	84	98	78	76	98	105	79	n.a.

Farm Net Value Added per livestock unit has similar regional differences but it is generally higher than FNVA per hectare, because farms on average have less than one livestock unit per hectare of arable land.

The income level per farm has been the lowest in the northernmost sub-region of Finland and in the Swedish region "*Lan i Norra*". The FNVA has been the highest in sub-region C3 and it does not differ significantly between sub-regions C1 and C2.

Amongst the dairy farms, the share of the Nordic aid from FNVA has been about 27-43% in the Finnish sub-regions C1 and C2, in sub-region C3 the share has varied between 63-72%, and in sub-region C4 between 82-136% (Table T1.22 and Figure T1.5). In Sweden in "*Lan i Norra*" the Nordic Aid has amounted to mainly 32-42% of FNVA. The ratios of Nordic Aid to FNVA amongst all farms are close to those found for the dairy farms with only one exception. In "*Lan i Norra*" the share of the Nordic Aid in FNVA has been clearly higher in the group of all farms than in the group of dairy farms.

Table T1.22. The Nordic aid per Farm Net Value Added (%) on the dairy farms and on all farms by sub-regions (Source: MTT FADN farms in Finland, FADN Standard Results in Sweden).

	1998	1999	2000	2001	2002	2003	2004	2005
Dairy farms:								
C1	26.9	31.0	36.7	38.3	36.0	38.3	42.6	38.2
C2	27.4	31.2	35.7	32.8	34.9	34.4	38.4	33.0
C3	62.9	70.1	67.5	66.0	64.9	58.4	71.9	69.5
C4	82.4	101.6	96.1	97.0	84.3	97.3	135.9	123.5
C in aver.	33.6	39.2	44.4	43.4	44.8	43.0	50.9	44.5
Lan i Norra	42.6	33.2	37.0	37.0	32.1	27.7	42.7	n.a.
All farms:								
C1	22.2	26.3	30.8	31.9	29.1	33.7	33.5	31.7
C2	30.1	34.1	39.0	36.2	39.6	40.7	48.1	40.7
C3	56.8	68.0	61.3	67.9	60.4	54.7	64.0	71.0
C4	82.4	101.6	96.1	97.0	84.3	101.7	133.1	117.1
C in aver.	29.6	34.3	38.2	37.4	37.5	39.9	44.6	40.1
Lan i Norra	68.5	45.6	53.4	46.3	36.8	31.1	54.0	n.a.

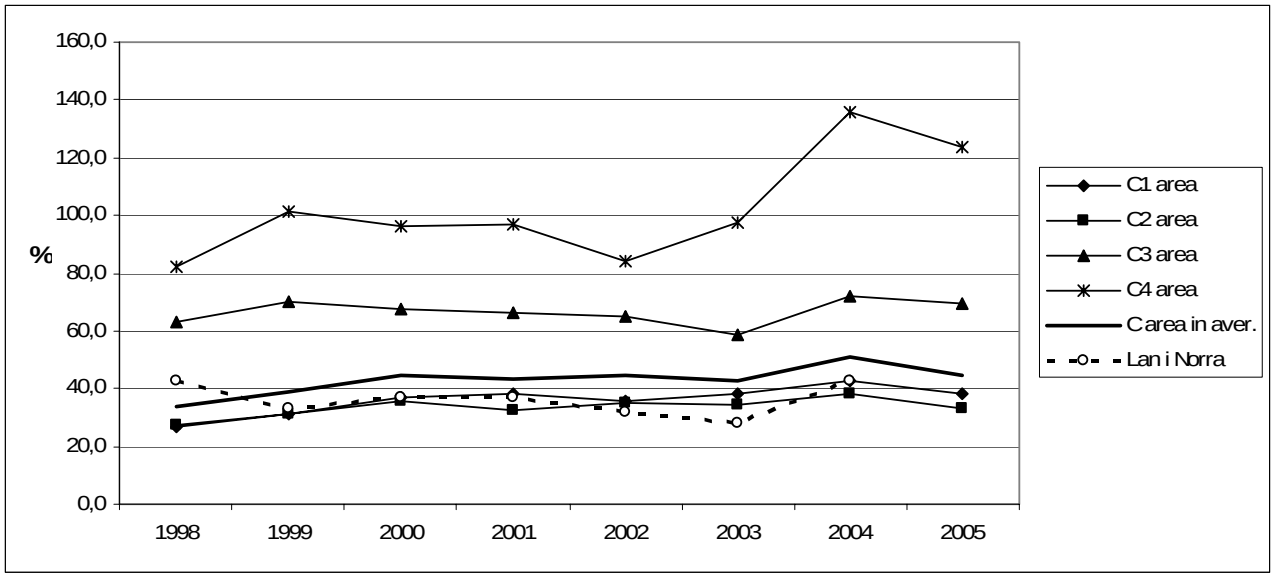


Figure T1.5. The Nordic Aid to Farm Net Value Added -ratios (%) on dairy farms. (Source: MTT FADN farms in Finland, FADN Standard Results in Sweden).

(5) Economic rents: Land and quota prices

If agricultural production activities generate positive net returns, net of subtracting all variable costs from the gross returns, a stream of these net returns (often referred to as economic rents) have a tendency to capitalize in the values of scarce quasi-fixed production factors and asset values. Therefore, the market values of these quasi-fixed production factors and asset values can be used to infer the profitability of agricultural activities, when the true costs, revenues and economic rents are unobserved. The quasi-fixed factors and assets that accumulate economic rents in agriculture are typically arable land and tradable production rights, such as milk quotas.

Milk quota prices
Since May 2000, the milk quota prices have been quite stable at about EURO 8.7/100 kg (SEK 0.8/kg) in the Swedish Nordic Aid regions. Over the period of 1997-2006 the corresponding price has been EURO 30/100 kg in the Finnish sub-regions C1 and C2, whereas in sub-regions C2p, C3 and C4 the price has been EURO 22/100 kg. The prices within the Finnish regions peaked in 2003, when the national quota was binding, and they have been gradually decreasing thereafter.

Thus, the price for milk quotas has been volatile and significantly higher in the Finnish regions than in the Swedish regions. And further, the regional price differences support the view that the southernmost sub-regions eligible for Nordic Aid in Finland, have either received the highest compensation as compared to other Nordic Aid regions, or the risk of exceeding the national quota has expected to imply the largest penalties in these areas. A further reflection could be that the potential for exploiting benefits from increasing the farm size have been relatively larger in the southern regions as compared to the northern regions. Hence, is likely that the Nordic Aid has capitalized in quota rents, and more so in the Finnish than in the Swedish sub-regions. In addition, the investment supports have likely capitalized in quota values in Finland, because a sufficient amount of milk quotas, as compared to the production volumes after the investment, have been required in advance to get access in the investment supports.

Land values
Detailed statistics on land values, stratified by the Nordic Aid regions do not exist. Some data are available for land rents in both countries. Eurostat has recorded annual average rents for agricultural land in EU-countries. In Sweden also some regional data exist on land rents. In Finland the situation is different since there exist broader data on land sales prices and a detailed case study for land rents in 2004 Myyrä (2004).

In both Sweden and Finland, average annual land rents have a large spatial variation and they decrease quickly when we move from south to north. In 2006, the average rent in southern Sweden was 315 €/ha and in northern Sweden it was 37 €/ha. Thus, the rent in northern Sweden was only 12% of the corresponding rent in southern Sweden (Agricultural rents 2006). Also in Finland the spatial variation in land rents is large and the rent depends on the population and dominance of agriculture in the area. Demand of the agricultural land is low in the sparsely inhabited areas, where the share of field in land-area is small (Lehtonen & Pyykkönen 2005, Myyrä 2004). In 2003-2004, the average annual land rent was 135 €/ha in the Finnish sub-region C1, 124 €/ha in sub-region C2, and about 42 €/ha in sub-regions C3 and C4. The land rents were zero, *i.e.* free of charge, in 27 per cent of the rented arable land area in Lapland (northern C3 and C4) and in 20 per cent of the rented arable land area in Kainuu county (located in northern C2 and eastern C3 sub-regions). Zero rents were also observed in other counties in region C. Such a large variation in land rents suggests that quality and productivity of arable land has large variation, and that the rents on lower than average quality land are approaching zero. In particular, the rents are approaching zeros in the most remote Nordic regions. In Sweden these regions are in the mountain areas in the North-West, whereas in Finland these areas are located in the North-East where emigration has decreased population densities.

The price of arable land is available only for Finland. The prices highlighted by Figure T1.6 below, represent sales transactions that include only arable land without farm compounds or forest land. Therefore, the prices exclude transactions in which farms have been transferred from elderly farmers to new successors, but they include transactions in which expectations from urban land use have affected prices. The tendencies observed in the land prices are consistent with the

corresponding tendencies in the rental prices. The regional average prices have a large spatial variation, they decrease rapidly from South to North, and they increase over time. Within the Nordic Aid regions, the prices have been the highest in sub-region C1 and the lowest in sub-regions C3 and C4. The annual increase in land values follows the general patterns in Europe. The increase of arable land values with respect to the passage of time has been slower during the evaluations period than the development of other asset values.

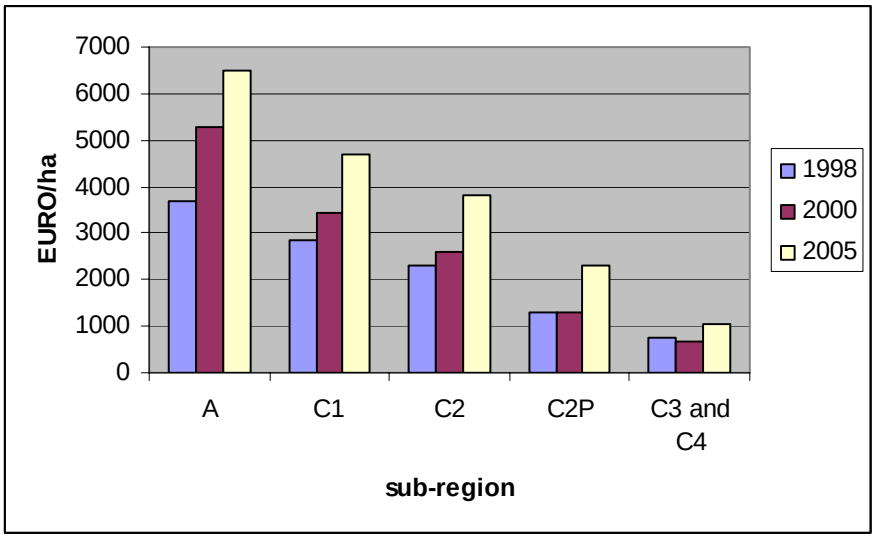


Figure T1.6. Land prices in the Finnish sub-regions in 1998, 2000 and 2005.

(6) Criteria for designation of sub-regions

Due to lack of sufficient data, it was not possible to carry out a comprehensive analysis addressing the question to what extent the boundaries between the sub-regions exactly responds to the variation in natural production conditions. Therefore, the only alternative to approach this question was to ask views of the farmers and their stakeholders in a questionnaire. The following question was asked:

> *a) Does the Nordic Aid Scheme pay enough attention to the natural differences of production conditions between different support regions? b) …between production lines? c) Do you think that the border lines of sub regions within the area of Nordic Aid should be changed?*

Three quarters of the responding farmers in Finland stated that the Nordic Aid scheme pays enough attention to the natural differences in production conditions between different support regions (Table T1.23). However, one quarter of the farmers stated that the Nordic Aid does not respond enough to the natural differences. In addition, a case farm located in the Finnish C2 region claimed that the spatial variation in the support rates should better reflect inversely the spatial variation in the reference yields, as established in the CAP.

Over 70 % of the Finnish responded farmers stated that the border lines of the sub-areas within the Nordic Aid regions should not be changed, whereas almost 15 % of the farmers were in favour of changing the borderlines (Table T1.24). In the group of 80 farms, which supported changing of the borderlines, 48 farmers gave a written proposal, where or how the sub-areas ought to be changed. Many of the answers dealt with the borderlines of sub-regions C2, C2north and C3 in the east. Majority of the representatives of the administration and stakeholders were satisfied with the borderlines, but 17 % of the answerers were dissatisfied with them and presented a wide range of changes. These proposals were, nevertheless, so mixed that it was not possible to draw a common

conclusion from them. More than 70 % of the respondents, representing administration and stakeholders were satisfied with the present regional distribution of the aid. Two thirds of the representatives of administration and stakeholders were also satisfied with the differences of aids between production lines (c.f. Tables T1.25- T1.26).

In Sweden, farmers' statements on whether boundaries between sub-regions represent a "fair" reflection of differences in natural disadvantages seem to be dependent on sub-region and, hence, on the level of support (Table T1.23). Thus, it is only in sub-region 1, where farmers receive the highest support, that the majority of respondents find the boundaries to be fair. The opposite pattern occurs in farmers' responses to whether or not the boundaries ought to be changed, i.e. farmers in sub-regions with lower levels of support tend to be more inclined to state that boundaries should be changed (c.f. Tables T1.23 and 1.28). It should be noted, though, that there was no majority for changing the boundaries in any of the sub-regions. In Sweden responses from administrators and other stakeholders are very much in line with responses from the farmers (except farmers in sub-region 1). That is, only a minority is of the opinion that boundaries between sub-regions, or differences in support levels between production lines, are fair with regards to natural disadvantages (c.f. Tables T1.25- T1.26).

In Sweden only a few respondents have commented their statements in Table T1.23 (10 percent in sub-region 1, 19 percent in sub-region 2a, 20 percent in sub-region 2b, and 27 percent in sub-region 3). All of them came from respondents who were dissatisfied with the present situation. There are also some indications that they primarily came from respondents with farms close to sub-region borders. The majority of respondents in sub-region 1 held the opinion that support levels in their region were too low, while the majority of respondents in the other sub-regions (2a – 3) commented that support levels in their region were too low compared to sub-regions with higher support levels. Very few respondents motivated their comments and those who did, were of the opinion that sub-region borders should follow climatic and topological boundaries to a larger extent than was perceived to be the case.

A few respondents in each sub-region stated that they were aware of the difficulties in constructing boundaries that were perceived as "fair" by all. Apart from in sub-region 1 (8 percent), a somewhat larger share of respondents have commented their statements in Table T1.24 (22 percent in sub-region 2a, 27 percent in sub-region 2b, and 32 percent in sub-region 3). Not surprisingly, in the light of the comments to Table T1.23, respondents in sub-region 2a suggested that their region should be included in sub-region 1, while respondents from sub-region 2b suggested that their region should be included in sub-region 2a. Some respondents, primarily from sub-region 3, suggested that there were no grounds for differentiating the Nordic Aid region into sub-regions (and that support levels, consequently, should be the same all over the Swedish Nordic Aid region).

In Finland administrators and other stakeholders seem to be more in favour of changing the borders between sub-regions than the farmers. In Sweden, administrators and other stakeholders are almost evenly distributed for and against the changing of the borders (c.f. Table T1.26). In the Swedish southern sub-regions also many farmers are in favour of changing the borders, whereas in northern most Sweden most farmers are against changing the borders, and in all sub-areas the number of unsure respondents is notable (Table T1.24). Comments concerning boundaries had a view that the borders do not follow climatic and topological differences.

Table T1.23. Farmers' statements on whether the boundaries between the sub-regions represent a fair reflection of differences in natural disadvantages (percent of farmers).

Sub-region	Yes	No	No opinion	Non-respondents
Sub- reg C4	59	33	...	8
Sub-reg. C3	59	26	…	15
Sub-reg. C2	67	23	…	10
Sub-reg. C1	58	22	…	20
Sub-reg. 1	60	6	34	0
Sub-reg. 2a	44	20	33	3
Sub-reg. 2b	28	25	43	4
Sub-reg. 3	20	46	22	12
Sub-reg. X *)	12	12	77	0
Resp. rate **)				

*) Sub-region X refers to respondents that have not answered the question on in which sub-region their farm is located.
**) Response rate in Finland 85 % and in Sweden 97 %.

Table T1.24. Farmers' statements on whether the boundaries between the sub-regions should be changed (percent of farmers).

Sub-region	Yes	No	No opinion	Non-respondents
Sub-reg. C4	16	68		17
Sub-reg. C3	12	68		20
Sub-reg. C2	12	76		11
Sub-reg. C1	11	73		16
Sub-reg. 1	4	62	34	0
Sub-reg. 2a	26	32	40	2
Sub-reg. 2b	32	26	39	3
Sub-reg. 3	42	17	29	12
Sub-reg. X *)	0	18	82	0
Resp. rate **)				

*)Sub-region X refers to respondents that have not answered the question on in which sub-region their farm is located.
**) Response rate in Finland 86 % and in Sweden 97 %.

Table T1.25. Administrators/Stakeholders' statements on whether the boundaries between the sub-regions represent a fair reflection of differences in natural handicaps (percent of respondents).

Finland	Too small	Suitable	Too large	Don't know	Non-respondents
Finland	8	70	10	12	0
	Yes	No		No opinion	Non-resp.
Sweden	30	49		16	5
Response rate 100 % in Finland and 95 % in Sweden.					

Table T1.26. Administrators/Stakeholders' statements on whether the boundaries between the sub-regions should be changed (percent of respondents).

	Yes	No	No opinion	Non-respondents
Finland	17	75		8
Sweden	46	41	8	5
Response rate 92 % in Finland and 95 % in Sweden.				

In Finland, about 60 % of the farmers were pleased with the distribution of support rates across the production lines, but 20 % of the farmers thought that the scheme doesn't respond to the differences well enough. Farms in the northernmost sub-regions and dairy and pig farms were more generally (compared to their share from the number of all farms in the area) dissatisfied for the Nordic Aid with that respect. Numerous written answers concerned *e.g.* the weak position of crop production in the Aid Scheme, or high cost of labour and capital in animal production. In Sweden most of the farmers did not have an opinion for this question, but one third in the northernmost sub-region and over 10 % in southernmost sub-region were pleased with the present differences between production lines (Table T1.27).

Most of the Finnish respondents in administration and stakeholders stated that the differences in the aid between production lines were on suitable level, some thought that the differences were too large and some had no opinion in the matter. In Sweden one fifth of the respondents of administration stated the differences were too small, but almost as many were unsure about the issue and saw the differences to be suitable (Table T1.28).

Table T1.27. Farmers' statements on whether the differentiation of the level of Nordic Aid support between the production lines is a fair representation of differences in natural handicaps (percent of respondents).

Sub-region	Yes	No	No opinion	Non-respondents
Sub-reg. C4	66	25		9
Sub-reg. C3	56	24		20
Sub-reg. C2	66	20		14
Sub-reg. C1	60	12		28
Sub-reg. 1	32	4	64	0
Sub-reg. 2a	22	12	65	1
Sub-reg. 2b	15	17	57	11
Sub-reg. 3	12	17	61	10
Sub-reg. X *)	18	0	82	0
Response rate in Finland 80 % and in Sweden 95 %.				

*)Sub-region X refers to respondents that have not answered the question on in which sub-region their farm is located.

Table T1.28. Administrators/Stakeholders' statements on whether differences in support levels between the production lines are fair representations of differences in natural disadvantages (percent of respondents).

Finland	Too small	Suitable	Too large	Don't know	Non-respondents
Finland	8	63	15	14	0
	Yes	No		No opinion	Non-resp.
Sweden	19	39		37	5
Response rate 100 % in Finland and 95 % in Sweden.					

Conclusion

The analyses suggest large productivity discrepancies among the Nordic aid sub-regions and, more broadly, between the Nordic aid areas and Denmark, which was used as one benchmark in the analyses. The productivity of dairy farms located in the Nordic Aid regions lag behind the physical productivity of equally sized Danish farms by 20-42%. The analyses suggest, however, that the support payments have significantly reduced the competitive disadvantage caused by these productivity differences. When the support payments are taken into an account, the competitive position of the Nordic farms is 92-97% in the Finnish sub-regions and 83-87% in the Swedish sub-regions, as compared to the equally sized Danish counterparts. Depending on the sub-region, the price support for milk has reduced the differences in the farms competitive position by 2-20 percentage-points. Thus, the Nordic Aid scheme has been effective in narrowing down the regional differences in the farms competitive position.

The Nordic Aid compensates for the natural handicap better in Finland than in Sweden. Within the countries, similar patterns are observed such that the central parts of these countries, which are eligible for the Nordic Aid, have a better competitive situation than the southern parts.

Within the Nordic Aid regions, the Central and West-central regions of Finland show a relatively stronger competitive position, whereas the competitive position of the northern most regions and the northern most Swedish region, in particular, remains weak.

The economic indicators, *i.e.* gross returns and farm net value added, also support the view that the Nordic Aid payments contribute to the economic results in these regions and, further, that the support payments reduce the regional income differences. Still, the net value added remains lower than average in the northernmost areas of Sweden and Finland.

Land and quota prices give signals on accumulation of economic rents on scarce farm assets and, hence the extent to which the Nordic Aid Scheme reduces economic implications caused by the natural handicap. The results suggest that the economic rents for scarce farm assets are higher at the margin in the Finnish than in the Swedish sub-regions. Land prices, on the other hand, signal that economic rents decrease quickly from south to north.

The survey results gave a rich but mixed picture on how the aid payments have contributed to the returns to farms and agricultural land, and how these payments reflect the regional and production line specific disadvantages. When it came to the question of whether boundaries should be changed, only a minority of those Finnish respondents, who where critical towards the current implementation of the scheme, was in favour of changing the borderlines. And further, amongst those farmers and stakeholders, who were in favour of revising the borderlines, the views on how the borderlines should be revised were mixed. Nevertheless, in Sweden, it was only in the sub-region with the highest level of support (sub-region 1) where the majority of the respondents think that the boundaries are fair, while farmers in regions with lower support are more inclined to suggest that the boundaries should be changed.

Contribution to changes in farm structures (Q 3)

Q 3: To what extent have the level of Nordic aid payments contributed to changes in farm structures in the areas concerned?

Introduction and interpretation

One of the objectives of the Nordic Aid scheme is to improve the structure of agricultural production. The question focuses on how the Nordic aid has affected structural change, *i.e.* the number and size of farms, farm successions (*i.e.* transfers) and farm closures, as means for improving farm structures. Farmers invest in order to pursue the economies of size and adopting new technologies, which in turn improve productivity and, at a given price level, reduce unit costs of agricultural production.

There may be a risk that the targets of the Nordic Aid are some what contradictory with respect to improving the farm structures. Structural development is a necessary condition for improving competitiveness, but if the number of active farms is quickly decreasing the development may also jeopardize preserving the country side in the remote rural areas and maintain livelihood by preserving the farmer population. If the number of active farms is decreasing, also the distances between farms may be increasing and, thus, the costs of transportation and transactions costs for collaboration between farms can start to increase.

In the evaluation, the development in farm structure is, nevertheless, seen as a necessary development to maintain agricultural activity in the Nordic regions. The reason is that the Nordic Aid regions cannot significantly lag behind the general development patterns observed elsewhere in agricultural sectors.

Analysis and the judgement criteria

The most important judgement criterion in describing the change in farm structures is the development of the number of farms and farm size, measured by the number of hectares and animals per farm. Effects of the Nordic Aid on the change of farm structures are then analyzed with the DREMFIA model for Finland and with the AgriPolis model for Sweden.

Besides farm investments, the structural development involves farms that are going to continue in farming over generations and farms that are being closed down. Thus, a judgment criterion is to look at how many farm successions (here generation transfers) have taken place and how many farms have exited from active production. Marginal effects of Nordic Aid to the likelihood of farm successions and continuity of family farming are analyzed by econometric models for Finland, which have been described earlier.

(1) The number of farms and structural change

(1.1.) Historical development

The number of farms

The total number of supported farms, *i.e.* the number of farms that receive at least arable crop payments, in the Nordic aid regions was in 1995 about 77,200 and it decreased to 53,800 in 2005. The number of farms decreased by 23,400, which corresponds to a third out from the initial number of farms in 1995. The average annual exit rate for the number of farms in all Nordic Aid areas was 3.5%, whereas the total number of farms in whole Sweden and Finland decreased at the rate of 2.5% (Table T1.29.a). Over the shorter period of 1995-2004, *i.e.* before the installation of the Single Farm Payment and the increase of farm numbers in Swedish statistics, the corresponding average exit rate was in the Nordic Aid areas 4.3%, and in the whole countries 2.8%. Thus, the number of farms has been decreasing at 1-1.5 percentage points faster each year in the Nordic Aid areas than in Finland and Sweden as a whole. The exact magnitude of the difference depends on the period, over which the geometric mean is computed for. Even if the average exit rate depends on the period of consideration in Sweden, the data can be interpreted reliable and valid as such, because they represent the whole population. In other words, the data on the number of subsidy recipients are based on the observed data in the administrative registers, underlying the actual subsidy payments.

The data give to some extent different indications about the development patterns between the Swedish and Finnish Nordic Aid *sub-regions*. In all Swedish sub-regions, the aggregate number of farms has been decreasing annually within the range of 2.6-6.0%, depending on the period considered, whereas the annual exit rate has been in the Finnish sub-regions 3.9% (Table T1.29.b). In both countries, the series are consistent such that the number of farms has been decreasing the fastest in the northernmost sub-regions with the Finnish C4 are being an exception. By specific sub-regions, the annual exit rate is the highest (8.1%) in the Swedish sub-region 1 and in the Finnish sub-region C3. At these exit rates the number of farms has decrease by two thirds (67%) over the ten year evaluation period.

In 1995, the total number of supported *dairy farms* in the Nordic aid regions was 26,980 and in 2005 it was decreased to 14,063 farms, which corresponds in relative terms to a 48% decrease over the ten year period and an average annual exit rate of 6.3%. The farm exit rate has been similar in Swedish and Finnish sub-regions and, at this speed, the number of dairy farms is cut to a half once in every ten years.

The animal headage payments were paid only in the Finnish regions. The *cattle farms* specialized in beef production were the most important recipients of these payments. In 1995, the number of cattle farms was 5,436 and in 2005 it had decreased to 2,760 farms, which corresponds in total to a 49% decrease over the ten year period and an average annual exit rate of 6.5%. Thus, the number of farms specialized in beef production has been decreasing at a rate similar to that of the dairy farms.

Concerning the *granivores*, the number of supported producers has been decreasing in similar patterns compared to the dairy and beef sectors. In the chicken sector the development has been even faster. Particularly in the Finnish sub-regions the development has been fast, as the number of chicken farms has decreased from 739 farms to 200 farms between 1995 and 2005. The number of these farms has decreased in total 73% over the ten year period, which implies an average exit rate of 12.3%. At this speed, the number of producers is cut to a one third in every ten year period. In the Swedish regions, only few of the egg producing farms receive Nordic aid. The number of these

farms has fallen from 35 farms in 1996 to 18 farms in 2005, with an average annual exit rate of 7.1%.

In 1995, the number of *piglet producers and pig fattening farms* (the finishing units) were 1,079 and 1,378, respectively in Finland, and their number decreased to 512 and 748 implying average annual exit rates of 7.3% and 6.0%. In Sweden, the number of piglet producers and pig fattening farms amounted to, respectively, 256 and 190 in 1995, and had decreased to 67 and 149, respectively, in 2005. The resulting average annual exit rates are for the Swedish piglet producers 12.5% and 2.4% for the Swedish fattening farms.

In Finland, the number of supported farms specialized in *broiler production* is an exception to the common trends observed in other production lines. The number of broiler farms has increased from 33 in 1995 to 55 in 2005. In Sweden, broiler producers are not eligible for Nordic Aid.

Supported goat producers are located in Sweden. The number of them was 101 in 2001 and in 2005 it had decreased to 92. The number of these farms is small but it has remained quite stable over the years, with an average annual exit rate of 2.1%.

Reindeer husbandry is supported only in the northern most areas in Finland. The number of supported reindeer owners was 6,920 in 1995 and it had decreased to 5,134 in 2005. The average annual exit rate for the number of reindeer owners has been 3.0%.

Table T1.29. a). Annual exit rates (%) in the number of farms.

Time period	Sweden and Finland	Sweden	Finland	All Nordic aid areas
1995-2005	2.5	2.1	3.0	3.5
1995-2004	2.8	3.7	2.9	4.3

Table T1.29. b). Annual exit rates (%) in the number of farms in Nordic aid sub-regions.

Sweden	Sub-region				
Time period	1	2a	2b	3	Total
1995-2005	3.3	2.8	2.5	0	2.6
1995-2004	8.1	5.8	5.9	1.8	6.0

Finland	Sub-region					
Time period	C1	C2	C2p	C3	C4	Total
1995-2005	3.5	3.4	4.7	8.1	2.5	3.8

Farm size

The farms' arable land area has been growing thorough Finland and Sweden, and within the Nordic Aid sub-regions (Table T1.30). The growth has been faster in Finland than in Sweden, at least partially, because the farm size was initially smaller in Finland than in Sweden. The farms' arable land area has increased in Finland as a whole between 1995 and 2005 by 43%, whereas the growth within the Finnish Nordic Aid areas was 56%. In Sweden, the corresponding growth rates were 22% and 25%.

With only few exceptions, the farm size decreased from south to north, across the Nordic Aid areas in 1995. This pattern does not hold so clearly any more in 2005 because in some northern areas the farm size has grown faster than average. The growth has been the fastest in the northern most

Finnish sub-region C4, where the size has grown from 11.2 hectares in 1995 to 36.7 hectares in 2005. Thus, in area C4 the land area has more than tripled and the annual growth rate has been 12.6%. In 2005, the average farm size was already larger in the Finnish than in the Swedish Nordic Aid areas.

Table T1.30. The average arable land area, hectares per farm.

Whole Finland and Sweden				
		Finland	Sweden	Average of the whole Nordic Aid area
Hectares	1995	22.9	35.2	29.1
	2000	27.5	40.6	34.1
	2005	32.7	43.0	37.8

Nordic Aid area Finland and Sweden				
		Finland	Sweden	Average of the whole Nordic Aid area
Hectares	1995	19.4	19.6	19.5
	2000	24.0	24.0	24.0
	2005	30.2	24.5	27.4

Sub-areas		Finland					Sweden			
		C1	C2	C2p	C3	C4	1	2a	2b	3
Hectares	1995	19.3	20.7	17.2	15.7	11.2	14.3	21.8	20.5	18.8
	2000	23.8	25.7	21.3	19.7	12.0	18.5	26.7	23.8	23.1
	2005	27.7	31.8	27.7	37.9	36.7	19.5	28.0	23.9	23.0

The size of dairy farms has increased in Finland between 1995 and 2005 by 58% and the growth rate equals between the Nordic Aid area and other parts of the country. In Sweden, the corresponding growth has been 64% and, similarly to Finland, the growth rates in the Nordic Aid area do not differ from those in other parts of the country. The average farm size, both in terms of the herd size and arable land area, is still though substantially smaller in Finland than in Sweden (Table T1.31.).

Table T1.31. Average herd size in milk production in the Nordic Aid area and in the southern parts of Sweden and Finland, 1995 and 2004, 2005.

SWEDEN AND FINLAND	Sub-region 1-3 Sweden	Sub-region C1-C4 Finland	Southern Sweden	Southern Finland
1995	20.3	12.3	28.9	12.6
2004, 2005	33.3	19.5	47.0	19.8

Sources: SJV 2007, Tike 2006

(1.2) Modelling results

Sweden – Agenda 2000 framework

AgriPoliS is used to analyze to what extent Nordic Aid has contributed to changes in farm structures in a representative Nordic region, Västerbotten County in Sweden. Two forms of support have been chosen for analysis: milk price support provided by Nordic Aid (henceforth referred to as *Aid*) and RDP-investment support via the CAP's 2nd Pillar. Milk support is in absolute terms the most significant form of Aid. Investment support was also included in the analysis because it has potentially strong interaction with Aid. The investment support is based on a sliding scale of 35-15% of investment expenditure with a maximum of 0.32 mill EUR per farm within any four-year period. The sliding scale implies that relatively large investment receives relatively little support and hence the scheme reduces the relative profitability of increasing scale.

The results are presented in terms of four policy scenarios. AGENDA represents the benchmark scenario with Aid and coupled Pillar I support faced by farmers up until the 2003 CAP-reform. To isolate the influence of Aid, three alternative scenarios are generated. The first –MILK (read as AGENDA minus Aid) will isolate the impact of Aid by removing it and holding all other payments constant. Similarly, –INV eliminates investment support and –MILK–INV eliminates both milk and investment support. Results are presented primarily in terms of time series over the entire 13 year simulation period which enables both the short and long run impacts of aid to be observed.

Figure T1.7 shows the estimated development of farm structure in terms of Panel (a) the number of farms and Panel (b) average farm size. Aid is shown to have little impact on farm structure, whereas the combination of price and investment support has a complimentary effect leading to almost 15% more farms and smaller average farm size (40 compared to 55 ha). For drawing parallels with Finland and DREMFIA results, recall that the policy framework in 1995 was very different in the two countries and hence the expected impacts on farm structure (see Q1 Analysis).

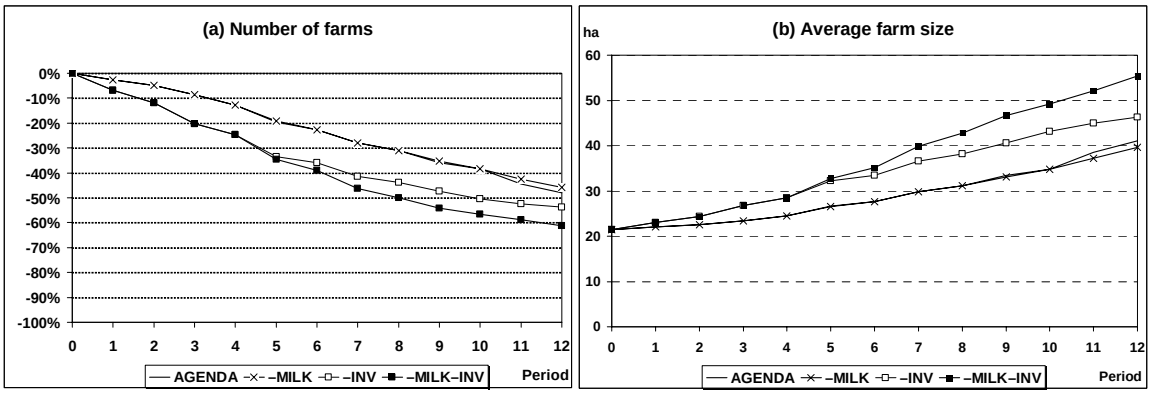


Figure T1.7. Impact on number of farms and farm structure.

The results also show that dairy cow numbers and hence milk output in the final period are fairly similar for all scenarios. The reason for this is that milk output is constrained by quota in Sweden. Hence, Nordic Aid results in a higher quota price rather than greater production (c.f. the analysis of the policy framework and discussion of CAPRI-results in Q1). Even investment support was shown to capitalise to a certain extent into the price of quota. The combination of investment support with Aid made it therefore possible for a larger number of farms to continue farming, as was shown in Figure T1.7.

Further beef production is shown to increase over time (+40 %) with the removal of Aid. This is because Aid favours milk production and hence provides an incentive for farmers to produce milk rather than beef. Thus Aid causes crowding out of beef. Suckler cow production on the other hand is shown to be very sensitive to investment support (as stables represent a major cost for this type of production) but not to changes in Aid.

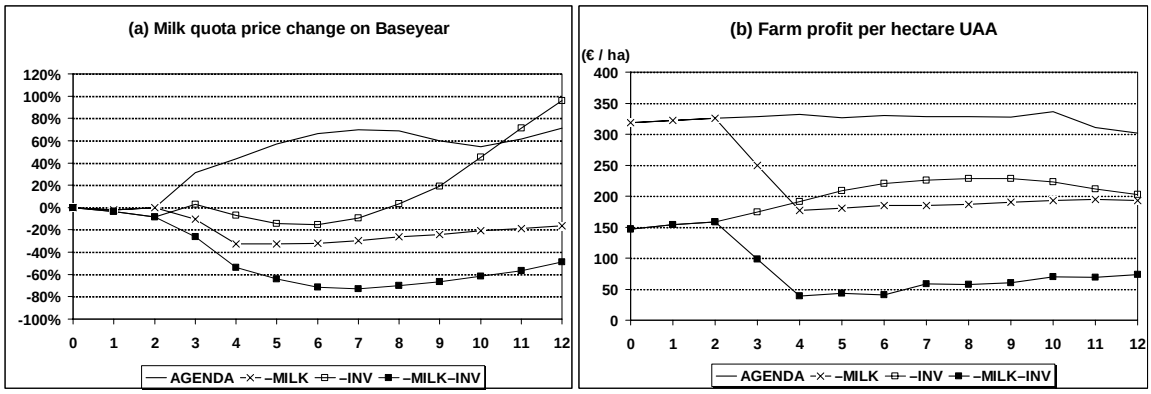


Figure T1.8. Developments on milk quota and land markets.

Both quota price and average profit per hectare, Figure T1.8, are lowest in the -MILK-INV scenario: because total Aid is also lowest in this scenario. Reduced profits imply that more farms will leave the sector and in so doing release additional land to the rental market. Simultaneously, lower quota price reduces the cost of expanding milk production for farms that choose to stay. These impacts provide more favourable conditions for farm expansion. Thus the combination of regressive sliding-scale investment support and Aid has made it possible for a larger number of farms to remain in the sector. Further, the value of investment support has capitalised into quota and land assets owned by existing farmers, which in the long run increases the costs for new entrants or expanding farms, resulting in smaller average farm size than would otherwise have been the case.

To summarize, Nordic Aid is shown not to have a significant impact on structural change in Sweden. The interaction of Aid with investment support however was shown to slow structural change. Farm expansion is hampered in this case because the combined policies a) raise the cost of quota, b) make it profitable for more farmers to continue farming and c) reduce the supply of land.

Sweden – 2003 reform framework

The 2003 decoupling of CAP support from commodity production represents a radical change in the basic principles for entitlement to agricultural support. For this evaluation the benchmark scenario, referred to as REFORM, assumes that CAP support is decoupled from production. The impact of Aid is then evaluated with identical scenarios to the historical analysis: -MILK, -INV, and -MILK-INV.

Farm structural development in a decoupling framework is shown in Figure T1.9. As can be seen from Panel (a) Aid has no discernable impact on farm structure even with decoupled CAP. Reductions in Aid reduce quota price (Figure T1.10(a)) rather than affecting production and farm structure. Investment support again contributes to more farms remaining in the sector and hence maintaining smaller average farm size. Compared to AGENDA (Figure T1.7.) decoupled CAP contributes to a significant slow down in structural change (+25-30 % more farms with decoupling).

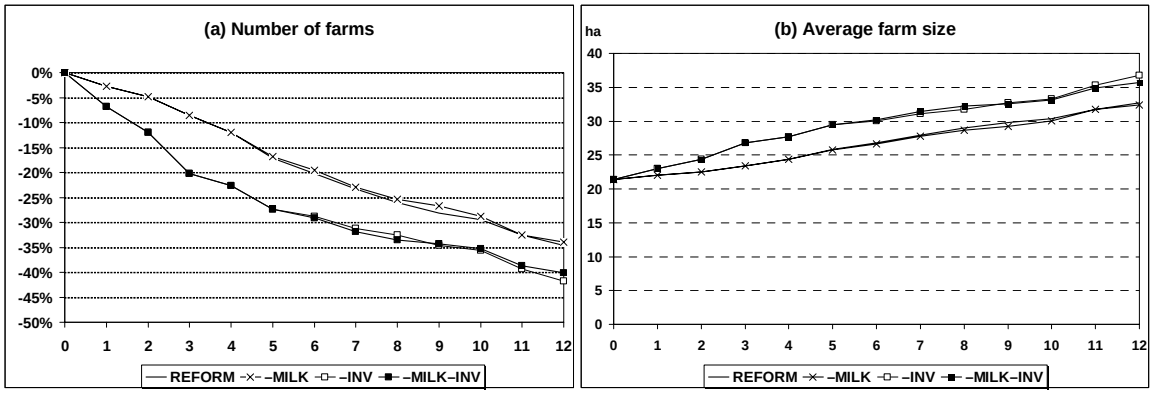


Figure T1.9. Development of number of farms and average farm size.

Note from Figure T1.10(a) that reductions in Aid with decoupled CAP imply that quota price falls towards zero and hence milk output will be more likely to decrease in the absence of Aid in a decoupling framework. As can be seen from Figure T1.10(b) average profit/ha UAA drops sharply without Aid. It is also evident that investment support has an almost equally large impact on average farm profit as Aid.

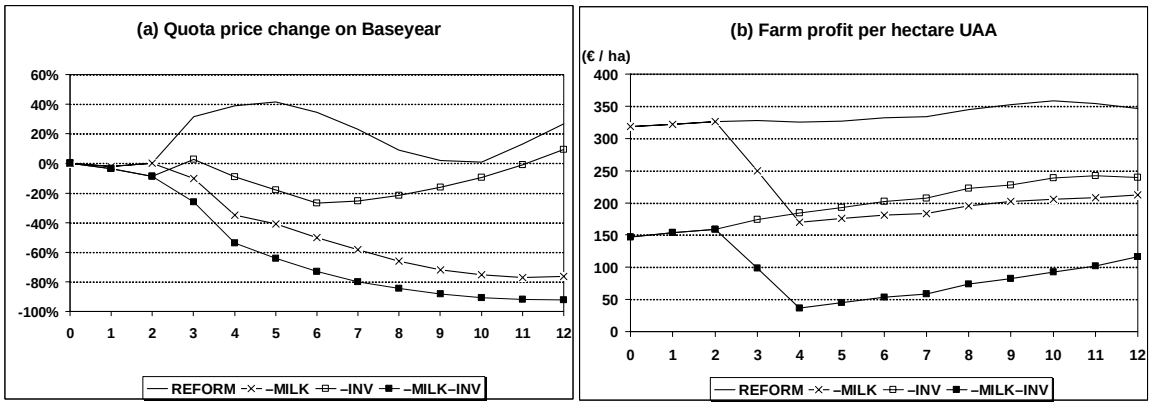


Figure T1.10. Milk quota price and average farm profit per hectare UAA.

The impact of Aid on livestock numbers was also analyzed. Initially dairy cow numbers declined significantly with the elimination of Aid—the short term impact—but as the price of milk quota declines simultaneously, T1.10(a), it buffered reductions in milk output in the long run as the costs of farm expansion declined. The natural production conditions also provide dairy farming with a comparative advantage in this region (*i.e.,* arable land is most suitable for grass production). Hence given a lack of alternative uses for agricultural land, dairy farming remained the comparatively best land use despite reductions in Aid. Reduced Aid also lead to moderate increases in beef and sheep numbers (5-10 %), which indicates that even with decoupled CAP, Aid still contributes to crowding out of other production.

Beef production on the other hand is severely affected by decoupling CAP and declines in all scenarios (since beef output is not regulated by quota, reductions in profitability are reflected in output changes). In the absence of Aid, beef output would be marginally higher because aid to dairying crowds out beef production. What could also be seen is that investment support is more import for beef production, which is almost 30 % lower without investment support, than for dairying. This is attributable to the fact that in comparison to dairying beef receives relatively little price support, thus making investment support relatively more valuable to beef producers. For similar reasons to beef, investment support also had a fairly significant impact on lamb production

with decoupled CAP. Investment support results in a significant increase in lamb production with decoupled CAP.

In summary, structural change proceeds at about the same rate with or without Aid in a decoupling framework, however, the rate of change is significantly slower in the decoupling framework compared to continuation of AGENDA. Milk quota rents fall to zero without Aid in this scenario which implies that production is likely to be sensitive to changes in Aid with decoupled CAP. Interaction with investment support is also stronger in a decoupling framework.

Finland

Results from DREMFIA model indicate that Nordic Aid, in contrast to the Swedish case, has facilitated farm size growth and improving production structure in Nordic Aid regions in Finland. Tables T1.32 and T1.33 show that the share of dairy cow animal places at medium (20-49 cows) and large (50cows) has increased much more rapidly in baseline in 1995-2005 than in simulated scenarios of no or reduced Nordic Aids.

However, the results also suggest that later, in the simulated scenarios starting at 2008, reduced level of Nordic Aid leads to a slightly higher share of dairy cows kept at large (50+ cows) farms than the 2006 level of Nordic Aid. This is despite the lower number of animal places and decreased milk production volume due to reduced Aid level. It seems that the 2006 levels of Nordic Aid, if unchanged up to 2020, may keep more medium sized farms in production than reducing Nordic Aid by 50%, which indeed is a very significant reduction in terms of production value at farm level, as well as in money term at the sector level and at state budget.[9]

Table T1.32. Share (%) of dairy cow places on dairy farms of different size, out of all cows at Finnish Nordic Aid regions. Source: DREMFIA model calculations. Actual data 2005: 1-19 cows 39.5%; 20-49 cows 52.1%; 50+ cows 8.4%.

	Baseline			No Nordic Aid			Nordic Aid 50%		
	1-19 cows	20-49 cows	50 - cows	1-19 cows	20-49 cows	50 - cows	1-19 cows	20-49 cows	50 + cows
1995	81.0	18.7	0.3	81	18.7	0.3	81.0	18.7	0.3
2000	57.3	39.7	2.9	55.7	32.0	2.3	61.0	36.3	2.7
2005	39.3	52.4	8.3	54.7	39.3	5.0	44.9	47.5	7.5
2010	24.0	57.3	18.7	43.2	43.3	13.5	31.8	51.4	16.8
2015	11.5	52.3	35.8	23.2	45.7	31.1	17.5	48.9	33.6
2020	5.3	41.3	53.4	10.3	35.8	52.9	7.7	37.8	54.5

Table T1.33. The percentage distribution (%) of dairy cow places by different herd size groups in Finnish Nordic Aid region. Source: DREMFIA model calculations.

	Cut 100% 2008			Cut 50% 2008			De-coupling		
year	1-19 cows	20-49 cows	50 - cows	1-19 cows	20-49 cows	50 - cows	1-19 cows	20-49 cows	50 - cows
1995	81.0	18.7	0.3	81	18.7	0.3	81.0	18.7	0.3
2000	57.3	39.7	2.9	55.7	32.0	2.3	61.0	36.3	2.7
2005	39.3	52.4	8.3	54.7	39.3	5.0	44.9	47.5	7.5
2010	30.2	55.3	14.5	28.0	54.7	17.3	30.2	55.3	14.5
2015	22.4	51.1	26.6	16.3	50.5	33.2	20.4	52.0	27.5
2020	11.0	42.2	46.8	7.5	38.9	53.6	10.8	42.3	46.9

[9] As described above, different impacts of Nordic Aid in Finland and in Sweden are due to fundamental differences in the policy frameworks pre-EU accession, as well as the differences in farm size and production efficiency, also represented in the models to be used for evaluating Aid

(1.3.) Survey responses

For the sparsely populated northern regions in Finland and in Sweden distances between farms are typically long. Therefore, farmers were asked the following question:

> *Have the distances between your farm and the neighbouring farms increased during ten years? What about your collaborators in the neighbour and surroundings of your farm? Does the change of distances cause problems to you and your farm?*

About 80 % of Finnish farmers and 50 % of Swedish farmers responded that the distances between farms have not increased. Amongst those farmers who stated that the distances have increased, 15 % in Finland and 8 % in Sweden stated further that the change of distances has been problematic (Table T1.34). The increased distance to the closest collaborating neighbour caused problems for 30 % of the farmers, who stated that the distances have increased. Distances to the collaborating farms in surroundings had also increased in many farms. The lack of the colleagues of the same age was stated by a quarter of farms in all sub-areas, and in area C3 about a quarter of these farmers saw the situation problematic. In the other sub-areas the corresponding share was 15 %.

Table T1.34. Farmers perceptions of changes in distances to the nearest farm, nearest farm with similar production line, nearest cooperating farm, 5 nearest Farms, 5 nearest Farms with similar production line, and nearest farmer of same age between 1995 and 2005. Share of respondents who perceive changes as problematic.

	Closest farm in active production			Closest active farm in the same production line			Closest farm with collaboration			Neigh. active farms in surroundings (in SW to 5 nearest farms)			Neigh. active farms with same prod. line in surround. (in SW to 5 nearest farms)			Neigh. farmers in the same age		
	Yes	No	Probl.	Yes	No	Probl.	Yes	No	Probl.	Yes	No	Probl.	Yes	No	Probl.	Yes	No	Probl.
FINLAND																		
C4	9	91	0	0	100	0	0	100	0	1	99	0	9	91	0	17	83	0
C3	21	79	16	22	78	16	19	81	30	25	75	22	30	70	23	23	77	23
C2	18	82	8	23	77	12	9.3	91	12	25	75	16	28	72	12	24	76	15
C1	17	83	10	19	81	13	14	86	12	27	73	27	27	73	25	23	77	18
Resp.	96		46	93		46	93		40	92		48	94		46	94		45
SWEDEN																		
1	42	52	10	58	38	16	28	56	8	28	56	16	68	28	14	36	46	10
2a	34	62	7	39	57	9	28	66	7	28	33	7	58	33	10	39	52	7
2b	32	62	3	42	52	5	47	45	8	47	45	3	50	40	2	35	50	2
3	37	54	7	49	37	7	39	51	7	39	51	0	56	44	12	39	51	5
X*)	24	76	6	18	76	6	24	65	6	24	65	0	35	59	6	35	59	6
Resp.	95			94			91			92			91			88		

*) Sub-region X refers to respondents that have not answered the question on in which sub-region their farm is located.

In Sweden, structural change does not seem to have caused problems due to increasing distances between farmers. The majority responded that the distance to the nearest farmer had not increased, and of those who stated the contrary, only a few perceived this as a problem. Only in sub-region 1, a majority of respondents stated that the distance to the nearest farmer with similar production had increased and, again, only few of them perceived this to be a problem. The same pattern is repeated concerning distance to the nearest cooperating farmer, distances to the 5 nearest farms with similar production, and distance to the nearest farmer of the same age. A majority of respondents do state that distances to the 5 nearest active farms have increased. However, again only few of them perceive this to

be a problem. It should be noted, though, that to what extent the distances between farms have been affected by the Nordic Aid scheme, and in which direction, is uncertain.

Production plans were asked also from the farmers in the questionnaire made in the evaluation as follows:

> *Are you going to change the agricultural production of the farm during next few years? How are you going to change it?*

In Finland about two thirds of the answered farmers in areas C1 and C2 and half of the farmers in area C3 planned to continue production as before. In the northernmost area C4 less than 40 % of farmers were going to continue farming as before, and almost an equal share of the farmers has a plan to expand production. In other sub-areas only ten percent of farmers planned to expand their production. Five percents were planning to change the production line and switch from the animal production to the plant and cereal production. Only in a few cases, the dairy production was planned to change to other cattle production. Four per cents of the farms had a plan to decrease and eight per cents had a plan to quit their production. Decreasing and ceasing were more general plans in area C3 than in other areas. About 13% of farmers didn't know what to do. The rate of the unsure farmers was the biggest in the northernmost areas (Table T1.35).

Table T1.35. Farmers' plans for production in the nearest future.

	Continued as present	Decreased	Ceased	Increased	Prod. line will change	Don't know	Non resp.
FINLAND							
C4	38	1	5	38	0	19	8
C3	48	10	13	9	2	17	0
C2	61	3	11	9	6	11	1
C1	64	5	3	10	4	14	0
SWEDEN							
1	58	8	10	34	22		
2a	64	14	15	20	19		
2b	68	3	15	17	17		
3	49	22	12	17	24		
X*	71	6	24	29	12		

*) Sub-region X refers to respondents that have not answered the question on in which sub-region their farm is located

Concerning the investments carried out by the farmers, the question was:

> *a) Have you done some reasonable big investments in agriculture during the last five years in your farm? b) If yes, how big?*

In Finland about one third of answered farmers have done some reasonable big investment in agriculture during last five years. Variation between the means of the sub-areas was from 24% to 37%. The amount of the investments per farm has been on average € 181,000. Most of the large-scale investments have been done in area C1, on average € 228,000 per farm, whereas in area C4 the investments have been generally smaller, on average € 89,000 per farm. Two thirds of the answered farmers did not invest during the last five years.

In Sweden, regardless of sub-region, about 40 percent of the respondents stated that they had invested during the last five years. However, there seem to be larger differences between sub-

regions in the average size of the investment with investments in sub-region 2a, on average, being about 1.8 times the size of investments in sub-region 1 (Table T1.36).

Table T1.36. Share of farmers' that have decided to undertake major investments during the last five years and size of investment (1,000 EUR).

	Have invested	Average size of investment	Have not invested	Non-resp.
FINLAND				
Sub-reg. C4	37	89	63	17
Sub-reg. C3	24	110	76	18
Sub-reg. C2	35	155	65	12
Sub-reg. C1	35	228	65	17
SWEDEN				
Sub-reg. 1	40	138	60	0
Sub-reg. 2a	43	245	54	4
Sub-reg. 3b	50	193	43	7
Sub-reg. 3	39	155	54	7
Sub-reg X*	41	86	47	12

*) Sub-region X refers to respondents that have not answered to the question on in which sub-region their farm is located.

Implementation of the Nordic Aid in comparison with the investment aid was asked from the farmers as well as from the respondents of administration and stakeholders.

> *How do you evaluate the importance of the existing Nordic Aid and the Investment Aid from the view point of implementing of the realised investment in your farm / in your area?*

In Finland, most of the respondents stated that the importance of the Nordic Aid and investment aid has been quite big or very big from the view point of implementing of their investments. Importance of the Nordic aid was seen quit big or very big in Finland by 56% of answerers and in Sweden by 50% of answerers. About two thirds of the Finnish answerers saw investment aid important for the investment decisions. In Finland in the northernmost area C4 about 95% of farmers stated both Nordic aid and investment aid as important. The corresponding share was significantly lower in other areas. In area C1 it was about 50%, whereas in C2 and C3 areas it was about 60%. About 10% of the Finnish farmers and 25% of Swedish farmers didn't see any remarkable importance on either the Nordic aid or the investment aids (Table T1.37).

Also in Sweden most of the respondents stated that both Nordic Aid and the investment aid under the RDP in Pillar II had been of large or very large importance for their decision to invest. The exception is farmers in sub-region 3, where the majority considered Nordic Aid to have been of no importance. In this region, the majority of respondents also stated that they had not been granted investment aid from EU:s RDP. The importance of Nordic Aid seems to decline as one moves from sub-regions with larger natural disadvantages to sub-regions with smaller natural disadvantages. Hence, Nordic Aid appears to have been most important to respondents in sub-region 1 and the least important to respondents in sub-region 3. This picture is repeated for the importance of the investment aid under the RDP.

Table T1.37. Farmer statements on the importance of Nordic Aid for investment decisions.

	Importance of Nordic Aid						Importance of investment support						
Sub-reg.	Non	Very small	Quite small	Quite big	Very big	No opi-nion	Not granted	Non	Very small	Quite small	Quite big	Very big	No opi-nion
FINLAND	(All respondents)							(All respondents)					
C4	0	0	5	38	57	-	-	0	0	6	49	45	-
C3	18	4	21	21	37	-	-	17	3	15	26	40	-
C2	8	10	20	36	26	-	-	11	9	12	34	33	-
C1	11	20	22	32	15	-	-	16	19	11	26	28	-
Resp.	81						77						
SWEDEN	(Only farmers who have invested)						(Only farmers who have invested)						
1	5	0	10	35	45	0	25	0	0	0	20	50	0
2a	17	7	12	25	36	2	31	0	3	12	10	41	0
2b	27	7	10	23	27	3	33	7	0	7	0	43	0
3	56	13	6	0	13	6	56	0	0	0	13	25	0
X*)	13	25	13	25	25	0	38	0	13	0	0	38	0
Resp.	97						96						

*) Sub-region X refers to respondents that have not answered the question on in which sub-region their farm is located.

Representatives of administration and stakeholders stated the importance of Nordic aid scheme and investment aid both much bigger than the farmers. In Finland, 86 % of the respondents stated that the importance of Nordic aid has been quite big or very big, and nearly all answerers stated investment aid important. Also in Sweden the administrators and other stakeholders value the Nordic Aid scheme and the investment aid more than the farmers (Table T1.38).

Table T1.38. Administrators' and stakeholders' statements on the importance of the Nordic Aid scheme and the investment support under the CAP for investments in agriculture (percent of all respondents).

	Very small or small	Big	Very big	Don't know	Non-resp.
Finland:					
Nordic Aid	4	10	86	…	3
Investment aid	2	0	97	…	4
Sweden:					
Nordic Aid	13	16	65	3	3
Investment aid	3	11	78	3	5

(2)The number of farm successions

(2.1.) Historical developments

Farm successions, in which an elderly farmer retires and transfers the farm to a new entrant, are supported through farmers' early retirement programs only in Finland. In whole country the number of farm successions, under the early retirement program, decreased at the Finland EU entry by almost 60%. Before EU-membership, in years 1990-1995, the number of farm successions was in average 1,116 per year, and over the period of 1995-2005 the corresponding annual average number was decreased to 467 (Väre 2007).

The number of supported farm successions was in the Finnish Nordic aid areas (C1-C4) all together 1,734 over the six year period of 2000-2005 which corresponds to an average 289 farm successions per year (Table T1.39). At the same time, the total number of farm closures, supported through the early retirement programs, was 922 in 2000-2005, *i.e.* 154 cases per year. The number of farm closures through the supported early retirement system is small, because most of the farm closures occur through standard old age retirement systems. Because the number of farm successions and exits with farm closures have a large annual variation, it is impossible to identify a trend in the annual figures.

The share of supported *farm successions*, out from the total number of farms in the pension insurance scheme, is available only for the whole country. The share has been in average 0.8% and it has varied annually within the range of 0.5-1.0%.

The data on the number of supported farm successions and farm closures through the early retirement program is reliable, because it is based on the data in the Farmers' social insurance company, MELA. The data cover the full population, because it is compulsory for farmers to participate in this particular pension insurance scheme.

Table T1.39. The number of supported farm successions and farm closures in Finland in 2000-2005.

Southern Finland A and B areas	Year						Total
	2000	2001	2002	2003	2004	2005	
Farm successions	153	224	260	208	181	283	1,309
Farm closuress	148	71	77	52	112	138	598
Total	301	295	337	260	293	421	1,907
Nordic Aid areas C1-C4 areas	Year						Total
	2000	2001	2002	2003	2004	2005	
Farm successions	192	346	347	279	231	339	1,734
Farm closures	265	104	124	65	179	185	922
Total	457	450	471	344	410	524	2,656

(2.2.) Modelling results

The estimates on marginal effects of price supports and arable land payments in the likelihood for farm successions suggest that farm successions respond significantly to both price supports and arable land payments, which are both paid under the Nordic Aid Scheme. The results indicate that both of these supports advance and encourage farm successions. The bigger these supports are, the earlier the farms are transferred to the new entrants (new generations). The impact of market price

supports is likely to be more elastic than the impact of decoupled arable land payments. Thus, we conclude that the price support paid under the Nordic Aid Scheme has had a tendency to encourage farm successions, even if the number of farm successions has decreased to about half from the pre-accession levels, as a result of Finland entry in the EU.

(2.3.) Survey responses

Plans concerning the future of farm a question was asked from the farmers:

> *Will you exit farming in the near future? What would happen to the farm in that case? What would you do after the exit? Have you identified a (or several) successor(s) to your farm?*

About 95 % of the Finnish farmers who answered to the question do not intend to exit farming in the near future, while 5% intend to. Variation between the means of the sub-areas varied between 87 % and 97 %. In Sweden about 20 % of farmers plan to cease with agricultural production (Table T1.40).

In Finland, lack of confidence for the future of the farm was reflected by over 10 % of answerers (means of the sub-areas 11-15 %), who didn't know what to do. About 60 % of those, who will cease the farming, will still continue living on the farm, 12 % will continue living outside the farm, but still on the countryside, and only 10 % will move away from countryside. In Finland only 40 % of answered farmers had identified successor to their farm, and 60 % stated that they have not any successor. In the northernmost area C4 only 35 % of farmers had identified successor, but in area C1 about half of the answerers had successor existing.

In Sweden, regardless of sub-region, only a little more than 20 percent of the respondents planned to cease farming. Those who stated that they did plan to cease farming had somewhat diverging responses to what would happen to the farm. Thus, in sub-region 1, only a small minority stated that a successor would take over. On the other hand, the probability of succession increased substantially when moving to sub-regions with less natural disadvantages. In all sub-regions, the majority of respondents who planned to cease with farming, planned to stay at the farm. In sub-region 2b, this share was particularly large, amounting to 80 percent of the respondents. It is also noteworthy that, in all sub-regions, very few respondents planned to move from the country side upon ceasing with farming (Table T1.41).

Table T1.40. The share of farmers who plan to exit agricultural production (percent of all respondents).

	Yes	No	Non-respondents
FINLAND			
Sub-reg. C4	3	97	0
Sub-reg. C3	5	95	8
Sub-reg. C2	12	87	1
Sub-reg. C1	3	97	0
SWEDEN			
Sub-reg. 1	22	78	0
Sub-reg. 2a	25	75	0
Sub-reg. 2b	23	77	0
Sub-reg. 3	22	78	0
Sub-reg. X*	35	65	0

*)Sub-region X refers to respondents that have not answered the question on in which sub-region their farm is located.
**) Response rate in Finland 99 % and in Sweden 100 %.

Table T1.41. Farmers' statements regarding what will happen to the farm and what they will do after the exit.

Sub-region	Successor will take over	Land will be sold	Land will be leased	Land will be kept but not cultivated	No opinion	Non-resp.	Stay on the farm	Stay in the area but not on the farm	Move to nearest centre	Leave the area	No opinion	Non-resp.
FINLAND												
C4	9	0	0	14	77	9	59	0	0	0	41	54
C3	8	1	4	17	70	8	67	5	4	6	18	42
C2	11	1	8	2	78	7	63	13	6	5	13	42
C1	13	2	6	2	78	16	55	12	3	2	28	56
SWEDEN												
1	20	13	0	20	20	23	53	13	0	0	0	34
2a	40	6	9	9	37	0	65	13	3	3	18	0
2b	53	6	6	0	29	6	80	0	0	0	20	0
3	55	0	9	9	27	0	67	8	8	0	8	9
X*)	22	11	0	11	22	44	50	17	0	0	33	0

*) Sub-region X refers to respondents that have not answered the question on in which sub-region their farm is located.

The majority of administrators and other stakeholders (62 percent) stated that the scheme have facilitated both farm successions and new entry into the agricultural sector.

Conclusion

Structural development has been faster in the Nordic Aid areas than elsewhere in Finland and Sweden. The average annual exit rate in the number of farms has been amongst all farms in the Nordic Aid areas 4.3%. Amongst the dairy farms, the corresponding annual exit rates have been 6-7%, on the average, in both Finnish and Swedish Nordic Aid regions. The annual exit rate has been the highest within two northern support regions (one in Finland and one in Sweden), where 8.1 % of farms have quit annually. Our conclusion is that, with these large annual exit rates, structural development has been proceeding sufficiently fast in the Nordic Aid regions. The number of farms has been decreasing quickly while agricultural production has remained for the most part at the pre-accession levels.

The equilibrium analyses suggest, nevertheless, that the Nordic Aid and the relatively high investment supports have together maintained the number of medium size farms considerable larger than in the long run equilibrium without the Aid. In this respect, the Nordic aid scheme has had a tendency to slow down the exit from farming. Thus, we conclude that structural development would have been even faster than observed without Nordic Aid and investment aid.

The empirical results support, further, the view that the support scheme has been slowing down the structural development more in the Swedish regions than in the Finnish regions. The observed data also support this view in the sense that the initial differences in farm size between the Swedish and Finnish regions have decreased over time. The growth of farm size has been faster in Finland than in Sweden.

The effects of the Nordic Aid scheme have differed with regards to encouraging or discouraging new entry in the sector. There are signals that the scheme has discouraged entrants from outside the existing farming households, because the aid has maintained agricultural asset values. On the other hand, the scheme, and the price supports in particular, has provided continuation for the family farms by advancing and encouraging farm successions, where new entrants from the farming households take over the farm from the elderly farmers (e.g. from their parents).

Conclusions on Theme 1

Overall, the Nordic Aid scheme has maintained agricultural activities in the Nordic Aid area over the period 1995-2005 and its contribution has more evident in the Finnish sub-regions than in the Swedish sub-regions. It is characteristic for both countries that the northernmost sub-regions (sub-region 1 in Sweden and sub-region C4 in Finland) have been loosing production to the southern sub-regions. In the Swedish sub-regions, the milk production volumes have also been falling more generally in sub-regions 2b and 3, indicating that the Nordic Aid milk support has not maintained production at the pre-accession levels. In Finland the development patterns are further characterized by the concentration of the dairy and livestock production towards the western coastal line, where they have initially been the most intensive. The spatial concentration has been the most prominent in the poultry and pig production.

The analyses suggest large physical productivity discrepancies among the Nordic aid areas and, more broadly, between the Nordic aid areas and Denmark, which was used as one benchmark in the analyses. The support payments have reflected regional differences in natural conditions such that they have significantly reduced the competitive disadvantage caused by the regional productivity differences and by low productivity in the Nordic Aid regions. The Nordic Aid has compensated for the natural handicap better in Finland than in Sweden. Within the countries, similar patterns are observed such that the central parts, which are eligible for the Nordic Aid, have had a better competitive position than the southern parts.

Within the Nordic Aid regions, a relatively better competitive position is found for the Central and West-central regions of Finland, whereas the competitive position of the northern most Swedish region remains very weak. The results further suggest that the contribution of the price supports for milk is significant and, depending on the sub-region, it reduces the differences in the farms competitive position by 2-20 percentage-points.

The Nordic Aid, together with the conditions in the CAP and LFA programs, has had a positive impact on the area of arable land kept under active cultivation in Finland but in Sweden such a clear link could not be identified. The arable land area does not seem to be very sensitive to adjustments in Nordic Aid, because the cross compliance requirements in the CAP and environmental programs encourage keeping land open and in good condition. Some marginalization of arable land is, nevertheless, occurring in the most remote Nordic Aid regions, where land rents are approaching zero and land may be left idle.

The evaluation results further suggest that the supports coupled to production, such as the price supports for milk, have been efficient in maintaining agricultural production in the Nordic Aid regions. Moreover, the importance of coupled Nordic Aid payments in maintaining agricultural production has increased after most of the CAP supports have been decoupled from production. The results and the observed development patterns indicate, however, that a large number of different coupled support measures pose a challenge for the sector to reflect market movements so that the production volumes stay at the levels at the time of accession. With regards to land management, in particular, more decoupled arable land payments have been efficient in keeping arable land at active land use.

The Nordic Aid scheme has not impeded necessary structural developments in the Nordic Aid regions as the number of farms has been decreasing faster in the Nordic Aid areas than elsewhere in Finland and Sweden. Nevertheless, the structural development would have been even faster without the Nordic Aid and investment support schemes, because these measures have jointly kept the number of medium sized farms above the long run equilibrium levels.

The survey results gave a mixed picture between the Finnish and Swedish regions on how the aid payments reflect the regional and production line specific conditions. When it came to the question of whether boundaries of the sub-regions should be changed in Finland, only a minority of those respondents, who where critical towards the implementation of the scheme, was in favour of changing the borderlines. And further, amongst those farmers and stakeholders, who were in favour of revising the borderlines, the views on how the borderlines should be revised were mixed. In Sweden, farmers in regions with lower levels of support were to a higher degree inclined to propose changes, especially if they were located close to the boundaries.

In summary, the results signal that there is likely space for simplifying the rich set of coupled support measures, applied in the Finnish regions, such that the allocation of resources between the individual production activities is steered more by the market than locked in by the specific support measures. Under a more production neutral support mechanism the regions would have more potential to specialize on production lines exhibiting comparative advantage in the region. Allowing more flexibility would, nevertheless, require that spatial concentration of dairy and livestock sectors is steered by environmental programs on the lines, as preferred by society.

THEME 2: EFFECTS ON PROCESSING AND MARKETING

Introduction

The focus of the Nordic Aid scheme is on maintaining agricultural activities, as addressed by the first evaluation theme above. The Nordic Aid does not include measures directly aimed at supporting the marketing of agricultural produce (c.f. chapter 2), and the only measure that specifically targets the processing industries is the transport aid paid to dairies and slaughterhouses.

However, maintaining agricultural production is expected to have significant indirect effects on the entire agri-food chain. Thus, if Nordic Aid results in larger volumes being produced by a larger number of farms, processing industries which depend on locally produced inputs may also be maintained in the Nordic Aid area. This is likely to be the case for dairies and slaughterhouses in particular since fresh milk and live animals are costly to transport over longer distances. It should be noted that, for the same reasons, maintaining dairies and slaughterhouses in the Nordic Aid area would facilitate the maintenance of agricultural activities. Hence, the objectives of maintaining agricultural production and maintaining processing industries are interdependent.

In addressing this theme, the assignment includes two specific evaluation questions (Q4 and Q5), which are analysed and answered together. The first question (Q4) focuses directly on how the scheme has maintained processing industries that are naturally suited in the specific, Nordic conditions. The second question (Q5) addresses how the Nordic aid payments have contributed to improving the structures for marketing and processing and, in the long term, to maintain processing industries and market access for farmers in the Nordic Aid area. Since the two evaluation questions are highly interrelated, they are addressed simultaneously in the following analysis. At the end of the chapter concluding remarks and conclusions with policy recommendations are given concerning the full theme.

Maintaining processing industries and improving structures in marketing and processing (Q4 and Q5)

> ***Questions 4 and 5:*** **To what extent have the Nordic Aid payments contributed in maintaining the processing industries naturally suited to the specific conditions of the regions concerned? To what extent have the Nordic Aid payments improved the structures for the marketing and processing of agricultural products?**

Introduction and interpretation

These evaluation questions relate to the development of the food processing industries, which have an important role in maintaining agricultural activities by providing market access for agricultural products. The use of income generated in agriculture, food industry and industries producing inputs for the agri-food sector expand the linkages to other parts of the regional economy. The demand induced by agriculture is significant for maintaining various kinds of services in the rural areas, such as shops, transporting and public services. Similarly, part of the processing of agricultural products may be dependent on local production of inputs.

However, simultaneously it is important that the competitiveness of the food-marketing and processing industries is improved. This requires that structural change in the agri-food industries located in the Nordic Aid area is not too much lagging behind the development in the rest of Europe. One feature of structural change is the realisation of economics of scale, manifested by the merging of firms and by the concentration of operations to a smaller number of facilities. Another feature is that companies search for efficiency gains through specialization. As a result, spatial concentration of processing and marketing activities may increase, implying that distances between these industries and the farms supplying their inputs also increase. This may restrict market access for agricultural produce, thereby reducing the relative profitability of farming activities, and counteract the objective of maintaining agricultural production in the Nordic Aid area.

In order to compensate for some of the resulting increase in transport costs, the northernmost dairies (and slaughterhouses in Finland) receive direct transport aid from the Nordic Aid scheme. However, the main contribution to the maintenance of processing industries from the Nordic Aid scheme is probably the indirect effects arising from the maintenance of agricultural production in the regions concerned, while its contribution to improving the structures for marketing and processing in the area is limited (i.e. restricted to not holding back too much the structural change in the sector.)

Therefore, as in Theme 1 above, *"The level of Nordic aid payments"* is interpreted to cover all Nordic Aid payments and all sub-regions. The "*processing industries naturally suited to the specific conditions of the regions concerned"* have traditionally included dairies and slaughterhouses. If processing and marketing activities concentrate and the farm structures remains this would lead to increased distances between the processing companies and the farms. The transport aid paid to dairies and slaughterhouses for collecting fresh milk and live animals may serve to maintaining market access for farmers despite increasing distances to processing companies. In analysing the evaluation question, it is interpreted that *"The structures for the marketing and processing of agricultural products"* consist of the number and location of processing and marketing facilities directly downstream from the farms.

Analysis and the judgement criteria

To analyse how Nordic Aid has contributed in maintaining the processing industries, a natural step would be to investigate the effects on the number of facilities, and the sales- and investment volumes within said industry. However, the simulation models do not allow processing industries to be singled out. Hence, a less direct approach is taken. First, the development of the number of facilities and volumes processed in the Nordic Aid area is investigated. Second, as Nordic Aid mainly affects the processing industries through its effects on primary production, the results from Theme 1 are utilised to infer to what extent Nordic Aid has contributed to the observed changes.

In analysing the development of the structures for marketing and processing of agricultural produce, the effects on market access for the farms is also of interest. This entails an analysis of how Nordic Aid has affected distances from farms to processing facilities, the number of competing processing companies and whether or not the transport aid compensates for increasing distances.

Data on the number of processing industries receiving Nordic Aid and the amounts granted to each sub-region have been obtained from Statistics Finland, TIKE, and the Swedish Board of Agriculture (SJV). TIKE and SJV are the bodies responsible for the administration of the Nordic Aid scheme. Hence, the data have high validity.

(1) Number of processing facilities and volumes processed in the Nordic Aid area.

Processing industries are granted direct support from the Nordic Aid scheme through the transport aid paid to both dairies and slaughterhouses in Finland but only to dairies in Sweden. In monetary terms, the transport aid for milk and meat increased from € 1.6 million in 2000 to € 2.0 million in 2005 in Finland (Table T2.1). In Sweden, the total amounts of transport aid for milk remained rather stable throughout the period 1995 – 2005, varying between € 1.9 – 2.1 million.

Table T2.1 Total transport aid for milk and meat in Finland and Sweden (million EUR).

	1995	2000	2001	2004
Finland	n.a.	1.6	1.6	2.0
Sweden	2.0	2.1	1.9	1.9
Total	n.a.	3.7	3.5	3.9

Sources: Finland – TIKE .
Sweden – SJV.

In both countries, the number of dairy facilities decreased during the period (Table T2.2). In Finland, the amounts of milk processed even increased, revealing an on-going and strong concentration process. Thus, the data support the hypothesis that the decrease in the number of facilities is a result of structural change leading to efficiency gains in the Finnish dairy sector. In Sweden, the decline in the number of facilities is accompanied by a decline in the total amounts of milk processed in all sub-regions, except for 2a. The fact that the decline in amounts processed (16 %) is only half as large as the decline in the number of dairy facilities (33 %) again suggests that there have been efficiency gains.

Table T2.2. Dairy facilities and amounts processed in 1995 and 2005 in each sub-region of the Nordic Aid area in Finland and Sweden.

Finland	Sub-region	No. of Facilities 1995	Thousand tons processed 1997*	No. of Facilities 2005	Thousand tons processed 2005*
	C1	20	515.0	17	486.8
	C2	29	1 027.3	19	1 104.0
	C3	6	182.2	5	185.4
	C4	-	-	-	-
	Total	55	1 724.5	41	1 776.2
Sweden	Sub-region	No. of Facilities 1995	Thousand tons processed 1995	No. of Facilities 2005	Thousand tons processed 2005
	1	2	13.0	1	0.5
	2a	4	178.2	3	187.4
	2b	3	179.7	2	138.5
	3	3	97.1	2	68.4
	Total	12	468.0	8	394.8

Notes: * quota year for Finland.
Sources: Finland – TIKE, Statistics Finland.
Sweden – SJV.

Since slaughterhouses are not eligible for transport aid in Sweden, it may be of some interest to compare the development of dairies with that of slaughterhouses. Table T2.3 indicates that the number of slaughterhouses in the Swedish Nordic Aid area declined by about 39 %, and that the number of cattle slaughtered annually declined by about 25 %. Accordingly, the decline in both the number of facilities and in the amounts processed has been larger than that observed for the dairies. This suggests that the transport aid to dairies has had at least a mitigating effect on the development of the processing industries. However, it should be recalled that the Nordic Aid scheme in Sweden

consists almost exclusively of support to milk production. Therefore, Nordic Aid may have been more effective in maintaining milk production than meat production, implying that it might be the indirect effects of the scheme that has caused the differences in the development of dairies and slaughterhouses. This will be discussed in detail below. In Finland the amounts processed have developed in a similar direction as in Sweden, though the relative decline (21 %) is somewhat smaller.

Table T2.3. Slaughterhouse facilities and number of cattle processed in the beginning of EU membership* and 2005 in each sub-region of the Nordic Aid area in Sweden and Finland.

Sweden	Sub-region	No. of facilities 1994	No. of cattle processed 1994 (in 1000)	No. of facilities 2005	No. of cattle processed 2005 (in 1000)
	1	3	2.8	1	3.3
	2a	3	18.9	3	17.4
	2b	9	25.4	4	15.5
	3	3	12.2	3	7.6
Total		18	59.3	11	43.8
Finland	Sub-region	No. of facilities 1997	No. of cattle processed 1997 (in 1000)	No. of facilities 2005	No. of cattle processed 2005 (in 1000)
	C1	n.a.	91.0	n.a.	63.9
	C2	n.a.	175.5	n.a.	145.4
	C3	n.a.	23.3	n.a.	18.8
	C4	n.a.	2.8	n.a.	2.4
Total		n.a.	292.6	n.a.	230.5

Notes: *) For Sweden, the year of comparison is 1994 and for Finland it is 1997.
Sources: Finland – TIKE.
Sweden – SJV.

(2) Indirect effects of measures in the Nordic Aid scheme targeting agricultural production

The measures to maintain agricultural production in the Nordic Aid area may, if successful, indirectly contribute to the maintenance of processing industries dependent on locally produced inputs in the said area. Above, it was hypothesized that locally produced inputs would be important especially for dairies and slaughterhouses. Thus, to investigate the indirect effects of the scheme on the processing industries, there are two issues to be addressed. *First*, the processing industries' dependence on locally produced output needs to be investigated. To gain some information on this issue, the questionnaire included the following question for representatives of the processing industries in the Nordic Aid area:

How dependent is your operation on locally produced agricultural inputs?

As can be seen from Table T2.4, the majority of respondents in both countries stated that locally produced inputs were either crucial or important for production. However, one should be aware that the number of respondents was limited (4 out of 71 in Finland and 14 out of 16 in Sweden).

Nevertheless, the answers do not refute the hypothesis that the processing industries in the Nordic Aid area are dependent on locally produced inputs. Accordingly, *the second issue*, i.e. of whether Nordic Aid has contributed to maintaining agricultural production, becomes relevant.

Table T2.4. The statements of representatives of administration and other stakeholders regarding their dependency on locally produced inputs (percent of all representatives).

	Crucial for production	Important for production	Negligible importance for production	No opinion	Non-resp.
Finland	4	1	0	0	95
Sweden	75	13	0	0	13

Sources: Finland – Question 7 in Questionnaire to administrators/stakeholders in Nordic Aid area. Note: None-respondence rate in the case of this question was high in Finland (67 out of 71).
Sweden – Question 24 in Questionnaire to administrators/stakeholders in Nordic Aid area. Note: The question was only presented to representatives for processing industries.

This was addressed in Theme 1 above were it was concluded that the contribution differs between Finland and Sweden. Thus, results from the CAPRI- and AgriPoliS-models for Sweden indicate that Nordic Aid has had only minor effects on agricultural production during the period 1995 – 2005. The support to milk production from Nordic Aid has been mainly absorbed by quota rents since quotas were nearly exhausted by the support contained in the CAP and the RDP. In addition, the support to milk production has resulted in some crowding out of beef production. This would have had negative effects on the availability of locally produced inputs for the slaughterhouses. However, some of the reduction in beef production was compensated by the increase in the number of dairy cows. Accordingly, since Nordic Aid has not had substantial effects on agricultural production in Sweden, its indirect effects on the maintenance of processing industries could only be marginal. In Finland, although stakeholders declared a high dependency on local raw material, it should be noted that the number of responses to this question was as low as 5 %.

(3) Structural change, efficiency and competition in the dairy and meat-processing sectors

The structural development in the Nordic food processing industries has followed the general development patterns in which industries consolidate into a smaller number of firms and production plants. Since Nordic Aid is focused on supporting primary agricultural production, its main contribution is probably that, while maintaining agricultural activity, it has not obstructed the market driven structural change of processing industries too much.

As described above, the number of dairy facilities has declined, being largest in sub-region C2. From 1995 to 2005, the largest dairy company increased its market share in Finland from 75 to 85 %, while the market share of the second largest company remained constant at about 10 %. The group of small dairies has been rather volatile. Even if their number stayed the same, about 15-20 % of them change constantly over time, *i.e.* companies go bankrupt while new ones enter the market (Finnish Food and Drink Industries' Federation, ETL). Most of the small-scale dairies produce fresh cheese for the local market or niche products for the national retail chains and/or speciality delicatessen disks of department stores.

The number of meat processing facilities in the Finnish Nordic Aid area increased from 71 in 1995 to 122 in 2005. The relative increase has been the largest in sub-regions C3 (100 %) and C4 (250 %). Part of the explanation is the establishment of 17 smaller slaughterhouses for reindeers in these sub-regions during the period. On the other hand, the largest companies have decreased their number of facilities (from 24 to 16 facilities) and concentrated production to certain parts of the Nordic Aid area (primarily to the southern, western and eastern parts of sub-regions C1 and C2). The biggest meat processors are located in sub-region C1 and in the southern and western parts of C2. In sub-region C3, the two meat processing companies are also located in the west close to the sea.

Table T2.5. The number of food processing facilities in the Finnish food industry by subsidy regions and by industries in 1995 and 2005.

1995	Meat industry	Dairy industry	Milling industry	Feed industry	Other food industries	Total food industry
C1	27	20	19	23	282	371
C2	27	29	12	19	287	374
C3	13	6	5	2	91	117
C4	4	0	1	0	23	28
C total	71	55	37	44	683	890
Finland	216	90	94	76	1,558	2,034
2005	Meat industry	Dairy industry	Milling industry	Feed industry	Other food industries	Total food industry
C1	51	17	16	18	331	433
C2	30	19	12	21	297	379
C3	26	5	1	2	87	121
C4	15	0	0	0	27	42
C total	122	41	29	41	742	975
Finland	254	63	69	74	1,516	1,976

Source: Statistics Finland.

The observation that the number of dairy and slaughterhouse facilities had declined more than the amounts of milk and meat processed was interpreted as suggesting that the structural change had resulted in efficiency gains. The figures of food industry companies in the Nordic Aid area in Finland also confirm that the processing industries have noticeably increased the level of investments over the past years. This provides good basis for a shift into more efficient ways of production (Table T2.6). Yearly investments made by food processors in the C area went up from € 90-110 million in the second half of the 1990s to 120-130 million in the 2000s – with the exception of 2004. They have been relatively more active to invest than food manufacturers in Southern Finland, since Nordic Aid areas represented – again with the exception of 2004 – 35-40 % in the total food industry investments in the 2000s (annual average being 36.9 %), which compares to a lower average proportion, 33.7 % in the late 1990s.

Table T2.6. Investments made by the food processing companies in Finland and in the Nordic Aid area, 1995-2005 (million €)

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Finnish food industry	295	320	300	282	273	285	339	362	335	283	329
Food industry in the Nordic Aid area	89	108	94	110	94	124	123	125	121	88	130
Share (%)	30.2	33.7	31.3	38.9	34.3	43.5	36.2	34.5	36.2	31.3	39.4

Source: Statistics Finland.

Note: The figures in the table are based on the regional data of the Statistics Finland, the Nordic Area includes the data of South-Savo, North-Savo, North Carelia, Central Finland, South Ostrobothnia, Ostrobothnia, Central Ostrobothnia, North Ostrobothnia, Kainuu and Lapland.

Further evidence concerning the efficiency increase can be obtained from data on the development of value added in Finnish processing industries during the period 1995 to 2005 (Table T2.7). The Gross Value of Production (GVP) increased in the Finnish food industry from € 8023 million in 1995 to € 8446 million in 2005. Concurrently, value added grew slightly faster, so its share of GVP increased from 24 % to 25.2 %. It may be noted that the growth rate of both GVP and value added in the Nordic Aid area was higher than the national average. In 1995 only 35 % of total GVP and 29 % of total value added originated from the C area, while its share of total GVP and value added was, respectively, 39 % and 35 % in 2005. Table T2.7. demonstrates that the growth occurred in

C1-C2 sub-areas. GVP and value added in fact decreased in C3-C4 sub-areas, which are characterised by small and medium-scale processing units. As for the C1-C2 sub-areas, a considerable growth was recorded in the region of South-Ostrobothnia, which is attributable to the presence of two particularly large processing companies.

Table T2.7. Gross value of production and value added in the Finnish food industry and in the Nordic Aid regions - C area and C sub-areas - in 1995 and 2005 (in million €).

	Finland total		C area total		Sub-areas C1-C2		Sub-areas C3-C4	
	1995	2005	1995	2005	1995	2005	1995	2005
Gross value of production (GVP)	8023	8446	2807	3269	2226	2743	581	526
Value added	1928	2127	551	738	417	614	135	124
Value added share in GVP (%)	24.0	25.2	19.6	22.6	18.7	22.4	23.2	23.6

Source: Statistics Finland.

Note: The figures in the table are based on the regional data of the Statistics Finland, so South-Savo, North-Savo, North Carelia, Central Finland, South Ostrobothnia, Ostrobothnia, Central Ostrobothnia were included into C1-C2 and North Ostrobothnia, Kainuu and Lapland into C3-C4.

Since processing industries, except in the Finnish meat industry, have concentrated during the period, the question on how important the transport aid is for keeping processing industries in the Nordic Aid area arises. To this end, the questionnaire included the following question to the representatives of the administration, and other stakeholders:

> *How do you evaluate the importance of the transport aid in the Nordic Aid Scheme paid to the northernmost dairies and slaughterhouses for the collection of milk and animals?*

Table T2.8. The statements of representatives for administration and other stakeholders on the importance of the transport aid in the Nordic Aid scheme (percent of all respondents) in Finland and in Sweden.

Country	Finland	Sweden
Very important	31	62
Rather important	39	16
Non-important	2	3
No opinion	24	16
Non-respondents	4	3

The results suggest that the transport aid plays an important role in compensating for increased transport costs due to concentration. However, since almost half of the respondents in Sweden were representatives of the processing industries, there may have been strategic incentives for respondents to overstate the importance of the transport aid. In Finland, on the other hand, 65 % of the respondents were representatives of the municipalities and only 7 % were representatives of the processing industries.

As to effects on competition for farm output, the concentration process observed in both countries suggests that the remaining processing industries may have gained in market power. However, in the Swedish case it may be noted that the majority of the dairies are producer cooperatives owned by the farmers themselves. Hence, though four of the facilities were closed between 1995 and 2005, the number of independent companies was only reduced by one, in sub-region 1. In contrast, most slaughterhouses in the Swedish Nordic Aid area are independent companies. However, the decline from 18 to 11 facilities between 1994 and 2005 affected the number of independent companies differently in the respective sub-regions. Sub-region 2a actually gained two independent companies. In sub-region 2b, concentration might have decreased competition, since there in 1994 were four major slaughterhouses processing between 11 and 38 % of the total amount, while in 2005 two major slaughterhouses each processed about 45 % of the total amount. The other sub-regions were

dominated by one major slaughterhouse (processing more than two thirds of the total amount) both in 1994 and in 2005. However, when assessing the effects on competition, it should be noted that sub-regional borders are somewhat artificial since farms in a given sub-region may trade with processing industries in any other sub-region that they find convenient.

Thus, to elicit further information on competition and market access, farmers were asked the following question:

> *Is it possible for you to change the marketing channel of farm products? Have you changed it during last five years?*

In both countries, regardless of sub-region, only a small minority of farmers stated that it is possible to change to another dairy (Table T2.8). Moreover, only a few of the Finnish farmers, and none of the Swedish, had actually changed dairy. In the Finnish case, it should be noted though, that the rate of non-respondents to this question was very high. In Sweden, the responses from farmers in the Nordic Aid area are not very different from those of farmers in the control-group (sub-region 5). However, given that most dairies in Sweden are producer cooperatives owned by the farmers themselves, the results are more or less what would have been expected.

Table T2.9. Farmers' opinions on whether it is possible to change the marketing channel of agricultural products in the Nordic Aid area in Finland and in Sweden and share of respondents having changed marketing channel (percent of respondents).

	Dairies				Slaughter houses				Buyers of grain and other prod.			
Sub-Region	Yes	No	Non resp.	Chan-Ged	Yes	No	Non resp.	Chan-ged	Yes	No	Non Resp.	Chan-Ged
FINLAND												
C4	0	26	74	0	25	49	25	10	…	…	99	…
C3	18	28	54	2	51	35	14	24	…	…	83	…
C2	10	35	55	1	51	20	29	22	44	14	42	22
C1	8	24	68	1	35	21	44	17	54	16	30	24
Resp. rate	39				57				59			
SWEDEN												
1	0	62	38	0	34	42	24	10	10	24	66	2
2a	1	75	15	0	52	36	12	17	23	22	55	5
2b	7	52	41	0	40	35	25	22	18	18	64	8
3	0	71	29	0	51	39	10	17	17	32	51	2
X*)	6	59	35	0	29	59	12	6	18	47	35	12
5**)	12	65	24	0	56	21	24	15	32	18	50	3
Resp.rate	82				91				74			

X*) Respondents that have not answered the question on in which sub-region their farm is located.
5**) Farms in the control group, i.e. region 5 in central Sweden outside the Nordic Aid area.

The number of farms, which have changed the marketing channel, clearly indicates higher competition among slaughterhouses than among dairies. In both countries between 10 and 25 % of the farmers reported that they had changed the slaughterhouse. Concerning buyers of grain and other agricultural produce, only a minority of the Swedish respondents believed that it was possible to change buyer, and less than 10 % reported that they actually had done so. In Finland, the answers concern only buyers of grain, which in the Finnish Nordic Aid area mainly involves fodder grain. Between 22-24 % of the Finnish grain selling respondents reported that they had changed buyer during the last five years.

(4) Structural change and distances between farms and processing facilities

Distances between farms and processing facilities may have been affected by the reduction in the number of farms, as well as by the closure of processing plants. On the other hand, neither dairies, nor slaughterhouses were initially very abundant in the Nordic Aid area.

In Finland, there are no larger slaughterhouses in the eastern parts of sub-regions C2 and C3 or in the whole of sub-region C4. Consequently, distances to the nearest slaughterhouse from farms in sub-region C3 can be over 300 km, and in sub-region C4 even as long as 600-1000 km. This situation has been prevailing throughout during the period 1995 – 2005. Long distances imply that transportation of fresh milk and living animals become costly, and may therefore impede the farmers' possibilities to gain market access. On the other hand, the transport aid in the Nordic Aid scheme is designed to address this particular problem. To elicit whether distances have been affected and whether the changes are perceived as problematic, farmers, as well as representatives of administration and other stakeholders were asked the following questions:

> *Have the distances from your farm/ your area/ to dairies, slaughterhouses or other marketing places increased during the last ten years? Does the change in distances cause problems for you and your farm / your region?*

Table T2.10. Farmers' opinions about the changes in distances between farms and dairies, slaughterhouses or other buyers of agricultural produce in the Nordic Aid area (percent of respondents).

	Dairy				Slaughterhouse				Grain and other product buyers			
Sub-Region	Yes	No	Proble-matic	Not relev.	Yes	No	Proble-matic	Not relev.	Yes	No	Proble-matic	Not relev.
FINLAND												
C4	45	0	…	55	47	43	*34*	9	16	50	*16*	84
C3	24	35	*4*	41	57	33	*32*	10	3	13	*3*	85
C2	17	47	*3*	36	32	51	*12*	17	11	46	*11*	43
C1	16	41	*9*	43	38	45	*18*	17	15	59	*8*	26
Resp. rate	75				85				55			
SWEDEN												
	Dairy				Slaughterhouse				Buyer of grain and other products			
Sub-region	Yes	No	Probl.	Non-resp.	Yes	No	Probl.	Non-resp.	Yes	No	Probl.	Non-resp.
1	38	34	*6*	28	58	28	*20*	14	10	30	*10*	60
2a	15	67	*2*	18	47	46	*16*	7	5	55	*4*	40
2b	20	53	*3*	27	65	25	*17*	10	10	43	*3*	47
3	17	54	*7*	29	66	24	*17*	10	15	49	*2*	36
X*)	35	35	*0*	30	35	47	*6*	18	6	47	*0*	47
5**)	26	65	0	9	24	68	25	9	24	68	38	9

*) Sub-region X refers to respondents that have not stated which sub-region their farm is located in.
5**) Farms in the control group, i.e. region 5 in central Sweden outside the Nordic Aid area.

In Finland, 15-20 % of the responding farmers in sub-regions C1-C2, and 24-45 % of the farmers in sub-regions C3 and C4 stated that distances between farms and *dairies* had increased during the last ten years. However, less than 10 % found this to be a problem (Table T2.9). One third of the farmers in sub-regions C1 and C2 stated that distances between farms and *slaughterhouses* had increased. For 12-18 % of them, the change was problematic. In the northernmost sub-regions C3-C4, about half of the farmers stated that distances to slaughterhouses had increased, and more than 30 % found the situation problematic. Some farmers also stated that distances to *other buyers of agricultural produce* had increased, and almost all of them found the situation problematic.

In Sweden, except in sub-region 1, only few of the respondents stated that distances to *dairies* had increased during the last ten years. Contrary, a majority of respondents in sub-regions 1, 2b and 3 found distances between farms and *slaughterhouses* to have increased. Finally, only few respondents perceived distances to *buyers of other agricultural produce* to have increased during the last ten years. Concerning dairies and buyers of grain and other agricultural produce, very few of the respondents stated that increasing distances posed a problem. However, increasing distances to slaughterhouses were found to be problematic by a larger share of respondents. In most respects, the reflections of farmers in the Nordic Aid are similar to those of farmers in the control-group. The only notable difference concerns the share that finds increasing distances to buyers of grain and other agricultural products as problematic, but here it should be noted that there was a substantial share of non-respondents among the farmers in the Nordic Aid area.

Thus, farmers in both countries seem to agree on the fact that distances to slaughterhouses have increased. They also seem to find this more problematic than the growth in distances to dairies and buyers of other agricultural products. Given that the transport aid in both countries is focused on the dairy sector (in Finland only slaughterhouses in the most northern sub-regions are eligible for transport aid), one may conclude that in the dairy sector the transport aid is effective in compensating the cost increases due caused by longer distances. To investigate the farmers' views on this issue, they were asked the following question:

> *How do you evaluate the importance of the transport aid in the Nordic Aid Scheme paid to the northernmost dairies and slaughterhouses for collection of milk and animals?*

In both countries, the majority of respondents in the two most northerly sub-regions (C4 and C3 in Finland, and 1 and 2a in Sweden) found the transport aid very- or rather important while respondents in other sub-regions are less convinced (Table T2.10).

Table T2.11. Farmers' opinions on the importance of the transport aid in the Nordic Aid scheme (percent of all respondents) in Finland and in Sweden.

	Finland				Sweden				
Sub-area	C4	C3	C2	C1	1	2a	2b	3	X*)
Very important	50	48	27	7	42	56	35	29	24
Rather important	20	15	19	13	8	9	7	17	12
Non-important	8	10	18	20	0	2	2	0	0
No opinion	5	10	14	22	8	9	17	17	12
Non-respondents	17	17	22	38	42	24	39	37	52

X*) Respondents that have not answered the question on in which sub-region their farm is located.

When interpreting the differences in importance attached to the transport aid between the sub-regions, it may be noted that there could be two causes for the north-south gradient. First, the amount of transport aid paid per unit of milk and animal differ between sub-regions (being higher the farther north the sub-region is located). Second, distances from farms to processing industries are also longer in the northern than in the southern sub-regions.

Representatives of the administration and other stakeholders in the Nordic Aid area were also asked for their opinions on how structural change had affected distances between farms and processing industries (Table T2.11).

Table T2.12. Opinions of administrators and other stakeholders about changes in distances between farms and dairies, slaughterhouse or other marketing place of animals (percent of respondents) in the Nordic areas in Finland and in Sweden.

Distances between farms and marketing places for their products have…		Strongly agree	Mildly agree	Unde-cided/ unsure	Mildly disagree	Strongly disagree
increased because of the centralisation in the processing industry	FI	49	28	6	11	6
	SW	76	5	3	11	0
not changed since the number of farms also has decreased.	FI	9	11	16	43	21
	SW	8	5	16	41	19
Changes in the distances have primarily caused problems for the farmers.	FI	16	37	20	26	1
	SW	46	27	8	11	0
Changes in the distances have primarily caused problems for processing industry.	FI	1	41	34	20	3
	SW	51	19	8	14	0
Nordic Aid provides sufficient compensation for additional costs due to the increase in distances.	FI	3	17	26	40	14
	SW	3	19	19	32	19

The answers appear to be parallel in both countries to most of the propositions. A large majority of administrators and other stakeholders agreed strongly with the proposition that distances between farms and marketing places had increased. A majority disagreed (mildly or strongly) with the proposition that distances had not changed due to the decrease in the number of farms. The only substantial differences between the Swedish and the Finnish respondents concern whether or not changes in distances have affected the processing industries. Half of the Swedish respondents agreed strongly with this proposition, while almost none of the Finnish respondents did so.

It is noteworthy that, in both countries, the majority of respondents mildly or strongly disagree with the proposition that Nordic Aid provides sufficient compensation for the additional costs caused by the increase in distances. However, it should be noted that about half of the Swedish respondents were representatives of processing industries, which of course have strategic incentives to disagree. Similar tendencies are likely also in the Finnish responses.

Conclusions for Theme 2

The Nordic Aid is primarily designed to support agricultural production in the northern areas. The only measure directly targeting the processing industries is transport aid, which represents only a small portion of Nordic Aid in both countries. On the other hand, the support to agricultural production may indirectly contribute to the maintenance of processing industries, in particular dairies and slaughterhouses that are dependent on locally produced inputs. The results in Theme 1 indicate that the indirect effects have been only marginal in Sweden but more notable in Finland.

The empirical data indicate that despite the effects on primary production in Finland, the Nordic Aid scheme has not maintained the number of processing facilities at the 1995 level in any of the sub-regions. Nevertheless, in Sweden the number of dairies (that were eligible for transport aid) has decreased less than the number of slaughterhouses (that were not eligible for transport aid). These observations suggest that the transportation aid has had at least a mitigating effect on the maintaining of the processing facilities.

The food processing industries have concentrated steadily in the Nordic Aid areas both in Sweden and Finland. The structural changes have provided means for increasing efficiency in the sector, which process has also been driven by other economic factors than measures applied under the Nordic Aid Scheme. However, it can be stated that the Nordic Aid has contributed to the increased

efficiency of processing companies through indirect effects, i.e. by slowing down the reduction or maintaining the available farm output. The Finnish data, in particular, indicate that the efficiency of processing industries has increased in the Nordic Aid area.

The Finnish meat industry is an exception to the common concentration trends, because the number of meat processors in the Nordic Aid area actually increased, and the increase was observed evenly in all sub-regions. The proliferation of meat processors is attributable to the newly established small-scale enterprises, a great deal of them being reindeer slaughterhouses, which are not eligible for transportation aid. The reindeer slaughterhouses explain the increase in the number of processors in the northernmost areas, such as C3 and C4. Some mall-scale slaughterhouses have also been set-up by farmers, such as in sub-regions C1 and C2, where cattle and pig slaughtering were also stable or expanded. The increase in the number of meat processing likely resulted from the indirect effects of the Nordic Aid, i.e. the regular Nordic aid paid to livestock and reindeer farms.

The concentration in the food processing industries and the fact that there are fewer processors located more scattered may at least potentially reduce competition for farm output and market access for farms that are located at a distance. The survey results did not, nevertheless, give significant support to this claim. Comparing the two main sectors, the survey results indicate relatively more competition among slaughterhouses than among dairies. A larger share of farmers perceives the increased distances to slaughterhouses as a problem than was the case for increased distances to dairies. This may be a result of the fact that in Sweden transport aid is paid to dairies only, which also suggests that transport aid may compensate for some of the problems in accessing the more concentrated markets. It can also be attributed to the fact that transport of live animals is more expensive and more restricted than transport of other goods.)

The Nordic Aid scheme does not, nevertheless, contain any measures directly aimed at enhancing processing industries or steering structural change in these industries. The main contribution of the Nordic Aid is probably in its indirect effects arising from the maintenance of a larger agricultural production in the area than would otherwise have been the case. This could, in turn, have both positive and negative effects on the structures for marketing and processing of agricultural products. Positive effects might result if a larger amount of agricultural production was maintained on a smaller number of farms since this would allow processing industries to exploit economics of scale also in the collection of farm output. On the other hand, negative effects would arise if Nordic Aid merely resulted in a larger number of small scale farms being maintained. However, if this should be the case, the transport aid contained in the Nordic aid scheme may provide at least some compensation.

THEME 3: IMPACTS ON THE ENVIRONMENT

Q 6: To what extent have the Nordic aid payments ensured that the environment is protected and the countryside preserved?

Introduction and interpretation

Agricultural activity, beyond its primary function of supplying food, fibre and fuels (commodities), also shapes the landscape, provides environmental benefits such as maintenance of biodiversity and contributes to the socio-economic viability of rural areas. It also causes negative environmental impacts such as pollution (eutrophication of surface waters, groundwater contamination, atmospheric emissions, etc.). These are of course general environmental characteristics of agricultural production and the significance of any particular impact, positive or negative, will be strongly influenced by regional characteristics and type of farming.

The Nordic regions are characterized by relatively extensive arable land production (average chemical and fertilizer application rates are low), though milk yields per cow are high (around 9,000 kg). The natural and dominating vegetation type is coniferous forest which produces a homogeneous and "closed" landscape. Agricultural land functions in these regions to "open" up the landscape and provide living space for humans and a greater diversity of other species. The managed landscape is also important for preservation of cultural heritage. Hence in the Nordic regions the maintenance of *landscape values* (or positive environmental externalities) associated with agricultural activity tend to be the primary environmental concern. Pollution impacts on the other hand are generally of secondary concern.

Given that Nordic Aid schemes do not include targeted environmental measures but are complemented by the general environmental regulatory framework in each region and interact with agri-environmental schemes (the main EU instrument for managing the environment), the evaluation question is interpreted as follows; a) The extent to which the environment is *protected* is taken to mean whether Nordic Aid schemes have increased the negative environmental impacts of agriculture and, if so, to what extent, and b) Preserving the *countryside* is taken to mean, to what extent Nordic Aid has contributed to maintaining landscape values (biodiversity and mosaic) and rural populations. Thus we shall evaluate the impacts of Nordic Aid on both pollution and landscape related impacts, as well as on the viability of rural populations. However, given the nature of the overriding environmental concerns in these regions the focus will be on evaluating countryside impacts.

As motivated in the Descriptive Part a modelling approach will be used to evaluate environmental impacts since we otherwise have no way of knowing how the landscape would have evolved without Aid. The modelling approach makes it possible to do this by varying the level of aid whilst holding all other factors constant. Both the AgriPoliS and DREMFIA models link changes in farmers' production decisions to environmental indicators such as biodiversity value and nutrient surplus. Recall from the Descriptive Part that AgriPoliS is calibrated to a single year, 2001, and all simulations are based on this calibration year. DREMFIA on the other hand is calibrated to developments over the entire evaluation period, i.e., from 1995 and forward. Whichever the case, the two models can be used to determine the extent of the impact of Aid on the environment and countryside.

Analysis and judgement criteria

It is becoming increasingly clear that the environmental quality of the landscape increases with the diversity of land use, especially in terms of biodiversity (Benton et al. 2003) and direct human valuation such as for recreation or visual appeal (Berland 1994; Drake 1992). The landscape in the Nordic Aid regions is quite homogenous, consisting mainly of forest. Thus, any scheme that contributes to maintaining the cultivated land area can also be assumed to contribute to maintaining landscape diversity and hence its value to society. Another way of looking at it is that agricultural land is a relatively scarce land use in these regions. The use of chemical fertilizers and other polluting agents is on average low because of adverse climatic conditions and low yields. However, this does not preclude that Aid could have led to an increase in the use of polluting inputs which will also be investigated. The potential link between Nordic Aid and the viability of rural populations will be investigated using an Input-Output model for Finland.

Due to the problem of not being able to link Nordic Aid payments to developments in environmental quality over time—as stated above we do not know how environmental quality would have developed without Nordic Aid—the evaluation will be based on two types of indicators. Historical indicators will be used to evaluate actual developments in environmental quality and the countryside over the evaluation period by comparing observed indicators in 1995 and 2005. These indicators however will not provide any information about the *extent* to which aid has influenced the environment. To do this would require a panel of data over time with simultaneous observations on farm decisions, input and output prices and environmental quality. Given the time required for construction of panels and the lack of suitable data, the econometric approach is not feasible. Historical indicators can therefore only measure the extent to which environmental quality has changed but not the influence of Nordic Aid. Instead, modelled indicators from AgriPoliS and DREMFIA will be used to evaluate the influence of Aid on the environment. Indicators will be sub-divided into the categories following from our interpretation of Q6:

1) Landscape (mosaic and biodiversity) indicators
2) Pollution indicators (nutrient surplus)
3) Rural population viability indicators

The specific indicators chosen for evaluation purposes are explained and motivated in the coming text. Modelled results will also be complemented with replies from the questionnaire sent to farmers and administrators.

Three scenarios are analysed with the models:

1) a 100 % reduction in Aid in both Sweden and Finland,
2) a 50 % reduction in Aid in Finland, and
3) a 100 % reduction in RDP-investment support in Sweden.

A complementary 50 % reduction scenario is analysed for Finland in order to consider the large difference in Aid levels between the two countries. This difference is likely to be an important determinant of the differences in agricultural development in the Swedish and Finnish regions. Further, this scenario is particularly relevant because it will help to show to what extent the *level* of support has influenced the environment. For example could the environment have been preserved with 50 % less Aid in Finland? To investigate the interaction of Aid with other support schemes (a request from the Sponsor) AgriPoliS will be used to analyse the interaction of Nordic aid with investment support from the Rural Development Programme (RDP). Finally, the influence of Aid on the viability of rural communities will be evaluated.

(1) Landscape mosaic and biodiversity

Landscape *mosaic* or pattern is an important general indicator of landscape value. The more diverse or heterogeneous a landscape, the more complex its mosaic, and hence the more it contributes to: biodiversity, amenity, recreational, cultural and knowledge values. Measures of landscape mosaic fall into two general categories: those that quantify the *composition* of the map of a landscape, without reference to spatial attributes, and those that quantify the spatial *configuration* of the map, which requires explicit spatial information (e.g., distribution of field size). Composition is easily quantified, and refers to features associated with the variety and abundance of field types within the landscape, but without considering the spatial character, placement, or location of fields within the mosaic. The following indicators will be used for evaluating the effects on composition and complexity of the landscape mosaic: (1) Distribution of different agricultural land uses, (2) Land use diversity (Shannon's Diversity Index), and (3) Stakeholder questionnaire.

The biodiversity indicator is based on the widely studied species-area relationship from Landscape Ecology (Rosenzweig, 1995; Armsworth et al., 2004), where in this case species is measured in terms of endangered rather than all species to reflect the economic value of species diversity {Brady et al. 2007}.

(1.1) Historical developments

The agricultural mosaic in both countries is dominated by arable grass (primarily for silage and hay production) which is illustrated in Figure T3.1 for 1995. This dominance raises the marginal diversity value of other land uses because each additional hectare of an alternative land use will have a relatively large impact on mosaic complexity (compared to more grass). From this perspective it can be said that marginal reductions in arable grass would have relatively less impact on landscape value than reductions in the other land uses. Set-aside from this perspective is a form of arable grass and hence is assumed be a perfect substitute for arable grass. Grazingland in Sweden represents semi-natural pasture which has documented high landscape and biodiversity value. An equivalent land use has not been identified for Finland.

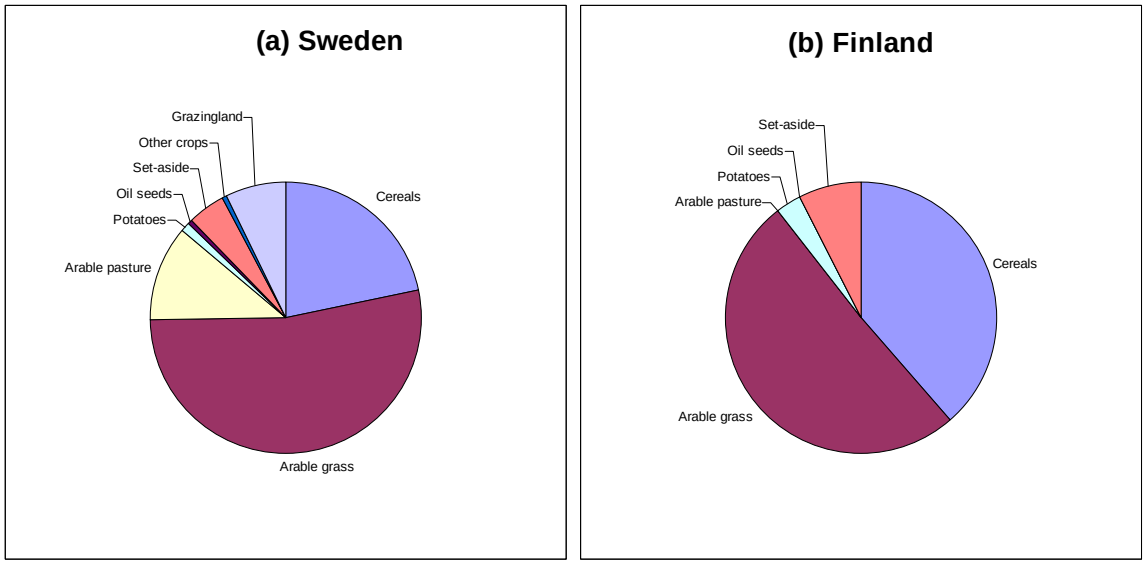
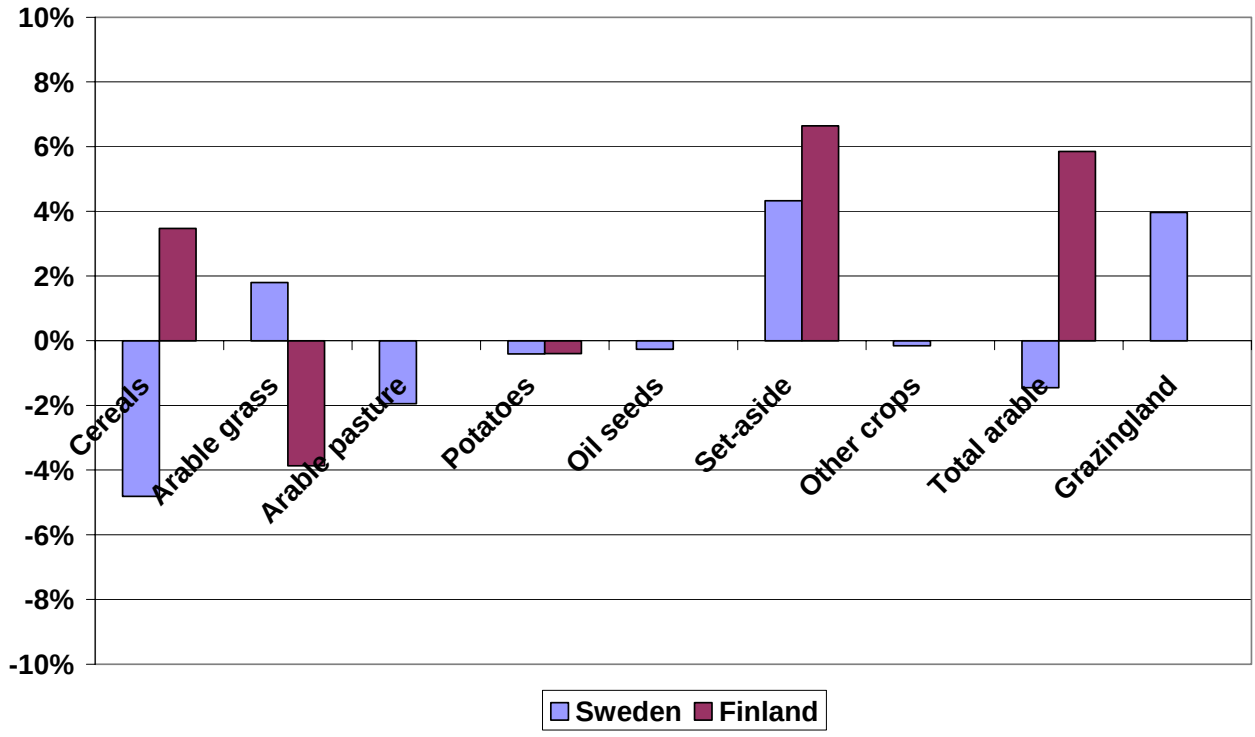


Figure T3.1. Field type as proportion of landscape 1995 (a) Sweden and (b) Finland.

The changes that occurred in land use over the evaluation period are presented in Figure T3.2. To ease comparison, all changes are presented as a proportion of the total arable land area in each of

the Swedish and Finnish Nordic Aid regions in 1995. Land use area in 1995 will also be used as the benchmark to determine the extent to which the landscape and environment have been preserved.



FigureT3.2. Historical change in land use 1995-2005 (Proportion of total arable land 2004).

Total arable land increased over the evaluation period in Finland because previously unused land has been restored to agricultural land, whilst in Sweden a marginal proportion was taken out of agriculture (which is explained by differences in policy frameworks on accession to the EU in 1995, see Theme 1, Q1). The other major impact was the relatively large increase in the areas of set-aside in both regions which was a direct result of EU accession and CAP regulations. In the case of Sweden the increase in set-aside came at the cost of cereals, which is negative for landscape mosaic. In Finland the increase in set-aside is largely balanced by a reduction in arable grass, whereas the increase in cereals is positive for mosaic.

The mosaic effects of the historical changes in land use are measured in Table T3.1 using Shannon's Diversity Index (SDI). The eight land use categories identified in Figure T3.2 are also used for calculation of the index which is maximized when the total landscape area is evenly divided between each of the land uses (i.e., 12.5% of area for each land use). As can be seen from Table T3.1 the index is unchanged in Sweden and increases slightly in Finland at the aggregate level. The variation between regions in Sweden though was quite high with negative effects being related to the reduction in areas of arable crops and pasture in all regions. However in Jämtland and Dalarna this reduction has been compensated for by a relatively large increase in the area of grazingland. The increase in grazingland area can be attributed to the introduction of coupled CAP livestock support and environmental schemes which have had a general effect on maintaining the area of grazingland in the whole of Sweden (SJV 2003). Hence some regional variation in landscape mosaic has occurred but at the country level it has been largely preserved through substitution of land uses.

Table T3.1. Landscape diversity as measured by Shannon's Diversity Index (SDI).

Region	SDI 1994	SDI 2005	Change %
Norrbotten	0.58	0.55	-6.3
Västerbotten	0.70	0.66	-5.9
Jämtland	0.57	0.62	8.3
Västernorrland	0.69	0.62	-9.9
Gävleborg	0.79	0.78	-1.0
Dalarna	1.01	1.13	12.0
Sweden	**0.73**	**0.73**	**0.0**
Finland	**1.09**	**1.10**	**1.4**

Source: Calculated from land use statistics for 1995 and 20005.

Thus it is concluded that the landscape mosaic at the country level has been preserved over the evaluation period in both Sweden and Finland but with some large regional variation in Sweden. Reductions in the area of arable crops have caused an up to 10 % reduction in mosaic (as measured by SDI) in the most northerly Swedish regions. The extent of the influence of Aid on preserving landscape mosaic is studied in the next section with the help of models.

(1.2) Modelled developments

The extent of the impact of Aid on land use is shown in Figure T3.3 (Note that land use is the fundamental variable that is used to calculate the mosaic and biodiversity indicators below). In this figure only the modelled effects of Aid are shown and as a percentage of the total agricultural area in 1995. The Swedish results are based on AgriPoliS simulations for the Västerbotten region and can be interpreted as showing how much of observed land areas in 2001 can be attributed to Aid (i.e., would differ in the absence of Aid). The Finnish results are based on DREMFIA and include the entire Nordic Aid area. The extent of the effect in both countries is measured as the change in area, as a proportion of total arable land in 1995 (i.e., all changes are normalized to the arable area).

In the case of Sweden the impacts on Total land were negligible (< +2 %). However the allocation of land between different uses was affected. Nordic Aid (**SWE_AID**) and investment support (**SWE_INV**) are also shown to have similar impacts, resulting in a greater area of intensive land uses (cereals and arable grass) and set-aside at the cost of less extensive land uses (arable pasture and grazingland). This is driven by the fact that Aid in Sweden is principally paid to milk and milk production is very intensive. The net impact on mosaic is determined in Table T3.2 using SDI.

The main effect on land use in Finland (FIN_AID) is that a much greater area of land was kept in arable grass production (+ 22 %) with Aid. The 50 % Aid scenario (FIN_AID_50%) indicates that this would have fallen to 10 % with 50 % less Aid.

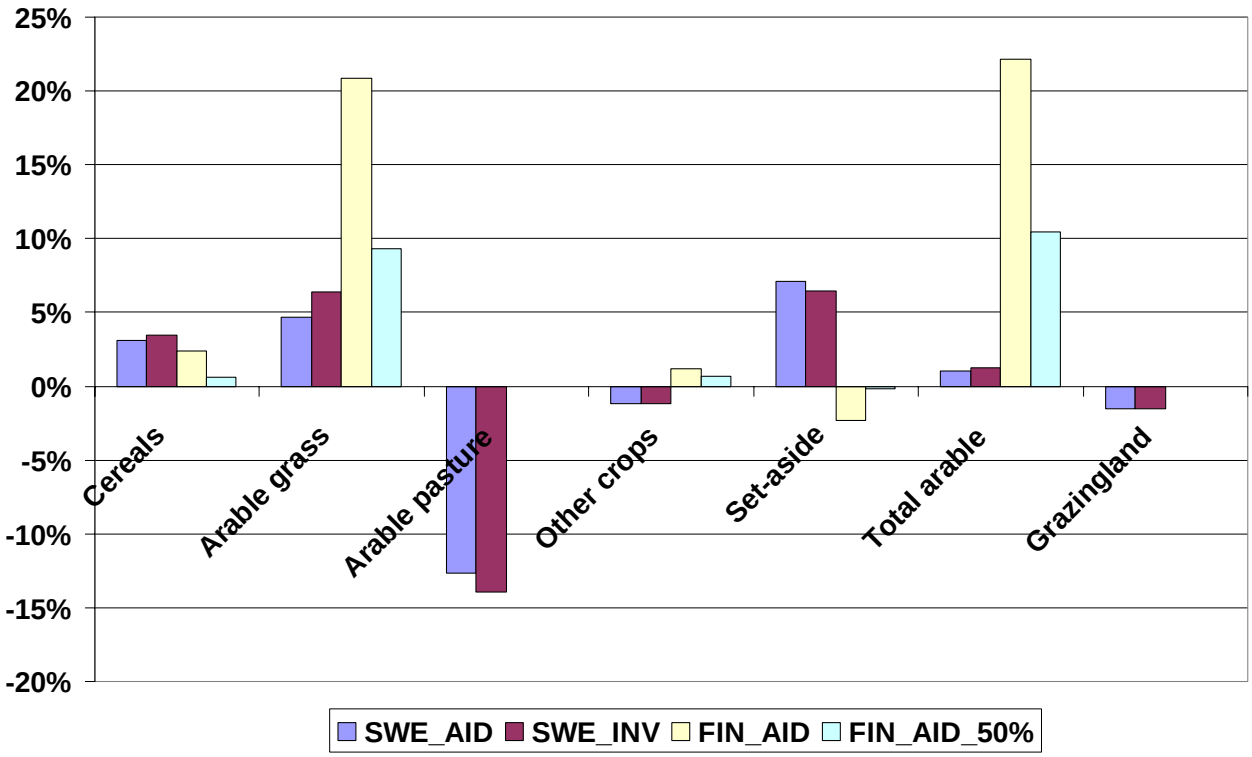


Figure T3.3. Extent of the influence of Nordic Aid on maintaining land use (impact of Aid as percentage of total arable area in 1995).

The impact of Aid on landscape diversity shown in Table T3.2 is measured in terms of the change in SDI, and indicates that both Aid and Investment support have contributed to reducing landscape diversity in Sweden, whereas in Finland Aid has increased diversity compared to 1995. In Finland diversity would have fallen by around 9 % in the absence of Aid (or 4 % with 50 % of actual aid). As seen in Figure T3.3, which shows the effect of having Aid, the higher Aid in Finland compared to Sweden results in a large increase in the total area of land in agricultural production (and hence less of the dominating land use, forest) and without any reductions in any important land uses. Aid in Sweden on the other hand, being concentrated to milk causes a redistribution of land from extensive pasture based fodder production to more intensive silage and grain. These changes in area of different land uses result in differences in SDI for the two countries.

In summary, Nordic Aid has contributed to maintaining landscape mosaic in Finland by keeping a larger area of land in agricultural production and out of forest. In Sweden Aid has had a negative impact due to a redistribution of area between land uses whilst the total area has remained largely unaffected.

Table T3.2. Impact of Nordic Aid on preserving landscape diversity (Change in SDI).

Scenarios	Total effect	Aid effect
SWE_AID	-5.9 %	-5.4 %
SWE_INV		-5.3 %
FIN_AID	1.4 %	9.2 %
FIN_AID_50%		3.8 %

(1.3) Biodiversity value

The biodiversity indicator is based on the species-area relationship from Conservation Biology. Put simply the number of species expected to be found in a particular habitat increases with the total habitat area but at a decreasing rate. Hence a marginal reduction in an abundant habitat such as grass in the Nordic regions will have a relatively small impact on the biodiversity indicator whereas a small change in scarce habitat, such as arable crops, could have a relatively large impact depending on the number of species associated with the habitat. A difference in data sources exist between the Swedish and Finnish regions. For the Swedish region the indicator is based on observed endangered species (ArtDataBanken 2005) whereas the Finnish data are based on an indicator species, butterflies (Lehtonen et al. 2005). To make the results comparable only the relative indicator values will be presented in the evaluation. The various agricultural land uses were aggregated into three or four categories for this analysis. Land uses in the same category are assumed to be perfect habitat substitutes.

A species index value for each habitat type defined for the two countries, together with the proportion of landscape area taken up by each habitat type in 1995, are presented in Table T3.3. The values are normalized to the least valuable habitat for comparative purposes. For example in Sweden grazingland is, on average, 9.2 times more valuable habitat than intensive grass such as silage. Note however that the marginal value of habitat will vary in accordance with the total area of habitat for the reasons explained above. For example in both countries cultivated grass is the habitat with greatest area and due to its relatively low index value will also have a relatively low marginal biodiversity value. In Finland we do not differentiate between permanent grass and grazingland which is why the habitat index is highest for permanent grass in Finland.

Table T3.3. Relative biodiversity value of agricultural habitat.

Habit type	Sweden Index	Finland Index	Sweden Area, %	Finland Area, %
Arable crops	1.4	1.0	24	42
Cultivated grass	1.0	1.2	53	51
*Permanent grass**	1.6	5.3	16	7
Grazingland	9.2	n/a	7	0

* Includes arable pasture and set-aside.

Both the historical impact of developments in agriculture on biodiversity value and the modelled impacts of Aid are presented in Table T3.4. The results for Sweden are presented by region to obtain an indication of the regional variation and the relevance of the analysis of Västerbotten with AgriPoliS. Overall the Historical indicator values indicate that continued agricultural activity in the regions has been positive for conservation of biodiversity at the country level, but with some important variations between regions in Sweden.

The positive impact on biodiversity value in Finland was due to the relatively large increase in area of permanent grass—attributable to accession causing a large increase in the area of set-aside—between 1995-2005 in both scenarios (120 % and 92 % respectively). Slightly more than half of this affect was attributable to Aid (i.e, +5.8%) because aid ensured a greater area was maintained as cultivated grass (Figure T3.3).

The Historical net positive increase in biodiversity value in Sweden is heavily influenced by large increases in the area of grazingland in Jämtland, Dalarna and Gävleborg (the most southerly Swedish Nordic Aid regions). However, as explained previously the increase is not attributable to Aid, which is also supported by our results (i.e., in Figure T3.3 a slight negative impact of Nordic

Aid on grazingland area was found). Ignoring the grazingland effect implies that the average change in biodiversity value for Sweden would have been -1.9 % over the evaluation period. To isolate the impact of aid on biodiversity value in Sweden we analysed the Västerbotten region with AgriPoliS. From Table T3.4 it can bee seen that almost the entire reduction in biodiversity value in Västerbotten is attributable to Aid. This is consistent with the reduction in landscape diversity identified in Västerbotten, as an increase in relatively abundant habitat has occurred at the cost of relatively scarce habitat. Recall that landscape diversity and biodiversity are linked via land use/habitat area (refer to Judgement Criteria).

Table T3.4. Impact on biodiversity value.

		Modelled impacts			
Regions	**Historical %**	**SWE aid %**	**SWE inv %**	**FIN aid %**	**FIN 50% aid %**
Norrbotten	-3.3				
Västerbotten	-4.4	-4.2	-4.3		
Jämtland	10.3				
Västernorrland	-6.4				
Gävleborg	6.3				
Dalarna	17.5				
Sweden	3.4				
Finland	9.1			5.8	5.0

In conclusion Aid has had a positive impact on biodiversity value in Finland (+5.8% compared to 1995) and a negative impact in Sweden (-4.3%). These differences are attributable to the differences in the policy framework in 1995 (see Theme 1, Q1).

(1.4) Reactions from farmers and administrators

A sample of farmers and administrators were asked whether changes in the level of Nordic Aid would have influenced biodiversity and the cultural or "open" landscape in their regions. The specific changes in aid they were asked to consider were:

a) If Nordic Aid never existed (for Finland 50 % lower)
b) If Nordic Aid was 50 % higher

The respondents were given four alternatives: (+) Increase, (0) No-Change, (-) Decrease and (?) No-Opinion. The proportion of total responses in each category is summarized in Table T3.5. The proportion of non-responses is also given.

The reaction from the majority of farmers in Sweden (i.e., no Aid) and Finland (50 % Aid) was that Aid has had little or no impact on biodiversity i.e., the situation would have been about the same without Aid. Regarding open-landscape their reaction was the same; the majority believed that no change or some reduction in open-landscape would have occurred. Administrators had stronger and more negative views. In Finland 40 % believed in a reduction in biodiversity and over 60 % in reduced open-landscape. In Sweden 60 % believed in decreased biodiversity and 80 % in decreased supply of open landscape. An explanation for the less negative reaction by farmers regarding the effects on biodiversity and open landscape could be greater knowledge about relevant connections between agricultural production and the level of Aid, and environmental effects. For example farmers would be more aware of substitution possibilities such as switching to less extensive production activities without Aid.

Reactions were more similar between farmers and administrators for the scenario with 50 % higher Aid. The majority of farmers believed in no effect or an increase in biodiversity and open-landscape in both countries. In Finland over 34 % of responding administrators believed in increased biodiversity and 53 % in increased supply of open landscape. In Sweden the corresponding figures were 48 % for increased biodiversity and 72 % for increased supply of open landscape. In this case it is at least clearer why in both groups almost half of the respondents believed in no-change. Since agricultural land is a limited resource, the potential to expand the agricultural area is also limited. That few believed in decreased biodiversity is somewhat surprising when increased price support would result in an increase in the optimal intensity of production which would be negative for biodiversity.

Table T3.5. Farmers' opinions regarding conservation of biodiversity and preservation of the open-landscape if Nordic aid never existed (Sweden) or was 50 % lower (Finland).
(Indicators: **+** Increase, **0** No-Change, **–** Decrease, **?** No-Opinion, **NR** non-respondents, and **RR** response rate).

	Nordic aid 50 % lower										**Nordic aid 50 % higher**									
	Bio-Diversity					**Open Landscape**					**Bio-Diversity**					**Open Landscape**				
	+	**0**	**–**	**?**	**NR**	**+**	**0**	**–**	**?**	**NR**	**+**	**0**	**–**	**?**	**NR**	**+**	**0**	**–**	**?**	**NR.**
FINLAND																				
C4	0	56	28	16	17	8	55	31	5	17	54	35	0	10	8	49	43	0	8	8
C3	10	51	26	13	15	6	52	26	16	21	43	44	2	11	16	45	42	2	11	16
C2	5	60	19	15	12	5	55	31	9	14	39	50	1	11	13	47	44	2	7	13
C1	2	59	17	22	10	3	49	25	23	11	40	48	1	11	12	38	52	1	10	13
RR	88					87					88					87				
SWEDEN	**Nordic aid never existed**										**Nordic aid 50 % higher**									
1	4	46	22	18	10	2	38	38	12	10	26	46	0	16	12	38	42	0	10	10
2a	4	39	25	17	15	2	36	36	11	15	20	48	1	16	15	38	36	1	10	15
2b	2	48	12	18	20	2	40	25	17	16	15	47	2	15	21	30	33	0	15	22
3	2	51	20	15	12	0	51	22	12	15	27	5	0	10	58	39	34	0	10	17
X*)	18	35	24	24	0	18	29	29	24	0	35	35	0	24	6	35	35	0	24	6
RR	86					86					86					86				

*)Sub-region X refers to respondents that have not answered the question on in which sub-region their farm is located.

(2) Pollution risk

Principal agricultural pollutants such as nutrient and chemical residuals are forms of non-point source pollution which follow complex pathways to environmental resources such as water and the atmosphere. Levels of emissions and ultimately pollution damage are not only related to input levels but also farmers' choices of management practices, geophysical characteristics such as soil quality and random weather events. As a result the relationship between agricultural activity and pollution damage is indirect and can be weak. Measuring actual pollution damage caused by agriculture is therefore far from straight forward and not possible within the constraints of this evaluation. Nevertheless biodiversity and water quality are adversely affected by nutrient and chemical residuals so it is important that Aid does not increase residual levels. Indicators of input intensity will therefore be used to evaluate pollution risk.

(2.1) Historical developments of nutrient balances

Nitrogen and phosphorus indicators (i.e., surplus calculations) have generally improved over the evaluation period in both countries. This development was to be expected as both countries have had ambitious environmental goals over the period to reduce nutrient pollution that have e.g., resulted in significant investment in better manure storage and spreading technologies {HELCOM 2001; Johnsson & Hoffmann 1997}. The impacts of Aid however are shown to vary diametrically

between the two countries. The use of plant protection products, which has always been low because of the northern conditions, is even more carefully targeted.

(2.2) Modelled developments in nutrient balances

Farm gate nutrient balances are used to analyze pollution risk. In Figure T3.4 the historical changes in nitrogen (N) and phosphorous (P) surpluses are compared with the modelled impacts of Aid. Panels (a) and (b) show the results for Sweden disaggregated into two regions (Southern and Northern Aid Regions), and (c) and (d) for Finland disaggregated into three Nordic regions.

In the case of Sweden, Västerbotten lies in the Northern Nordic area so we include AgriPoliS results for comparison with Northern Nordic historical data only. The modelled results show the impact of Nordic Aid as a proportion of the 1995 balance; that is how much the relevant surplus in 1995 would have changed over the period if Aid (or investment support were eliminated). The historical trend shows small to large reductions in average nutrient surpluses per ha in all Swedish and Finnish regions.

In Sweden Aid is shown to contribute to reducing nutrient surpluses where as in Finland surpluses would have decreased *even more* without Aid. The reason for this variation is two fold, but is naturally based on the differences in type and extent of Aid in 1995. First, in Sweden there would have been more manure production without aid because of a relatively large increase in the numbers of beef cattle relative to dairy cows (recall aid favours milk production). Thus given relatively small changes in the area of arable land due to Aid nutrient surpluses in Sweden would have been higher without Aid. On the other hand Aid has been very important for maintaining dairy cow numbers in Finland. Hence in Finland modelled manure levels are much higher with Aid, the result being significantly higher nutrient surpluses than would have been the case without aid.

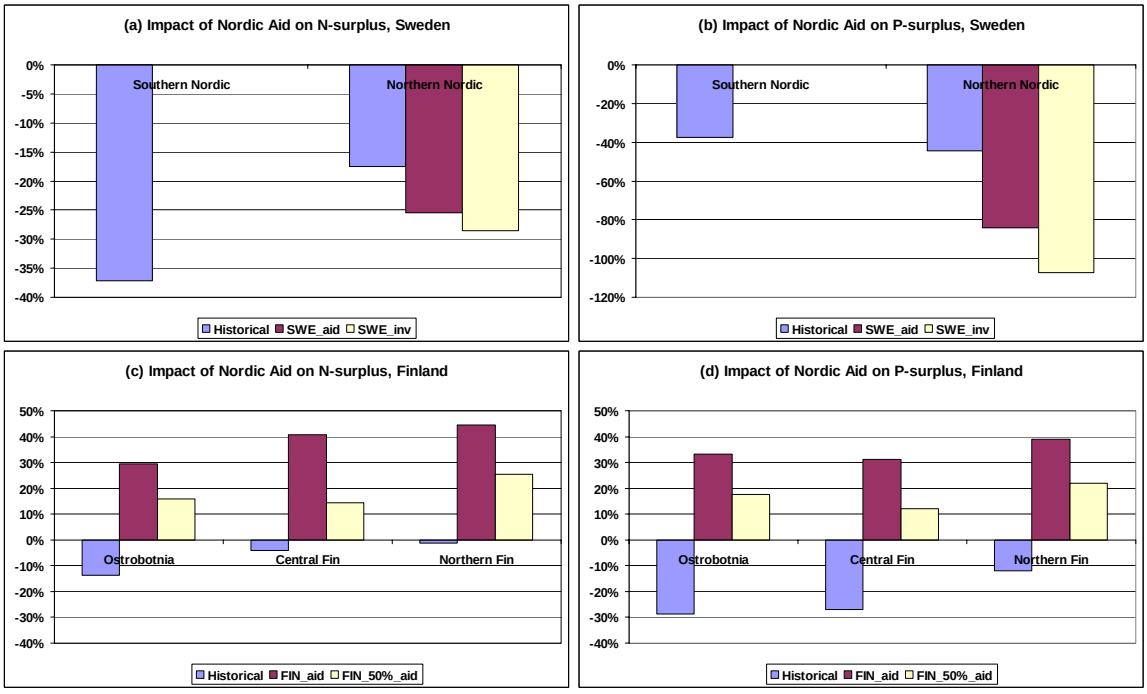


Figure T3.4. Historical and modelled impacts on farm gate nutrient balances in Swedish and Finnish aid regions.

(2.3) Reactions from farmers, administrators and other stakeholders

Farmers and representatives of the administration and stakeholders were asked to give their opinion about the impact that reduced or increased Aid would have had on the use of fertilizers and pesticides, and water quality on their farm or in their region.

> *How do you evaluate the environmental impacts on your farm/in your area?*
> *a) If Nordic Aid never existed (for Finland 50 % lower),*
> *b) If Nordic Aid was 50 % higher*

The majority of farmers in Finland and Sweden expected that the use of fertilizers and pesticides would have been the same or lower if Aid had been half of the present respectively non-existent, and, consequently the impact on water quality would have been about the same or higher water quality compared to a situation with Aid (Table T3.6). Administrators and stakeholders are more or less of the same opinion, except for the use of fertilizers, where a significant number believed in a reduction if Aid was lower.

Table T3.6. Farmers' opinions regarding the use of fertiliser and pesticides, and the quality of water if the Nordic aid never existed (Sweden) or it was 50 % lower (Finland).
(Indicators: **+** increase, **0** no change, **–** decrease, **?** no opinion and **NR** non-respondents).

	Use of Fertiliser					**Use of Pesticides**					**Water Quality**				
	+	**0**	**–**	**?**	**NR**	**+**	**0**	**–**	**?**	**NR**	**+**	**0**	**–**	**?**	**NR**
FINLAND	***Nordic aid was 50 % lower***														
C4	4	81	10	5	17	4	35	20	41	17	0	63	20	17	17
C3	8	60	21	10	20	7	57	16	20	28	11	62	15	12	21
C2	8	65	16	11	11	6	69	13	11	12	7	61	20	12	13
C1	6	58	17	19	9	1	72	7	19	10	2	59	14	25	10
Resp.rate	89					88					88				
SWEDEN	***Nordic aid never existed***														
1	2	56	16	14	12	4	58	8	16	14	2	66	6	16	10
2a	12	44	19	1	24	12	43	11	21	13	2	56	6	21	15
2b	2	43	18	18	19	5	43	13	20	19	3	60	0	18	19
3	2	68	2	10	18	2	61	0	22	15	0	66	2	15	17
X)*	6	47	29	18	0	6	35	18	35	6	6	59	12	24	0
Resp.rate	86					86					86				

*)Sub-region X refers to respondents that have not answered the question on in which sub-region their farm is located.

If Aid had been 50% higher, the answers from the Swedish and Finnish farmers indicate no-change to an increase in the use of fertilizers, and no-change in the use of pesticides and water quality. Administrators and stakeholders were of the same opinion.

Table T3.7. Farmers' opinions regarding the use of fertiliser and pesticides, and the quality of water if the Nordic aid was 50 % higher. (**+** increase, **0** no change, **–** decrease, **?** no opinion and **NR** non-respondents).

	Use of Fertiliser					**Use of Pesticides**					**Water Quality**				
	+	**0**	**–**	**?**	**NR**	**+**	**0**	**–**	**?**	**NR**	**+**	**0**	**–**	**?**	**NR**
FINLAND															
C4	26	74	0	0	8	10	58	0	33	8	18	71	0	10	8
C3	36	54	0	10	18	28	51	1	20	27	27	63	0	10	19
C2	34	57	1	8	13	25	65	1	9	14	32	57	2	9	14
C1	26	64	1	9	14	25	67	0	8	15	26	61	0	13	14
Resp.rate	87					85					86				
SWEDEN															
1	20	48	6	16	10	2	58	10	16	14	9	66	0	18	7
2a	17	48	12	11	12	5	52	10	20	13	7	57	2	18	16
2b	17	48	0	13	22	10	50	3	17	20	5	57	2	15	21
3	12	59	2	7	20	2	59	2	15	22	2	61	0	17	20
X)*	41	12	0	24	23	6	29	18	29	18	18	47	6	24	5
Resp.rate	85					85					85				

*)Sub-region X refers to respondents that have not answered the question on in which sub-region their farm is located.

(3) Viability of the countryside

(3.1) Regional demography and employment

It has not been possible to identify the extent of the effect of Aid on the viability of the countryside. Instead only a discussion of the potential significance of Aid is presented.

Agriculture is significant for employment in rural areas in the Aid regions in Finland (area C), because in this sparsely populated area about 15 % of the workforce is employed in enterprises related to agriculture, in the rural heartland areas the corresponding share is 15.6 % and in the areas close to towns only 4.6 % (Table T3.8). However, the role of the agricultural sector in the regional economy of area C has been declining since 1995. This is partly due to the growth of other sectors and partly the real decline in the food sector. In 2002, total employment in the Nordic Aid regions of Finland, including towns, was around 910 000 people, which is 55 % of total employment in Finland. In the rural areas of sub-region C, employment was around 530 000 people, which is 58 % of those employed in C. E.g. in 2000-2002, the number of employment in area C decreased about 1.2 %.

What is important in terms of the Finnish picture is that the population and jobs are not decreasing in all rural areas, and in most of them there is not much change, while in some rural areas the population is growing and new settlement being created. About 31% of the economic active population in the sparsely populated regions do not have any form of employment while the corresponding figure for the areas closer to towns is 27 % (Table T3.8).

In Sweden, the importance of agriculture is less pronounced. In the sparsely populated areas, 2.2% of the economic active population is employed in agriculture while the corresponding figure in the urban-rural fringe is 1.2% (Table T3.8).

Table T3.8 Economic active population: Persons (age 16-64) employed in agriculture and non-agricultural activities in the rural areas

Status of the individual	Sub-region 1-3 in Sweden		Sub-region C1-C4 in Finland		
	Sparsely populated rural areas (2003)	Urban-adjacent rural areas (2004)	Sparsely populated rural areas	Rural heartland areas	Urban-adjacent rural areas
Non-employed	53 055	49 242	35 000	25 500	15 500
Employed in agriculture	3 759	2 249	29 500	33 000	5 500
Employed in non-agriculture activities	111 621	130 262	131 500	153 500	98 000
Sum	168 509	181 689	196 000	212 000	119 000

Source: SJV (2006), Statistics Finland (2006)

The input-output (I-O) analysis results for Finland indicate that in 2002 the agri-food sector comprising agriculture and food industry, had a direct impact on GDP of EUR 3,9 billion or 3,1% of total GDP. A multiplier of 1.9 was generated by the model, with direct and indirect gross impacts of the food sector on GDP amounting to EUR 7.4 billion or 6 % of total GDP. The results also show, as expected, that Nordic Aid regions are relatively more dependent on agriculture than the country as a whole. The extent of the impact of Aid (and other policies such as CAP) on regional economic development, however, is not otherwise easily identified. For example there is no general consent over an appropriate reference system for comparing "with" and "without policy" scenarios. Nevertheless the input-output (I-O) analysis, which is based on best available knowledge, indicates that there would be a rapid decline both in employment and in income in the absence of Nordic Aid in the Finnish regions, as a result of the large decrease in the overall volume of farm output (I-O results should though be interpreted as upper bound estimates of the actual change in economic activity rather than an estimate of the change in economic activity itself). In this sense (i.e., without knowledge of alternative development scenarios), Nordic Aid has resulted in more labour and land remaining in agricultural production in the Aid areas, thereby boosting agricultural and rural populations.

(3.2) Results of the questionnaires (Sweden only)

A sample of farmers, administrators and other stakeholder were asked:

> *Has Nordic Aid influenced the viability of the rural population in their region? If so, indicate in what way.*

The question was presented only in the Swedish questionnaire. The specific changes in aid they were asked to consider were if Nordic Aid never existed or if aid was 50 % higher. The respondents were given two response alternatives regarding the general influence of Nordic Aid.

Table T3.9. The Swedish farmer's and administrators/stakeholders comments on in what way Nordic Aid has influenced the rural community in general. Percent of respondents answers.

Respondent/category	Maintain agricultural production	Maintain rural community	Maintain open landscape	Other
Farmers	56	14	19	11
Administrators	43	29	28	-

The majority of the respondents were of the opinion that Nordic aid has influenced the rural community, and the respondents also took the opportunity to comment upon in what way (Table T3.9). They point out that the landscape has been kept open, making rural areas a more attractive place to live. It is also mentioned that the agricultural sector is valuable for the tourism sector and for the service sector. In addition, several farmers highlighted the environmental aspects of keeping land in agricultural use. Over half of the administrators/stakeholders who answered the question also commented on it. A majority of the respondents highlighted the importance of Aid as a means of maintaining agricultural production, and, as an indirect effect, maintaining both rural communities and the open landscape.

Conclusions

The aim of Theme 3 has been to determine "To what extent Nordic aid payments have ensured that the environment is protected and the countryside preserved?". The indicators used to measure the impacts of Aid and the results are summarized in Table T3.10. The "Historical Change" represents the observed change in indicator value in 2005 compared to 1995. The "Impact of Aid" results for Sweden are for the representative Västerbotten region which has been modelled in AgriPoliS whereas for Finland they are for the entire Finnish Nordic Aid region which is modelled in DREMFIA.

Table T3.9. Summary of historical and modelled environmental indicators.

	Sweden (Västerbotten)		Finland		
Indicators	**Historical Change**	**Impact of Aid**	**Historical Change**	**Impact of Aid**	**Impact 50 % Aid**
Landscape					
Total arable area	-0.1 %	+1.0 %	+6 %	+22 %	+10.5 %
Semi-nat. grassland	-1.5 %	-1.5 %	n/a	n/a	n/a
Landscape mosaic (SDI)	-5.9 %	-5.4 %	+1.4 %	+9.2 %	+3.8 %
Biodiversity value	-4.4 %	-4.2 %	+9.1 %	+5.8 %	+5.0 %
Pollution					
Nitrogen surplus	-17 %	-25 %	-1 to -12 %	+30 to 44 %	+15 to 25 %

Overall the historical developments in environmental quality have been more pronounced in Finland than Sweden. In general the agricultural area has been maintained and pollution has declined in both countries. Sweden however showed declines in mosaic and biodiversity value whereas in Finland they have increased. This difference is attributable to the very large impact Finnish Aid has had on maintaining and even increasing the agricultural area (+6 %) relative to forest.

The effects of Aid were also shown to be more substantial in Finland than in Sweden. This was to be expected due to the fundamental differences in the policy framework in both countries on accession to the EU in 1995 (see Theme 1, Q1). Aid in Finland has resulted in a significant area of land being maintained in agricultural production rather than being converted to forest or set-aside (which is an indirect consequence of greater milk production and feed requirements with Aid). A larger agricultural area has been positive for landscape mosaic and biodiversity in Finland but negative for pollution levels as these tend to increase with output. Interesting to note is that 50 % less Aid in Finland would have been sufficient to maintain the landscape and would have resulted in less pollution.

In Sweden the effects of Aid are less pronounced. Though a small positive impact on the area of agricultural land was found the indirect impact of Aid on mosaic and landscape has been negative. This is because Aid is concentrated to milk production which has indirectly resulted in more intensive land uses than otherwise would have been the case. As a result, mosaic and biodiversity values have been negatively affected by the form of Swedish Aid (*i.e.,* to milk). On the other hand pollution has not been made worse by Aid but some improvements were found (due to fewer beef cattle than otherwise would have been the case).

RDP-investment support was also studied to evaluate the interaction of Aid with other policies. Investment support was found to have similar impacts to aid and hence dampened the effects of removing Aid.

The modelled results tended also not to be contradicted by the survey results and the majority of respondents —representing farmers and administrators— believed that Aid has not affected the environment negatively and that the situation would be unchanged or cause a decrease in quality if Aid was eliminated. The majority of respondents in both Finland and Sweden stated that Nordic aid has had little or no effect on biodiversity. The majority also stated that the use of fertilizers and pesticides would have been about the same or less if Aid had been half of the present or non-existent.

Input-output analysis was used to determine the impacts of Aid on rural populations and regional GDP in Finland. The results indicate that Aid has attracted and retained higher levels of resources in the agricultural sector than would have occurred without such support. However, the overall impact of Aid on the regional economies over the last decade could not be identified.

THEME 4: COHERENCE AND COMPLEMENTARITIES WITH OTHER POLICIES

Introduction

For addressing the coherence and complementarities with other policies, three specific evaluation questions (*Q7*-*Q9*) are given. The first question (*Q7*) deals with the effects of the Nordic Aid on the internal market and competition amongst farmers and down-stream industries and sub-regions. The concern in the second question (Q8) is the efficiency of the Nordic Aid payments in relation to other policy measures in reaching its goals. The last question under the theme addresses potential synergies, creation of discrepancies and competition between the CAP and rural development policies.

As in the themes above, each of the three evaluation questions are introduced, analysed and answered below. The concluding remarks are first drawn for each question separately and, then at the end of the chapter, conclusions with policy recommendations are given concerning the full theme.

Internal market and competition (Q 7)

Q 7: Have the Nordic aid payments had any effects on the functioning of the internal market with respect to competition between: farmers, down stream industries and interregional trade?

Introduction and interpretation

The evaluation question is interpreted as referring to whether or not the Nordic Aid scheme has caused any distortions to the internal market. The "internal market" is interpreted as referring to the trade of Finland and Sweden with the rest of the EU as well as between different sub-regions of the Nordic Aid area and between farmers.

According to the analysis in Theme 1 Nordic Aid contributes to maintain agricultural production in the Nordic Aid regions. Therefore it also (indirectly) affects trade within the common market. In this context the common rules on competition is applicable, and especially the rules regarding aids granted by states, as aid which affects trade is considered incompatible with the common market. Article 87(1) EC, the key provision in the chapter on State aid of the EC Treaty, provides;

"Save as otherwise provided in this Treaty, any aid granted by a Member State through State resources in any form whatsoever which distorts or threatens to distort competition by favouring certain undertakings or the production of certain goods, shall, in so far as it affects trade between Member States, be incompatible with the common market."

The scope of Article 87 EC has been defined by the ECJ as follows:

"The aim of Article 92 (now Article 87) is to prevent trade between Member States from being affected by benefits granted by the public authorities who, in various forms, distort or threaten to distort competition by favouring certain undertakings or the production of certain goods."

Accordingly, Article 92 (now Article 87) does not distinguish between the measures of state intervention concerned by reference to their causes or aims but defines them in relation to their effects." (Case C-173/73 Italy v Commission [1974] ECR 709, para. 13).

In order to fall within the scope of Article 87 as defined by the ECJ and for a measure to constitute State aid, the following conditions must be met: the measure has to (i) involve a transfer of state resources, (ii) confer an economic advantage, (iii) be selective, and (iv) affect competition and trade.

As regards the condition "distortion of competition", it is important to underline that a serious distortion does not have to be established. It is enough that the aid strengthens the position of the beneficiary enterprise compared with other enterprises operating in the same line of trade. It should further be noted that in practice the effects on competition and those on trade between the Member States will coincide. It is therefore common practice to employ these two concepts interchangeably even though there is a theoretical difference.

In the light of the Commission decisions and the case law of the ECJ regarding the interpretation of these conditions, it is obvious that the measures adopted under the Nordic Aid scheme constitute state aid. Trade takes place between Finland and Sweden and between these countries and the rest of the EU. Aids to farmers and to down stream industries can distort competition by favouring certain actors on behalf of others. Farmers in the Nordic Aid area get support to produce certain goods, and some primary processing industries get support to transport the agricultural output from the farm to the first point of collection, i.e. to dairies and slaughterhouses in certain sub-regions, which may affect market transactions. However, once it has been established that a measure is aid, it is necessary to see if it falls under the exceptions provided for by the Treaty or the secondary legislation. In this case the relevant exception is the Swedish and Finnish Accession Act providing for the Nordic Aid scheme.

As the principle of Nordic Aid is that aid may be granted *provided that it does not raise the total agricultural production in the areas and production lines concerned*, the important question is if there are changes in agricultural production volumes compared to the initial situation (1995), and not compared to a situation with no aid. It should be noted however that even if the Nordic Scheme has not raised the total agricultural production compared to the initial situation (1995), this would not necessarily mean that the scheme has not had any effect on the functioning of the internal market.

Analysis and the judgement criteria

One judgement criterion is the development of interregional trade flows between Finland and Sweden on the one hand, and the rest of the world on the other. Additional criteria are whether or not the production limits as defined by the reference quantities have been adhered to, and the existence of controversies on whether Nordic Aid has generated excess exports of produce between regions in the Nordic Aid area (including excess animal transports between sub-regions). Simulation models are used to assess how trade between Finland and Sweden and the rest of the world would have developed in the absence of Nordic Aid. These results are also presented and discussed below.

(1) Interregional trade flows: exports and imports in Finland and in Sweden

(1.1) Register data on trade flows

Starting with interregional trade flows, it should be noted that increasing trade flows of food, agricultural commodities and live animals is a common characteristic of modern and open economies. They are an indication of increasing market efficiency resulting from reductions in trade barriers and are not, necessarily, linked to a specific agricultural support scheme, such as the Nordic Aid. These general tendencies are observed also in the official data on the foreign trade of Finland and Sweden since their accession to the EU. For instance, Finland's agri-food trade (sum of imports and exports) has almost doubled during the EU membership, increasing from € 2.4 billion in 1994 to € 3.9 billion in 2006. Simultaneously, Finland's deficit in the agri-food trade balance has increased as the imports have been growing more rapidly than exports. Sweden also witnessed a substantial increase in agri-food trade since the accession in 1995. As in the case of Finland, imports have grown more rapidly than exports, implying that the deficit in agro-food trade has grown from about € 1.6 billion in 1995 to about € 3.0 billion in 2005.

When discussing the effects of Nordic Aid on interregional trade flows, the primary interest is in investigating trade in the products that are most likely to be affected by the support. These are dairy products, meat and meat products, and to some extent eggs. Tables T4.1a and T4.1b presents data on the trade in these products in 1995 and 2005 for the respective countries. It should be noted however that trade figures in the two tables are based on different trade classification. Table T 4.1a is based on the Harmonized Schedule (HS) and table T4.1 b on the Standard International Trade Classification (SITC). The data in Table T4.1a indicate that, in value terms, the Finnish trade surpluses have grown for dairy products, but not for meat products and eggs. Net exports of dairy products have increased mainly as a result of stable domestic production, and at the same decreasing domestic consumption of these products.

Table T4.1a. Net exports of certain agricultural products (million Euros) from Finland by country in 1995 and 2005.

Net exports from Finland to:	Meat and meat products		Dairy products		Eggs	
	Year		Year		Year	
	1995	2005	1995	2005	1995	2005
Sweden	-3,7	-0,1	-8,5	3,7	2,2	3,5
Denmark	-36,0	-25,2	-8,8	-37,1	0,3	0,7
Germany	-2,2	-28,6	-0,8	-25,3	0,6	0,4
Rest of the EU*	-4,5	-0,3	52,4	28,3	0,6	0,2
Russia	11,0	18,9	26,5	92,4	1,8	-
Other	4,6	-9,5	37,6	84,9	1,4	0,5
Total	-30,8	-44,8	98,4	146,9	7,0	5,3

Source: National Board of Customs (HS-categories 02 and 1601-1602). .
* The category "Rest of the EU" refers to EU-15 in 1995 and to EU-25 in 2005.

The general increasing trend in the trade of agriculture and food products in 1995-2005 has increased both exports and imports of the same products. There also seems to be a tendency of re-directions of trade flows. Imports of dairy products, notably low priced cheeses, from Germany and the rest of the EU, including the new member countries, have increased substantially to Finland. Then Finnish dairy industry has increased its exports to Sweden, Russia and other non-EU-countries. Exports to Sweden are mainly fresh products. This partly explains the large increase in the volume of exports to Sweden while the change in the value of exports has been smaller. Exports to Russia have been mainly butter and some cheese exports, while all other exports are mainly cheese exports from Finland.

While meat imports from Germany have grown, Finland has increased her meat exports to Russia, and in a lesser extent to Sweden, while beef imports from Sweden has increased slightly as well. Overall, the trade flows from Finland to Sweden have increased more than trade flows from Sweden to Finland. However the changes in trade between Finland and Sweden are relatively small compared to changes in other trade flows.

Table T4.1b. Net exports of certain agricultural products (million Euros) from Sweden by country in 1995 and 2005.

Net exports from Sweden to:	Meat and meat products		Dairy products		Eggs	
	Year		Year		Year	
	1995	2005	1995	2005	1995	2005
Finland	8.5	11.7	14.5	3.3	– 1.7	– 2.4
Denmark	– 75.9	– 245.4	– 7.0	– 63.6	0.1	– 1.7
Germany	– 13.3	– 135.0	– 8.6	– 54.0	0.0	– 0.5
Rest of the EU*	– 42.2	– 160.7	– 38.3	– 89.1	– 0.1	– 2.6
Other	– 19.7	– 28.5	21.0	66.2	1.8	4.1
Total	– 142.6	– 557.9	– 18.4	– 137.2	0.1	– 3.1

Source: Statistics Sweden (SITC-categories 01 and 02).
* The category "Rest of the EU" refers to EU-15 in 1995 and to EU-25 in 2005.

The data for Sweden show that the deficit in total trade has increased for all products from 1995 to 2005 (for eggs, there was actually a small surplus in 1995 which, however, had turned into a deficit in 2005). A similar development can be observed for Swedish trade with Denmark, Germany, and the rest of the EU (containing about 87 % of Sweden's total trade in these products in 2005). Since Sweden, in relation to these countries, does not have a comparative advantage in agri-food production, this is also what would have been expected. Exceptions to this general pattern are Swedish trade with Finland in meat and meat products, as well as in dairy products, and Swedish trade with non-EU countries (the other category in table 4.1b) in dairy products and eggs. However, except for in the case of trade in dairy products with non-EU countries, the amounts involved are rather small. It should also be noted that the production volumes of products eligible for Nordic Aid are in most cases are below the reference quantities, and generally decreasing during the reference period, in all Swedish sub-regions. Thus, compared to the situation in 1995, Nordic Aid does not seem to have resulted in an improvement of Sweden's competitive position.

To elicit information on the existence of trade controversies that could be attributed to the Nordic Aid scheme, the questionnaire included the following question to representatives of administration and other stakeholders:

> *AQ7/5. Are you aware of any international disputes or trade conflicts that could be linked to the Nordic Aid Scheme or where invoked in the discussions?*

In Finland, about two thirds of the respondents stated that they were not aware of any international disputes or trade conflicts that could be linked to the Nordic Aid Scheme (Table T4.2). However, about one third of them were aware of some international disputes concerning the aid scheme. A few respondents referred to opinions of representatives of the neighbouring countries about the level of support in the Nordic Aid scheme, which was regarded as being too high, especially in pig production. Some of the respondents were concerned about how the Nordic Aid was received by the WTO.

Table T4.2. Administrators/stakeholders' opinions on whether the Nordic Aid scheme has resulted in trade related conflicts either within regions in Finland and Sweden, respectively, or between Finland and Sweden, or between Finland and Sweden on the one hand and other EU-countries on the other (percent of all respondents)**.**

	Yes	No	Non respondents
Finland	29	52	18
Sweden	32	62	5

Source: Finland –
Sweden – Question 23 in Questionnaire to administrators/stakeholders in Nordic Aid region.

The majority of Swedish administrators/stakeholders were also of the opinion that Nordic Aid has not resulted in conflicts related to interregional trade. However, as in Finland, about one third was of the opposite opinion. The comments revealed that conflicts in all cases concerned trade between Finland and Sweden, and primarily Finnish exports of eggs and pigs meat to Sweden. The opinion was that this export had resulted from a higher level of support from the Nordic Aid scheme to said products in Finland. These suggestions may be compared with the official data in T4.1b above, which indicate that the Swedish deficit in egg-trade with Finland did increase from 1995 to 2005. As to pig-meat (not separated in Table T4.1b), data from Statistics Sweden reveal that Sweden had a trade surplus with Finland of about € 0.4 million in 1995, which had turned to a deficit of about € 0.6 million in 2005. Hence, though there is some support for increasing Finnish net exports of eggs and pig meat to Sweden in the official data, the amounts involved are only minor.

(1.2) Modelled results

While there does not seem to be evidence that Nordic Aid has caused any major distortions in trade compared to the pre-accession trade levels between Finland and Sweden or with the rest of the EU, this does not preclude that there may be distortions when comparing with a situation without Nordic Aid. Since the Nordic Aid scheme contributes to maintaining agricultural production in the Finnish Nordic Aid regions, it also (indirectly) maintains agricultural exports volumes at their pre-accession levels and affects trade flows with other countries. Thus, without the Aid, Finland would have imported more and exported less agri-food products. Results from the DREMFIA model suggest that abolishing Nordic Aid would convert Finland from a net-exporter to a net-importer of dairy products. Imports would cover 20–30 % of the demand for dairy products if Nordic Aid was abolished. Imports of cheese would grow the most rapidly. Some exports of butter would remain, since the demand for butter in Finland is already very low.

Overall one can conclude that Nordic Aid, in maintaining Finnish milk production, also have maintained dairy exports, and that without the scheme dairy exports would fall by 90 % in a period of ten years. The decrease in milk production would also reduce the number of bovine animals. Accordingly the net imports of beef to Finland would increase significantly; from the 10 million kg (2006) up to 35 million kg in the long-term. Further, the analysis shows that Finland's net-export of pig meat would turn to a slight net-import if Nordic Aid was not paid. However, as pig meat production has increased in both Nordic Aid and non-Nordic Aid regions in Finland during the period 1995-2005, Nordic Aid could not be the sole driving force of the increased pork exports. Instead, it is likely that the investment support, which has been paid in both Nordic Aid and non-Nordic Aid regions in Finland, has contributed to the increasing pig meat production and exports as well. The Nordic Aid regions comprised 42 % of the total pig herd in Finland in 2006.

As to cereals and other crops, Nordic Aid seems to have relatively little impact on the trade flows according to the DREMFIA analysis. The Nordic Aid scheme provides relatively little incentives for the crop production in Nordic Aid regions, except for potatoes, which is a relatively non-significant commodity in international trade. According to the DREMFIA analysis little change in

the trade in crop products would have taken place in 1995-2006 if no Nordic Aid was paid. The CAP reform implemented in 2006 is likely to decrease production and exports of cereals. As indicated in Theme 1, abolishing Nordic Aid would result in a larger set-aside area and a smaller area for cereal production.

For Sweden, results from the CAPRI-model indicate that the milk support in the Nordic Aid scheme (which is by far the most important component representing about 90 % of all Nordic Aid in Sweden) have had marginal effects on Swedish trade. This is because the milk-quota is exhausted by the price supports under the CAP, and the compensatory allowances and environmental supports under the RDP (which require a certain number of LU's per hectare for eligibility). Thus, if there had been no de-coupling of the supports under pillar I of the CAP (i.e. if the CAP-reform had not occurred), there would be no effects on the trade flows for milk products, meat or cereals. However, given the CAP-reform (which took effect in 2005 in Sweden), the results indicate that Swedish imports of milk products would increase by 14 000 tons annually, that exports of meat would increase by 30 tons annually, and that Swedish exports of cereals would increase by 7 000 tons annually if the milk support in the Nordic Aid scheme were abolished. Though the results from the CAPRI-model may understate the effects of Nordic aid for sub-region 1 and 3 (c.f. the discussion in Theme 1 above), this is less of a problem in the present case as more than 70 % of the milk production in the Swedish Nordic Aid area occur in sub-regions 2a and 2b.

(2) Domestic effects

In addition to interregional trade, Nordic Aid may have affected trade flows within Finland and Sweden. For Sweden, however, the results from the CAPRI-model suggest that this is very unlikely. When the current situation is in Finland compared to the initial situation before the accession, there Nordic Aid has not caused more distortions in regional trade patterns. But without Nordic Aid, overall domestic trade flows would have decreased by some 10–20 % in Finland. That is, reduced agricultural production in the Finnish Nordic Aid area would have resulted in smaller "exports" to, as well as higher "imports" from southern Finland.

These model-results are complemented below with results from the questionnaire, wherein farmers and representatives for administration and other stakeholders were asked for their perceptions of the effects of Nordic Aid.

Since Nordic Aid includes transport subsidies for milk (in both countries) and meat (Finland only) that are paid to dairies and slaughterhouses in the Nordic Aid area, it may have affected competition between down stream industries. In addition, the support paid to farmers under the Nordic Aid scheme may affect their demand for agricultural inputs which, in turn may affect competition between suppliers of said inputs located in the Nordic Aid area and suppliers in other parts of the respective countries. To address this issue, representatives for administration and other stakeholders were asked the following question:

AQ7/2.a) What kind of indirect impacts has the Nordic Aid Scheme had on the agricultural product and input markets during ten years on your area? What is your opinion?

Table T4.4a. Finnish Administrators/Stakeholders' opinions on the indirect impacts of the Nordic Aid Scheme on the markets for agricultural product and inputs during the last ten years.

Proposition	Strongly agree	Mildly agree	Unde-cided/ unsure	Mildly disagree	Strongly disagree
Transactions in grain and other fodder between farmers and processing industry/marketing bodies have increased.	3	47	34	12	4
Part of the market transactions have changed from between farms and industry/marketing bodies to trade between farms.	1	50	29	15	4
Processing industries in the Nordic Aid area gain a competitive advantage.	6	25	42	19	7
Nordic Aid has reduced competition in food processing and marketing.	3	17	39	29	12
Competition between deliverers of agricultural inputs has increased.	3	26	34	24	1

*) Rate 1.00 means strongly agree, 3.00 undecided, and 5.00 strongly disagree.

The question was followed by a number of propositions (5 in the Finnish questionnaire and 3 in the Swedish) to which the representatives were asked to respond using pre-determined alternatives. In Finland, 50% of the respondents agreed (mildly or strongly) with the proposition that Nordic Aid had increased market transaction in grain and other fodder, while only 16 % disagreed (Table T4.4a). However, about the same share (51 %) of respondents agreed with the proposition that parts of the market transactions had transferred from occurring between farms and processing industry/marketing body to occurring between farms. This is interpreted as due to the fact that market transactions have expanded rapidly during the last ten years. Further, 31 % of the respondents agreed with the proposition that processing industries in the Nordic Aid area had gained a competitive advantage because of the Nordic Aid scheme while 26 % disagreed. Somewhat fewer respondents, 20 %, agreed with the proposition that Nordic Aid had *reduced* competition in food processing and marketing, while 41 % disagreed. Finally, 29 % agreed with the proposition that competition between suppliers of inputs have increased because of Nordic Aid, while 25 % disagreed. Hence, the survey results are somewhat inconclusive.

Table T4.4b: Swedish Administrators/Stakeholders' opinions on whether the Nordic Aid scheme has affected the market for agricultural produce (percent of all respondents).

Proposition	**Completely agree**	**Partly agree**	**No opinion**	**Disagree**	**Completely disagree**	**Non-resp.**
Processing industries in the Nordic Aid area gain a competitive advantage	5	11	11	43	27	3
Suppliers of agricultural inputs in the Nordic Aid area gain a competitive advantage	3	16	24	27	27	3
Differences in support levels have affected transports of agricultural produce between sub-regions of the Nordic Aid area and between the Nordic Aid area and other regions	3	11	38	24	22	3

Sources: Question 21 in Questionnaire to administrators/stakeholders in Nordic Aid region.

The Swedish questionnaire was somewhat different from that in the Finnish questionnaire regarding the phrasing of this particular question (Table T4.4b below). The results indicate that the majority of respondents did not agree with any of the propositions. This was particularly the case for the proposition that processing industries in the Nordic Aid area had gained a competitive advantage as a result of the scheme where 70 % disagreed (mildly or strongly). It should be noted, though, that about 43 % of the Swedish respondents were representing processing industries in the Nordic Aid area, who of course may have had strategic incentives to disagree. Hence, the Swedish results are also somewhat inconclusive.

Representatives for administration/other stakeholders were also asked whether they perceived Nordic Aid to increase animal transports in response to differences in payments between the regions.

> *AQ7/2. b) Has the Nordic Aid caused transport of animals to increase in response to differences in payments between the regions?*

Over 70 % of the Finnish respondents did not perceive that regional differences in support levels in Nordic Aid affected animal transports in any way, while about 30 % saw some relationships between the aid differences and animal transports between the sub-areas. However, most of the open answers given to the question (19 of 65 respondents) referred to effects of structural changes in general and only few referred to differences in Nordic Aid payments as a cause for increased animal transports. The phenomenon was regarded more as an experiment of some few farms than a general practice. More transportation of calves to cattle breeding farms was regarded as a natural consequence of the reduction in the number of dairy farms. In many farms the cattle breeding has also changed from the traditional one farm system to different multi-site systems in with several farms in collaboration. Thus, many farms take part in the breeding process and the animal is moved depending on its age and weight from the farm specialised in calves and young animals to the farms specialised in final breeding.

Table T4.4. Administrators/Stakeholders' opinions on whether transport aid from the Nordic Aid scheme has resulted in increased animal transports between sub-regions with different amount of support, or between the Nordic Aid region and other regions (percent of all respondents).

Country	Yes	No	No opinion	Non-respondents
Finland	25	66		9
Sweden	8	57	32	3

Sources: Finland – Question 7 in Questionnaire to administrators/stakeholders in Nordic Aid region.
Sweden – Question 22 in Questionnaire to administrators/stakeholders in Nordic Aid region.

In Sweden, a similar picture emerges. That is, 57 % of the respondents did not perceive differences in Nordic Aid payments to have resulted in increased animal transports, 32 % had no opinion, and only 8 % were of the opinion that differences in regional support level had led to increased animal transports. Only 4 of the 37 respondents had commented their answers. All but one of them stated that animal transports between sub-regions were very few in Sweden.

Conclusion

The official trade data and the opinions of representatives of administration and other stakeholders do not seem to indicate that Nordic Aid has caused any major distortions in interregional trade compared to the pre-accession situation. Increasing trade flows of food, agricultural commodities and live animals is a common characteristic of modern and open economies. They are an indication of increasing market efficiency resulting from reductions in trade barriers and are not, necessarily, linked to a specific agricultural support scheme, such as the Nordic Aid. These general tendencies are observed also in the foreign trade of Finland and Sweden since their accession to the EU. Finland's agri-food trade has almost doubled during the EU membership. Sweden also witnessed an increase in agri-food trade since the accession in 1995.

While there does not seem to be any evidence that Nordic Aid has caused distortions in trade compared to the pre-accession trade levels between Finland and Sweden or with the rest of the EU, this does not preclude that there may be distortions when comparing with a situation without Nordic Aid. Since the Nordic Aid scheme contributes to maintaining agricultural production in the Finnish Nordic Aid area, it also (indirectly) maintains agricultural export volumes at their pre-accession levels and affects trade flows with other countries. Thus, without the Aid, Finland would have imported more and exported less agri-food products. Results from the DREMFIA model suggest, for example, that abolishing Nordic Aid would convert Finland from a net-exporter to a net-importer of dairy products. Furthermore, the results indicate that without Nordic Aid, overall domestic trade flows would have decreased by some 10–20 % in Finland.

In Sweden, on the other hand, the scheme does not seem to have caused distortions in domestic trade or trade between Sweden and other countries regardless of whether the current situation is compared with that in 1995, or with a situation without Nordic Aid. As to the scheme's effects on domestic competition, the results are somewhat inconclusive. Though a majority of the respondents in the Swedish survey do not perceive that Nordic Aid has affected competition between down stream industries, their answers may have been driven by strategic incentives since almost half of them represented down stream industries. On the other hand, they were also of the opinion that Nordic Aid has not affected competition between suppliers of agricultural inputs. As there were no representatives for suppliers of agricultural inputs among the respondents, strategic incentives are unlikely to have influenced these answers. In addition, very few (only 8 %) of the Swedish respondents were of the opinion that Nordic Aid, or differences in support levels between sub-regions in the Nordic Aid area, had affected animal transports.

In Finland, about one third of the respondents agreed with the proposition that processing industries in the Nordic Aid area had gained a competitive advantage because of the Nordic Aid scheme. However, most of the Finnish respondents were unsure of the effects. Furthermore, about three quarters of the respondents of administration and stakeholders in Finland saw some relationships between the differences in transportation aid and the volume of animal transports between the sub-areas.

Efficiency with respect to other policies (Q8)

Q 8: Has the Nordic aid proved efficient or not relative to other existing EU/national/regional support and income relevant systems, e.g. as regards farm incomes and in that case; how and why?

Introduction and interpretation

The Nordic Aid Scheme operates alongside with the CAP-support, Compensatory allowance and Environmental aid, the EU financed and national investment aids and aid measures based on the programme of development of rural areas as well as some smaller national specific aids in the Nordic area.

Such a large number of a different support schemes raises a question of coherence between them and of the efficiency of the Nordic Aid relative to the other schemes that are in operation. The issues of coherence, i.e. whether the different schemes do not work against each other creating discrepancies is the subject of the evaluation question 9. However, evaluation question 8 and 9 are closely related because coherence is a necessary, though not sufficient, condition for effectiveness and efficiency. Accordingly, the analyses of those two evaluation questions will be related. With respect to efficiency, i.e. the question whether or not the policy measure is the best way to obtain the objective, it should be observed that the abovementioned aid schemes have different objectives. Efficiency comparisons are meaningful only in so far the schemes share the same objectives. However, the impact on the farm incomes is an important aspect of all the applied schemes. Hence, the analysis will mainly concern differences between the Nordic Aid and the other aid schemes listed above in their income transfer capacity.

The Nordic Aid Scheme is primarily targeted on affecting production and maintaining agricultural activities. Hence, most of the support measures are coupled to production (i.e. price premiums, transport subsidies, storage aid, headage payments, investment subsidies, and support to farm successions). However, each of these measures may also have positive effects on farmer income by increasing remuneration to factors of production own by framers that are used in agricultural activities.

Analysing both efficiency and coherence with other existing and relevant schemes it should be taken into account that the CAP has undergone a major change with the introduction of the single farm payment, which is not longer coupled to production. The decision about decoupling was taken in 2003 to be applied from 2005 onwards. This raises a question about the interpretation of the concept "other existing schemes". In the analysis of both question 8 and 9, this concept is interpreted as the CAP prior to 2003 reform. However, since the reform represents a profound change of the policy, the coherence and efficiency issues are discussed also in relation to the CAP post 2003 reform, i.e. in relation to the policy which now applies. Otherwise, "other schemes" are interpreted to cover all the policies included in the descriptive part of this study. General national policies such as taxation or social policies are not included. Furthermore, the analysis also covers implication for the efficiency of the decoupling of the Nordic Aid.

Analysis and the judgement criteria

The efficiency of different support schemes in their capacity to transfer income is judged using the concept *transfer efficiency* as criterion. Transfer efficiency is usually defined as the ratio of income gained by the targeted beneficiaries, assumed in this evaluation to be farmers, to the sum of associated government expenditures and consumer costs, (OECD, 1995). The gain in farm income is the sum of gains in quasi-rents earned by farm households in supplying factors they own. A further criterion is the information cost due to policy uncertainty. The policy uncertainty is measured (or proxied) by the duration of the support program.

The reason for transfer efficiency being less than one, implying that part of the transfers is captured by others than farmers, is the fact that the transfer may increase the level of production which requires purchased inputs and results in other additional costs. Accordingly, for analysing the question of transfer efficiency it is relevant to stratify the support measures according to how much they are coupled to or de-coupled from farm output, farm input and farm's production capacity. This stratification allows us to judge the (cost) efficiency of a certain support measure in terms of its opportunity cost, i.e. the cost-benefit relationship that would be realized if an alternative measure would have been applied. In other words, a benchmark and efficiency criteria for price supports come from the anticipated effects of de-coupled supports.

It is also important to distinguish between policy instruments that are specific for the Nordic Aid, i.e. are used only in the context of the Aid such as transport subsidies and storage aids and other instruments such as price supports, area- and headage payments that are/were also part of the CAP. Those policy instruments that are identical/similar to the instruments that are part of the CAP have *in principle* the same effects as the CAP instruments and can therefore be deemed equally efficient. Additional price support that is paid to milk production and which is the major element of the Nordic Aid, operates in the same way as price support within the framework of the CAP. The *actual impact* of the measures that are included in the Nordic Aid schemes depends on the fact that those measures are applied on the top of the common policies.

(1) Relative importance of different support schemes for the farm incomes

An important aspect of the comparison of the aids included in the Nordic Aid scheme and other existing EU/national/regional supports is the actual contribution of different measures to farm income or farm revenue. Tables T4.6a and T4.6b below show the components of the gross revenue from milk production in the Swedish sub-regions in 2004 and in 1995. The shares of milk revenue and the different supports in gross revenue are also displayed.

Table T4.6a: Share of different revenues and supports in gross revenue for milk farmers in 2004 per sub-region of the Nordic Aid area in Sweden (MEUR).

Sub-region	1	%	2a	%	2b	%	3	%
Milk revenue	13,8	58	68,1	64	36,1	67	24,2	73
Bovine meat revenue	0,6	3	3,4	3	1,8	3	1,2	4
Support to ecological production	0,6	3	2,1	2	1,7	3	0,9	3
Nordic Aid	5,0	21	17,0	16	5,8	11	0,7	2
Compensatory allowance	1,3	5	6,3	6	3,3	6	2,1	6
Environmental support	2,2	9	8,9	8	4,6	9	3,6	11
Early marketing premium	0,1	1	0,7	1	0,4	1	0,3	1
Gross revenue	23,7		106,4		53,7		32,9	

Source: SJV 2007 (JoDep)

Table T4.6b. Share of different revenues and supports in gross revenue for milk farmers in 1995 per sub-region of the Nordic Aid area in Sweden (MEUR).

Sub-region	1	%	2a	%	2b	%	3	%
Milk revenue	17,5	57	68,5	63	38,7	67	28,2	74
Bovine meat revenue	1,4	5	5,5	5	3,1	5	2,3	6
Support to ecological production	0,15	1	0,5	1	0,4	1	0,2	1
Nordic Aid	6,9	23	18,3	17	6,8	12	1,0	3
Compensatory allowance	1,9	6	7,4	7	4,2	7	3,1	8
Environmental support	2,5	8	8,8	8	4,9	8	3,4	9
Early marketing premium	-		-		-		-	
Gross revenue	30,4		109		58,1		38,2	

Source: SJV 2007 (JoDep)

As can be seen, milk revenue is the main part of gross revenue in all sub-regions in 2004 and the situation has not changed much since 1995. It amounts to 58%, 64%, 67% and 74% respectively in sub-region 1-3. The importance of the Nordic Aid is, in accordance with its construction, largest in sub-region 1 where it amounts to 21% of gross revenue for milk farmers in 2004 while compensatory allowances and environmental support account for 14%. In sub-regions 2a, 2b and 3, the relative importance of the Nordic Aid scheme decreases. The share is negligible in sub-region 3, only 2%, while compensatory allowances and environmental support account together for 17%. Overall, the share of the Nordic Aid in gross revenue has fallen slightly since 1995 in all sub-regions.

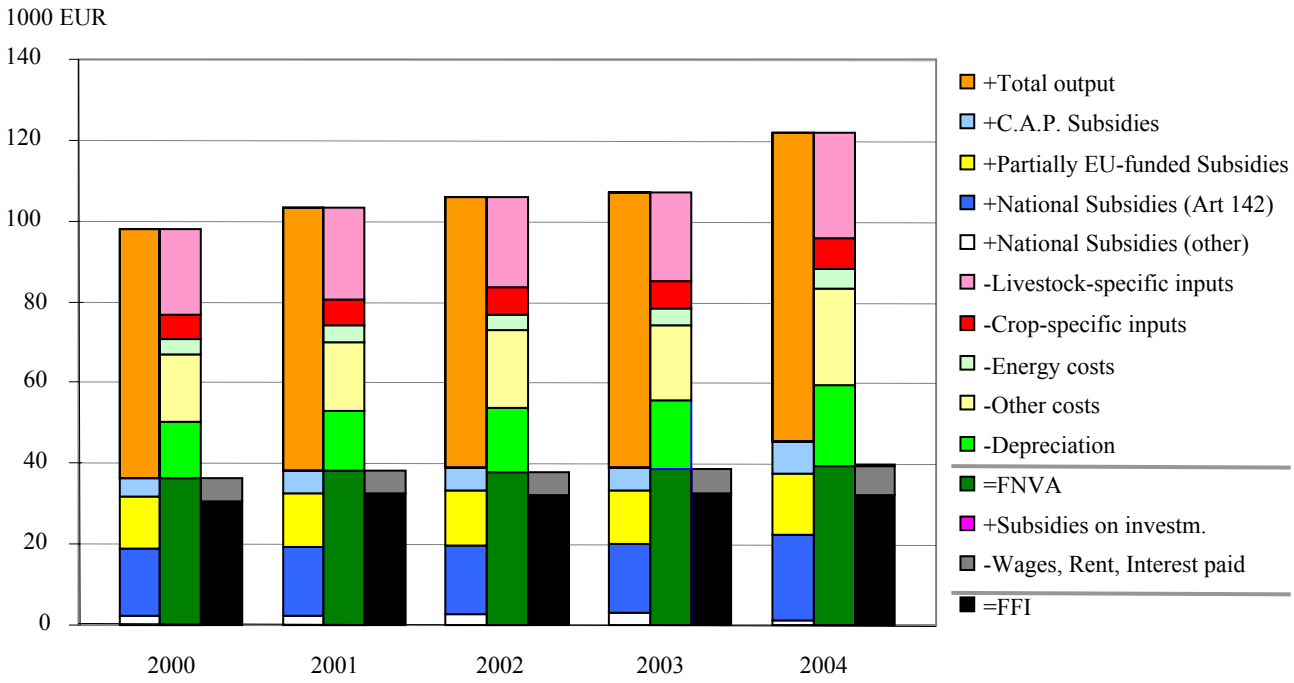


Figure T4.1. Dairy farmers' gross revenues, costs, farm net value added (FNVA) and farm income (FFI) in the Nordic Aid area in Finland during 2000-2004 (€/farm), (MTT FADN farms)

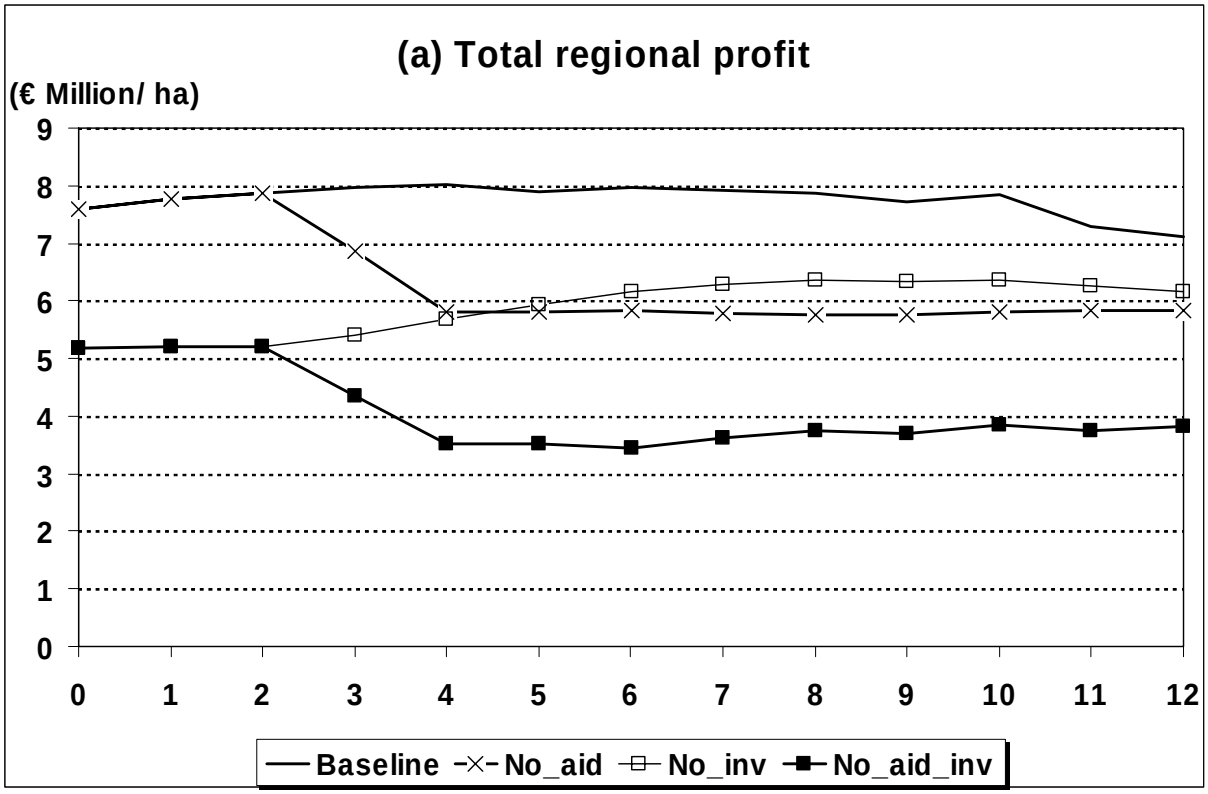
The income formation of agriculture in the Nordic Aid area of Finland is highly dependent on income supports paid to agriculture. The assessment of the role of Nordic Aid as well as other support schemes in Finland has been carried out on the basis of the FADN farms. The result concepts correspond to those used in the FADN. The results have been corrected by the consumer price index and they are given at the price level of 2004. Figure T4.1 above shows the components of the gross revenues in dairy farms in the Nordic Aid area in Finland over the period from 2000 to 2004. Market returns represented about 63-64 % and support payments about 36-37% of gross revenues for these farms during 2000-2004. The Nordic Aid alone accounted for about 16-17% of gross revenues. The compensatory allowances and environmental support, which are partly

financed by the EU, amounted to 12-13% while CAP payments accounted for about 5-7% of the gross revenues in 2000-2004.

(2) Model-based analyses of transfer efficiency

The previous analyses of the effects of Nordic Aid on production that were conducted in Theme 1 can also be used for assessing the efficiency of Nordic Aid in transferring income to farmers compared to a decoupled support scheme. Observe that in these analyses all existing support schemes, except Nordic Aid, were assumed to be unchanged. Nordic Aid is, in other words, evaluated on top of the existing programmes. In the Swedish case, experiments with the CAPRI and AgriPolis models indicate that the elimination of Nordic Aid would not affect production because the resulting reduction in dairy farmers' revenues is absorbed by falling milk quota rents. This implies at the same time that the introduction of the support has not resulted in an increase in milk production (given the existence of the other schemes). Instead, it has increased farm income by an amount equal to the amount of the aid. However, the increase in income translates with time to higher asset prices, in this case milk quota. Because of the lack of an effect on production, at least in sub-region 2a and 2b, Nordic Aid can be deemed, from a historical perspective, to have been equally efficient in transferring income as a decoupled payment would have been. After the 2003 Reform, CAP support to milk production is considerably lower than it was with Agenda 2000. The 2003 Reform implies a reduction in milk quota rents compared with Agenda 2000 according to analyses with both models. In the new policy environment, i.e., with decoupled CAP support, the role of Nordic Aid also changes. Instead of increasing the total level of coupled support, Nordic Aid now represents the only form of coupled support and therefore acts, to a certain extent, to promote production. This implies that part of the Aid is now absorbed by the costs of production and that the transfer efficiency is lower than it would be for a purely decoupled payment. An attempt was made to estimate the transfer efficiency for Nordic Aid in the two cases. However, it was not possible to single out Nordic Aid transfer efficiency, only to estimate the transfer efficiency for the total bundle of support in the two cases. The results show that the total transfer efficiency increases after the introduction of the Single Farm Payment. This is what we would have expected since the Nordic Aid is only a minor part of the total support package. Hence, though the transfer efficiency of Nordic Aid is expected to decrease, the transfer efficiency of all support measures is expected to increase when the majority of the measures become de-coupled.

Agent based models such as AgriPolis enable comparison of the efficiency of different schemes from a dynamic perspective. The diagrams in Figure T4.2. show the impact of removing alternatively; Nordic Aid, investment support and both schemes on farm income at the sector level (i.e., for the region covered by the model) and on average farm income. Simultaneous removal of both schemes produces the largest impact as both schemes reinforce each other (compare question 9). Removal of the Nordic Aid alone lowers the sectoral income more than removal of investment support but the difference declines with time. To evaluate the dynamic implications of Nordic Aid compared with the investment support, it is more appropriate to examine the impact on average farm income. Removal of the Aid would result in lower average profit but not affect the rate of growth of profits. Removal of investment aid would only reduce the average profit temporarily. This is explained by the fact that farms compete with each other for resources such as land. In the absence of investment support, the number of farms would be fewer but the size of an average farm would be larger. As to the effects on production, see Theme 1, Question 1.



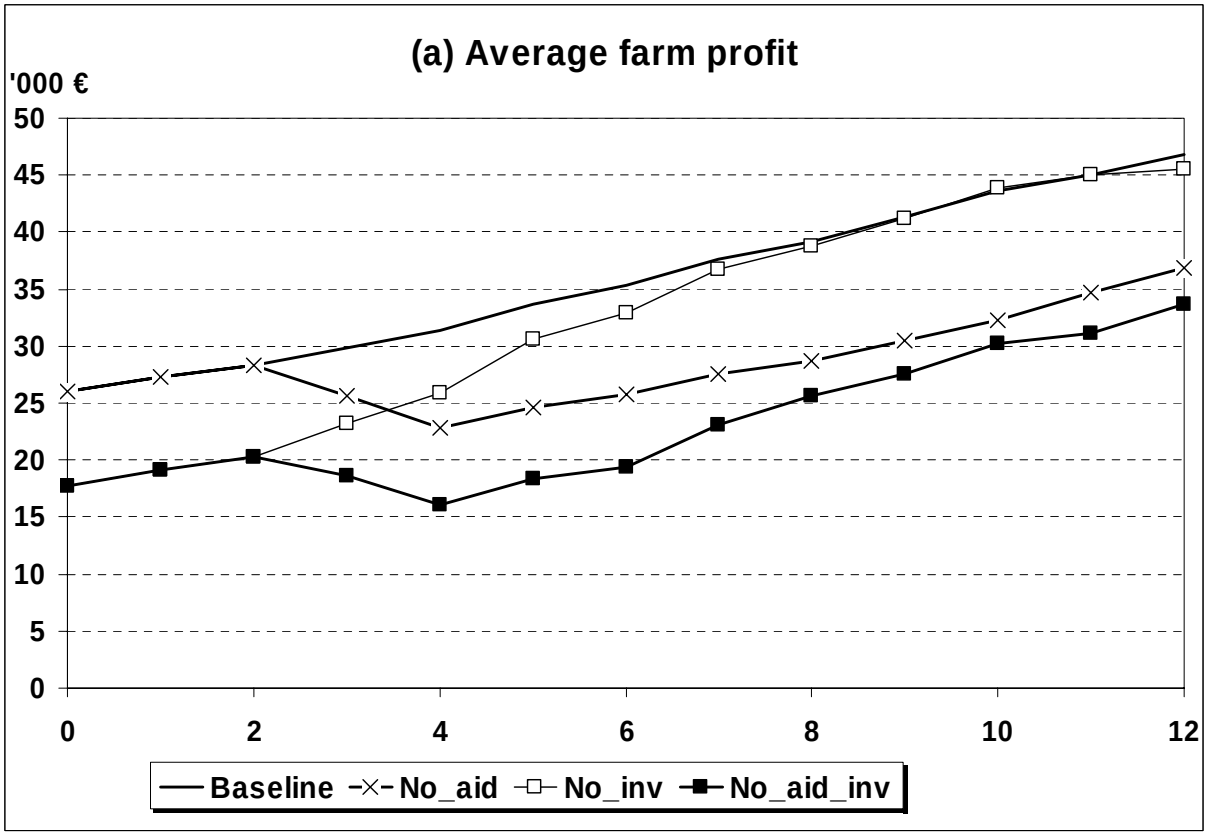


Figure T4.2. The impact of a removal of the Nordic Aid on the farm income in Sweden at the sector level (for the region covered by the model) and on average farm income.

In Finland the level of Nordic Aid has been higher than in Sweden, and it has been paid for cattle, pigs and poultry as well. There is no difference, at least in principle, in the level of investment supports or any other supports paid for small and large farms. The price level of agricultural products before the EU memberships was also significantly higher in Finland than in Sweden. In fact, the fall of producer prices in January 1st 1995 has been partly compensated by national supports, including Nordic Aid since then.

Because of these reasons Finnish agriculture in the Nordic Aid area has been more reliant on high prices and a higher level of overall support. Hence, unlike the results of the CAPRI and AgriPolis models, the DREMFIA model results suggest that eliminating Nordic Aid is not production neutral (Table T4.7) and eliminating Nordic Aid in the Finnish Nordic Aid area is not absorbed in the falling milk quota rents, for example. This is discussed more in Theme 1. In Figure T4.3, the development of the aggregate farm income in the Nordic Aid area under baseline and full elimination of Nordic Aid as well as the resulting difference in the farm income is presented.

Table T4.7. Relative change in agricultural production and actively cultivated land area in the Nordic Aid regions of Finland in the case of abolished Nordic Aids. Baseline = 100

	Milk	Beef	Pork	Actively cultivated land (all crops, excluding set-aside land)
100% reduction	0.54	0.64	0.71	0.75
50% reduction	0.75	0.81	0.69	0.73

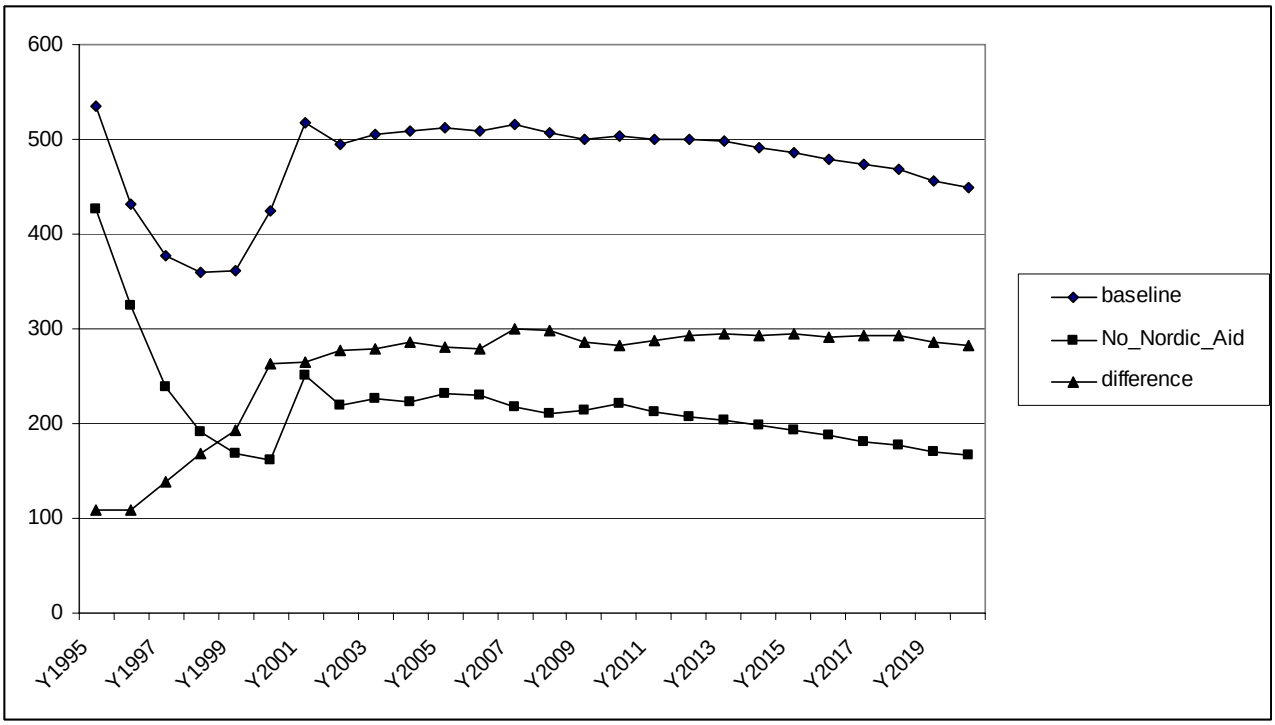


Figure T4.3. The development of the aggregate farm income in the Nordic Aid area of Finland in the case of eliminating Nordic Aid, compared to the farm income in baseline scenario.

One can readily see in Fig. T4.3 that the difference in farm income between the full Nordic Aid and the no Nordic Aid scenarios increases up to 270-300 million euros per year very soon after year 2000. The amounts in the Nordic Aid scheme increased gradually in 1995-1999, and were paid in full from the year 2000. The DREMFIA simulation suggests that the income loss due to elimination of Nordic Aid compared to the baseline scenario is rather stable in the long run. This 50-60% reduction in farm income in a steady-state is only 10-20% less than the level of Nordic Aid actually paid, totalling 330 million euros in 2005-2006. Hence one may infer that production adjustments and the resulting market reactions can mitigate only slightly the income loss if Nordic Aid should be abolished.

The large drop of production and farm income due to an elimination of Nordic Aid, and the weak capacity to compensate for the income loss through production adjustment, is explained by the weak adjustment capacity in 1995: high production costs and a relatively small number of large farms capable of producing an economic surplus without Nordic Aid. Production linked subsidies affect farm size growth in the DREMFIA model where investments are endogenous. Eliminating Nordic Aid therefore means that the development of farm income is impeded by the slower rate of technical change. The slightly higher prices of agricultural products as well as the closing of the most unprofitable production activities would only mitigate the income loss from abolishing Nordic Aid marginally.

The decreasing production would drive down market revenues by € 300 million if no Nordic Aids were paid (Table T4.8). Closing down the most unprofitable activities would also bring down production costs by approximately € 490 million (60% more than the lost market revenues) in the long-term equilibrium. This is an indication of the fact that production costs are clearly higher than the market revenues. At the whole country level the annual production costs are approximately € 2.7 billion (2005) whereas the market revenues are only € 1.7 billion, i.e. production costs are 60% higher than market revenues. This applies to the Nordic Aid regions as well, on the average (see table T4.8). The result that cost savings would be higher than the lost market revenues is explained by the high level of production costs as well as the necessity to keep land in good agricultural conditions in order to remain eligible for other farm subsidies such as CAP- LFA- and environmental payments. Hence the overall policy scheme partly restricts the cost savings.

Table T4.8. Market revenues, production costs, total of farm supports paid, and farm income in the Nordic Aid regions of Finland and their changes (all in million euros) relative to baseline equilibrium at year 2020 in the case of abolished Nordic Aids.

	Market revenues	Total farm aids	Production costs	Farm income
Baseline (long-term equilibrium 2020)	754	898	1203	449
100% reduction in Nordic Aids	447 (-307) -41%	431 (-467) -52%	710 (-493) -41%	168 (-281) -63%

If eliminating Nordic Aid results in reductions in production costs, clearly higher than the lost market revenues, why is the net effect in farm income so negative? The reason is that decreasing production decreases also other subsidies, especially those which are closely linked to production, such as coupled CAP animal payments (approximately 50% of beef premiums remain coupled in Finland still after CAP reform implemented in 2006) and environmental support payments, not paid for set-aside land but for crops only. Consequently, the abolishment of Nordic Aid would reduce

other support payment for farmers by € 137 million, in addition to the € 330 million of Nordic Aid paid in the baseline. This sum of € 137 million results from reduced CAP beef payments per head of bulls and suckler cows, as well as from decreased cultivated area not eligible for environmental payments. This reduction is due to *coupled* design of CAP measures, which is to a large extent a national choice. Also decoupled CAP payments and LFA payments, paid for set aside as well, were reduced since 28% of the land in the Nordic Aid area would not be used in agriculture due to Nordic Aid elimination.

Overall, farm income would remain approximately € 280 million below the baseline farm income in the long run if Nordic Aid was abolished taken the above mentioned into account. Curiously, this is only 15% less than the Nordic Aid paid, 330 million euros. This means that after a number of economic adjustments the eventual impact of Nordic Aid on farm income is as high as 85% of the amount of the support paid. Does this high transfer efficiency also imply that only a small part of the aid is spent on production costs? Such an implication would imply that Nordic Aid is mainly a wind-fall profit for farmers.

In the short run Nordic Aid cannot be considered a wind-fall profit to farmers in the Finnish Nordic Aid area. Since Nordic Aid is the most production linked agricultural support in Finland in relative terms (Dewbre et. al. 2001 have evaluated production impacts, trade effects and transfer efficiency of different forms of aid), and production costs exceed market revenues by 60%, it is likely that the Nordic Aid is the first alternative for a farmer to be used in covering production costs. It is inevitable that Nordic Aid, dominated by supports such as milk price support and payments per head of animals and hectare of crops, influences production intensity and volume, and are thus spent to cover high production costs. There are explicit production functions in the DREMFIA model for milk yields of dairy cow, different slaughter weights of bulls, as well as crop yield functions of crops, which model production decisions dependent on input and output prices as well as production linked subsidies.

Overall, the result derived by the DREMFIA model that the Nordic Aids are, in line with other production linked payments, accumulated to farm income relatively efficiently in the long run (Table T4.9). Nordic Aid contribute to a higher level of production and other subsidy payments, especially CAP payments for beef and environmental payments for crops as long as they are coupled to production. In other words, interaction between Nordic Aid and other aid schemes contribute to a significantly higher production and farm income compared to a case where no Nordic Aid were paid in 1995-2020. This result is also somewhat specific to the structure of the DREMDIA model: Nordic Aid contribute to the faster growth of farms and despite the higher level of production (and overall production costs of the sector) the faster technical progress and a higher share of production at large farms facilitate higher value added. Hence despite the fact that a significant part of Nordic Aid is spent on production costs as much as 85% of Nordic Aid are retained as farm income, defined as an economic surplus for farm family labour (rate of return for capital of farm family is zero in DREMFIA), in the long run.

When eliminating other agricultural support payments, such as environmental support, LFA payments and CAP support, the DREMFIA model yields similar results: Without each of these supports farm income would be decreased by approximately 65-90% of the value of each individual category of support, depending on the time scale and category of support. This, however, does not mean that the actual overall transfer efficiency of agricultural supports would be 65-90% (€ 1200 – 1600 million) since the actual farm income has been between € 780 – 1016 million in 2000-2006. Hence an analysis based on the DREMFIA model cannot provide transfer efficiency of different forms of support in isolation of other support payments. The DREMFIA takes into account the fact that all forms of support influence in combination with other supports, as well as with market situation on the EU market (exogenous EU prices).

The impacts of different forms of support on production and income are not identical however. The effects of eliminating environmental support would decrease cereals and pigmeat production very significantly but have little impacts on milk production. Eliminating LFA payments, paid also for set-aside and at a higher support level for livestock farms per hectare, would have somewhat stronger negative impacts on production and income for all products. Eliminating CAP support payments (keeping the CAP market regime in place) would affect beef, cereals and pigmeat production significantly, and in some extent also milk in 1995-2020. Overall the effects of CAP and Nordic aids are relatively stronger for beef and milk production while LFA and environmental payments have relatively larger impacts on cereals, pigmeat and poultry meat production. However the reduced farm income / reduced subsidies is slightly higher when eliminating Nordic Aids and CAP supports compared to eliminating environmental and LFA payments relatively more important for crop production. This is understandable since eliminating Nordic Aids and CAP payments result in relatively larger reductions in livestock production and market revenues compared to LFA and environmental payments.

Table T4.9. *Lost farm income / eliminated subsidy payments of Nordic Aid, Environmental payments, LFA support, and CAP support payments (excluding CAP market support mechanisms) in 2005, 2010, 2015 and 2020. Source: DREMFIA model simulations. Note: These figures should NOT be referred to as transfer efficiencies of different support regimes, due to the interaction between the support regimes.*

	2005	2010	2015	2020
Nordic Aid	83.3	86.3	90.0	86.3
Environmental support	94.0	68.3	71.6	64.8
LFA payments	89.8	80.1	73.2	63.1
CAP support	76.3	86.0	81.3	71.3

(3) The efficiency of price supports as compared to the decoupled supports in maintaining agricultural production and farmer income

From the previous discussion it becomes clear that de-coupling of Nordic Aid from production should increase farm income, at least slightly. This is because a de-coupled Nordic Aid does not decrease with the decreasing output. This means that a farmer may shut down unprofitable activities without loosing any subsidy. However the endogenous investments in the DREMFIA model results in a reduced rate of technical change in dairy production in the case of de-coupling which makes the increase in farm income rather marginal when simulating the impacts of a de-coupled Nordic Aid. The average increase in farm income is only 2-3% over the period 2008-2020. However the decreased production levels imply that income per hour of labour is 50% higher in the de-coupling scenario.

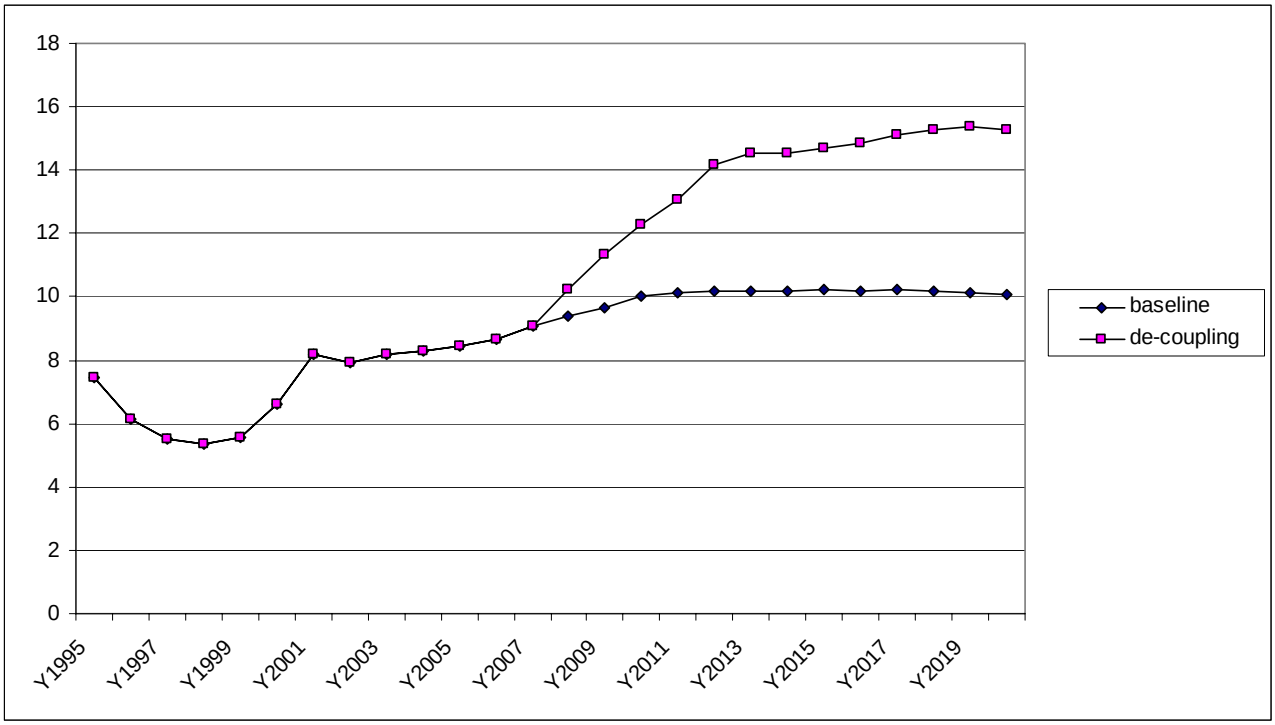


Figure T4.7. Farm income per hour of labour (eur/hour) in the Nordic Aid areas of Finland according to the DREMFIA model simulations.

Table T4.10. *Market revenues, production costs, total of farm supports paid, and farm income in the Nordic Aid regions of Finland and their changes (all in million euros) relative to baseline equilibrium at year 2020 in the case of abolished Nordic Aids.*

	Market revenues	Total farm aids	Production costs	Farm income
Baseline (long-term equilibrium 2020)	754	898	1203	449
Decoupling Nordic Aids in 2008	569 (-185) -25%	871 (-27) -3%	987 (-216) -18%	453 (+4) +1%

Since there is much less livestock production and labour hours in the de-coupling scenario (in the DREMFIA output) it can be stated that de-coupled Nordic Aid would accumulate more efficiently to farm income than coupled Nordic Aid, paid according to the 2006 levels. If Nordic Aid were de-coupled from production the share "Nordic Aid/overall farm income" would increase from 67% (baseline equilibrium) to 72%.

The conclusion that the share of Nordic Aid accumulated in farm income would improve as a result of de-coupling is well in line with the literature of agricultural economics, including recent analyses of OECD, for example, of this subject. It is evident that the price support for milk affects production intensity and thus part of the Nordic Aid is spent on production costs. However the overall working of the economic models applied in our analysis do not show the transfer efficiency rate exactly.

(4) Opinions of farmers and administrators/stakeholders on Nordic Aid compared to other support schemes

The efficiency of Nordic Aid vis a vis other support schemes was also analysed with the help of the questionnaires. However, the issue of the relative efficiency of the Nordic Aid cannot be addressed by a direct question to the recipients or administrators/stakeholders because the matter is too complicated to lend itself to straightforward questioning. Instead, farmers as well as administrators/stakeholder were asked whether they were satisfied with the scheme as it is or whether they would like to change it by de-coupling or replacing it (transfer of an equivalent amount of money) with other support measures such as investment support, environmental payments or rural development measures in general.

> *AFQ8/1. Are you satisfied with the Nordic Aid scheme as it is designed at present or would you like to change it in the future?*

The question does not refer explicitly to the efficiency in transferring incomes but it is considered here reasonable to assume that farmers attach high weight to this aspect while answering. The results for farmers in both countries are presented in tables T4.8a and T4.8b. In Finland, the questions about transferring the aid to alternative support schemes were not asked. In both countries farmers seem satisfied with the present construction of the Nordic Aid scheme. This is in particular the case in the northernmost regions where around 70 % of the respondents completely or partly agree that the construction is good as it is.

Table T4.8a: Swedish farmers' opinions on the construction of Nordic Aid (percent of respondents). A = completely agree, B = partly agree, C = don't know, D = disagree, E = completely disagree, NR = non-respondents.

	Construction good as it is						**Nordic Aid should be completely de-coupled**						**Nordic Aid should be partly de-coupled**					
	A	B	C	D	E	NR	A	B	C	D	E	NR	A	B	C	D	E	NR
1	46	22	12	4	12	4	6	6	20	18	42	8	2	16	20	14	42	6
2a	45	27	11	4	5	8	4	3	12	18	46	17	1	7	15	20	40	17
2b	22	32	30	7	5	4	5	10	32	8	30	15	2	10	32	15	27	14
3	10	32	20	20	12	6	2	7	22	24	29	16	5	5	22	24	24	20
X*	35	12	35	12	6	0	12	0	35	35	6	12	0	0	35	41	12	12
	Nordic Aid should be replaced by an investment support						**Nordic Aid should be replaced by an environmental support**						**Nordic Aid should be included in the Rural Development Program**					
	A	B	C	D	E	NR	A	B	C	D	E	NR	A	B	C	D	E	NR
1	2	10	28	16	34	10	10	8	20	18	34	10	8	6	20	14	42	10
2a	3	7	17	22	35	16	7	7	15	18	36	17	1	2	9	15	56	17
2b	7	10	32	17	20	14	3	17	32	17	18	12	0	5	25	12	45	13
3	0	17	17	22	22	22	12	15	15	15	23	20	2	2	15	17	49	15
X*	18	18	24	24	6	10	12	24	24	18	12	10	6	6	24	29	18	17

Sources: Sweden – Question 34 in Questionnaire to farmers in Nordic Aid region. *Sub-region X refers to respondents that have not answered the question on in which sub-region their farm is located.

Consistent with their satisfaction with the present form of the scheme, farmers in both countries disagree or strongly disagree with the idea that the support should be de-coupled. The resentment to complete de-coupling is somewhat stronger than to partial de-coupling. Even in this case, the northernmost farmers hold the strongest views. Neither investment support, nor environmental payments or rural development programs in general seem to appeal to the Swedish framers as a potential replacement of the Nordic Aid. The last mentioned alternative is the least popular one. It

may seem understandable that farmers prefer higher milk prices (i.e. the Nordic Aid) to investment support or environmental or rural measures. The latter are more cumbersome to apply for and the application may fail. It is more surprising that farmers prefer coupled to de-coupled support, especially now when de-coupled support is a part of the CAP. De-coupling gives farmers a possibility to produce exactly as they did before if they would choose to do so, but also to quit unprofitable production. A possible explanation could be that a responding farmer may fear that de-coupling would cause a considerable decline in production in the region which, in turn, could indirectly cause negative impacts (such as declining supply of service) on him. It is also possible that farmers answer strategically, expecting that the coupled support would be less prone to revisions or a removal.

Table T4.8b. Finnish farmers' opinions about the decoupling of the Nordic aid (percent of the respondents) (A = completely agree, B = partly agree, C = don't know, D = disagree, E = completely disagree)

FI	Good as is					Should be partly decoupled					Should be completely decoupled				
Sub-Area	A	B	C	D	E	A	B	C	D	E	A	B	C	D	E
C4	32	38	13	8	0	0	0	27	8	38	9	0	27	0	37
C3	22	31	12	16	2	5	7	16	15	32	7	3	13	16	40
C2	26	34	16	12	1	6	18	23	17	22	10	9	21	17	28
C1	17	34	23	15	2	4	17	30	9	27	11	7	24	15	32
Resp. rate	89					86					87				

In Sweden; administrators and stakeholders were asked the same question as farmers about their opinions about the Nordic Aid: is the scheme good as it is at present or should it be changed. The results are given below in table T4.9a.

Table T4:9a: Swedish Administrators/Stakeholders opinions on the construction of Nordic Aid (percent of respondents). A = completely agree, B = partly agree, C= don't know, D = disagree, E = completely disagree, NR = non-respondents.*

	Construction good as it is						**Nordic Aid should be completely de-coupled**						**Nordic Aid should be partly de-coupled**					
	A	B	C	D	E	NR	A	B	C	D	E	NR	A	B	C	D	E	NR
All	35	30	5	22	5	3	3	3	8	30	51	5	3	5	11	30	43	8
	Nordic Aid should be replaced by an investment support						**Nordic Aid should be replaced by an environmental support**						**Nordic Aid should be partly included in the Rural Development Program**					
	A	B	C	D	E	NR	A	B	C	D	E	NR	A	B	C	D	E	NR
All	0	11	8	30	46	5	0	11	8	32	43	6	0	8	8	27	51	6
	Nordic Aid should be completely included in the Rural Development Program																	
All	A	B	C	D	E	NR												
	0	0	8	19	68	5												

Sources: Sweden – Question 25 in Questionnaire to Adm./stakeholders in Nordic Aid region.

To a large extent farmers and administrators /stakeholder share the same views. However, the latter group has even stronger views on de-coupling of the aid. More than 80% of the respondents disagree, partly or completely, with the statement that the Nordic Aid should be fully de-coupled. Nobody agrees completely that the Nordic Aid should be replaced by investments support, environmental support or included in rural development programmes. It should be observed that this

category of respondents includes representatives of processing industry who have a direct interest in sustaining of the production.

In Finland, the answers from the representatives of administration and stakeholders were mainly similar to those of the farmers (Table T4.9b). Three quarters of the respondents were against a de-coupling of Nordic Aid from production, and two thirds of them agreed with the statement that the present construction of Nordic Aid Scheme was good. Concerning the need for structural changes in the aid scheme, the answers were somewhat dispersed, whereas the suggestion of simplifying the administration of the aid scheme got support from 68 % of the respondents.

Table T4.9.b. Statements of the respondents of administration and stakeholders on the changed needed in the Nordic Aid Scheme in Finland.

		Completely agree	Partly agree	Unde-cided/ unsure	Disagree	Completely disagree	Not resp.	Opin.in aver.*)
The whole aid ought to be decoupled from the production.	FI	3	3	14	17	62	99	4.34
A part from the aid ought to be decoupled from the production.	FI	3	8	17	21	51	97	4.08
Aid ought to be coupled with the quantity of products.	FI	27	35	24	7	4	97	2.25
Nordic Aid scheme is good as present.	FI	20	58	10	13	0	100	2.15
Structure of the Nordic Aid ought to be changed.	FI	1	27	35	23	13	99	3.19
Administration of the aid scheme ought to be simplified.	FI	34	34	23	8	1	100	2.10

(5) Information cost over policy uncertainty: Credibility and the duration of the program

The Nordic Aid scheme is a long term support program. Hence, the scheme it is not at risk of being terminated in the near future. The results of Heikkinen and Pietola (2006) suggest that, from the perspective of an investing entrepreneur, the information cost driven by uncertainty over the continuation of short term support programs can be substantial. Thus, the sustainability and credibility of the Nordic Aid scheme is a valuable asset, which increases the efficiency of the program in encouraging investments and maintaining agricultural activities. In other words, the Nordic Aid scheme as a credible long term program is efficient in maintaining agricultural activity.

Conclusion

Nordic Aid operates alongside the CAP-support, Compensatory allowance and Environmental aid, the EU financed and national investment aids, and aid measures based on the programme of development of rural areas as well as some smaller national specific aids in the Nordic area. When addressing the question of whether or not Nordic Aid has proved efficient relative to the abovementioned policy measures, it should be observed that all these schemes have different targets. Efficiency comparisons are meaningful only if the schemes share the same objectives. The impact on farm income is an important aspect of all the applied schemes. Hence, the analysis mainly concerns the relative importance of the Nordic Aid scheme for the farm incomes and the differences between the Nordic Aid and the other aid schemes in their income transfer capacity.

An important aspect of the comparison of the Nordic Aid scheme with the other existing EU/national/regional supports is the actual contribution of different measures to farm income or farm revenue. The income formation of agriculture in the Nordic Aid area is highly dependent on income supports paid to agriculture. In Finland, the Nordic Aid accounted for about 16-17% of gross revenue for dairy farmers in the Nordic Aid area in 2000-2004. The compensatory allowances and environmental support together amounted to 12-13% of the gross revenues, while CAP payments accounted for about 5-7% during 2000-2004. In Sweden, the importance of the Nordic Aid is, in accordance with its construction, largest in sub-region 1 where it amounts to 21% of gross revenue for milk farmers in 2004 while other support schemes (compensatory allowances and environmental support) account for 14%. In sub-regions 2a and 2b, the share of Nordic Aid is 16% and 11%, while the share is negligible in sub-region 3, only 2%. Other support schemes play a more important role in those regions, especially in region 3.

The results of the model-based analyses show that Nordic Aid has increased farm income. However, coupled payments impose costs on recipients and direct the recipients to certain activities in order to receive the transfer. Hence, a de-coupled support would be more efficient to fulfil the income objective. At the same time, a de-coupled support is likely to result in lower production, especially after the 2003 CAP-reform. So depending on whether the objective is income transfer or maintenance of production, different measures are the most efficient. Experiments with the CAPRI- and AgriPolis-models indicate that in the Swedish case Nordic Aid during the period prior to the 2003 reform could be deemed almost as efficient in transferring income as a de-coupled payment. The reason is that the introduction of the support has not increased milk production (given the existence of the other schemes) and, therefore, increased farm income by an amount equal to the amount of the aid. In Finland, the DREMFIA results indicate that the share of the present Nordic Aid in farm income is somewhat lower compared to the share of a de-coupled Nordic Aid, but the difference is rather modest.

The survey results indicate that farmers in both countries are satisfied with the present construction of the Nordic Aid scheme. This is the case particularly in the northernmost regions where around 70% of the respondents completely or partly agree that the construction is good as it is.

Synergy with CAP and RDP measures (Q9)

Q 9: To what extent has Nordic Aid worked in synergy with CAP and rural development measures, created discrepancies or been in competition with them?

Introduction and interpretation

In this Theme, the focus is on whether Nordic Aid has worked in synergy with the CAP and rural development measures, created discrepancies or been in competition with them. Synergy between the measures exists if the interaction between the measures and their combined effect is greater than the sum of their individual effects. A pre-requisite for this is that the measures are complements and coherent. Discrepancies prevail if measures counteract each other or are incoherent. Competition between measures can be interpreted as a "negative" synergy i.e. a situation where the combined effect of two measures is lower than the sum of their individual effects due to redundancy. Hence, three possible outcomes may occur; there could be a negative synergy due to competition between measures, a positive synergy if measures boost each others effects or a neutral situation if the measures do not influence each others performance. Using the analogy of one plus one equals two, the sum is less than two in the first case, larger than two in the second case and equal to two in the last case. In both the *positive* and *neutral* case the measures can be seen as complementing each other.

To determine whether the sum of two measures in a specific case is larger than their individual contribution requires essentially a quantitative approach as the realised impact of the measures needs to be measured and disentangled. As pointed out in previous themes, it is not possible to use data on actual development of production etc. to capture such effects. Instead a model approach is needed and below the AgriPolis and the DREMFIA models are used to analyse how Nordic Aid interact with different support measures. The interactions is first analysed in the historical context for the evaluation period 1995-2005, but as the decoupling of CAP support in the 2003 reform change the context and therefore also the interactions between Nordic Aid and CAP support, the decoupled scenario is also evaluated.

It is further discussed to what extent the Nordic Aid scheme has contributed to the attainment of the objectives of the CAP and rural development programmes, and whether the objectives of the Nordic Aid scheme are relevant for the needs in the targeted areas. Finally, a scenario including full decoupling of Nordic Aid is presented, showing what the effects would be if Nordic Aid is transformed to an income support in form of a single farm payment in line with the 2003 reform. Note that in question 8, Nordic Aid was compared with other measures in terms of efficiency. This says nothing about how measures affect each other, however. That is, the result that a given measure is more efficient than another does not preclude the possibility that their simultaneous application could increase the efficiency of both measures.

Analysis and the judgement criteria

A straightforward interpretation of the question of synergy would be to compare all measures included in the Nordic Aid schemes with all measures included in other schemes. Due to the large number of measures involved, this is quite a complicated exercise so the analysis is restricted to the most important and relevant measures. In Table T4.1 CAP and rural development measures are outlined.

Table T4.1. CAP and rural development measures

CAP coupled measures	**CAP decoupled measure**	**RDP structural agricultural measures**	**RDP* environmental measures**
Arable land payment	Single farm payment	Investment in agricultural holdings	Compensatory allowances to less-favoured areas
Animal headage payment		Setting-up of young farmers	Open and varied agricultural landscape
Price support		Human capital investment	Conservation of biodiversity and cultural heritage values in the farmed landscape
		Improved processing and marketing	Environmentally friendly agriculture (organic farming)

* In addition to the compensatory allowance, support was available for "environmentally friendly agriculture" between 1995 and 2000. The latter support was divided in period 2000-2006 in the measures presented in the table.

In Sweden, 90% of the Nordic Aid support is allocated to milk production. The remaining support schemes are insignificant in terms of money and impact. Therefore the analysis for Sweden focuses on synergies, discrepancies and competition between the Nordic Aid milk price support and three measures closely related to the Nordic Aid milk support: i) CAP milk price support, ii) investment support and iii) the single farm payment. No modelled interaction with the environmental measures is carried out since the Nordic Aid milk support has no explicit environmental objectives, although indirect effects on the environment is included in the analysis. It is important to note that the AgriPolis model simulations only include the Västerbotten county, which is equivalent to sub-region 2a. This region has maintained the level of milk production over the evaluation period. However, it shall be noted that the other three Swedish sub-regions, especially region 1 and 3 are loosing milk production.

In Finland the level of Nordic Aid has been higher than in Sweden, and the Aid scheme comprises payments for agriculture, horticulture and reindeer husbandry, transport aid for milk and meat, storage aid for horticultural products, wild berries and mushrooms and aid for young farmers. The total expenditure for the Nordic Aid scheme in 2005 was about 328 MEUR, of which 60%, or 200 MEUR, went to milk production and 105 MEUR to livestock. Thus the analysis for Finland needs to focus on synergies, discrepancies and competition between the Nordic Aid in general and CAP and rural development measures closely related to the Nordic Aid: i) coupled and decoupled CAP payments, ii) compensatory allowances to less- favoured areas, iii) agri-environmental support scheme.

(1) Synergies between Nordic Aid and CAP/RDP support

(1.1) Interaction between Nordic Aid and CAP support

Sweden

The estimated model results regarding the presence of positive and negative synergies are presented in Table T4.2 below. There are two cases: In Case I, the Nordic Aid milk support and the CAP support are both a price support coupled to milk production. Hence, both raise the price of milk that is relevant for farmers' decision-making. For this reason, there are no qualitative differences between these two sources of support as far as farmers are concerned. In Case II, Nordic Aid is unchanged while CAP support is decoupled from production in line with the 2003 reform.

It can be observed that a negative synergy arises if the presence of one measure makes another measure redundant. In this case, the sum of the two measures combined effect will be less than their individual effects. The model simulations show that this situation arises in Sweden when Nordic Aid is combined with coupled CAP support (Case I in Table T4.2.). The underlying explanation is the common market order milk quota which applies to the Nordic areas. The quota cap milk production to a certain level and the Swedish quota is binding with just coupled CAP support in force, meaning that Nordic Aid has no effect on production. Hence, CAP support is sufficient to maintain production in Sweden. It cannot actually be said, though, which one of the coupled measures is redundant; with several coupled support in play anyone of them could be reduced until the quota is just binding without any effect on the level of production. Having no impact on production, Nordic Aid instead turns into an income support, which over time capitalises into the value of quota via the milk quota market. As there are no additional costs due to increased production for the farmers to receive Nordic Aid the aid has high income transfer efficiency, see the discussion in Question 8, although the farmers must remain dairy farmers to receive the support.

Table T4.2. Combined effect of Swedish Nordic Aid milk price support (NA) and coupled CAP support (milk price support) or decoupled CAP support (single farm payment).

	Case I **Coupled CAP support**	**Case II** **Decoupled CAP support**
Milk production	Negative synergy - NA is redundant since the quota is filled by means of CAP support	Neutral synergy - Effect on production of NA with decoupled CAP
Beef production	Negative synergy – NA has no effect on the choice between milk and beef production due to the binding quota	Negative synergy – crowding out of beef production
Income	Positive income effect although capitalised in the quota price over time	Reduced income effect
Structural change	Negative or neutral synergy – both coupled CAP and NA slow down structural change by making it more difficult to rent or buy additional land	Negative synergy – decoupled payments makes it more difficult to rent or buy land
Environment	Negative synergy - NA has no effects on animal production, therefore, it will have no effects on land use	Positive synergy - slower structural change Negative synergy – NA encourages more intensive production
Efficiency	Inefficient since part of the combined coupled support is redundant because of the milk quota	Efficient since NA and SFP complement each other

Turning to Case II, the situation changes when CAP support to a large extent is decoupled following the 2003 reform. When the overall level of coupled supports are reduced the remaining coupled measures becomes increasingly important for maintaining milk production in weak areas, and the model results show that Nordic Aid has a positive impact on the level of milk production when combined with decoupled aid. The synergy as such is neutral; the two types of support complement each other and the negative synergy previously present has leaved off. However, there is still a problem of coherence, with one type of support decoupled from production levels and the other still coupled.

In addition to the direct effects on milk production, Nordic Aid also has a crowding out effect on beef production. The explanation is that there is no Nordic Aid for beef production in Sweden so the heterogeneousness in support levels favours of milk production. The model results show that interaction with other support measures has additional effects on the level of beef production. Most notably, the crowding out of beef production increased significantly with decoupled CAP combined

with Nordic Aid (Case II), compared with coupled CAP support and Nordic Aid (Case I), since little price support exists for beef in Case II. Turning to structural change, it can be seen that decoupling has a minor negative impact on structural change since decoupled support makes it slightly more difficult to rent or buy land for an expanding farm; the single farm payments makes it less attractive for the landowners to sell or lease their land.

With respect to the impact on the environment, decoupled CAP support in combination with the Nordic Aid payments produce both positive and negative synergies. On one hand, slower structural change has a positive impact on the field size, as Nordic aid will result in a larger number of smaller fields being maintained. On the other hand, the production would be less intensive without Aid, which, in turn, is more favourable for the environment.

Finland

Unlike the results of the CAPRI and AgriPolis models, the DREMFIA model results suggest that in Finland Nordic Aids in interaction with other aids contributes to a significantly higher production and farm income compared to a case where no Nordic Aids were paid in 1995-2020. Analysis performed in theme 1 show that Nordic aid has been in a very significant role in maintaining agricultural production, in particular milk production, in Nordic Aid regions in Finland. Therefore, eliminating Nordic Aid is not production neutral and eliminating Nordic Aid in the Finnish Nordic Aid regions is not absorbed in the falling milk quota rents, for example. This is discussed and explained more in Theme 1.

Furthermore, the result derived by the DREMFIA model indicate that the Nordic Aids contribute to a higher level of other subsidy payments, especially those which are closely linked to production, such as coupled CAP animal payments (appr. 50% of beef premiums remain coupled in Finland still after CAP reform implemented in 2006) and environmental support payments, not paid for set-aside land but for crops only. Consequently, the abolishment of Nordic Aids would reduce other support payment for farmers by about 137 million euros, in addition to the 330 million euros of Nordic Aids paid in the baseline ceteris paribus. This reduction is due to *coupled* design of CAP measures, which is to a large extent a national choice.

The DREMFIA simulation also suggest that hypothetical and isolated adjustments of the Nordic Aid Scheme in Finland as well as the timing of these adjustments are strongly linked to other policy measures applied either within the Nordic Aid regions or within the CAP. In particular, the CAP-reform in 2003, which partially decoupled the animal headage and arable land payments from production, has changed the economic role of the Nordic Aid. The full abolition of Nordic aid, for example, is predicted to decrease milk production in Nordic aid regions by almost 50% until 2015. This result, however, is influenced by the CAP-reform. Without the CAP-reform, i.e. keeping the milk payments linked to production quotas instead of de-coupling them, the abolition of Nordic Aid results to a 30% decrease in milk production in Nordic Aid region. This result shows that the CAP-reform has increased the vulnerability of milk production levels towards the cuts of Nordic Aid, though the structural change development mitigates the vulnerability to smaller cuts in Nordic Aid level.

(1.2) Interaction between Nordic Aid and the RDP

Structural support

Sweden

In case III, where Nordic Aid is interacted with investment aid, the model simulation shows that Nordic Aid reduces the relative importance of investment aid to dairy farmers so that investment aid is less efficient in stimulating investments than it would have been without Nordic Aid. The explanation is that Nordic Aid results in higher quota prices, especially when Nordic Aid is combined with coupled CAP support, and this higher quota price erodes the benefits of the investment support over time for expanding firms. Hence, a negative synergy is present. (The relative importance of investment aid for beef production increased after decoupling.)

Turning to structural change, the AgriPolis model results show that Nordic Aid alone has little impact on farm structure whereas the combination of Nordic Aid and investment support has a complimentary effect leading to more farms and smaller average farm size, see the discussion in Question 3. Hence, interaction between the two measures slows down structural change creating a negative synergy between the measures. The slowdown in structural change is, although negative from an economic efficiency point of view, beneficial for the environment. A slightly larger number of small fields have been maintained due to the interaction between Nordic Aid and investment support, thereby the variability of the landscape has increased.

Table T4.3. Combined effect of Swedish Nordic Aid milk price support (NA) and RDP support.

	Case III **Investment support (IS)**
Investments	Negative synergy – NA reduces the efficiency of IS since both measures impact investment decisions
Income	Positive synergy – the measures reinforce each other
Structural change	Negative synergy – the combined effect reduces the rate of structural change
Environment	Positive synergy – more small fields because of slower structural change

Finland

Results from DREMFIA model indicate that in Finland Nordic Aid alone have facilitated farm size growth by improving production structure in Nordic Aid regions. Furthermore, the model results support the view that the combination of Nordic Aid and relatively high temporary investment supports, as they have been implemented in Finland, has hastened investments on medium size farms significantly more than would be the case otherwise. Thus, the interaction of the support programs have contributed in encouraging investments in middle sized farms and maintaining a larger number of these farms in production than would be the case without the supports. The results suggest, for example, that reduced level of Nordic Aid would have led to a slightly higher share of dairy cows kept at large (50+ cows) farms than the current level of Nordic Aid. This is despite the lower number of animal places and decreased milk production volume due to reduced Aid level.

With regards to encouraging or discouraging new entry in the sector, the effects of the Nordic Aid scheme have differed. There are signals that the scheme has discouraged entrants from outside the existing farming households, because the aid has maintained agricultural asset values. On the other hand, the scheme has provided continuation for the family farms by advancing and encouraging

farm successions, where new entrants from the farming households take over the farm from the elderly farmers (e.g. from their parents).

Environmental support

Nordic Aid has neither any explicit environmental objectives nor any targeted environmental measures. It can, though, be seen that in Finland the above interactions between Nordic Aid, investment support and CAP support has resulted in a significant area of land being maintained in agricultural production rather than being converted to forest or set-aside. A larger agricultural area has been positive for landscape mosaic and biodiversity in Finland but negative for pollution levels as these tend to increase with output. In Sweden the effects of Aid are less pronounced. Though a small positive impact on the area of agricultural land was found the indirect impact of Aid on mosaic and landscape has been negative. This is because Aid is concentrated to milk production which has indirectly resulted in more intensive land uses than otherwise would have been the case. In addition, the positive and negative environmental effects caused by Nordic Aid computed in Question 6 can be said to be respectively coherent with or create discrepancies with the environmental measures. Those effects can be related to the objectives of the environmental measures in the RDP. The main objectives of the environmental measures are the following, excluding organic farming:

The agri-environmental support scheme in Finland implemented during the programming period 2000–2006 compensates the farmers for income losses resulting from the reduction in the production and increased costs as the farmers give a commitment to undertake measures aimed to reduce environmental loading caused by agriculture. The main emphasis is on water protection, but efforts are also made to reduce emissions into the air, reduce risks due to the use of pesticides and take care of the rural landscape and biological diversity. The support consists of basic measures, additional measures and contracts concerning special measures. The aim has been that the basic measures would be adopted by as many farmers as possible, and this has also succeeded: in 2004 the scheme covered 91% of the Finnish farms and 96% of the arable area.

Open and varied agricultural landscape: The aim of the measure is to improve and/or maintain the landscape and to prevent large scale abandonment of agricultural land in northern Sweden.

Compensatory allowances in less-favoured areas: The aim of the measure is to maintain employment in active agriculture in these areas, while at the same time promoting preserving and promoting farming methods which pay particular attention to environmental requirements. With regard to this aim, agricultural land should be kept under extensive forms of production and afforestation and overgrowing should be counteracted.

Conservation of biodiversity and cultural heritage values in the farmed landscape: An aim of the measure is to maintain the cultivated areas of semi-natural pastureland and mown meadows so that the diversity of species is conserved.

Compensatory allowances are intended to promote extensive production forms but since Nordic Aid is coupled to production it has the reverse effect and encourages more intensive production. As shown by the model simulations Nordic Aid results in a greater area of intensive land use at the cost of arable pasture and grazing land. This is also in contradiction with the measure Conservation of biodiversity which is intended to preserve semi-natural grassland in the area. On the other hand, Nordic Aid contributes to maintain a slightly larger amount of land in agricultural use.

(2) Nordic Aid coherence with the CAP and rural development objectives and the relevance of needs for the objectives

(2.1) Objectives of the schemes

One of the objectives of Nordic Aid is to maintain agricultural production in the Nordic Aid areas. In the Treaty of Rome, where the original goals of the CAP are outlined no equivalent objective is present (Table T4.4). Instead, the focus is on agricultural productivity, the standard of living, the stability of markets, the availability of supplies and reasonable prices for the consumers. Those objectives are still valid, although the mechanisms and principles employed to attain them have changed over time.

Table T4.4. Objectives of the CAP (the Treaty of Rome, 1957) and objectives of the Nordic Aid scheme (Act of Accession to the European Union)

Scheme	Objectives
CAP	- to increase agricultural productivity; - to ensure a fair standard of living for the agricultural community; - to stabilise (agricultural) markets; - to assure the availability of supplies; - to ensure that supplies reach consumers at reasonable prices.
Nordic Aid	The Commission shall authorize Norway, Finland and Sweden to grant long-term national aids with a view to ensuring that agricultural activity is maintained in specific regions. These aids must be granted in particular in order to: - maintain traditional primary production and processing naturally suited to the climatic conditions of the regions concerned; - improve the structures for the production, marketing and processing of agricultural products; - facilitate the disposal of the said products; - ensure that the environment is protected and the countryside preserved.

When introduced in 1962, the CAP granted farmers guaranteed prices for their commodities but an unlimited buying guarantee combined with prices substantially above world market prices led to surplus production. The intention of the 1992 reform was to reduce surpluses and control expenditure, while the aim of the subsequent 1999 reform was to deepen and widen the previous reform by replacing price support measures with direct aid payments, accompanying this process with a consistent rural and environmental policy. The 2003 reform introduced a new system of single farm payments (income support) and cut the link between support and production (decoupling). The CAP was previously based on a series of direct aids linked to area, production and number of livestock units. Following decoupling, aid paid to producers is no longer dependent on the type of production. The central objective of the 2003 reform was to increase the market orientation of the agricultural economy as a precondition for a viable European agri-food sector and to strengthen structural, environmental and broader rural development.

A general result for both Finland and Sweden in the analysis regarding synergies is that decoupling of CAP support following the 2003 reform has increased the importance of Nordic Aid in maintaining production in the targeted areas. Also, at least for Sweden, the efficiency of Nordic Aid has increased when being combined with decoupled support. Therefore, looking at the overall objectives and the motives underlying the reform process that CAP has undergone since 1992 the two schemes are becoming less coherent. While coupled support in the CAP has been increasingly replaced by direct payments and income transfers in form of the single farm payment and combined with specific support targeted to environmental and rural development objectives in Pillar II, Nordic

Aid has remained unchanged with a large part of its support coupled to production. The price support for milk production in Nordic Aid region, in particular, is in discrepancy with the CAP reforms to replace price support measures with direct aid payments. Hence, Nordic Aid can be said not coherent with the objective of the reformed CAP of promoting a more market-oriented agriculture, as coupled support strongly influence the farmers' production decisions. Altogether, the objectives between the two schemes differ and the set of measures to achieve the objectives have become increasingly disparate over time.

In light of the reformed CAP, it could be asked to what is the role of the Nordic Aid. How the question should be answered depends on the interpretation of the overall objective of the Nordic Aid that is, whether "to maintain traditional primary production naturally suited to the climatic conditions of the regions concerned" should be regarded as an end in itself or a means to accomplish other objectives. If one of the sub-objectives is to maintain a certain level of agricultural production in a specific area, then support coupled to production is the most efficient measure to accomplish this intention with. This is especially the case if the region in question has a natural disadvantage in agriculture as is the case in the Nordic Aid area.

Based on the objective to maintain traditional primary production and processing naturally suited to the climatic conditions of the regions concerned the Need in the intervention logic in the Descriptive Part of the evaluation accordingly becomes to compensate farmers for the adverse agricultural conditions prevailing in the Nordic Aid area, and it can be noted that the adverse agricultural conditions in the Nordic Aid area has not diminished since the Nordic Aid scheme was introduced. The compensation to farmers in the area inevitably creates market distortions and the higher the amount of support the larger the degree of distortions. Whether the level of support is adequate or not should in this case be related to how much agricultural production the current CAP measures preserve and how much additional support that is needed to "maintain production".

How the concept "maintain" should be interpreted becomes an issue in this case – should the level of production for instance be the same as in the reference year? In this perspective it is clear that the Nordic Aid has clearly contributed to maintaining agricultural production in the Finnish Nordic Aid regions at its pre-accession level. This result holds especially for milk production that is the most important production sector in the Finnish Nordic Aid region. In Sweden the combination of Nordic Aid and CAP support has also been able to maintain milk production in the sub-region 2a as production has not fallen below the reference year level. The combination of support has not, though, been sufficient to maintain milk production in Swedish sub-regions 1 and 3, where production has been in stronger decline than in the rest of Sweden. The tendencies in Finland are similar. The northernmost sub-region C4 in Finland is loosing production to the more southern sub-regions. The dairy and livestock production in the Finnish sub-regions has been clearly concentrating into the sub-region (C2) and towards the western coastal line.

It could also be the case that the objective to maintain traditional primary production and processing naturally suited to the climatic conditions of the regions concerned is derived from underlying social needs faced by the farmers and the community at large and if the CAP also can be said to ultimately target those needs, it can be investigated whether the CAP is insufficient to cater to those needs and, if this is the case, how the Nordic Aid can complement CAP in this respect. Also, the relevance of the objective "to maintain agricultural production" can then be related to those needs. With this perspective it can be discussed whether other types of measures within Nordic Aid could more efficiently fulfil those needs than the current measures. This type of analysis is not included in the commissioned evaluation but it is of importance for the future structure of Nordic Aid. The specific needs of the Nordic Aid area can essentially be broken down into economic/social needs and environmental needs and below a brief discussion of those needs are presented.

(2.2) Economic, social and environmental needs

Beyond its primary function of supplying food and fibre, agricultural activities can also shape the landscape, provide environmental benefits such as land conservation, the sustainable management of renewable natural resources and the preservation of biodiversity, and contribute to the socio-economic viability of many rural regions. Because of this multifunctional character, agriculture can play an important role in the economic life of rural areas in the Nordic Aid regions, although agriculture is no longer a driving force for employment and income. An important implication of the process of structural change over the past two three decades is the decline not only in the proportion of total output and employment accounted for by agriculture, but also the income derived by farm households from farming. The sector's economic significance has declined, and its structure and interaction with the rest of the economy have become more complex. It is therefore clear that agriculture alone cannot maintain rural livelihood, though it may still contribute to rural livelihood also through its traditional goal, i.e. via helping to maintain economic viability of the agricultural sector.

Nordic Aid schemes have attracted into and retained in the agricultural sector higher levels of resources than would have occurred without such support. In other words, Nordic Aids have resulted in excess of resources, particularly labour and land remaining in agricultural production in less favoured rural areas, thereby curtailing the decline of agricultural and rural populations. Notwithstanding the aforementioned potential positive contribution of agricultural support policies to rural economy, policies designed to retain resources in agriculture effectively contributes to the problem of excess capacity in the sector, which in turn lowers the rate of return on farm labour. Moreover, the balance of support is either capitalised into asset values (land) or transferred up or down the food chain (input suppliers, processors, distributors).

Indirectly, rural development measures for the diversification of the rural economy and the improvement in the quality of life in rural areas have to compete for funding with measures targeted only for agricultural support under the Nordic aid, CAP, and Axis 2 of the rural development scheme. Payments concentrated to agriculture cannot solve the problems of sparsely populated rural areas and rural heartland areas. The logic of remunerating the multifunctional role of agriculture – one of the key concept in the CAP today – calls for better consideration of factors like the rural territory, the environment, the landscape, rural communities and rural employment. Yet, even though multifunctionality of agriculture is easy to identify as a conceptual device for the reconfiguration of policy, there are some serious limitations and problems where its practical implementation is concerned, as the experience in CAP policies has shown. The allocation of CAP spending does not advance multifunctionality very much at all.

An important objective with the agricultural policy in the Nordic areas is also to promote *environmental objectives*. Finland and Sweden are the most forested countries in Europe, which means that the position of forestry and forest industry is particularly strong and significant. In the densely forested areas, the agricultural landscape can be said to "open" up a sea of forest that creates living space. In Finland, the share of agricultural land in the total surface area is only 8.9 per cent, while the Community average is 46.7 per cent. Without agricultural activity "open" land would eventually regenerate to forest, the natural vegetation. A potentially important effect of Nordic Aid from an environmental perspective is to preserve agricultural land in areas were farmland is scarce, and the basic conditions for agriculture weak, thereby contributing to the provision of environmental services. So far Finland and Sweden have managed to prevent land abandonment through national and EU support measures for agriculture.

(3) Decoupling of Nordic Aid

An alternative to align Nordic Aid with the reformed CAP is to decouple Nordic Aid. The effects of decoupling are presented below.

The DREMFIA simulation results suggest that de-coupled Nordic Aids would not maintain milk production or meat production in the Nordic Aid areas in Finland at the current level, the drop in production volume would be almost as much as if the Nordic Aid was abolished altogether. De-coupling all Nordic Aids from production at 2008, would, according to the DREMFIA analysis, result in a 44% decrease in milk production, 51% decrease in beef production, and 13% decrease in pig meat production in Nordic aid regions until 2015 (Table T4.5). Furthermore, results from DREMFIA model indicate that coupled Nordic Aids contribute to growth of farms and hence improve production efficiency in Finland, and such a positive development would slow down, at least temporarily, if Nordic Aids would be decoupled in full.

Table T4.5. The impacts of de-coupled Nordic Aids on milk production (million litres) and number of livestock units (1,000) in the Nordic Aid regions in Finland, 1995-2020.

	Milk production (million litres)		Bovine animal units (1,000 livestock units)		Pig animal units (1,000 livestock units)	
	baseline	de-coupling	baseline	de-coupling	baseline	de-coupling
1995	1641	1641	458	458	94	94
2000	1665	1665	420	420	87	87
2005	1682	1682	398	398	107	107
2010	1519	1203	345	286	89	91
2015	1573	911	345	223	87	92
2020	1576	842	341	217	?	82

However, de-coupling Nordic Aids from production should increase income transfer efficiency and, in turn, farm income, at least slightly. This is because de-coupled Nordic Aids do not decrease with the decreasing output. This means that a farmer may shut down unprofitable activities without loosing any production linked subsidies. Furthermore, the decreased production levels imply that income per hour of labour would be 50% higher in the de-coupling scenario.

The results from the Agripolis simulation show that Nordic Aid for milk has little impact on farm structure even with decoupled CAP support. As in the Agenda 2000 framework, reductions in milk aid resulted in lower quota price rather than impacting production and hence farm structure. On the other hand a modelled decoupling of Nordic Aid was shown to result in an extreme breaking of structural change, with less than 10% of farms leaving the sector (over the 13 year simulation period) compared to 30-35% without Aid. In other words decoupling Aid would magnify the structural impacts of the decoupled CAP because decoupled aid maintains profit/ha UUA and as such provides little incentive for farmers to leave the sector or rationalize production. The consequence of “too many” farmers remaining in the sector, is that less land will come onto the rental market and hence reduce the opportunities for “efficient” farms to expand, and structural change grinds to a stop.

(4) Survey responses

In the questionnaire, the farmers and the administrators/ stakeholders were asked whether they think that Nordic Aid is coherent with other forms CAP or national support.

Does the Nordic Aid fit well with other forms of support to agriculture?

Most of the farmers stated that the Nordic aid fits well with other aid schemes. In Finland 53-70 % and in Sweden over 80 % of farmers had the impression that Nordic aid is in synergy with the other aid schemes. However, a notable amount of farmers in Finland were 'unsure' whether Nordic aid fits well with the other forms of support, whereas the Swedish questionnaire lacked this option. (Table T4.6). Those farmers who perceived some inconsistencies between the Nordic Aid and other support schemes were given an opportunity to specify which support scheme they consider to be least consistent with the Nordic Aid. Only few Finnish farmers have answered this question and all of them referred to the CAP support.

Table T4.6. Statements of the farmers and respondents of administration and stakeholders on the coherence of the Nordic Aid Scheme with other aid schemes.

Finland					Sweden			
Sub-area	Yes	No	Unsure	Non-resp.	Sub-area	Yes	No	Non-resp.
C4	53	0	38	9	1	92	6	2
C3	70	6	18	6	2a	87	4	9
C2	65	4	25	6	3b	95	2	3
C1	55	2	42	2	3	83	12	5
					X*	88	6	6
Resp.rate	96				Resp.rate	94		
Resp. of administ-ration	69	28	1	2	Resp. of administ-ration	87	5	8
Resp.rate	99				…			

About 70 % of the Finnish administrators and stakeholders considered the Nordic Aid coherent with other support schemes, but nearly 30 % had ticked the opposite statement. Over half of the respondents had answered the questions, what support the Nordic Aid is least consistent with. More than half of the answers concerned CAP support, 15 % environment support and nearly 20 % investment aids. Only few ticked compensatory allowance or some other aids. In Sweden, the vast majority of administrators and stakeholders, 87%, mean that the Nordic Aid fit well with other aid schemes; only 5% indicate the opposite.

Farmers were also asked about their opinion about their opinion about the impact of decoupling of the Nordic Aid in their own production.

What would happen with your production if Nordic Aid is decoupled from production?

A relative large share of farmers both in Finland and Sweden believes that they would decrease or close down their production. Surprisingly, farmers in the northernmost region in Sweden, where the share of subsidies in the income is the highest, are least inclined to quit or decrease production. This may reflect a lack of opportunities of alternative employment.

Table T4.7. Farmers' opinions on the effect on production of a de-coupling of Nordic Aid (Percent of farmers).

Finland	**No effect**	**Increase**	**Decrease**	**Close down**	**No opinion**
Sub-reg. C1	53	1	13	5	28
Sub-reg. C2	51	3	14	11	21
Sub-reg. C3	27	1	21	27	25
Sub-reg C4	25	0	16	20	40
Resp. rate	97				
Sweden	**No effect**	**Increase**	**Decrease**	**Close down**	**No opinion**
Sub-reg. 1	26	0	26	20	28
Sub-reg 2	17	0	39	23	17
Sub-reg 3	20	3	32	17	27
Resp. rate	98				

Sources: Finland – Q8/2
Sweden – Question 35 in Questionnaire to farmers in Nordic Aid region.

Conclusion

The Nordic Aid Scheme operates alongside with the CAP-support (including rural development measures). The main issue addressed by the evaluation question is whether different schemes work against or in synergy with each other. A straightforward interpretation of the question of synergy would be to compare all measures included in the Nordic Aid schemes with all measures included in other CAP-supported schemes. However, due to the large number of measures involved, the analysis has been focused on the most important and relevant measures in the Nordic Aid area.

The Nordic Aid comprises measures such as the price supports for milk and the headage payments for live animals that are similar to the measures included in the CAP supports prior to the 2003 CAP reform. Further, the decrease of CAP supports from south to north has been levelled off by Nordic Aid measures that have increased from south to north. The results suggest that these measures have been efficient in maintaining agricultural production especially in the Finnish Nordic Aid regions, as compared to fully de-coupled payments or no Nordic Aid at all. However, the marginal effects of the coupled supports on milk production have been in some cases negligible, since a quota in milk production imposed by the CAP policy has been binding also in the Nordic Aid areas. Nevertheless, after decoupling of CAP supports in the 2003 reform, farmers' incentives to maintain production are expected to significantly decrease and, hence the role of Nordic Aid will be more important for keeping the production in the Nordic Aid area. With decoupled CAP, reductions in Nordic Aid leads to lower levels of production.

Therefore, incoherency between the Nordic Aid measures and the CAP measures has increased. Important features of the CAP reform process have been that the support is no longer linked to the quantity produced and that support is no longer defined for individual commodities allowing more freedom on what to produce. An overall purpose has been to increase the market orientation in resource allocations and competitiveness of the agricultural sector. The Nordic Aid scheme with commodity-specific, coupled support as well as production limits for individual commodities creates a rigid production structure detached from the market.

With respect to coherence with rural development measures, Nordic Aids have resulted in excess of resources, particularly labour and land remaining in agricultural production in less favoured rural areas curtailing their rates of decline. Notwithstanding these potential positive contributions of agricultural support policies to rural economy, payments concentrated to agriculture cannot solve the problems of sparsely populated rural areas and rural heartland areas. The logic of remunerating the multifunctional role of agriculture calls for better consideration of factors like the rural territory, the environment, the landscape, rural communities and rural employment. The results signal that, in particular, if the goal of maintaining agricultural activity is shifted from intensive agricultural production (e.g. milk and meat) more towards extensive land management and environmental services, there is likely space for simplifying the rich set coupled support measures. Simplification would also allow for more efficient allocation of resources between the individual production activities such that allocations would be steered more by the market signals than locked in by the specific support measures.

Conclusions for Theme 4

The official trade data and the statements of representatives of administration and other stakeholders do not seem to indicate that Nordic Aid has caused distortions in interregional trade as compared to the pre-accession situation. Increasing trade flows of food, agricultural commodities and live animals are a common characteristic of modern and open economies. They are an

indication of increasing market efficiency resulting from reductions in trade barriers and are not, necessarily, linked to a specific agricultural support scheme, such as the Nordic Aid. These general tendencies are observed also in the foreign trade of Finland and Sweden since their accession to the EU. Finland's agri-food trade has almost doubled during the EU membership. Sweden also witnessed an increase in agri-food trade since the accession in 1995. While there does not seem to be evidence that Nordic Aid has caused distortions in trade compared to the pre-accession trade levels between Finland and Sweden or with the rest of the EU, this does not preclude that there may be distortions when comparing the current situation with a situation without Nordic Aid. Since the Nordic Aid scheme contributes to maintaining agricultural production in the Finnish Nordic Aid area, it also (indirectly) maintains agricultural export volumes at their pre-accession levels and affects trade flows with other countries.

The Nordic Aid Scheme operates alongside with the CAP-support (including rural development measures). Important issues are therefore the coherence between the measures, *i.e.* whether different schemes work against or in compliance with each other, and whether Nordic Aid is efficient relative other existing support systems, *i.e.* if the measure is the best way to obtain the objective. The results suggest that Nordic Aid measures such as the price supports for milk and the headage payments for live animals have significantly contributed to farm income. However, since coupled payments impose costs on the recipients and direct the recipient to certain activities in order to receive the transfer, decoupled supports would have been more efficient to fulfil an income supporting objective.

Nevertheless, the results also show that Nordic Aid has been efficient in maintaining agricultural production, as compared to partially de-coupled arable land payments or fully de-coupled payments. The role of coupled Nordic Aid measures in maintaining agricultural production has further increased after the recent CAP reform, which de-coupled most of the CAP support payments from production into the Single Farm Payment. Hence the role of Nordic Aid will be more important in this respect. However, the question of coherence should be addressed at another angle. Important features of the CAP reform process have been that the support is no longer linked to the quantity produced and that support is no longer defined for individual commodities allowing more freedom on what to produce. The Nordic Aid scheme with commodity-specific, coupled support as well as production limits for individual commodities creates a rigid production structure detached from the market. In this respect, incoherency between the Nordic Aid measures and the CAP measures has increased.

With respect to coherence with rural development measures, Nordic Aids have resulted in excess of resources, particularly labour and land remaining in agricultural production in less favoured rural areas curtailing their rates of decline. Notwithstanding these potential positive contributions of agricultural support policies to rural economy, payments concentrated to agriculture alone cannot solve the problems of sparsely populated rural areas and rural heartland areas. The results signal that, in particular, if the goal of maintaining agricultural activity is shifted from intensive agricultural production (e.g. milk and meat) more towards extensive land management and environmental services, there is likely space for simplifying the rich set coupled support measures. Simplification would also allow for more efficient allocation of resources between the individual production activities such that allocations would be steered more by the market signals than locked in by the specific support measures.

THEME 5: ADMINISTRATIVE IMPACTS

Q 10: What are the implications of the current limitations at total, regional and sector level; have these been followed and necessary to fulfil the objectives of the Nordic aid scheme or do they leave room for simplifications in terms of targeting and transparency?

Introduction and interpretation

According to the Article 142 in the Treaty Act (concerning the conditions of accession 1994) Nordic Aid measures are coupled to physical inputs and they are not allowed to lead to an increased production in the area. In addition, the measures are not allowed to be coupled to future production. The evaluation question relates to administrative bodies responsible for the administration of the Nordic Aid scheme and the routines necessary to ensure that the Aid scheme stays within the agreed regulations. The administrative regulations for the Nordic Aid scheme were stipulated more than ten years ago, since then the structural development in the area has advanced, which could imply possibilities to simplify the administration.

"*Current limitations*" refer to the limits agreed upon while introducing the Nordic Aid scheme in 1995. These limits concern the quantity of milk produced, the number of animals/LU:s and the number of hectares, as well as the amount of support in EUR, both at total level and at sub-region level per sector.

The issue of whether the limits are "*necessary*" to fulfil the objectives of the Nordic Aid Scheme relates to the relationship between the limits and the observed production volumes. An additional issue is if the current set of multiple limits, restrictions on both monetary support payments and on production volumes and production inputs, is needed. The question also pays attention to "*possible suggestions for simplification*" of the Aid scheme. For some aid measures and production lines the Aid scheme may appear complex and discourage potential beneficiaries from applying for the support. In addition, there is the issue of whether the differentiation of limits according to sub-region is efficient and necessary to fulfil the objectives of the scheme.

The condition that the supports should not be linked to future production is self evident because the supports are determined by the amount of predetermined production factors. Nevertheless, we conclude already at this stage that the supports are not linked to future production.

Because the number of objects and sub-regions in the Nordic Aid scheme is large, especially in Finland, the realization of the production and the aid payments in respect to the limits of the production factors and the budget of the Nordic aid are presented only for the whole Nordic Aid area in Finland and in Sweden. The milk sector is further disaggregated by sub-region because this sector is spread thorough all sub-regions and most of the supports is allocated to milk.

Analysis and the judgement criteria

The analysis involves three different sub questions and the corresponding judgement criteria:

1) **Have the current limitations been followed at total, regional and sector level?**

   - The actual support and production in relation to the reference levels of amount and quantities of milk, number of animals and land area.

2) **Have the current limitations been necessary to fulfil the objectives of the Nordic Aid scheme?**

   - The general objective concerned
   - Preferences and statements of farmers and representatives of administration and stakeholders

3) **Is there room for administrative simplifications of the Nordic Aid scheme?**

   - Preferences and statements of farmers and representatives of administration and stakeholders

1. Have the current limitations been followed?

Aid payments

Regarding *annual payments to animal production*, there are three exceptions where the annual payment either hits the total limit per sector or exceeds it (Table T5.2). Two of these exceptions concern the first year of membership in 1995, when both countries exceeded the reference amount for payment to milk production. In Finland, Nordic Aid was lower in the 1990's because of the transitional aid. In the Swedish Nordic Aid area, support to milk production exceeded the reference amount in 1995 by 15 %. Thereafter, the realized amounts vary between 92-106 % of the reference amount, reflecting minor violations of limits in sub-areas 2-3 in 1996-2000. The third exception is the total annual payment for laying hens in Sweden in the years from 2003 to 2005.

Regarding *annual payments to crop production*, there is only one occasion when the realized annual payment has exceeded the reference amount, i.e. support for starch potatoes in Finland in the first year of membership 1995 (Table T5.3). This was caused by an erroneous definition of the reference amount, which was later corrected.

Amount of production factors

The *limits concerning the underlying production factors*, such as hectares allocated to supported crops and animal heads/livestock units, have generally been followed. However, in 2000, the number of pigs in the Finnish Nordic aid area exceeded the reference number by 7%, the number of poultry exceeded the reference number by 3%, and the number of horses by 32%. But even if the number of these animals has exceeded the reference numbers, the aggregate aid payments did not exceed their maximum limits, because the payment rates (per livestock unit) were scaled down accordingly (Table T5.2).

Concerning the crop production factors, the hectares allocated to starch potatoes exceeded the reference area by 56 % in 1995 in Finland, but this was caused by a miscalculation in the initial reference area (Table T5.2) which later on has been adjusted to better correspond to the pre-accession levels. There are some minor production lines in horticultural and field scale vegetables sectors that have exceeded the reference areas. In apple production, the problem was solved in 2002 by defining the upper limits only for the whole area of field scale vegetables and apples

(2002/404/EC). As with the animal husbandry sectors described above, the payment rates have been adjusted also in the crop sector so that the limits for aggregate aid payments have not been exceeded.

Production volumes

In Finland the production volumes of cow's milk have exceeded the limits by 3-5 % and, since the aid payments have been scaled down, no notable production restrictions nor economic sanctions has resulted. By sub-regions, the reference quantities of milk have been exceeded most notably in C2 and C3, where production was 9 % higher than the reference quantity in 2000 and 7 % higher in 2005. In the whole Nordic Aid area production was about 5.5 % higher than the reference quantity in 2000 and about 3% higher than the reference quantity in 2005 (Table T5.4).

In Sweden, the reference quantities of cow's milk have not been exceeded for the Nordic Aid area as a whole, since the figure for 1995 is not comparable to the rest due to the estimation method used when introducing the scheme. In fact, production declines during the period (Table T5.4). At sub-region level, milk production has exceeded the reference quantities in sub- region 2a from 1999 to 2005, but the figure for 2005 is somewhat misleading. In 2004 some parishes in sub-region 2b were moved to sub-region 2a, which explains the increase in 2a in 2005. The reference quantity was not adjusted correspondingly, (probably because reference quantities are not valid from 2003). If the figures for 2a and 2b are summarized, instead a reduction in milk production is found, and the volume is well within the restriction.

2. Have the current limitations been necessary?

With perfect information of production technologies etc., no quantitative restrictions would be necessary as the planner could optimize the support payments to achieve the policy goals without risk of exceeding reference quantities.

Under uncertainty and imperfect information two cases are identified. The Nordic Aid scheme is either failing to reach the goal of maintaining agricultural activity – as interpreted under Theme 1, *i.e.* decreasing production volumes far below the reference quantities, or production volumes are exceeding the agreed limits. If the scheme is at risk of failing to maintain production adjustments in monetary regulations would be sufficient for steering the development towards the goals. The case when the production volumes are at risk of exceeding the reference quantities is more complicated and would call for a combination of quantitative and monetary restrictions. This is because subsidized production in excess of the reference quantities could be argued to result in unwarranted trade distortions given the conditions for the scheme (c.f. the discussion under Theme 4 above).

In Finland, the standard has been either to scale down the support rates or to pay support only for the reference quantity (milk) so that the limits for the total payments have not been violated even if the production volumes have exceeded the reference quantities. Thus, though it may be argued that the violations of the reference quantities make this policy questionable, the monetary limits have in practice been the true binding constraint. In Sweden, the limits concerning the production volumes were abolished already in 2003 and only the monetary limits have remained thereafter. The fact that reference quantities have not been exceeded suggests that monetary limits for the aggregate aid payments per sector have been sufficient.

At the sub-regional level, the boundaries determine the level of Nordic Aid, which could be crucial for whether or not the reference quantities are violated. Nevertheless, the only information available

on whether the boundaries reflect differences between sub-regions are the data on sub-regional production complemented with the statements provided in the survey responses.

Empirical data on sub-regional production

Given the data on sub-regional milk production in Table T5.4 it may be conjectured that a revision of regional differences in aid levels is called for. For instance, in Finland, milk production has decreased somewhat in sub-region C1 and substantially in C4, while it has increased marginally in sub-region C3 and substantially in C2 since accession. In Sweden, milk production has decreased substantially in all sub-regions except 2a. Moreover, in both countries reference quantities have been exceeded in the sub-regions where milk production has increased while, except for in sub-region C4, production has been below the reference quantities in the sub-regions where milk production has decreased. Hence, if the goal is to maintain production in each sub-region, one suggestion would be to reduce aid levels in C3 and C2, and 2a, and increase them in the other sub-regions.

Survey results

Farmers and representatives for administration and stakeholders were asked whether the demarcation between sub-regions represent a fair reflection of differences in natural handicaps. These questions have been analysed in the context of evaluation Question 2 in Theme 1, and only a short summary is given here. In Finland, the majority of the farmers thought that Nordic Aid has paid enough attention to the natural differences between sub-regions, and did not find it necessary to change the boundaries. Most of them were also satisfied with the differences in aid between production lines. In Sweden, only in the most northern sub-region a majority of farmers were content with the boundaries between sub-regions. However, regardless of sub-region, only a minority was in favour of changing the boundaries. Administrators and other stakeholders were less satisfied with the present boundaries and more in favour of changing them. One explanation could be that the respondents at the same time consider the alternative, which is to adjust the aid levels between the sub-regions instead. The overall conclusion is that the views on how the borderlines should be revised are mixed and that no general conclusions can be drawn from the statements.

Administrators and other stakeholders were also asked for their opinions about the quantitative restrictions on sector level. In Sweden, very few of the respondents (3-16%) perceived the quantitative restrictions to be necessary. This is also the case in Finland (with the exception of milk, were more than a third of the respondents found the reference quantity to be necessary). Though the share of non-respondents was high (about 50%), these results, in combination with the empirical data, suggest that the quantitative restrictions in most cases are redundant.

Interestingly, the result from the administrators/stakeholders in Finland differs substantially from the Finnish farmers' opinions regarding the restrictions on milk quantities. A clear majority (more than 70%) of the responding farmers believe that a reference quantity for milk is necessary.

3. Is there room for administrative simplifications?

Description of the administrative routines

Finland and Sweden have to submit information each year to the Commission on the impact of the aid granted, on the economic development in the specific regions and on the impact on the environment and on the preservation of the countryside. Those annual reports provide details on aid stratified by the sub-regions.

In Finland the administration of agricultural aids is decentralized. Duties of the Ministry of Agriculture and Forestry (MAF) concern planning, implementing and bringing together of the aid schemes wholly or partly financed by EU and the national aid schemes. MAF is responsible also for the developing of the aid schemes and the control systems as well as for monitoring, evaluation and reporting of the impacts of the aids. The regional organization of the agricultural administration consist of 15 Employment and Economic Development Centres. In addition to monitoring the aid schemes, these so called TE-Centres also participate in the implementation of the aid schemes as e.g. schooling of the farmers, handling of selected applications and accepting of payments. The aid applications are submitted in and accepted by the municipalities, where the applications are saved into the Interregional Aid and Controlling System. Calculations are centralized, and thereafter officers in the municipalities approve and effectuate payments to the farmers.

In Sweden, Nordic Aid for milk production, slaughter pigs and egg production is handled, approved and controlled by the Swedish Board of Agriculture (SJV). Audits to check that the beneficiaries meet the conditions required for the aid are conducted within the integrated administration and control system (Ararat). On the spot checks are conducted regarding qualification factors like the minimum requirement of hectares of agricultural land. SJV also audits dairies and slaughterhouses within the scope of the aid system according to the market regulations. The dairies send computerized information about milk deliveries connected to delivery number and identity for every producer. The information is checked against the application in force and (from 1 January 2006) the individual milk quota of the producer. Payments are carried out after delivery together with the monthly payments from the dairy. Dairies involved also receive aid for the transportation of milk within the area. The application is sent to SJV and the payment is carried out after delivery. According to a special regulation ((EG) 854/2004) slaughterhouses are obliged to report every slaughtered animal to SJV. Payments to the producers are carried out by SJV after delivery according to information from the slaughterhouses. For piglets, goats, soft fruit and vegetables the aid is handled by the County Administrative Board (CAB) in the county where the farm is situated. The support is applied for (together with the EU supports) and paid once a year, usually in November. SJV is the paying authority and also responsible for co-ordinating the audits that are conducted by the CAB. At least 10 % of the applications related to animal based aid and at least 5 % of the area-based aid is audited. These percentages are coherent with the sampling techniques used in IACS.

Simplifications already effectuated

In Finland, Nordic Aid did not reach its long term level until Commission Decision of 2000/405/EC. The same decision approved the inclusion of the unused SLOM quantities allocated in 1997 and 1998. The total number of animals qualifying for aid was limited by the application of a stocking density (i.e. two livestock units (LU) per hectare of forage area). Finland accepted not to apply the upper limit of beef and veal (90 heads per farm) under the common organisation of the market. Calculation of the overshoots in the meat sector was changed to consider the sector as a whole instead of different meats. Also, the poultry sector got some flexibility in the number of livestock units and the aid payable implying, e.g. that production could follow increases in demand. In the Commission Decision 2002/404/EC the former Decision 95/196/EC was ceased and stated the before mentioned amendments. According to the amendment C (2005)122, Nordic Aid to milk production was paid only for the reference quantity of milk per farm, subject to a limit of 1 776.8 million kg for the whole Nordic Aid area. The amendment came into force in 2006, but already before that many farmers had to buy additional milk quota in order to qualify for the full aid.

In Sweden, in 2000, the Commission Decision 96/228/EG was retroactively changed (from 1 January 1998), implying that the basis for comparison between realized and reference quantities should be seed consuming animals (slaughter pigs, sows and laying hens eligible for support)

converted into livestock units (LU). The summarized reference quantity for the animals concerned is from 1998 and on 16,532 LU. Commission Decision 2004//291/EG was retroactively changed from the 1 of January 2003 implying that reference quantities regarding production volumes no longer should be valid. From this date only the monetary limits in EUR per production line and sub region is valid as reference limit.

Survey results

As farmers and representatives of administrators and stakeholders on a regular basis deal with the aid, they were asked whether they were (globally) satisfied with the administration of the scheme, as well as with separate dimensions of its administration.

More than 70% of the farmers in the northernmost sub-regions in both countries were satisfied with the administration of the Nordic Aid Scheme in general, and also in the other sub-regions the share of satisfied farmers was high. Nevertheless, in the northernmost Finnish sub-region, more than 50% of the respondents perceived that information about the scheme was lacking, 69% found the application process difficult, and 66% agreed that aid should be paid more frequently. In Sweden, concerns about these issues were less frequent (30-40%). The differences between countries are understandable since the aid scheme is much more complicated and versatile in Finland. Therefore, a direct question on the need for simplifying the administration was put to the Finnish farmers. Depending on sub-region, between 68% and 78% of the respondents agreed with the proposition that the scheme needed simplification.

In Finland, more than 70% of the representatives of administration and other stakeholders found Nordic Aid easy to administrate, the application process to be easy for the farmers, and the guidelines for farmers to be sufficient. More than 60% also found the information to farmers sufficient and stated that payments were on time. Only 27% believed that payments should be made more frequently. On the direct question concerning the need for simplifying the administration, 61% of the respondents stated that there was no need for this. In Sweden, 100% of the representatives for administration and other stakeholders found that Nordic Aid was easy to administer, that the application process was easy for the farmers, and that their guidelines and information were sufficient. Half of the respondents stated that payments were on time, while only 17% believed that payments should be made more frequently. The representatives of administration and stakeholders were also asked about the cooperation between different administrative bodies regarding access to information. In both countries an overwhelming majority (more than 75% in Finland and 100% in Sweden) had no problems whatsoever.

A suggestion for a “profitable” auditing process in the Finnish questionnaire got support from one third of the respondents. The idea of profitability in auditing is that it ought to give more aid payments back than the annual cost of the auditing, if it doesn’t, farmers have followed the pre-conditions of the aid scheme well enough and the number of audits could be reduced. Farmers were also asked for their opinions about the auditing process of the Nordic Aid scheme. As ten years is a long period, and there are several different aid schemes in Finland, (easy to mix up) one extra alternative for answer was given in Finland; being “Have your farm been audited whatsoever?”

Except for in sub-region 3 in Sweden, about 40% of the farmers had been subject to an audit of Nordic Aid during the period (Table T5.1a). In Finland, nearly the same share recalled to have been part of an audit, but could not remember exactly for what scheme. In sub-region C4 all respondents had been subject to audits of agricultural aids during the period.

Table T5.1a. Share of farms that have been audited for the Nordic aid or other aids in Finland and in Sweden.

FINLAND					SWEDEN			
Sub-region	Yes for Nordic aid	Yes for some aid	No	Non-resp.	Sub-region	Yes	No	Non-resp.
C4	46	45	0	8	1	40	58	2
C3	46	26	24	5	2a	43	53	4
C2	39	25	33	4	3b	43	52	5
C1	37	32	27	5	3	27	68	5
C in aver.	39	28	29	4	X*)	47	53	0
Resp.rate	96				Resp.rate	97		

*) X refers to respondents not answered the question on in which sub-region their farm is located.

In both countries most farmers found the auditing processes well functioning (Table T5.1b). An open question about how the auditing ought to be developed gathered 125 answers in Finland (the question was not raised in Sweden). An overwhelming majority of the answers concerned simplification of the aid scheme; surprisingly many suggested changing the auditing process in a more consultative way, so that farmers could learn more about pre-conditions of the aid.

Table T5.1b. Farmer statements about the result of the auditing process in Finland and in Sweden.

	Very well	Quite well	Not well neither poorly	Quite poorly	Very poorly	No resp.
FINLAND:						
C4	63	21	12	4	0	0
C3	54	24	10	0	0	12
C2	62	25	8	3	2	0
C1	51	27	8	3	0	11
C -area in aver.	55	25	8	2	1	9
Resp. rate	91					
SWEDEN:						
1	25	30	40	0	5	0
2a	14	29	49	5	0	3
2b	31	27	35	0	8	0
3	9	18	55	0	0	18
X*)	38	13	50	0	0	0
Resp. rate	98					

*) X refers to respondents not answered the question on in which sub-region their farm is located.

Conclusion

Regarding the *annual support payments,* the limitations have been followed, with some exceptions (*i.e.* payments to milk production).

Regarding *production factors and volumes*, the limitations have generally also been followed, but the number of exemptions is more frequent than in the case of monetary payments. The reason for the discrepancy between the two criteria is that the monetary payment rates have been scaled down accordingly when the amounts of production factors have been at risk of exceeding the agreed limits.

The empirical data, therefore, suggest that the quantitative restrictions are redundant and the monetary restrictions would be sufficient to secure that the limits for the Nordic Aid scheme are not exceeded. Similar conclusion is also supported by the survey responses.

In Finland, most farmers are satisfied with *the spatial distribution of the aid, definitions of the sub-regions and differences of the aid between the production lines.* In Sweden, only in the most northern region a majority of farmers were satisfied with the boundaries. However, in both countries only a minority of farmers are in favour of changing the boundaries. The administrators and other stakeholders were less satisfied with the present boundaries between sub-regions and more in favour of changing them. Nevertheless, their views were so mixed that general conclusions cannot be drawn from them. Hence, the results do not give any firm indications on how to revise sub-region borders or differences in aid levels between sub-regions and production lines.

In both countries the administration of the Nordic Aid scheme is an integral part of the overall administration of EU-supports and simplifications in administrative procedures have been made continuously during the period from 1995 to 2005. According to the views of the representatives for administration, the administration of Nordic Aid is not very demanding and they do not perceive any immediate calls for further simplifications. Also, the majority of farmers in both countries are satisfied with the overall administration of the scheme, though in Finland, there is some concern about the application procedure, and the information and guidelines provided. The demand for further simplifications amongst the Finish farmers is not unexpected, as “simplifications of the administration” probably are perceived to reduce their costs of utilising the scheme. Of course, the fact that a scheme is functioning well (administratively) does not preclude that it could be made to function even better. One might, for instance, consider reducing the number of production lines included in the scheme. However, the results of the evaluation do not provide sufficient evidence to recommend specific measures of simplification.

Table T5.1. Maximum quantities of the aid and production factors and realization of them in the Nordic Aid Scheme for the animal production of agriculture in 1995, 2000, 2002, 2005 in Finland (95/196/EC, 2000/405/EC, 2002/404/EC and MAF) and in Sweden (96/228/EC, 2000/411/EC, 2004/29/EC).

FINLAND and SWEDEN	Year	Limits of aid MEUR	Realization of aid MEUR	%	Limits of LU, ha, tons	Realization of LU, ha, tons [2)]	%
Finland: Bovine animals,	1995	25.3			605,350		
of which	2000	77.3			605,350	510,100	84
	2002[1)]	91.2	51.98	57	167,274	129,360	77
	2005	91.2	54.90	60	167,274	130,862	78
— suckler cows	1995	0.57	0.44	77	15,350	14,513	95
	2000	5.21	2.29	44	15,350	13,180	86
— male bovine animals > 6 months	1995	19.4	11.64	60	117,700	86,432	73
	2000	54.9	41.98	76	117,700	93,251	79
— heifers for slaughter	1995	5.3	3.23	61	57,040	34,535	61
	2000	17.2	6.21	36	57,040	30,281	53
— milk cows	1995				316,900	294,289	92
	2000				322,250	271,821	84
Finland: Ewes and she-goats	1995	1.20	0.93	78	5,010	5,913	118
	2000	2.76	2.49	90	5,886	4,873	83
	2002	3.47	2.57	74	5,886	4,649	79
	2005	3.50	3,25	93	5,886	5,668	96
Sweden: Goats	1995	0.12	0.11	95			
	2000	0.13	0.12	91			
	2004/05	0.13	0.10	80			
Finland: Swine and poultry,	1995	0.7	0.52	74	139,200		
of which	2000	58.3	48.03	82	139,200		
	2002[1)]	61.3	45.96	75	139,200	139,200	100
	2005	61.3	37.03	60			
— swine:	1995	0.5	0.42	84	106,590	122,452	115
	2000	44.7	38.65	87	106,590	114,062	107
— poultry	1995	0.1	0.1	100	32,610	25,316	78
	2000	13.64	9.38	69	32,610	33,560	103
Sweden: Sows	1995	0.32	0.25	81			
	2000	0.34	0.16	47			
	2004/05	0.47	0.20	42			
Sweden: Slaughter pigs	1995	1.38	1.09	79			
	2000	1.68	1.36	81			
	2004/05	1.53	1.36	89			
Finland: Horses	1995				6,000	8,721	145
	2000	2.54	2.12	83	6,000	7,906	132
	2005	2.52	2.23	88	6,000	7,741	129
Sweden: Laying hens	1995	0.26	0.25	99			
	2000	0.29	0.16	56			
	2004/05	0.26	0.28	110			
Finland: Cow's milk:	1995	67.8	69.9	103	1,720,000	1,718,932	100
	2000	202.6	182.3	90	1,750,863	1,846,351	105
	2002	225.22	179.3	80	1,759,129	1.809,339	103
	2005	225.22	158.89	71	1,776,765	1,825,664	103
Sweden: Cow's milk	1995	29.93	34,40	115			
	2000	32.54	31.58	97			
	2004/05	29.71	27.66	93			

[1)] From the year 2002 the upper limits were defined only for the bovine animals total excluding the mil cows, and swine and poultry total (2002/404/EC).

[2)] Amount of production factors qualified for the aid, even if the aid is paid for smaller amount of production.

Table T5.2. Maximum quantities of the aid and production factors and realization of them in the Nordic Aid Scheme for the plant production in 1995, 2000, 2002, 2005 in Finland (95/196/EC, 2000/405/EC, 2002/404/EC and Ministry of Agriculture and Forestry) and in Sweden (96/228/EC, 2000/411/EC, 2004/29/EC).

FINLAND and SWEDEN	Year	Limits of aid MEUR	Realization of aid MEUR	%	Limits of LU, ha, kg, tons	Realization of aid (LU, ha, kg, t)	%
Finland: Sugar beet	1995	0.34	0.29	85	3,750	3,525	94
	2000	1.28	0.47	37	3,750	2,318	62
	2002	1.34	0.45	34	3,750	2,212	59
	2005	1.34	0,38	28	3,750	2,034	54
Finland: Potatoes for starch production	1995	0.32	0.45	141	3,890	6,059	156
	2000	1.18	0.91	77	6,580	5,154	78
	2002	1.24	0.91	73	6,580	5,110	78
	2005	1.24	0.65	52	6,580	4,546	69
Finland: Cereals and other arable crops, of which	1995	9.54	6.90	72	558,300	421,200	75
	2000	14.36	10.06	70	557,700	505,609	91
	2002[1)]	15.14	14.67	97	557,700	297,758	53
	2005	15.14	12.90	85	557,700	315,975	57
— barley, oats, mixed cereals	1995	9.17	6.71	73	507,650	395,870	78
	2000	9.17	7.97	87	507,650	453,962	89
— other cereals and crops	1995	0.4	0.17	43	50,050	25,330	51
	2000	5.2	1.92	37	50,050	51,647	103
Finland: Horticulture under permanent shelter, of which	1995	0.00	0.00		202.9	201.8	99
	2000	18.00	16.75	93	202.9	217.6	107
	2002[1)]	24.69	21.20	86	203.2	202.9	100
	2005	24.69	21.43	87	202.9	189.9	94
— vegetables	1995	0.00	0.00		147.8	149.8	101
	2000	18.00	16.75	93	147.8	154.7	105
— flowers and plants	1995				55.1	52.0	94
	2000		8.29		55.1	62.9	114
Finland: Field scale vegetables and apples	1995	0.03	…		2,095	2,094	100
	2000	0.86	0.81	94	2,095	2,154	103
	2002[1)]	0.90	0.75	83	2,095	1,934	92
	2005	0.90	0.64	71	2,095	1,774	85
— vegetables	1995	0.03	0.00		2,085	2,084	100
	2000	0.86	0.81	94	2,085	2,122	102
— apples	1995				10.0	10.0	100
	2000	0.00	0.00	0	10.0	31.8	318
Sweden: Soft fruits and vegetables	1995	0.22	0.19	86			
	2000	0.22	0.14	59			
	2005	0.22	0.13	62			
Payment per ha UAA (pastures, set-aside, etc.)	1995	26.47	0.00	0	849,502	693,892	82
	2000	26.51	16.79	63	846,812	638,656	75
	2005	27.87	16.48	59	848,812	427,022	50
Young farmers	1995	80.00	15.88	20			
	2000	15.80	12.23	77			
	2002	16.66	11.75	71			
	2005	16.66	12.68	76			
Total	1995	143.01	136.87	96	1,417,140	1,127.887	80
	2000	443.76	354.02	80	1,417,140	1,106.942	78
	2005	485.94	328.10	68	1,419,090	751.541	53

[1)] From the year 2002 the upper limits were defined only for the cereals and other arable crops, and horticulture under permanent shelter total (2002/404/EC).

Table T5.3 Supported milk production (1,000 tons) and the Nordic aid paid for milk (Million Euros) in the Nordic Aid area and in the whole country in 1995, 2000 and 2005. (Sources: 95/196/EC, 2000/405/EC, 2002/404/EC, C(2005)122, MAF and Tike) and in Sweden (96/228/EC, 2000/411/EC, 2004/29/EC and SJV).

	Amount of supported milk[1]) 1,000 tons			Change	Nordic aid paid for milk Million Euros			Change
	1995	2000	2005	1995/05 %	1995 [2])	2000	2005	2000/05 % [3])
Nordic area								
Total	2,193.5	2,307.2	2,257.3	+2.9	104.3	213.9	186.6	-12.8
Finland, %	78.4	80.0	80.9		67.0	85.2	85.2	
Sweden, %	21.6	20.0	19.1		33.0	14.8	14.8	
FINLAND								
Realized:								
Country	2,370.0	2,447.0	2,367.0	-0.0				
C4	23.8	23.2	20.6	-13.4	4.3	5.5	4.6	-16.4
C3	168.9	173.3	170.6	+1.0	18.4	28.3	25.6	-9.5
C2	1,009.1	1,122,8	1,133.8	+12.4	32.4	103.4	91.5	-11.5
C1	517.2	527.0	500.8	-3.2	14.8	45.2	36.9	-18.4
C total	1,718.9	1,846.4	1,825.8	+6.2	69.9	182.3	158.9	-12.8
Limits:								
Country	2,407.0	2,398.0	2,342.0					
C4	24.0	24,0	24.4	+0.7	4.3	5.7	6.5	+14.6
C3	164.0	165,6	175.1	+5.7	17.1	30.5	35.2	+15.2
C2	1,008.0	1,027,0	1,059.7	+4.1	32.7	110.7	124.6	+12.6
C1	524.0	534.2	517.5	-2.2	14.6	55.7	58.9	+5.8
C total	1,720.0	1,750.9	1,776.8	+2.3	67.8	202.6	225.2	+11.1
Realized/ Limits, %:								
Country	98.5	102.0	101.1					
C4	99.2	96.7	84.4		100.0	96.5	70.8	
C3	103.0	104.6	97.4		107.6	92.8	72.7	
C2	100.1	109.3	107.0		99.1	93.4	73.4	
C1	98.7	98.7	96.7		101.4	81.1	62.6	
C total	99.9	105.5	102.8		103.1	90.0	70.6	
SWEDEN								
Realized:								
Country	3,258.0	…	3,163.0	-2.9				
1	52.5	47.3	41.7	-20.6	5.8	5.9	4.8	-18.2
2a	215.0	218.4	230.2	+7.1	18.3	18.4	17.6	-4.1
2b	119.5	116.7	90.6	-24.2	7.2	6.5	4.6	-29.3
3	87.1	78.4	69.0	-20.8	3.1	0.8	0.7	-16.0
1-3total	474.6	460.8	431.5	-9.1	34.4	31.6	27.7	-12.3
Limits:								
1	54.8	54.8	54.8	0.0	5.8	5.8	5.9	+3.0
2a	216.2	216.2	216.2	0.0	17.1	17.1	17.1	0.0
2b	121.1	121.1	121.1	0.0	6.1	6.1	6.1	0.0
3	92.3	92.3	92.3	0.0	0,8	0,8	0.8	0.0
1-3total	484.2	484.2	484.2	0.0	29.8	29.8	30.2	+1.5
Realized/ Limits, %:								
1	95.8	86.3	76.1		101.6	102.3	81.2	
2a	99.4	101.0	106.5		106.9	107.2	102.8	
2b	98.7	96.4	74.8		117.2	106.4	75.2	
3	94.4	84.9	74.8		384.0	102.5	82.7	
1-3total	98.0	95.2	89.1		115.5	105.9	91.5	

[1]) Amounts of milk in the whole country refer to the total milk production to dairy houses.
[2]) Without transitional aid in Finland.
[3]) The change in monetary payments is calculated between the year 2000 and 2005, because at 2000 the transitional aid was phased out and the annual figures are comparable.

CONCLUSIONS AND RECOMMENDATIONS

Impacts

Agricultural activity, regional handicaps and structures

The evaluation results suggest that the Nordic Aid Scheme has contributed to maintaining the agricultural activities, production and land use in the Nordic Aid regions. The impact is particularly evident within the Finnish sub-regions but not so evident in the Swedish sub-regions, where the support rates are smaller. These general results hold, in particular, to the milk production, which is the most important production line and also the agricultural activity best suited for the conditions in the Nordic Aid region. Nevertheless, the northernmost sub-regions (sub-region 1 in Sweden and sub-region C4 in Finland) have been loosing production to the more southern sub-regions. In the Finnish sub-regions, the dairy and livestock production has been concentrating to sub-region (C2) and towards the western coastal line. The spatial concentration and increase of production volumes have been the most evident in the Finnish pig meat and poultry sectors. The production of beef has remained quite stable in the Nordic Aid region.

The Nordic Aid reflects differences in regional handicaps, when the natural handicap is measured by dairy farms' physical productivity, *i.e.* by the ratio of physical farm output to physical farm input. When the support payments are accounted for in the regional comparisons, the farms located in the Nordic aid regions have either worse or almost equal competitive position in the common market as compared to their equally sized counterparts located in more productive regions in Denmark. The competitive position has remained the worst and behind other regions in the northern most Swedish sub-region. Even if the Nordic Aid measures have decreased the spatial differences in natural handicaps, the market has continued to concentrate production within the aid regions, as described above. This suggests that exogenous constraints for expanding production have been smaller in the southern than in the northern aid areas.

The results indicate that Nordic Aid scheme has not impeded structural development, which has been faster in the Nordic Aid regions than elsewhere in Finland and Sweden. A rapid drop in the number of farms has, nevertheless, been avoided in the Finnish regions where producer prices declined by 40-60 % at the entry in the EU. The average annual exit rate for the number of farms in all Nordic aid areas was 3.5%, whereas the total number of farms in whole Sweden and Finland decreased at the rate of 2.5%. The development has been the fastest in certain northern most sub-regions, where more than eight percent of all farms have quit annually. At this speed, the number of farms is cut to a third in every ten year period. The evaluation results suggest, however, that without Nordic Aid, farm exit rates would have been higher as Nordic Aid has kept medium size farms active more than would be the case without the support.

Processing and marketing

The spatial distribution of the processing industries has not been directly addressed or maintained by the Nordic Aid Scheme, and the market driven developments have been two fold. Amongst the largest companies, the efficient commodity and capital markets have been concentrating, specializing, and relocating processing plants. These developments have been feasible, because food processing is not directly linked to spatial distribution of natural resources. Nevertheless, new small entrants have also been emerging in the market (*e.g.* in the Finnish meat processing).

The environment and viability in rural areas

Nordic Aid scheme does not explicitly include targeted environmental measures, but it indirectly contributes to European agri-environmental programs and regulatory framework concerning the Nordic agricultural regions. The results support the view that Nordic Aid, together with the conditions in the CAP and RDP, has had a positive effect on the arable land area kept under active cultivation. The statements of the administrators, in particular, support the view that, if the Nordic Aid had been lower, more land would have been left idle in the most remote Nordic Aid regions, where land rents are approaching zeros.

The impact of Nordic Aid on maintaining mosaic and biodiversity value was found to be negligible. Instead the allocation of land was affected. Nordic Aid in combination with investment support have resulted in a greater area of intensive land uses (cereals and arable grass) at the cost of less extensive land uses (arable pasture and grazing land).

The functioning of the internal market

Under an assumption of efficient market, the price supports and other support measures that are coupled to farms' output levels are trade distorting by definition. Nevertheless, the data do not seem to support the view that Nordic Aid has caused more distortions in interregional trade, as compared to the pre-accession situation. Both countries have witnessed a substantial increase in agri-food trade, such that both exports and imports have increased, since the accession in 1995. Nevertheless, neither Sweden nor Finland has increased their net exports of products eligible for the Nordic Aid during the period of 1995-2005. In fact, both countries exhibit increased deficits in agri-food trade with the EU. Model results suggest, nevertheless, that without the Aid, Finland would have imported more and exported less agri-food products, which would have converted Finland from a net-exporter to a net-importer of dairy products. Furthermore, the results indicate that without Nordic Aid, overall domestic trade flows would have decreased by 10 – 20 % in Finland. In Sweden, on the other hand, the scheme does not seem to have caused significant distortions in domestic trade or trade between Sweden and other countries even if we compare the current situation with a situation without Nordic Aid.

Coherence and efficiency

The Nordic Aid measures, such as the price supports for milk and the headage payments for live animals, are coupled to farm production. The results suggest that these measures have been efficient in maintaining primary agricultural production, as compared to partially de-coupled arable land payments or fully de-coupled payments. The weight of price supports in maintaining agricultural production has further increased after the recent CAP reform, which de-coupled most of the CAP support payments from production into the Single Farm Payment.

Nevertheless, decoupled support would be more transparent and efficient to fulfil income support objectives, but it would result in lower production, especially after 2003 CAP reform policy framework. So, depending on whether the objective is income transfer or maintenance of production, different measures are the most efficient. The overall purpose of the CAP reforms has been to increase market orientation and competitiveness with support not longer coupled to production and defined for specific commodities. In this respect, incoherency between the Nordic Aid measures and the CAP measures has likely increased.

Relevance of Objectives

With regards to the primary agricultural production and food distribution oriented situation of the Nordic agricultural sectors, such as the persisting natural handicap, low productivity, long distances and decreasing population densities, the relevance of the Nordic Aid Scheme has remained. The evaluation results suggest that productivity of farms located in the Nordic Aid regions has remained significantly lower than productivity of the corresponding farms of equal size in Denmark. The distances from the agricultural holdings to the food processors and logistic centres have increased as food processing industries and logistic centres have been concentrating into fewer and fewer locations in the southern sub-regions. Further, migration has gradually decreased population densities in the Nordic Aid regions. Agriculture has remained an important source of vitality in rural economies, but it has not been able to maintain vitality of local economies in areas where population densities have initially been low and where economic pressures on other economic activities have resulted in migration and decreasing services.

Hence it may be concluded that the natural and economic disadvantages faced by the Nordic regions remain and the identified needs are still relevant. However, it may be questioned, whether operational objectives of the scheme comprising of a large number of coupled and commodity specific support programmes are still appropriate. Under a more production neutral support mechanism the regions would have more potential to specialize in production lines exhibiting comparative advantage at the regional level. Furthermore, such a change of the scheme would be more in line with the development of the CAP at large. Moreover, the importance of agriculture for the vitality of the rural economies is likely to decrease further with declining number of farms and declining farm employment. A different set of measures may in the future be needed to ensure that the environment is protected and countryside is preserved.

Recommendations

It is expected that maintaining agricultural activity in the Nordic areas will be a challenge also in the future even if the ongoing rapid and productivity enhancing structural development is expected to continue. The market will spatially concentrate agricultural production and processing industries further and agricultural employment will continue to decline. The role of agriculture for protection of environment and preservation of the countryside will, accordingly, change. Therefore, there is scope to increase the relevance of the objectives of the Scheme by broadening the goal of maintaining agricultural activity from primary production more towards sustainable land management practices, provision of environmental services and rural development programmes. Targeted measures broadening the scope of the scheme, *e.g.* in protecting the artic environment, would be valuable development options to be incorporated also in the Nordic Aid Scheme.

Notwithstanding the positive contributions of agricultural support policies to rural economy, the payments concentrated to agriculture cannot solve the problems of sparsely populated rural areas and rural heartland areas. The logic of remunerating the multifunctional role of agriculture also calls for better consideration of factors like the rural territory, the environment, the landscape, rural communities and rural employment. The results signal that, in particular, if the goal of maintaining agricultural activity is shifted from intensive agricultural production (e.g. milk and meat) more towards extensive land management and environmental services, there is likely space for simplifying the rich set of coupled support measures. Simplification would also allow for a more efficient allocation of resources between the individual production activities such that allocations would be steered more by the market signals than locked in by the specific support measures.

The separate administrative restrictions concerning monetary payments, quantity of production factors and production volumes, are not all necessary for reaching the goals of the Nordic Aid Scheme. The restrictions on production factors and volumes have been, for the most part redundant. The monetary budget constraints would be sufficient regulations (in addition to the economic incentives provided by the payments) for reaching the goals of the Nordic Aid Scheme. This simplification, in fact represents the practices already adopted in both countries.

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