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**Risk Management Tools
for EU Agriculture**

with a special focus on insurance

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Summary

This report provides an overview of the different types of risk that agriculture faces and evidence of risk exposure in European agriculture. After looking at the tools available to manage agricultural risk, it examines the reasons and objectives of government intervention and discusses the policy instruments Member States and other countries use to help their farmers in dealing with risk exposure. The lessons that can be learned from existing public involvement in agricultural risk management form the basis for reflections concerning the potential of applying risk management policies at the EU-level.

In Chapter 2, the risks faced by farmers are described. The risk types considered include price risks and production risks. Whereas the former are likely to increase due to further potential trade liberalisation, the latter might increasingly be influenced by rising quality requirements, the growing movement of animals and plants as well as climate change. Both are, furthermore, subject to increasing specialisation in agriculture. An analysis of Eurostat and FADN data shows that risk exposure in the EU as measured by price, yield and output variability varies widely across products and regions.

Chapter 3 gives an overview of risk management tools at the disposal of farmers. Several types of risk management strategies are distinguished:

- On-farm strategies concern farm management and include selecting products with low risk exposure (e.g. products benefiting from public intervention), choosing products with short production cycles, holding sufficient liquidity or diversifying production programmes. Evidence suggests that European agriculture is not adopting the strategy of diversification. Between 1975 and 1997, the share of non-specialised farms fell from 32 per cent to 17 per cent.
- Risk-sharing strategies include concluding marketing and production contracts, vertical integration, hedging on futures markets, participation in mutual funds and insurance.
- Diversification through increasing the share of income from sources outside agriculture.
- Relying on public assistance (disaster aid).

Ideally, markets should provide a wide range of risk management tools. The most important markets for risk coverage are futures markets and insurance markets:

- Futures markets help to reduce short term price risks and at the same time increase price transparency. In the EU, futures can be traded on five exchanges. Traded volumes are still relatively low. However, American trade volumes show the long run potential. Up-take is slow because the use of futures requires considerable investment in know-how and infrastructure and traders will only move to the European futures market once they have reached a minimum liquidity. In addition, the development of futures markets in Europe has been hampered by CAP-induced price stability. As price-volatility on the European markets is likely to increase with possible further

trade liberalisation, the conditions for the development of futures markets and other market-based risk management tools are expected to improve.

- Production risks can be covered by insurance if the risks are as little correlated as possible across insured individuals (independence of risks) and if farmers and insurance companies have similar information concerning the effective risks involved (symmetry of information). The classical example of such an insurable risk is hail. Mutual funds are a special case of insurance. Mutual funds are owned by the participants and cover losses of members either through money already available in the fund and/or through an additional collection among participants.

When markets for risk management tools are incomplete or missing, public intervention can be justified. Chapter 4 explains the reasons for incomplete or missing markets. Reasons can be found both on the supply and the demand side. The main reasons on the demand side are:

- Know-how to make use of certain risk-management tools (e.g. futures and options markets) can be acquired only at high start-up transaction costs and is, therefore, not always available to farmers.
- Farmers perceive risks they face as being smaller than they actually are, resulting in low demand for risk-management tools (“Cognitive failure”). Events of low probability, which are associated with high potential losses (catastrophes), are very likely to be neglected in individual decision making.
- Even if farmers do not underestimate the risks they face, they might count on other safety nets, including off-farm income and therefore might not use available risk management tools.

On the supply side, the reasons vary from product to product:

- Insurance products might not be offered on the market because the conditions for insurability (independence of risk, symmetry of information) are not sufficiently fulfilled.
- Re-insurance is often necessary in order to cover big natural hazard risks. However, re-insurance can be very expensive, especially after catastrophes have happened, making an insurance product commercially inviable. Furthermore, agricultural re-insurance markets are limited, because of the special know-how involved and because the expected returns for covering the high set-up costs might not be attractive enough.
- The conditions for a successful establishment of futures and options markets are not always fulfilled. Not only do farmers need a certain amount of know-how, there is also a need for substantial price variability, sufficient traders and speculators and products with standardised grades and quality.

Public policy can intervene at different levels: A field of action can be to set-up the necessary legal framework for the creation of markets for risk coverage. Public policy can also provide incentives for the development of such markets (e.g. by encouraging training in the use of risk management tools) or lower the costs of such tools (e.g. by providing

subsidies for insurance premia). Finally, governments can also provide risk coverage themselves (e.g. by providing re-insurance).

Different systems of agricultural insurance in Member States and other countries helping farmers to cope with production risk exposure are described in Chapter 5. The overview shows considerable differences in coverage, public sector involvement and up-take.

- Greece has a predominantly public system. The state, through its public insurance organisation, collects compulsory contributions, administers the programme and guarantees coverage of losses. By virtue of this, the role of the private sector is limited (system under reform).
- Spain and Portugal have “public-private partnership”-systems, where the state plays a key role, providing both premium subsidies and re-insurance. The private insurance industry is integrated into the system; it takes care of programme administration and contributes to covering a share of the risk.
- Italy, France, Austria and Germany have systems of agricultural insurance, which are predominantly private. The four countries differ considerably with respect to subsidies for insurance premia. While Germany is not providing any premia subsidies, Italy grants considerable amounts.
- In the US, a comprehensive system of crop insurance is in place within which state involvement takes four principal forms: (1) subsidising insurance premia; (2) covering administration expenses of the private insurance sector; (3) reimbursing acquisition costs of the private sector; and (4) providing reinsurance. Although two thirds of the country’s total planted acreage of field crops (except for hay) is insured (1998) substantial emergency aid has been paid since 1998.
- Canada has a crop insurance programme (CI), a subsidised savings programme for farmers (NISA) and an anti-cyclical income safety net (AIDA) which secures individual whole farm income at 70 percent of the historical three-year average income.

In the framework of the WTO Uruguay Round Agreement on Agriculture, insurance subsidies and disaster aids are, under certain conditions, exempt from reduction commitments (green-box). These conditions are explained in Chapter 6.

In Chapter 7, lessons from existing public-private systems of agricultural insurance are drawn. The chapter draws heavily on the US experience.

- Coverage and participation: Even for well-developed agricultural insurance systems the coverage in terms of products and participation rates remains limited. This is true even for products which are specifically designed to provide basic safety net coverage for every farmer and which are provided at very low cost. In Spain, 30 per cent of the farmers participate in the system resulting in 30 per cent of crop production and 10 per cent of animal production covered. In the US, 20 per cent of farmers participate in the system, while two thirds of the country’s total eligible acreage is covered.
- Incentive structure and efficiency: Covering a wide range of perils at a level of protection which is interesting to the farmer seems to require considerable state

involvement (US, Spain). Questions arise as regards the efficiency of programmes, which are based on a public-private partnership.

- **Programme design:** Publicly supported insurance programmes can be under (political) pressure to provide products which have not been sufficiently tested and which can therefore undermine the soundness of the system.
- **Complexity:** Changing demands and necessary programme adjustments increase complexity and decrease transparency. This makes it easier for the various stakeholders to engage in rent-seeking.
- **Limits of comprehensiveness:** Even insurance systems benefiting from considerable public support do not have universal take-up rates. Farmers' needs vary widely and no system can be tailored to meeting everyone's needs. Therefore, the (political) demand for providing ad-hoc aids remains considerable.
- **Equity and influence on production:** Since premia subsidies are normally set as a percentage of premia, farmers and regions facing the highest risk receive the highest subsidies. Due to these subsidies, producers might not abandon production in high-risk areas, which can result in significant costs for society as a whole.

Chapter 8 summarises the availability of off-farm instruments to cope with risk exposure in the EU and discusses the potential of applying risk management policies at the EU-level.

In all Member-States, some private off-farm instruments to cope with risk exist. Some instruments have reached maturity and are widely available (mainly hail insurance), whereas others are less developed (futures and options markets, mutual funds). Some insurance systems are private, whereas others rely heavily on public involvement. Instruments which cover a combination of production and price risk (revenue risk) are in their infant stages. The main public measure is disaster aid. Member States are also active in risk prevention (sanitary and phytosanitary measures)¹.

Current off-farm responses to risk exposure in EU Member States

Response	Risk	
	Production	Price
Private	Insurance (mainly hail) Mutual funds	Futures and options markets
Public	Disaster aid Sanitary and phytosanitary measures	(CAP)
Public-private	Insurance (multi-peril) (mainly crops)	-

Market support, direct payments and rural development measures (diversification) in the framework of the CAP have a major impact on farmers' risk, even if their main goal may be income stabilisation and not risk reduction. In particular, the price support mechanisms play a role in reducing price risks for key products. EU measures explicitly targeted at production risk include sanitary and phytosanitary measures as well as guidelines for Member States' disaster aids and insurance subsidies.

¹ Furthermore, income tax averaging systems are in force in some Member States.

The perspective of rising risk-exposure in Europe raises the question whether the EU has a role to play in risk management, which goes beyond its current role. This question has to be examined in the context of the fact that the core CAP instruments have an impact on farmers' risk exposure, as mentioned before. It also has to be remembered that specific risk management policies cannot replace income support policies. The goal of risk management policies is not income support but only to reduce fluctuations of income or its components. Risk management instruments cannot reverse long-term income trends.

The case for introducing additional risk management instruments can be argued, if it can be shown

- that markets for risk-reduction are missing or incomplete;
- that risk reduction is not sufficiently achieved by existing income stabilisation policies;
- that Community action provides value-added as compared to national or regional initiatives/action.

Price risk

Although market intervention remains important even after Agenda 2000, the lower price floor for beef and cereals increases the scope for private instruments to manage price risk, i.e. the use of futures and options for commodities with standardised grades. Although the traded volumes are still low on EU futures markets, a dynamic development can be observed, with an increasing range of products.

The EU has an active interest in well-functioning futures and options markets. Firstly, as price support is being reduced, new instruments are needed to help farmers across Europe to cope with the increasing price volatility. Secondly, futures and options markets contribute to market transparency, which favours the functioning of the internal market. The development of futures markets can already be promoted through education and training measures under Rural Development policies. In addition, an active encouragement at the EU-level might be needed in order to prepare the ground for a wider use of such instruments. Initiatives might include a special information programme on futures and options markets for all European farmers.

Production risk

Traditionally, Member States have been at the forefront of helping producers to cope with production risk (disaster aid, sanitary and phytosanitary measures, public-private systems of agricultural insurance, insurance subsidies). The Community's role has been limited to setting the overall framework (i.e. sanitary and phytosanitary measures), providing some financial support (e.g. disease control), and – most importantly – applying state aid disciplines with a view to avoid market distortions.

EU guidelines on state aids give Member States a considerable margin of manoeuvre in responding to the various needs of their farmers. As a result, existing agricultural insurance systems vary widely among Member States with respect to organisation, coverage, complexity and state involvement. The Spanish experience shows that a comprehensive system of agricultural insurance could be developed within the common framework on state aids.

Three conclusions can be drawn from existing public-private systems of agricultural insurance:

- Firstly, initiatives have to be based on a “bottom-up approach” in order to be successful. Insurance products have to be tailored to the needs of farmers which vary among countries and regions.
- Secondly, a system has to be given time to develop. With growing experience, it can become more and more comprehensive (regarding both products and risks covered).
- Thirdly, strong and close public surveillance is needed in order to avoid growing complexity leading to unjustified rent-seeking and losing track of the original purpose of providing insurance.

Insurance solutions should be primarily developed at the Member States level. In addition to the need for a “bottom-up approach”, two further reasons support this conclusion:

- Insurance could increasingly replace national ad-hoc disaster aids. This would stabilise expenditure and reduce negative effects of disaster aids (e.g. delayed payments, discouraging private risk management and encouraging irresponsible management decisions).
- Member States are best placed to target public funds spent in the framework of such systems to certain groups of farmers, reflecting specific needs.

A cautious role regarding the EU’s involvement beyond its current involvement is therefore advocated. The EU might have a role where production risks are to a large extent systemic (probability of high losses in any given year), which prevents insurance products being offered on the market or makes them very expensive and therefore commercially inviable. A private solution for this problem could be for insurance and re-insurance companies across Europe to jointly cover such risks by creating insurance/re-insurance pools. The EU could accompany such a process by providing the appropriate legal framework, where needed. The issue of risk-pooling across regions and commodities is equally relevant for farmer-owned mutual funds.

The EU could also investigate further into the potential of insurance systems. Major trade partners use such instruments and there might be a certain prospect for getting these instruments accepted as modestly trade distorting within a future WTO agreement on agriculture. In the long term, a more substantial involvement would be possible under two conditions: Firstly, an instrument would have to fit into the overall policy-mix of the CAP. Essentially, this would require that there is no overlapping with other instruments addressing the problem of risk exposure in agriculture. Secondly, sufficient funds would have to be made available.

Providing re-insurance (especially covering losses above a certain level) would address the most often cited obstacle for the development of insurance systems, i.e. potentially catastrophic losses. If such re-insurance were provided, more insurance companies would offer insurance for the coverage of risks potentially resulting in catastrophic losses.

Re-insurance could be made contingent on risk pooling at EU level in order to limit aggregate loss potentially covered by the EU. A further condition could be that pool members have to offer insurance for all major products of European agriculture. Any involvement would have to meet the requirements of efficiency and transparency and take into account possible effects on production, price levels and income distribution.

Anti-cyclical income support

Anti-cyclical income support might be an attractive option in the long run. The very meaning of such an approach is to provide income support in times of need, while reducing support during periods of prosperity. This instrument has the potential to respond in a transparent way to the farmers' needs by preventing severe disruptions in the farm sector and to gain support from the broader public. It could help to overcome the problems of ad-hoc disaster measures and it appears to be compatible with the WTO green box criteria.

As such solutions have features similar to those of socially motivated safety-nets, questions of compatibility with existing national social security systems aiming to secure a certain minimum standard of living arise. It would be necessary to explain carefully why farmers need an additional safety net.

An example of such a safety net is the Canadian AIDA programme. Payments are made if individual farm incomes fall below 70 percent of their historical three-year average. The provisions for calculating the trigger for payments ensure that newcomers, high-debt and low-debt farmers, as well as high and low investment enterprises are treated equitably. A cap is placed on payments.

Under this system, tax declarations are used to determine the relevant income. Given that aid is targeted to cover 70 per cent of a moving average of past income histories, the system would not create adverse incentives. Farmers still have an incentive to go beyond the 70 per cent trigger for aid, in order to avoid a continuous deterioration of their reference income serving as the basis for calculating payments.

Model calculations applying the AIDA system to the EU show that in 1997, the family farm incomes of 20 per cent of the commercial farms were less than 70 per cent of their average income during the previous three years. Compensation of income losses up to the 70 per cent level would have cost about 3 500 million Euro for commercial farms in 1997 (2 700 million € in 1996). This figure does neither prejudge any assumption about the global cost of such a scheme in the EU nor its potential allocation between EU and Member States' budgets.

With respect to a possible application in the EU, it should be taken into account that the system is very demanding as regards information requirements (individual income histories) and administrative provisions. Also the differences between tax systems applied in the different Member States could pose problems with respect to identifying income. Furthermore, it must be taken into account that such a public safety net could represent a disincentive for farmers to use private risk-management instruments.

1. INTRODUCTION

The agricultural sector is characterised by a strong exposure to risk. While this has always been the case, risk exposure is still likely to increase. **Price risk** is likely to rise because of agricultural trade liberalisation. **Production risk** is expected to increase due to rising quality requirements for some products and stricter rules as regards the use of inputs and medicines for animals (Meuwissen, Huirne and Hardaker 1999a). Growing mobility of people and movement of animals and animal products can result in an increased spreading of animal diseases across national borders, thereby also increasing production risk (FAO 2000). The same phenomenon applies to plants. Climate change will have an impact on production risk as well. It is very likely that the frequencies and intensities of summer heatwaves will increase throughout Europe, likely that intense precipitation events will increase in frequency, especially in winter, and that summer drought risk will increase in central and southern Europe, and possible that gale frequencies will increase (Parry 2000). Furthermore, specialisation in European agriculture is expected to continue, thus increasing both producers' production *and* price risk.

This stock-taking report gives an overview of the different types of risk that agriculture faces and evidence of risk exposure in European agriculture (Chapter 2). After looking at the tools farmers have available to manage risk (Chapter 3), it examines the reasons and objectives of government intervention and discusses the policy instruments Member States and other countries use to help their farmers dealing with risk exposure (Chapter 4 and 5). Chapter 6 looks at how the different forms of government support are classified by the WTO. The lessons that can be learned from existing public involvement in agricultural risk management (Chapter 7) form the basis for defining potential fields of action for the EU (Chapter 8).

2. RISK – DEFINITION, CATEGORIES AND RISK EXPOSURE IN THE EU

2.1. Risk and uncertainty

Decision-making takes place in an environment of imperfect knowledge of the future - **uncertainty** - and is associated with **risk** which is normally defined as “uncertainty of outcomes” resulting in losses negatively affecting an individual’s welfare (Hardaker, Huirne and Anderson 1997; Meuwissen, Huirne and Hardaker 1999a).

To take a risk is to expose oneself to a chance of injury or loss. For many decisions, risk is unimportant, since the scope of a possible loss is small and/or the probability of suffering that loss is judged to be low. However, in order to withstand adverse outcome and to avoid jeopardising the existence of an enterprise as the base for income generation, risk has to be managed effectively, within the capacity of the individual, business or group (Hardaker, Huirne and Anderson 1997).

Risk in agriculture is not only of concern to the individual farmer. It is also of importance to society as a whole, as risk-averse behaviour of farmers can lead to an allocation of farm resources which is not efficient, resulting in a sub-optimal overall allocation of resources and consequently lower overall welfare. For example, risk-averse farmers might not adopt a new productivity-enhancing technology because of potential risks associated with it, which results in a lower increase in output than possible.

2.2. Categories of risk in agriculture

Some risks have to be more explicitly taken into account than others. If potential losses are big, more attention has to be paid to the choice among the available alternatives, as the differences between the various outcomes may be significant.

Some risks farmers have in common with other businesses, others are unique to farming. The most important risks can be classified as follows (Hardaker, Huirne and Anderson 1997; USDA 1999):

- **Human or personal risks** relate to death, illness or injury of the farm operator and/or its labour force. These risks are common to all business operators and employees. In the European Union, basic coverage for personal risk is normally provided by sector specific or general social security systems. Additional coverage is available on insurance markets.
- **Asset risks** are those associated with theft, fire and other loss or damage of equipment, buildings and other agricultural assets used for production. Losses are normally covered by insurance or, in case of catastrophic events, public disaster aid may contribute to reduce asset losses.

- **Production or yield risks** are often related to weather (excessive/insufficient rainfall, hail, extreme temperatures), but also include risks like plant and animal diseases. Yield risk is measured by yield variability, the randomness relative to the mean value in a yield series. Yield variability for a given *crop* differs considerably from region to region depending on climate, soil type and production method. It can be measured at farm, regional or country level. Aggregate data can, to a considerable extent, mask variability at lower levels of aggregation or at the individual farm level. “Yield” risk is smaller in the *livestock sector* for most producers, as weather has a smaller influence. The risks mainly stem from disease, mechanical failure in confinement operations and variability in weight gain.
- **Price risk** is the risk of falling output and/or rising input prices after a production decision has been taken. Price risk is measured by price randomness. As opposed to yields, prices do not follow clear trends. Price volatility, of course, is for many products mitigated by measures of price support. In open markets, prices are generally more highly correlated across different regions than yields.
- **Institutional risk** is the risk associated with changes in the policy framework (agricultural *and* other policies) which intervene with production and/or marketing decisions and in the end negatively affect the financial result of a farm. Institutional risks also include contracting risk, e.g. the risk of breach of contract.
- **Financial risks** include rising cost of capital, exchange rate risk, insufficient liquidity and loss of equity.

The various risks are often interrelated. For example, the institutional risk of a change in price support has an influence on price risk. Likewise, imposing environmental restrictions has an impact on yield risk. Risks of all categories have an effect on the income situation of a farm household.

2.3. Some facts about yield, price and output variability in EU agriculture

Meuwissen, Huirne and Hardaker (1999a) examined **yield variability** for individual farms in selected regions of Europe² and found coefficients of variance³ between 5 per cent for milk (in the Netherlands) and 30 per cent for potatoes (Baden-Württemberg, Germany). However, the authors expect that yield risk will increase, for example as a result of stricter rules for the use of fertilisers and medicines.

² Data from 1989 to 1995 were used.

³ $CV = SD/x*100$;
with CV = coefficient of variance
SD = standard deviation
x = mean

It has to be taken into account that CV (measuring variability) overestimates risk (defined as uncertainty of outcomes), as variability to a certain extent can be predicted and can therefore not be considered as risk.

Following a similar approach, the Farm Accountancy Data Network has been used to up-date this analysis and to produce results for all EU regions with relevant data available. Yield data of individual farms have been analysed for common wheat (including spelt), potatoes, sugar beet and milk. Only those FADN farms were chosen for the sample which had reported yield data over the whole 9 years period⁴ 1989-1997. For the calculation of variability, the effects of productivity increases were not excluded. Table 2.1 shows which regions had the highest and lowest variability over that period of time. Maps showing detailed results can be found in Annex 1.

Table 2.1 Highest and lowest yield variability for selected products 1989-1997

Product	Region with ...	
	...highest variability	...lowest variability
Wheat and spelt	Alentejo e do Algarve (40.4)	Ile de France (9.7)
Potatoes	Centre (67.7)	Valencia (8.9)
Sugar beet	Piemonte (28.9)	Netherlands (1.4)
Milk	Toscana (30.3)	Sweden¹ (4.7) Provence (5.8)

¹ 1995-1997

In brackets: Yield variability in per cent

Source: FADN

Price variability is expected to rise on European markets in the context of CAP-reform and increasing trends towards agricultural trade liberalisation. Trade liberalisation aims at increasing price transmission from world markets to domestic markets and therefore bringing domestic prices more under the influence of fluctuating world market prices.

Meuwissen, Huirne and Hardaker (1999a) found that during the period 1986-96 potato prices at the Amsterdam Exchange Market showed a strong variability (CV of 49.9 per cent). During that period price variability was less extreme for pig meat (16.8 per cent).

Eurostat price data at national level (1985-99) confirmed strong variability for potatoes in particular in Austria, Germany, the Netherlands, Belgium and the U.K., while price fluctuated less in Italy and Greece. Due to CAP price support, national variability of soft wheat prices was very limited in all EU Member States. Taking apples, tomatoes and cauliflower as examples for fruit and vegetables, no clear regional distribution of price variability could be identified. As expected, price variability for cow milk was much lower than for pig meat and for eggs.⁵ Regional distribution of price variability for selected products is visualised by the maps in Annex 1.

⁴ For the new German Länder, some Italian, Spanish and Portuguese regions a time period shorter than 9 years had to be used. Data for Austria, Sweden and Finland only cover the period 1995-97.

⁵ Results for Finland are strongly biased through the accession effect.

Finally, some coefficients of variance have been calculated on FADN total output data for individual farms. Total output showed the lowest variation over years in the Italian Molise region (8.3 per cent) and the highest variation in certain Spanish and Portuguese regions.

Results for Austria, Sweden and Finland might underestimate output variability since they are based only on 1995-97 data.

2.4. Sources of risk as perceived by farmers

Risk exposure *objectively* varies from farmer to farmer. Whether a strategy to cope with risk is adopted and what elements it encompasses, however, does not only depend on objectively determined risk exposure but also on how risks are *subjectively* perceived by the individual farmer. Risk perception of course can vary from farmer to farmer depending for instance on the farmer's own experience and on the degree of risk-aversion.

In a survey on risk perception in the Dutch livestock sector, carried out in 1997, price risk was identified as the major source of risk, followed by personal and institutional risk. Financial risks were perceived as the least important (Meuwissen, Huirne and Hardaker 1999a).

For the U.S., a survey carried out in 1996 showed that risk perception differed depending on the production programme. Wheat, corn and soybean producers, for example, were most concerned about yield and price risks, whereas livestock farmers perceived institutional risks as particularly high (USDA 1999).

When assessing the possibility of success of new risk-management tools (e.g. a commercial insurance product), it is important to keep in mind that objectively determined risk exposure and risk perception can differ considerably. While an instrument is bound to be successful on *objective* grounds, a good take-up rate is not automatically guaranteed, as the *perceived* risk might be low (problem of “**cognitive failure**”, section 4.1.1).

3. RISK MANAGEMENT TOOLS FOR FARMERS

Two types of risk management strategies are normally distinguished: (1) strategies concerning on-farm measures and (2) risk-sharing with others (Meuwissen, Huirne and Hardaker 1999a).

In a first step, risks have to be quantified and the effectiveness of different measures has to be assessed. The adoption of a strategy basically requires the evaluation of the trade-off between the costs of reducing risk exposure and expected returns (USDA 1999). The adopted strategy will differ according to the relationship between the various risks faced, the costs of the various instruments, the farmer's income and wealth (his capacity to bear risk) as well as his risk perception (Meuwissen 2000).

On-farm strategies concern farm management and include selecting products with low risk exposure (e.g. products benefiting from public intervention), choosing products with short production cycles, diversifying production programmes or holding sufficient liquidity.

Risk-sharing strategies include marketing contracts, production contracts, vertical integration, hedging on futures markets, participation in mutual funds and insurance.

Other strategies include relying on public assistance (disaster or emergency aid) or increasing the share of income from sources outside agriculture.

3.1. Diversification

The idea behind diversification is that returns from various enterprises or activities are not perfectly positively correlated. A favourable result in one enterprise may help to cope with a loss in another enterprise. Diversification thus reduces overall risk. However, there may be a trade-off with cost increasing effects linked to this strategy, i.e. higher cost for additional equipment and costs in terms of foregone economies of scale which would alternatively be achievable with higher degrees of specialisation. Lack of managerial expertise and market outlets as well as climate, soil quality or the availability of water may limit the opportunities for diversification of farm activities.

Evidence suggests that in European agriculture the trend has not gone in the direction of diversification: Between 1975 and 1997, the share of specialised farms⁶ in total farms increased from 68 per cent to 83 per cent (Table 3.1).

⁶ Holdings earning a main source of income (more than two-thirds of their total revenue) from a single type of production.

Table 3.1 Structural development of EU-9 farms by farm type, 1975-1997

Farm Type	1975		1990		1997	
	Number in 1000	in % of total	number in 1000	in % of total	Number in 1000	in % of total
Specialised	3 943	68	3 910	80	3 389	83
- field crops	1 049	18	1 104	23	956	23
- horticulture	125	2	124	3	100	2
- permanent crops	1 098	19	1 309	27	1 207	30
- grazing livestock	1 584	27	1 310	27	1 074	26
- pig and poultry	86	1	63	1	52	1
Non specialised	1 892	32	991	20	702	17
- mixed cropping	619	11	414	8	314	8
- mixed livestock	464	8	165	3	96	2
- crops – livestock	808	14	412	8	292	7
Total	5 835	100	4 902	100	4 091	100

Source: Eurostat

Diversification includes off-farm strategies as well. Taking-up off-farm employment which reduces dependency from agricultural income, can be considered such a strategy, although off-farm employment may have other reasons as well, for instance, the fact that agricultural income is too small to support a whole family.

In the EU, the share of farmers having a gainful activity outside agriculture is considerable. It reached 29 % in the year 1997 with some differences among Member States. The available statistics show the highest proportion of part-time farmers with off-farm income sources in Sweden (54 %), Finland (49 %), Germany (45 %), and Austria (39 %), whereas Belgium and Luxembourg (17 %) can be found at the lower end. The Mediterranean countries are in the middle field with Spain (28 %), Greece (27 %), Portugal (33 %), and Italy (24 %).

3.2. Contracts and vertical integration

In a **marketing contract**, a farmer agrees to sell a commodity at a certain price to a buyer before the commodity is ready to be marketed. The farmer retains full responsibility for all production management decisions. The contracts can take many forms. They can be based on a fixed price, or alternatively depend on the development of the commodity's futures price. The latter type of contract does not eliminate price risk completely. Price risk is zero only in those cases, where the exact price to be paid to the producer upon delivery is fixed. The (opportunity) costs born by the farmer result from forgoing the opportunity of achieving a higher price on the open market. For the U.S. some 1997 data about the importance of marketing contracts are available (Table 3.2).

Table 3.2
Value of selected commodities produced under marketing contracts, USA 1997

Commodity	Value of production under marketing contracts	
	Per cent	million dollars
Sugar beets	82	973
Fruits	59	7 199
Canola (rapeseed)	46	44
Potatoes	43	720
Peanuts	41	372
Cotton	33	1 923
Rice	31	573
Vegetables	24	3 374
Barley	19	167
Cattle	9	2 735
Soybeans	9	1 672
Peas	9	4
Corn	8	1 720
Sunflowers	8	51
Sorghum for grain	6	86
Eggs	6	82
Dry edible beans	3	131
Oats	3	8
Total value of production under marketing contract, all commodities*	22	41 610

* Includes \$ 21 323 million in crop category and \$ 20 287 million in the livestock category. The total value of agricultural production in 1997 was \$ 191 724 million.

Source: USDA 1999

Besides reducing risk, contracting provides the farmer with an opportunity to differentiate his products from mass production and to draw an economic rent from this. Intermediate and final consumers may be willing to pay a higher price for a contractual guarantee of a certain quality or trait. Contracting allows distributing this additional value (“quality premium”) along the production chain (Cordier and Gouin 2000). However, the premia agreed on in most of the quality-related contracts are not fixed at a specific value but rather depend on market conditions. A further advantage of marketing contracts in the crops sector is related to time management. During the busy harvesting season, time does not have to be allocated to selling the product.

Production contracts typically give the contractor (the buyer of the commodity) considerable control over the production process. These contracts normally specify the production inputs to be used, the quality and quantity of the final product and the price to be paid to the producer. The contracts vary in the degree of control exercised by the contractor. Apart from other possible advantages for the farmer, the contract partially shifts price risk to the processor. On the downside, the farmer depends to a large extent on one buyer, thus incurring a risk of losing his only outlet following contract termination.

In the USA 99 per cent of broiler production is covered by contracts. Also for eggs and hog production contracts are quite important (Table 3.3). In the crops sector, the development of biotechnologies has recently led to an increase in production contracts. If segregation or identity-preservation develop, crops, be they genetically modified or not, will increasingly be grown and sold under contracts (Directorate-General Agriculture 2000).

Table 3.3
Value of selected commodities produced under production contracts,
USA 1997

Commodity	Value of production under production contracts	
	Per cent	Million dollars
Broilers	99	6 664
Eggs	37	773
Hogs	33	3 097
Cattle	14	4 230
Vegetables	8	1 145
Total value of production under production contracts, all commodities*	10	18 215

* Includes \$ 1 627 million in crop category and \$ 16 588 million in the livestock category. The total value of agricultural production in 1997 was \$ 191 724 million

Source: USDA 1999

A **vertically integrated** firm retains ownership control of a commodity across two or more levels of activity. There are many complex reasons to vertically integrate, risk reduction is only one of them. Vertical integration helps to reduce risks associated with a variation in quantity and quality of inputs (in the case of backward integration) or outputs (in the case of forward integration). Vertical integration is more common in the livestock sector, with integration backward into inputs (feed manufacturing) or in the fresh vegetables sector with forward integration into sorting, assembling and packaging.

3.3. Hedging in futures and options

On spot or cash markets, prices are set for goods that are immediately available. Production and marketing contracts as well as futures markets add the time dimension to these markets. They allow users to hedge their price risk by locking in the price of a commodity they wish to purchase or sell at a future date. **Futures market contracts** differ in three important issues from production and marketing contracts: Firstly, they are standardised in terms of contract terms and thus they can be more easily traded. Secondly, they are traded in organised exchanges under rules and regulations. Thirdly, while production and marketing contracts usually involve physical delivery of goods at maturity, in futures markets this is the exception (Larson *et al.* 1998).

Trading in futures enables shifting risk from a firm that desires less risk (the hedger) to someone who is willing to accept the risk in exchange for a profit. A hedger can be a farmer, a trader or a processor, who wants to “lock in” a price for a commodity he is going to sell or buy on the spot market at a later stage. Futures contracts help to protect against price risk, as futures and cash prices converge against the end of the delivery period, resulting in losses and gains in the two markets offsetting each other.

A farmer would usually use the instrument as follows: At the beginning of the growing or feeding period, he sells a futures contract, thus entering an obligation to sell after the end of the production cycle a certain quantity of a commodity at a certain price. The futures position (“short futures position”) is held until the product is ready for sale. Before the end of the delivery period of the futures contract, the farmer typically buys an off-setting futures position (“long futures position”). The commodity itself is then traded through its usual marketing channels. Losses (gains) in the expected value of the output due to price changes tend to be offset by gains (losses) in the value of the futures position. Thus, the farmer is able to “lock-in” a certain price for his commodity.

An **option** gives the holder the right (without incurring the obligation) to take a futures position at a specified price (called the “strike” price) at a specific time. As opposed to futures, options giving the right to sell a futures contract do not constrain potential profits resulting from increasing prices. Such options give security against the implications of decreasing prices. The costs of achieving this security are materialised in the price to be paid for the option.

Hedging largely eliminates price risk, but leads to what is called **basis risk**. Basis is the technical term for the difference between the price of a commodity on the spot market and the price of the corresponding futures contract. The variability of this difference introduces a new category of risk associated with futures markets. The basis reflects differences in price across space (transportation costs, exchange rates), time (storage costs), and quality (difference between actual quality and standard quality specified in the futures contract).

The effectiveness of hedging on futures markets may also be reduced by yield variability. Uncertainty about effective yields makes it not advisable to sell a futures contract for the total expected output, because of the potential obligation to buy additional quantities in order to fulfil a mature contract. Generally the effectiveness of hedging to reduce risk diminishes as yield variability increases.

The effectiveness of hedging furthermore depends on the correlation between yield and price for a given commodity. If there is a strong negative correlation between yield and price (a “natural hedge”, with yield and price fluctuations offsetting each other), hedging becomes - because of the cost associated with it - inefficient. With increasing trade liberalisation negative correlation will decrease.

Futures contracts were traded as early as 1730 in Japan (Osaka rice futures). In 1848, trading of grain futures was started at the Chicago Board of Trade (CBOT). Meat and livestock futures contracts were introduced at the Chicago Mercantile Exchange in 1957 (Sarris 1997; Larson *et al.* 1998).

On the US grain markets, the largest groups of hedgers are the grain merchants and processing firms (Sarris 1997). A survey in Montana suggests that in the early 1990s less than 15 per cent of the crop producers in that area used futures, and about 19 per cent used options (Sakong *et al.* 1993). In the mid-1990s the direct use of futures by US farmers still remained modest compared to other risk management tools. Less than 30 per cent of the farmers in the Corn Belt and in the South-East production regions used them, in the Southern Plains less than 15 per cent (Harwood 2000).

Based on the model of the Chicago Board of Trade (CBOT), futures contracts for agricultural commodities developed in other countries around the world. In the EU the main markets are:

- the French *MATIF* (Marché A Terme d'Instruments Financiers) (futures and options for rape-seed, futures for milling wheat, corn and rape-seed meal)
- the British *LIFFE* (London International Financial Futures and Options Exchange) (futures and options for cocoa, coffee, white sugar, wheat, barley, potatoes)
- the Dutch *Amsterdam Exchanges futures products* (futures and options for potatoes, futures for hogs and piglets)
- the German *Warenterminbörse Hannover* (futures in potatoes, hogs, wheat, rape-seed, rape-seed meal and rape-seed oil)
- the Spanish *Futuros de Citricos y Mercaderias de Valencia* (Citrus Fruit and Commodity Futures Market).

Furthermore, there is a project for setting up a futures market for olive oil in Spain in the course of 2001.

There are huge differences in trade volumes between the North American and the European exchanges (table 3.4). The American data show the potential of the European exchanges. However, this potential should not be overestimated in the short run. The use of futures requires considerable investment in know-how and infrastructure and traders will only move to the European futures market once they have reached a minimum liquidity.

The main obstacle for the establishment of futures markets (including markets for derived products) in Europe has been the CAP-induced relative price stability for major commodities (resulting in little interest from both the farmers' as well as the speculators' side) (Cordier 1998). As price-volatility on the European market has risen in the wake of the 1992 CAP-reform and is further expected to rise with the implementation of Agenda 2000 and further trade liberalisation, the conditions for the development of futures markets and other market-based risk management tools are improving. Consequently, several new products have been introduced to the market over the last few years. MATIF's corn futures, rape-seed meal futures and rape-seed options, for example, were all introduced in 1999.

Whereas futures and options have significant advantages and potentially have an important role to play in the future, they also have a number of limitations. They only deal with short to medium-term risks of market downturns (as other risk management tools like insurance) and their use requires considerable investment in know-how and infrastructure.

Table 3.4
Volume traded on selected exchanges relative to production in the
respective country 1990-99 (in %)

Commodity	Exchange	Country	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Wheat	CBOT	USA	527	795	709	630	780	1135	1182	1019	1115	1427
Wheat	KCBT	USA	208	357	272	281	324	357	402	390	394	504
Wheat	LIFFE	UK		23	45	49	63	71	72	86	64	67
Wheat	MATIF	France								2.0	5.2	5.8
Wheat	WTB	Germany										2.0
Wheat	SFE	Australia							1.1	1.3	1.6	1.4
Barley	LIFFE	UK								20	17	10
Corn	CBOT	USA	720	726	546	904	574	1021	1063	922	809	833
Rape-seed	WCE	Canada	427	386	431	354	323	334	530	434	408	372
Rape-seed	MATIF	France						95	105	109	139	156
Rape-seed	WTB	Germany										1
Soybeans	CBOT	USA	2674	2269	2054	3115	2137	2440	2990	2704	2268	2361
Potatoes	AEX	Netherlands	40	28	28	50	81	56	23	24	35	21
Potatoes	LIFFE	UK								7.2	7.7	4.5
Potatoes	WTB	Germany									1.2	0.8
Hogs	AEX	Netherlands	26	36	30	26	25	19	31	42	27	25
Hogs	WTB	Germany									1.1	3.5

Source: Directorate-General Economic and Financial Affairs, European Commission (2000)

The following box lists several conditions that have been identified as being pivotal for a successful establishment of futures and options markets:

Conditions for the successful establishment of futures and options markets

- Substantial commodity price variability
Without price variability market participants would have no incentive to use the market for hedging and the market would not attract any speculators, as potential profits would be small.
- Large number of potential traders and speculators (to ensure liquidity of the market). If the trade volume is too small, there is a danger that few transactions can influence the price significantly.
- Products with standardised grades and quality
Futures relate to standardised commodities (size, grade, place of delivery, date of maturity). Products with a large number of grades and quality variations are therefore not entirely suitable for successful futures contracts (e.g. rice, as opposed to soybeans, wheat, corn)
- Limited government intervention in pricing and trade
Transactions in commodity markets must be unhindered by physical or legal barriers and government controls.
- The existence of a regulatory body to safeguard the integrity of the markets and prevent fraud and manipulation
- Good transportation and telecommunications systems
- A well-functioning financial system
- An effective legal environment
- Political and macro-economic stability.

Source: Sarris 1997

3.4. Insurance – conditions and types

The idea behind insurance is that of risk pooling. Risk pooling involves combining the risks faced by a large number of individuals who contribute through premia to a common fund which is used to cover the losses incurred by any individual in the pool.

3.4.1. Basic requirements for insurance

In order for a risk to be insurable, two basic requirements have to be met: Managing the adverse effects of “asymmetric information” and overcoming the implications of “systemic risks”. These two concepts are explained in the following box.

Asymmetric information

Asymmetric information relates to the problem that the buyer of insurance and the insurance company may not have the same information as regards the probability of losses occurring. Asymmetric information has two dimensions:

Adverse selection occurs if those more at risk buy more insurance than others, without the insurance company being aware of this. A common tool insurance companies use to minimise adverse selection is to ask the insured to disclose any factors that may lead to above normal risk. Based on that information premia can be differentiated for different classes of risk.

Moral hazard: In the case of insurance, moral hazard refers to an individual's change in behaviour after having taken out an insurance policy. The change in behaviour results in an increase in the potential magnitude and/or probability of a loss. Tools insurance companies generally use to minimise moral hazard include:

- Deductibles or co-payments (the insured has to bear part of the loss: a fixed amount or a percentage of the total loss);
- No-claim bonuses (premium discounts when over a certain period of time no claims are made);
- Checks to verify whether the insured takes the precautionary measures agreed upon to prevent losses;
- Indemnification based on an objective index which cannot be influenced by the insured.

Systemic risk

As opposed to risks like fire and burglary, systemic risks are dependent risks: a lot of people suffer a loss at the same time. Systemic risks result in many people making a claim at the same time with the effect that the premia paid into a pool are not sufficient to cover the loss incurred, which may threaten the solvency of the insurance pool. An example for systemic risks is price risk. All producers suffer from price downturns at the same time. Measures insurance companies can take to deal with systemic risks include re-insurance, geographic spreading and the use of capital markets.

Risks are insurable, if the following basic conditions are fulfilled (Skees 1997, Skees and Barnett 1999):

- **Symmetric information:** The insurer and the insured have (nearly) the same information as regards the probability distribution of the risk (the probability of a bad outcome). This is normally not the case, the main problems being moral hazard and adverse selection. Therefore, insurance solutions are only viable and can be offered at reasonable cost, if these problems can be adequately dealt with (see box).
- **Independent risks:** Risks should be (nearly) independent across insured individuals. If risks are systemic (dependent), special measures have to be taken in order to make insurance solutions viable (see box above).
- **Large number of exposure units:** The law of large numbers allows an accurate prediction of average future losses and the calculation of the premium.

- **Calculable chance of loss:** In order to fix the premium rates, the insurance company must be able to estimate both average frequency and average severity of loss. For low-probability risks with potentially catastrophic outcomes it is difficult to fix a rate.
- **Actual losses occurring must be determinable and measurable.**
- **In the perception of the potential buyer of a policy, potential losses must be significant, otherwise he will bear the risk himself. At the same time, premia must be economically affordable.**

3.4.2. *Types of insurance in agriculture*

Many agricultural risks are considered to be *in-between risks* which are neither perfectly independent nor perfectly correlated (systemic), for example yield and price risk. Insurance solutions for agriculture also have to include provisions to deal with problems of asymmetric information (moral hazard and adverse selection).

In the light of these considerations, the feasibility of various types of insurance products are discussed (the following is mainly based on Meuwissen, Huirne and Hardaker, 1999a).

Yield insurance is mainly feasible for crops. Livestock products in general cause yield measurement problems, due to the fact that output is produced at a very fast (e.g. milk) or a very slow pace (e.g. “production” of feeder calves) and because there are no clear, objective “harvesting” times (which increases the scope for moral hazard). However, not all crops have objective harvesting times, either. For such crops, for example horticultural crops in glasshouses, insurance is more difficult (Meuwissen, Huirne and Hardaker 1999a).

Yields are normally insured for named (known) perils, such as hail, which allows the calculation of the probability distribution of a loss occurring, based on historic data. Insurance can be based on individual yields or area yields. In the first case, indemnities are paid, if the individual loss falls below a pre-determined trigger yield, whereas in the latter case a farmer would only receive a payment, if the area yield falls below a trigger yield. When the yield insured is area-based, problems of moral hazard and adverse selection are less important. However, an area-based solution is only attractive, if yields are well correlated, otherwise the degree of risk reduction for an individual farmer might not be sufficient to make participation attractive. If individual yields are insured, solutions have to be found to cope with problems of asymmetric information (deductibles, checking of behaviour etc.).

The availability of yield insurance can lead to a shift of resources to those products, for which yield insurance is available and consequently an increase in production levels and pressure on market prices.

Why have private companies successfully offered hail insurance but not multi-peril crop insurance?

1. With hail damage, the source of the damage can be clearly identified as “an act of God” as opposed to an “act of bad management” (Skees 1999). Therefore, insuring hail doesn’t pose any significant problems of adverse selection. The insurer and the insured have (nearly) the same information as regards the probability distribution of the risk (the probability of a bad outcome).
2. The losses from hail better meet the condition that losses among insured clients should be as independent as possible in a statistical sense. Therefore, hail is not a fully systemic risk, which makes it insurable as opposed to risks which are highly correlated across many producers.

Catastrophic losses as a result of natural disasters or epidemic diseases pose special problems for insurance. Natural disaster risk within a certain region is a highly correlated risk between the farmers of that region, with a low probability of very high losses. There are several reasons why it is difficult to develop insurance products to cover such risks (Skees 1997):

- Systemic nature of the risk. If re-insurance or state guarantees are not available, the nature of the risks makes it necessary for an insurance company to charge high premia (which may make the product unaffordable for many farmers) and to build up substantial capital reserves.
- Insufficient relevant historical data available to calculate a sound premium due to the infrequency of such events.
- Crowding out by Government providing ad-hoc disaster payments which stifles the development of insurance products.

As natural disasters, epidemic diseases have a systemic character and data concerning the outbreaks are rare. In the case of animal diseases and as opposed to natural disasters, farmers can influence the chance of an outbreak of a disease by taking appropriate precautionary measures. Furthermore, state involvement is important with respect to both legislation and covering direct losses resulting from outbreaks of animal diseases (value of destroyed animals).

As governments normally cover direct losses, losses which need to be covered are those resulting from business interruption (empty buildings), supply and delivery problems (because of movement restrictions) and repopulation (Meuwissen, Huirne and Hardaker, 1999a; Meuwissen 2000).

Whether such private insurance products against epidemic diseases can be developed depends on - as in the case of natural disasters - whether sufficient data is available for calculating premia and whether sufficient re-insurance capacity or state guarantees are available.

Price insurance is feasible only for those products, for which objective price data are available. To avoid moral hazard and adverse selection problems, loss assessment should be based on a price that cannot be influenced by the farmer (futures price, spot market price). The major obstacle for price insurance is the high correlation of prices which is associated with a systemic risk. Generally, systemic risks can be dealt with on options and futures markets. Thus, whether price insurance is offered or not would also depend on whether such futures and options markets are available or not as well as on the availability of sufficient re-insurance capacity (see below for re-insurance).

If losses resulting from a loss of quality are excluded from coverage, then price insurance provides less protection for the farmer. However, including loss of quality may involve significant moral hazard problems, as quality depends to a certain extent on management decisions (Meuwissen, Huirne and Hardaker 1999).

Revenue insurance is a combination of price and yield insurance. It has the potential advantage of being cheaper than either price or yield insurance, as the risk of a bad outcome is smaller (low yields may be offset by high prices and vice versa).

Revenue insurance can be set up on a commodity-per-commodity basis or for a portfolio of commodities. The latter could again be cheaper for the farmer, because low revenues from one enterprise are likely to be partly offset by higher revenues from another (if the revenues are not positively correlated).

However, such insurance would only be feasible if there is knowledge about the correlation between the different commodities. In order to offer a revenue insurance, an insurance company must be able to determine the joint probability distribution of price and yield risks and find solutions to overcome moral hazard and adverse selection problems. In addition, access to objective price *and* yield measures is needed.

Income insurance is potentially more attractive to farmers than other forms of insurance (e.g. yield, price), because it deals with losses affecting farmer's welfare more directly (Meuwissen 2000). It could be based for instance on net farm income of family workers (farm revenue - including subsidies - minus variable costs, taxes, depreciation, rent, interest and compensation of employees).

Insurance of individual income risks poses considerable problems of moral hazard and adverse selection. Potential losses do not only occur by accident but depend to a large extent on how well a farmer manages his business. Furthermore, a farmer can easily manipulate certain elements influencing his income (e.g. compensation of employees, operating costs, inventories). These two factors make it difficult for an insurance company to calculate the probability distribution of a bad outcome and to fix a sound premium accordingly.

3.4.3. *Re-insurance and insurance pools*

Re-insurance is insurance purchased by primary insurers to pass-on the part of the risk that is beyond their underwriting capacity⁷. Re-insurance is important for insurance companies which cover correlated risks and are thus running the risk of having to cover big losses. Without re-insurance, premia would have to be set at a very high level to build up enough reserves in order to cover potentially high losses.

Two basic models for re-insurance dominate:

- Proportional re-insurance (Quota share arrangements): Insurer and re-insurer share premia and risk. The re-insurer assumes an agreed-upon, fixed percentage of all the insurance policies written by a direct insurer. The quota determines how premia and losses are distributed between direct insurer and re-insurer.
- Non-proportional re-insurance:
 - a) Excess of loss: re-insurer covers up to a certain amount any part of a loss resulting from a single catastrophic event that exceeds an agreed deductible.
 - b) Stop-loss: re-insurer covers up to a certain amount any part of a total annual loss that exceeds an agreed deductible.

In order to be financially viable, a re-insurance company has to diversify the risk it takes by creating a large and varied insurance pool (diversification of risk-bearing activities). Typically, a re-insurer would cover a wide range of different risks in locations all over the world in order to reduce the variability in losses from its portfolio.

The availability of re-insurance capacities is generally limited. There is evidence that re-insurers tend to have “short memories”, resulting in the fact that after a catastrophe either premia rise substantially or companies pull out of agreements (Skees and Barnett 1999).

⁷ Underwriting capacity can be defined as the possibility to cover losses beyond the premia income in a given year.

In the US there are **new products** developing which could be an alternative to re-insurance, most notably catastrophic bonds and catastrophic insurance options. Catastrophic bonds provide capital contingent on the occurrence of a disaster. Buyers of such bonds receive a high rate of return if there are no catastrophes but lose some or all of their investment in the occurrence of a catastrophe. With catastrophic insurance options, an insurance company can share risk with market speculators. A futures crop insurance contract based on USDA estimates of state crop yields for major crop producing states has so far been unsuccessful, probably because the competition from the federal government which provides subsidised re-insurance, is too strong. In general, capital market based substitutes for re-insurance are still in their infant stages. Today, CAT bonds and CAT insurance options account for less than 5 per cent of US re-insurance capacity (Skees and Barnett 1999).

In addition to re-insurance, the creation of **insurance pools** can be a solution for insurers to pass on/spread risk. A pool is set up by insurers to jointly provide insurance for certain risks. Risks are covered which an individual company alone could not cover. The risks normally covered by such pools include:

- New, unknown risks
- Catastrophic risks
- Infrequent risks - the prediction of the total loss to be expected for a certain period is not possible (law of large numbers does not apply)
- Risks which can only be covered by applying special know-how.

Advantages of an insurance pool include the following:

- Together, the members can provide maximum capacity. Risks can be spread more widely. The more risks can be spread, the less re-insurance is needed and the cheaper re-insurance therefore is
- The pool can provide optimum safety (screening of applicants, solidarity clause, mutual coverage of risks)
- Combination of know-how
- Fast exchange of information
- Economies of scale.

Two categories of pools exist:

- Co-insurance pools: insurers put together their individual capacities
- Co-reinsurance pools: a group of insurers (normally also including re-insurers) acts as re-insurer which covers a share of the members' risks.

The capacity a company contributes to the pool determines its share in receipts and indemnities as well as its share in profits and losses.

Risks covered by existing pools include nuclear, civil aviation and environmental risks. In the Spanish system of agricultural insurance the co-insurance pool AGROSEGURO plays an important role (section 5.2).

3.5. Mutual funds

Mutual insurance schemes are a special case of insurance. Mutual funds are **owned by the participants**. In the case of a member incurring a loss, the loss will be fully or partially compensated through the collected money already available in the fund and an additional collection among participants. Premia also have to cover administrative costs and potentially re-insurance.

If mutuals are organised regionally, the advantage of a fund is that farmers know each other and there is a possibility for social control, reducing problems of moral hazard and adverse selection. The disadvantage of regionally organised mutuals is the fact that there is a danger that many or even all farmers incur losses at the same time. This could mean for a farmer that he incurs losses and has to contribute to the fund to cover other farmers' losses at the same time. Solutions for this problem are re-insurance or the teaming up with mutuals in other regions which would cover a share of the loss.

In the Netherlands, for example, mutual insurance schemes have been developed for contagious disease outbreaks both in crops (horticulture and potatoes) and livestock (poultry). The Commission has recently proposed the setting up of similar funds in Member States intended to stabilise revenue in the pig sector. These regulatory funds would be financed by producers and would enable them to stabilise revenue through a system of levies to be collected during periods when their economic situation is satisfactory. In exchange, payments would be made during periods of a difficult market situation (European Commission 2000).

4. AGRICULTURAL POLICY AND RISK MANAGEMENT

4.1. Justification for government intervention

4.1.1. Market failure

A missing market for risk coverage – in addition to other reasons such as the existence of monopolies, externalities and the “public good” character of certain products - can explain why markets may fail in their role to provide an efficient allocation of resources (Parkin, Powell and Matthews 2000).

Several risk management tools are offered on the market, even without any government intervention (futures and options, certain insurance products). So far, however, these developments remain quite limited. Several reasons have been identified why markets for risk-management products may not be available or be incomplete. As a result, the market for risk coverage clears at less than socially optimal quantities of risk sharing (Skees and Barnett 1999). Reasons can be found both on the supply *and* the demand side:

On the **demand side**, three main reasons may result in incomplete or missing markets:

- Know-how to make use of certain risk-management tools (e.g. use of futures markets) can be acquired only at high start-up transaction costs and is, therefore, not always available to farmers.
- Farmers perceive the risks they face as being smaller than they actually are. This phenomenon is called “cognitive failure” and can result from insufficient information or misjudgement. Events of low probability which are associated with high potential losses (catastrophes), are very likely to be neglected in individual decision making.
- Even if farmers do not underestimate the risks they face, they might count on other safety nets, including off-farm income or government support programmes (disaster aid) in case of significant losses and as a consequence might not use the risk management tool available.

For the last two reasons, the “willingness to pay” and the demand for risk-management products is reduced. Insufficient “ability to pay” of certain groups of farmers can also cause insufficient demand for risk-coverage.

On the **supply-side**, the reasons vary from product to product:

- **Insurance products** might not be offered on the market because the conditions for insurability, such as independence of risk and symmetry of information, are not sufficiently fulfilled (section 3.4). Each violation of these conditions increases the marginal cost of insurance and reduces market supply (Skees and Barnett 1999).

Agricultural risks are often natural hazard risks which means that they are not independent risks. Only if risks are independent and an insurance company can cover a large number of exposure units, it can accurately predict the average future losses. Normally natural hazard risks are correlated up to a certain degree, meaning that many exposure units (farms) incur losses at the same time, making losses for the insurance company highly variable. The higher the variance around expected loss cost, the greater the need for including a reserve load in the premium. A particular challenge is the insurance of catastrophic risks, which are infrequent but of high consequence – making it necessary to add catastrophic loads to the premium. These factors lead to premium rates that are much higher than those for largely independent risks.

- Because of potentially big losses incurred in covering agricultural natural hazard risks, an insurance company will normally try to obtain **re-insurance**, which involves additional transaction costs. US evidence shows that re-insurance can be very expensive, especially after catastrophes have happened (Skees and Barnett 1999). Furthermore, agricultural re-insurance markets tend to have limited capacity. Agricultural risks are only re-insured if they fit into the portfolio of re-insurance companies and if the expected profit is high enough. If the coverage of agricultural risks yields lower returns than other sectors, less capacity is attributed to the agricultural sector. The capacity of the industry is also limited by virtue of the fact that for the highly specialised re-insurance market entry barriers are quite high.
- For a successful establishment of **futures and options markets** several conditions have to be fulfilled (section 3.3). Farmers need to adopt the necessary know-how. In addition, it has to be recalled that future markets can emerge only under the condition of substantial price variability, a sufficient number of traders and speculators and products with standardised grades of well-defined quality.

4.1.2. Other reasons for government intervention

Apart from market failure, there are two other possible reasons for government intervention in markets for risk-management products (Meuwissen, Huirne and Hardaker 1999a):

- (a) By setting the legal framework for farm operations the government influences to a considerable extent farmers' risk exposure, for example by creating the legal framework for animal disease control and veterinary measures. To create an incentive for the government to set up an effective risk-minimising framework, it can be argued it should be financially co-responsible for potential losses.
- (b) Concerning re-insurance, government intervention has also been justified by economic reasons. The government might be able to provide re-insurance cheaper than the private sector as it is able to raise more and cheaper capital than the private sector to cover potentially high losses.

4.2. Objectives of government action

The overall objective of government involvement in agricultural risk management can be to help **reduce** farmers' risk exposure (through diversification, sanitary and phytosanitary measures, price safety net) or help them **cover** losses resulting from risk exposure. Governments can either help to prevent/cover big losses or contribute in general to preventing/covering losses, whatever their size.

4.3. Policy instruments

4.3.1. Fields of action

There are basically four potential fields of action for governments.

Firstly, the setting-up of the necessary **legal framework** for risk reduction (e.g. sanitary and phytosanitary legislation) or the establishment of markets for risk management tools. For example, competition policy should take into account that risk pooling between insurance companies (which may result to a certain extent in reduced competition) might be necessary to cover catastrophic risks (section 3.4).

Secondly, governments could help to create the necessary conditions for developing markets providing risk-management tools (**market facilitation**). For example, they could provide information and training on risk and risk-management tools to farmers.

Thirdly, policy could consider **lowering the costs** of risk-management tools. As regards insurance, subsidies could be justified if an insurance product - because of the systemic nature of the risk it covers or problems of asymmetric information - would be otherwise unaffordable for the farmers. Possibilities include subsidies for insurance and re-insurance premia. Subsidies could also be justified on a temporary basis to encourage the development of market solutions.

Fourthly, governments can also **provide risk coverage themselves**, e.g. by providing disaster aid payments, public insurance and re-insurance⁸, or a specific safety net. Such approaches could be justified, if private markets for risk coverage for market failure reasons (as elaborated in section 4.1.1) cannot sufficiently develop to provide the necessary protection for all categories of farmers (missing or incomplete markets)

It should be noted that both the third and the fourth option can easily turn into income enhancement, if applied with a certain intensity of public funding. However, changing the purpose of policies from insurance to income objectives might come under fire, once awareness is rising as regards the potentially serious market and competition distorting effects of such measures.

8 priced at expected or lower than expected cost. The rationale for providing re-insurance (stop-loss or quota share, see section 3.4.3) would be lacking private re-insurance capacity. If it is offered at lower than expected cost, it includes a subsidy element.

Finally, it has to be remembered that all government intervention in itself can be an additional source of risk to the farmer (institutional risk) (section 2.2 and OECD 2000).

4.3.2. *Specific public tools*

This section concentrates on those tools which can be provided by governments and which are not related to private instruments described in Chapter 3, i.e. tax solutions, safety net policies and disaster aids.

Tax solutions⁹

Under a progressive tax system, taxpayers whose annual income fluctuates may pay higher total taxes over a period of several years than other taxpayers with a similar yet more stable income. Income averaging tax rate systems are therefore designed to mitigate this effect by allowing taxpayers with variable incomes to pay a more constant and overall lower income tax rate over time. Such systems have the effect of enhancing income after taxes by making the tax basis more stable. This can be justified on grounds of tax equity (farmers have particularly unstable farm incomes).

In the EU, different income tax averaging systems exist. An example is the Swedish system. Under this system, up to 20 per cent of the annual taxable income can be deducted in a given year. It has then to be added to taxable income in any of the following five years (OECD 2000). A similar system is in operation in the US under the Taxpayer Relief Act of 1997. Under this system, farmers who rely on farming as their primary source of income can opt to shift a specified amount of farm income to the preceding three years and pay taxes at the rate applicable to each year. If the marginal tax rate was lower during one or more of the preceding years, a farmer may pay less tax than without income averaging (USDA ERS 1998b).

A different system is under consideration by US Congress (USDA ERS 1999a). The system would allow farmers to deposit up to 20 per cent of eligible farm income into special Farm and Ranch Risk Management (FARRM) accounts during years of high net farm income. By doing this, farmers could build a fund to draw on during years with abnormally low income. Withdrawals would be at the farmers' discretion (no triggers) within five years of making the deposit and federal income taxes on eligible contributions would be deferred until withdrawal. As opposed to the Swedish system and the system in operation under the US Taxpayer Relief Act of 1997, this system not only has an income *enhancing* but also a *stabilising* effect on expenditure (consumption/investment). The reason for this is that it makes sure that money is actually *saved* in good years (the money has to be put into an account), resulting in the building-up of reserves that are then available in bad years.

⁹ Retirement tax-schemes are not discussed here. For an example see (USDA ERS 1998a).

Public Safety Net Policies

A safety net *in general* is an instrument which has a role to play in exceptional circumstances, when income or a component of income falls below a given reference level. Safety nets exist or are imaginable at different levels: household income (including off-farm revenue), farm income (revenue – costs), farm revenue, product revenue, yield and price.

Safety nets can be private as well as public instruments. An overview of existing and proposed private and public safety nets is given in table 4.1. Insurance discussed in section 3.4 is a private safety net.

Table 4.1 Safety net approaches in agriculture

Safety net for ...	Examples for instruments (existing instruments and proposals for new instruments)	
	Private	Public
Household income (on and off-farm)		ERS USDA simulation (Ag. Outlook, Jan/Feb 2000)
Farm income		Canadian AIDA programme
Farm revenue (all sources of revenue)		US CISS proposal
Product revenue (price times yield)	(Low level) revenue insurance	US SIPP proposal
Product yield	(Low level) yield insurance, mutual funds	(Low level) public yield insurance
Product price		EU intervention, US marketing loans and loan deficiency payments

At the household-level, public safety nets exist under the heading of social policy for all households. We are not aware of any existing safety nets specifically targeted at the agricultural sector (going beyond more general social policy measures in force for example in France and Germany). However, the USDA Economic Research Service has in a recent study addressed the issue of a household safety net specifically targeted at the agricultural sector (USDA ERS 2000b). It should be noted, however, that safety nets in the field of social security systems differ significantly from commodity-related safety nets. Social security policies are decoupled from the context of producing a particular commodity and, therefore, do not distort commodity prices. This holds even under the condition of a considerable public funding.

Addressing farm income (revenue – cost), Canada's AIDA programme provides coverage if the farm income falls below 70 per cent of a three years average (section 5.4.3)

Farm revenue safety nets and revenue safety nets for individual crops are under discussion in the US, for example the Commodity Income Supplement Support (CISS) and the Supplemental Income Payments for Producers (SIPP) (section 5.3.8).

Safety nets for product revenue and yield of course exist in the form of insurance in many countries, often supported or directly offered by the state. For example, the US CAT multi-peril crop insurance provides a basic safety net for crop farmers (section 5.3.2).

Furthermore, the intervention measures in the EU and the US marketing loans/loan deficiency payments can be classified as measures providing a safety-net concerning prices.

The rationale for providing *public* safety nets is to avoid drastic and widespread income downturns in a given year, which might potentially force farms out of business, jeopardise production (potential) and destabilise those rural economies which still depend largely on the farm sector. Widespread income downturns are a result of systemic risks, for which private instruments are often not or not sufficiently available (insurance).

As only household income (on- and off-farm) determines whether a farm is forced out of business it appears that household income should be taken into account for a public safety net rather than sectoral yield, price revenue or farm income development. If yield, price, farm revenue or farm income would be chosen as a trigger for safety nets to avoid business interruption, public money might not be well targeted. If any one of these farm income components is exceptionally low in a given year, it would not necessarily mean that the whole business is in danger. The decline in single income components might be sufficiently offset by other income components.

Disaster Aid

Disaster aids are paid to help citizens, including farmers, to cope with losses from non-insured natural catastrophes. A frequent argument in economic literature against ad-hoc aids relates to risk-awareness. If the farmer knows that he can get free ad-hoc disaster aids in the event of a natural disaster, he is less likely to take the corresponding risk into account in his decision making. Furthermore, disaster aid potentially crowds out private initiatives.

Another criticism, this time from the side of farmers, relates to the time-lag between the occurrence of a loss and compensation. A solution to this problem is sometimes seen in using the insurance industry to channel public money to the farmers, since it might – due to its infrastructure and know-how - be able to distribute compensation more quickly.

In the EU, disaster payments are mainly made by Member States. The EU itself has two tasks. It participates financially in Member States' sanitary and phytosanitary measures¹⁰ and approves state aids by Member States. Approval is necessary to prevent possible distortion of competition between producers in different Member States. The Commission has recently adopted revised community guidelines for state aid in the agriculture sector¹¹, with

¹⁰ Budget 2000: 106.5 million Euro. The funds are mainly used for the eradication of animal diseases.

¹¹ Community Guidelines For State Aid in the Agriculture Sector (2000/C/28/02) (European Commission 2000b)

the purpose to clarify current practice of dealing with state aids in the agricultural sector. Current practice is inter alia described with respect to compensating farmers for damage to production and means of agricultural production as caused by natural disasters, adverse weather conditions or outbreaks of animal or plant disease. It also includes information on current practice as regards aids matching parts of the premia for insurance covering such events.

The document lists the events which can be classified as natural disasters/exceptional occurrences (earthquakes, avalanches, landslides, floods etc.) and adverse weather conditions (frost, hail, ice, rain, drought etc.). The Commission permits aid up to 100 per cent to compensate for material damage resulting from natural disasters/exceptional occurrences. Outbreaks of animal or plant diseases are not normally considered as natural disasters/exceptional occurrences. Losses resulting from adverse weather conditions may be compensated up to 100 per cent, if the level of damage reaches 20 per cent of normal production in less-favoured areas and 30 per cent in other areas. Aid for combating animal and plant diseases may only be accepted as part of appropriate programmes for disease prevention, control, or eradication. Aids may be granted for up to 100 per cent of such measures, if Community legislation doesn't specify that such costs have to be borne by producers. Compensation of losses incurred may be granted up to the normal value of crops destroyed or animals slaughtered and may include reasonable compensation of loss of profit.

The Commission allows aids of up to 80 per cent of the cost of insurance premia to cover losses caused by natural disasters/exceptional occurrences (as defined above) or significant adverse weather conditions (beyond the thresholds mentioned above). Where insurance also covers other losses (including animal or plant diseases), the aid rate allowed is reduced to 50 per cent.

Table 4.2
State aids to agricultural sector newly approved by the EU
between mid-1998 and mid-2000

	Million EURO
Bad weather / Natural disasters	305.2
Plant health and prevention	7.7
Animal health and prevention	88.9
Dioxin	900.8
Subsidies for insurance premia	0.5
Total	1 303.1

Source: Official Journal

A review of state aids newly approved by the Commission over the last two years (August 1998 – July 2000) in the fields of natural catastrophes and the prevention and/or the compensation of diseases shows a sum of 1 303 million Euro (excluding forestry payments and payments where the share going to agriculture is not specified¹²) (Table 4.2). However, the actual payments by Member States differ from the approved sum for the following reasons:

- Payments were also made under schemes approved before the period in question.
- Payments approved in this time period may concern a different time period.
- Payments made may be lower than the approved sum.
- Some payments in the field of prevention were approved as payments which Member States can make every year without a set limit in time.

The approvals have been particularly high in the context of the dioxin crisis. Apart from that, most money was approved to compensate for bad weather and natural disasters. Hardly any new subsidies for insurance premia were approved in this period.

Table 4.3 presents some figures provided by Munich Re and Österreichische Hagelversicherung (1999) about public expenditure in selected Member States and the US for disaster aids and insurance subsidies (1988-97). Among the Member States selected, Italy spent the biggest amount of money to compensate producers for crop losses in the form of disaster aid. A considerable amount of disaster aid was paid by France, while Spain paid close to four times more money for insurance subsidies than for disaster aid.

¹² 276,5 million Euro were paid to compensate for natural disasters where the share going to agriculture was not specified.

Table 4.3
Government expenditure for disaster aid and insurance subsidies,
1988 – 1997, selected countries

Country	Government expenditure 1988-97		
	Insurance subsidies mio. EURO	Disaster aid mio. EURO	Total mio. EURO
Italy	1 110	2 740	3 850
Spain	1 153	314	1 467
Austria	90	18	108
France	*	595	595
Germany	0	315**	315
USA	8 165	8 921	17 086

* Does not correspond to the information that France in fact does provide to a limited extent subsidies for hail-insurance (for fruit and certain vegetables)

** Federal government: 269, Länder: 46

Source: *Munich Re and Österreichische Hagelversicherung 1999*

5. EXAMPLES OF AGRICULTURAL INSURANCE AND SAFETY NET SYSTEMS

5.1. Selected EU Member States

EU Member States have developed different systems to cope with risk exposure in the farming sector. For illustrative purposes, we look at seven Member States.

The various systems can be classified according to the state involvement:

Greece has a predominantly public system. The state, through its public insurance organisation, collects contributions, administers the programme and guarantees coverage of losses. By virtue of this, the role of the private sector is limited – it only covers products not covered by the public system or provides top-up coverage (system under reform).

Spain (see following section) and **Portugal** have “public-private partnership” systems, where the state has a key role, providing both premium subsidies and re-insurance. The private insurance industry is integrated into the system, administering the whole programme and covering a share of the risk.

Italy, France, Austria and **Germany** have systems of agricultural insurance which are predominantly private. The four countries, however, differ considerably as regards subsidies for insurance premia. While Germany is not providing any premium subsidies, Italy grants considerable amounts of premium subsidies to the farming sector (table 4.3 in section 4.3.2). The Italian system is under reform.

For a synopsis see table 5.1. The Spanish system will be described in more detail, since it is of a particular nature as regards its high level of government involvement.

Table 5.1: Agricultural insurance and disaster relief in selected EU-Member States

Country	System	Products	Funding	State aids
Greece <i>(system under reform)</i>	Public and private insurance co-exist and complement each other.	<p>Public: Compulsory insurance for hail, frost, windstorms, floods, drought, excessive rainfall, snow, sea water, damages caused by bears (all crops) and certain natural loss events, a limited number of diseases (livestock).</p> <p>Private: Coverage for production not covered by the public system (e.g. aquaculture) and additional coverage for production covered by the public system.</p>	<p>Public: Premia are calculated at a per farm basis and are not risk-related (3 % of gross value for crops and 0.5 % of gross value for livestock production), further sources of income: public funds, income from capital investments, fees for loss adjustment.</p> <p>Private: Risk premia.</p>	Yes.
Portugal	Public-private partnership: SIPAC (Integrated System of Protection Against Climatic Randomness).	<p>Harvest insurance: Basic coverage for fire, lightning, explosion and hail, complementary coverage for frost, waterspout, tornado and snow (most crops), administered by the insurance industry.</p> <p>Disaster fund for crops: Coverage for losses resulting from disasters that are not covered by harvest insurance (loans, interest subsidies, grants).</p> <p>Claims´ rate compensation: Public re-insurance for harvest insurance.</p>	<p>Harvest insurance: Premia, subsidised by the State (special bonus for collective insurance contracts).</p> <p>Disaster fund: Premia (small), subsidies.</p> <p>Claims´ rate compensation: Premia, public funds.</p>	Yes (to be eligible, the farmer must have taken out harvest insurance).
Spain	Public-private partnership.	See section 5.2		

Country	System	Products	Funding	State aids
Italy <i>(system under reform)</i>	Private insurance, partly subsidised, public disaster aids.	<p>Private insurance: Hail, allied perils (frost, wind, dryness, sun scorching for a limited number of crops and few communities, varying from year to year), diseases and damage to fruit trees.</p> <p>Disaster aid: Excessive rain, flood, windstorm, frost, rime, hail, drought (only in communities where these risks/crops are not insurable) (investment grants, subsidies, exemption from taxes/duties or rebates of taxes/duties).</p>	<p>Private insurance: Premia, subsidies for hail, frost, wind and dryness (redefined each year).</p> <p>Disaster aid: Public funds.</p>	Yes (for excessive rain, flood, windstorm, frost, rime, hail, drought in communities where these risks/crops are not insurable).
France	Private insurance, partly subsidised, public-private system of disaster aids.	<p>Private insurance: Hail (for all crops), storm (in addition to hail for corn, rape, sunflower and hop), frost (viticulture in Beaujolais), multi-risk (tobacco), animal losses for a number of causes (depending on production mode and sector).</p> <p>Public disaster aids: Grants and loans at preferential interest rates for all losses resulting from natural disasters which cannot be covered by private insurance (crops and livestock).</p> <p>Exceptional public aids: Drought (affecting livestock sector), unspecified disasters (interest subsidies, reduced social security payments, restructuring of debts).</p>	<p>Private insurance: Premia, subsidies for hail-insurance (for fruit and certain vegetables).</p> <p>Public disaster aids: Public funds, surcharges on private insurance premia.</p> <p>Exceptional public aids: Public funds and funds of professional organisations to reduce the price of feedstuffs (drought affecting the livestock sector). Public funds (unspecified natural disasters).</p>	Yes (excluded for losses which can be covered by private insurance).

<p>France (continued)</p>		<p>Tax breaks in case of natural disasters</p> <p>Possibility to smooth tax burden over the years: In case of disasters in general (available for the whole economy).</p> <p>Stop-loss re-insurance: For insurance covering losses of buildings and contents (not only agriculture).</p>	<p>Tax breaks in case of natural disasters: Public funds.</p> <p>Possibility to smooth tax burden over the years: Public funds.</p> <p>Stop-loss re-insurance: State guarantee.</p>	
<p>Austria</p>	<p>Private insurance, partly subsidised, public disaster aids.</p>	<p>Private insurance: Hail (all-inclusive coverage for the whole acreage of a farm including grassland, OR coverage for individual crops), in addition damage by snails (all crops), damage by crows (corn, Ölkürbis), stagnant water (all crops excluding sugar-beet and grapes), drought, frost, flooding, storm (corn), pests and outgrowth (cereals), flooding, frost (grassland), combination of frost and hail (viticulture). Hail, storm and snow (horticulture).</p>	<p>Private insurance: Premia, premia subsidies for hail and frost.</p>	<p>Yes (but not for hail and frost, as insurance is subsidised).</p>
<p>Germany</p>	<p>Private insurance, public disaster aids.</p>	<p>Private insurance: Hail, frost (viticulture), quality-related insurance: sugar content (sugar-beet), content in starch (potatoes), specific diseases (potatoes), storm, frost, rainfall (only for big farms in Eastern Germany). Business interruption (fire). Epidemic diseases, accidents (animals): Value of destroyed animals, coverage of consequential losses (business interruption).</p> <p>Disaster aid: Special programmes adopted at federal level by special legislation, in addition: disaster relief programmes at the Länder level. Epidemic animal diseases: coverage for value of destroyed animals.</p>	<p>Private insurance: Premia.</p> <p>Disaster aid: Public funds.</p>	<p>Yes.</p>

5.2. Spain

Spain has a rich experience in agricultural insurance. Different systems with a varying degree of involvement of the state were tested between the 1920s and the 1970s. Overall success, however, remained limited and participation rates disappointing. The current system is built on that experience. It was set up in 1978 and continues to evolve (Burgaz 2000, Agroseguro 1999, Stoppa 2000, Forteza del Rey Morales 1999).

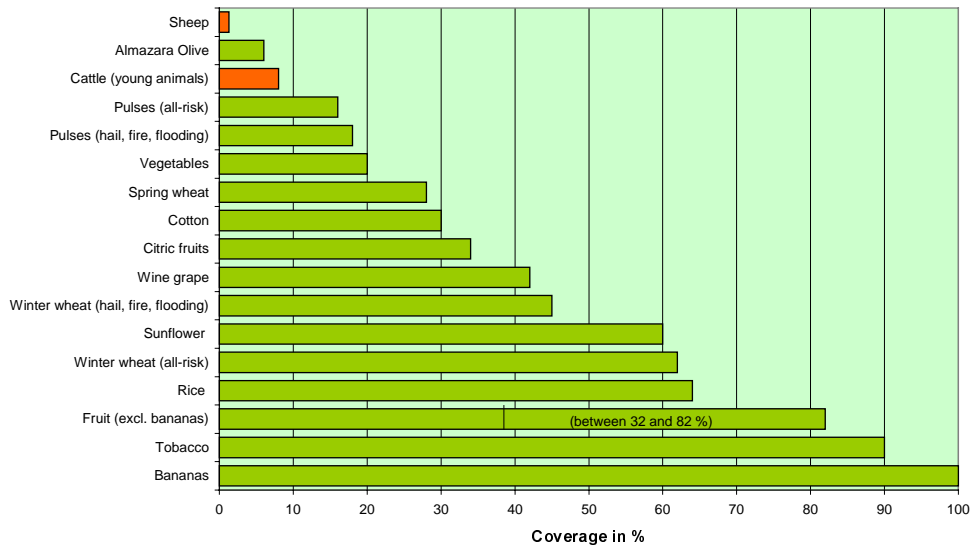
The Spanish system does not distinguish between risks in agriculture that can be insured by the private sector and risks where - because of market failure - the state has to step in. *All* insurable agricultural risks are covered by the private sector and *all* types of policies are subsidised by the state. Three different types of policies are on offer:

- Policies which cover only one type of risk (exceptional);
- Policies which cover multiple risks;
- Policies which provide coverage for all risks beyond the farmer's control ("all-risk").

Most policies are of the type "multiple risk". Traditionally multiple-risk policies go even beyond climatic risks and also cover risks like fire. As of 2000, a new type of policy is on offer for various crops which covers multiple climatic risks (seguros de rendimientos).

Policies can be taken out by individual farmers or by groups of farmers (co-operatives, professional organisations etc.). In 1999, farmers could choose between 58 different types of policies. All crops can be covered (at least for the most important risks). Of the 58 types, three cover animal products and five cover marine cultures. The wide range of policies on offer is considered to be one of the main reasons for the programme's success in terms of high overall participation rates. In the year 2000, about 30 per cent of Spanish producers participated in the system and about 30 per cent of crop and 10 per cent of animal production were covered. Graph 5.1 presents the coverage ratios for important products for the year 1999.

Graph 5.1
Percentage of total production value covered by insurance, Spain 1999



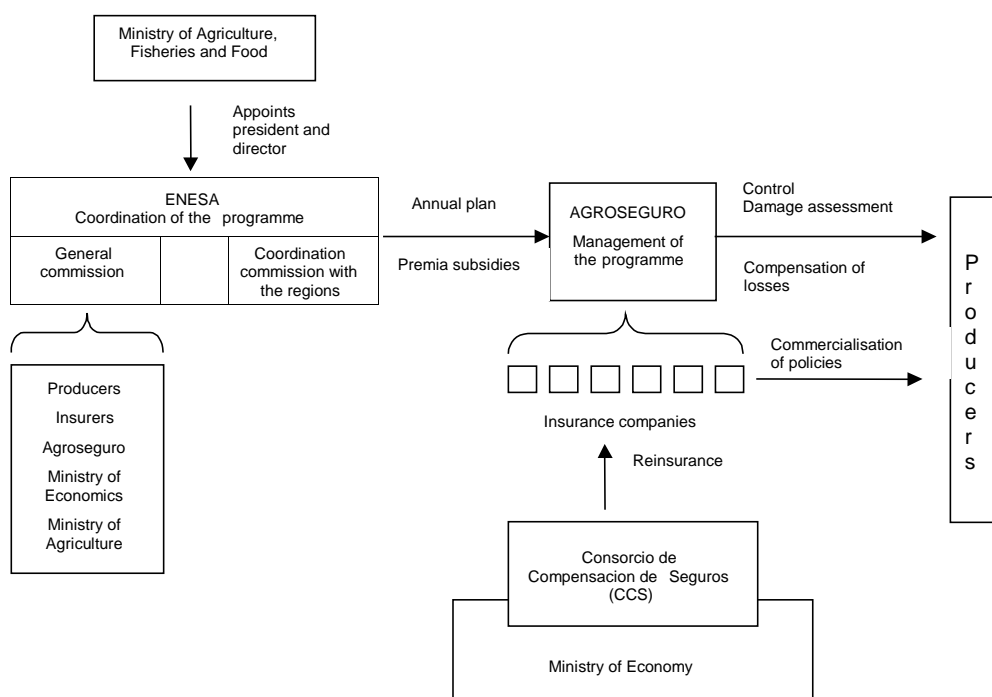
Source: *Agroseguro 1999*

The system is based on an intricate partnership between the private and the public sector. The customers of the system are farmers who can take out agricultural insurance individually or obtain coverage through co-operatives and professional organisations. Participation in the system is voluntary. Besides the customers, the key-players of the system are:

- **ENESA** (Entidad Estatal de Seguros Agrarios), an organism attached to the Ministry of Agriculture, Fisheries and Food. Its president is the under-secretary of the Ministry and its director is appointed by the Minister of Agriculture. In its two main bodies all stakeholders of the system are represented. The tasks include the elaboration of annual plans for agricultural insurance, in which the technical framework for the system is laid down (level of subsidies, insurable yields, minimum cultivation standards, deadlines for subscribing to insurance policies etc.), the subsidisation of the insurance premia (together with the regions, i.e. Comunidades autonomas) and the control of implementation of the insurance plans. Furthermore, ENESA is acting as arbiter in all cases of disputes.
- **AGROSEGURO** (Agrupación Española de Entidades Aseguradoras de los Seguros Agrarios Combinados), a pool of sixty private insurance companies which participate in a system of co-insurance. According to this system, the companies share the total risk underwritten in a given year by all members in proportion to their participation in the equity of AGROSEGURO. AGROSEGURO, on behalf of its members, assumes the day-to-day running of the programme, i.e. fixing and collecting premia, assessing losses, paying compensations, controlling farmers etc.
- **CCS** (Consortio de Compensación de Seguros), a public enterprise with own resources, operating as a re-insurer (under the control of the Ministry of Economy). Re-insurance by CCS is obligatory.

For a graphic presentation of the system see Graph 5.2 (based on Stoppa 2000).

Graph 5.2 Agricultural insurance system in Spain



In operative terms and for any given year, ENESA takes the lead in publishing the annual plan. On the basis of the framework set out in the plan, AGROSEGURO fixes the detailed conditions for all insurance products, in particular the regionally differentiated premium rates which vary according to risk exposure and also include administrative and re-insurance costs. Once the conditions for the various products are set, they are then commercialised through the networks of the insurance companies which are members of the pool of AGROSEGURO. Obligatory re-insurance is provided by CCS, additional private re-insurance is provided by private companies for viable lines for coverage going beyond the level provided by CCS.

The re-insurance CCS provides is non-proportional to the premium to be paid for re-insurance.

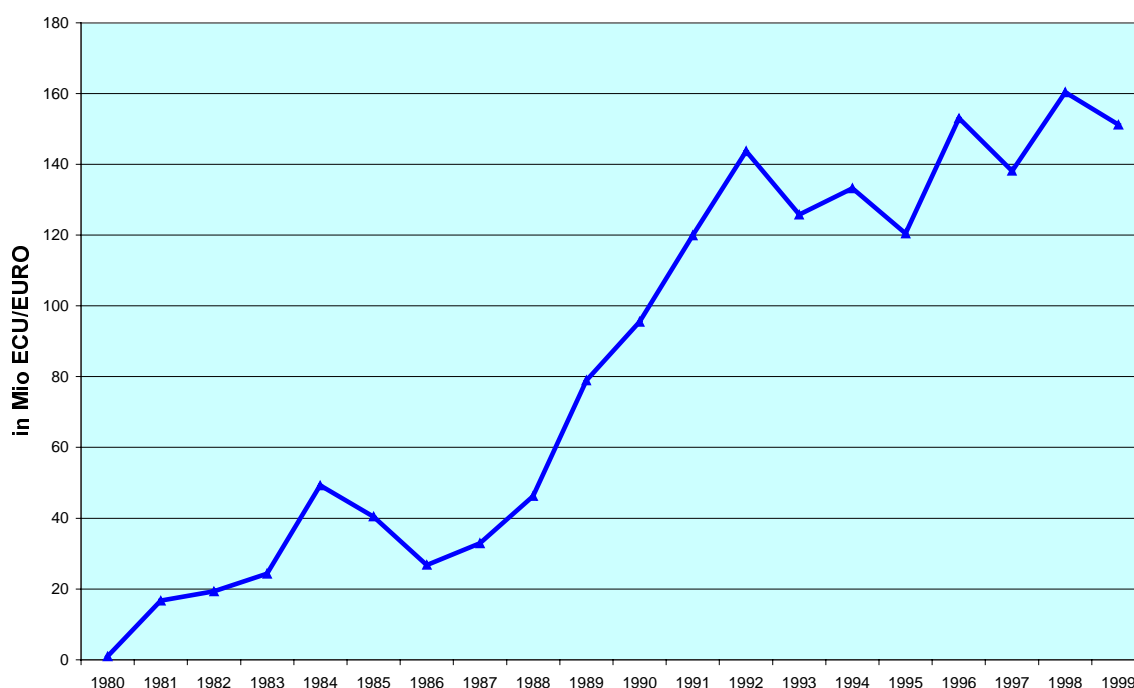
In 1999 total receipts by AGROSEGURO amounted to 307 million Euro, of which farmers paid 155.8 million Euro and the state 151.2 million Euro. In the same year, administrative costs of AGROSEGURO amounted to 11.7 million Euro. Subsidies from the state and the regions are paid out by ENESA and channelled through AGROSEGURO to the insurance companies. Public subsidies amount to up to 41 per cent of the premium (45 per cent in the case of the new multiple climatic risk policies).

Graph 5.3 shows how the state's involvement has developed financially between 1980 and 1999.

The actuarial situation of the system was difficult at the beginning and is currently suffering set-backs with a loss-ratio (claims/premia) of 132 per cent in 1999. For the whole period of 1980 – 1999 taken together it was 113 per cent. Losses are covered

by the insurance industry and CCS. In 1999 CCS paid 79.9 million Euro in compensation.

Graph 5.3 Subsidies to Spanish insurance system (million ECU/Euro)



Source: Agroseguro 1999

A particularity of the Spanish system lies in the participatory approach adopted. All stakeholders are represented in ENESA, which enables taking strategic decisions and fixing the framework for the system (annual plans) in line with their needs. The system is welcomed by all stakeholders because of its stability, resulting from the fact that is backed-up by the state. Furthermore, the system had sufficient time to evolve, as it was relatively limited in scope at the outset and became more and more comprehensive over the years. The system is continually revised on the basis of experience.

Weaknesses, as perceived by official Spanish sources, include the fact that there are important actuarial imbalances for certain products and regions, certain deficiencies in the day-to-day running of the programmes and the fact that not yet all risks are insurable for all products. The question of efficiency of the system is not addressed by official sources.

5.3. United States of America

5.3.1. Crop Insurance and Disaster Aid - development until 1994

The U.S. has a long experience in public involvement in agricultural insurance. Congress first authorised federal crop insurance in the 1930s along with other initiatives to help agriculture to recover from the combined effects of the Great Depression and the Dust Bowl disaster.

Public involvement in crop insurance remained limited until the adoption of the Federal Crop Insurance Act of 1980 which introduced co-operation with private insurance companies and expanded the crop specific and regional coverage. This expansion of coverage intended to replace ad hoc disaster relief offered under several farm bills created in the 1960s and 1970s. Subsidies for crop insurance premia were introduced in order to encourage participation.

However, the U.S. government continued to provide ad hoc disaster assistance for catastrophic crop losses. In 11 of the 15 years from 1980-1994, Congress approved ad-hoc disaster programmes due to adverse weather conditions that destroyed or reduced production of a variety of agricultural commodities. The availability of “free” disaster assistance reduced the attractiveness of buying insurance policies. This was seen as the major reason why the crop insurance programme didn’t achieve a sufficient level of participation.

5.3.2. Multiple Peril Crop Insurance (MPCI)

In 1994, USDA proposed again legislative reforms to replace ad-hoc disaster assistance in favour of an enhanced crop insurance programme. The Federal Crop Insurance Reform Act of 1994 merged crop insurance with disaster payments and created the Multiple-Peril Crop Insurance policy (MPCI).

MPCI provides protection against most naturally occurring perils, including drought, excessive moisture, floods, hail, high winds, and other catastrophes. It is currently available for all major field crops (e.g. corn, wheat, and soybeans) and some fruit, vegetable, and nut crops. Altogether, crop insurance is available for more than 70 crops, though in some locations coverage is not available for all these crops, since climate and other factors limit production areas. There are different forms of MPCI – delivered by private insurance companies - and farmers can select the most suitable among a wide variety of coverage levels under the program.

MPCI coverage is based on yield data of individual farms, the Actual Production History (APH). The producer’s APH yield is calculated as a 4- to 10-year simple average of the producer’s actual yield on the insured parcel of land. If a producer does not have actual yields, the series (up to 4 years) is filled in with a “transition yield” based normally on county yields.

The three different forms of MPCI are Catastrophic Risk Protection (CAT), Buy-up Coverage and Group Risk Plan (GRP). A Non-insured Assistance Program (NAP) provides protection for crops which are excluded from these standard programmes.

Catastrophic Risk Protection (CAT): Under that policy, farmers may obtain a minimum level of insurance coverage. To ensure the widest participation, CAT coverage in 1995 was made conditional to be eligible for any price support or production adjustment programme. In 1996, Congress repealed the mandatory participation requirement. However, farmers who accepted benefits from other programmes were required to purchase crop

insurance or otherwise waive their eligibility for any disaster benefits that might be made available for the crop year.

CAT covers 50% of the approved APH yield at 55% of the expected market price. The price reference level is the expected price during harvest time as announced by the Federal Crop Insurance Corporation (FCIC). Thus, with a total loss, the farmer would get 27.5% of his expected gross revenue reimbursed by the CAT programme.

The premium for CAT coverage is paid completely by the government. Farmers only had to pay an administrative fee of \$ 50 for each crop and each county where they wished to insure crops. In 1999, the fee was increased to \$ 60. The maximum fee per producer is \$ 600 for all counties in which a producer is active and for all crops he wants to insure. Limited-resource farmers, having less than \$ 20'000 in income from all sources in the previous two years, may be exempt from this contribution to administration cost.

Buy-up Coverage: Under the MPCCI policies, farmer can select higher yield and price coverage levels than is possible under CAT option. With buy-up, the farmer may increase the yield level insured at 5 per cent intervals up to 85%¹³ of his APH. Furthermore, the price level insured may be up to 100 % instead of 55 % being the CAT level generally applied.

Farmers pay a processing fee and a premium in order to receive buy-up coverage. The premium payment is based on the yield risk associated with the policy. Farmers in areas with greater annual yield fluctuations pay a higher premium than farms in areas where yields are more uniform. A part of the premium is subsidised by government (see Annex 3 for rate-setting methodology).

Another form of MPCCI which has been offered on a limited basis as from 1993, is the **Group Risk Plan (GRP)**. The coverage of this option is based on the average county yield rather than the individual farm yield. A producer can purchase a guarantee based on the county yield, and if the county yield falls below the insured level, then the producer will receive a payment regardless of the individual farm yield. This option is most effective in protecting individual yield risk when individual and county-level yields are strongly correlated.

A **Non-insured Assistance Program (NAP)** is designed to provide protection of yield losses for producers of crops which are excluded from the standard programmes (e.g. citrus fruits, pears, peppers, plums and flax). NAP offers coverage similar to CAT coverage, but requires a 35 per cent loss in a certain area (which includes at least 5 producers of eligible crops) to trigger payments at the farm level. The relevant area can be defined as a county, several contiguous counties, an area encompassing at least 320'000

¹³ The maximum level was increased in 1999 from 75% of expected yield to 85% for some crops in some areas.

acres (ca. 130'000 ha), or a parcel accounting for a crop value of at least \$ 80 million annually.

NAP coverage is offered free of charge to the producer. However, farmers are required to sign up (reporting their acreage and past yields) before the beginning of the season to be eligible for NAP protection.

5.3.3. *Revenue insurance*

In addition to the yield-based programmes, U.S. farmers are currently offered several revenue insurance programmes. Revenue protection is provided by adding a price variability component to yield protection, which refers to the Actual Production History (APH). The price component of revenue insurance policies is based on intra-year futures prices. Indemnities are paid when the producer's actual combination of harvested yield and harvest-time price falls below the guarantee level. Each product requires that producers pay a premium for coverage which is subsidised by the Federal Government in a manner similar to multi-peril crop insurance. The Federal Government also reinsures private companies against a portion of the losses associated with each of the products, and provides reimbursement for delivery expenses.

The **Income Protection (IP)** instrument was first time offered in 1996 by Federal Crop Insurance Corporation FCIC. This insurance programme offers a revenue guarantee based on the farmer's expected yield and the crops harvest-time price. It protects against declines in actual revenue from expected revenue for a particular crop. It is available for barley, corn, cotton grain sorghum, soybeans and wheat but only in a limited number of counties.

The Actual Production History (APH) yields are used as a yield component when revenue guarantee is calculated for IP. Price setting is accomplished by using the average of the futures market closing prices for the insured crop prior to the policy's sales closing date and during harvest. Indemnities are paid if the actual harvest-time revenue (actual yield multiplied by the harvest-time price) is below the revenue guarantee. Coverage is offered from CAT level (50% yield, 100% price, administration fee) up to 75% of the approved APH yield, and up to 85% in selected counties.

Crop Revenue Coverage (CRC) insurance was introduced in 1996 by a private insurance company. Producers may select a coverage level between 50 to 75 per cent. 85 per cent coverage level is available for selected crops and counties. CRC insurance is specified by product and is available for almost 90 per cent of the corn, wheat, cotton, soybean, and grain sorghum area in the USA.

The most interesting element of CRC is that revenue coverage may increase during the growing season if harvest prices are higher than the base price taken at the time of signing the contract. The spring market price of the Chicago Board of Trade (CBOT) is used for most crops to establish the initial policy revenue guarantee. The harvest market price is used to establish

the crop value to count against the revenue guarantee, and to re-compute the revenue guarantee when it is higher than the spring market price.

Revenue Assurance (RA) insurance was first time offered in 1997 as a pilot project by a private company. In 2000, RA is available for selected crops in Idaho, Illinois, Indiana, Iowa, Minnesota, North Dakota and South Dakota. For a RA policy, revenue guarantee is calculated by multiplying the approved APH yield for the insured unit with the projected harvest price and the coverage level selected by the farmer. The coverage level ranges from 65-75 per cent. RA policyholders must insure all the acreage of the insured crop in a county. Indemnity payments are due when the actual production multiplied by the harvest-time price is less than the revenue guarantee.

Table 5.2
Summary of the Main Crop and Revenue Insurance Options
available to U.S. farmers

	Multi-Peril Crop Insurance			Revenue Insurance		
	CAT-coverage	Buy-up coverage	Group Risk Plan	Income Protection	Crop Revenue Coverage	Revenue Assurance
Insured risk	Individual production risk	Individual production risk	County production risk	Individual revenue risk	Individual revenue risk	Individual revenue risk
Yield coverage	50% of APH yield	50 to 75(85)% of APH yield	70 to 90% of county yield	50 to 75% of APH yield*price	50 to 75% of APH yield * price	65 to 75% of APH yield * price
Price coverage	55% of RMA price ¹	60 to 100% of RMA price ¹	90 to 150% of RMA price ¹	Planting futures price	Higher of planting or harvest futures price	Planting futures price
Indemnity based on	Actual yield	Actual yield	County yield	Actual yield and harvest futures price	Actual yield and harvest futures price	Actual yield and harvest time price
Crops	Over 70 crops	Over 70 crops	Over 70 crops	Selected crops	Corn, soybeans, grain sorghum, cotton, wheat, rice	Selected crops
Regions	All states	All states	Most states	Some states and counties	Most states	Selected states and counties
Producer subsidy	100% subsidised, administrative fee \$60	41.7% of the premium at 65% coverage level	Like buy-up coverage	Same as in MPCl policy for buy-up coverage		

¹⁾ RMA price = expected price during harvest time as announced by the FCIC.

Source: RMA – 2000 Revenue Crop Insurance Plans.

Adjusted Gross Revenue (AGR) insurance is tested as a pilot program in specified counties in five states (Florida, Maine, Massachusetts, Michigan, and New Hampshire) in 1999. It is intended for producers of crops for which individual crop insurance programs are not presently available. In AGR the insurance coverage is based on income from agricultural commodities as reported on the grower's Federal income tax return. The program covers

income from all crops and some livestock income. The coverage of AGR is 50 or 60 per cent of the farm revenue.

Group Risk Income Protection (GRIP) program adds a revenue component to the Group Risk Plan (GRP) area-yield insurance. GRIP is a pilot program introduced in 1999. It is available for corn and soybeans in selected counties in Iowa, Illinois, and Indiana where GRP is offered. In GRIP the revenue coverage is based on county-level revenue, calculated as the product of the county yield and the harvest-time futures market price. Indemnities are paid if the actual county revenue falls below the county revenue guarantee.

5.3.4. Private-public partnership

The Federal Crop Insurance Corporation (FCIC) was created in 1938 to carry out Federal crop insurance. It is a wholly owned government corporation which today is administered by the Risk Management Agency (RMA). The RMA was set-up in 1996 to administer the agricultural insurance programmes and other non-insurance-related risk management and education programmes that help support U.S. agriculture. The RMA regulates and promotes insurance programme coverage, sets standard terms – including premium rates – of insurance contracts, ensures contract compliance, and provides premium and operating subsidies. Crop insurance policies are delivered – sold, serviced, and underwritten – by private insurance companies.

Insurance companies may develop new insurance products which have to be submitted to the FCIC for approval. In addition, insurance companies offer private coverage without government support that supplements the crop insurance programmes. Furthermore, companies that qualify to deliver crop insurance must annually submit plans of operation for approval by FCIC. Through a plan of operation an insurance company provides the FCIC with information on the ability of the company to pay potential underwriting losses and on the allocation of the company's crop insurance business to the various risks sharing categories for the purpose of re-insurance. In addition to re-insurance, the companies are paid a subsidy by FCIC for administrative, operating, and loss adjustment costs. The levels of administrative and operating subsidy and the terms of re-insurance are specified in the Standard Reinsurance Agreement (SRA), which applies to all companies delivering FCIC-reinsured policies. More details of the content of this agreement are provided in Annex 2 of this report.

Private companies share the risk with FCIC by designating their crop insurance policies to risk-sharing categories, called reinsurance funds. Companies retain or cede to FCIC portions of premia and associated liability (potential indemnities). FCIC assumes all the underwriting risk on the ceded business and various shares of the underwriting risk on the retained business, determined by the particular category and level of losses. Companies can further reduce their underwriting risk on retained business through private reinsurance markets.

In 1999, 17 insurance companies delivered crop insurance policies. The companies' insurance portfolios vary in size and scope. Companies compete for crop insurance business through insurance agents who sell and service the policies. Most of the nation's 15,000 crop insurance agents are independent agents who may sell insurance for more than one company. Others are captive agents, selling for only one company. Insurance companies usually pay an agent a sales commission proportional to the premium of the policy sold. Loss adjusters for claims are employees or contractors of the insurance companies.

5.3.5. Premia and premium subsidies

The government determines insurance premia through FCIC/RMA. The calculation of premium rates for each of the crops is based on loss histories of up to 20 years. The basic rule for the premium calculation requires that over the years the premia should be sufficient to pay the claims on the policies. In practice, USDA is at present required to achieve a loss ratio of 1.075, which means that for every premium dollar, the claims paid would be expected to average no more than 1.075 dollar. Annex 3 of this report provides a more detailed description of the premium rate-setting methodology.

In addition, the federal government subsidises premia, in order to reduce the insurance costs of farmers. The subsidy varies by level of coverage and type of product. Insurance premium discounts of a total amount of \$ 400 million included in the 1999 emergency assistance package further reduced the price for buy-up insurance coverage. Sparked by premium discounts and by an increase in the maximum allowable yield or revenue guarantee from 75% to 85%, participation in crop insurance increased in 1999, particularly for the buy-up coverage levels.

In June 2000 President Clinton signed the Agricultural Risk Protection Act of 2000. The objectives of this reform are: (1) to make buy-up coverage more affordable to farmers by increasing premium subsidies; (2) to address the impact of multiple-year losses on the reduction of insurance reference level; (3) to broaden the coverage to new crops and regions, and (4) to improve the provisions against fraud (Glickman 2000). The act makes available \$ 8'200 million for insurance for the next five years.

The increase in subsidies for the programmes based on the Actual Production History is shown in table 5.3. At a 100% price coverage level, premium subsidies now range from 38% for 85% yield coverage to 67% for 50% yield coverage.

Table 5.3
Agricultural Risk Protection Act 2000:
Changes in premium subsidies for different coverage levels

Coverage level								
– Yield (%)	50	55	60	65	70	75	80	85
– Price (%)	100	100	100	100	100	100	100	100
Previous subsidy*	55%	46%	38%	42%	32%	24%	17%	13%
New subsidy**	67%	64%	64%	59%	59%	55%	48%	38%

* applied to major crops under APH coverage. Rates of subsidy may differ for price coverage levels less than 100%

** applies to all plans of insurance (except group risk-based policies) and all price levels within a certain yield coverage level.

Source: RMA (2000) (<http://www.rma.usda.gov/news/pr/2000/000630.html>)

5.3.6. *Unit structure of insurance contracts*

Under a crop-insurance contract, the insured farmer agrees to insure all eligible acreage of a crop planted in a particular county. This choice is made county by county and crop by crop. In order to reduce the potential for adverse selection against the insurance provider all eligible acreage must be insured. However, farmers have a possibility to divide eligible acreage to different insurance units. Each parcel of land that is insured independently of other parcels is called a ‘unit’ and one farming operation may have several insurance units. This means that farmer may receive an indemnity payment, e.g. because of hail, on one unit, while other units on the same farm produce a record crop.

The unit structure of a farm is a very important part of an insurance contract, because it determines the guarantee, premium, and amount of any possible loss payment for the unit’s crop acreage. Often farmers like to divide their land into as many units as possible to maximise the risk management protection offered by insurance policies, although this may result in higher premium costs with a more differentiated unit structure.

5.3.7. *Scope and costs of crop and revenue insurance policies*

Participation in the crop insurance programmes increased significantly following enactment of the 1994 Act. For example, in 1999, 196 million acres of farmland was insured under the programmes. This is about twice the acreage insured in 1994 and represents today about two-third of the country’s total planted acreage of field crops.

The liability (value of insurance in force) in 1999 is about \$ 30.9 billion, the largest amount since the inception of the programme, and is expected to rise further in 2000 (Table 5.4).

The total premium which includes subsidies and the premium paid by farmers was \$ 2.3 billion in 1999. In recent years, indemnities (the compensation received by farmers for qualifying losses paid under insurance programmes) have varied between \$ 0.6 billion and \$ 2.4 billion.

Table 5.4
Scope of crop insurance programme in USA in 1994-2000

		1994	1995	1996	1997	1998	1999*	2000*
Area insured	Mio acres (Mio ha)	100 (40)	221 (89)	205 (83)	182 (74)	181 (73)	196 (79)	203 (82)
Liability	Mio \$	13 598	23 728	26 878	25 446	27 919	30 864	33 793
Total premium	Mio \$	949	1 543	1 839	1 774	1 874	2 305	2 493
- of which subsidy	Mio \$ (\$ / ha)	255 (6.4)	889 (10.0)	982 (11.8)	902 (12.2)	946 (13.0)	953 (12.1)	932 (11.4)
Indemnity	Mio \$	601	1 568	1 493	991	1 675	2 416	706

* data until October 2000

Source: *Summary of business report, RMA* (<http://www.rma.usda.gov/data/#national>)

The total costs consist of delivery expenses, administration costs and indemnities. The total programme cost for crop insurance policies has ranged between \$ 1'600 million and \$ 2'400 million during the last five years and is expected to increase in 2000 up to almost \$ 2'600 million (table 5.5). The net government costs (total costs less premium paid by producers) have ranged from \$ 1'100 million and 1'700 million during the period 1995 to 1999 and are expected to stay at that high level in 2000.

Table 5.5
U.S. Federal Government expenditure on crop insurance
(in million dollars)

	Crop year					
	1995	1996	1997	1998	1999 1)	2000 2)
Delivery expenses	392	487	450	429	401	426
Indemnities 3)	1 463	1 834	1 072	1 394	1 980	2 084
Administration and operation of RMA	75	68	67	63	64	71
Total programme costs	1 930	2 389	1 589	1 884	2 449	2 585
Less producer premium	n.a.	n.a.	- 842	- 928	- 905	- 954
Underwriting gain	n.a.	n.a.	340	412	127	134
Producer premium net 4)	- 573	- 641	- 502	- 516	- 778	- 820
Net Government costs	1 357	1 748	1 087	1 368	1 671	1 765

1) current estimate

2) 2000 Budget

3) Indemnities differ between tables 5.6 and 5.7 because of different accounting periods.

4) Net of underwriting gain retained by companies

Source: *Budget summaries for 1997-2000* (<http://www.usda.gov/agency/obpa/Home-Page/obpa.html>)

5.3.8. *New developments*

At present, RMA is under a mandate for crop and revenue insurance programme **simplification**. It is stated that the present policies are complex, require massive amounts of data and are costly to administer. During autumn 1999 Senate Agricultural Committee has been discussing on possibilities to reform the present crop and revenue insurance policy. There seem to be two basic lines for the reform. The first is to make technical changes to the current insurance programme and to call for more money for the programme. The second is to integrate risk management into the broader context of agricultural policy. Under this approach, direct payments could be made to farmers who use at least two different risk management practices. Despite the diverging views on the ways to reform, there is a consensus that reform is needed as the present system is lacking attractiveness and participation for some producers and in some regions (see also section 7.1).

To date, government was involved only in crop and revenue insurance policies but not in **livestock insurance**. Several types of insurance covering livestock are widely available in the United States through the private sector. However, these products are not subsidised by the Federal Government. Annex 4 provides a short description of insurance options for livestock farmers.

The 2000 Agricultural Risk Protection Act also establishes a pilot insurance programme for livestock and includes a mandate for USDA to provide competitive grants to educate producers in under-served areas about the full range of risk management activities – the aim being to increase participation in these regions.

In the current debate, one of the weaknesses of the 1996 Farm Bill is perceived as its failure to act in a counter-cyclical manner. Cash transition payments are (by design) paid to farmers even when market income is high and the size of the payments does not increase when market income is low. Therefore, political support is growing in the US for payments which increase, when market income goes down and which decrease, when it goes up.

The 2001 budget proposal of the Clinton administration is a step into this direction. Amongst other initiatives, the administration proposed a programme, under which supplemental government payments would be provided to eligible producers if projected gross income for certain crops (wheat, feed grains, rice, upland cotton and oilseeds) falls below 92 percent of the preceding 5-year average. In the proposal, gross income included gross market revenues for the crop plus government payments (USDA 2000a).

For early 2001 the US Commission on 21st Century Agriculture is expected to publish a report on how to establish a farm **income safety net** for US agriculture. The underlying idea is to convert the AMTA (Agriculture Marketing Transition Act) into counter-cyclical payments which would vary depending on the level of farm prices and/or income. The objective is to mitigate the (political) need for massive annual emergency payments.

One such proposal, called SIPP (Supplemental Income Payments for Producers), was introduced as a bill in Congress. SIPP would make payments to producers of a crop when the per-acre national gross revenue for that crop falls below a set percentage of the 5-year average of that crop's per acre national gross revenue. The cost of such a policy at a 95 percent payment trigger level would have averaged \$ 1.06 billion per year had it been in place from 1977 to 1998.

As the programme would depend on national triggers, it would be free of moral hazard and adverse selection problems. The problem of such a system is that farmers of a particular region suffering yield losses may not receive a payment because revenue at the national level has not dropped sufficiently. To solve this problem, payments could be based on regional yields. Another potential problem is the influence such a programme would potentially have on planting decisions. If - before planting - the price for a crop falls significantly below the 5-year average, the probability increases that farmers receive compensation. In such a case, the programme would significantly influence the planting decision. Basing the guarantee on a futures market price could solve this problem.

Such a system based on national/regional triggers would cover the part of the farmers' risk exposure which is systemic in nature. With such a system in place, traditional crop insurance could deal with the part of the risk which is non-systemic (Hart and Babock 1999).

An alternative to the crop-specific revenue safety net under discussion is an instrument known as Commodity Income Supplement Support (CISS), which is an idea for a safety net based on the *aggregate* revenue of a number of programme crops.

5.4. Canada

Canada has three different programmes that create a basic coverage for yield and income risks in farming. These are the Crop Insurance Programme (CI), the Net Income Stabilisation Account (NISA), and the Agricultural Income Disaster Assistance (AIDA). The common objective is to provide income stabilisation and a safety net system against crop and revenue risks to farmers. In addition, province-specific programmes are used to complement these programmes in addressing more specific provincial and regional concerns.

5.4.1. Crop Insurance Programme (CI)

In Canada, the history of crop insurance dates back to 1939 when the Canadian Government introduced the Prairie Farm Assistance Act. This act provided permanent crop loss disaster assistance for grain producers in the Prairies and the Peace River area. In 1959, the **Crop Insurance Act** was passed to provide more adequate protection to farmers in all provinces. Crop insurance has been a key federal support programme since 1959 and has varied little over the years. Basic features are involvement of both levels of government (federal and provincial) and producers, shared programme costs,

voluntary participation, provincial administration, and the objective of actuarial soundness in the long run.

Crop insurance provides production risk protection to producers by covering crop losses caused by natural hazards like drought, flood, hail, frost, excessive moisture, uncontrollable diseases and insects. There is also a provision for crop damage incurred by protected migratory waterfowl.

In crop insurance, crop loss protection is available to farmers in the form of a yield guarantee. It is based on a producer's individual previous production history. If production falls below that hypothetical yield, the producer will be eligible for an indemnity. Generally, the maximum coverage available is 80 per cent while up to 90 per cent coverage is available for low risk crops. Farmers are free to choose different coverage levels. The price at which losses are compensated is adjusted each year to reflect expected market returns for a representative grade of each crop.

Although federal legislation establishes the national framework, a lot of flexibility exists for provinces to modify the programme to meet the needs of their producers. Provincial plans are developed through consultations with all three parties (producers, federal and provincial governments) on a common basis. Crop insurance is available in all provinces for a wide variety of crops but coverage is not universal, nor are participation rates necessarily high in spite of the fact that the costs of the programme are subsidised by government. Two of the key conditions for the federal financial contributions are that (1) premium rates must be set in an actuarially sound manner and provincial schemes must be self-sustaining, and (2) the method used to establish probable crop yields must reflect true yield histories.

Table 5.6 Scope of crop insurance programme in Canada in 1992-1999

		Crop years						
		1992-93	1993-94	1994-95	1995-96	1996-97	1997-98	1998-99
Producers	1000	141,5	130,0	118,3	111,7	101,5	99,8	100,8
Area insured	Mio acres	54,1	46,5	40,7	39,7	40,8	43,8	49,2
Coverage	Million \$	4 534	4 302	3 888	4 071	4 992	5 212	5 446
Premia	Million \$	497	505	452	479	533	552	584
Indemnities	Million \$	784	464	269	286	247	293	284

Source: Agriculture and Agri-Food Canada – Performance Reports (<http://www.agr.ca/rpp/dpre.html>)

During the crop year 1998-99, over 100 000 farmers and almost 50 million acres were insured through the programme (table 5.6). This means that about 50 % of all eligible producers and 55 % of all crop and forage acres in Canada were insured. The total value of insurance in force was Canadian \$ 5.4 billion in 1998-1999. In recent years, the total indemnities paid have been about 50-60 per cent of the total premia paid by farmers and governments together, but in 1992-1993 indemnities were much higher than premia.

Federal contributions to the Crop Insurance Program are provided under the authority of the Farm Income Protection Act (FIPA). Currently, Agriculture and Agri-Food Canada (AAFC) allocates approximately \$ 200 million per year to crop insurance from its total safety net envelope of \$ 600 million. At present, the federal government and provinces each pay 25 % of total premia and 50 % of administration costs. In recent years, the federal government's expenditures for crop insurance have increased. In the last fiscal year federal expenditures were \$ 226.9 million (table 5.7). The federal part of the premium costs was \$ 181.3 million and of the administrative costs \$ 45.6 million. Because of the cost share nature of the crop insurance programme, provincial governments are spending collectively about an equal sum of money on the programme as the federal government.

Table 5.7 Federal costs of crop insurance in Canada in 1995-1999 (in million \$)

Federal contribution to	Fiscal year			
	1995-96	1996-97	1997-98	1998-99
Premia	123,6	149,8	167,8	181,3
Administrative cost	45,4	36,1	38,3	45,6
Total Federal costs	169,0	185,9	206,1	226,9

Source: Agriculture and Agri-Food Canada – Performance Reports

In addition to premium subsidies and contributing financially to administrative cost, Federal government may enter into a reinsurance agreement with provinces according to the Farm Income Protection Act. At present, four provinces have reinsurance agreements with the federal government: Alberta, Saskatchewan, Manitoba and New Brunswick. British Columbia and Ontario buy reinsurance from the private sector and the federal government shares in the costs.

5.4.2. *Net Income Stabilisation Account (NISA)*

Net Income Stabilisation Account (NISA) is a voluntary programme developed jointly between producers and the government of Canada and participating provinces. It was introduced in 1991 as a part of the Farm Income Security Act. The programme is designed to help producers to achieve long-term farm income stability on an individual basis. Producers are provided with the opportunity to deposit money annually into their NISA account which is supplemented by matching government contributions. In lower income years, producers can make withdrawals from the funds they have set-aside.

NISA is available in all ten provinces. Anyone who files a farm income tax statement can participate in the programme. Corporations, co-operatives or communal organisations which file an income tax return reporting farming business income/loss and meet specified eligibility criteria may also participate. To be eligible to participate in NISA, producers must open a NISA account at a participating financial institution of their choice.

In practice, NISA subsidises and assists farmers in building savings for low revenue years. This is done through savings accounts where farmers contribute and receive a dollar-for-dollar match from the government. At present, farmers are allowed to contribute up to 3 per cent of Eligible Net Sales (ENS) and they receive matching contributions from governments (2 % from the federal government and 1 % from the provincial government). Eligible net sales are calculated by subtracting purchases of qualifying commodities from the gross sales of qualifying commodities. A qualifying commodity is any primary agricultural commodity with the exception of supply managed commodities (dairy, poultry and eggs). Producers also have the option of depositing an additional 20 per cent of their eligible net sales but the government does not match these additional contributions. However, both the basic contributions and the additional ones earn a 3 per cent interest bonus above regular interest rates offered by the financial institutions.

A withdrawal from the account is allowed on the basis of the Stabilisation Trigger or the Minimum Income Trigger. The Stabilisation Trigger entitles a withdrawal when farm's current year Gross Margin falls below the Gross Margin average from previous years (up to five). The Gross Margin is calculated by taking the net sales of all agricultural commodities, plus income from contract work and machine rental, minus eligible expenses. The Minimum Income Trigger entitles a withdrawal when net income from all sources falls below the minimum income threshold of \$10'000 plus a farmer's current year maximum matchable deposits. A farmer can close her/his account at any time by submitting a written notification to NISA. In this case, the farmer can choose to have the entire account balance paid out either in a lump sum or in annual instalments over a period of up to five years.

At the end of the stabilisation year 1997, the net assets in the NISA accounts were \$ 2.8 billion (table 5.8). The change in net assets varies between years but until 1997 the net assets increased steadily every year. Federal government contributions to the NISA programme were 264 million in 1997. In the same year, provincial governments were contributing 117 million dollars and farmers' deposits were 363 million dollars.

Table 5.8
Changes in net assets of NISA programme in 1990-1997 (in million \$)

	Stabilisation years					
	90 to 92	1993	1994	1995	1996	1997
Participant deposits	533	173	295	405	341	363
Federal contributions	565	81	205	322	239	264
Provincial contributions	204	76	111	143	105	117
Regular interest	35	32	52	57	75	112
Increase in net assets	1336	363	663	927	759	857
Participant withdrawals	875	102	137	189	250	481
Administrative costs	18	5	5	8	8	8
Decrease in net assets	893	107	142	196	258	489
Change in net assets	443	256	521	731	501	368
Net assets end of the year	443	699	1220	1950	2452	2820

Source: *Agriculture and Agri-Food Canada – Performance Reports*

Table 5.9 Net Income Stabilisation Accounts in November 1999

Province	Number of participants	Total value of funds, \$ in millions	Average account in \$
Alberta	25757	514.0	19955
British Columbia	2856	53.3	18667
Manitoba	19184	374.4	19515
New Brunswick	343	13.3	38655
Newfoundland	80	1.1	13478
Nova Scotia	1073	15.0	14013
Ontario	28762	585.6	20361
Prince Edward Island	809	33.4	41299
Quebec	1066	31.5	29595
Saskatchewan	55951	1101.7	19690
Whole country	135881	2723.3	20042

Source: *National Crop Conditions Report* (http://www.agr.ca/policy/crop/home_e.html)

In November 1999, the number of participating farmers was over 135'000, approximately 60 % of all eligible producers (table 5.9). The average balance of accounts per farmer was about 20'000 dollars. The total balance in the autumn 1999 was slightly lower than 1997 (\$ 2.7 billion).

5.4.3. *Agricultural Income Disaster Assistance (AIDA)*

The **Agricultural Income Disaster Assistance (AIDA)** Programme is a national programme designed to provide assistance to producers facing dramatic income declines as a result of factors beyond their control and for which existing programmes cannot provide assurance of continuing the farm business. It is a federal-provincial initiative introduced for the 1998 taxation year. It is funded 60 per cent by the federal government and 40 per cent by provincial governments. The federal government, through Agriculture and Agri-Food Canada, originally allocated \$ 900 million for the delivery of AIDA. In January 2000, the total federal allocations were \$ 1.07 billion.

The AIDA programme is open to individuals, farming corporations, co-operatives and trusts filing a farm income tax return and providing supplementary information. Producers will not be required to pay any administration fees for the federal share of the programme. Individual provinces may have administrative fees for their share of the programme.

The AIDA programme takes a “whole-farm” approach. All commodities are covered. This coverage is based on gross margins. Gross margin represents the income available to the farmer after paying for the cash operating cost on the farm; adjustments are made to ensure that beginning farmers, high-debt and low-debt farmers, and those with high and low investment levels are treated equitably.

Maximum coverage does not exceed 70 per cent of gross margins averaged over the three previous years. When the gross margin in the claim year is negative, the negative portion is not covered. The federal share is based on a cap to individuals that does not exceed \$175'000. Payments to corporations or co-operatives reflect the number of shareholders or members, to a maximum of five. Caps for the provincial share are determined by the provincial programme and may affect the total received by the applicant.

The federal portion of the programme is identical in every province, although to avoid duplicate delivery systems and to keep administrative costs to a minimum, AIDA is delivered through existing administrative processes wherever possible. Producers are not required to complete two application forms. AIDA eligibility and payment for the federal share is uniformly applied in all eligible provinces.

Farmers are entitled for AIDA payments whether or not they are eligible for NISA, crop insurance and other provincial programmes. However, any AIDA payments will be reduced by an amount that is equivalent to the “base government matching contributions” available through NISA whether or not a farmer is participating in NISA.

5.5. Japan

As Japan lies in the monsoon zone, its agricultural production frequently suffers from heavy losses caused by typhoons, floods or low temperatures. However, there are no private insurance companies offering agricultural insurance, but a **comprehensive public system** is in place (Yoshii 1999). The system consists of six programmes and covers almost all crops and livestock, except for vegetables, flowers and fowls:

- Rice, wheat and barley insurance
- Sericultural insurance
- Livestock insurance
- Fruit and fruit-tree insurance
- Field Crop insurance
- Greenhouse insurance

The rice, wheat, barley, sericultural and livestock programmes are offered nationwide. Participation is compulsory for rice, wheat, barley and sericultural programmes because of the importance of the respective sectors for Japanese agriculture. Compulsory participation prevents adverse selection and helps to stabilise the programmes as risks can be spread more widely.

Livestock insurance covers animal losses as well as expenses for treating diseases and injuries (Kagoshima 1999).

The scheme has a three-level structure. Agricultural insurance is organised by Agricultural Mutual Relief Associations at the municipal level. As natural disasters often cause extensive damage over a wide area, the risks cannot be sufficiently spread within a municipality. Therefore, the Associations are re-insured by Federations at the prefectural level which in turn are re-insured by the central government. Furthermore, the central government partly subsidises farmers' premia and a part of the insurers' administrative expenses.

In 1996, government expenditures amounted to JPY 153'100 million (€ 1'610 million), the main item being the subsidy of JPY 90'400 million provided to policyholders (€ 940 million). The subsidy rate for the premium is 50 per cent for most of the programmes.

The programmes not always seem to correspond to farmers' needs. Small, part-time farmers depend more on their off-farm than on their on-farm income and thus have a significant capacity to cope with income risk themselves. This seems to be the most important reason, why they are reluctant to pay premia under the compulsory programmes. On the other hand, some large-scale farmers feel that the premia they have to pay don't fully correspond to their risk exposure and that small farmers benefit more from the system. Another point of criticism is that insurance is only helpful in the case when damages exceed a certain level. Japanese authorities also consider improving further the administration of the programmes.

Rice Farm Income Stabilisation programme: This programme was introduced within a set of new policies in the rice sector. If the price for rice declines in a given year compared to the average price achieved over the preceding three-year period, the farmers receive 80 per cent of the price difference as compensation. The compensation is paid out of a stabilisation fund which is financed by farmers (25 %) and the government (75%). Only those farmers who fully comply with certain set-aside requirements can participate in this scheme (The Food Agency, MAFF Japan).

6. WTO ISSUES

In the framework of the Uruguay Round Agreement on Agriculture (URAA) domestic support has to be reduced in six equal annual instalments starting from 1995. For developed country members, reduction amounts to 20 per cent as compared to the base period 1986-88. Reduction commitments are defined in terms of a reduction of a “Total Aggregate Measurement of Support” (Total AMS) which includes all product-specific support and non-product specific support in one single figure. Two categories of support (green and blue box) are exempt from the reduction commitments.

To be classified under the green box, support measures have to fulfil certain conditions as specified in the Annex 2 of the Agreement. A number of conditions relate to all green box measures (no price support, no or at most minimal trade-distorting effects, no effects on production) (Point 1 of Annex 2). Additional conditions relate to specific types of support. Among others, specific conditions relate to (1) income insurance and income safety nets and (2) disaster aids (see annex 5 of this report).

(1) Subsidies for insurance and government participation in income safety-nets (point 7, heading “Government financial participation in income insurance and income safety-net programmes”)

Government financial participation in insurance is classified as green box compatible if:

- the insurance relates to *income* shortfall based on a reference period. The payments may *not* relate to the type or volume of production (including livestock units) or the prices (domestic or international) applying to such production or to the factors of production employed and
- the income loss is more than 30 per cent and the amount of payments compensate for less than 70 per cent of the producer’s income loss.

The same conditions apply for government participation in income safety-nets.

(2) Disaster aids (point 8, under the heading “Payments made (either directly or by way of government financial participation in crop insurance schemes) for relief from natural disasters”)

Government payments for relief from natural disaster (made available either directly or by way of governmental financial participation in crop insurance schemes) have basically to fulfil the same conditions. There are, however, a number of differences. Payments can only be triggered by a production loss resulting from a disaster which is specifically recognised as such by the government. Payments can relate besides income also to losses of livestock, land or other production factors and can compensate up to 100 per cent of the total cost of replacing losses. Where producers receive payments under income insurance/safety-net programmes *and* payments for relief for natural disaster, the total of such payments must be less than 100 per cent of the producer’s total loss.

With a view to the ongoing WTO round and in the light of the wide-spread use of insurance systems by trade partners, there might be attempts to widen the scope of the green box provisions in order to encompass a wider range of insurance and safety net measures. This could be concluded for example from the negotiation position of the US, which underlines the importance of minimally trade distorting support which “could include, among others, income safety-net and risk management tools....” (US 2000).

7. LESSONS FROM EXISTING SYSTEMS OF AGRICULTURAL INSURANCE

From the experience of existing systems of agricultural insurance several lessons can be drawn. Most of the material available is based on the US experience, including several reports by the United States General Accounting Office (GAO) and the Office of the Inspector General of USDA (OIG). These reports focus more on yield than on revenue insurance as the latter products are still in an experimental status (Skees 2000).

7.1. Coverage and participation

Even for well-developed and well-established agricultural insurance systems the coverage in terms of products and participation rates remains limited. This is true even for products which are specifically designed to provide basic safety net coverage for every farmer and which are provided at very low cost.

In the US, **product coverage** by federal crop insurance has increased significantly over the last years (75 crops in 1999 compared to 59 crops in 1994; GAO 1999a). However, important speciality crops (e.g. citrus fruits, pears, peppers, plums, flax) are still excluded and may just rely on basic coverage through the non-insured Assistance Programme NAP. Moreover, the livestock industry is not (yet) covered by the standard insurance programmes, although it represents the most important sector of American agriculture in terms of value of production. In Spain, all crops can be covered (at least for the most important risks). However, as in the US, coverage for animal production remains less developed.

As to the level of **participation**, in the US two thirds of the country's total eligible acreage of field crops is insured under the programme in 1999 (Harwood *et al.* 2000). However, only 400'000 farmers out of 2 million farmers nation-wide participate in the programme (20 %) (GAO 1999c). In Spain, the participation rate is 31 percent.

Relatively low participation rates in the US are the more surprising as farmers on average benefit substantially from the insurance programmes. Since 1995, the US aggregate indemnity/producer-paid premium ratio has averaged nearly 1.77, implying \$1 of premium has bought \$1.77 of expected indemnity benefit on average, plus additional benefit from risk reduction which is not included in the figures (Schnepf and Heifner 2000).

There are several reasons which may explain less-than-universal participation:

- Other safety nets exist (like off-farm income) or other instruments to manage risk are considered more useful (i.e. providing a better level of coverage) or cheaper for a given level of risk-reduction. The US CAT programme is an example of a programme which is considered not to be useful by certain farmers.

The "linkage" provision in the 1994 Reform Act required that farmers participating in the annual commodity programmes (e.g. commodity loans

and deficiency payments) also had to acquire at least the CAT level of insurance coverage.

When the linkage requirement was eliminated by US Congress in 1996, the number of CAT policies fell sharply (in 1998 it was down 66 per cent over 1995) (OIG 1999c). According to OIG (1999c) producers decided not to participate in the CAT programme because the protection provided was not sufficient, despite the fact that premia are 100 per cent subsidised and producers only have to pay an administrative fee. Indeed, CAT will not pay indemnities until a producer has lost over half of his crop, and guarantees the loss at only slightly more than half of the market price. This means that a producer who has lost everything will recover only about a quarter of the value of the total crop.

- The risk environment and probably also the risk perception vary significantly from farmer to farmer and therefore risk-management strategies have to be tailored to individual needs. Even with the subsidies available, farmers may come to the conclusion that the premia they would have to pay for a specific insurance product do not reflect their specific risk-exposure. They may perceive the premium rates overstating their individual risk of loss.
- Information deficits: Farmers may lack the necessary information on the programmes available or misunderstand the way the numerous programs available are operating.
- Following their experience, US farmers may also rely on their expectation that potential losses will be covered by public ad hoc disaster assistance payments.

7.2. Incentive structure and efficiency

For a system of agricultural insurance to be comprehensive, i.e. to cover a wide range of perils at a level of protection which is interesting to the farmer, state involvement seems necessary, since private insurance companies alone would not have sufficient incentives to deliver it. However, serious questions arise as regards the efficiency of programmes, which are based on a public-private partnership.

The lack of efficiency is a main point of criticism in particular for the US programmes. The OIG reports focus on the efficiency of the CAT programme including buy-up policies. Two main arguments can be summarised:

- Success of the programme vs. underwriting gains of the *insurance* industry

The OIG's view is that the CAT programme has failed in providing the intended safety net (particularly to the small farmer), while it has produced significant underwriting profits for the insurance industry. According to the OIG (1999a), the insurance companies involved in CAT were able to benefit from significant windfall profits. From 1995 to 1998, companies gained about \$ 305 million in CAT underwriting which represents a return of about 19 per cent on gross imputed premia of about \$1.6 billion. Also for buy-up policies,

the insurance companies gained about 14 per cent on gross premia of about \$ 5.4 billion (OIG 1999b).

- Indemnities paid out to producers vs. total delivery costs

With the CAT programme between 1995 and 1998 more money went to the insurance companies than to producers helping them to recover from insured losses. The insurance companies involved received about \$ 506 million for the delivery of CAT insurance (administrative expenses, loss adjustment, excess loss adjustment expenses and underwriting gains) while the farmers only received indemnities for about \$ 250 million. In other words, delivering \$1 to producers suffering from crop losses costs more than \$ 2 within the CAT programme (OIG 1999c).

However, the USDA has argued that such remarkable underwriting gains are due to specific conditions. Growing conditions have been generally favourable in the period taken into account and at the same time the average figures mask wide variation among areas, companies and years (Harwood 2000). Large potential underwriting gains are seen to be a necessary condition for the companies to provide insurance products, since the *potential losses* for the insurance companies are large as well. The USDA maintains that this is the case under the SRA in effect (Harwood 2000).

The efficiency question is linked to the question of incentives. According to the OIG the companies do not have an adequate incentive to manage the crop insurance programme in an actuarially sound manner, because the public reinsurance leaves only *minimal risks* to the private companies (OIG 1999a). Because they incur minimal risk, insurance companies involved have little reason:

- to effectively monitor risky policyholders
- to deny claims of questionable losses¹⁴
- to improve their own practices and performance¹⁵.

As a profit oriented actor in a market economy, the insurance industry legitimately seeks to maximise profits. Thus in a private public partnership concerning the complex and sometimes intransparent system of agricultural insurance, the government has to closely monitor private gains. The framework and incentives for the private industry have to be adjusted regularly if the private sector appears to be overcompensated in relation to the services it provides (use of existing infrastructure, know-how etc.). An appropriate incentive structure is also necessary

14 Individual claims are verified by so called loss adjustors. They are either employees or private contractors, and, as such, are impelled to favourably adjust claims to retain customers for the reinsured companies, which in turn provide them with employment. OIG suggests that there is a need for a separation of duties between the loss adjuster and the reinsured companies (OIG 1999b).

15 For example, OIG has found quality control reviews to be superficial and not providing independent verification of claims (OIG 1999a).

to make sure that the private sector effectively contributes to keep the losses for the *government* as low as possible.

Constant evaluation of programme performance is not only necessary to avoid over-compensation but also to make sure that the goals of the programme can be achieved. For example, if a programme intends to offer support to all producers (no matter what their characteristics are as regards economic situation, size etc.), the private sector has to be given the right incentives to make sure that it serves all producers equally well.

For the US, the OIG has identified a specific problem concerning incentives. Administrative fees to compensate insurance companies for their services are paid as a percentage of premia collected¹⁶. This is criticised because the workload and cost associated with administering an insurance policy do not increase proportionally with the premium. In fact, the larger the premium of an individual policy, the greater the differential between reimbursement and the actual costs the insurance companies incur to administer this policy¹⁷. Reimbursement proportional to premium volume motivates insurance companies to promote insurance types that have a larger premium or prefer larger producers. This results in a bias against small producers, which undermines the effectiveness of the crop insurance programme as a safety net for *all producers*. “Getting the incentives right”, thus, is a constant concern in a private-public partnerships.

Delivery through public institutions could be an alternative which deserves careful evaluation. The OIG, for instance, has raised the question whether it would not be cheaper to deliver and administer the Federal crop insurance programme through the existing field office structure of the Farm Service Agency (2500 field offices throughout the country, 15'000 employees for delivering numerous programmes including the Agricultural Marketing transition Act, price support, conservation, emergency assistance, and loan programmes) (OIG 1999a and OIG 1999b). It is estimated that the additional costs incurred could be lower than the \$ 759 million received by private insurance companies for delivering the 1998 programme.

7.3. Programme design

A publicly supported insurance programme can be under (political) pressure to provide products which have not been sufficiently tested and which can therefore undermine the soundness of the system.

¹⁶ In 1999 companies were reimbursed for their sales and service expenses at 11 per cent of total premium for CAT coverage, and 24.5 per cent of total premium at buy-up levels for APH insurance. The buy-up reimbursement is higher than for CAT because of the higher probability of claims and the associated added paperwork and loss adjustment (Harwood et al. 2000).

¹⁷ A closer link between the number of policies sold and the reimbursement is therefore advocated. Although the number of policies sold decreased 23 per cent from 1996 to 1998, reinsured companies' administrative reimbursements decreased only about 10 per cent (OIG 1999b).

The US Risk Management Agency has been accused of insufficient research before implementing crop insurance policies. This systemic flaw has resulted in unreasonably high reference yield figures in certain programmes, such as cotton and corn, but it has also resulted in poorly written policies for some speciality crops. Moreover, the lack of historical data made it impossible to measure the actuarial appropriateness of insurance products. CRC (Crop Revenue Coverage) for example was initially established as a pilot programme for 1996 in two States, and was expanded the following year, still without actuarial history. Despite this, it covered most of the corn, cotton, rice, grain sorghum, soybeans, and wheat produced in the U.S. (OIG 1999b).

7.4. Complexity

While a government programme might be relatively simple at the outset, changing demands and the need to respond to programme deficiencies are likely to increase its complexity and decrease transparency over time. The US system of crop insurance today is so complex that only few people understand it fully. The more complex a system gets, the easier it is for the various stakeholders - who are generally not concerned with the overall efficiency of the system - to engage in rent-seeking (Skees 2000).

The complexity of a programme increases with its scope and participation rates. In the US, the number of different premium rates in effect has exploded. The complexity does not only result in high delivery and control costs but also makes it difficult to consider reforms (Skees 1999b).

The complexity of the crop and revenue insurance policies is very likely to create moral hazard problems. For example, the possibility to divide eligible acreage to different insurance units allows U.S. producers to isolate a ‘disaster’ on a very small unit of land, even though overall production was normal. The optional unit policy might encourage a producer to dishonestly shift production from one unit to another to create a qualifying loss and to create a false production history on some units for future claims of losses. In principal, it is the loss adjusters’ duty to control that claims are valid but control of false claims is very difficult.

As often observed with government programmes, shortcoming and failures result in refining existing instruments or adding new instruments. The introduction of a “Yield Floor Option” programme in 1999 for barley and spring wheat in Minnesota and North and South Dakota is an example for this in the field of crop insurance. The programme was introduced as a pilot programme to help farmers overcome the problem that their insurance guarantee was low because of low reference yields as a result of the poor weather and plant diseases in the years before. With the “Yield Floor Option” they are now allowed to use yields which are calculated in a way which is normally used for farmers who are unable to provide records of farm-level actual production history (Dismukes 2000).

When complexity of programmes coincide with participatory approaches, there is an even higher risk that group interests drive the system towards a mechanism the dominating function of which is to shift public money to agriculture and the insurance companies. As a result, the degree of government involvement might go far beyond the justifiable level of intervention. Channelling income to farmers could well be a desirable outcome. However, particular attention has to be paid to unwanted side-effects such as distorting competition among farmers in different countries and attracting resources to inefficient production in high-risk areas or high-risk production programmes (section 7.6).

7.5. Limits of a comprehensive system of agricultural insurance

Even if an insurance system benefits from considerable public support it cannot be expected that the take-up rate will be universal. The reason is that farmers' needs vary widely and a system can never be tailored to the needs of everyone. It will therefore never provide a safety net for the whole farming community and the temptation to provide ad-hoc aids remains considerable.

In the US, a combination of low crop prices, regional weather disasters, and the impact of multiple-year losses caused financial problems to farmers in 1998. As a result, Congress and the Administration agreed on providing help through a \$ 6 billion emergency farm aid package. In 1999, even more money, \$8.7 billion, was allocated to ad hoc relief. Although the subsidies to insurance programmes were increased in parallel, it seems that the crop insurance programme has not become the primary source of federal assistance for farmers suffering a crop loss.

The main reason for farmers to complain about insufficiencies of the insurance system seems to be its failure in providing a sufficient safety net in the event of natural disaster and/or abrupt revenue reduction. Basic CAT coverage is low, and not all farmers have bought higher levels of coverage (two-third of the farmers who have crop insurance). In addition, current insurance products do not protect farmers against low prices that carry over annually because they are based on expected market prices established at the beginning of the growing season¹⁸. On the other hand farmers who experience several years of adverse weather conditions may be unable to obtain acceptable insurance coverage because the coverage level available is normally linked to, and limited by, their actual production history (Leach 1999).

Of course, ad-hoc aids, at the same time as making up for deficiencies of the insurance programme, undermine the system as they probably prevent a substantial number of farmers from participating.

7.6. Equity and influence on production

In a subsidised system of agricultural insurance, subsidies are normally set as a percentage of the unsubsidised premia, therefore those farmers and regions facing

¹⁸ Learning from Canadian experience, most US revenue insurance products use an intra-year, futures-based price in establishing the guarantee, rather than a long-term average price (Skees 1999b). Similarly, in yield insurance, the indemnity price is based on the FCIC's estimate (made prior to planting and sales closing) of the market price at harvest. Therefore, the US crop insurance system does not solve the problem of falling prices over several years.

the highest risk receive the highest subsidies. In that sense, such a system raises questions as regards social and regional equity.

While it is generally acknowledged that the subsidies have an effect on production and prices, the size of the effect is an issue of debate. Subsidies are likely to introduce rigidities to the system. Because of the subsidies producers will not abandon production in high-risk areas which can result in significant costs for society as a whole.

The contentious issue is whether insurance subsidies have a significant influence on production and prices. In the US, some authors argue that crop insurance subsidies significantly boost production¹⁹, others say that the value of the subsidies have so far had no effect on cropping decisions as they are too small in comparison with crop returns as to be of any significant influence²⁰. Even the latter authors, however, expect that with rising subsidies the distorting effects will become greater.

The fact that producers in high-risk areas can take these risks at relatively low costs makes it likely that production is locked-in in these areas with the respective costs accruing partly to society as a whole (in the form of disaster assistance etc.).

¹⁹ Keeton, Skees and Long estimate that cropland use of the top six crops in the US may be as much as 15 per cent greater than it would be without crop insurance subsidies (Skees 2000).

²⁰ Taking the example of corn and soybeans, the USDA suggests that during 1990 – 1999 the net benefits were relatively small in comparison to expected crop returns (less than 1 per cent) and concludes that the subsidies are not likely to have significantly influenced cropping decisions.

8. POTENTIAL FIELDS OF ACTION FOR THE EU

8.1. Trends in risk exposure in the EU

Several trends in European agriculture affecting risk exposure of producers can be predicted with a fair degree of certainty. **Production risks** are likely to increase further because of rising quality requirements, stricter rules for the use of inputs and medicines for animals, growing movement of people, animals, animal products and plants as well as because of climate change. Furthermore, trends towards greater agricultural trade liberalisation and reduction of CAP market support increase **price risk**. Specialisation in European agriculture is likely to continue, thus increasing both producers' production *and* price risk. All developments taken together are very likely to result in EU farmers' market income being more volatile than in the past.

8.2. Current response to risk exposure in the EU

It was shown that risk measured by yield, price and output variability varies widely across Europe (section 2.3). Also, answers to cope with the results of risk exposure differ considerably from Member State to Member State (section 5.1).

In all **Member States**, some private off-farm instruments to cope with risk exist. Some instruments have reached maturity and are widely available (mainly hail insurance), whereas others remain underdeveloped (futures and options markets, mutual funds) or depend on public involvement (multi-peril insurance). Instruments which cover a combination of production and price risk (revenue risk) are in their infant stages. The main public measure is disaster aid. Member States are also active in risk prevention (sanitary and phytosanitary measures)²¹. For an overview see table 8.1.

Table 8.1 Current off-farm responses to risk exposure in EU Member States

Response	Risk	
	Production	Price
Private	Insurance (mainly hail) Mutual funds	Futures and options markets
Public	Disaster aid Sanitary and phytosanitary measures	(CAP)
Public-private	Insurance (multi-peril) (mainly crops)	-

The EU's policies in the framework of the CAP have a major impact on farmers' risk, even if their main goal may be income stabilisation and not risk reduction (i.e. market intervention, direct payments, rural development measures providing incentives for on- and off-farm diversification). Sanitary and phytosanitary measures are more specifically targeting (production) risk. With its guidelines for state aids the EU also established a framework for Member States' activities in the field of disaster aids and insurance subsidies (section 4.3.2)

²¹ Furthermore, income tax averaging systems are in force in some Member States (section 4.3.2).

8.3. New tasks for the EU in risk management?

The perspective of rising risk-exposure in Europe raises the question whether the EU has a role to play in risk management, which goes beyond its current role. This question has to be examined in the context of the fact that the core CAP instruments have an impact on farmers' risk exposure. It also has to be remembered that specific risk management policies cannot replace income support policies. **The goal of risk management policies is not income support** but only to reduce fluctuations of income or its components. **Risk management instruments cannot reverse long-term income trends.**

On the basis of general considerations regarding policy orientations, the case for new EU measures is examined. Tools in the field of price and production risk are discussed, before we look at the possible introduction of a new income safety net.

8.3.1. Short term versus long term policy orientations

When discussing new policy instruments, the context of the existing set of policies for the agricultural sector needs to be taken into account. In the short run, the existing set of policies is given, new instruments, therefore, would have to complement existing ones. As regards price risks, the current CAP with its price support mechanisms plays an important role in reducing such risks for key products. In the medium and long term, however, the set of CAP-instruments could be re-oriented by taking on board new policy options. In the long term, the budgetary margin of manoeuvre, in terms of allocation of funds between different instruments, rises as well.

The case for additional risk management instruments can be argued, if it can be shown

- that markets for risk-reduction are missing or incomplete;
- that the risk reduction goal is not sufficiently addressed by existing policies such as those to achieve income stability and
- that Community action provides value-added compared to national or regional initiatives/action.

8.3.2. Price risk

Although intervention prices for cereals and beef were lowered for the second time with Agenda 2000, the instrument remains important in limiting farmers' risk exposure for these products. The lower price floor together with trade liberalisation increases the potential for private instruments to manage price risk, i.e. futures and options markets for commodities with standardised grades. The traded volumes in Europe are today still much lower than in the US. Nevertheless, the sector has been quite dynamic over the recent years, with a range of new products being offered on the market. There are active futures markets emerging in several Member States.

Market facilitation

As **lacking know-how** regarding the use of futures and options in the farming sector is a major obstacle (section 4.1), education and training is an obvious field for the public sector to help develop such markets.

There are two reasons why the EU should take an active interest in well-functioning futures and options markets. Firstly, price policy is a core instrument of the CAP. As price support is being reduced, it would seem appropriate that the Community would help farmers across Europe to cope with the increasing price volatility. Secondly, futures and options markets contribute to increasing market transparency, which is in the interest of a well functioning internal market and therefore in the overall EU interest.

One strategy could be to support education and training initiatives which would enable farmers to use futures and options markets to cope with within-year downturns in commodity prices. Whereas such training programmes can already be co-financed under the rural development framework, the initiative lies with the Member States. An active encouragement at the EU-level might be needed in order to prepare the ground for a wider use of futures markets. Such initiatives might include a **special information programme** for all European farmers. An information programme could cover issues like objectives of using futures and options, existing futures and options markets, product coverage, organisations providing training etc. Such an initiative could be envisaged **in the short term**, as it would **be fully in line with existing policies**.

8.3.3. Production risk

Traditionally, Member States have been at the forefront of helping producers to cope with production risk (disaster aid, sanitary and phytosanitary measures, public-private systems of agricultural insurance, insurance subsidies). The Community's role, on the other hand, has been limited. Apart from setting the framework in the field of prevention (sanitary and phytosanitary measures) and participating financially in some measures of disease control, its main role has been to set common rules regarding Member States' aids to avoid market distortions (section 4.3.2).

In the framework of the EU's guidelines on state aids, **Member States have a considerable margin of manoeuvre** to respond to the varying needs of their farmers. For example, existing systems of agricultural insurance in Member States vary widely as regards organisation, coverage, complexity and state involvement. The Spanish experience shows that a comprehensive system of agricultural insurance could be developed within the common framework on state aids.

The US experience demonstrates that substantial public involvement in insurance including the subsidisation of premia is not without problems (chapter 7). Where public involvement to develop insurance solutions is necessary because of the specific characteristics of certain risks, three lessons from existing systems have to be taken into account:

- Firstly, experience shows that initiatives have to be based on a “**bottom-up approach**” in order to be successful. Insurance products have to be tailored to the needs of farmers which vary from country to country and region to region.
- Secondly, a system has to be given **time to develop**. With growing experience, it can become more and more comprehensive (regarding both products and risks covered).
- Thirdly, **strong and close public surveillance** is needed in order to avoid growing complexity leading to unjustified rent-seeking and losing track of the original purpose of providing insurance.

Insurance solutions should be primarily developed at the **Member States** level. In addition to the above mentioned need for a “bottom-up approach”, two further reasons support this conclusion:

- Some Member States have traditionally been involved in systems of agricultural insurance. In the future, such an approach could increasingly replace national ad-hoc disaster aids. This would result in more stable expenditure and negative effects of disaster aids could be partly eliminated (compensation payments are made a long time after the event, discouragement of private instruments, farmers don't sufficiently take disaster risk considerations into account in their management decisions). Even if insurance is subsidised, it can help to provide an incentive to integrate risk-considerations into farm management decisions.
- Member States are best placed to target public funds spent in the framework of such systems at certain groups of farmers, according to perceived specific needs.

A cautious role regarding the EU's involvement beyond its current involvement is advocated. The EU might have a role in the light of the fact that one of the main reasons of missing or incomplete markets for the coverage of production risks is the partly systemic character of such risks with a probability of high losses in any given year (section 4.1.1). The partly systemic character can prevent the development of viable products, as potential losses are too big for commercial companies/mutual funds and private re-insurance is often not sufficiently available or too expensive.

Legal framework – market facilitation

The EU could help address this problem in two ways:

- Apart from the solution of classical re-insurance, insurers can reduce their risk exposure by creating insurance/re-insurance pools to share their risks with other insurance companies which have a different portfolio or operate in different regions (section 3.4.3). The EU could accompany such a process by providing the appropriate legal framework in the field of competition policy, where needed.

- Like insurance companies, farmer-owned mutual funds face the problem of big losses in any given year because of the partly systemic nature of most agricultural risks. Potentially big losses reduce the attractiveness of such funds, as contributions must be high²², or, if money to pay for losses is gathered a posteriori, farmers are confronted with large surcharges in any given year. As in the case of classical insurance, one solution is to share the risk with other mutuals/insurers which cover different risk or are active in different European regions. An initiative at the Community level could be to examine whether there are possibilities to promote the idea of such **co-operation across Europe**.

These initiatives would encourage solutions both in the crops *and* the animal sector.

Lowering of costs – provision of risk coverage

The EU could also investigate further into the potential of insurance systems, possibly through pilot approaches. Major trade partners use such instruments and there might be a certain prospect for getting these instruments accepted as modestly trade distorting within a future WTO agreement on agriculture. For example, subsidies for insurance premia could be co-financed under the rural development programmes.

In the **long term**, a more substantial involvement would be possible under two conditions. Firstly, an instrument would have to fit into the overall policy-mix of the CAP. Essentially, this would require that there is **no overlapping with other instruments** addressing the problem of risk exposure in agriculture. Secondly, sufficient funds would have to be made available. This will be particularly difficult, **if no additional EU funds** are made available for agriculture, thus making it necessary to use funds which are currently used for other agricultural policy instruments.

Providing re-insurance (especially covering losses above a certain level) would address the issue which is most often cited as being the obstacle for the development of insurance systems (especially also in the animal sector), i.e. potentially catastrophic losses. Providing such capacity, the development of private insurance could be facilitated. In providing re-insurance great care would have to be taken to make sure that private re-insurance is not crowded out.

Re-insurance could be made contingent on the setting-up of a European pool of agricultural insurance, which would spread risk between the partners and thus limit aggregate potential losses which would be covered by the EU. A further condition could be that the members of the pool offer insurance for all major products of European Agriculture.

²² Even with high contributions, in the short-term a fund cannot build up sufficient reserves in order to cope with a disaster striking in the first few years after the setting-up of the fund.

Every involvement would have to be critically analysed on the basis of lessons from existing systems of agricultural insurance (chapter 7), especially as regards efficiency, transparency and possible production, price and distribution effects.

8.3.4. Anti-cyclical income support and safety nets

Anti-cyclical income support provides support in times of need, while reducing support during periods of prosperity.

Such an instrument would not only **respond to farmers' needs**, it would also have a good prospect of gaining **support from the broader public**. It is transparent, could help to overcome the problems of ad-hoc disaster measures and would respond to rising risk-exposure, preventing severe disruptions in the farming sector and those rural economies that still rely heavily on the farm sector. And, finally, the instrument under certain conditions appears to be compatible with the **WTO green box criteria**.

Strengthening the social dimension could contribute to ease public acceptance of the CAP. However, in all Member States general social security systems are available also to farmers. Therefore, establishing specific agricultural social systems at the EU level might provoke the general **question of compatibility with national social security systems** aiming to secure a certain minimum standard of living. It would be necessary to explain carefully why farmers need an additional safety net.

In Canada, an income safety-net system is in place (section 5.4.3). Payments are made if individual farm income falls below 70 per cent of the historical three-year average income. Coverage is based on gross margins. Gross margins represent the income available to the farmer after paying for the cash operating costs of the farm; adjustments are made to ensure that beginning farmers, high-debt and low-debt farmers, and those with high and low investment levels are treated equitably. A cap is placed on payments.

Under this system, tax declarations are used to determine the relevant income, thus reducing moral hazard to overstate income. There is no need for the farmer to justify the reason for low income. Given that aid is targeted to cover 70 per cent of a **moving average of past income histories**, the system would **not create adverse incentives**. Farmers still have an incentive to going beyond the 70 per cent trigger for aid, in order to avoid a continuous deterioration of their reference income serving as the basis for aid calculation.

With respect to applying as similar system of anti-cyclical income aid in the EU it should be noted that such an approach requires a comprehensive recording of income, following standardised methods. Therefore such a system is **very demanding as regards the necessary administrative provisions**. This would become even more complicated, should the reference income refer to household incomes (including off-farm revenues) rather than only farm income.

The provisions of the AIDA system have been applied to data of the Farm Accountancy Data Network (FADN) in order to provide some ideas on the number of EU farms that would be eligible under such a system and to illustrate the potential financial impact. As FADN data is used, the calculations are only based on the results of *commercial* farms. Of course, payments would vary significantly from year to year. In 1997 the family farm income of about 660'000 commercial farms (20 %) was less than 70 per cent of their average income during the previous three years (1996: 630'000 farms, 19 %) (EU12²³). Compensation of income losses up to the reference level would have cost about 3 500 million Euro for commercial farms in 1997 (2 700 million € in 1996) (Annex 6). This figure does neither prejudge any assumption about the global cost of such a scheme in the EU nor its potential allocation between EU and Member States' budgets.

The main difficulty to apply a similar approach to EU agriculture would be the differences between national tax regimes. Furthermore, the percentage of bookkeeping farms is limited, thus income taxes are based on estimates for many farms and small farms are often exempt from taxes on their farm income. It also has to be taken into account that a public safety net competes at least partly with private risk-management instruments and that such a net would be a disincentive for farmers to take (disaster) risk considerations into account if it were provided free of charge.

²³ Germany: ex-BRD

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