Agricultural Insurance Schemes

Summary report, November 2006

1 Introduction
This document is a summary of the report produced by the IPSC-Agrifish unit of Joint Research Centre (JRC) of the EC in the framework of the administrative arrangement n°.agri-2005-0321 with DG AGRI G/1. This study was commissioned by DG AGRI, and was inscribed by the European Parliament into the context of the ongoing discussion on the Commission communication on risks and crisis management in agriculture (COM (2005) 74 final) and the Council conclusions of 17 December 2003 on risk management in agriculture.

Most information in the mentioned report comes from fact sheet collected from experts or consultants in the different countries. Most details in the analysis are omitted, as well as the bibliographic references, but a summarised glossary with a few insurance keywords is included; and a few maps are presented as examples. The reader wishing to have more extended information can refer to the full report (JRC-DG AGRI, 2006).

1.1 Background: risks in agriculture
The economic situation of farms can be subject to strong variability due to several reasons:

- Policy reforms, marked by trade agreements and market liberalisation and the consequent reduction of prices paid to farmers.
- An unbalanced relationship between retailers, generally well organised to put a strong pressure on prices and farmers.
- Sanitary measures and risk of animal diseases.
- Climate change: There is a general perception that the frequency and intensity of extreme meteorological events is growing. Climatic risks are more important for crops and sanitary risks are more important for livestock, but none of them are exclusive: pests can have a considerable impact on crops and a bad climatology can make strong damages on livestock farming through the pastures or forage availability.

The study summarised in this document intends to give a contribution to the CAP efforts to enhance appropriate risk and crisis management strategies, providing an improved response to crises in the agricultural sector.

1.2 Risk maps
Several sources of data have been used to give a geographical picture of the level of risk in the EU agriculture: Yield data from the Eurostat REGIO database, FADN (Farm Accountancy Data Network), agro-meteorological models and satellite images. Most of the maps produced correspond to the crop sector. Mapping the risk of animal diseases still requires a more in-depth analysis, partly because the prevention systems are evolving quickly and the frequency and damage of past outbreaks does not necessarily indicate the risk level for the future.

1.2.1 Specific climatic risks: drought, frost, excessive rain
Some types of climatic risks can be mapped on the basis of agro-meteorological models and their associated databases. We have used the CGMS system that uses crop physiology models, a soil map and a climatic database, obtained by interpolation of daily observations in more than 2000 meteorological observatories since...
The maps in Figure 1. represent drought, excessive rain and frost risks indicators for common wheat. The maps show that many areas in the EU have a significant level of at least one of these risks. There is not only drought risk in the Mediterranean areas, but also can be appreciated in the Baltic region and to a lower extent in some regions along the Danube. Excess of rain is problematic mainly in the East of the EU. Frost risk affecting all types of crops is generally assessed by temperatures at “crown level” (about 3 cm. below the surface). It is increasing on approaching the North-East with local risk spots. This geographic pattern still needs to be validated. But besides the climatic risks in a region, other criteria are responsible for the development of agricultural insurance, especially the country’s policy and the undertaken measures after natural disasters.

Figure 1. Some meteorological risks and in the EU.

1.2.2 Yield reduction risk.

Data from the Eurostat REGIO database have been used to map the risk of regional average yield reduction beyond a certain level (deductible) for main field crops (wheat, barley, field beans, grain maize, rapeseed, sunflower, potatoes, sugar beets). These maps (Figure 2.) show a strong heterogeneity with regions essentially stable and regions with a high risk of yield reduction. However the regions with significant risks are not concentrated in a single geographic area.
Figure 2. Yield reduction risk index for wheat and average income reduction risk

1.2.3 Farm income reduction risk
FADN data have been used to quantify the risk level of significant income reduction. The maps produced reflect the geographic pattern of significant income reduction for each main type of farm and for each size of farms. Figure 2. reports an average risk index for different types of farm. The index has been computed on the basis of the average Income/AWU (Annual Working Unit) for each farm type in each region. However income reduction risk has been significantly underestimated because of the smoothing effect of averaging income data.

1.3 Main tools for risk management in agriculture
Tools for risk management in agriculture are distinguished in strategies concerning on-farm measures (diversification of the production programmes) or risk sharing strategies like marketing contracts, production contracts, hedging on futures markets, or the participation in mutual funds and insurances.

Calamities funds are regulated by the Governments and provided on a regular (yearly) basis. All aids are given under the declaration of catastrophes. The main advantage of the funds over ad-hoc aids is that they avoid big distortions of the government budget. Funds sometimes receive also contributions from the private sector, usually in the form of compulsory levies to production or levies to premiums.

Mutual funds are owned by the participants. If mutual funds are organized regionally, the advantage is that farmers organise their own cross-control reducing moral hazard and adverse selection. The disadvantage of regionally organized mutual funds is the danger that many or even all farmers incur losses at the same time. On the other hand farmers are not always sufficiently organised to set up an efficient mutual fund structure. Solutions for this problem are re-insurance or the cooperation with mutual schemes in other regions which would cover a share of the loss.

Insurance is probably the best known risk pooling tool. In order for a risk to be insurable, two basic requirements have to be met among others: managing the adverse effects of “asymmetric information” and overcoming the implications of “systemic risks” (a lot of people suffer a loss at the same time). Natural disasters or epizootic diseases cause special problems for insurance.

If re-insurance or state guarantees are not available, the nature of the systemic risks makes it necessary for an insurance company to charge very high premiums which can be unaffordable for many farmers, and to build up substantial capital reserves. This means that comprehensive agricultural insurances schemes need a strong support from the public sector.

On the other hand, if governments provide ad-hoc disaster payments, it stifles the development of insurance products.

2 Policy framework

2.1 WTO agreements
Public aids in agriculture have to comply with the WTO agreements, which classify aids into three boxes: Green, Blue and Amber.

The Blue Box contains aids for goods that have a production limitation (e.g. milk in the EU)

The Green Box defines other aids that do not distort trade: Income insurance and income safety-nets. Aid is admitted when the income loss (...) exceeds 30 per cent of average gross income or the equivalent in net income terms (...) in the preceding three-year period or a three-year average based on the preceding five-year period, excluding the highest and the lowest entry. The amount of such payments shall compensate for less than 70 per cent of the producer's income loss in the year (...).

Programs based on farmers' income are not frequent. Canada notified one program. Payments for relief from natural disasters (directly or by subsidies to crop insurance) also fall in the Green Box if there is a formal recognition by government authorities that a natural or like disaster (...) with a production loss which exceeds 30 per cent of the average of production in the preceding three-year period or a three-year average based on the preceding five-year period, excluding the highest and the lowest entry. Agricultural insurances are mentioned, but mostly ad-hoc payments are notified.
The Amber Box contains other support measures to agriculture. Aids in the amber box which exceed the “de minimis” limits (5% of agricultural production for developed countries, 10% for developing countries) are subject to reduction commitments. Most of the subsidies to crop insurances have been notified within the Amber box. One of the main reasons that make subsidies to insurance not eligible for the green box is that they do not follow a formal recognition by government authorities of the natural disaster. Such recognition is not operational in an insurance model managed by private companies. Other reasons often exist but do not apply to all types of insurance products (e.g. 30% threshold or being product-specific).

2.2 The concept of crisis and disaster - Regulations on state aids

The definition of crisis and disaster is rather generic. More precise conditions can be found to authorise state aids in case of disaster or adverse climatic conditions. In general an official declaration of disaster is needed. At national level such a declaration by the government is usually quick. A potential EU-wide regulation should define the competent body to make a declaration of disaster.

Article 87 of the EC Treaty authorises certain State aids, more precisely defined in the “Community guidelines for state aid in the agriculture sector” (EC, 2000), generally followed by MS. These guidelines state that adverse weather conditions on agricultural production may be assimilated to natural disaster if the damage is more than 20% of normal production in the less-favoured areas and 30% in other areas. Aids in case of animal and plant diseases are permitted normally as a part of an appropriate programme for prevention, control or eradication. In general, all aids in these circumstances may be granted up to 100% of actual costs. Insurance premiums may be subsidized up to 80% when insurance covers natural disasters, or assimilated events. If the insurance covers other losses, the maximum aid is 50% of the premium.

New Commission Guidelines are under study with a new Regulation on the application of Articles 87 and 88 of the Treaty. The definitions adopted should be strongly shaped by the WTO Agreements.

The main changes added by this draft Regulation in the field of risk management aids in agriculture, besides the fact of being a Regulation and not only Guidelines, can be summarised in the following:

- Regarding adverse climatic events (Art. 11): they can be assimilated to natural disasters when they exceed the threshold of 30%, but there is no more the 20% threshold for less favoured areas. The compensation cannot exceed 80% of the losses and 90% in less favoured areas (formerly 100%), what means that additional to the threshold there is a deductible.

  It sets as a condition for losses suffered after 2010 in case of adverse climatic events: compensation must be reduced by 50% unless it is given to farmers who have taken out insurance covering at least 50% of there average annual production or production-related income and the statistically most frequent climatic risks in the Member State or region concerned.

Regarding the aids towards the payment of insurance premiums (Art. 12), there are no changes.

Member States keep several types of positions of on State Aids for exceptional climatic events:

- Most of the countries apply the Agriculture Guidelines, with explicit mention in their legislation (Belgium, Cyprus, Estonia, Greece, Italy, Latvia, Lithuania, Slovenia), or without explicit mention (Finland, Germany, Ireland, Luxembourg, Spain)

- Other MS have more restrictive criteria: Austria, France, Portugal, Romania

- Bulgaria, Czech Republic and Hungary seem to have a broader definition.

- Some countries simply do not give any aids to agriculture for climatic events, but have compensation programs for livestock diseases (Netherlands, Sweden, UK)

Some of the countries have the constraint to aids given in case of crisis or disaster that it must not be due to an insurable risk (see 4.2.1)

If a common EU definition for natural disaster were to be applied to all member countries, it could consider:

- Exceptional character of the climatic phenomenon
- Minimal number of farms or surface should be affected, and thresholds for losses at crop level and/or at farm level (already existing in the Guidelines).
- A fast procedure for an official declaration.
- Exclusion if efficient preventive techniques or developed insurances are available.
3 Main types of insurances

The characteristics of specific agricultural insurances are basically different in the crop sector and in the livestock sector.

3.1 Crop insurances:

The most widely extended crop insurance in the EU is hail insurance, which often includes other scattered risks such as fire (single risk insurance). In many countries this is nearly the only existing type of crop insurance. Some kind of insurance policies cover also the risk of frost or a limited number of meteorological events. These are known as combined risk insurance.

We call "yield insurance" the type of policy that covers yield losses for a given crop due to any meteorological event. The meteorological origin of the damage has to be identifiable to avoid moral hazard and adverse selection. In general all the fields of a farm with the same crop have to be insured. We avoid here the term "multi-risk" or "multi-peril crop insurance (MPCI)" because it is sometimes applied to combined insurances and sometimes to yield insurances.

Whole-farm yield insurance refers to all the crops produced by the farm. A yield reduction in one crop will not be compensated by the insurer if the global production reduction of the farm does not reach the trigger.

Revenue insurance combines yield and price insurance. The farmer is paid if the total value of his production falls below a threshold. Income insurance takes also into account the costs of production; it is only applied in USA.

All the former types of insurance are based on the results of the individual farms and losses are adjusted measured on the field. However, index insurances are based on an index common for an area. In area-yield insurance, the compensation paid to the farmer (and the trigger) depend on the statistical yield for the year in a predefined area, usually an administrative unit. Area-revenue insurance is based on the area yield multiplied by the area price. If the average yield/revenue in that area is below a certain threshold, all the farmers in the area insured for that crop are compensated. Indirect-index insurance does not refer to the average yield in an area but to a meteorological indicator or satellite images. Weather derivatives can be included in this category of insurances.

3.2 Livestock insurances:

The main type of risk in the livestock sector is the sanitary risk, but catastrophic climatic events can also have a direct impact on the animals (floods, etc.) and other weather events can affect pasture and forage availability and therefore on the economic sustainability of the farm. On a minor extent, DG SANCO has undertaken an in-depth study on the risk management tools for livestock sanitary crisis. In the main report of this study we give a summary of the conclusions reached and explore some insurance on risk indexes of pasture and fodder production.

Livestock epidemics can result in substantial losses for governments, farmers and all the other participants in the livestock production chain involved. Member states are obliged to apply the control measures established in EU directives if an outbreak of 'List diseases' arises (Office International des Epizooties, 1998). Recently, the European Commission (EC, 2006b) has approved a financial package of €193 million to support programmes to eradicate, control and monitor animal diseases during the year 2007. The 155 programs which were selected for EU funding will deal with animal diseases that impact both human and animal health. The large EU contribution towards these programmes reflects the high level of importance attached to disease eradication measures, for the protection of both animal and public health.

In the livestock sector, there is a different treatment for direct losses and for consequential losses. MS Governments and European Institutions generally support the largest part of the direct losses due to mortality or morbidity, such as the value of destroyed animals. Some member states finance the non-EU compensated direct losses from the national budget (Denmark, Finland, France, Ireland, Italy, Luxembourg, Portugal, Spain, Sweden, and United Kingdom). Other member states have set up some form of statutory system to co-finance the direct losses. These Public-Private financing schemes have a compulsory fund structure in which all farmers pay a tax (Austria, Belgium, Germany, Greece, The Netherlands).

Consequential losses, such as losses resulting from empty buildings and movement standstills, are most often completely borne by the farmers themselves. Some EU member states partly compensate consequential losses in a form of ad-hoc relief program (Austria, Belgium, Ireland, etc) or by compensating above the value of the
animals which are forcibly slaughtered to cover part of the consequential losses. In some other EU member states the absence of public assistance has led to the creation of private insurance schemes for some types of livestock production (Germany, Netherlands, Sweden, Spain, United Kingdom, and Italy). There are also some forms of public-private partnership in which the government acts either as an insurer or a reinsurer of a subsidised consequential loss insurance policy (Greece, Spain). Producers do not commonly take up private policies that are specifically designed to cover sequential losses. Only the German “Ertragsschadenversicherung” has a relative high level of participation.

4 Main characteristics of existing crop risk management systems.

4.1 Outside the EU

Risk management tools such as insurances and futures markets are very developed in North America. In the US there is no risk-specific insurance, but yield insurance covers most risks. It ranges from the basic or catastrophic coverage (CAT) which guarantees 50% of the average yield of the farm, to 80 or 100%. Livestock insurance is not very developed. The USA and Canada, have also developed revenue and income insurances.

In the USA both revenue and income insurance exist. 73% of the premiums come from revenue insurances products that include: area index revenue insurance; livestock prices insurance; livestock gross margin insurance and whole-farm income insurance. The three standard revenue insurance products are Crop Revenue Coverage (CRC), Revenue Assurance (RA) and Income Protection (IP). The most popular is CRC, which offers the possibility to get a higher price if the market price increases. These products apply for the main field crops: corn, soybeans, wheat, rice, cotton.... Livestock Risk Protection (LRP) covers declining prices for swine, feeder cattle and fed cattle. Livestock Gross Margin (LGM) protects the gross margin between the value of insured hogs and the cost of feed inputs (corn and soybean meal). Reference prices come from the futures market. They protect against price oscillation within the year. The whole-farm income insurance, Adjusted Gross Revenue (AGR), uses a grower’s historic tax information to provide a level of guaranteed revenue. It covers both crops and livestock if livestock gives less than 35% of the total income. In AGR-Lite, available in limited areas and similar to AGR, producers are eligible regardless of the percentage of their income derived from animal products. GRP or Group Risk Plan is based on area yields, while GRIP or Group Risk Income Protection, on “area revenues” (area yield multiplied by price). In 2004, area yield and area revenue policies accounted for 7.4 % of the total insured acreage but less than 3 % of premiums.

Insurance in the USA is provided by 17 private companies. They work in agreement with the USDA Risk Management Agency (RMA). About 45% of field crops production value are insured (23% in the EU). The average premium rates is close to 9%, much higher than in Europe (4%) mainly because they offer a wider coverage: revenue or yield insurances versus mainly single-peril or combined-risk insurances. The premium subsidies amount to $1,900 million (58% of the total premiums). The USA Government also provides funds for the administrative costs of the insurance companies and provides reinsurance. The total support thus provided to insurance would amount to 72% of the total premiums (in the EU around 500 M€ = 32% support).

In the USA, price risk protection is also achieved through the Counter-cyclical payments, established by the 2002 Farm Bill, given when the commodities prices decrease below a target price.

Canada has an income program based on a stabilisation account: CAIS (Canadian Agricultural Income Stabilization). It started in 2003, and it substitutes two former programs: NISA or Net Income Stabilization Account and CFIP or Canadian Farm Income Program. Farmers put an amount of money every year in the individual stabilization account, which they can withdraw in a year of big losses. CAIS, based on a farm’s production margin, is a whole-farm program available to eligible farmers regardless of the commodities they produce. Government pay a share of funding when producers withdraw funding from their accounts. The program now includes coverage (60%) for negative margins. The system is mainly led by public insurance agencies. The subsidies from the Federal and the provincial governments total € 425.5 Million (66% of the premiums).

Area-index insurance has been experienced for some years in countries such as USA, Canada, Brazil or India.

4.2 In the EU

The main risk management tools in Europe are Calamities Funds, Mutual Funds and Insurances. Ad-hoc aids are generally given when no other tools are available. Aid is often organised in the form of compensation schemes, or funds, partially financed by the agricultural sector, either on a voluntary or on a compulsory basis (in
the form of levies, etc.). There are often public subsidies and/or support to reinsurance, either in the direct provision of insurance or of a public security net (the case in Greece and Cyprus).

### 4.2.1 Funds and ad-hoc aids

Risk management tools like mutual funds, calamity funds or ad-hoc payments (see section 1.3) exist in most countries. Ad-hoc payments and compensation payments from catastrophe funds are summarised in Table 1.

Agricultural insurances are fostered in countries where the law forbids that ad-hoc measures or disaster funds compensate damages that could have been insured.

In Spain, Austria, Portugal, Greece and Sweden there are no public fund payments if insurances are available. In France payments include damages for which there is no insurance at all or that insurance has not reached yet a significant diffusion level. In Italy only subsidized risks are excluded from public ad-hoc payments after natural disasters. In Romania public payments are given to farmers if they have insured “standard risks” like hail. In other countries it seems that there are no explicit regulations.

#### Table 1. Ad-hoc and Funds Payments in the last years (data from fact sheets)

<table>
<thead>
<tr>
<th>Country</th>
<th>Years available</th>
<th>Total payment (M €)</th>
<th>Average payments/year (M€)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Austria</td>
<td>1995-04</td>
<td>55.9</td>
<td>5.6</td>
<td>Frost, drought, flood</td>
</tr>
<tr>
<td>Belgium</td>
<td>1985-02</td>
<td>29.4</td>
<td>1.6</td>
<td>Frost, drought, rain, pests</td>
</tr>
<tr>
<td>Belgium</td>
<td>1999</td>
<td>280</td>
<td>-</td>
<td>Livestock: dioxine</td>
</tr>
<tr>
<td>Bulgaria</td>
<td>2000-04</td>
<td>2</td>
<td>0.4</td>
<td>Insect pest control fund &amp; others</td>
</tr>
<tr>
<td>Cyprus</td>
<td>2001-04</td>
<td>28.6</td>
<td>7.2</td>
<td></td>
</tr>
<tr>
<td>Czech Rep.</td>
<td>1995-04</td>
<td>369.3</td>
<td>36.9</td>
<td>Flood, drought, frost</td>
</tr>
<tr>
<td>Denmark</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Storm &amp; forest storm damage</td>
</tr>
<tr>
<td>Estonia</td>
<td>-</td>
<td>0</td>
<td>0</td>
<td>No payments</td>
</tr>
<tr>
<td>Finland</td>
<td>1996-05</td>
<td>114.2</td>
<td>11.4</td>
<td>Crop damage compensation scheme</td>
</tr>
<tr>
<td>France</td>
<td>1996-05</td>
<td>1,555.8 (1)</td>
<td>155.6 (1)</td>
<td>Drought 67%, frost 19%, rain 13%</td>
</tr>
<tr>
<td>Germany</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>no data</td>
</tr>
<tr>
<td>Greece</td>
<td>1995-04</td>
<td>701.0</td>
<td>70.1</td>
<td></td>
</tr>
<tr>
<td>Hungary</td>
<td>1999-02</td>
<td>48.8</td>
<td>12.2</td>
<td>Frost, drought</td>
</tr>
<tr>
<td>Ireland</td>
<td>1999-04</td>
<td>400.6 (1)</td>
<td>66.8 (1)</td>
<td>Livestock disease</td>
</tr>
<tr>
<td>Italy</td>
<td>2001-06</td>
<td>680.0</td>
<td>113.3</td>
<td>Drought and others not covered by insurance</td>
</tr>
<tr>
<td>Latvia</td>
<td>2000-05</td>
<td>19.3</td>
<td>3.2</td>
<td>Frost, drought, rain</td>
</tr>
<tr>
<td>Lithuania</td>
<td>2000-05</td>
<td>15.7</td>
<td>2.6</td>
<td>Frost, drought, rain</td>
</tr>
<tr>
<td>Luxembourg</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>No ad-hoc aids for crops. No other data</td>
</tr>
<tr>
<td>Netherlands</td>
<td>1998</td>
<td>250.0</td>
<td>-</td>
<td>Excessive rain; aids not allowed any more</td>
</tr>
<tr>
<td>Poland</td>
<td>-</td>
<td>10.0</td>
<td>10.0</td>
<td>Epidemic diseases</td>
</tr>
<tr>
<td>Portugal</td>
<td>last 10 ye</td>
<td>30.0(2)</td>
<td>3.0(2)</td>
<td></td>
</tr>
<tr>
<td>Romania</td>
<td>last 5 years</td>
<td>56.8</td>
<td>11.4</td>
<td>Drought, frost, floods</td>
</tr>
<tr>
<td>Slovakia</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>no data</td>
</tr>
<tr>
<td>Slovenia</td>
<td>1995-04</td>
<td>97.8</td>
<td>9.8</td>
<td>Drought, hail, frost</td>
</tr>
<tr>
<td>Spain</td>
<td>2000-05</td>
<td>22.2</td>
<td>3.7</td>
<td>Frost, drought, rain</td>
</tr>
<tr>
<td>Sweden</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Infectious diseases</td>
</tr>
<tr>
<td>UK</td>
<td>2001-05</td>
<td>1,897.7</td>
<td>379.5</td>
<td>Livestock disease</td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
<td></td>
<td>904.3</td>
<td></td>
</tr>
<tr>
<td>(Croatia)</td>
<td>1997-04</td>
<td>-</td>
<td>2.5</td>
<td>54 M€ in 2003 for drought</td>
</tr>
</tbody>
</table>

(1) The 50% of this amount comes from sector private contributions, through taxes on agricultural insurances (France) or from levies on the commercialization of the products (Ireland).

(2) Portuguese farmers also contribute to the calamities fund but the amount refers to Government contributions

We can see very high ad-hoc payments in France (2000-05: 1,167 M€) and a low level in Spain (2000-05: 22.5 M€), but annual subsidies for insurance (Table 2.) are higher in Spain (~230M€/year) than in France (~5 M€). This example shows a different approach for the use of public funds in risk management support.
About 50% of the annual ad-hoc payments are given for natural disasters like drought, frost, flood and excessive rain, risks which are insurable in countries providing yield insurance.

4.2.2 Insurances

Table 2. shows different types of agricultural insurance systems in Europe, their level of penetration and key figures in each country. Single-risk (mainly hail) insurance is well developed with a long history. It exists in almost all European countries. In general there is a direct relationship between Government involvement and insurance development. Usually, private companies insure only hail and fire, and as the government involvement in insurance increases, more comprehensive coverage is provided by the insurance.

Several types of insurance have been classified as “yield insurance”, although some of them are locally called multi-risk insurance. They provide coverage against all the main climatic hazards (plant diseases and plagues usually not covered). In European yield insurances, it is necessary to ascertain which risk caused the loss, while the US “Multiple Peril Crop Insurance” (MPCI) includes yield losses by plagues and diseases and damages are calculated simply as the difference between guaranteed and actual yield: The European system has higher loss-adjustment costs, but it helps to avoid moral-hazard, one of the big problems for the US insurance system.

4.2.2.1 Level of development:

Figure 3. Availability of the main agricultural insurance systems in EU
Figure 3. shows the insurance products available in the different European countries (see also Table 2.). In Spain the Government collaborates with farm unions and insurance companies to run the system. All the insurance companies operate in a pool, in a co-insurance regime. Most risks are covered in yield insurance policies. In other countries such as Austria, France, Italy, and Luxembourg the insurance system also is well developed and most risks are covered depending on the contracts. Mostly there is a basic coverage for hail and in addition yield insurance covering the most important risks.

In Bulgaria, the Czech Republic, Hungary, Poland, Portugal, Slovakia, Slovenia and Sweden, single and combined risk insurance is available. Only hail and a few other risks are covered.

For Belgium, Germany, the Netherlands and UK hail insurance or single-products insurance are the main products available, demand of other farm insurance products is negligible. There is no public support to insurance. In some northern countries, including the Baltic States, there is less demand of crop insurance or they are starting to develop their systems (Latvia and Lithuania). In Finland private crop insurance is less developed, but there is a public “Crop Compensation Scheme” provided to compensate yield losses after natural disasters.

The schemes in Greece and Cyprus are different: a compulsory insurance system is provided by the public sector.

<table>
<thead>
<tr>
<th>Table 2. Agricultural insurance in Europe</th>
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<td>Austria</td>
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<td>Belgium</td>
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<td>Sweden</td>
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<tr>
<td>UK</td>
</tr>
<tr>
<td>TOTAL</td>
</tr>
</tbody>
</table>

Source: Prepared from information in the fact sheets provided by the experts in each country.

Legend:
- : Not existing
n.d.: no data
#: Pilot experience
4.2.2.2 Penetration of insurance:
In Table 2, we can see that there are high differences in the penetration of insurance. The percentage of insured production value alone is a poor indicator of the development of agricultural insurances. An important indicator is the availability of yield insurance. In some countries (Sweden, Germany) a high level of penetration results mostly from a basic coverage in single risk insurance.

4.2.2.3 Premium rates:
Average premium rates expressed as a percentage of the insured value also have very different levels, from a low level around 1% in the UK and Germany and high levels between 6-8% in Spain, Portugal and Italy.

Some of the determinants of the level of premium rates in crop insurance are:
- The frequency of risks in time and on area
- The type of risk (hail, drought) and the number of risks covered.
- The sensitiveness of crops
- The number of farms insured.
- Technicalities like deductibles

Consequently comparing average premium rates in a meaningful way is very difficult.

The total premium amount per year in EU25 is around **1.539 M€** (without the public system in Greece), and the average indemnities around **1.061 M€**.

4.2.2.4 Loss ratio:
The loss ratio is the proportion between indemnities and premiums paid. For an insurance system to be actuarially sound, the loss ratios should be lower than one (100%) in a quantity enough to pay the administrative and loss adjustment costs. In general, the average loss ratios range between 60% and 75%, with some exception, the compulsory system in Cyprus with 95% for the period from 1978 to 2005 and Slovenia with an average of 148%, non sustainable at long term. The loss ratio has a strong variation over time due to the high volatility of natural disasters. Reinsurance and public support become essential conditions.

4.2.2.5 Level of subsidies:
The amount of support provided by EU Member States to subsidize insurance premiums varies depending on the country’s policy to promote some particular type of coverage, to help some agricultural sub-sector or to facilitate some types of farms. Some countries have integrated it as an essential agricultural policy instrument for the stabilisation of agriculture income.

Table 2. reports subsidies per country, where available. Some additional comments are:
- **Italy**: around 67% of total premium; 64% for the multi-peril yield-type product
- **Spain**: around 49% including the regional subsidies
- **Austria**: around 46% of total premium including regional subsidies; 50% for hail and frost
- **France**: The 2.5% average of three years is due to a majority of non-subsidised single-risk insurance. Since 2005 new yield products have been launched with subsidies of 35% (40% for young farmers)
- **Portugal**: around 68% of total premium; subsidies vary from 35% to 75%
- **Czech Republic**: Subsidies from 15% for livestock to 30% for crop insurance
- **Slovenia**: Subsidies for crop insurance given the first time in 2006. 30 to 50% for the basic risk coverage (hail, fire and thunderstorm).
- **Latvia and Lithuania**: 50% subsidy, but still very low penetration of insurance.
- **Cyprus**: 50% for all insurable risks in the compulsory scheme
- **Luxembourg**: 50% for all insurable risks

The annual subsidies to agricultural insurance in EU25 are around **497 M€** (32% of premiums). The average amount of ad-hoc aids in EU25 is **904 M€** (it does not include all aids given for livestock).
- **(Croatia)**: 25% since 2003
• (Turkey): 50% since 2006

4.2.2.6 Some other technicalities:

Re-insurance:
In most countries, reinsurance is undertaken by private companies. However, there are some exceptions in which insurance is totally or partially managed by the Government or public companies. It is the case for Portugal and to a minor extent in Spain and Italy.

There are two main types of re-insurance systems used in agriculture: non-proportional reinsurance such as stop loss reinsurance and proportional reinsurance such as quota-share reinsurance.

Triggers and deductibles:
There is a variety of different deductibles with a range from 0% to 40% and more. Some generalities can be pointed out:
• The higher the risk, the higher the deductibles. This can mean that the risk is high (high frequency in time or affecting a large area) or the crops covered are very sensitive (e.g. fruits, vegetables).
• Flexible deductibles are often used to provide individual insurances tailored to the demands of customers: for a higher deductible they pay a lower premium.
• In general new insurance products (less experienced) have higher deductibles.

The losses can be evaluated per field, per crop (all fields with the same crop in the farm), or even per farm in whole-farm insurance products. In single-risk insurance products, such as hail insurance, losses and deductibles mostly are calculated per field.

Bonus-malus system:
The bonus-malus system or system of deductions and penalties on the premiums due to former results is used to avoid moral hazard and adverse selection problems. It is applied in Austria, Bulgaria, Estonia, Finland, Germany, Hungary, Lithuania, Luxembourg, Netherlands, Romania and Spain. In Greece this does not exist for the compulsory public insurance, but it does for private insurance. In Denmark, Portugal, the United Kingdom, and in Ireland there is no bonus/malus-system. In Belgium, there is no bonus-malus system applied by the Belgian companies, but it is applied by the Dutch company OFH who is the main insurer for apples and pears. In France and Italy no information was provided about it, and in Poland, Slovenia and Sweden, it seems not to be applied in crop insurance, but it is applied in livestock insurance.

Compulsory insurance on crop level:
In most countries and for most insurance products, it is compulsory to insure all the fields with the same crop, to avoid that only fields with higher risks are insured (another type of adverse selection). Sometimes the insurer excludes specific areas from the coverage.

Loss assessment:
Normally the loss assessment is done by loss adjusters in the field. To estimate the loss they use field work protocols developed for different crops. There are international expert meetings every year organised by AIAG (International Association of Hail Insurers) to exchange their experience. The loss assessment for single risk (hail) insurance in the countries is very similar.

For indirect-index insurance the loss assessment is based on indexes (meteorological data) or on area yield in area-based-index insurance, but these new insurance products in Europe are mostly on project or pilot studies.

5 Feasibility of an EU-wide system of agricultural insurance
We discuss some potential advantages, drawbacks and limitations of several options of EU-wide agricultural insurance schemes. However any priori feasibility assessment of a hypothetical EU-wide scheme of agricultural insurance has a large uncertainty. The most important source of uncertainty is probably the farmers’ behaviour.
5.1 Alternative options
Risk management tools available in the MS could be developed further to improve sustainability of farms. However, given the big differences in the agricultural risks, legal, social and economic backgrounds in EU countries, an EU-wide system of agricultural insurances can be debatable. Alternatives to a common scheme based on existing systems could be easier to manage and control by the EU administration. An alternative to a proper EU-wide scheme can be a set of actions to foster national systems by:

- Facilitating/subsidizing the composition of yield/income databases, at a detailed level (farm): The use of databases can be considered as a basis for improving the premium rating, although some of these databases have important limitations due to confidentiality rules.
- Reinsuring: Public re-insurance exists in some MS and in the US. Budgetary uncertainty may be the strongest limitation to a hypothetical public participation of the EU in reinsurance.
- Clarifying the framework. The draft of “Commission Regulation (EC) No …/… on the application of Articles 87 and 88 of the EC Treaty to state aid to small and medium-sized enterprises active in the production of agricultural products and amending Regulation (EC) 70/2001” is a significant step forward. To be mentioned in particular that, from 2010 onwards, aid to compensate bad weather losses shall only be exempted if the farmer has also taken out insurance for at least 50% of his average annual production (EC, 2006).
- Partially subsidizing national systems which are within the framework: This option would stimulate MS to enhance risk management tools, while keeping a flexibility to adapt better the needs in each country.

5.2 The role of the public sector
A clear role of the EU institutions is setting up a regulatory framework, which includes technical criteria such as eligible risks, minimum deductibles or reference product prices allowed, etc. There is also a role on the control of the approved regulations. A question more open to debate is whether agricultural insurances should be subsidised by the CAP. One of the elements of this debate is the feasibility of purely private agricultural insurances with a wide coverage of risks. There are examples of totally private insurance in agriculture, covering in particular hail damage. Most other insurance schemes are provided under subsidised governmental schemes because the risks being covered are, in fact, not insurable in the sense that a market determined premium would be too high (Moreddu, OCDE, 2001). In countries, such as Spain, Austria and Italy, with a strong public support to agricultural insurance, systemic risks tend to become insurable.

5.3 Criteria to assess the feasibility
A feasible EU-wide insurance scheme should ideally meet several conditions. Some of these conditions relate to decisions of the policy makers (political criteria); others relate to decisions of the private sector, insurers, re-insurers and farmers (socio-economic); a third category of conditions have a more technical nature.

5.3.1 Political criteria
- Long term financial perspective: This condition depends on political decisions, but is obviously related with the possible cost of the system. Possible cost of different type of systems is considered in section 5.3.3. A point that deserves in-depth debate is whether a hypothetical EU support to agricultural insurances can be framed in pillar 2 of the CAP, possibly through modulation. If introduced to the menu of rural development measures, these options would be available for Member States and regions to take up and use, according to their specific priorities for the next programming period. The causes of the weak development of market based risk management tools (insurance, futures market, contract farming) could be addressed by training measures within rural development programmes.
- Compatibility with WTO agreements and CAP: In general, the compatibility with the WTO and with the European legislation could be guaranteed for most tools if they meet the criteria of the 30% threshold and deductibles, and if there was a declaration of calamity by the government for the (single or multi-)peril or yield oriented products. The 30% thresholds and deductibles wouldn’t be a big problem for income products and for peril/yield based products with high risks. However, for the support of crop insurance products, the need of an official declaration would be a hindering constraint. Crop insurance would not be compatible with the Green box with its current definition.

5.3.2 Criteria related to the behaviour of the private sector.
- A high proportion of farmers should be expected to buy the insurances at medium-long term. There is a high uncertainty level on this criterion. Some studies report that farmer’s behaviour does not always conform to theory and that there is a need to better understand farmers’ attitude toward risk and the way they adjust their
5.3.3 Technical criteria

- Meet the needs of farmers: The analysis of income variability with FADN data shows a heterogeneous geographic pattern of the need for income stabilisation tools, depending on farm types and farm sizes. The available range of existing insurance is generally insufficient to smooth significant income reduction in bad years.
- Cost: The possible amount of premiums of an EU-supported insurance system has been roughly quantified for a few hypothetical scenarios, under given assumptions (penetration of insurance of 40% - 60% and average premium rates). Yield insurance for field crops (cereals, oil seeds, sugar beets, and fodder on arable land) could represent a volume of premiums between 1 B€-1.4 B€. An EU-wide system for fruits with similar characteristics to the existing systems in Spain, Italy or Austria could mean 500 M€ to 900 M€ premiums. A similar amount (500 M€ to 800 M€) might be involved in a potential system for vegetables. An area-index insurance for cereals could lead to 450 M€ to 750M€, while an area-index insurance for a reduction of more than 10% of the average income for specific farm types in FADN regions might correspond to 2-3 B€. In this case we have included livestock farms that have not been considered in the other quantified scenarios. It should be stressed that these quantifications have been made with assumptions that do not necessarily match the choices of a hypothetical political decision. More focussed quantifications are needed when/if such possible scenarios are better defined. For the budgetary impact, additional assumptions are required on the subsidy rate. If we assume for example a 50% subsidy, shared between the Member State and the CAP, the budgetary impact on the CAP would be 25% of the mentioned figures.
- Feasibility/simplicity of control systems to avoid malfunctioning. If a risk management program would be introduced as compulsory tool (parallelism with the cross-compliance), MS would be probably responsible to create risk information programs. Potential fraud by farmers would be controlled by insurance companies that would be the first losers in case of fraud.
- Technical feasibility and database information availability. In theory, any system that exists in one country can always be applied in others. However, some insurance products require databases that are not always available. For example the US approach to revenue insurance requires historical yield data at the farm level that are not available in most EU countries.
- Asymmetric information: potential adverse selection, moral hazard or other problems. The farmer knows better the own risk level than the insurance company, and it can happen that only farmers with a high level of risk buy the insurance. Consequently the risk in the insured population is higher than the average. To limit this problem, detailed databases are necessary. The possible public support to build such databases should be discussed.
- Have advantages compared with alternative tools: Insurance provides farmers with a legal title to get compensation compared to ad-hoc payments from the public sector. It also provides a quicker payment of compensations, the average time of payment being of around 2 months while ad-hoc aid can take 1-2 years. Private insurance probably gives indemnities more adjusted to the farmers’ real losses, on an individual basis, because the insurance company tries to optimize the own profit. Subsidizing agricultural insurance is a way to stabilize the budgetary impact on the public sector and to provide farmers a means to manage their own risk management strategies. From an economical point of view it seems that it is easier to plan a financial support to insurance premiums, than to make public ex-post payments for compensation after natural disasters. However, critical views support that the global cost of insurances is higher because of the cost of loss adjustment, and that subsidizing agricultural insurances means subsidizing insurance companies. Another point of view holds that with a public system (ad-hoc aids), the Administration is in charge of damage assessment, etc. Supporting an insurance system transfers this responsibility to the companies that have a profit in compensation of this service. For example, in the US, the profit of companies ranges from -30 M$ to 400M$/year with an average of around 200 M$/year in a program with a total cost of approx. 4000 M$/year.
In the case of mutual insurance companies partially owned by the farmers (for example in Austria) most of the profit has to be used as reserves for bad years and even given back to the farmers when these reserves reach a maximum level.

5.4 Specific issues of each type of insurance

• **Single-risk or combined insurances**
  - Single risk and combined risk insurance already exist in most MS (historical data available).
  - Control: good experience in loss assessment, but expensive procedures.
  - Moderate risk of moral hazard, but higher adverse selection
  - Support on EU-level doubtful

• **Yield insurance** *(climatic cause of losses has to be identified)*
  - Similar to combined insurance but more comprehensive
  - Meets better farmer’s needs
  - More expensive
  - Need of higher deductibles for systemic risks like drought
  - Lower adverse selection because more risks pooled among different regions
  - Loss assessment more difficult
  - Need of public support for development on private sector
  - Support on EU-level useful

• **Yield insurance** *(no identification of climatic cause of losses)*
  - High risk of moral hazard
  - Lower acceptance by insurance and reinsurance
  - Lower costs for loss assessment

• **Whole-farm yield insurance**
  - Addresses a bit better the target (income stabilisation)
  - Heavier to control

• **Income/Revenue insurance**
  - Addresses much better the target (income stabilisation)
  - Difficult to control, unless on area index basis
  - Very systemic risks (prices): difficult to accept by insurers unless strong public support
  - Difficult to give a reference price
  - High risk of moral hazard to undermine the system

• **Area index insurance**:
  - Little risk of moral hazard and adverse selection
  - Relatively easy to control
  - Does not take into account the differences of damage inside each “presumed homogeneous” area
  - who is competent to give the official reference yield?

• **Indirect-index insurance** *(meteorological indexes, satellite images)*:
  - Objective criteria, but some are difficult to understand by farmers (vegetation indexes, etc.)
  - Only useful for coverage with high deductibles
  - Less developed in Europe
  - Risk of overcompensation or under compensation

• **Public reinsurance**:
  - Difficult to guarantee that the expenditure will be kept within a certain level (compatible with EU financial regulations?)
  - Partial public support to reinsurance as option
  - Could make risks insurable mentioned as not insurable

• **Flexible system: supporting MS systems**
  - Meets better different demands on national level
  - Breaking the difficulties in case of different systems in MS
  - Could be a first step to harmonize the MS systems.

6 Conclusions
This study highlights the high diversity of agricultural insurance systems in the EU. The level of risk is also very heterogeneous from country to country, from one farm type to another and from small to large farms. The
development of agricultural insurances in each country is linked to the needs (risk level), but the MS policy to support the system is also a decisive factor. For non-systemic risks (hail), private sector offers suitable insurances, but for insurance products offering a wide coverage, there is a direct relationship between development and public support. The development of insurances in the livestock sector is generally lower than in the crop sector. Livestock risk management relies on sanitary assistance programs; major crises (diseases with high externalities) are covered by public aids.

Climatic risk analysis has been undertaken, but it still needs to be improved to derive solid conclusions at the appropriate scale (farm level or comparable geographical level).

The total amount of premiums in the EU agricultural insurances is around 1.5 B€ with a public subsidy of approximately 500 M€. The average amount of compensations for losses by farmers is close to 1.1 B€. The total amount of ad-hoc aids for which we could collect data is slightly above 900 M€, but many countries did not provide data on ad-hoc aids for livestock. Therefore this figure is probably strongly underestimated.

Some hypothetical scenarios of EU-wide insurances have been quantified, but the level of uncertainty is very high. Some feedback on the possible EU decisions is necessary to reduce the uncertainty.

7 Glossary

**Adverse selection**: A situation in which the insured has more information about his or her risk of loss than does the insurance provider and is better able to determine the soundness of premium rates. As a consequence, the level of risk in the insured population is higher than in the total population (Harwood et al 1999a).

**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 can result in one or both of these problems: Adverse selection and moral hazard.

**Deductible or excess (French: Franchise)**: The portion of an insured loss to be borne by the insured before he is entitled to recovery from the insurer. It may be in the form of an amount of euros, a percent of the value of the insured property (straight deductible) or a percent of the loss (relative deductible). The trigger is the percentage of the insured value the losses must exceed in order to trigger the payment.

**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.

**Non-proportional re-insurance**: The coverage of the re-insurer is based on the loss. The re-insurer takes charge of the loss above a certain threshold of the loss. It is similar to insuring with a straight deductible.

**Stop-loss**: The re-insurer takes charge of the losses above a fixed threshold of the annual balance (annual loss or loss ratio) of the insurance company.

**Proportional reinsurance**: The coverage of the re-insurer is based on the sum insured. It is more similar to insuring with a relative deductible.

**Quota-share reinsurance**: The reinsurer assumes a set percentage of risk (covered sum insured), in this quota the reinsurer takes charge of the loss of the company and the same share on the profit.

**Systemic risk**: As opposed to risks like fire and burglary, systemic risks affect a big population at the same time. Systemic risks result in many people making a claim at the same time with the effect that the premiums 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.

REFERENCES


