

Risk management schemes in EU agriculture

Dealing with risk and volatility

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Risk is inherent in the agricultural sector, and farmers have to develop strategies to address higher price volatility, increasing pressure on income and risks stemming from climate change. Greater market orientation of the Common Agricultural Policy (CAP) led to more exposure to market risks and expectations that risk management should become more important in the CAP.

The aim of this market brief is to describe the current state of risk management in EU agriculture. Different drivers of agricultural risk are explained and perceptions, attitudes and responses of farmers towards risk and how risks can be managed on farm are discussed.

The different private or public-private instruments that can be used by farmers to prevent, mitigate or cope with agricultural risks are reviewed subsequently, followed by a discussion of risk management instruments that are present in the CAP to mitigate catastrophic risks. This brief explains how these instruments work, describes the extent to which they are currently used by farmers, and identifies obstacles in the uptake of the instruments in the EU.



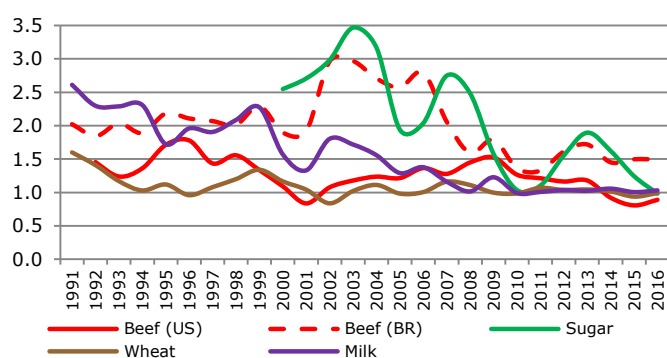
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1. Introduction

In its recent history, the Common Agricultural Policy has undergone several reforms towards greater market orientation, shifting from production support to mainly decoupled payments and less public intervention. This shift has increased trade opportunities for farmers through the integration of the EU into global markets and reduced the price gap between EU and world market prices over time (see Graph 1), leading to impressive gains in the trade performance of the EU agri-food sector.

In parallel, the shift away from market management also made farmers more exposed to the risks in the agricultural sector, whether on the internal market because of lower support prices or in global markets due to higher price volatility.

Graph 1: Ratio between EU and world prices



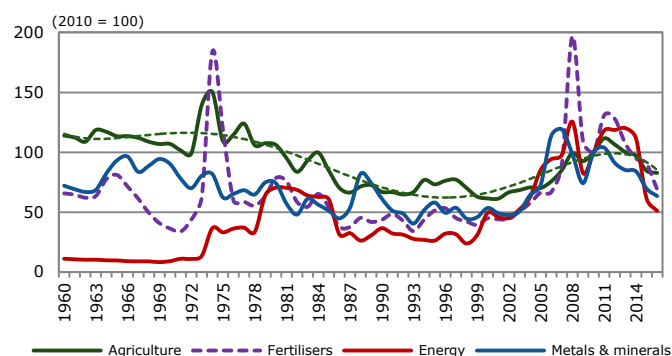
Source: DG Agriculture and Rural Development

Risk is inherent in all economic activities, but due to external factors that influence the yield and price of agricultural output, farmers in particular are exposed to increased uncertainty. Uncertainty about price, and thus income, makes farmers more hesitant in long-term investments that raise productivity.

In the last decade, price volatility in the agricultural sector increased during the price spikes in 2007-2008 and 2010-2011, followed by a severe drop in prices. This is partly explained by the close dependency of agricultural prices on other commodity prices, especially the highly volatile energy prices (see Graph 2). Yet, while price volatility of agricultural prices in real terms did not significantly increase in the medium-term, the perception of volatility did.

Hence, with the expectation that the volatility in prices and farm incomes will remain or even increase in the agricultural sector, risk management is of primary concern for farmers, investors and policy-makers.

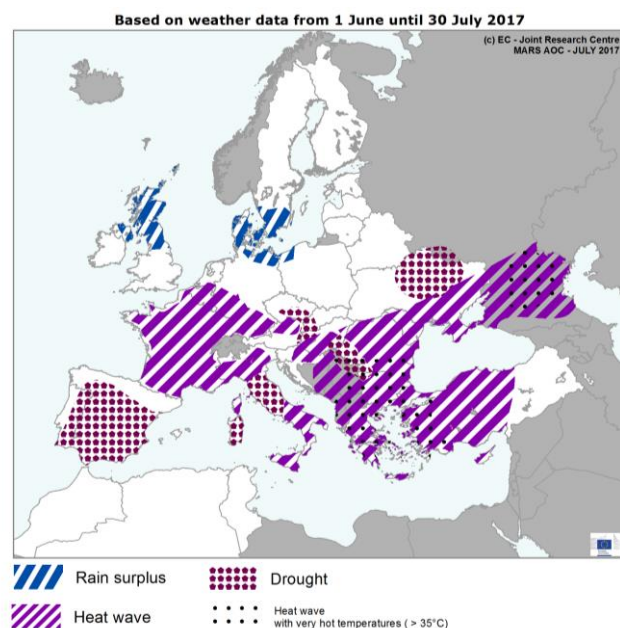
Graph 2: Trends in real commodity prices



Source: World Bank

Additionally, increased occurrence of extreme climatic events is also raising farmers' concern and need for an adequate risk management approach. These events have potentially serious impacts on agricultural production, the 2017/2018 marketing year being a current example when heat waves and drought in various areas negatively affect EU production of cereals (see Graph 3)¹.

Graph 3: Areas of concern - Extreme weather events



Source: JRC MARS Bulletin Vol 25 No 7, 24 July 2017

In the CAP, risk management instruments have become more important over time. With the 2008 Health Check, a risk management layer was

¹ See also the Short-term outlook for EU agricultural markets in 2017 and 2018, Summer 2017.

introduced in the CAP for the first time. This layer provided targeted risk coverage instruments such as subsidised insurance schemes and mutual funds in the operational programmes for the fruits, vegetables and wine sector. Member States were also allowed to subsidise insurance premiums via the direct payments 'envelopes' up to 10%².

With the 2013 reform, this option was removed, although the support for the fruits, vegetables and wines was maintained under the new Common Market Organisation (CMO)³. Instead, support for risk management was introduced in the second pillar for the period 2014-2020. Member States are allowed to allocate funds of the European Agricultural Fund for Rural Development (EAFRD)⁴ to provide financial contributions to insurance premiums, mutual funds and a newly introduced income stabilisation tool.

2. Types of risks

Farmers are exposed to different types of risks that influence their agricultural activity. We can broadly distinguish between three types of risk that have different causes.

Price risks

Characterised by strong price volatility, uncertainty about future prices and co-movement of prices, these price risks are driven by an imbalance between demand and supply that can be the result of competition, macro-economic, geopolitical, climatic changes, phytosanitary risks etc). For agricultural products, in addition, demand occurring at the end of the food supply chain generates delayed price signals for suppliers who will then take decisions that have a deferred effect on the quantities produced⁵.

² Article 68 of Council Regulation (EC) No 73/2009 of 19 January 2009 establishing common rules for direct support schemes for farmers under the common agricultural policy and establishing certain support schemes for farmers.

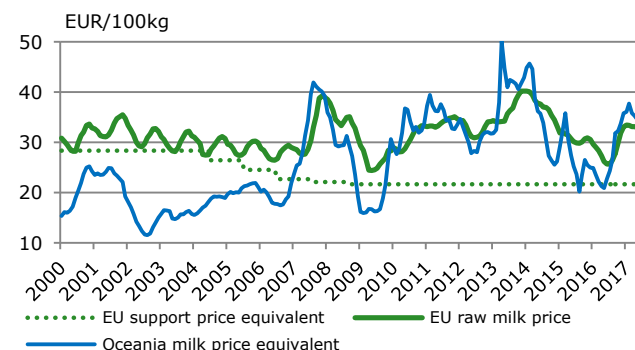
³ Regulation (EU) No 1308/2013 of the European Parliament and of the Council of 17 December 2013 establishing a common organisation of the markets in agricultural products.

⁴ Regulation (EU) No 1305/2013 of the European Parliament and of the Council of 17 December 2013 on support for rural development by the European Agricultural Fund for Rural Development (EAFRD).

⁵ This effect is also known as the cobweb cycle or pig cycle or hog cycle and is mainly observed in the livestock sector. When prices are high, producers increase production. Due to production lags, the market becomes saturated and prices decline. Producers then decrease production and prices start to increase again.

How volatile market prices can be is demonstrated by the two crises in the dairy sector (see Graph 4).

Graph 4: Trends of dairy product prices



Note: milk price equivalent based on SMP and butter prices
Source: DG Agriculture and Rural Development

The causes of the two crises are quite different. The first dairy crisis coincided with the financial crisis of 2008, but was driven by severe world supply constraints from successive droughts in Oceania and the subsequent instant supply response in the EU. The 2014 Russian import ban for agro-food products led to a decrease in dairy prices as a result of an oversupply situation consequently to the loss of one of the main cheese markets for the EU, and drop in Chinese demand pressured the dairy market even more in a context of increased EU production to prepare the end of the milk quotas in 2015. But the result was the same – significant price volatility with negative consequences on farm income.

Production risks

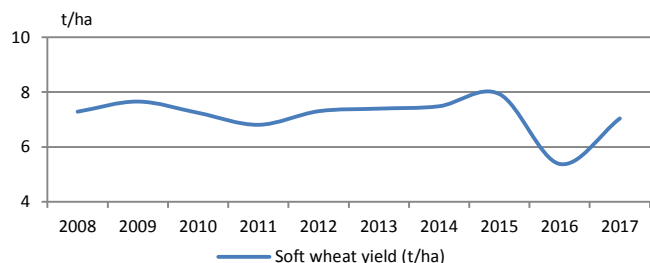
Production risks refer to the possibility that yields and/or outputs are lower than expected. This can be the result of extreme climatic conditions such as drought, hurricanes or floods. Also less systemic events such as pests, diseases and local weather phenomena such as hail, frost and excessive rainfall can have a significant impact on agricultural output.

The projection of weather events is subject to high uncertainty, though recent years indicate that, due to climate change, more years turn out to be unfavourable, which in turn increases crop yield variability⁶.

⁶ European Environment Agency, Climate change, impacts and vulnerability in Europe 2016, EEA Report No 1/2017.

Increasing production insecurity significantly hampers farm decisions. To illustrate, yield fluctuations for soft wheat (see Graph 5) clearly demonstrate the effect of wet conditions followed by lack of solar radiation on yield in 2016⁷.

Graph 5: Yield fluctuations in soft wheat in France



Source: DG Agriculture and Rural Development calculations based on ESTAT data

Income risks

Characterised by an imbalance between revenue and costs (mainly affected by the previous types of risk, price and production), income risks do not only refer to income volatility but also to low levels of income. Large unfavourable fluctuations in prices and output can result in cash-flow constraints and lead to farmers going bankrupt.

When prices for inputs such as fertiliser, seed or feed increase while the price of the agricultural output remains stable, the profit margin is reduced. Farmers with a low profit margin will therefore be more sensitive to income risk when input and output prices are fluctuating.

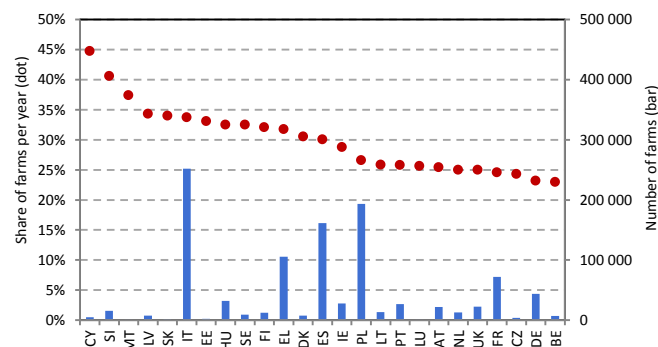
In the EU, Member States with the highest number of farms suffering from income losses above 30% are Italy, Poland, Spain and Greece (see Graph 6). High shares are found in Cyprus, Slovenia, Malta and Latvia.⁸

The income risk between types of farming in Europe is different (see Graph 7). Farms with permanent mixed crops, cereals, oilseeds and protein crops (COP), pigs and poultry, fruits and vegetables face an income drop below 30% more often than average farms. The share of farms facing a farm income drop above 30%

between 2007 and 2013 was lower in the milk sector, mixed livestock and mixed crops and livestock.

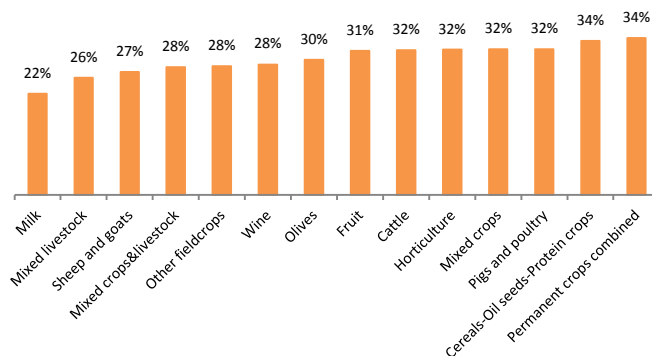
However, in 2009 specialised dairy farmers experienced the highest losses among all farm types, with 50% of farmers having an income loss above 30%.

Graph 6: Share and number of farms with a farm income drop above 30% by Member State in EU-25 (2007-2013 average)



Source: DG Agriculture and Rural Development calculations based on FADN data

Graph 7: Share of farms with a farm income drop above 30% by type of farming in EU-25 (2007-2013 cumulated)



Source: DG Agriculture and Rural Development, estimations based on FADN data

Graphs 6 and 7 together show that over a period of seven years, the average minimum share of farms that experienced annual income drops of more than 30% is higher than 20% both at EU sector-level as well as Member State aggregate level. With maximum shares reaching 34% and 45% respectively, the occurrence of this risk event can be expected at a regular basis.

⁷ See also the Short-term outlook for EU agricultural markets in 2016 and 2017, Autumn 2016.

⁸ Income loss of 30% compared to the average of the three preceding years.

3. Responses to risks

How the three types of risk identified above should be addressed is dependent on the frequency of the risk events occurring and the impact of the event on farm income. The combination of frequency and impact of the risky event determines to a large extent the response to it.⁹

Normal risks are characterised by events that occur frequently but with low damage, and which can be managed on-farm. Such risks could be small changes in prices or yields that can be caused by weather events (for example, when a growing season with low precipitation leads to lower yields).

Less frequent than the normal risks are **marketable or insurable risks** which, when they occur, lead to higher losses. These risks are more difficult to manage by farmers on their own, and there is hence a need to transfer the risk using private market instruments or sharing the risk with other farmers. The desired instrument can be applied ex-ante or ex-post, and can be designed to prevent, mitigate or cope with the risk at hand. An example of a marketable risk would be a large price decrease that can lead to a significant decrease in farm income.

Finally, **catastrophic or systemic risks** occur infrequently, but cause large damage to many farmers. Because catastrophic risks can lead to very high costs, it is too costly for private companies to provide instruments to cover these losses. Because of this market failure, public aid is provided to cover the losses of agricultural producers. Examples of catastrophic risks are large scale droughts or floods that hit an entire country or region, or a widespread contagious disease.

Graph 8 illustrates the different risk management instruments categorised by the three layers of risk.

Graph 8: Mapping of risk management instruments

	Normal risk	Marketable risk	Catastrophic risk
On farm	<ul style="list-style-type: none"> Financial management Standards (hygiene, quality) Diversification (including off-farm) 		
Market tools		<ul style="list-style-type: none"> Forward contracting Cooperatives Non-subsidised insurances Non-subsidised mutual funds 	
Ex-ante policies		<ul style="list-style-type: none"> CAP subsidised Income Stabilisation Tool (not risk specific) CAP subsidised insurances and mutual funds for production risks CAP Market measures CAP Basic Payment Scheme 	
Ex-post policies			<ul style="list-style-type: none"> Ad hoc disaster aid

Source: DG Agriculture and Rural Development based on the OECD classification of risks

However, there are no clearly defined boundaries between the above layers of risk. As a result, there is no clear definition of whether and when the desired instrument to manage price, production or income risk should be public, private or public-private in nature. The same applies at the farm level, where risk perceptions and attitude differ. One farmer could consider a marketable risk significantly distorting, another could consider the same risk to be normal.

Consequently, public support can have important effects on the development of private risk management tools. More public income support to farmers will shift part of the marketable risks to normal risks because farmers receive more income protection and their possibility to manage risks on-farm increases.

Similarly, more generous public support to deal with catastrophic risks could make farmers more dependent on public funds to manage catastrophic risks, and thus reduce incentives to use private risk management tools. Public support can thus crowd out the development of private risk management tools. Insured farmers tend to use less risk reducing inputs and have less incentive to apply more resilient business systems.

⁹ Classification by the OECD of risks into three layers, each requiring a different policy design: OECD (2011), Managing risk in agriculture: policy assessment and design.

Box 1: Variability in attractiveness of tools

The attractiveness of risk management tools will significantly vary in function of the degree of the risk, depending on the sector, region subject to the risk and farm size.

Sectors with lower average income level, such as beef, sheep and goat, may favour tools providing an income buffer like direct payments. On the contrary, sectors with a regular volatility in income, but with sometimes big shocks, such as dairy and crops, may also look for tools which compensate income losses.

Similarly, the degree of organisation of farmers or the product characteristics will impact on the (available and) selected tools. In sectors with homogenous products such as cereals, futures and mutual funds will be more attractive.

Different instruments will also be preferred based on regional concerns. For example hail insurance is available when the risk takes place in a specific area, while futures can be used when the risk has an effect to more farmers at the same time. Likewise, bigger and more specialised farms which are exposed to higher risks will more willingly turn towards various risk management tools than smaller farms.

4. Risk management at farm level

Before we focus on the different risk management schemes that are available in the EU and their role in managing risks in European agriculture, a look at what farmers can do to manage the so-called normal agricultural risks is pertinent.

Managing risks starts at the farm level, where farmers have different strategies to stabilise their income. Farmers have a large variety of options to choose from in order to reduce their exposure to risks. They can, for example, diversify their production or income by using different crops or livestock, or by developing non-agricultural income sources for the farm like agro-tourism to balance a loss in one of their agricultural activities. However, diversification comes at a cost because it usually leads to a lower than average income¹⁰, due to the loss of scale economies. Off-farm employment is another way to diversify the farm household income, together with precautionary savings or cuts in private expenditure and investments in times of hardship.

On-farm, there is the possibility for technical improvements such as using drought-resilient

varieties, optimising the scale of the farm or to increase the value added of the product by on-farm processing or sales.

Besides these different on-farm practices, farmers can also make use of private and/or public risk management tools. These instruments will be discussed in more detail in the next pages.

The choice a farmer makes on whether and which risk management strategies to use, is dependent on both risk attitude and risk perception. Risk attitude is the actor's orientation towards or willingness to take risks. It can vary from being risk-averse, which means a farmer is unwilling to take risks, to risk-seeking where the farmer is willing to take significant risks. The perception of risk relates to how large the farmer estimates the threat of the risk and can be influenced by previous events.

The relation between risk attitude and the choice for risk management strategies is paradoxical.¹¹ More risk-averse farmers adapt less ex-ante strategies to prevent risks but rather use ex-post mitigating measures. On the other hand, risk-seeking farmers make more use of ex-ante measures. A possible explanation for this is that risk-seeking farmers take more risks and hence have more need to protect them against these risks.

Since farmers operate in a risky environment, they have been found to be in general more risk-averse. They are sometimes reluctant to engage in risk management schemes for different purposes. Some of these problems are to pay money upfront for ex-ante schemes without knowing what their 'return on investment' will be, or because it is hard to cooperate with other farmers to pool risks because of personal, cultural or regional differences.¹²

It is also possible that participation in risk management schemes changes the risk perception or attitude of farmers, creating moral hazard (i.e. reducing farmers' incentive to protect themselves properly against the risk since they are protected from its consequences by, for example, buying insurance).

¹⁰ S. Tangermann (2011), Risk Management in Agriculture and the Future of the EU's Common Agricultural Policy.

¹¹ Van Winsen et al (2014), Determinants of risk behaviour: effects of perceived risks and risk attitude on farmer's adoption of risk management strategies.

¹² Agricultural Markets Task Force (2016), Improving market outcomes: enhancing the position of farmers in the supply chain.

Moreover, the existence of a risk management instrument can have an effect on the uptake of other instruments when risk management policies are not designed carefully to take account of other policy tools that are in place. It is for example possible that ex-post payments provided by public institutions crowd out the incentive for farmers to protect themselves ex-ante against risk through the private market if they know that their losses will be covered anyway.

As a result, disaster payments should normally be granted only in cases where a catastrophic loss cannot be covered by the private market and the use of government funds is thus justified to refund farmers for (part of their) losses.

5. Private risk management tools

Non-subsidised insurance

Crop or livestock insurance works similarly to any other insurance. The farmer pays a premium and, in case of losses covered by the insurance, receives compensation for these losses. Insurance allows the farmer to transfer part of the risks to a third party. In the EU, insurance addresses mainly production risk, while insurance protection against price risks, revenue losses and income losses, whether related to crops or livestock, is uncommon in the EU.

The amount of indemnities is generally calculated on the basis of results of individual farms. Deductibles up to 40% of losses may apply. Some yield insurance schemes, covering yield losses due to meteorological events, use indices based on meteorological data or area and yield to trigger compensation.

The insurance market is dominated in each Member State by a limited number of players active on the national market. Private-based insurance schemes are difficult to establish. Firstly, as in all insurance schemes, the asymmetric information (adverse selection and moral hazard) needs to be managed. In particular, it is difficult to foresee and calculate the costs of phytosanitary outbreaks and livestock epizootics. Secondly, the occurrence of systemic risks causes problems for insurance, and may require the insurance company to set very high premiums.

Options for insurance companies to cope with these challenges are to cover themselves on the futures market or to get re-insurance by global players with a more diversified portfolio.

Crop insurance (both of private and public-private nature) covering climatic risks is largely available in Europe. The most extended type of insurance is the single-peril crop insurance covering hail. Multi-peril risk insurance, securing against a larger range of weather events (e.g. frost, storm, excessive rain, drought), is only available to a lesser extent.

In a few Member States, phytosanitary risk insurance is proposed, mainly for potatoes.¹³ Compensation covers direct losses resulting from quarantine actions, limited to 60%-90% of the value of crops destroyed, but rarely to consequential losses in income.

Livestock insurance schemes covering diseases are commonly available in the EU, except for some Member States (BE, DK, UK, PT). While direct losses, i.e. the value of the deceased animal, are compensated, few schemes also cover consequential losses from livestock epizootics. Endemic diseases are also rarely covered. In general, livestock insurance covers death and emergency slaughter due to illness (sanitary risks), risk of accident, theft, contamination of products, fire and storm.

The uptake of insurance in the EU remains limited¹⁴, with the main obstacles being the high premiums, the high deductibles and the mismatch between demand and supply, in particular with regard to multi-peril crop insurance and the absence of revenue/income insurance.

Non-subsidised mutual funds

Mutual funds require farmers to contribute, usually with a fixed amount independent of the risk, to a common financial reserve. In case of losses, the farmers concerned receive full or partial compensation, when necessary with an additional collection from participants to the fund.

Mutual funds are set up mainly at a sector-specific level or regional level, where farmers experience similar risks. Mutual funds are based on a solidarity principle with a pooling of risks amongst farmers and over time. Its effectiveness depends largely on the available funds in case of losses. Indeed, one of the

¹³ Insurance schemes are reported in Bulgaria, Czech Republic, Cyprus, Germany, Italy, Latvia, the Netherlands, Poland, Slovakia and Spain.

¹⁴ Single peril crop insurance uptake remains below 50% in many MS, while multi-peril crop insurance uptake is considerably lower.

main issues with mutual funds is when too many farmers incur losses at the same time.

Mutual funds may provide protection against climatic and sanitary risks, but also against income risks.

Set-up and uptake of mutual funds remain limited.¹⁵ This is partly explained by the availability of public support (the crowd out effect discussed in section 3). Besides, specific difficulties to setting up mutual funds may incite farmers to turn to other available risk management tools, in particular insurance. The challenges for setting up a mutual fund include the administrative requirements, behavioural biases (individualism, lack of trust among farmers), and the need for sufficient reserves and possible re-insurance to mitigate risks.

Forward contracts

To address price risks, the farmer has the option to use forward contracts. These are non-standardised agreements between a farmer and a buyer. Both parties agree on a transfer of a commodity/product to take place in a predefined future point in time, where the traded volume and unit price is pre-set. Using forward contracts thus guarantees the farmer to sell an agreed amount of output and, based on the specified conditions, at a predefined price. Contracts allow farmers to manage their cash flow, reduce uncertainty and can stimulate investments.

There are different types of forward contracts available. Agreements can be made to deliver at the market price prevailing at the moment of delivery (benchmark), the average market price over a certain period (pool contract), against a predetermined price (fixed price), or with a minimum price.

What type and to what extent contracts are used can differ significantly and is also dependent on the sector. In sectors where firms are vertically integrated, contracting is superfluous because of the full integration of producers and processors.¹⁶ At the other side of the spectrum, individual farmers can negotiate contracts with downstream partners, but in general have a lack of bargaining power.

In sectors with only a few downstream partners, for example in the hog sector, processing companies can exert a certain amount of power on producers with respect to prices or quality. Therefore, higher use of forward contracts is mostly present in sectors and Member States that have cooperative structures in place that are able to lower transaction costs and increase the market power of farmers.

The use of forward contracts in the EU for both crops and livestock is not widespread. Forward contracts are widely developed in the grain and oilseed sectors in France, in the pig sector in Denmark, and benchmark contracts are used for dairy and poultry in Hungary and Slovenia.

Futures markets

Futures are standardised forward contracts traded on stock exchanges (futures markets). Quality, quantity, delivery method (physical delivery or value transfer) and expiry date are all pre-determined. As such, they eliminate some of the contractual risks that occur with forward contracting.

Farmers can use the futures market to hedge their risk in order to protect themselves against an unforeseen decrease in prices. In this way the farmer is securing a price at the cost of losing some potential gains in case that the price at the moment of delivery has gone up.¹⁷

To participate in the futures market, farmers need to pay a small margin that serves as collateral to minimise credit risk. To make hedging work, the price on the futures market and the market price should converge. The difference between these two prices measures the value of the basis risk.

When a farmer wants to sell a contract on the futures market, there should also be a counterparty to buy a contract to create liquidity. Speculators involved to bear the risk and willing to take the opposite position on the futures market are essential. One of the main issues for the development of futures is to increase the liquidity in the market. To increase the liquidity, more market information and price transparency is required, to incentivise investors.

¹⁵ Mutual funds are known to be set up in Belgium, France, Germany, Greece, Hungary, Italy, Luxembourg and the Netherlands.

¹⁶ i.e. two or more stages of production normally operated by separate firms are combined within one firm.

¹⁷ For more details and examples on how futures work, see also: Managing risk in the dairy sector: how futures markets could help, March 2017, EU Agricultural Markets Briefs, No11,

Whereas in the US, futures markets for cereals have a long history, the first futures markets started to develop in Europe in 1992 with the reduction in price support under the CAP. There are contracts available for different products. The Euronext stock exchange (based in Paris, London, Brussels and Amsterdam) provides contracts for different cereals, fertilisers and dairy products. The European Energy Exchange (EEX) offers contracts for hogs and piglets, potatoes, dairy products and fertilisers.

However, the trade activity on the market is different across commodities. Rapeseed and wheat are the most traded commodities on the futures market with respectively 19% and 10% of the crop production in 2016. For skimmed milk powder (SMP), butter and whey it is lower than 1%, so the market is characterised by low liquidity. However, it's growing rapidly. Also for the other commodities concerned, the shares traded on the futures market are close to zero.

As futures are standardised contracts, future contracts are adequate precisely for standard products. The characteristics of some agricultural products are thus less favourable to be traded on the futures market. Particularly in Europe products such as cheese or hogs are not as homogeneous as cereals are.

Also for some agricultural products, the price in the local market is not strongly correlated with the prices on the EU futures market. For these producers, futures may not be appropriate to off-set their price risk.

Another product on futures markets are options. Option contracts give the holder the right but not the obligation to buy or sell. Options are attractive to hedgers because they protect against loss in value but do not require the hedger to sacrifice potential gains.

Forward, future and options contracts are the main private instruments available to manage price risks. Farmers can decide to individually hedge their risk on the futures market, but this barely happens. More often, cooperatives provide forward contracts to farmers and base the price of these contracts on the futures market. Other private initiatives by cooperatives such as the fixed milk price scheme of Glanbia can also reduce the price risk of farmers (see

https://ec.europa.eu/agriculture/sites/agriculture/files/markets-and-prices/market-briefs/pdf/11_en.pdf.

Box 2). Nevertheless, farmers require more education and training, in particular about how future markets work. Public authorities can provide support to farmers on how to use future markets. This is already taking place in the Farm Advisory System.

Box 2: Glanbia Fixed Milk price scheme¹⁸

Glanbia, an Irish dairy cooperative that processes milk, launched its new scheme in December 2016. This voluntary fixed milk price scheme allows milk suppliers to lock in a minimum milk base price based on a given quantity for either one year or three years. This base milk price consists of the milk costs plus a farmer's margin that moves in line with the Consumer Price Index. A market adjuster applies to the scheme to increase the base price per litre with 0.5c/l when the milk price gets 1 cent above a predefined threshold. In a similar manner, the base price will decrease when the milk price gets below a lower threshold.

By locking in a minimum milk price, farmers have more predictability for the duration of the scheme in exchange for accepting a price that might not be as attractive as the current market price. The scheme has a 60% participation rate among the suppliers of the dairy cooperative.

6. Subsidies to private risk management tools and public-private partnerships

Insurance

Considering the challenges for private insurance schemes, agricultural insurance is largely supported by the public sector. This support takes the form of national or CAP subsidies to render insurance premiums affordable to farmers.

According to Article 37 of the Rural Development Regulation¹⁹, Member States may allocate part of the budget to insurance premiums (support rate up to 65%), under the condition that the losses covered represent more than 30% of the average annual production of the farmer based on a three years average or an "Olympic" average²⁰. Under the 2014-2020 Financial Framework, the programmed total public expenditure for insurance premiums represents almost EUR 2.2 billion. Countries making use of this option are Belgium (Flanders), France, Croatia,

¹⁸ Irish Farmers Journal, Glanbia fixed milk price scheme explained, <http://www.farmersjournal.ie/glanbia-fixed-milk-price-scheme-explained-244035>.

¹⁹ Regulation (EU) No 1305/2013

²⁰ An Olympic average corresponds to the average over the last five years excluding the highest and lowest value.

Hungary, Italy, Latvia, Lithuania, Malta, the Netherlands and Portugal.

Box 3: Public-private insurance in Spain (State aid)

The Spanish Agricultural Insurance System offers multi-peril public-private insurance for all sectors, and all the relevant climatic risks and some pests and animal diseases.

The particularity of the system lies in the fact that insurance companies are grouped into a co-insurance pool (AGROSEGURO). Setting of premiums, draft contract models and payment of the indemnities are dealt with by AGROSEGURO. Hence, companies cannot compete in the products offered (same risks covered, no exclusion of applicants) nor the premium rates, but only in the management costs charged and the quality of the service. They assume the risks in the same proportion as their participation in the stock capital of AGROSEGURO.

The public sector adopts annually an Agricultural Insurance Plan (AIP), establishing the general aspects of the system, supervises the premium rates asked for by the insurance sector and provides re-insurance. The Central Government (ENESA) subsidies are deducted from the premium paid by the farmer at the moment of underwriting the policy. In order to be eligible for the subsidies, beneficiaries must comply with tax and Social Security obligations, be small or medium-sized enterprises and comply with minimum farming practices. The ENESA subsidises over 400 000 policies annually, covering around 36% of costs, while additional subsidies of around 10% are granted by autonomous governments. This means that for each euro granted by the ENESA, the farmer pays an additional EUR 2.2.

Mutual funds

Even more than insurance, mutual funds are mostly public-private initiatives. Here also, funds may be subsidised at national or EU-level.

Similarly to insurance, financial contributions to mutual funds may be co-financed under Article 38 of the Rural Development Regulation for climatic or sanitary risks, and under Article 39 for severe drops in income, the latter referred to as the income stabilisation tool (IST – see next paragraph). The financial contribution must relate to the administrative costs of setting up the fund and the financial compensations to farmers, with a maximum support rate of 65% of the eligible costs. Under the 2014-2020 Financial Framework, the total public expenditure programmed for contributions to mutual funds under Article 38 are limited to EUR 325 million, with use of this risk management toolkit to this purpose only in France, Italy, Romania and Portugal.

Box 4: Maize mutual fund in the Veneto and Friuli-Venezia Giulia regions (Italy)

In the Veneto region in Italy, a mutual fund system²¹ has been set up for addressing risks for maize crops, with consideration for environmental concerns. To participate in the mutual funds, it is compulsory to follow guidelines for integrated pest management (IPM)²². IPM promotes low pesticide-input management including non-chemical methods.

Risks covered are production risks due to adverse weather conditions, pests and diseases, and damage caused by wild fauna. It also covers the risk of ineffectiveness of pesticides and late treatment. Costs for farmers are between EUR 3 and EUR 5/ha, and compensation up to EUR 1 000/ha.

Risks maps are drawn up by region and up-to-date, specific information is provided to farmers, including suggestions and warnings.

Income stabilisation tool

The income stabilisation tool (IST) is another option provided for under the Rural Development Regulation to manage income risks. The IST was introduced in the post-2013 reform and is a mutual fund that compensates for income losses.²³ Farmers contribute to the mutual fund to establish a financial reserve that can be used to compensate farmers for income losses independent of the cause. The IST compensates for less than 70% of income lost when the effective loss is larger than 30% compared to the average annual income of the previous three year or to the 'Olympic' average of the previous five years.

Under Article 39, the EU can financially contribute up to 65% of the eligible costs, which relate to the administrative costs of setting up the fund and the financial compensations to farmers.

Under the 2014-2020 Financial Framework of the Rural Development Program, only two countries (Italy and Hungary) and one region (Castilla y Leon in Spain) planned expenditure for an IST, for a programmed expenditure of EUR 130 million. However, none of the ISTs is operational yet, due to different obstacles.

²¹ <http://www.codivv.it/Attivit%c3%a0-Mutualistiche/1/Fondi/>

²² Directive 2009/128 establishing a framework for Community action to achieve the sustainable use of pesticides

²³ Income is defined as the sum of revenues a farmer receives from the market, plus any additional public support, deducting input costs.

One of the main obstacles for uptake of the IST is that funds may only be used in case of income losses larger than 30%. Furthermore, the programming of ISTs is hampered as it is not allowed to target schemes to specific sectors, although there are large differences between agricultural sectors in terms of the risks faced and the chance that payments are received. Also, no public support for the initial capital stock is allowed.

The IST is considered as a complex tool, hampered, among others, by the general lack of experience and knowledge on how to design it. Questions that arise by governments and farmer organisations are how to organise, initiate and govern the mutual fund. What should happen when funds have to be paid in one of the starting years when the capital stock is still very small is also a bottleneck.

Moreover, the budgetary needs of the IST can be very volatile and quite demanding. If the scheme is implemented in all Member States, the maximum budget needs for one year are estimated at EUR 22 billion (see Table 1).

Table 1: Maximum annual EU budget needs for IST

	Compensation (EUR million)	Beneficiaries (million)
All sectors	22 200	3.06
Dairy	3 700	0.44
Crop	4 700	0.45
Olive	800	0.23
Sugar beet	140	0.01
Sum 4 sectors	9 300	1.14

Source: DG Agriculture and Rural Development simulations based on FADN data

How to calculate income is found to be another problem. The income definition that is used influences compensation. For example, if decoupled payments are not included the scheme is triggered more often.

Furthermore, it is hard to accurately assess farmer income and revenue, especially for small farms that do not have an adequate accounting system. In addition, relying only on accounts delays the compensation. The option to use indices to calculate income loss to reduce the administrative burden, as proposed in the Omnibus regulation currently under discussion, is promising, provided that the necessary data become available.

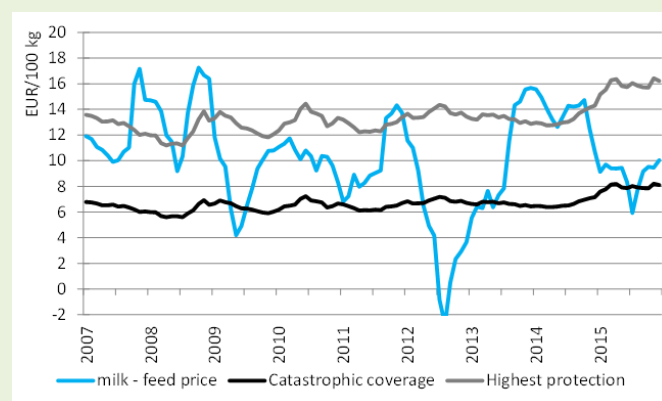
Box 5: The U.S. dairy margin protection programme

The dairy margin protection programme is a voluntary risk management program. It provides dairy producers with payments when at federal level, the milk price minus feed costs falls below a threshold. Producers enrolling commit until the expiration the Farm Bill period (2014 Farm Bill until end 2018), and choose the coverage²⁴ and the coverage level threshold²⁵ on an annual basis. Payments are made whenever the average national indicator falls below the selected coverage level threshold for a consecutive two-month period.

The uptake of the tool is high, with 78% of the milk production covered in 2016. However, a large share is covered under the catastrophic coverage (60% of the milk production), as costs for farmers are high if they choose the maximum coverage. Likewise, the public budget involved may also be potentially substantial. The calculation of the indicators at national level, without consideration of differences at farm and regional level, is also a main drawback of the program.

Error! Reference source not found. illustrates the US program in an EU context with feed costs based on maize and soya only, in absence of EU price for forage. Applying the program would have led to larger compensations in years when feed prices are high, like in 2012, than when milk prices are low, like in 2009 or 2015. It highlights the difficulty to calculate an accurate index based on available data, describing correctly farmers' reality.

Graph 9: EU milk prices minus EU feed costs



Source: DG Agriculture and Rural Development

²⁴ Between 25% and 90% of their production history, i.e. the highest annual milk production of 2011, 2012 or 2013, with an annual adjustment based on national average growth in the overall U.S. milk production.

²⁵ Between EUR 7.3/100kg and EUR 14.6/100kg (based on an average 2014-2015 USD/EUR exchange rate at 1.22, 1cwt = 45.36 kg). The lowest coverage level (or catastrophic coverage) is free of charge with the exception of an annual administrative fee (100 USD), with premiums increasing from EUR 0.015/100kg to EUR 0.866/100kg in line with the coverage level.

The actual loss could be estimated on the basis of market price indices for outputs and inputs weighted by the ratios of the declared account structure in the reference period.²⁶ However, being closer to farmers' reality would require calculating indices for market prices at a smaller regional scale and implies significant administrative burden. It moreover does not ensure equal treatment of farmers.

In order to stimulate the uptake of the IST, the Commission put forward a number of improvements in the Omnibus proposal²⁷. These improvements are to provide Member States with the possibility to make the IST sector-specific, to reduce the threshold for compensation from 30% to 20% and considering to allow public contributions to the initial capital stock.

Financial instruments

While financial instruments do not explicitly address price volatility or production risks, they may play a determinant role in farmers' liquidity in times of crises.

Currently available loans to farmers at national and European level mainly finance investments. Funds of the EAFRD are available to farmers to support investments and part of the linked working capital (maximum 30%).

7. Public instruments for managing risks

Direct payments

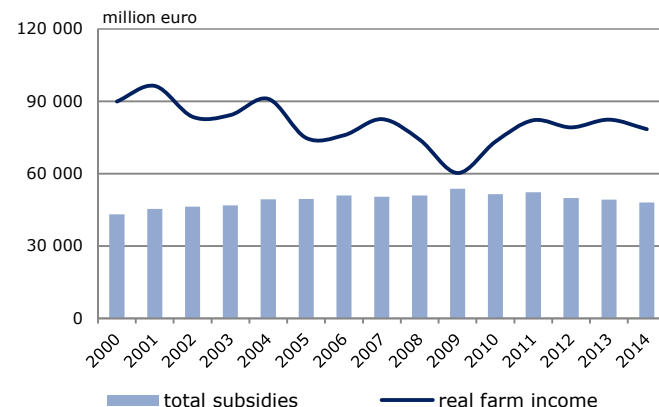
The main instrument in the CAP to stabilise farm income is direct payments. European farmers receive support in the form of direct payments, on the condition that they respect strict rules on human and animal health and welfare, plant health and the environment. The amount of support received is not linked to the quantities produced, and is designed to provide EU farmers with a safety net against volatile market prices. Direct payments are granted to farmers in the form of a basic income support based on the number of hectares farmed.

Besides these direct payments that are decoupled from production, Member States also have the option

to use a limited amount of direct payments for the voluntary coupled support.

The main role of direct payments is to provide a buffer for income. They allow stabilising income and reducing income variability in relative terms (see Graph 10).

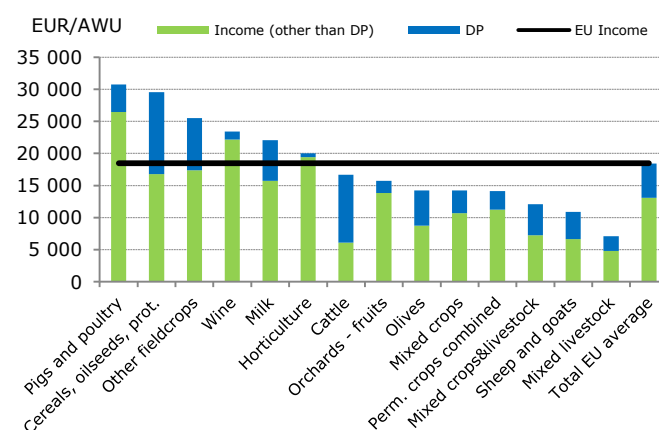
Graph 10: EU real farm income and subsidy payments



Source: DG Agriculture and Rural Development based on ESTAT data

The share of direct payments in income is different across sectors (see Graph 11). For specialist cattle, the direct payments are a large share of the total income. For several sectors (e.g. milk, mixed crops or livestock) the direct payments help to bring the income closer to the EU average, whereas for specialist cereals, oilseeds and protein crops (COP) the income is above average.

Graph 11: Income and direct payments (DP) by type of farming, 2011-2013



Note: Based on the farm net value added by annual working unit (AWU)

Source: DG Agriculture and Rural Development based on FADN

²⁶ Bureau and Mahé, Research for AGRI Committee – The Future of Market Measures and Risk Management Schemes.

²⁷ More info: https://ec.europa.eu/agriculture/newsroom/296_nl

Box 6: Commodity programs in the U.S.

U.S. successive Farm Bills shifted over time from price support policies to addressing revenue losses. Countercyclical payments were introduced in the 2002 Farm Bill. Stronger market conditions and hence higher prices, led to the suppression of fixed payments in the 2014 Farm Bill.

The commodity programs provide countercyclical payments to farmers when there is a decline in prices. Farmers must choose between two available schemes.

Under the **Price Loss Coverage**, farmers receive a payment if a covered commodity's average price is below a reference price. The payment corresponds to the difference between the average price and the reference price, multiplied by the payment yield and 85% of the base acreage (see also Box 7).

Under the **Average Risk Coverage**, farmers receive a payment if the actual farm revenue from all covered commodities is less than the benchmark guarantee. The benchmark is either calculated at farm level, corresponding to the Olympic average²⁸ revenue over the last five years, weighted in proportion of each crop's area, or at county level using average county yields. Payments are made when actual revenue is lower than 86% of the benchmark and are limited to 10% of the benchmark. Deeper losses are supposed to be covered under the federal crop insurance scheme.

The Average Risk Coverage, at county level, has the highest uptake with 76% of base acres enrolled, compared to 1% for individual Average Risk Coverage and 23% for the Price Loss Coverage.

The main criticism to the countercyclical payments is the fact that farmers do not further perceive market signals and are hence not adapting their production decisions to developments on global markets. Moreover, the payments do not take into consideration variations in input prices. Finally, and similarly to the IST, countercyclical schemes may potentially require significant and poorly predictable public budget.

Market safety net

The CAP operates a market safety net to support farm income in sectors that are faced with excessive price risks.

Initially, public intervention functioned as an income safety net with guaranteed prices stimulating production. In case the market price fell below the intervention price, the excessive supply was bought

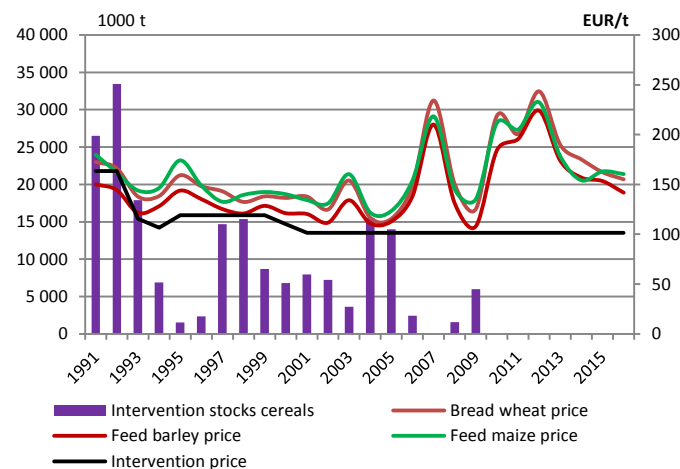
²⁸ An Olympic average corresponds to the average over the last five years excluding the highest and lowest value.

by the public authorities against a guaranteed price. Because there was no incentive to reduce production, the safety net resulted in the development of 'butter mountains' and 'milk lakes' in the 80's.

In the current CAP, the market safety net is transformed into a crisis-safety net. The intervention prices are set at reference levels which are sufficiently low to ensure that public intervention only takes place in times of crisis and when there is a real risk of market disruption. Low levels also still allow for price signals to reach producers (see also Box 7), maintain competitiveness and avoid accumulation of stocks.²⁹ In this way the intervention price acts as a minimum floor in times of low prices.

The possibility that public intervention (automatically) takes place remains only for some specific products, namely: common wheat, butter and skimmed milk powder (SMP)³⁰. For other main cereals (durum wheat, maize, barley and rice), beef and veal the Commission may decide to open the market for public intervention.

Graph 12: Intervention in cereals



Source: DG Agriculture and Rural Development

Both the market for cereals (see Graph 12) and butter illustrate that since 2011 there has been no use of intervention. Prices for these commodities increased after 2009 and stayed away from the intervention

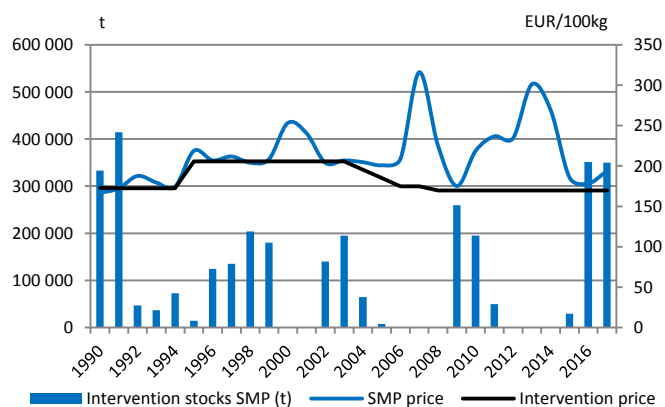
²⁹ Hélaine S, Santini F, Araujo enciso SR, Dillen K, Perez Dominguez I (2016) A stochastic approach of the assessment of EU intervention mechanisms for dairy products.

³⁰ Public intervention is available for butter and SMP, from 1 March to 30 September, up to 50 000 tonnes for butter and 109 000 tonnes for SMP each year at fixed intervention prices. Outside this period, intervention can be opened as an exceptional measure by a delegated act. Beyond the quantitative limits, intervention operates by tender.

price of EUR 101.31 per tonne for cereals and EUR 221.75 per 100kg for butter.

On the contrary, the price of SMP in 2015 and 2016 reached levels below the intervention price of EUR 169.80 per 100kg in several Member States, resulting in stocks of over 350 000 tonnes (see Graph 13).

Graph 13: Intervention in SMP



Source: DG Agriculture and Rural Development

Stocks are released on the market again when the market is recovering to prevent the accumulation of stocks over a longer time period and downward pressure on the price.

Private storage aid is also available under the safety net. It consists in granting aid for storage of a number of products by private operators for an agreed amount of time.³¹ Private storage aid was available between September 2014 and September 2016 for butter and cheese, till February 2017 for SMP and in March 2015 and January 2016 for pigmeat.

Also market withdrawal is available for the fruit and vegetables sector under the current Common Market Organisation (CMO).

In addition to the market safety net, further exceptional measures can be taken in the case of market disturbance, of animal diseases and public, animal and plant health risk and in order to resolve specific problems. The different crises measures will only be triggered in times of excessive market disturbance.

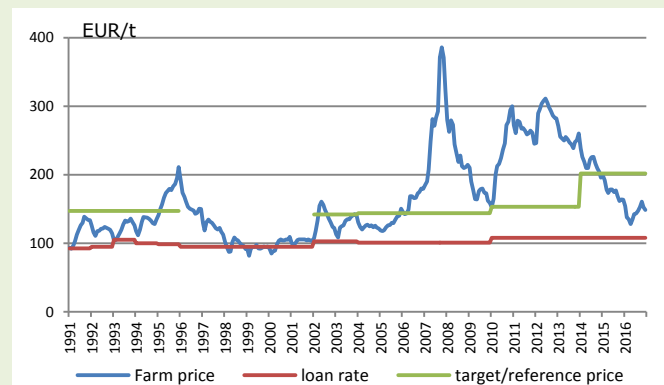
³¹ Private storage aid is available for a number of crop (white sugar, olive oil, flax fibre), meat (bovine, pig, sheep and goat) and dairy products (butter, cheese and SMP).

Such exceptional measures, as well as specific intervention measures, may be funded thanks to a Reserve for crises in the agricultural sector, intended to provide additional support in times of major crises and consisting of EUR 2.8 billion for the period of 2014-2020.

Box 7: U.S. reference prices and loan rates

Under the Price Loss Coverage (PLC, see Box 6), farmers receive a payment when prices are above the loan rate but under reference price (previously called target price). When, at county level, prices fall under the loan rate, additional loan deficiency payments are made, which correspond to the difference between the local price and the county loan rate.

Graph 14: Reference prices and loan rates



Source: DG Agriculture and Rural Development based on USDA data³²

U.S. farmers under this scheme have a guaranteed minimum revenue level, as they will under all circumstance receive up to the reference price for 85% of their historical production. However, the lower income variability also renders farmers less receptive to market signals and they will in consequence adjust their production decisions more slowly. In consequence, public budget needs under the U.S. PLC system are little predictable.

National policies (state aid, etc.)

National governments are allowed to provide ex-post state aid in case a catastrophic event takes place. The European Commission allows Member States to provide aid to compensate for the damage caused by natural disasters, adverse climatic events that can be associated to a natural disaster and animal diseases and plant pests.

Table 2 gives an overview of the state aid that was provided by EU Member States between 2010 and

³² Based on annual average prices, 1 bushel = 27.2155 kg

2014. All Member States provide ex-post state aid in case of catastrophic events. France, the UK, Greece, Germany, Italy, Spain, Romania and Poland together provided 80% of the total ex-post expenditure between 2007 and 2013. France and Romania provided most aid to compensate losses caused by floods. In countries more exposed to the Mediterranean climate (Greece, France and Italy) and more vulnerable to climate risks, 70% of the total EU expenditure is spent for adverse weather and climate events.

The UK spends most aid to cover losses from animal and plant diseases. Both in the UK and to a lesser extent in Germany, France, Poland and Spain, aid is provided for animal diseases. Only 6% of the ex-post payments are used for the coverage of losses by plant diseases.

Finally, some Member States (e.g. UK, France) provide a special treatment on taxation to farmers on disposable income to reduce the variability of income. For instance, reduced tax rates could be applied to returns from savings made in a systematic manner to overcome cash flow shortages. These allow farmers to cope with income losses through income smoothening by the tax system. There are also concessions related to inputs and property, such as special inheritance policies.

8. Conclusions

Recent developments indicate that risks faced by European farmers will be increasing. Greater exposure to global markets and emerging new risks such as those linked to climate change (e.g. higher frequency of extreme weather events or of disease outbreaks) render the income of farmers more fragile..

The current CAP proposes a quite detailed system for managing risks, addressing all risk layers (normal, marketable and catastrophic) through a set of tools, complemented by a number of private and national tools. However, uptake of a number of tools remains low, in particular with regard to marketable tools (futures, insurance, mutual funds and IST).

The above conclusions raise certain issues that need to be further explored. What could be done to increase the uptake by farmers? How can risk management help increasing the resilience and economic viability of the farming sector? What are the lessons from existing best practices and which ones could form the basis for further reflection? What is the adequate balance between private and public instruments?

Table 2: Total EU ex-post state aid (2010-2014)

Measure	Value in million euros				
	2010	2011	2012	2013	2014
Natural disaster	283	172.4	113.9	25.8	160.9
Adverse weather events	173.6	387.9	368.2	81.2	63
Animal & plant disease	667.2	524.8	482.3	453.2	479.9

Source: Bardaji and Garrido, based on DG COMP data³³

³³ Bardaji and Garrido (2016), Research for AGRI Committee – State of play of Risk Management tools implemented by Member States during the period 2014-2020: National and European frameworks.

This document does not necessarily represent the official views of the European Commission

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http://ec.europa.eu/agriculture/markets-and-prices/index_en.htm

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