

Risk Management in Agriculture and the Future of the EU's Common Agricultural Policy

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FOREWORD

Over the last fifty years the world's farmers have grown more food nearly every year, yet hundreds of millions of people, many themselves farmers, continue to go hungry. In the face of environmental degradation and climate change, more people than ever are competing over scarce resources such as water, land and farm inputs. Although the mantra of inadequate distribution and availability is often cited, not enough has changed at the household level to avert recurring crises. While a fraction of the food that makes it to our table crosses borders, we increasingly depend on a complex and interdependent global system to ensure that supply meets demand, especially at the margins. Quite simply, the way that the world feeds itself has changed and the rules that govern trade in agriculture should reflect this reality.

Trade rules negotiated at the World Trade Organization could offer hope on key issues affecting the most vulnerable. Limits on subsidies in developed countries, expanded market access for developing country goods and protection for the poorest farmers are sorely needed outcomes of any such process. Farmers in developing countries need improved incentives to invest to produce the food we need. Until recently, multilateral talks focused almost exclusively on issues that were the product of an era of historically stable and declining food prices. Trade talks need to reflect changing realities, such as countries limiting exports, biofuel policies tying food to fuel and the increasingly risky nature of agriculture. Governments need to address these challenges collectively.

Unpredictable climatic conditions and volatile prices may require more targeted policies to ensure that enough food is accessible and available for all. The food price spikes of 2007/8 and 2010/11, occurring in short succession, made clear that policy makers need to react quickly in times of crisis. However, in many cases, institutions at the international level lack the mandate, political will or funding to take decisive action. UN agencies, such as the Food and Agriculture Organization, note that global food production will need to double by 2050 to feed a population of nine billion. In some cases the technical solutions, such as drought resistant seeds, may have progressed further in their development than the policies surrounding their use and dissemination. Policy makers will need to piece together solutions that run from the dinner table to the field and all the ports in between.

This paper examines options for a possible 'risk management toolkit' that could form part of the post-2013 Common Agricultural Policy, drawing on the proposals and discussion in this area to date. In particular, it explores the extent to which risk management policy options in the developed world could affect developing countries, as well as the extent to which such options could represent viable policy instruments for managing risk in developing countries.

Ricardo Meléndez-Ortiz
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EXECUTIVE SUMMARY

Agriculture is a sector facing particularly large risks, resulting mainly from natural factors outside the control of farmers. The resulting variations in farm output, combined with a relatively low price responsiveness of supply and demand, also cause agricultural markets to be rather volatile. While volatility of international markets for major agricultural products has not systematically increased over the last fifty years or so, it was particularly high in recent years, with two episodes of major food price spikes in 2006-08 and again in 2010-11. That recent experience with volatility has resulted in growing interest in risk management in agriculture. In the EU, it has further intensified the debate about risk-related agricultural policies, which was already under way anyhow in response to growing volatility of prices on EU markets for agricultural products, resulting from successive rounds of CAP reform since the early 1990s and the consequent wider opening of domestic EU markets to international price signals.

In designing policy responses to agricultural risk it is important to keep some typical characteristics of that risk in mind. Price risk in agriculture, where most commodities are storable, tends to be of asymmetric nature, with much variation around the trend, occasional large upward price spikes and less pronounced price troughs. Hence, at the global level the risk of surging food prices to poor consumers in developing countries is more prominent than the risk of declining prices faced by farmers in rich countries. Another important consideration is that there are typically correlations between different forms of risk in agriculture. In particular, yield risk and price risk tend to be negatively correlated, with the result that revenue fluctuates less than either price or yield.

Farmers have a wide variety of options to manage risk, ranging from strategies to reduce risk (for example through appropriate production technologies) through approaches to mitigating risk (e.g. through diversification and various market instruments such as insurance and futures markets) to possibilities for coping with risk (mainly through financial instruments). The options available to consumers when dealing with food price risk depend very much on their standard of living. Where families are poor and food insecure anyhow, rising food prices can cause grave hardship.

Governments of most developed countries have for a long time had a strong tendency to engage in policies that support risk management in agriculture. Such policies should keep a number of principles in mind. Farmers should be expected and encouraged to deal with normal business risks themselves; government policies should facilitate, rather than crowd out, the use of the various market instruments available to manage agricultural risk, such as crop insurance and futures markets; risk-related policies should adopt a holistic approach, rather than dealing with individual risks separately; risk management should be clearly distinguished from farm income support; distortions of markets and trade should be minimized; disaster assistance, providing well justified support to farmers hit by catastrophic risks, should be based on clearly defined a priori rules. A look at typical risk-related agricultural policies in many developed countries, often forming a significant part of overall farm support, suggests that much remains to be improved before such principles are fully respected. In particular, risk reduction is frequently confused with providing farm income support.

Among the wide array of government policies that can be brought to bear on risk in agriculture, policies to stabilize domestic markets by insulating them from international price movements have traditionally played an important role in many developed countries. The Uruguay Round Agreement on Agriculture was a turning point in that regard, because it imposed tighter disciplines on such policies, at least on the import side and regarding export subsidies. Export taxes and restrictions, though, are still not much constrained and have been used by a number of important exporting countries in the recent episodes of spiking food prices. The negative implications that

these export restrictions had for price volatility in international trade have led to a new debate on the possibility of circumscribing them more tightly in the WTO. Other conceivable attempts at dampening price fluctuations on international markets for agricultural commodities, such as buffer stocks, virtual reserves or constraints on speculation, do not promise much success. Thus it is advisable to face continued volatility on agricultural markets and focus on approaches that can minimize their worst implications.

Governments can do much to empower farmers so they are better able to manage risk. More information, training and extension can be valuable. Well functioning financial markets help to cope with risk. An appropriate legal and institutional framework can strengthen farmers' ability to adopt collective risk management approaches. Tax provisions can facilitate the tiding out of years with low incomes.

Enhancing risk markets is another route for government policies. More use can be made of markets for derivative such as futures and options. There are also various forms of insurance against typical risks in agriculture. In many rich countries, governments have a strong inclination to subsidize crop insurance, on the grounds that market failures get in the way of purely private insurance arrangements. However, it is highly questionable whether subsidies to crop insurance are really appropriate, and experience in a number of countries warns against their ample use.

Disaster assistance is often provided on an *ad hoc* basis after a crisis has hit, and introduction of crop insurance has not always had the effect of eliminating the rent-seeking activities involved in disaster assistance. Income safety nets for farmers, a policy that is particularly prominent in Canada, have a tendency to degenerate into massive farm income support, placing a heavy burden on the public budget.

Risk-related policies have the potential to distort production, markets and trade. Research has shown that even income safety nets compatible with WTO green box rules can distort markets and trade. Thus, when governments of rich countries reduce their farmers' risks while agriculture in developing countries remains a higher-risk activity, global competition is likely to be distorted in favour of farmers in developed countries. However, the quantitative extent to which risk-reducing farm policies in rich countries overall, and in the EU specifically, actually distort markets is not easily determined, for both conceptual and analytical reasons. The research evidence available, focusing on individual policy measures rather than encompassing the overall regime of risk-related policies, suggests that distortions exist, but that their magnitude is relatively small. Yet, that finding applies only to the pure risk-reducing effect of the policy measures concerned. If the farm income support typically going along with the risk-related policies were included in the analysis, then the distortion impacts found might be much larger. There is a need for more research in this area.

In the EU, policies related to production risk in agriculture, in particular those providing support to insurance regimes, are so far in the domain of national Member States, with EU rules aimed at limiting the extent to which competition within the common market is distorted. At the EU level, policies that mitigated market risk by supporting producer prices at a high and stable level have undergone reform, leaving more space for prices to fluctuate in response to changing forces of supply and demand. Instead, large direct payments were introduced, and later 'decoupled' from production. These continuous and fixed payments, amounting to nearly one-third of factor income in EU agriculture, now provide a significant element of risk-reduction to farmers in the EU.

It looks as if the direct payments will also survive, largely undiminished though somewhat modified and redistributed, into the post-2013 period, for which the future CAP is currently being prepared.

This is an important factor to keep in mind when considering future risk-related policies for EU agriculture. From this perspective it is fortunate that the European Commission has not proposed the introduction of any grand new scheme of risk management policies for all farmers at the EU level. Instead, the Commission has suggested the creation of a "risk management toolkit" as part of the Rural Development measures under Pillar 2, where national governments of the Member States might be given the option of choosing from a menu of instruments and receive co-financing from Brussels, within a given overall budget constraint. One element of that "toolkit" envisaged by the Commission might be some form of an income safety net, to be constructed and implemented in a way that is compatible with the WTO rules for green box policies.

Intensified risk-related policies for EU agriculture, and in particular a new farm income safety are not really warranted in view of continued large direct payments and expected conditions on agricultural markets. On the other hand, if tightly constrained by budgetary limits under Pillar 2, introduction of a "risk management toolkit" is likely to do relatively little harm. It has the potential to create new market and trade distortions, thus possibly making life more difficult for the EU's trading partners, including developing countries. However, the extent to which a new "risk management toolkit" under the CAP's Pillar 2 is likely to do so will probably be limited.

Policy responses to the recent episodes of heightened volatility on agricultural markets should focus less on farmers in rich economies, but more on poor consumers in developing countries. Experiences since 2006 have shown that governments and the international community are not sufficiently prepared to deal with the grave consequences that price surges can have for global food security. Policy response will have to come in the form of helping people more effectively to cope with spiking food prices. In that context, social safety nets in developing countries merit particular attention. Governments of the countries concerned and the international community need to invest more into such approaches to dealing with the implications of volatile food markets.

1. INTRODUCTION

In recent years, the world saw and suffered through two successive periods of massive surges in food prices. Agricultural markets have always been volatile, and prices of important foodstuffs in international trade had exploded to even higher levels in the early 1970s. However, the striking market developments in recent years and their dramatic implications have triggered a renewed attention to risk in agriculture. In the EU, where preparations are underway for policies in the 2013-20 budget period, risk management in agriculture is an element of the debate about the future of the Common Agricultural Policy (CAP). In its November 2010 Communication on the CAP post-2013, the European Commission proposes the introduction of a new "risk management toolkit" (European Commission, 2010).

There is no doubt that agriculture is a particularly risky business, given the significance of natural factors, beyond the control of farmers, in its production process. As one consequence, agricultural markets have an inherent tendency to be rather volatile. Risk management, including the response to market fluctuations, therefore merits particular attention in agriculture. Governments in many parts of the world have felt responsible for contributing to the management of agricultural risks, and risk-related policies play an important role in many countries' agricultural policies. There is a strong presumption that these policies have added to the distortions that plague markets and trade in agriculture.

Against this background, this paper looks at risk management policies in agriculture, with a particular view on their use in the EU. The paper begins with a few comments on the nature of risk in agriculture and to role of governments in managing that risk (Section 2). It continues with a discussion of the options that exist for risk-related government policies, with a particular view of their implications for the functioning of markets (Section 3). It provides a brief account of current risk-related policies in the EU (Section 4), before turning to the possible role of these policies in the future of the CAP (Section 5). Given the particular vulnerability of farmers and food consumers in developing countries, the paper then also adds a few observations on risk management in the food and agriculture sector of developing countries (Section 6). It ends with some conclusions (Section 7).

2. THE NATURE OF RISKS FACED IN AGRICULTURE

2.1 Sources of Risk

Most human activity is subject to risk: the outcome of any given action may differ from what was expected when that action was initiated. Yet, agricultural activity is particularly risk-prone given that farmers can manage only some part of the production process while natural conditions beyond the farmer's control also have a significant impact.[1] Both crop and livestock production can be strongly affected by weather. Yields vary from year to year, and extreme weather events such as frost, droughts, floods and storms can heavily damage agricultural output. Sanitary and phytosanitary conditions play an important role, and pests and diseases can cause major losses in production. Over time, technological progress has allowed agricultural producers to improve the degree to which they can manage the influence of natural factors, but agricultural production still remains much more variable than industrial output and will always be.

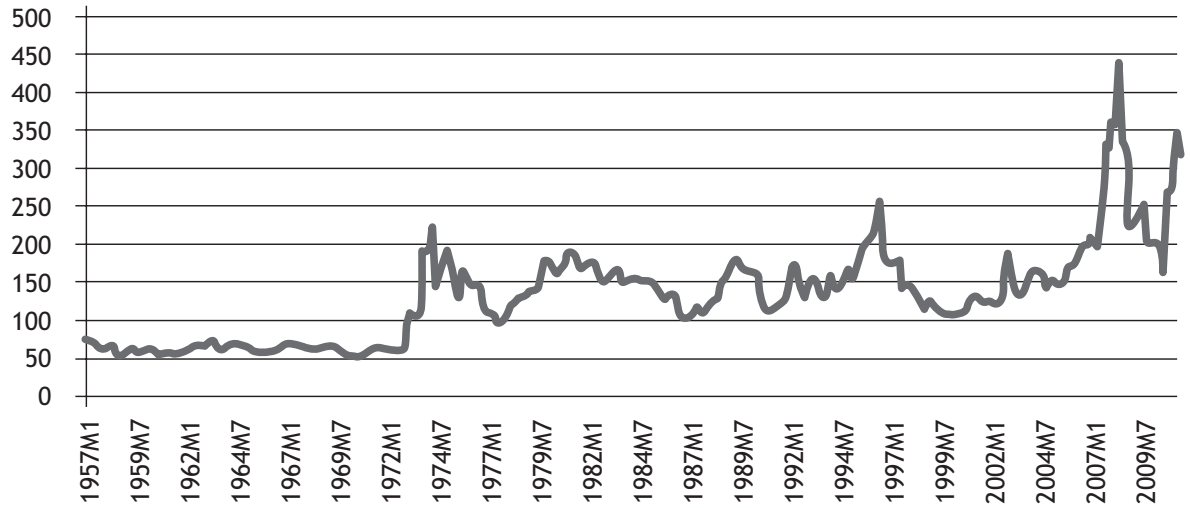
The typical variability of output in agriculture also causes prices of agricultural products to fluctuate. As a matter of fact, the characteristics of supply and demand for agricultural and food products are such that price fluctuations tend to be particularly strong. Neither supply nor demand respond much to price changes. On the supply side, the time required to complete the production process, for crops typically a year, means that output cannot be much adjusted in the short run when the price changes. On the demand side, the essential nature of food as a necessity results in a low price elasticity. As a consequence of this limited price responsiveness of supply and demand in agriculture, the price typically needs to change a lot to re-establish equilibrium once an output variation hits the market. In addition, some agricultural markets tend to exhibit cyclical price fluctuations, resulting from lagged responses of supply to past price changes (the notorious 'hog cycle' phenomenon).

For such reasons, any closed domestic market for an agricultural commodity would tend to exhibit significant volatility.[2] In international trade, price fluctuations tend to be even more pronounced because world markets for most agricultural commodities are relatively narrow, with only a limited share of global production entering into international trade and many domestic markets being insulated against international price movements. Large price spikes on a number of international markets for agricultural commodities have occurred recently, in the 2006-08 period and again in 2010-11, and reminded the international community of the inherent volatility of agricultural markets and the resulting risks, in particular for food security. The price development of wheat in international trade provides a good illustration of the notorious volatility of agricultural markets and recent price spikes (see Figure 1).

For storable agricultural commodities such as cereals, stock changes can dampen the price fluctuations. When the price is low, market participants take the commodity on stock, expecting to be able to sell later at a higher price, thus covering the cost of stockholding and making a profit. This additional demand from stockholders dampens the price decline. Conversely, at high prices stocks are run down, thus providing additional supplies that moderate the price rise. However, once stocks are depleted they can no longer contribute to dampening the price rise. Price fluctuations for storable agricultural commodities, therefore, exhibit a typical asymmetric feature, where frequent variations around the mean are interrupted by occasional sharp upward price spikes but not equally pronounced downward troughs (Wright, 2009). This characteristic feature of asymmetric price volatility is clearly evident from the skewed frequency distribution of the deviation of the monthly wheat price in international trade from its moving 36 month average, see Figure 2.

Figure 1: Monthly Wheat Price in International Trade, in Nominal Terms, January 1957 to March 2011

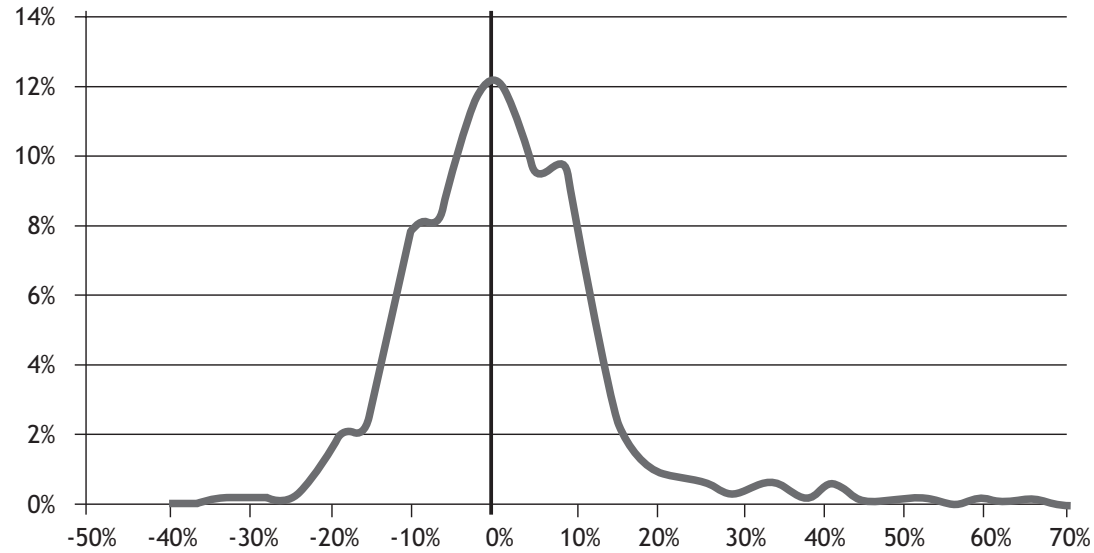
US$ per ton



Source: Data from OECD (2010a) and IMF, Primary Commodity Prices

Figure 2: Wheat Price in International Trade, Frequency Distribution of Percentage Deviations of Monthly Price from Its 36 Month Moving Average, January 1957 to March 2011

frequency



Source: Own calculations based on price data shown in Figure 1.

While output variability and the resulting relatively large price fluctuations constitute a type of risk that is specific to agriculture, farmers also face a wider array of risks that affect other sectors as well. In particular, input prices can vary, and in recent years that has been particularly the case for energy-intensive inputs such as fuels and fertilizers. Macro-economic developments, particularly dramatic in recent times during the 2009 global financial crisis, tend to impact less on agriculture than on other sectors of the economy as demand for food is less dependent on income changes than demand for most other goods. However, exchange rate variations tend to pass through to markets for agricultural commodities more intensively than to markets for more highly differentiated products. Also, variations of interest rates are strongly felt among farmers who finance their relatively capital-intensive operations with borrowed capital. Like all other businesses farms can suffer from general risks such as fire, theft, illness and accidents, and from financial risks such as non-fulfilment

of contracts on the side of their business partners. Finally, a specific risk in the farming industry results from sometimes unpredictable changes of agricultural policies.

Among these manifold types of risk in agriculture, variability of output quantities and output price fluctuations are generally considered the most important elements. A large number of quantitative studies across several countries and types of farming, reported for example in OECD (2009), support that view. Also, empirical research into farmers' risk perceptions typically finds that farmers are primarily concerned about production and output price risk, with price risk ranking highest in nearly all studies (OECD, 2009, p. 145).

The pronounced volatility of international markets for agricultural commodities in recent years appears to have intensified concerns about price risk among farmers in many countries. The view is sometimes expressed that ongoing climate change causes more frequent and more serious extreme weather events and, hence, has resulted in growing volatility of agricultural markets. Quantitative research, covering developments on international markets for several agricultural commodities over the last five decades or so has found that there is no firm evidence of an increase in volatility over time (OECD, 2010a). Regarding the future of agricultural commodity markets, a number of factors can be cited that may lead to growing volatility, but there are also forces working in the opposite direction (Tangermann, 2011a). In any case, output price volatility is, and will most likely remain, a primary concern in managing agricultural risks, among both market participants and policy makers. The main focus of the discussion in this report will, therefore, be on managing price risk. This appears particularly relevant in the EU where variability of prices on domestic agricultural markets has increased in the course of CAP reforms.

However, before entering into a discussion of risk management for EU farmers it is worth remembering that volatility of prices in agriculture and the food sector is a serious issue in all parts of the world, and that the nature and magnitude of price risk may be a much bigger concern where people are more vulnerable than most farmers in the EU. Simply speaking, the lower the level of economic welfare is in a family, the less that family is able to cope with any vagaries of life. Poor farmers in developing countries often have a low capacity to buffer price troughs, be it through stocks, savings or access to credit. Malnourished consumers in those countries, often found not only in cities but also in rural communities, have even less ability to cope with food price spikes. In other words, when discussing the volatility of agricultural and food prices there is, from a global perspective, good reason to be more concerned about the situation in poor countries than about the implications for farmers in developed economies such as the EU. This is even more true because price fluctuations on agricultural and food markets, as suggested above, tend to exhibit an asymmetric distribution, with sharp upward price spikes typically more pronounced than downward price troughs. To put it bluntly, one can well argue that volatility on markets for agricultural and food products causes much more severe problems for food consumers in poor countries than for farmers in rich economies.

Another consideration regarding the characteristics of market risk faced by farmers relates to the relationship between fluctuations of prices on the one hand and quantities on the other. Given that the primary source of price variations in agriculture is the variability of supply, it is typical for price and quantity changes to be of opposite sign: large volumes of output cause low prices and vice versa. This means that the market tends to function as a built-in mechanism automatically stabilizing revenues. Of course this does not necessarily apply to each individual farmer – where a crop failure affects only a limited group of producers the price may not rise noticeably. Equally, price fluctuations 'imported' from international markets may have little to do with domestic output variations. However, empirical research at the farm level has in most cases found a

negative correlation between crop yields and prices, with correlation coefficients in the order of -0.3 to -0.4 in many cases (OECD, 2009, pp. 127-128). An implication is that a policy that aims at stabilizing prices may well result in larger variability of revenues (OECD, 2009, pp. 61-63).

These findings may, though, not apply equally to the livestock sector, for two major reasons. First, as much of livestock production now takes place under tightly controlled conditions, the variability of output tends to be less than in the case of crops. Second, markets for livestock products are particularly susceptible to a loss of consumer confidence when a major disease or other sanitary problem hits the respective sector. The mad cow disease was an obvious case in point, as were instances of dioxin found in feed and, consequently, in meat, eggs or milk. In such cases, the producers concerned suffer not only from a drop in production, or possibly even a ban of marketing their produce, but often as well from a price decline resulting from consumer resistance to the products in question. Where this happens, markets do not function as automatic stabilizing devices – quite the contrary. The comment must, though, also be made that such idiosyncratic cases of market disturbance in the livestock sector have a nature that is completely different from the usual price fluctuations typically observed on markets for agricultural products. In other words, when the issue of agricultural market volatility is discussed with a view to considering possible policy responses, one is not typically talking about sanitary crises in the livestock sector, which pose very different issues for risk management strategies.

2.2 Farmers, Consumers and Risk Management

Like all entrepreneurs, **farmers have a wide array of options** for managing the various risks they face (see for example OECD, 2000, pp. 17 ff, and OECD, 2009, pp. 25 ff). While many of these options can well improve the farm's resilience in a risky environment, it must also be acknowledged that all approaches to managing risk come at some cost, very much like an insurance is not available for free.

The most fundamental strategy in managing risk aims at **reducing the probability of a negative outcome.** Choosing the appropriate production technology is probably the most common approach in this context. For example, in order to reduce the probability of a yield loss due to drought, farmers may plant drought-resilient crop varieties, or they invest in irrigation facilities. In the first case, the cost comes in the form of a lower average yield, in the second case the farmer has to bear capital and operating cost.

A second set of options is oriented to ***mitigating risk***. Diversification is one of the most basic and obvious approaches in this category, used since mankind began to engage in agriculture. On the farm, simultaneous production of several commodities with different risk patterns can mitigate the risk resulting from natural factors. Combining different sources of revenue, on-farm and off-farm, can smooth the development of overall household income. The cost of diversification typically comes in the form of lower average income as it is not only the most profitable activity that is pursued.

Price risk can be mitigated through various market-based approaches. Derivatives such as futures and options contracts, and similar over-the-counter (OTC) products, are a classical instrument to hedge prices. Farmers have used them for a long time in countries where agricultural commodity prices fluctuate widely, in particular in the US. In Europe, where the CAP has traditionally supported and stabilized prices, futures and options did not play a large role in the past. However, after CAP reforms created more open agricultural markets in Europe, exhibiting more volatility, interest in and activity on derivative markets for agricultural commodities grew. A number of derivative markets have been established in different parts of Europe, and derivates can now be traded for various agricultural commodities, ranging from sugar through cereals and potatoes to olive oil and hogs

(OECD, 2000, p. 29; Joint Research Centre, 2008, pp. 233-236). There is interest in creating derivatives markets for other agricultural commodities in Europe, possibly also including dairy products (Matthews, 2010). The number of contracts traded on Europe's derivative markets for agricultural commodities has increased in recent years, and policy makers pay growing attention to regulatory issues relating to derivative markets (Commission of the European Communities, 2009a; European Commission, 2011). The cost of managing price risk through hedging comes in various forms, including fees, options prices and interest on margin deposits, but also through new types of risk such as basis risk.

Farmers can also mitigate price risk through specific approaches to marketing their output, such as forward contracting, long-term contracts or vertical integration. A number of issues involved in such approaches, and more generally the issue of price formation in the food supply chain, have recently been discussed, with a particular focus on the dairy sector, by the EU's High Level Group on Milk (2010).

Another traditional form of mitigating risk is to buy insurance. In essentially all Member States of the European Union, farmers can insure against various types of production risk, and in most countries these insurance schemes are subsidized by the national governments (see below). A more innovative form of market-based management of production risk comes in the form of weather derivatives such as rainfall index insurance, which can well be economically attractive for farmers (Turvey, 2001; Mußhoff and Hirschauer, 2008).

The options for **coping with risk**, finally, consist mainly of financial approaches, in particular saving in good times and selling assets or borrowing from banks when a negative outcome has occurred. Given the well known volatility of agricultural commodity markets, it can be argued that farmers with sufficient foresight will make sure they can cope with market risk (to the extent they did not hedge) as far as possible, in particular that they will not want to spend all the extra revenue accruing to them in years with above average returns, but save a good part of that extra liquidity to tide out years with lower revenues. Another option for coping with market risk is to time larger expenditures, specifically investments, such that they are made in years with above-average liquidity. The fact that farmers make considerable use of that latter option is well known, for example, to the farm machinery industry, which occasionally complains about the wide swings in sales resulting from the ups and downs of farmers' revenues.

While farmers have several ways of dealing with risk, **food consumers have less scope to manage the risk** of rising food prices. Most consumers in rich countries are only marginally affected when prices for agricultural commodities rise, as only a small share of their incomes is spent on food, and even less on the raw material content of their retail food expenditure. The situation is, of course, very different for poor families in developing countries whose real incomes can come under severe pressure when food prices rise. Essentially all of their coping mechanisms entail a significant deterioration of their living conditions (FAO, 2009, pp.26 ff). For a while, poor households may be able to adjust their consumption patterns, by switching to cheaper (typically starchy) foods, giving up on micronutrient-rich items such as milk, meat, fruit and vegetables, or by spending less on health, education or durable goods. If a food crisis last longer, they may be forced to sell assets or to borrow from formal or informal lenders. In prolonged crisis situations, families or some of their members may be forced to look for additional income generating activities, or to migrate to areas with better employment opportunities or back to their village of origin. However, these latter options typically are not very promising as in a situation of generally high food prices many families will try to use them. In many cases of food crisis, women are particularly negatively affected (FAO, 2009 and 2010). Eventually, steeply rising food prices in poor countries cause extra malnutrition, deteriorating health and possibly deaths. The 2007-08 global food crisis had all of these disastrous consequences (FAO, 2009).

2.3 Risk Management and the Role of Governments

Governments often feel compelled to reduce the risk to which their citizens are exposed, and that tendency appears to be particularly pronounced among agricultural policy makers. This may appear understandable, given the many risks faced by farmers and in particular the intrinsic volatility of agricultural commodity markets. But it is well worth considering, from a somewhat more fundamental perspective, what the role of public policy is in responding to the risky nature of agriculture.

A first very basic point to consider is the fact that governments can normally not make risk disappear, but only reshuffle its (negative) implications to a different part of the system, typically from the private to the public sector. For example, publicly financed crop insurance does not eliminate yield variations, but only moves (some of) their financial consequences from the farming industry to the government's budget. Equally, where a government provides a counter-cyclical payment to farmers, market volatility continues unabated, but the resulting financial risk is shifted from farmers to the public purse. This point may appear absolutely trivial, but its policy implications are often overlooked. For example, in policy making circles there is a tendency to argue that risk, be it natural or market-related, may lead farmers to under-invest, and hence that the government needs to reduce farmers' risk exposure. However, the fact that a given activity is particularly risky may well be a good reason, even for society overall, not to invest too much into it, and if governments take that risk away from producers by shifting its negative implications to other parts of society, then the economy overall may invest too much in that sector. It is only when there are clear indications that society overall is less risk-averse than the producers concerned that there may be a point in shifting the risk from producers to the wider public – but it is rare for policy makers to prove that this is the case.[3] Another form of shifting risk in the system it to export it to the rest of the world, for example through trade policies. It should be clear that this is an unfriendly way of reducing risk for domestic agents.

A second consideration relates to different categories of risk. OECD (2009 and 2011a) suggest distinguishing between three layers of risk, in terms of the probability and magnitude of possible losses – normal, marketable and catastrophic risk. Frequent but limited losses (or gains) can and should be considered part of the normal business environment, managed by farmers (or consumers) through the instruments available on the farm or in the household. This can be called the risk retention layer. Less frequent and more significant risks may be beyond what farmers want to bear themselves, but they can be dealt with through market instruments such as hedging or insurance. These risks fall into what can be considered the market insurance layer. Finally, some risks may generate rather infrequent but very large losses of catastrophic magnitude, threatening the survival of the farm or the household concerned. In many cases the market does not provide for instruments to pool or shift such catastrophic risks, which is why they can be considered the market failure layer.

Drawing the lines between these three layers of risk is not precisely easy and involves subjective judgment. Farmers make a distinction between normal risk that they manage on the farm and risk that they manage through market instruments such as derivatives and insurance contracts as part of their business strategy, and it is wise for governments not to interfere with that decision. The limit beyond which a risk is considered catastrophic and therefore potentially requiring government assistance, though, must necessarily be defined in the political process.

Consideration of the three risk layers takes us directly to the realm of policy making, and to a number of important principles that governments should keep in mind when designing policies towards risk management in agriculture. These principles are well outlined and reasoned by OECD (2009 and 2011a), and they can only be briefly summarized here, with a focus on risk facing producers. Policy

considerations regarding the risk for consumers resulting from food price spikes will be discussed below in the context of developing country concerns (Chapter 6).

The **first and most fundamental principle** is that public policy should leave as much space as possible for private activity and market solutions. It is only where markets fail, or where their efficient functioning requires specific framework conditions, that governments have a good reason to be active. One important implication of that principle is that public policy should not absorb risks that farmers can manage themselves, be it on the farm or through market instruments. Governments can, though, support private risk management on the farm, on derivative markets and in the insurance sectors in a number of ways that will be discussed in the following Chapter. Where markets fail, for example because of information asymmetries, transaction costs, systemic nature of risk or externalities, the characteristics of market failure and the reasons for it should be clearly analyzed and stated before public policy intervenes. Where that is not the case, public policy is likely to crowd out private activity, most likely at higher overall cost. Domestic price stabilization under the pre-reform CAP was an obvious case in point, where private management of market risk was crowded out by public policy. Empirical research has clearly shown to what extent government policies can reduce farmers' use of private risk management strategies, in particular diversification (Kimura, Antón and LeThi, 2010). The costs and benefits of each individual instrument of public policy towards risk in agriculture should also be clearly stated before the policy is put in place.

A **second principle** is that risk management, and public policy relating to it, should be based on a holistic approach. Farms face several risks simultaneously, and they may be positively or negatively correlated with each other. While yield is low, price may be high. When the price of one product is depressed, the price of another commodity may be above trend. Input prices may, or may not, move in parallel with output prices. Empirical research based on farm-level data has shown that, as a result of diversification and co-variability of the various risk factors, the variance of farm income in many cases is only half or even less of what it would otherwise be (Kimura, Antón and LeThi, 2010, p. 19). Government policy should, therefore, not deal with individual risks separately, but adopt a broader view of the overall pattern and implications of risk affecting farmers. Agricultural policy is typically focused on farm income. Much can, therefore, be said for paying particular attention to the bottom-line implications for overall farm incomes when it comes to developing risk-related policies, rather than dealing with individual commodities or specific types of risk. Equally, where governments implement a number of different policy instruments towards managing agricultural risks simultaneously, there is a high probability that the results are incoherent, not cost-effective and distortive. This is, for example, what the OECD found in evaluating the US agricultural policy regime (OECD, 2011b, p. 146). Among others, the co-existence of crop insurance and disaster payments in the US has allowed many farmers to collect two payments for the same damage, thus receiving "double indemnity" (Glauber, 2007).

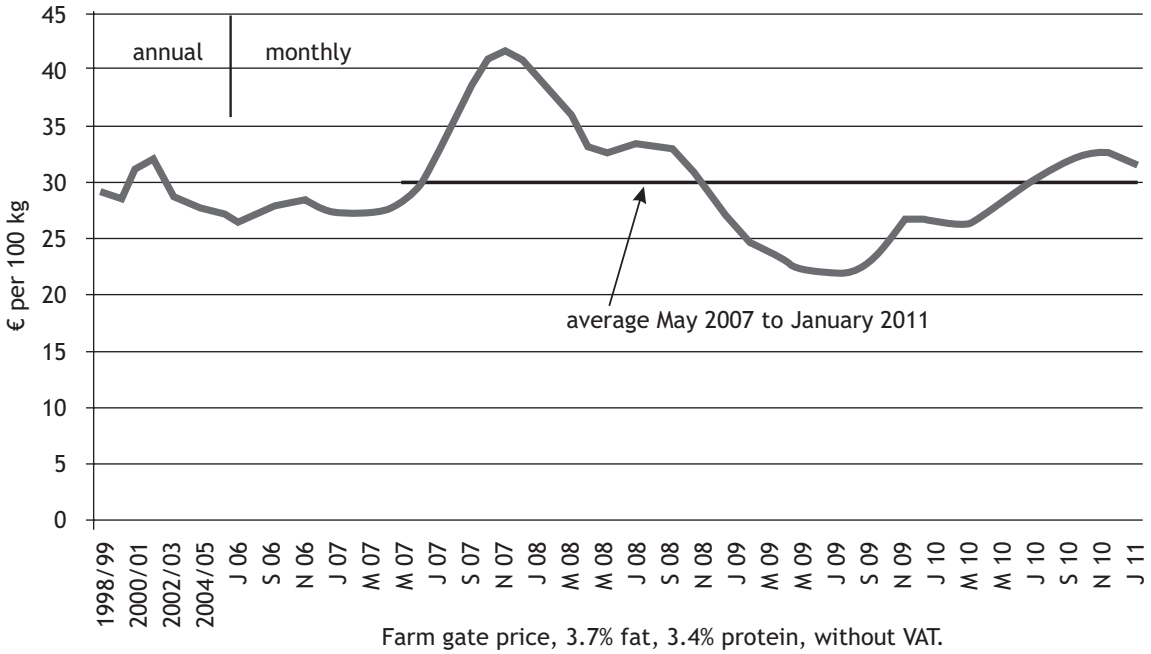
In agricultural policy circles, stabilization and support are often not clearly distinguished. For example, in the EU the traditional policy of supporting domestic prices of agricultural commodities was frequently referred to as a policy of price stabilization. Clearly, 'pure' price stabilization, as a policy to eliminate market risk, would eliminate not only downward price troughs but also upward price spikes. A policy that keeps the price (or revenue or income) at a level above what the average would have been otherwise, reduces not only risk but also provides longer-term support, whatever the name is under which it is advertised. Hence, a **third principle** for risk-related policies is that a clear distinction should be made between dealing with risk on the one hand and providing support on the other hand.

In the day-to-day practice of agricultural policy making, there is a strong tendency to disregard this principle, and to respond only to negative events without considering the extent to which they are just the flip side of a coin characterized by a sequence of both positive and negative outcomes. Policy response to the recent dairy 'crisis' in the EU was an outstanding example of this asymmetric perspective. Crisis sentiment developed rapidly when the farm gate price of milk declined in 2008 and intensified when the price decline continued in 2009. Farmers took to the streets, staged violent action in some cases and even went as far as engaging in a milk delivery strike, destroying milk in front of TV cameras. In response to these vociferous protests from producers and lobby groups, the European Commission and the Council of farm ministers adopted various forms of assistance measures, ranging from intervention buying, through the re-introduction of export refunds, to major financial support packages, advanced direct payments, expanded school milk programmes and national measures.[4] Eventually, "in light of the difficult market situation for milk", the EU Commissioner for Agriculture and Rural Development established a High Level Expert Group on Milk, with the mandate to "work on a regulatory framework to be put in place, which can contribute to stabilizing the market and producers' income and enhance transparency on the market" (High Level Group, 2010, p. 6).

Like the earlier steep increase in the EU milk price, its decline was caused by changing conditions on international markets for dairy products. As was to be expected, the 2008-09 price trough on international dairy markets, and the resulting price depression on domestic markets, did not last long. Indeed, widely available market projections had already indicated that dairy prices were likely to rise again to levels higher than usual before the price spike (OECD-FAO, 2008 and later editions), and that was exactly what happened. Such expectations, though, did not calm down the sentiment among producers and policy makers in the EU. When EU milk prices began indeed to recover again, mainly in response to recovering demand for dairy products on international markets[5], not much publicity was made of the improving market conditions: it appeared politically convenient to maintain the notion of a 'crisis'.

Regarding the asymmetric perception of, and response to, price risk, it is interesting to note that the unusually high milk price that farmers had seen in much of 2007 and 2008 was completely disregarded in the response to the 'crisis'. Indeed, the average producer price over this period was well above the level that had prevailed even before the EU dairy market regime was reformed, and price support reduced, in the early 2000s (Figure 3). When the reforms were decided, payments had been introduced to compensate dairy farmers for the cut in support prices. As a result, producer revenues over the whole of this episode, inclusive of the payments under the related emergency packages, must have been well above what they were before the EU dairy regime was reformed. In other words, this was clearly a case where 'stabilization', by compensating for a price trough, effectively provided support.[6]

Figure 3: Evolution of the Milk Producer Price in Germany, 1998/99 to January 2011



Farm gate price, 3.7% fat, 3.4% protein, without VAT.

Source: Federal Ministry for Food, Agriculture and Consumer Protection, Monthly Statistical Reports, various issues; own calculation.

The highly desirable distinction between stabilization and support takes us to a **fourth principle** for public policy towards risk in agriculture. Whatever governments do to enhance risk management in the farming industry, the policy measures adopted should aim at minimizing distortions to markets and trade. It is clear that stabilization of domestic producer prices violates that principle. In an institutional and legal sense, a minimum criterion to be respected for avoiding distortions is that policies need to be compatible with WTO rules, in particular rules regarding the green box.

Finally, as a **fifth principle** there should be clearly defined procedures and criteria for determining, and responding to, catastrophic crises that go beyond the capacity of farmers to cope and hence call for government action. Though disasters often are of idiosyncratic nature and require *ad hoc* response, it helps to organize effective and credible public policy response if there is a firm framework for action in such cases.

3 OPTIONS FOR RISK MANAGEMENT POLICIES AND THEIR MARKET IMPLICATIONS

3.1 Stabilizing Markets

The recent episodes of price volatility on international markets for agricultural commodities have considerably intensified the policy debate about risk management in agriculture. Against that background, one conceivable policy response would be to aim at reducing the volatility of prices in international trade, hoping that this would also dampen price fluctuations on domestic markets. Indeed, the hefty price swings since 2006 have sparked a lively debate about options for stabilizing international markets for food and agricultural commodities. For example, the meeting of ministers for agriculture from the G20 countries that will take place in June 2011, the first such meeting ever, was called by the French presidency of the G20 specifically with a view to developing international policy responses to the volatility of agricultural commodity markets.

In the recent literature and policy debate about policy responses to agricultural market volatility, various options for international policies have been proposed which can be discussed here only very briefly.[7] Based on the notion that prices become particularly volatile when stocks are depleted, the old idea of price stabilization through international reserves has been revived again. However, history has clearly shown that, and economic analysis can explain why, global buffer stocks and other international commodity arrangements, wherever they have been tried, do not work.

Another strand of the debate has singled out speculation on futures markets for commodities as the major cause behind recent price spikes, and from that view has followed the proposal to use "virtual reserves", i.e. financial means to counter-act and discourage speculation on futures markets, to calm down market volatility (von Braun and Torero, 2009). It is, though, not at all unanimously clear that speculation on futures markets has significantly contributed to recent price spikes. Moreover, there are good reasons to believe that "virtual reserves" would not work and could, in the worst case, even be counter-productive (Tangermann, 2011a). Much can, though, be said for more transparency on, as well as better and more internationally harmonized regulation of, derivative markets for commodities. Equally, better information on stock levels would help to improve the understanding of developments on markets for major foodstuffs. However, approaches along these lines would not do away with the fundamental phenomenon of volatility on international markets for agricultural products.

As long as that is the case, the temptation will remain strong for governments to try and stabilize at least domestic markets, by insulating them from price volatility in international trade. It is well known that such stabilization of domestic markets simply exports price fluctuations to international markets, where volatility is then even more pronounced (Martin and Anderson, 2011). In developed countries, the trade policy instruments used to stabilize domestic markets, specifically to protect domestic farmers against price troughs on international markets, have traditionally been non-tariff import barriers, in particular variable levies and quantitative restrictions, as well as (variable) export subsidies. The WTO Agreement on Agriculture concluded in the Uruguay Round, has greatly improved the situation in this regard, by requiring all countries to convert their non-tariff measures into bound tariffs and by imposing constraints on the use of export subsidies. As far as the EU is concerned, these changes, in combination with related reforms to the CAP, have indeed greatly enhanced the transmission of price movements from international to EU markets and hence arguably helped to avoid even larger volatility in international trade.

Developing country Members of the WTO were also required to subscribe to the new rules regarding border measures. However, most of them used the option of ceiling bindings for their previously unbound tariffs, thus setting relatively high limits for maximum tariffs while actually applying lower, in many cases much lower tariffs on most of their agricultural imports. As a result they have the option, in many cases, to raise applied tariffs when international market prices decline. Yet, whether it makes sense for them to do so, given the often precarious food security situation, is a different matter (Díaz-Bonilla and Ron, 2010). For developing countries, a particular concern in recent years was to protect domestic markets against international price spikes. As far as trade policies are concerned, WTO rules allow for four options, all of which were used in recent episodes of price spikes (Díaz-Bonilla and Ron, 2010). Importing countries could anticipate a price rise and bring planned imports forward, and they could also reduce or eliminate import duties. Exporting countries could charge export taxes or impose restrictions, if not bans on exports. Where large countries engaged in such policies they may have exacerbated price spikes. Specifically, it has been convincingly argued that export restrictions and taxes imposed by a number of major food exporters have greatly fueled recent price spikes on international markets (Headey, 2011; Martin and Anderson, 2011; see also Tangermann, 2011a, and the literature cited there).

WTO disciplines on export taxes and export restrictions are rather weak (Mitra and Josling, 2009; Díaz-Bonilla and Ron, 2010). Given the damage that these measures can do to volatility on international markets, there are good reasons to consider imposing tighter constraints on these measures in the WTO. In the Doha Round negotiations, marginal improvements were already considered before the recent food price spikes. However, given experience with volatile food prices in the last few years and their implications for food security, the issue of restrictions on food exports has become more acute again. Indeed, a debate has started on what should and could be done about export restrictions in the food and agriculture sector, and proposals have been tabled, in the context of the Doha Round negotiations, as to how restrictions on food exports could possibly be disciplined in order to safeguard food security in vulnerable countries (ICTSD, 2011). It may, though, prove very difficult to find a balance between the food security concerns of exporting countries and those of countries depending on food imports. It may also be questionable whether any tighter disciplines on export restrictions could be effectively enforced in periods of acute food price spikes.

In summary, there is little that the international community can do to effectively dampen price volatility on international markets for agricultural commodities.[8] Thus, it is better to focus on how to minimize the negative implications of the unavoidable price swings. National trade policies could, within given limits, insulate domestic markets, but they should be strongly discouraged, given the negative consequences they have for international market volatility. Hence policy makers should focus on other means of managing risks in the food and agriculture sector.

3.2 Empowering Farmers to Manage Risk

There are several ways in which governments can create conditions under which farmers are enabled to manage risks on the farm (OECD, 2009 and 2011a). One fundamental ingredient in risk management on the farm is sufficient and reliable information, in particular regarding market developments. Governments can do much to improve market information, and to make farmers aware of it. Advisory and extension services can also contribute to farmers' ability to manage risk. They can, among other things, help farmers to fully appreciate the importance of diversification

as one of the most effective ways of reducing risk. It appears that "to date, producers and policy makers continue to be insufficiently aware of the relevance of such forms of risk management" (OECD, 2011a, p. 16).

Another important requirement for farmers to manage their own risk is access to financial markets, so to be able to save in good times and borrow in times of low income. Where rural banking and credit is not well developed, public policy can strengthen these financial markets. Proper legislation regarding land ownership and the functioning of land markets is another requirement for financial means to risk management to perform properly.

Farmers can also act collectively to manage risks, and there are several examples in various countries of such collective regimes (OECD, 2011a, p. 16).[9] Governments can support such efforts by creating the appropriate legal and institutional framework for farmers to establish such collective services, including co-operatives and mutual funds.

There are also options in tax regimes that help farmers to smooth the stream of disposable income across good and bad years. In particular, some countries have income tax provisions that allow farmers to average incomes across several years for tax purposes (OECD, 2009, p. 79). Some countries also provide deposit options under which farmers can save income tax-free in good years within given limits, and pay taxes only when funds are withdrawn (OECD, 2011a, p. 17). Moreover, improved access to the generally available social security regimes in times of distress can be provided by relaxing the asset test requirements for farmers.

3.3 Enhancing Risk Markets

Where risk goes beyond what producers can retain on the farm, various options exist for using market approaches, and governments can do much to create the conditions under which risk markets can operate effectively (OECD, 2009 and 2011a). Markets for financial derivatives, in particular futures and options markets and similar over-the-counter (OTC) products, provide ample possibilities for hedging price risks, and they exist in many countries and for many products. However, in most countries reviewed by OECD, farmers, with the exception of large and export-oriented producers, still make only limited use of these approaches (OECD, 2011a, p. 23). In part this may be due to the fact that farmers, used to public policies that have intervened in markets, are still unaccustomed to these hedging instruments. Training and extension services may be able to help overcome this hurdle. Governments also obviously have an important task to establish appropriate regulation of these markets. A fine balance, though, must be struck between creating fair and reliable conditions, and strangulating these markets to the extent that they can no longer operate effectively. Where farmers themselves do not directly use futures markets for hedging price risk, they may still benefit from these institutions when traders or co-operatives engage in financial derivates and provide farmers with equivalent forward contracts. Moreover, price information flowing from futures markets provides farmers with foresight on market developments.

Probably the most frequently used market instrument to manage agricultural risk is insurance against natural factors, in particular crop insurance, and in many countries governments provide subsidies to such agricultural insurance schemes. However, it is not at all clear that subsidies to crop insurance and similar forms of production insurance serve a defendable purpose. The arguments advanced in favour of subsidies for crop insurance and similar schemes typically refer to market failures requiring government engagement. The major types of market failure in the insurance sector are information asymmetries (the farmer has better information on the degree of risk

exposure than the insurance company) and the resulting problems of moral hazard and adverse selection. A consequence are high transaction costs of collecting appropriate information for insurers, costs that may be so high as to undermine the profitability of offering insurance. Where that is the case, private companies would not offer insurance contracts to farmers – and that is taken as a reason to call for government assistance.

However, subsidies to insurance premiums paid by farmers do not overcome these fundamental problems. On the contrary, there are indications that such difficulties are frequent also in highly subsidized crop insurance schemes. For example, Glauber (2007) argues that the US Crop Insurance Program has not been able to overcome moral hazard and adverse selection, and the US Government Accountability Office has indicated that there is considerable fraud, waste and abuse in the US crops insurance regime (GOA, 2007). It was also found that government payments to the insurance companies in the US provide them with excessive rents (GAO, 2007).

Rather than subsidizing insurance premiums, it is probably more effective to let private insurance companies deal with these issues on their own account. Insurers have developed approaches to dealing with the typical information asymmetries, such as retention (the insured retains part of the damage) and bonus/malus regimes. Moreover, in some countries there are long-term databases on risk, coverage, indemnities etc. that help in reducing information asymmetries (OECD, 2011a, p. 22). Governments can assist in the creation of, and access to, such databases and thereby improve the functioning of the private insurance market.

Another argument often invoked in favour of subsidization of agricultural insurance schemes is the systemic nature of many risks in agriculture. In particular, where bad weather has depressed yields, most farmers in the country or region concerned suffer from that same damage simultaneously, which makes it difficult for insurance companies to diversify their risk and exposes them to potentially large indemnity payments that may be beyond their capacity to shoulder. However, there is the possibility of reinsurance, and it can well be argued that yield liabilities, while potentially large in themselves, are small relative to the global reinsurance market (Glauber, 2007). Hence, the systemic nature of many risks in agriculture is, also, not a defendable reason for subsidizing agricultural insurance schemes. As a matter of fact, the systemic nature of weather-related risk in agriculture can actually be exploited in a constructive way to reduce transaction costs, by developing index insurance that covers a relevant risk factor, for example the amount of rainfall (OECD, 2011a, p. 20). Governments can contribute to the development of such innovative forms of insurance through investment in weather stations and research on appropriate indexes.

While public involvement in, and subsidization of, agricultural insurance schemes, in particular crop insurance, appear to be highly popular among governments and form a significant part of many countries' agricultural policy regimes, experience has shown that there are several typical problems with this policy approach. Insurance subsidies have a tendency to become rather expensive, with a burden on the public purse that increases over time. For example, in Spain, where subsidized insurance is a key element of risk management policy, insurance subsidies, covering nearly 60% of total premium payments, have represented a growing share of the value of agricultural production, increasing from 0.2% to more than 1.1% since 2005 (Antón and Kimura, 2011, p. 38). In the US, government subsidies for crop insurance have recently also covered around 60% of total premium payments (calculated from Glauber, 2007, p. 7). In 2008, total government cost amounted to USD 4.4 billion, equivalent to 1.2% of the total value of agricultural sector production and 2.4% of the cash receipts for all crops (OECD, 2011b, pp. 53 and 189).

As noted already above, insurance subsidies do not overcome the problem of moral hazard and adverse selection. On the contrary, one can probably argue that these problems can potentially become the more pronounced the lower the net premiums are that producer have to pay. An implication of the adverse selection issue also is that insurance subsidies have specific distribution implications, with most of the benefits going to farmers engaging in the most risky production activities. At the same time, insurance subsidies also tend to distort production incentives, leading farmers to produce more of high-risk commodities and pay less attention to diversification than would be the case if they had to pay all of the premiums out of their private pockets.

Probably the most important contribution governments can make to stimulating farmers' use of private risk management instruments available on markets is to make sure they are not crowded out by public risk management programmes. Empirical studies have found that government policies, including crop insurance, compete strongly with private approaches to risk management (see, for example, Coble et al, 2004). In the case of Canada, for example, it has turned out that government risk policies have a tendency to crowd out production diversification which may have declined by as much as 30% (Antón, Kimura and Martini, 2011, p. 63).

3.4 Absorbing Residual Risk

Even where farmers, supported by wise government programmes, make full use of all available private approaches to risk management, both on the farm and through market activities such as futures markets and insurance, there will always be a residual risk to their incomes. In particular, prices change from year to year. Hedging can provide some degree of certainty on prices received and paid in the near future, but it cannot do away with changes in price levels from one year to the next. As far as production risks are concerned, natural disasters can reach dimensions beyond the coverage of any insurance. What are the policy options for governments when it comes to absorbing such residual risks? This question takes us to income stabilization and disaster assistance.

A traditional policy approach to stabilizing farm incomes in the face of fluctuating prices was the granting of deficiency payments, still available in a number of developed countries, in particular the US. Such directly output-related payments distort markets and trade so strongly that they should not be seriously considered as an element of a modern policy towards risk management in agriculture. A more decoupled variant are counter-cyclical payments, made on the basis of output in a historical reference period and irrespective of current production, with payment rates derived from the difference between a target price and the effective market price. Payments of this nature form a part of US agricultural policy. While such counter-cyclical payments are less distortive than traditional deficiency payments, they still provide significant production incentives as they reduce the farmer's price risk (OECD, 2003 and 2011b). The 2008 US Farm Act introduced another variant of a counter-cyclical measure, the Average Crop Revenue Election (ACRE) programme, providing farmers with protection against revenue loss for each crop, regardless of the cause (price decline, yield loss, or some combination of the two).[10] Payments are made when revenue for the respective crop drops below a given threshold, based on a moving average, at both the state level and on the individual farm. Farmers enrolling for ACRE must give up on the earlier Counter-cyclical Payments and receive lower deficiency payments and direct payments. As receipt of ACRE payments is based on actual production, this new instrument probably has rather strong distortion effects.

The product-specific nature of all of such policies means not only that they have the clear potential to distort markets, but also that they fail on one important principle of sound risk management, namely the need for a holistic approach. Measures that target bottom-line farm income are definitely preferable from that perspective. Policies of that nature come in various forms, and the successive income stabilization programmes that Canada has had over the years, and their evolving instrumentation, provide specific examples (Antón, Kimura and Martini, 2011). The latest version of Canada's farm income stabilization policy, AgriStability in combination with AgriInvest, is worth describing in some detail as it constitutes an interesting model of a policy targeting bottom-line income on a whole-farm basis, very much with the WTO's green box rules in mind.

The backbone of the current Canadian regime is a layering of income declines in any given year below the farm's reference level.[11] When actual income is below the reference by no more than 15%, then the decline is considered part of normal business risk and farmers may draw from their AgriInvest account, filled earlier by themselves and matching contributions from the government, such that in that first layer the government's contribution is 50%. When actual income is between 85% and 70% of the farm's reference, considered the "stabilization" layer, government payments under the AgriStability programme cover 70% of the decline below the 85% threshold. When income drops to less than 70% of the farm's reference, then the "disaster" layer is reached where government payments make up for 80% of the additional income decline.[12] While this Canadian regime represents an interesting illustration of how a whole-farm income stabilization policy can look like, it also has several deficiencies (Antón, Kimura and Martini, 2011). In particular, it is not clear why any government assistance should be needed in the first layer of normal business risk – in this regard the objective appears to be income support rather than risk management. Also, there is a whole regime of other risk management policies in Canada, resulting in overlap and incoherence.

A central requirement for any stabilization policy targeting individual farm income risk is information on actual farm income. Where farmers keep accounts for tax purposes, that information is available. Yet, in many countries farmers are provided with much flexibility in this regard, and proper accounting is not universally required. Where such deficiencies exist, one can argue that making public assistance, in the form of income stabilization measures, available only to farmers keeping accounts is an effective way of providing an incentive for farmers to engage in bookkeeping which is anyhow in the interest of effective farm management. Where governments consider that approach too tough, they can use shortcut approaches based on estimates of individual farm incomes or aggregate regional information. However, such shortcuts will never be as targeted as individual farm accounts.

In most developed countries, governments also provide some form of disaster assistance to farmers, making specific payments when catastrophic risks have hit. There are several issues to be considered in that context (OECD, 2011a). One of them is the definition of catastrophic risk. Can market risks ever be considered to be catastrophic? When has a natural disaster reached catastrophic dimensions? In many countries the nature of catastrophic risk as a basis for disaster assistance remains poorly defined. Another difficult issue relates to the balance between *ex ante* frameworks and *ex post* assistance. Given the idiosyncratic nature of catastrophes, *ex ante* rules are often considered too inflexible. On the other hand, *ex post* assistance is easily susceptible to rent seeking. In a number of cases, governments have introduced or intensified public support to crop insurance and other forms

of insurance against production risks, hoping that this would reduce, if not eliminate, the need for, and political temptation to grant, *ad hoc* disaster assistance after a damage has occurred. However, as suggested above, this hope has often not materialized, and "double indemnity" issues have resulted. Thus there is a major issue regarding governance of disaster assistance, suggesting that a strong dose of *ex ante* rules for criteria to be applied and procedures to be followed in responding to catastrophic risks would make a lot of sense.

3.5 Risk Management Policies, Farm Support and Distortions

In the ideal case, government policies towards risk management in agriculture would focus on an efficient allocation of resources and not on redistribution of income, except in cases where catastrophic risks have hit. In other words, policies would help to overcome market failures, and provide support to farm incomes only in the form of disaster assistance. In the reality of agricultural policy making, though, many countries' risk management policies have a strong tendency to provide support to farmers, not only in disaster cases (OECD, 2009, p. 41). The political economy of this finding is easy to understand: there is a lot of sympathy for what is considered a hard fate of farmers, suffering so much from the vagaries of nature and markets, and hence policies to help them manage their risk appear highly desirable. Once such policies are in place, they can then also easily be used to transfer income to farmers. This is the more the case as it is not precisely easy to disentangle the 'pure' element of correcting for market failures in risk management from the income transfer effect of these policies, for both analytical and political reasons. As far as the latter are concerned, there is a strong tendency in the political sphere to point at all sorts of alleged market failures and the 'obvious' need for government policy to overcome them (for examples in the US and Spain, see Glauber, 2007, and Antón and Kimura, 2011).

Just looking at the magnitude of the financial flows involved, without any judgment on the extent to which they are needed to overcome market failures, it turns out that a significant share of all farm support in the OECD countries is provided in the form of risk-related policies, i.e. policies aimed at reducing farming risk. In the OECD area overall, two-thirds of all farm support as measured through the Producer Support Estimate (PSE) was provided in that form during the 2002-2007 period (OECD, 2009, p. 88). By far the largest element in this set of policies, accounting for 86% of all support provided through risk-related policies, was market price support resulting from border measures and involving transfers from consumers to farmers. When looking only at government payments (including pest and disease control, variable payments, insurance subsidies etc.), then one finds that such risk-related policies made up for about one-fifth of all budgetary support to farmers in the OECD area in the 2002-07 period (ibid, p. 89).

While the political economy can easily explain why government policies towards risk management in agriculture have a strong tendency to be used to transfer income to farmers, it also has to be emphasized that they are not the most transfer efficient forms of support. For example, quantitative research has found that with a given amount of government expenditure, farm incomes benefit more from fixed area payments than from insurance subsidies (OECD; 2009, p. 41).

As actual risk-related policies have a strong tendency to also provide significant support to farmers, they have the potential to result in noticeable distortions of markets and trade, probably more through their income support impacts than through their pure risk-reducing effects. The extent to which that is actually the case is difficult to quantify, and it appears that there is no study that has ever attempted to provide an estimate of the overall distortion effects of the whole set of a given countries' risk-related policies. However, there is some,

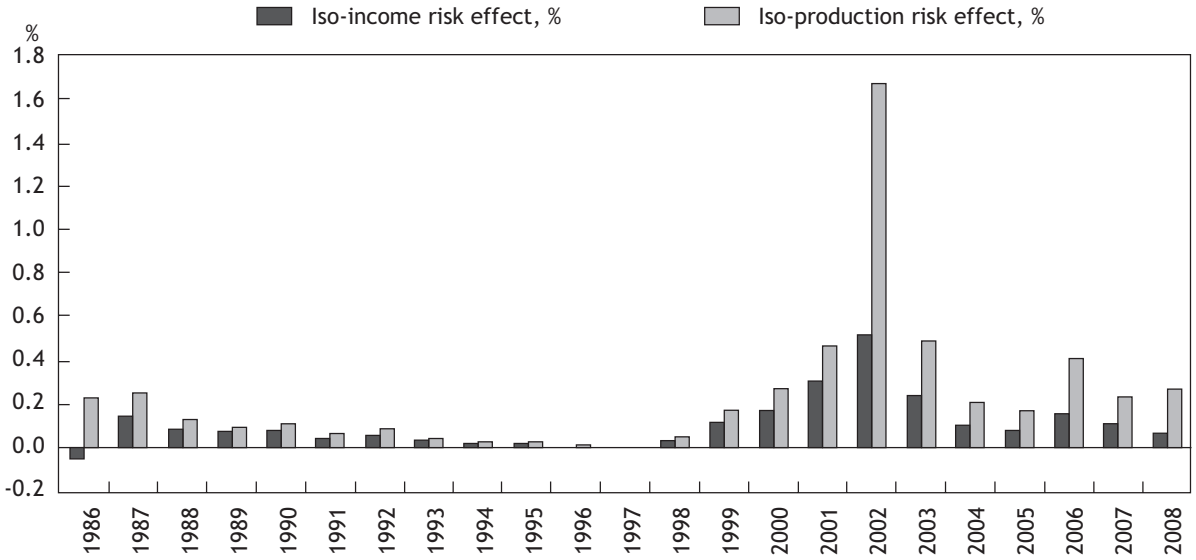
though limited, research on the distortion implications of individual policy measures.

As far as subsidies to crop insurance are concerned, Glauber (2004, p. 1190) cites a number of studies showing that subsidies to US crop insurance have provided incentives to expand production of the commodities covered. However, in most cases the studies found these effects to be relatively small. For instance, in an econometric study of acreage response to crop insurance subsidies, Goodwin, Vandeveer and Deal (2004) estimated that a 30% decrease in premium cost were likely to increase barley acreage by about 1.1%, while in the case of corn the acreage response was expected to be less than 0.5%. Young, Vandeveer and Schnepf (2001), using a simulation model, concluded that total planted acreage to major field crops might be about 0.4% higher with government subsidized crop insurance than in the absence of any insurance program. Antón and Kimura (2011, p. 39) make reference to studies that found small but statistically significant supply effects among cereal producers resulting from insurance subsidies in Spain. For example, in an econometric study Garrido, Bielza and Sumpsi (2003) estimated that a 35% increase in subsidies to yield insurance in Spain had about the same effect on cereal production as a 1% increase in cereal prices.

There are also a few studies on the distortions caused by farm income safety nets, focusing on Canada because of the importance of this policy tool in that country. Bakhshi and Kerr (2009), combining econometric analysis and simulation models, analyzed the Canadian whole farm income stabilization policies, and found that they increased the acreage allocated to spring wheat, rye and peas (by an order of magnitude of around 10%, though with much variance depending on the crop and province concerned), while they decreased the acreage for barley and canola in the prairie provinces (by similar percentages). Turvey (2010), also looking at Canada's farm income safety net policies, though based on mathematical programming models, showed how income insurance can have a significant impact on farm plans, and lead farmers to take on production risks that they would otherwise have tried to avoid. He also pointed out that such impacts are the stronger the more the regime is subsidized.

OECD has developed an interesting and valuable methodology to assess the distortion impacts of risk reducing elements in agricultural support policies, and applied that methodology to the loan rates and Counter-cyclical Payments used in the US (for a description of the approach used, see OECD, 2011b, pp. 41-45 and Annex D). The methodology converts the risk reducing implications of policies into equivalent increases of incentive prices received by farmers, and on that basis estimates the production (or trade, or farm income) impacts of the 'pure' risk reduction effects of the policies concerned. The results presented must be interpreted with a view to the overall approach adopted, in which all policies included in the analysis are converted into the level of market price support that would have the equivalent effect on production (or trade, or farm income). The risk reducing effects of the policies covered are then expressed as the percentage increase of that equivalent level of price support. As shown in Figure 4, over the whole of the 1986-2008 period covered in the analysis, the production impacts of the risk reducing effects of the loan rates and Counter-cyclical Payments were relatively small, equivalent to an increase of average US price support for agriculture by mostly less than 0.5%. An exception was the year 2002 when commodity prices were relatively low and, hence, the risk reducing impact of these US programmes was relatively strong, equivalent to an increase of price support by 1.7%.

Figure 4: Risk Reducing Effects of US Loan Rates and Counter-Cyclical Payments



Source: Reproduced from OECD (2011b), p. 44.

In interpreting this result, one needs to consider that many other risk-related policies in the US were not included in the analysis. Loan rates and Counter-cyclical Payments made up for less than a quarter of all risk-related policies in the US during the 2002-07 period (calculated from OECD, 2009, p. 93).[13]

The quantitative research cited here suggests that risk-related policies have the potential to distort production, markets and trade. It is easy in principle to understand why that is the case. Where governments reduce risks inherent in agricultural production, farmers will tend to engage more in risky production activities, and overall resources employed in agriculture are also likely to expand when farming becomes a less risk-prone business. Moreover, the pronounced tendency in most developed countries to use risk-related policies as a politically convenient vehicle for providing farm income support enhances the threat that these policies distort production, markets and trade. However, the extent to which risk-reducing farm policies actually distort markets is not easily determined, for both conceptual and analytical reasons.

Conceptually, it is not really clear how the reference case (for a with-and-without comparison) should be formulated. Take the case of market price support for a given commodity, instrumented such that domestic price fluctuations are dampened (e.g. through variable import duties). Is the appropriate reference case the situation with fixed duties at the average level of the variable duties? Or is it a situation without any duties at all? In the former case, the policy impact is just the reduction of risk, and the distortion impact found will be relatively small. In the latter case the policy will be seen as reducing risk plus providing price support, with a rather large overall distortion impact. To make things worse, the policy alternative taken as the reference case may also be of rather different nature. For example, instead of providing subsidies to crop insurance, the alternative policy considered might be to use the same amount of money to grant 'decoupled' direct payments.

Analytically, research on risk-related policies faces a number of challenges, ranging all the way from the rather complex theoretical economics of behaviour under risk to empirical information on farmers' risk attitudes. For example, the extent to which a government policy reducing risk in a given farming activity leads to an expansion of that activity depends on the extent to which farmers are risk averse. In the extreme case of a risk-loving farmer, the activity might even contract. In spite of a

considerable body of research on farmers risk preferences, a clear-cut universal picture has not (yet?) emerged (see OECD, 2009, pp. 144-150). Thus, there is not a very firm basis for the assumptions on risk preferences that have to be made in model-based research on the distortion effects of risk-reducing policies.

In a situation like that it cannot come as a surprise that there is not more hard-core evidence regarding the distortions of production, markets and trade caused by risk-related policies in agriculture. In particular, it appears that there is no empirical evidence regarding the overall trade distorting impact of the totality of a given country's risk-related farm policies, and even less so regarding the distortions caused by all developed countries' risk-related agricultural policies on aggregate. The evidence available relates to specific types of risk-related policies in individual countries. That evidence appears to suggest that the pure risk-reducing impact of these policies (as opposed to the impact of farm support going along with them) is such that production of the commodities concerned is stimulated, but that the magnitude involved is small relative to the distortions caused by many policies aiming at income support, in particular relative to price support.

4. EVOLUTION OF RISK MANAGEMENT POLICIES IN EU AGRICULTURE

Though the EU does not, so far, have a comprehensive and unified policy aimed at managing risk in agriculture, there is a host of policy instruments assisting farmers in dealing with various types of risk. These policies have evolved over time, at both the national and the Community level, and their current status reflects that historical development.

4.1 National Policies in Member States

At the national level in the EU Member States, institutional regimes to manage risk focus on production risks resulting from adverse weather events or sanitary and phytosanitary conditions. The absence, so far, of any national schemes to protect farmers against price risks probably reflects the fact that for a long time market policies pursued at the EU level under the CAP provided a high degree of price stability.[14]

Approaches to managing production risks in agriculture differ significantly across Member States of the EU, in terms of both coverage and institutional design, and they continue to evolve. In all Member States, farmers can have some form of insurance against farming risks resulting from natural conditions. Single risk insurance, in particular against hail damage, is available in all Member States, mostly on a private basis but in some countries also partially subsidized (JRC, 2008, p. 149). In several Member States, farmers can also take out combined risk insurance against different weather risks (drought, freeze), or more general yield insurance. In some Member States, more than one half of the overall value of crop production is insured against some form of natural risk (Garrido and Bielza, 2008). The most developed regime of insurance against all sorts of natural risks exists in Spain, where a hybrid system transfers yield risks to private insurance companies, farmers pay some part of the premium and the government covers the remaining costs (Antón and Kimura, 2011). Revenue or income insurance is not (yet) offered in any Member State, and only Spain and Austria have limited experience with index-based insurance (JRC, 2008, p. 152). In the UK, a private index-based insurance was offered for a short while, but terminated again due to minimal take up (ibid).

Most Member States also protect farmers against various types of calamities and natural disasters through some form of calamity funds, stabilization accounts or ad hoc aids, financed either from the public budget or through levies on given products (JRC, 2008, pp. 220 ff). The average annual payments from these schemes in the whole of all EU-27 Member States in the period from around the mid-1990s to the mid-2000s was around 1 billion EUR (JRC, 2008, p. 230). The definition of disaster and crisis eligible for public assistance differs widely across Member States, and there may well be a need for working towards a common understanding and definition of disaster in the Community (JRC, 2008, p. 123).

These national policies to manage production risks are established, implemented and financed at the national level in the individual Member States.[15] They must, though, respect EU rules on state aid so as to avoid distortion of competition in the common market.[16] These Community rules on state aid relate specifically also to national subsidies granted to premiums paid in agricultural insurance schemes, limiting them to a maximum percentage of the costs of insurance premiums.

4.2 EU-wide Policies

Traditionally, the core of the CAP was management of EU markets for major agricultural products, through both domestic and border measures aimed at supporting

producer prices at a high and stable level, thus largely eliminating price risk for many important products. The domestic side of this policy came in the form of intervention buying at policy-determined floor prices. At the border this policy was defended, for most products, through variable levies, making sure that imports could not enter the EU market below threshold prices set well above the EU's domestic intervention prices. This policy, introduced when the CAP was originally established in the early 1960s, provided strong incentives for EU farmers to expand production beyond what was economically justified, even to the point where EU became an exporter even though under market conditions it would have been an importing region. The EU, therefore, resorted to subsidized exports, grossly distorting world markets and denying opportunities for more competitive producers in other parts of the world, including developing countries. As not all of the EU's surplus production could be immediately disposed on world markets, the policy also resulted in the infamous butter mountains and wine lakes (and growing intervention stocks for other agricultural products, in particular cereals).

For a long time during the 1970s and 1980s the EU, unwilling to reform the CAP, tried to suppress the most problematic symptoms of its excessive price support policy, through various forms of supply management, including production quotas for sugar and milk. However, intervention buying and export subsidy expenditure continued to mount, and generated a growing burden on the EU budget that pushed the EU a number of times to the brink of financial collapse. At the same time, tensions with the EU's trading partners and international criticism of the CAP intensified. In the Uruguay Round of GATT negotiations, finally, a point was reached where the EU could no longer sustain its outdated market policy under the CAP. Commissioner for agriculture MacSharry saw the writing on the wall and embarked on a reform course in 1992, cutting the level of price support and introducing direct payments to EU farmers as compensation. This opened up the way to a successful conclusion of the Uruguay Round, which also did away with the EU's variable levies, replaced by fixed and reduced tariffs.

Commissioners Fischler and Fischer Boel continued with CAP reform. As a result, the structure of the CAP has fundamentally changed, with a large part of former price support having been transformed into 'decoupled' direct payments to EU farmers. The EU's domestic markets for agricultural products have also become much more open to international influences. While intervention buying is still a possibility for a number of products, the safety net that it offers is slung at a much lower level, leaving EU agriculture open to a larger degree of price risk. At the same time, however, large direct payments, being granted in a fixed amount that does not depend on market outcomes, create a wholly new degree of stability in revenues of EU farmers.

While not expressly designed as a risk management tool, direct payments have the undeniable effect of shielding EU agriculture significantly against revenue fluctuations (Cafiero et al, 2007). This is already obvious from the financial flows involved. In 2009, factor income of agriculture in the EU-27 amounted to 118 billion EUR (European Commission - Agriculture and Rural Development, 2011b, p. 59). EU expenditure on 'decoupled' direct aids in 2009 was 33 billion EUR (ibid, p. 131). In other words, 28% of factor income in EU agriculture, i.e. nearly one third, resulted from 'decoupled' payments.[17] Given the complete lack of any volatility in direct payments, this element of the CAP creates a significant element of risk reduction. As a matter of fact, analysis of the evolution of variability of farm income in the EU has shown that income stability has improved as direct payments increased over time (European Commission, 2008, p. 9).

While the intensity of market intervention under the CAP has declined significantly as a

result of CAP reforms since the early 1990s, leaving domestic markets more widely open to fluctuating forces of supply and demand, not the least those originating in international trade, market and trade policy has not at all been completely abandoned in the EU. The instruments available in the various market sectors include intervention buying; disturbance clauses; crisis management; 'green harvesting'; measures to deal with serious market disturbance due a loss of consumer confidence because of animal health issues; and export subsidization. A rather visible, and much criticized, example of the use of export subsidies to keep EU market prices from declining further was the re-introduction of export refunds for dairy products during the dairy market 'crisis' in 2009. Overall, CAP expenditure on market intervention, largely aimed at stabilizing markets, amounted to 4 billion EUR in 2009 (European Commission - Agriculture and Rural Development, 2011b, p. 131).

In addition, markets for many agricultural products in the EU continue to be protected by high tariffs against international competition. Around 13% of all tariff lines for agricultural products in the EU, covering around one sixth of total agricultural imports into the EU, have tariffs above the equivalent of 50% (Kutas, 2010, p. 30). Product groups with particularly high tariff protection include grapes and grape must (152% ad valorem equivalent on average for tariff lines in that group), bovine meats (146%), sugars (145%), dairy products (141%) and goat and sheep meat (100%) (ibid).

While the EU's border protection no longer has the strongly insulating power emanating in the past from variable levies, there are still product groups where import duties can vary with market conditions, thus providing the potential to shield EU markets from price fluctuations. This is in particular the case for cereals where duties can vary inversely with international prices, up to the bound tariff level. However, as international prices for cereals were high in the recent past, no tariffs were charged on EU imports of cereals. Duties can also vary in the fruit and vegetable sector where the entry price regime aims at making sure imports do not enter the EU below a politically determined price level. Where import tariffs are essentially prohibitive, even fixed tariffs may shield EU markets from international influences.

Finally, the EU's framework for Rural Development policies in Pillar 2, under Axis 1 (improving the competitiveness of the agricultural and forestry sector) and Axis 2 (improving the environment and the countryside), also provides for a number of measures relating to risk management, such as mitigating natural disasters and climatic risks by supporting restructuring of physical potential and by promoting innovation; training farmers in risk-reduction strategies; supporting diversification; and bio-security strategies to reduce animal health risks (European Commission, 2008, p. 4 and Annex). As for all Pillar 2 policies, these measures are co-financed by the respective Member State and the Community.

5. RISK MANAGEMENT AND THE FUTURE OF THE CAP

Preparations for the 2013-2020 budget period of the EU afford an opportunity for a major overhaul the CAP. The Commission has provided a first impression of its line of thought about the CAP post-2013 in its November 2010 Communication (European Commission, 2010). The focus of the Communication is overwhelmingly on the future of direct payments, which the Commission wants to modify in a number of respects. There are no indications, however, of any intention on the side of the Commission to argue for a significant reduction, let alone elimination, of the direct payments in the foreseeable future. It also appears that the European Parliament and the majority of Member States regard the direct payments as a cornerstone of the CAP which should be continued, largely undiminished, into the 2013-20 period. While it can well be argued that this would mean a missed opportunity to transform the CAP into a more targeted and effective policy (Tangermann, 2011b), at the time of writing this report it appears advisable to assume that the direct payments will remain the centerpiece of the CAP, and that the overall volume of these payments will not be much reduced.

As far as risk management is concerned, this means that the significant contribution which direct payments make to reducing farm income risk, as mentioned above, would remain largely intact. When nearly one third of factor income in EU agriculture comes in the form of a continuous and completely reliable stream of government money, then the risk to farm income is already greatly reduced. Moreover, it should not be forgotten that, in the reality of agricultural policy making of most countries, a good part of risk-related policies, as argued above, serves at least as much to support farm incomes as it serves to enhance risk management. Given the large magnitude of farm support which direct payments will most likely continue to provide in the EU, in addition to all other continuing forms of support under the CAP, in particular market price support, there should not be much reason to resort to new risk-related policies as vehicles to support farm incomes in the EU.

Moreover, there are good reasons to expect that the level of prices for agricultural commodities on international markets, and consequently also on markets in the EU, will in future be higher than in the past (OECD-FAO, 2010). Hence there should be less reason for the CAP to engage in policies that provide farm support, be they risk-related or other policies. Even if there are reasons to believe that market volatility will in future be greater than in the past, prices would then most likely fluctuate around a higher average level. That means that any price decline from that higher level cuts less deeply into farm incomes than if prices were to fluctuate around a lower level.

Because of its importance, the point is worth making again explicitly. The need for, and the political attractiveness of, making public money available to farmers in the form of risk-related policies is the less obvious the better the outlook is for farm incomes. As long as the EU plans to continue making large direct payments to farmers, and in a situation where high farm prices can be expected in the years to come, the need to put much emphasis on new risk-related policies is greatly diminished, to say the least.

From this perspective it is somewhat reassuring that the Commission's Communication does not propose any grand new scheme for risk management under Pillar 1, where it could potentially have been foreseen as a policy that would be extended to all farmers in all EU Member States alike and entirely financed out of the Brussels budget. In particular, the Communication fortunately does not suggest a return to massive stabilization of domestic EU markets for agricultural commodities as it existed under the 'old' CAP. It invokes "consensus on keeping the overall market orientation of the CAP while also maintaining the general architecture of the market management tools" (p. 9). The Communication does suggest that

"potential adaptations [of market measures] could include the extension of the intervention period, the use of disturbance clauses and private storage to other products, and other revisions to enhance efficiency and improve controls" (p. 9), but also emphasizes that "such market measures, and in particular the intervention instrument, should only be used as a safety net in case of price crisis and potential market disruption" (p. 9). It is also noteworthy that the Commission does not suggest the introduction of any counter-cyclical payments such as those playing an important, and not commendable, role in US agricultural policies.

Instead, the Commission proposes the creation of a risk management toolkit under the Rural Development measures of Pillar 2, where Member States could, if they felt like it, establish their own national schemes, within framework conditions set by the EU, and co-financed between Brussels and the national budgets. The Communication suggests that

> In addition [to other modifications of Pillar 2], a risk management toolkit should be included to deal more effectively with income uncertainties and market volatility that hamper the agricultural sector's possibility to invest in staying competitive. The toolkit would be made available to Member States to address both production and income risks, ranging from a new WTO green box compatible income stabilization tool, to strengthened support to insurance instruments and mutual funds. Coherence with other CAP instruments, in particular market instruments, will be ensured for new instruments introduced. (p. 11)

As far as sharing responsibility for measures such as insurance and mutual funds with Member States is concerned, this line of thought is similar to what the Commission expressed when it looked at risk and crisis management in the context of the 2008 CAP Health Check (European Commission, Directorate General for Agriculture and Rural Development, 2008). The conclusions of the Commission's 2008 note suggest that

> For dealing with the potentially growing needs for production risks, an EU-wide scheme cannot be considered feasible at this stage. Introducing an EU-wide scheme would be immensely expensive, and would imply an increased administrative burden for farmers and MS.
>
> Given the heterogeneity of the risks and crises that the EU faces (with respect both to the type of risk/crisis and the type of production) heterogeneous measures seem to provide the most suitable solution to help farmers deal with crisis situations (ex-ante as well as ex-post). A harmonisation at EU level of the aid schemes currently supported with state aids could contribute to increased transparency between MS, while at the same time allowing the CAP to better meet the objective of contributing to the income stability for the agricultural community. An introduction of new risk management tools within existing CAP instruments would be budget neutral with respect to the overall EU budget. National contributions would depend on MS preference, but introducing the measure would in any case be optional. On top of this, Rural Development programmes contain measures which are directly related to risk management for agriculture and forestry, and that provide complementary support for preventive action in the areas of physical investment or human capital formation. (p. 23)

In all EU Member States, farmers already have access to at least some form of insurance and/or mutual funds covering production risk. In some Member States these regimes are purely private, in others they are subsidized or public (see above). Yet, where subsidies are granted, they are currently financed nationally by the respective Member State. Hence, what inclusion of production insurance (and mutual funds) in Pillar 2, as now suggested by the Commission, would change is that such schemes could in future receive budgetary support from Brussels like other co-financed Rural Development policies. This could make some sense if financial involvement of the EU level would mean that distortions of competition among Member

States could be better controlled. However, existing EU rules on competition and state aids already allow the Commission to have a close eye on whether Member States use their risk-related measures to distort competition in favor of their farmers. Thus the major effect of including production insurance in Pillar 2 might be to provide extra incentives to Member State governments for them to introduce new, or extend existing, insurance schemes.

One could be tempted to argue that such extra incentives are unlikely to result, given the budgetary rules for Pillar 2. The way Pillar 2 of the CAP operates, each Member State receives a given maximum financial contribution from Brussels for the totality of all of the many Rural Development measures under Pillar 2. The Member State government can then choose (in co-ordination with the Commission) for which measure it wants to use that pot of money. In other words, if a country wanted to spend more on production insurance it would then have to spend less on extension services or environmental improvement. This mechanism might appear to put a lid on incentives to expand production insurance. However, subsidies to agricultural insurance currently receive no support from Brussels. Introduction of the possibility to receive co-financing from Brussels would, thus, create a new situation in which the relative attractiveness of production insurance, compared to other rural development policies, will rise from the perspective of Member State governments.

Such extra incentives might be justified if one were able to prove (a) that market failures require government support to production insurance, and (b) that current subsidies at the national Member State level are insufficient to overcome such market failures. However, as argued above it is not at all clear that production insurance in agriculture actually suffers from decisive market failures. In that situation, current national subsidies to agricultural insurance are already likely to have resulted in an over-expansion of such schemes. Thus it is not really clear that there is a good reason to include production insurance in Pillar 2 under the CAP post-2013.

According to the Commission's Communication of November 2010, the risk management "toolkit" for Pillar 2 would also be expected to deal with market volatility. That would add a totally new dimension to government-supported risk management in EU agriculture. In its 2008 note, the Commission still considered it unnecessary to introduce any new policies to deal with price risk, concluding that

> price risks appear to be sufficiently addressed with safety-net intervention and with the flexibility that decoupling provides, hence there is no need for additional risk management tools to deal with price risks. The extension of SPS [i.e. direct payments] to sectors which are currently not included could also provide a positive contribution in mitigating price variability for the agricultural community. (European Commission, Directorate General for Agriculture and Rural Development, 2008, pp. 22-23)

It would be interesting to know why the Commission's view on the necessity of introducing new measures to manage price risk has changed since 2008. Of course, agricultural markets have been more volatile since 2008 than in the recent past (though not more volatile than in earlier parts of the post-World War II period, see above). That market volatility has attracted much attention at the international level, and there is a lively debate, in both academic and political circles, on what has caused markets to be so volatile and how governments should respond (Tangermann, 2011a). However, the specific nature of agricultural market volatility in recent years was characterized by large upward price spikes for a number of commodities, and the average level of agricultural product prices in international trade in recent years was significantly above that before these price spikes (OECD-FAO, 2010). In other words, market volatility in recent years was such that farmers in the EU benefitted from it. Against that background it is not at all clear why the Commission's views on the virtues of introducing new policies to manage price risks should have changed since

2008. The 2007-08 dairy 'crisis' in the EU could also not really be cited as a convincing justification, given that the element of downward price volatility on the dairy market was not sufficient to overcompensate for the rather high milk price in the earlier part of the cycle (see above).

In any case, one may assume that the Commission's suggestion regarding inclusion of "a new WTO green box compatible income stabilization tool" in the risk management "toolkit" for Pillar 2 is mainly aimed at price risk. A tool of precisely that nature was also considered in the context of the 2008 Health Check, and the Commission presented quantitative estimates of the implications of introducing such a WTO compatible income safety net in the EU-15 (European Commission, Directorate General for Agriculture and Rural Development, 2008, pp. 16-19).[18] Specifically, the regime considered at the time would make payments to farmers with income declines of more than 30% (relative to the average income of the respective farm in the preceding three-year period[19]), and would compensate for less than 70% of that income loss.[20] At the time, the Commission found that

> over the last six years (1998-2003) compensation would have amounted, on average, to nearly 9.3 billion € per year for the EU-15, varying between a minimum of 8 billion € to a maximum of 12 billion €

and concluded that

> a great weakness with introducing an EU-wide scheme for providing basic coverage against income crises would be the high budgetary variation and uncertainty, which is difficult to conciliate with a policy of budget stabilisation and the likely need of some tool to limit the expenditure (European Commission, Directorate General for Agriculture and Rural Development, 2008, pp.17 and 18).

The Commission also pointed to the administrative difficulties related to determining the level of income on farms not keeping accounts, and to moral hazard. While such administrative problems would still exist, the budgetary implications would, of course, be very different if farm income safety nets were to be implemented by individual Member States under Pillar 2, where the financial contributions from Brussels would have to come out of the fixed amount of money made available for the totality of all Rural Development measures employed by the respective Member State government.

However, the fact that the budgetary implications of income safety nets under Pillar 2 would be manageable at the EU level (though not necessarily at the level of the individual Member States) is not a sufficient reason to introduce that policy to manage income risks. It should be remembered that price volatility in agriculture is typically of asymmetric nature, with occasional large upward price spikes but less pronounced price troughs (see above, Section 2.1). Farmers can well be expected to manage that price risk themselves, in particular where tax regimes allow for some flexibility (see above, Section 3.2). That should be even more the case in a market situation that is likely to be characterized by relatively high farm product prices. Moreover, the large direct payments to EU farmers that are likely to continue into the future under the CAP post-2013 provide so much protection against income risk that it is not clear why any income safety net should still come on top of that extensive income support.

Finally, income safety nets, probably even more than some other risk-related policies, have the built-in feature of providing income support, simply because they act in an asymmetric way, adding to farm incomes when they are low while not subtracting from them when they are high. As a result they have a tendency to distort production, markets and trade, even when they are in line with the WTO requirements for the green box. As already reported above, Bakhshi and Kerr (2009) as well as Turvey (2010), analyzing Canada's income safety nets, found that they are not at all production-neutral, in spite of their formal compatibility with the

WTO's green box criteria. The production impacts are the stronger the more the regime is subsidized. If the EU were to create the option of income stabilization tools under Pillar 2, the amount of subsidies going into such schemes would probably remain relatively small. In consequence, the distortion implications would also be likely to remain limited – but they would still exist. With a given overall amount of budgetary resources for Rural Development, any new farm income safety nets at the Member State level under Pillar 2 might have to crowd out other Pillar 2 policies. Whether the measures crowded out are more or less distortive than the new farm income safety nets is impossible to say as it is not clear how the individual Member State governments would structure their Rural Development policies in the future.

6. MANAGING RISKS IN POOR COUNTRIES' FOOD AND AGRICULTURE

Many farmers and food consumers in poor countries are far more vulnerable to risks than their counterparts in rich countries. Where living standards are low anyhow, families have a limited capacity to buffer income declines, and where poverty prevails, any further drop in purchasing power may result in destitution and misery. The share of family income spent on food is considerably larger among poor people than among rich, and a rise in food prices can have a dramatic impact on overall purchasing power in a poor country while it has only marginal implications in industrialized economies. Moreover, basic agricultural raw materials typically account for a significantly larger share of retail food expenditure in a poor society than among rich families who spend more on high-value products, processing, distribution and other non-agricultural elements in the food chain. As a result, price fluctuations on agricultural commodity markets affect food prices more in developing countries.

At the same time, market instruments to manage risk tend to be less available or completely missing in poor countries. In particular, financial markets may not function well and make it much more difficult than in rich countries to borrow money that could help to tide out a bad year. Futures markets may not exist, or access to them may be extremely difficult, in particular for small producers or farmers living in remote areas. Production insurance is often not available. Social safety nets are likely to provide less protection in crisis times than those in developed countries. In other words, managing risks effectively in agriculture and the food economy is more important but also more difficult in poor than in rich countries.

For a long time, governments of many developing countries had a strong tendency to engage in heavy-handed management of their agricultural markets, at both the border and domestically: keeping prices reasonably stable (and often also low, in the interest of urban food consumers) was one central aim of their market policies. Over time, these policies were reformed in many parts of the world, and policies became considerably more market-neutral (Anderson, 2009). Policies have begun to focus more on managing risks rather than markets (Varangis, Larson and Anderson, 2002). However, when it came to responding to the extreme food price spikes during the 2006-2008 period, governments of many developing countries have intervened heavily in their agricultural and food markets, through various forms of domestic and border measures, with the aim of calming down prices.[21] There are good reasons, though, to question the effectiveness and efficiency of such market interventions (Tangermann, 2011a). Moreover, attempts at controlling domestic prices in the face of international market volatility tend to aggravate the latter, much as when developed countries try to isolate their markets from international price fluctuations. In particular, as argued above, export taxes and restrictions imposed by major exporters during the 2006-08 episode have inflated the price spikes.

Regarding producer risks in agriculture more generally, there are various approaches that governments of poor countries can use to strengthening risk management. Fundamentally, the tools available to them are the same as those used in richer countries, though they have, of course, to be adjusted to the economic, social, structural and natural conditions in the countries concerned. As a matter of fact, all sorts of instruments to manage risks in agriculture have been used in developing countries for a long time, and many governments and international donors, including multilateral institutions such as the World Bank and FAO, make efforts to assist farmers in their endeavors to manage risks. For example, FAO aims at supporting governments in developing risk-related policies, among others by issuing related policy briefs.[22] A number of innovative developments can help to facilitate agricultural risk management in developing countries. For

example, micro-insurance schemes can provide crop or livestock insurance to small producers. Weather index insurance can help to overcome the potentially large transaction costs involved in identifying crop losses on individual small farms, and at the same time guard against moral hazard (World Bank, 2005). Guidelines on disaster risk management, such as those put together by FAO (Baas et al, 2008), can help to improve preparedness and rapid response in dealing with natural hazards.

When it comes to dealing with price volatility on agricultural markets, arguably the most severe issue in poorer countries is the threat to food security resulting from food price spikes. Rising food prices have a positive impact on farmers in developing countries and provide incentives to invest in agriculture and expand production. Through their impact on employment creation in agriculture and rural regions, they may in the longer run even have positive implications for net food consumers, i.e. those families that consume more food than they produce (Aksoy and Isik-Dikmelik, 2010). However, the most immediate and often dramatic impact of spiking food prices is the extra poverty and malnutrition that they generate among low-income food consumers, including those in agriculture that produce less food than they need for their families. In the short run, that poverty impact of high food prices dominates. Recent World Bank research on the 2010-11 surge in food prices has shown that the adverse welfare impact on net food buyers outweighs the benefits to net food sellers, and it was estimated that an extra 44 million people fell below the $1.25 per day extreme poverty line as a result of this most recent price spike (Ivanic, Martin and Zaman, 2011).

Dealing with these grave consequences of food price spikes is a major challenge for developing country governments. Among the many policy responses observed in recent years (see literature cited above), the most promising approach with the least negative longer-term implications is the targeted use of social safety nets to assist those families whose livelihood is threatened by rising food prices. Indeed, several developing countries made use of their safety net regimes in recent episodes of spiking food prices (see Demeke, Pangrazio and Maetz, 2009). This is not the place for an extensive discussion of the many issues involved in constructing and implementing social safety nets, and their use in response to surging food prices.[23] Probably one of the most important lessons is that well designed safety net regimes need to be put in place in quiet times, for them to be available and fully functioning when a food crisis hits. Another lesson to be drawn from recent experiences with responding to exploding food prices is that many developing countries have difficulties mustering the requisite budgetary resources in crisis times. The international community can, and should, do more to help poor countries establish the necessary safety net regimes, and to finance their operations in episodes of surging food prices (Tangermann, 2011a). Limited emergency food reserves, at both the national and international level, can also help to make targeted food assistance available to the most vulnerable families (Tangermann, 2011a).

Finally, there are options for helping developing country governments to hedge prices of their food imports, and to protect them against counterparty risk in international trade contracts. In particular, an International Grain Clearing Arrangement as proposed by Sarris (2010) would appear worth considering in that context.[24] Another approach that should be discussed is to find ways in which agricultural raw materials used as feedstocks for the production of biofuels could be channelled back into food markets, preferably in a targeted way to assist poor food consumers, in periods of spiking food prices (Wright, 2011).

7. CONCLUSIONS

All economic activity is subject to various forms of risk. However, agriculture is a sector facing particularly high risks, resulting mainly from natural factors outside the control of farmers. The resulting variations in farm output, combined with a relatively low price responsiveness of supply and demand, also cause agricultural markets to be rather volatile. While volatility of international markets for major agricultural products has not systematically increased over the last fifty years or so, it was particularly high in recent years, with two episodes of major food price spikes in 2006-08 and again in 2010-11. That recent experience with volatility has resulted in growing interest in risk management in agriculture. In the EU, it has further intensified the debate about risk-related agricultural policies, which was already under way anyhow in response to growing volatility of prices on EU markets for agricultural products, resulting from successive rounds of CAP reform since the early 1990s and the consequent wider opening of domestic EU markets to international price signals.

In a way, though, it is ironic that heightened interest in risk management as an element of the CAP should be derived from recent experiences with volatility on global food markets. What happened in the last few years was that prices of some major foodstuffs rose steeply on two occasions. These food price explosions caused major hardship for poor consumers in many developing countries. Governments of those countries and the international community have good reasons to consider policy approaches that might help to mitigate such dramatic implications of market volatility for food security in the future. EU producers of the commodities concerned, though, cannot really be said to have suffered from rising prices. Market volatility as such may be a significant risk factor in agriculture, but it is somewhat difficult to argue that the recent experience with rapidly rising prices is a good reason for governments to be concerned about risk management on farms. More generally, price volatility on markets for many agricultural products is typically skewed, with occasional upward price spikes being more pronounced than deep price troughs. In addition, the level of agricultural commodity prices on international markets is expected to be higher in future than in the recent past before the 2006-08 price spikes. From that perspective it can well be questioned whether risk management in agriculture has really become more important now than it was in the past.

Yet, governments of most developed countries have for a long time had a strong tendency to engage in policies that support risk management in agriculture. Such policies should keep a number of principles in mind. Farmers should be expected and encouraged to deal with normal business risks themselves; government policies should facilitate, rather than crowd out, the use of the various market instruments available to manage agricultural risk, such as crop insurance and futures markets; risk-related policies should adopt a holistic approach, rather than dealing with individual risks separately; risk management should be clearly distinguished from farm income support; distortions of markets and trade should be minimized; disaster assistance, providing well justified support to farmers hit by catastrophic risks, should be based on clearly defined *a priori* rules. A look at typical risk-related agricultural policies in many developed countries, often forming a significant part of overall farm support, suggests that much remains to be improved before such principles are fully respected.

Risk-related policies have the potential to distort production, markets and trade. Where risk is reduced, farmers will tend to expand risky production activities, and overall resources employed in agriculture are also likely to expand when farming becomes a less risk-prone business. Moreover, the pronounced tendency in most developed countries to use risk-related policies as a politically convenient

vehicle for providing farm income support enhances the threat that these policies distort production, markets and trade. Thus, when governments of rich countries reduce their farmers' risks while agriculture in developing countries remains a higher-risk activity, global competition is likely to be distorted in favour of farmers in developed countries.

However, the quantitative extent to which risk-reducing farm policies in rich countries overall, and in the EU specifically, actually distort markets is not easily determined, for both conceptual and analytical reasons. The research evidence available, focusing on individual policy measures rather than encompassing the overall regime of risk-related policies, suggests that distortions exist, but that their magnitude is relatively small. Yet, that finding applies only to the pure risk-reducing effect of the policy measures concerned. If the farm income support typically going along with the risk-related policies were included in the analysis, then the distortion impacts found might be much larger. Future research could and should generate more ample evidence. It would be desirable, for example, to look not only at acreage impacts of crop insurance subsidies, but also at yield implications. More research would also be valuable on the distortion impacts of risk-reducing market price support. Above all, though, it would be beneficial to generate evidence regarding the overall production, market and trade implications of the totality of individual countries' risk-related policy regimes in agriculture – something that is non-existent for the time being.

In the EU, policies related to production risk in agriculture, in particular those providing support to insurance regimes, are so far in the domain of national Member States, with EU rules aimed at limiting the extent to which competition within the common market is distorted. At the EU level, policies that mitigated market risk by supporting producer prices at a high and stable level have undergone reform, leaving more space for prices to fluctuate in response to changing forces of supply and demand. Instead, large direct payments were introduced, and later 'decoupled' from production. These continuous and fixed payments, amounting to nearly one-third of factor income in EU agriculture, now provide a significant element of risk-reduction to farmers in the EU.

It looks as if the direct payments will also survive, largely undiminished though somewhat modified and redistributed, into the post-2013 period, for which the future CAP is currently being prepared. This is an important factor to keep in mind when considering future risk-related policies for EU agriculture. With large direct payments to EU farmers and the expected relatively high prices of agricultural commodities, the need for extensive government support to risk management in agriculture should be limited.

From this perspective it is fortunate that the European Commission, in its November 2010 Communication about the CAP post-2013, has not proposed the introduction of any grand new scheme of risk management policies for all farmers at the EU level. Instead, the Commission has suggested the creation of a "risk management toolkit" as part of the Rural Development measures under Pillar 2, where national governments of the Member States might be given the option of choosing from a menu of instruments and receive co-financing from Brussels, within a given overall budget constraint. One element of that "toolkit" envisaged by the Commission might be some form of an income safety net, to be constructed and implemented in a way that is compatible with the WTO rules for green box policies.

Intensified risk-related policies for EU agriculture, and in particular a new farm income safety are not really warranted in view of continued large direct payments and expected conditions on agricultural markets. On the other hand, if tightly constrained by budgetary limits under Pillar 2, introduction of a "risk management toolkit" is likely to do relatively little harm. It has the potential to create new market and trade distortions, thus possibly making life more difficult for the EU's trading partners, including developing countries. After all,

research has shown that government support to risk management in agriculture, including for income safety nets that are formally compatible with WTO green box criteria, can well distort markets. However, the extent to which a new "risk management toolkit" under the CAP's Pillar 2 is likely to do so will probably be limited.

Policy responses to the recent episodes of heightened volatility on agricultural markets should focus less on farmers in rich economies, but more on poor consumers in developing countries. Experiences since 2006 have shown that governments and the international community are not sufficiently prepared to deal with the grave consequences that price surges can have for global food security. There is little that can be done to reduce volatility on international markets for agricultural commodities, though better information on market developments and stock levels might help to improve the functioning of markets. Also, tighter disciplines on export taxes and restrictions could reduce their negative implications in times of scarcity. Yet, most of the policy response will have to come in the form of helping people more effectively to cope with spiking food prices. In that context, social safety nets in developing countries merit particular attention. Governments of the countries concerned and the international community need to invest more into such approaches to dealing with the implications of volatile food markets.

ENDNOTES

1 This is not to say that farming is more risky than any other types of business: there are certainly many other sectors where risk is also a significant factor.

2 The term volatility typically refers to frequent changes of a variable over time. While a broad definition like this is sufficient for the present paper, it should be pointed out that movements along a more or less smooth trend line, as well as regular cyclical variations (such as seasonal changes), are easily predictable and do not pose major economic problems. Hence the term volatility will be used here to characterise frequent and irregular changes of an economic variable. The terms volatility, variability, fluctuations will be used interchangeably.

3 For example, the European Commission argues that "farmers who are risk averse may not undertake the necessary investments to sustain the level of competitiveness" (European Commission – Agriculture and Rural Development, 2011a, p. 2. However, the Commission does not provide any evidence that society overall minds that risk less than farmers. Moreover, it is not at all clear that larger investments would indeed improve market-based competitiveness of European agriculture: the EU's farming industry may already be too capital intensive.

4 A detailed account of the emergency measures adopted is provided in Commission of the European Communities (2009b).

5 The increase of EU milk prices in the second half of 2009 and throughout 2010 was indeed largely the result of rising international market prices for dairy products, rather than the effect of EU policies. During the price trough on international markets, EU support measures have, though, kept EU milk prices somewhat higher than might otherwise have been the case, see Figure 6 in European Commission - Agriculture and Rural Development (2011a).

6 Had the EU not provided support during the dairy price trough, the average milk producer price over this episode would have been somewhat lower, but because of the direct payments compensating for the cut in price support revenues would probably still have been higher than before the reform of the milk regime.

7 For a more extensive discussion of the major policy options proposed and for references to a large body of literature, see Tangermann (2011).

8 For a more extensive discussion of options to reduce volatility on international markets for agricultural commodities, and of their limitations, see Tangermann (forthcoming).

9 For example, in New Zealand so-called levy organizations are empowered by respective legislation to collect levies from all producers of a given commodity, and that revenue is used, among others, to engage in collective risk management, e.g. emergency response to disease outbreaks (Melyukhina, 2011a). Australia has equivalent institutions (Kimura and Antón, 2011). In the Netherlands, similar functions are performed by the Product Boards (Melyukhina, 2011b).

10 For details of the ACRE programme, see OECD (2011b), pp. 50-51.

11 Rather than farm income on an accrual basis, what is used as a trigger in the Canadian regime is the farm's "margin", measured as allowable revenue minus allowable expenses, from cash based accounting. The reference margin is defined as the Olympic average, i.e. the moving average over the previous five years with the top and bottom years discarded. For details, see Antón, Kimura and Martini (2011, p. 23-34).

12 There are also provisions for negative margins.

13 This does, though, not suggest that the overall effect of all risk-related policies in the US was four times as large as the impact shown in the OECD analysis: there is no reason to assume that the risk-related policies not covered in the OECD analysis had the same average production impact as the policies included.

14 The EU's Common Market Organisation (CMO) for agricultural products does, though, already provide for the possibility of adopting exceptional measures of market support in individual Member States "in order to take account of restrictions on intra-Community and third-country trade which may result from the application of measures for combating the spread of diseases in animals" (Council Regulation (EC) No 1234/2007, Art. 44-46). In these cases, the Community covers 50% (60% in the case foot-and-mouth disease) of the expenditure borne by Member States.

15 The Community does, though, contribute to the financing of emergency measures in the livestock sector to eradicate epizootic diseases, through the EU Veterinary Fund (JRC, 2008, p. 105). In cases of large damage resulting from major natural disasters, the Community may also contribute financial assistance through the European Union Solidarity Fund (EUSF) (JRC, 2008, p. 104).

16 These rules are laid down in Commission Regulation (EC) 1857/2006 and the related Community Guidelines for State Aid in the Agriculture and Forestry Sector 2007 to 2013 (2006/C 319/01).

17 Expenditure on direct aids overall, including coupled payments, in 2009 was 39 billion EUR, equivalent to 33% of factor income in EU agriculture.

18 The analysis did not include the new Member States due to a lack of data.

19 The applicable rules of the WTO green box, specified in Article 7 of Annex 2 of the Agreement on Agriculture, would, alternatively, also allow WTO Members to calculate the income loss relative to "a three-year average based on the preceding five-year period, excluding the highest and the lowest entry" (often referred to as the Olympic average).

20 The WTO green box rules in Article 7 also stipulate that such payments shall relate solely to income, and not to the type or volume of production, to prices or factors of production. Where a farmer also receives disaster payments in the same year, the sum total of payments under the income safety net and under disaster relieve shall be less than the farmer's total income loss.

21 For a review of policy responses during this period in a large number of developing countries, see Demeke, Pangrazio and Maetz (2009). Policy responses in ten major emerging economies were reviewed and analysed by Jones and Kwiecinski (2010). See also OECD (2010b).

22 See, for example, the case study of risk management tools used in India by Rao and Bockel (2008).

23 See Tangermann (forthcoming) and the literature cited there, in particular Tiba (2011), for a discussion of issues related to the use of social safety nets in food crises.

24 For a discussion of that option, see Tangermann (forthcoming).

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