RISK MANAGEMENT TOOLS FOR ITALIAN FARMERS: PUBLIC SUPPORT, PROBLEMS AND PERSPECTIVES UNDER CAP REFORM

JEL classification: Q18, Q14, C15

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Abstract. *Currently there is ample discussion among EU Institutions (European Commission, European Parliament, and Member States' governments) on the possibility of setting up a comprehensive EU-wide framework on risk and crises in agriculture. With the changes introduced in the proposed regulations on rural development for the period 2014 - 2020, the Commission not only confirms the provisions contained in Regulation 73/2009 (placing them, however, in the multi-annual setting of the funding for actions to support rural development), but introduces a new measure, called IST (the Income Stabilization Tool), aimed at supporting risk management for farm incomes using insurance principles. This paper therefore discusses the main issues related to public intervention for risk and crisis management in agriculture, with emphasis on the main criticisms of an overall public support policy aiming to manage risk in agriculture in Italy..*

Keywords: *crop insurance, risk management tools, public intervention*

1. Introduction

Alongside the particular characteristics of agricultural production there is no doubt that agriculture in developed countries has reached such levels of complexity that both the ranking of the various causes of income variability and the impact of a given variation in farm revenue on the viability of the farm enterprise have radically changed. The organization of agricultural production and its integration in the agro-food chain, the increased use by farmers of services such as credit, professional technical assistance, finance and insurance, the regulatory system within which farms operate and the diversification of income-generating activities within rural households are all factors that make the risk faced by today's farmers in developed economies something profoundly different and more articulated than it was only a few decades ago.

The topic of risk management in agriculture has always been at the margin of the European debate. The main reasons lie firstly in the structure of EEC/EC/EU intervention, which, for nearly half a century, has effectively ensured the presence of mechanisms to stabilize markets, and secondly, (in the subsequent development) in the use of hedging instruments within individual

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Member States (MS), covering, in particular, production risks, many of which have developed along very different trajectories, creating prospects for intervention that have not evolved according to common paths. This diversity of available instruments, the ongoing process of EU enlargement and the specific features of the various "agricultures", have led to a complex set of risk management systems in different Member States, which differ in the measures adopted and the degree of coverage that the practices achieve.

With the phasing out of guarantees provided by the CAP to European farmers in terms of stabilizing markets, the issue of risk management tools is gradually acquiring an ever more important role, this being reflected in a series of innovations that first appeared in the 2009 'Health Check' and then in the proposed Commission regulation for rural development policy 2014-2020.

With the changes introduced in the proposed regulations on rural development for the period 2014 - 2020, the Commission not only confirms the provisions contained in Regulation 73/2009 (placing them, however, in the multi-annual setting of the funding for actions to support rural development), but introduces a new measure, called IST (the Income Stabilization Tool), aimed at supporting risk management for farm incomes using the mechanism of insurance.

The IST aims to create a safety net for farmers, protecting them from the negative consequences that may arise from adverse trends in income. A risk that includes not only production, but is all-encompassing, referring to the income of farmers, and therefore, to all the adverse circumstances that might affect a farm's performance.

The IST, therefore, while framed in the same logic of risk-management measures already available, is a much more ambitious tool, aiming to supplement and strengthen the safety net already provided by direct payments, but which discounts the absence of a connection with market trends. The Commission's proposal defines the admissible costs for financing and, if only in part, the characteristics of how the instrument itself functions, especially by establishing its operational limits which should be consistent with the commitments undertaken at the WTO.

This study is intended to contribute to the debate, initiated by the Commission in 2005 among EU instutions and stakeholders (EC- Commission of the European Communities, 2005a, 2005b), on private strategies that could be adopted by farmers to manage their risk and on the role that public policies might play in supporting such strategies. The ultimate objective is the definition of a framework of policy instruments that could be adopted in Italy to effectively confront the problem of risk and crisis management in agriculture.

2. Welfare analysis of risk

The ultimate effect of risk on the economic welfare of agents is conceivably the result of both the characteristics of the potentially dangerous random events and of the complex set of public and private actions that can be taken, both ex-ante and ex-post.

Risk generating events can be distinguished according to:

- the frequency of the event, from rare to frequent;
- the severity of damages caused, from negligible to significant;
- the degrees of correlation between affected units, from idiosyncratic (i.e. events that independently affect single units) to systemic (i.e. events which simultaneously affect many units).

A fourth dimension in terms of predictability should also be added, to distinguish predictable risks from unpredictable crisis.

Considering these four dimensions, different strategies may be suitable for managing risky events, reducing the risk or mitigating its consequences, that include private and public actions, both ex-ante and ex-post.

Through private actions, when the potential damage is limited, risk can be retained and farmers can cope with the consequences of bad outcomes by taking ex-post actions. The most common risk-coping strategy is based on the use of personal financial reserves, such as savings, or of credit, which smooth consumption in face of varying income. Avoidance, instead, is a better strategy when the potential damage is very high. In such cases, risk is evaded by not taking risky actions or by preventatively eliminating its negative effects, for example by investing in physical protection devices or by taking the so-called income-skewing decisions, i.e. the decision to engage in lower risk-lower income activities (Dercon, 2004). In many cases, the most effective risk reduction strategy is diversification, by engaging in various uncorrelated risky activities. Diversification, however, always comes at the cost of foregoing possible gains due to specialization in the activities which have the highest expected return. Apart from extreme situations of negligible or very damaging risks, the vast majority of economically relevant risks can be transferred onto other subjects.

The typical risk transfer tool is insurance, the efficiency of which might be limited by the presence of informational problems such as asymmetric information (leading to adverse selection) and hidden actions (generating moral hazard), which, in extreme cases, can be a cause for serious market failure. In agriculture, insurance often also faces a problem due to the systemic character of the risks, which may limit the effectiveness of risk pooling.

Public policies aimed at dealing with risks in agriculture can be classified as:

- direct measures, which include both ex-ante policies, such as preventive public investments that reduce the potential damage of negative events, and ex-post policies designed to mitigate the effects of damage suffered by farmers, usually consisting in ex-post compensatory payments;

and

- indirect measures, intended to increase the risk management ability of farmers, usually justified on efficiency grounds as corrections for various forms of market failure. Examples include:

(i) incentives for the development of insurance markets, through granting subsidies for premium payments; the provision of reinsurance; the provision of information to reduce asymmetry; and/or the assurance of competition in the insurance industry; (ii) institutional innovations for the functioning of financial markets capable of providing new risk management instruments; (iii) incentives to the formation of precautionary savings and/or to the access to credit, which might increase the ability of farmers to retain risk.; (iv) information gathering and distribution.

From the social point of the view, public actions intended at complementing the actions taken privately by economic agents can be justified when they determine a social welfare improvement. Traditionally, the welfare effects of behaviour under risk and related policy is analyzed through models of expected utility maximization. In this context, to assess the welfare effects of a risk- managing policy correctly, three aspects should be underlined:

1. models based on expected utility maximization under common specifications of the utility function may greatly underestimate the potential benefits of the elimination of extreme, rare losses;
2. the correct choice of the objective of economic agents facing income fluctuations should

be the stabilization of consumption rather than current income. The theory of consumer behaviour postulates that the yearly level of consumption is not directly linked to current income, but rather to the expected value of long term wealth, and this is widely confirmed by empirical evidence. This emphasizes the role of savings and borrowing as private risk-management tools;

3. finally, when it is considered that the relevant consumption decision unit is the rural household, whose income can be composed of revenues from farming as well as off-farm employment and other financial activities, the extent of the negative welfare consequences of farm income fluctuations might be reconsidered when other income-generating activities are present.

The assessment of the relative merits of different policy instruments aiming to achieve the same objective must consider the effects not only on the welfare of farmers, but also on that of other economic agents. Transfer efficiency is a useful instrument for this task, because it compares benefits accruing to agricultural producers with the costs borne by taxpayers and consumers. Assessment of transfer efficiency is particularly relevant when public policies are implemented in the context of market failure, such as when a monopoly power exists or there is incomplete information.

Besides distributive effects, the assessment of a policy must also evaluate other aspects such as policy-induced distortion in resource allocation, consistency with existing and possible future international trade agreements; coherence with other relevant policy objectives.

It must be noted that the presence of public policies that reduce risk exposure might generate incentives resulting in perverse policy effects, favouring the adoption of excessive risk-taking behaviour, with possible negative effects on resource allocation, negative environmental externalities and crowding-out of alternative possibly efficient private actions.

Regarding consistency with existing norms and regulations, analysis of the set of existing constraints imposed by WTO rules on risk and crisis policies, of the EU discipline on State aids and of the financial discipline of EU budget shows that, whereas both WTO rules and existing guidelines for state aids in agriculture are rather permissive and allow for introduction of generous income protection policies, the existing financial commitments of the new CAP are likely to impose severe constraints on the amounts of resources available for new policies to be implemented at a significant level.

3. Theoretical framework

The most widely used theoretical model of analysis of the consequences of the presence of uncertainty on economic behaviour is the so-called **expected utility** framework. It is based on the definition of the individual agent's structure of preferences for *lotteries,* (L). A lottery is defined by a complete set of possible outcomes[5] $\mathbf{X} = \{X_1, \ldots X_N\}$ and associated probabilities $\mathbf{p} = \{p_1, \ldots, p_N\}$.

[5] Notice that the theoretical framework is very general: the relevant outcome X is whatever generates "utility". Depending on the context, in specific applications it might be expressed in monetary levels, quantities of food, etc. something we will return to later.

Given a complete preference structure defined for lotteries[6], it can be demonstrated[7] that a Von Neumann-Morgestern (VNM) utility function U(X), defined for the levels of outcome X, and unique up to an affine transformation, exists such that to choose the 'best' lottery is equivalent to choosing the one that maximizes the expected value of the VNM utility defined as

$$E[U(X)] = \sum_i p_i U(X_i), \text{ for } i = 1, \ldots, N$$

Given the VMN utility function, the value of each risky prospect can be synthesized by the **certainty equivalent**, C(**X**,**p**), defined as the level of outcome X_c such that $U(X_c) = E[U(X)]$, in the sense that risky prospects ranked according to the expected utility could be equally ranked according to their certainty equivalent. The definition of certainty equivalent allows for the assessment of the cost imposed by the presence of uncertainty in a way that is fully consistent with the concept of consumer's surplus, an analytical device long accepted in the literature on welfare economics. Given the VMN utility function, in fact, the 'damage' caused by the presence of uncertainty could be, in principle, measured by the **risk premium**, RP(**X**,**p**), which is defined as the difference between the expected outcome of the lottery, E(**X**,**p**) and its certainty equivalent, C(**X**,**p**) and is commonly interpreted as the maximum amount, expressed in terms of units of the relevant outcome X, that an agent characterized by the preferences described by the VNM utility function U(X) would be willing to pay to give up the risky prospect in exchange for a certain amount equal to the expected outcome, E(**X**,**p**).

Notice that the risk premium is a function of the entire distribution of outcomes and it depends on the full structure of preferences. While it is possible, in principle, to measure it for a given individual facing a given risky prospect of which the probability distribution is known, and assuming a given structure of preferences, it is virtually impossible to estimate it in a theoretically consistent credible way from observed choices: there will simply never be enough data to be able to identify both the preference structure and the probability distribution.

The expected utility framework has also been used to provide a formal characterization of **risk aversion** based on the notion of risk premium. Essentially, an economic agent is said to be risk averse if her or his preferences over risky prospects express strictly positive risk premiums. The structure of the individual's preferences will naturally determine also the 'degree' of aversion towards a given risk prospect, degree which would, in principle, imply a strongly idiosyncratic component.

To measure the degree of risk aversion, the coefficient of (local) **absolute risk aversion**, r_A, is defined as the negative ratio between the second and the first derivative of the VNM utility function: $r_A(X) = - U''(X)/U'(X)$ and the coefficient of (local) **relative risk aversion** as $r_R = X\, r_A$. (Pratt, 1964). The advantage of using relative instead of absolute risk aversion lies in the fact that the former does not depend on the units of measurement of X, and therefore could allow, for example, for comparison between measures obtained for monetary outcomes measured in different currencies.

[6] The axioms on which the expected utility theorem of choice is based are (see Jensen, 1967): (completeness) for any pair of lotteries (L_A, L_B), the agent is always able to express one of the following preference orderings: either $L_A > L_B$; $L_B > L_A$, or $L_A \sim L_B$, where the symbol ">" means "strictly preferred to" and the symbol "~" means "equally preferred as"; (transitivity) $L_A > L_B$ and $L_B > L_C \Rightarrow L_A > L_C$; (convexity) the set of all possible lotteries is a convex set, which is equivalent to saying that given any three lotteries strictly preferred to each other, $L_A > L_B > L_C$, there exist $\alpha \in (0, 1)$ and $\beta \in (0, 1)$ such that $\alpha\, L_A + (1-\alpha)\, L_C > L_B$ and $L_B > \beta\, L_A + (1-\beta)\, L_C$ (independence) for any L_A, L_B and L_C, $L_A > L_B \Rightarrow \alpha\, L_A + (1-\alpha)\, L_C > \alpha\, L_B + (1-\alpha)\, L_C$, for any $\alpha \in (0, 1)$.[12] See Excellence model of the European Foundation for Quality Management (EFQM, 2003).

[7] See von Neumann and Morgerstern (1944)

Notice that both coefficients are local measures, that is, they are evaluated at a point in the range of outcome values, and they are functions, which means that their value is possibly different for different levels of X, even for the same individual. In practice, to know the coefficient of the absolute risk aversion function is equivalent to knowing the entire preference structure for lotteries as postulated by the Von Neumann – Morgerstern theorem. This, which may seem an advantage of the expected utility framework, is, in truth, a dangerous aspect in applied analyses if we duly consider the meaning of the converse of the reasoning just made: to select a specific form for the coefficient of risk aversion (such as for example to select a constant relative risk aversion, as is common in the literature) amounts to imposing a heavy structure on the preferences over the entire range of values of X. In other words, for example, to maintain that an individual has a constant coefficient of relative risk aversion means to assume that her or his preferences have a precise structure over all possible values of X, which implies, among other things, the fact of being always risk averse, or always risk-seeking, no matter what the 'riskiness' of the prospect one is facing. This is an observation that has generated strong criticisms of the validity of many expected utility analyses, based on the fact that even casual introspection would demonstrate that the propensity toward risk usually depends on the amount at stake (most of us would exhibit a certain degree of risk-seeking behaviour when the amounts at hand are very small, as for example when we buy a lottery ticket for which the expected outcome is much lower than the price of the ticket, and at the same time would reveal sizeable risk aversion when buying car-theft insurance. See Friedman and Savage, 1948).

It must be noted that the concept of risk aversion does not add to the definition of the preference structure through the VNM utility function. The way they are defined, the three concepts are, in fact, equivalent. Their precise meaning, when applied to real situations, is strongly linked to the basic assumption that underlies the whole theoretical construction, namely, that rational preferences are defined for *lotteries*, that is the combination of outcomes and associated probabilities, which requires that the agent is capable of fully characterizing the stochastic structure of all of the risky prospects over which the decision is taken. Unfortunately, such dependency and the heroic character of such an assumption is seldom recalled in applied analyses, when the concepts of risk aversion and measures of risk premiums are presented in a much more casual way than the rigor of the theory would authorize.

3.1. Interpreting the results of economic analyses of risky prospects

The relevance of the points raised in the previous section will become evident when we critically review the procedures which are usually followed by analysts engaged in risk assessments. In most cases, an economic analysis of a risky situation is performed as follows: a certain functional form is chosen for the VNM utility function, usually taken from a class of function that would allow for a simple characterization of the coefficients of risk aversion, one or two parameters defining the degree of risk aversion are assumed, justified on the basis of the limited number of studies that have claimed to have empirically assessed them; then, the risk prospect that needs to be assessed is described by only a limited number of parameters (usually just the mean and the variance) and the analysis is performed by calculating the value of the risk premium associated with the particular prospect, taking it as an indication of the welfare cost of the risk.

From the discussion in the previous section, it should be clear that the figure that comes out of such a kind of analysis, if any, is mainly the result of the assumptions maintained by the analyst rather than a credible indicator of the social cost imposed by the presence of risk. Unfortunately,

the assumptions are almost invariably kept in the background and therefore an assessment of the real value of the analyses is difficult. In the following sections, we will list some of the most common mistakes that could be made in conducting risk analysis and that might be useful in critically reviewing the discussions that have been presented on the role of risk in the conditions of the reformed European agriculture. The three mistakes can be synthesized as:

(i) incorrect specification of the *distribution of outcomes*,
(ii) incorrect choice of the *utility function*, and
(iii) incorrect choice of the *argument of the utility function.*

3.2. Incorrect specification of the distribution of outcomes

From the axiomatization on which the expected utility approach to decision-making under uncertainty is based, it should be clear that to evaluate the welfare effect of the presence of risk necessarily requires the complete definition of the probability distribution of outcomes. In other words, a synthesis of the work of Bernoulli (1738), Von Neumann and Morgerstern (1944), and Friedman and Savage (1948) could be made by saying that both the levels and the variability matter in a way that does not in general allow for separation of the two effects.

As a result, if one wants to discuss the economic cost of risk and be coherent with the expected utility approach, 'risk' cannot be taken as simply 'the probability of a bad outcome' or as 'the variability of outcomes': it must be defined as the 'uncertainty of the outcomes', intended as the characterization of the entire random distribution of the possible outcomes (Hardaker, 2000). To rely on synthetic measures of variability such as the coefficient of variation, albeit very convenient from a computational point of view, might be highly misleading in cases in which the distribution of outcomes is far away from a normal distribution, such as for example, when rare but severe damage interrupts a series of relatively stable outcomes, the cases typically dealt with by insurance and which are also the most relevant ones from a social welfare point of view.

In other words, in evaluating the impact of a change in the risk structure faced by a farmer, as for example following the introduction of a public price-stabilization scheme, one should characterize the complete probability distribution of the relevant outcome before and after the intervention. To simply consider the coefficient of variation (as is done in many cases of applied analysis, and often with no other justification than the need to ease the computation) is not enough to characterize the entire distribution, given that there exist an infinite number of distributions with the same coefficient of variation, unless one restricts attention to a specific class of distributions, such as the Normal distribution, which is fully characterized by the first two moments. The point we want to stress here is that often to use mean-variance approach or to rely on the coefficient of variation to measure uncertainty amounts to imposing strong unwarranted conditions on the structure of the preferences which would affect the results of the analysis.

3.3. Incorrect choice of the utility function

As in the standard economic theory of consumption, in the theoretical setting outlined above preferences are given. The utility function is taken to be a fundamental individual characteristic. As with demand elasticity, risk aversion coefficients should be estimated empirically from representative samples of the population, and projections outside the sample should always be taken with some degree of caution.

Unfortunately, as opposed to traditional demand estimation, in this case it is virtually impossible to find sufficient data to identify the structure of the risk preference from, for example, the

underlying distribution of the relevant variable. For example, does the fact that a farmer does not buy insurance means that he is not risk averse, or that he does not believe a bad outcome would occur? The simple observation of not buying insurance could be used as evidence of lack of risk aversion, if one is willing to *assume* the probability distribution of outcomes, or of evidence that the subjective distribution of outcomes is not very wide if one *assumes* a certain degree of risk aversion.

As difficult as it might be, however, to distinguish between the two, it is imperative from a policy point of view. In the previous example, if the farmer is not risk averse, why should he be compensated in the case of a bad outcome when he decided not to insure? After all, no government would ever engage in compensation to unlucky gamblers. The case would be different if real damage occurred for lack of sufficient information on the probability distribution of the events, in which case compensation might be morally justifiable[8].

Put it in a simpler way, it is always possible to justify an intervention in favour of an agent or a group of agents by *assuming* that they suffer damage facing whatever the current conditions are. The point is that the customary habit of analysts in these cases has been to *assume* a certain degree of risk aversion, which would invariably lead to 'discover' that facing a risky prospect implies damage and therefore that an intervention is justified, without taking the care of checking whether the assumed degree of risk aversion is consistent with other observed behaviour of the agents.

A better 'code of best practice', as Hardaker suggests, would be to focus on trying to address the 'objective' probabilities of the possible outcomes, and therefore to make the best use of observed behaviour to try to assess the real propensity of farmers towards risk, and perhaps one would discover that 'agricultural economists have paid too much attention to risk aversion' (Hardaker, 2000, p.13) and that 'from a social welfare perspective, most risks faced by individual farmers or groups of farmers are very unimportant.' (ibid.)

3.4. Incorrect choice of the argument of the utility function

A third problem that afflicts the welfare analysis of the presence of risk in economic activities concerns the definition of what is the fundamental variable of interests, i.e. in formal terms, what is the agent's relevant argument of the utility function.

Since the work of Friedman and Savage (1948), and Markowitz (1952) who discussed the expected utility approach to cases of monetary outcomes, it is clear that the argument of the VNM utility function should be **wealth**, not income, i.e. a measure of a monetary stock and not of a flow, and there is a good reason for that: what really provides utility should never be considered to be 'money' per se, but rather, it is the level of consumption that money permits that individuals care about. It is well established that consumption is much more closely linked to wealth, or what we could term as 'permanent' income rather than to current or 'transitory' income (Friedman, 1957). Of course, income contributes to wealth formation, and transitory fluctuations in income may have consequences. However, the impact in terms of welfare of a *temporary* change in current income, and therefore what would justify public intervention, is admittedly much lower than the impact of a similar change in *permanent* income, something we will return to when discussing the meanings of 'risk' and 'crisis'.

The relationship between the cost of uncertainty in total wealth as opposed to uncertainty in

[8] Subsidizing insurance on the grounds that farmers do not buy it would not be the best policy anyhow, since it does not address the real problem. On the contrary, providing means to improve the forecasts of bad outcomes would certainly be beneficial.

current income can be highlighted by following the simple example of Hardaker (2000, pp. 9-11).

Let us indicate with W_0 the initial wealth and with X a random additive component (such as current income might be). Uncertain wealth will therefore be:

$$W = W_0 + X$$

For the sake of simplicity, let us assume constant absolute risk aversion for wealth and keep W_0 constant. This would imply that $r_A(W) = r_A(X)$. But what does it mean in terms of *relative* risk aversion with respect to income fluctuations? By recalling that, by definition, $r_R(W) = W\ r_A(W)$, and that $r_R(X) = X\ r_A(X)$, we have $r_A(W) = r_R(W)/W$, which implies that $r_R(X) = (X/W)\ r_R(W)$ that is, that the coefficient of relative risk aversion expressed in terms of income is equal only to a fraction of the coefficient of relative risk aversion expressed in terms of wealth, where the fraction is given by the ratio between current income and total wealth. Given a fundamental attitude towards risk, the lower is the share of X over W, the lower should be the relative risk aversion towards variations in X.

4. The Italian system

Public intervention in agricultural risk management in Italy has a long tradition. The "Fondo di Solidarietà Nazionale in Agricoltura (FSN)" was instituted in 1974 with the aim of providing farmers with the means to effectively manage their production risk. The system has evolved over the years with numerous reforms until recently, when, in the Legislative Decree n° 102 of the 29th of March 2004, Italy adopted the Community guidelines for state aid in the agricultural sector regarding compensation for damage and insurance premium subsidies, The Decree defines new operational rules for the FSN and regulates financial tools for risk management and incentives for capitalisation for farms.

The Italian FSN erogates two different services: financing for insurance policies and ex-post payments, although this general principle is subject to many exceptions that will be described in the following paragraphs.

A) Ex post compensation

The Law establishing the FSN states that, in the case of an exceptional event, farmers are entitled to compensation for the damage suffered. The regulation of compensatory aid has not changed much over time. In order to initiate the process of compensation, the status of exceptional event needs to be officially recognized by the Central Government. To this end, when an adverse event occurs (most commonly drought, flood and late frost) the Regional Governments involved file a request to the Ministry of Agriculture which, in turn, after assessing the actual extent of damage, issues the decree which entitles farmers to ask for compensation.

Compensation is then paid based on various criteria determined by the Ministry of Agriculture, mostly depending on the availability of funds, rather than on the actual extent of the damage. In fact, over the years there has been a rather weak correlation between actual losses and compensation paid.

Compensation is, moreover, usually paid several years after the occurrence of the damaging events. These drawbacks, coupled with the unpredictability of the budget cost due to ex-post compensation, have led to several attempts to shift the bulk of the intervention of the FSN towards subsidy to crop insurance.

B) Insurance policy

The current status of public involvement in the crop insurance industry in Italy is regulated by the Legislative Decree n° 102 of 2004, with rules for implementation set out in several Ministerial decrees.

The main features of the system are:

- Every year, an Annual Insurance Plan is issued by the Ministry of Agriculture, determining which crops/types of damage are deemed insurable. For an insurable combination of crop/damage, producers are no longer entitled to ex-post compensation financed by the FSN.
- Insurance policies written for the crop/damage included in the Annual Insurance Plan are entitled to a subsidy for the premium, according to parameters fixed by the Ministry (accounted, on average, at around 40% of paid premiums in recent years).
- Starting from 2006, subsidised insurance is allowed also for losses deriving from cattle disease.
- According to Legislative Decree n° 102-2004, the insurance schemes entitled to state subsidy are: single-peril, combined/named perils, and multi-peril policies, depending on whether the insurance contract covers one or more predetermined perils.
- Since last year, the State contribution is granted up to a maximum of 80% of the premium only to those policies that pay an indemnity when at least 30% of the average production is damaged.

The actual incidence of State intervention is defined in the Annual Insurance Plan and depends on the budget allowance and on the number of farmers who have subscribed to policies.

The terms through which public subsidy is granted are subordinated to the actual availability of public resources (Ministerial Decree of 15th of July 2004).

Starting from the 1st of January 2005, farmers are obliged to take on crop insurance for the whole area devoted to the crop they want to insure that falls within the borders of the township they belong to. Subscription of policies can be both on an individual and on a collective basis, through Consorzi di Difesa, cooperatives and their operating consortia.

The current legislation also allows farmers to create mutual funds. They operate in favour of insured crops and structures and for those crops and structures which have been damaged and are not included in the annual insurance plan. The condition for acceding to payments is that loss regards at least 30% of crop production. Aids can consist in different kinds of intervention, such as: investment grants, five year graduated payment loans, national insurance contributions, deferment of credit operations.

The first year of full implementation of reform of the Italian crop insurance system was 2005. Available data do not seem to show a significant change in comparison with the situation prevailing in the past: the number of contracts signed has not increased radically. In terms of hectares insured, there has been an increase mainly due to the obligation of insuring the entire cropped area of a given product, rather than to a real expansion of insurance coverage to new producers.

The state contribution is constantly increasing in nominal terms, although this is mostly due to the increased share of combined perils policies that benefit from higher public subsidy to premiums (80%). Tariffs show a significant reduction between 2007 and 2011. (Table 1).

Tab. 1 - The crop insurance market in Italy

		2004	2005	2006	2007	2008	2009	2010	2011
Certificates	n°	212.231	212.445	211.444	236.922	264.698	226.177	208.204	207.762
Quantities insured	.000 t	14.894	14.837	14.805	16.329	20.416	18.218	20.090	19.872
Hectares insured	.000 ha	982	1.074	1.125	1.051	1.450	1.355	1.153	1.164
Value insured	.000 €	3.710.212	3.810.222	3.789.132	4.379.809	5.436.140	5.131.045	5.312.829	6.145.146
Total Premiums collected (TP)	.000 €	177.439	269.124	265.033	292.888	338.059	317.210	285.502	287.461
Indemnities (VR)	.000 €	152.165	159.984	149.975	184.626	272.711	234.781	169.259	171.534
Public Contribution *	%	56,80	65,90	66,62	66,78	66,34	67	66,41	66,12
Average tariffs	%	7,5	7,4	7,5	7,22	6,75	6,70	5,78	5,74
VR/TP	%	66,2	59,6	55,4	64	81	75	60	58

* premiums/insured value
Source: Ismea

What is rather striking is that, in the most recent four years for which data are available, the loss ratio has been well below unity. This means that the amount of premiums paid (inclusive of public subsidy) has been almost double the indemnities received by farmers, which questions the need for such a high level of subsidy.

In particular, policies covering damage from hail have diminished in favour of an increased number of policies for named perils, most of all "wind and hail" policies.

Another aspect to be emphasized is that the highest number of the insurance certificates issued in 2011, slightly less than 80%, are underwritten in the northern regions with a high prevalence of the North East which accounts for almost half of the total. The insured values reflect the spatial distribution of certificates, although compared to those in the South and especially in the Centre, the incidence is greater. This reflects the fact that the average values insured in the Centre and in the South are greater than in northern regions (Table 2).

Tab. 2 - Geographical distribution of crop insurance in Italy

Region	Certificates n°	Insured Value €	Premium Collected €	Indemnities €	c/b %
	a	b	c	d	
North East	108.351	2.395.663.321	178.040.328	142.136.898	7,4%
	48,2%	47,4%	57,9%	61,7%	
North West	68.605	1.485.679.557	69.066.291	33.523.735	4,6%
	30,5%	29,4%	22,5%	14,6%	
Centre	14.928	419.503.783	20.409.592	16.761.289	4,9%
	6,6%	8,3%	6,6%	7,3%	
South	33.037	753.880.448	39.925.862	37.860.871	5,3%
	14,7%	14,9%	13,0%	16,4%	

Source: our elaboration on Ismea data

5. The definition of a new strategic framework of risk and crisis management in agriculture and associated tools

The rhetoric that surrounds the debate on public support to privately delivered insurance in agriculture often claims that the benefit to a State because of the widespread use of insurance in agriculture lies in sharing with private insurance companies a part of the financial burden imposed by the need to compensate farmers for damage due to natural causes.

The evidence, however, seems to point against the merit of such an argument, especially in the case of USA, where increasing subsidies to insurance premiums have never succeeded in reducing ad hoc compensatory payments (Glauber, 2004).

In this context, and following what has been said above, to implement a new strategic framework for risk and crisis management in agriculture would require some elements to be clearly defined:

1. understanding the relevance of the risk factors and their potential effect on farmers' welfare;
2. unambiguous distinction between normal enterprise risk and truly disastrous events;
3. definition of the scope for public intervention.

In fact, there are risks that can be most efficiently managed by farmers' own resources, either by diversification of income sources or by coping with the consequences of limited income fluctuations by self insurance. At the opposite end of the risk spectrum, we found risks for which there is no alternative to the reliance on some form of public solidarity, when predictability is so limited that no preventive action might be conceived. Most of the relevant agricultural risks are "in between" risks, with various combinations of frequency, significance and correlation. Hence, no single instrument is ideal under all circumstances. Any sensible policy framework should allow for a sufficient degree of flexibility to adapt to the different conditions.

In the context of agricultural risk management, this requires a preliminary and clear distinction of what constitutes normal enterprise risks in agriculture from what can truly be called a crisis.

Public action that tends to substitute for possible private action should always be avoided. Farmers should retain the main responsibility for management of normal enterprise risk and a clearer distinction needs to be made between normal enterprise risk and truly catastrophic events.

The study makes clear that risk must be measured against the potential consequences on the levels of consumption, not of current income, and that in most cases consumption depends on what is considered the expected permanent level of total family income. Such a position leads to the need to reconsider the predictable welfare implications of exposure of farming to such things as natural hazards or to market crises for specific, single products, and therefore of the benefits associated with direct public intervention. At the same time, the focus of the policy should be on the agricultural consumption units, rather than on production, and therefore less emphasis should be given to what has usually been done on prices, yields, or even income fluctuations per se.

In the strategic design of a new framework for risk and crisis management in agriculture a few points must be considered.

1. Direct ex-post compensation cannot be avoided for unforeseen, systemic dangerous events.
2. Incomplete markets for risk transfer and other forms of market failure prevent private actions from achieving a desirable level of risk protection from society's point of view, and therefore public action other than direct compensation of damage is needed.
3. Public policies, however, might influence incentives for the use of private instruments, creat-

ing a potential for widespread distortion and hindering the development of efficient private markets.

4. Public policies must therefore integrate, recognize and promote to the maximum possible extent, individual farmer responsibility in confronting risky choices.
5. The best level of public intervention should be set, according to the subsidiarity principle.

Two levels of **public intervention** can be envisaged **to manage crisis**.

Compensation for damage is the only option in the short-medium term. However, because the risk of political failures at the local level is higher, it becomes crucial to set unambiguous rules at Community level, stating when such interventions might be triggered. The responsibility for assessing conditions that trigger public transfers ought to be separated from the political authority and delegated to an independent agency. **Only damage to farm assets should be directly compensated**, whereas damage to current production should be excluded. Compensation might take the form of both direct transfer of money, and of financial participation in interests payments on loans specifically intended for damage recovery. In the medium-long term preventive private action that reduces the possible extent of damage caused by natural disaster should be supported.

In the medium-long term, private action that might reduce the extent of damage caused by natural disaster should be supported, for example by **providing incentives to farmers to move from disaster-prone areas, or to make investments in protective infrastructures. Direct public investment in protective infrastructures** might be needed, too.

When normal enterprise risk is considered, as entrepreneurs, farmers should develop their own risk management abilities by making use of private markets for insurance, credit and financial instruments.

In this case, public intervention should act in order to promote the private market or to favour the development of private ability to manage risk. Several actions can help in this direction:

- **providing the needed regulatory institutions and informational support** in order to promote the expression of the private demand for market-based risk management tools, while guaranteeing competition on the supply side.
- **promoting the constitution of precautionary saving accounts** through direct and indirect incentives, such as fiscal benefits, in order to increase the potential of self- insurance against some of the less severe risks at the individual farm level
- **promoting concentration of the demand for risk management instruments** in order to have more efficient access to all of these markets. In this case, supporting the operation of **mutual funds** is an effective way of fostering the development of risk markets. In addition, to improve efficiency in risk transfer, the concentration of demand will also have the effect of internalizing monitoring costs, thus increasing the scope for mutual management of some of the risks which, by their nature, might be difficult to transfer because of the presence of asymmetric information.

It should be evident that the institution of such a framework will require a thorough revision of existing policy within the CAP. With a new EU risk policy put in place, there would no longer be justification for the market stabilisation features of various CMOs. In fact, although the role of price intervention has been widely reduced, several CMOs still grant forms of market stabilization aimed at smoothing price variability. This set of measures still absorbs a non-negligible share of the overall EU budget devoted to agriculture. Removal of these market stabilization measures would release financial resources that could be more effectively employed within the new risk management framework.

6. Conclusions and recommendations

On the basis of what we have said in the previous parts of this study, a few important conclusions and recommendations may be drawn.

First, and most important, it should be emphasized that we need a new policy framework of risk and crisis management. It is quite evident that, after the CAP reform and in a new EU risk policy framework, there is no longer justification for continuing measures which support market stabilisation the effects of which are far from clear and that might create conflict between instruments. This is especially significant considering that public resources available for an effective risk and crisis policy are rather limited.

In this context, the income stabilization tool (IST) is one of the major novelties of the proposed Regulation for Rural Development 2014-2020, and entails a quantum leap compared to the risk management measures currently available under the CAP. The IST aims to protect farmers from the risk of excessive reduction in annual income, providing comprehensive coverage, not limited to traditional production risks, but extending to any event which may have a negative impact on farm income.

Given the innovative scope of the measure, and the benefits that it can bring to an agricultural sector increasingly exposed to fluctuations in international markets, it seemed appropriate to verify its applicability and sustainability within Italy in the medium and long term.

Currently, great uncertainty surrounds the IST with regard to the estimates of expenditure for two reasons:

- As a new measure it is difficult to make accurate predictions about the number of farms taking part;
- The diverse nature, and often systemic aspects of the risks covered make it difficult to estimate the annual value of any losses incurred.

Under such conditions of uncertainty, it becomes risky to programme the measure, particularly in Regions with large budgets and little aptitude for risk management by farms, as is the case for various Regions of the country.

Regardless of the resolution of doubts at EU level and the critical issues raised, in order to evaluate the implementation of the IST in Italy it is necessary to estimate the cost of the instrument and verify its sustainability over time.

Second, one of the main themes of the discussion included in this study is that, in both technical and political discussions on the consequences of risk and the role of public policies, a clearer distinction ought to be made between normal enterprise risk and truly catastrophic events. Without such a precise distinction, the possibility of confusion and of inappropriate competition among public and private actions for risk management becomes real. The use of private instruments, which in many cases are efficient enough to guarantee socially acceptable protection to farmers at a limited cost, will be greatly hindered by the presence of public policies that, even if well intentioned, could imply large inefficiencies and unjustifiable distributional effects.

The discussions so far may have given the impression that the tendency has been to overvalue the welfare cost possibly associated with income fluctuations that are not so uncommon as to constitute a risk of which farmers might be unaware, and therefore to suggest a larger public involvement (under the two forms of ad hoc relief payments and of State participation in the crop insurance market) than was really needed, whose distributive effects are often uncertain.

To conclude, the following recommendation can be put forward:

For catastrophic risks:

1. Private insurance against truly catastrophic damages seems unfeasible, unless on a global scale, and therefore the direct role of government through direct compensation for damage via operation of national solidarity funds seems to be unavoidable.
2. Only that damage which is in excess of the normal enterprise risk must be considered in direct compensation. And only that which truly compromises the viability of the enterprise.
3. The exposure of solidarity funds could be hedged on the global financial market.
4. The resources to finance solidarity funds might be in part obtained by taxing risk-taking behaviour (such as lotteries) or luxury consumption (entertainment)(13).

For normal enterprise risks:

1. When the set of existing conditions and the policy of European agriculture are duly considered, enterprise risks in agriculture do not exceed in level and scope those of other sectors of the European economy. Therefore the question arises as to whether they should receive a differential treatment at all.
2. Nevertheless, private markets that could be effectively used to manage those risks are not yet fully developed. The main role of governments should be that of facilitating the operations of private markets, such as those of insurance and other financial instruments (namely, futures on commodity prices, options on agricultural yields, options on weather events) by directly targeting the cause of market failure, i.e., by providing regulatory institutions and informational support rather than by subsidizing premiums, which is like filling with water a tank with holes in it.
3. At the initial stage of development with financial instruments such as yield options or weather derivatives, the Governments could enter directly into the markets by issuing options covering both positions, on an experimental basis (i.e., trying to sell the guarantee against low rain in the summer to farmers and that against excessive rain in the summer to tour operators).
4. Financing of these instruments can be achieved by the MS without recurring to CAP funds, when the measures are clearly not market distorting.
5. Credit subsidy and other forms of intervention (such as tax deferral) can be used to help farmers overcome the negative impact of catastrophic events for the part that corresponds to normal enterprise risk.

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