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RISK MANAGEMENT TOOLS IN AGRICULTURE: SOME REFLECTIONS ON THE OPPORTUNITIES AND LIMITATIONS OF THE EUROPEAN COMMISSION PROPOSAL

JEL classification: Q18, Q14, G22, G28, G32, H50

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Abstract. *Economic risk management tools in agriculture have been the subject of renewed interest and profound evolution, not only for the their increasing diffusion in national policies in support of agriculture but also in relation to the important role that they could have in adapting agriculture to climate change within the measures of the future CAP.*

The contribution that economic tools for risk management can bring in this context is related in particular to their flexibility and adaptability to farm needs. Starting from an analysis of tools currently in use at international level and taking into consideration the Italian experience in risk management at national level (the National Solidarity Fund), this paper aims at highlighting both the potential and limitations of risk management tools in the context of the new CAP and its challenges.

In fact, in order to be effective, these tools need strong integration in a wider framework of policies and actions on climate change adaptation. Moreover, it is crucial that, when designing these tools, consistency with other key agricultural objectives is ensured, most notably food security and environmental sustainability.

Keywords: *climatic risk management, CAP sustainability, agriculture and climate change, insurance schemes*

1. Context

The use of economic risk management tools in agriculture has recently been discussed with renewed interest for their potential, within agricultural policy, for supporting farms in situations of crisis. The role that economic tools for risk management can have in this context is related in particular to their flexibility and adaptability to farm needs under increasing uncertainty and volatility of markets.

The emerging new interest is also due to the important role that these tools could have in adapting agriculture to climate change and the occurrence of extreme events. The key concepts are that agriculture is one of the sectors most exposed and vulnerable to climate change and that the uncertainty of scenarios requires the definition of flexible tools in order to manage risk.

The European Commission's proposal for CAP towards 2020 in the new regulation on rural development policies (European commission, 2011) introduces a kit of measures for risk man-

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agement in agriculture and some countries have started studies and evaluations in order to face up to the most problematic aspects of these tools as well as integration between them and other policies in order to avoid overcompensation. In fact, referring to the structure of the EC proposal, the characteristics of agriculture and to the evolution of risk management in the European countries, some reflections are necessary in order better to understand the potential role of these economic tools in supporting farmers within the new CAP, in order to improve the effectiveness of the policy.

Several studies have been started about the technical aspects and impacts of the proposal on feasibility, cost-effectiveness and also the juridical structure of the policy measure (Adinolfi *et al.*, 2012; Adinolfi, 2011). It is, however, considered crucial to give some consideration also to the general policy approach, as the definition of these tools must be consistent with other key agricultural objectives, in particular the adaptation of agriculture to climate change, most notably for the consequences for food security and environmental sustainability.

2. Managing risks in order to manage uncertainties in agriculture

Mediterranean and Italian agricultural sectors are fragile in particular because of the wide variety of ecosystems, microclimates and environmental conditions, as well as the variety of agricultural production based on the quality and territorial specificity of its products.

According to the generally accepted economic meaning, in business management the planning phase seeks to consider all factors that may influence the expected result. However, there are some external factors with unpredictable behaviour that generate uncertainty and potential risk.

The agricultural sector presents important peculiarities, as production is strictly correlated to environmental and climate factors that, by their very nature, are hardly subject to management control. In short, agriculture has a higher exposure (to climate events) and higher vulnerability (to the consequences of events).

In particular, the production risk associated with adverse weather conditions[1] (generally speaking the "climatic risk"), understood as the risk that the yields or the quality of production are lower than expected owing to the effect of adverse meteorological or environmental events, has always been considered as a matter of priority and perceived as medium/high risk (in terms of likelihood and damage).

The concept of climatic risk may also encompass the behaviour and diffusion of physiopathologies and parasitic attacks, which appear in the long term to be abnormal, as a result of exceptional events.

Agriculture in the Mediterranean basin has a higher degree of exposure and vulnerability to climatic risk compared to other areas for the following reasons:

- it is based on the quality of production rather than on quantity, that is, on production with high added value and with significant economic relevance also in terms of exports. Therefore, equal damages in quantitative terms, correspond to higher economic loss;
- environmental and climatic conditions of Mediterranean countries are extremely heterogene-

[1] The concept of adverse weather conditions is not clearly defined at international level. According to the European Commission's community guidelines for state aid in the agriculture and forestry sector 2007 to 2013, national disasters include earthquakes, avalanches, landslides and floods. The Commission does not recognize the insurgence of plant and animal diseases or exceptional events unless the latter are particularly calamitous (in terms of diffusion) and the Member State justifies the exceptional nature of such an event.

ous. This factor renders production more diverse and rich but also entails higher risks for the territorial specificity of production.

Given these considerations, risk management on farms has always represented an important element and, in certain cases, a decisive factor for the farms' very existence.

In this already complex contest for risk management, climate change (CC) raises fundamental questions regarding the future of agricultural production. In fact, compared with baseline scenarios, climate change increases the level of uncertainty and variability of the environmental conditions under which agriculture operates and thus heavily influences cropping cycles, agricultural practices and farm management.

Recent and ongoing studies[2] highlight the possible effects of CC on the agriculture of the Mediterranean, most notably Italian, taking into consideration the main climatic variables in different zones of the Member States and, in certain cases, simulating the effects of such changes on specific aspects such as yields, water availability and phytosanitary conditions.

Concerning productivity, the common understanding – yet to be verified in more specific situations – is that the increase in temperatures and the decrease in precipitation may cause a reduction in production owing to the impacts on irrigation (less water available), cultivation systems (modification of cropping cycles, riskiness of pathogens, modification of the entomological component) and on animal production. For instance, scenarios on phytosanitary conditions reveal that higher temperatures may favour the development of pathogens also due to the increased thermal and water stress on crops which are thus subject to higher vulnerability, and to the arrival of new pathogens typical of subtropical areas.

Moreover, the impact of the increase in temperatures on animal health and well-being is also being debated: notably, the effect of high temperatures on the nutrition of the breeding stock (reduced appetite and reduced productive and reproductive capabilities as a result of increased stress).

In short, even if agriculture has always adapted naturally to environmental conditions, the ongoing climatic changes put forward specific problems, such as:

- the speed of the changes in relation to the ability of agri-ecosystems to adapt;
- the increasing frequency and the higher magnitude of extreme meteorological events such as drought and floods;
- the uncertainty of climate change scenarios;
- the global production of food: while changes in climate may create new production opportunities, they may generate more important preoccupations regarding the ability of agricultural systems to ensure food security for an increasing world population.

The above considerations complicate the context in which business choices take place. The latter become increasingly more uncertain regarding the type and quantity of production and regarding the execution of practices, i.e. seeding, irrigation, phytosanitary intervention and harvesting (when, how, how much). In other words, farmers are today faced with the choice, on the one hand, to continue operating as usual (entailing a higher risk), or investing in a more complete risk coverage, adapting the farm and its management.

Different types of actions are available, most notably:

- structural: actions for the improvement of business infrastructure and of the territory in order to reduce the exposure and vulnerability to the effects of CC.

[2] Projects financed by CLIMAGRI, Agroscenari Programme, AdaptAlp.

- management level: improvement of farm and territorial management (business planning, innovation and modernization of management, diversification of activities and production), decision-making support and early warning for drought, floods, landslides and pathogenic attacks.
- economic: financial and economic tools to cover risk such as insurance, compensation funds, mutual funds, investment funds, etc.

Concerning in particular the latter category, traditional tools are considered useful, compared, for instance, with structural or infrastructural investments, for their characteristics of flexibility and adaptability at the stage both of definition and of application (contracts with subject and objectives that are modifiable in time and space). In the context of CC, such characteristics are even more important (and indeed useful) given the uncertainty regarding the effects and impacts on production. This is because economic tools are adaptable in terms of objectives and substance as different scenarios may unfold.

Several studies try to explain the role that these tools can have in the context of increasing uncertainty, showing that risk management at local and farm levels represents one of the most important elements and key challenges (OECD, 2009).

The analysis of the international context (Mahul and Stutley, 2010) demonstrates that the diffusion of risk management in agriculture through these economic tools, primarily insurance, is based on the possibility of benefiting from supportive public policies (Bielza *et al.*, 2009; Cafiero *et al.*, 2007). In most cases, public support is in fact targeted to the specific needs of each context: adverse climatic events in the EU and North America, and more recently also in Australia, as well as the objectives of agriculture and development in South America, are all cases in point (the most frequent being agricultural insurance) (Pontrandolfi and Nizza, 2011a).

The transformation of climate is going to modify (is modifying) the behaviour of the main variables that impact risk distribution both in terms of pattern and of measurement, mainly that of production.

Tendentially, an increase in general levels of risk is to be expected, as well as intensification of uncertainties and question marks regarding the behavior of the main reference parameters (first and foremost temperature, precipitation and yields).

3. The current status of risk management systems in Italy

Italy has a strong tradition of risk management in agriculture. This is mainly because of its particular climatic, environmental and production characteristics, which determine strong heterogeneity and complexity of variables as well as higher exposure and vulnerability to risks associated with meteorological and climatic conditions.

Since the 1970s, the insurance market has offered single-risk hail insurance with the partial coverage of the "National solidarity fund for natural calamities in agriculture" established and dedicated to the financial compensation of farmers hit by natural disasters. The fund was reformed in 2004 (legislative decree n. 102/04), with a change in principles and economic tools. The main objective is to promote actions for prevention to cope with damage to production, infrastructure and productive equipment. The types of intervention foreseen are as follows:

a) measures for insurance contracts: aid for payment of insurance premiums (public contribution up to 80 percent of premiums with a damage threshold of above 30 percent). The measure is voluntary and is applicable to both individual and collective forms of organisation (consortia or cooperatives).

b) compensation measures for damage to production, infrastructures and equipment, aimed at helping the economic recovery of farms that have suffered more than 30 percent for damage not covered by insurance.

This approach responds to two different risk management strategies:

- transferring the risk to third parties, traditionally associated with insurance and generally used for risk management with medium probability of the event happening and with a medium degree of damage.
- accepting the risk, generally associated with a low probability of events with a high level of damage.

It is important to highlight that the principle of exclusion, which is not always applied in other countries, is foreseen for both types of tools: it is not possible to give compensatory contributions for insurable risks (included in the National agricultural insurance plan, approved by decree of the Ministry of Agriculture). The 2004 reform and its evolution in 2005-2009 highlight the choice to give more importance to insurance, which today covers around 80 percent of the available contributions.

Furthermore, in recent years, the demand for and offer of insurances has widened and diversified: the introduction of new insurance types (pluri-risk and multiple risk), in addition to traditional ones (single-risk of hail), has certainly contributed to the diffusion of insurance in areas where they were traditionally lacking (Capitanio and Cioffi, 2011). In recent years, there has been a constant increase in pluri-risk policies, which today cover approximately 46 percent of the agricultural insurance market (Razeto, 2011). Pluri-risk insurance linked to adverse meteorological conditions (drought, hail, floods) has had a significant diffusion.

At legislative level, a number of already existing opportunities arise from combining EU and Italian law, even if some of them are not considered implementable or of interest for Italy. Contributions for insurance premiums can also derive from the Common Market Organisation (CMO) for Wine and Fruit, even if to date only the premiums for the Wine CMO have been utilized. Since 2010, for the first time in the history of the Common Agricultural Policy (CAP), some contributions for risk management tools come directly from the CAP Regulation 73/2009. Specifically, Italy has implemented article 68 (d) relating to contributions for insurances.

Currently, in Italy public contributions for insurance and compensation funds are available. An issue discussed is the ability of the system to satisfy the exact needs of the agricultural sector with regard to the occurrence and damage caused by adverse events. In the period 2007-2011 the insured value[3] of production has increased from €4.3 billion/year to €6.1, but the role of compensation funds is still strong and it seems to have increased in recent years (from 2006 to 2013 more than €6 billion of financial aid for compensation[4]) in relation to the adverse events that occurred (severe drought in 2012 and several floods).

For these reasons, the most debated topics are the following:

- at legislative level, the lack of tools complementary or supplementary to insurance and compensation funds in order to manage other levels and types of risk not yet covered (market crisis, diseases, etc.).
- the insured base is still considered to be excessively low (approximately 18 percent of national production) despite significant public contributions[5].

[3] www.ismea.it

[4] Data from Italian Ministry of Agricultural, Food and Forestry Policies.

[5] Data from: Ministero delle Politiche agricole alimentari e forestali (Ministry of Agriculture, Food and Forestry policies).

- the disparity in geographical distribution with a predominance of premiums in Northern Italy (70-80 percent).

It is worth noticing that in recent years the need has emerged for introduction of new tools enabling wider choice and freedom of action for farmers in difficulty, given the increase in the frequency of adverse events linked to CC.

4. Opportunities emerging from CAP reform: the EC proposal on risk management

Following the European Commission's communication adopted in November 2011 on future directions for CAP towards 2020, a proposal for a Regulation on rural development has been put forward and is currently being negotiated (European Commission, 2013). The proposal, for the first time, introduces in the European Union a comprehensive policy framework of measures and tools for risk management in agriculture. The proposal acknowledges that the agricultural sector is more vulnerable than other sectors to damage to its production potential as a result of natural disasters. Therefore, support to farmers for the recovery of the agricultural assets damaged by natural disasters, as well as support for risk management notably in the is required.

Most notably, the proposal introduces a specific measure for risk management, providing support for:

- crop, animal and plant insurance premiums against financial losses caused by adverse climatic events or by animal/plant diseases (art. 51);
- mutual funds[6] to pay financial compensation to farmers for losses suffered as a result of the outbreak of animal or plant diseases or environmental incidents (art. 52); contributions may include: the administrative costs of setting up the mutual fund, spread over a maximum of three years in a degressive manner; the amounts paid by the mutual fund as financial compensation to farmers; interest on commercial loans taken out by the mutual fund for the purpose of paying the financial compensation. No contribution of public funds is accepted to the initial capital of the fund (paid by farmers).
- an income stabilization tool, in the form of financial contributions to mutual funds to compensate farmers that have suffered a loss of over 30 percent of their income[7] (art. 53). Payments by the mutual fund to farmers shall compensate for not more than 70 percent of the income loss.

Mutual funds have a certain degree of spread in Northern Europe and notably in the livestock sector covering the risk for animal diseases (Netherland, France). In Italy, there is a general interest in mutual funds: some experiments have been attempted in the North of Italy, but they are contingent and intermittent, even though the results are considered positive (Pontrandolfi and Nizza, 2011b).

In the cases analyzed no public contributions to mutual funds are present, therefore imple-

[6] By "mutual funds" the EC means a regime recognized by the Member State, in line with its legal system (Member States define rules for the establishment and management of funds), which allows member farmers to cover themselves and to benefit from compensatory payments in the case of economic losses.

[7] Income reductions must be in excess of 30 percent of the average income of the previous 3 years or of a 3-year average based on the previous 5 years excluding the highest and lowest years in terms of income. Income is referred to as the sum of revenues that the farmer receives from the market, including any form of public support.

mentation in CAP Health Check (Regulation 73/2009) and the CAP reform of a specific measure is quite an important innovation in risk management policy.

In general terms, the existence of mutual funds that do not benefit from public contributions may imply that the agricultural sector has enough confidence in such a tool.

Mutual funds are not considered to be in contrast with insurance but rather as important and potential complementary tools, able to cover types and levels of risk that are non-insurable, for instance animal/plant diseases.

It has also emerged that the stronger competition ensured by the very existence of a fund is generally considered to have a positive effect on insurance premiums (they tend to decrease) and their features (more specific to farm needs). In areas where insurance premiums paid are much higher than compensation received, investment in a mutual fund may be considered more effective and useful.

Essentially, the most evident positive effect is the placing on the market of a new and complementary risk management tool.

Referring to the EC proposal, it is foreseen that a specific regulation must be adopted by Member States to govern the institution and management of the mutual fund, from the juridical and administrative to its economic and financial aspects (authorization by a competent authority, transparency of financial flows, rules for the allocation of responsibility and for compensation, etc.).

The **Income stabilization tool** (IST) in the CAP reform deserves particular attention. Income as a variable is not a component of risk. Income is the final result, while the risk factors are the variables influencing the result. In any case, in the global context, the choice of income stabilization tools represents an emerging and much-debated issue since recent market crises as well as price volatility (INEA, 2010) have underlined the need to find new ways for income stabilization in agriculture to complement traditional income support measures (present in all Member States with different support policies and tools).

The IST is considered for the first time in European policy as an instrument to help farmers in case of an excessive reduction in income, independently of the negative event which occurred (for instance, an adverse climatic event or a market crisis) (Adinolfi *et al.*, 2012).

As regards the objectives of income protection (a kind of safety net), a heated debate is under way at European level (Chatellier, 2011), including the Italian Government and the scientific community.

The most critical aspects are:

- the allocation of the IST to the Second instead of the First Pillar of the CAP. The criticism refers not only to the nature of the tool, but also to the rules for implementation (multi-annual contracts, administration and timing of proceedings, disengagement rules, etc.) and the spatial scale (in Italy regionalized[8]) of rural development measures, which may not be appropriate for managing the necessary support to farmers in case of crisis (immediate actions for recovery after the damage and reimbursement immediately effective);
- the evaluation of the income loss (regional and sectoral indices proposed seem inadequate (JRC, 2009) and its calculation at farm level (links to fiscal systems and availability of historical data);
- the integration with other risk management tools in order to avoid overcompensation;

[8] Italy has proposed amendments to the legislation to create a National programme for risk management measures.

- the difficulty of estimating the financial needs to implement the measure in the Programmes;
- the performance of the new measure, in particular the challenge is to enhance the participation of farmers in relation to their financial conditions (ability of farmers to participate with financial capital to the creation of the fund).

The aspects of the introduction of an IST considered more positive are:

- this would be the first risk management tool adopted in a policy context explicity covering the farmer's income from the risk of adverse market conditions such as volatility of prices, costs for raw materials and inputs (Capitanio *et al.*, 2011);
- the choice of the mutual fund for IST could ensure less issues of adverse selection and moral hazard typical of an insurance tool since it is based on farmers' agreement and association, shared knowledge of risks and participation in management and control;
- major opportunities arising from the allocation to the Second Pillar are the potential synergies between risk management tools and other rural development measures of a more structural and management nature, which could contribute to a reduction of exposure to risk and of the vulnerability of farms (first and foremost agro-climatic-environmental measures, product diversification, irrigation infrastructures, technological and management innovations and formation-information- advisory services);

Concluding this part, it is important also to consider the document "**Green Paper on the insurance of natural and man-made disasters**" produced by the EC in 2013, accompanying the launch of "An EU strategy on adaptation to climate change" (European Commission, 2013). The document discusses several issues concerning the adequacy and availability of appropriate disaster insurance with the objective "*to raise awareness and to assess whether or not action at EU level could be appropriate or warranted to improve the market for disaster insurance in the European union* […] *and help to promote insurance as a tool of disaster management and thus contribute to a shift towards a general culture of disaster risk prevention and mitigation, and bring in further data and information*". A general consideration must be made regarding the explicit choice of insurance as tool to manage the risk of natural disasters in a context of adaptation strategy to CC. There is no doubt that the exposure and the vulnerability to changes create the need for innovative instruments to face the economic damage of natural disasters, more and more frequent ,and at the expense of society as a whole, as a result of increasing risks. The document also expresses the importance of combining the natural disaster insurances with preventive measures; the role of the actions for reduction of exposure and vulnerability, however, seems minor in relation to the enhancement of the insurance tool (which is also proposed as compulsory in some cases), in the launching of public-private partnerships and Governments as reinsurers. Describing the needs for risk prevention actions, the EC considers that citizens and owners could be more protected with insurance ("*insurance is a critical requirement for development as uninsured losses can extend the cycle of poverty and impede economic growth*") and that "*disaster risk management can help to promote undisturbed economic development*". From this point of view, the EC approach and the choice to publish the Green paper as an accompanying document of the adaptation strategy could be considered as a sign of strong orientation of the policy to transfer the risks through economic and financial tools more than as enhancing public prevention actions, while in designing policies a more complete perspective of disaster risks would be necessary, together with a more comprehensive strategy for prevention and safeguard of the population, the territory and most vulnerable human activities, primarily agriculture.

5. Final Considerations

Referring to the European and Italian experiences and the results of the researches already done in this field, several issues need to be further investigated and expanded in order to define the future CAP and to develop the risk management system.

Without considering all the technical aspects and critical points under discussion to ensure the effectiveness and efficiency of the proposed policy measures some considerations about the general policy approach could be useful to the debate.

Several observations can be made on the opportunities offered by economic risk management tools with regard to the objective of protecting European farms from risks and adapting agriculture to climate change. There is no doubt that this type of tool is useful to farms in order to face the increase in risks, in particular considering the uncertainty and complexity of the factors involved in production. In the presence of unforeseeable and extreme events, in terms both of occurrence and magnitude, risk coverage can determine the very survival of the affected farms.

However, it is important to highlight that risk management through economic tools cannot itself represent the only answer, as its limitations as well as its effectiveness largely depend on the conditions in which farms operate at business and territorial level. In other words, without a good risk assessment the economic tools could result ineffective (for instance, insufficient financial coverage of damage or lack of incentives to activate insurances). For instance, if the occurrence of floods increased and the area is not protected from hydrological risks, an economic risk management tool would not cover the damage caused by the extreme event. Similarly, the tools would lose effectiveness if no preventive actions are taken at farm level (anti-hail nets, improvement in irrigation, maintenance of ditches, strengthening and adjustment of infrastructure, etc.) and at management-level (risk planning, farm innovation and modernization, diversification, farm advisory system and early warning system).

It is important, moreover, to integrate the risk management policy in a wider context of environmental sustainability and food security. With regard to environmental sustainability, the main concern is the occurrence of "maladaptation" phenomena (lowering of the farmer's attention towards maintenance and innovation of land, water and soil management, given the presence of an economic tool covering possible damage). The same concern may arise in relation to the food security objective, as these tools safeguard farmers' incomes, not the production level. Of course it is difficult to estimate the impacts of a wide diffusion of risk management tools on production levels, nonetheless it represents an element worthy of consideration when designing policies.

These considerations are even more relevant when operating in a national or international policy context: when choosing to allocate public funds to risk management, the ineffectiveness of these tools would imply inefficiency of public spending.

It is thus of crucial importance that risk management tools are placed within a more general integrated strategy, clearly defining complementary actions and synergies within structural, management and economic actions as well as ensuring consistency with other strategic objectives.

Concluding, critical points to discuss in the definition of the European policy on risk management in agriculture within the CAP reform are:

a) the necessary preliminary analysis on risk conditions (parameters, risk levels and interrelations) and risk assessment which justify the choices made on policies and public aid;
b) the analysis of demand, for risk management tools with policies oriented more to market

supply (insurances); this tendency can create inefficiency and ineffectiveness of the policy and the tools (economic aid even for not-insurable risks, consequent imbalance between contributions to premiums and ability of companies to indemnify damage, insufficient financial coverage of damage);

c) a low level of integration among the available risk management strategies (reduction of exposure and vulnerability, transferring and acceptance). In general the object of policies is only or mainly trasferral of risk. A multilevel (farm and territorial, management and structural), integrated approach seem more appropriate to ensure the effectiveness of the the long term policies.

Taking into account these considerations, it is important to define policies, objectives and tools starting from risk assessment and demand for risk management tools and then specify the more appropriate tools to support farmers, in synergy with other structural and management measures.

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