

## RISK MANAGEMENT IN THE AGRICULTURAL SECTOR WITH SPECIAL ATTENTION TO INSURANCE

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**Abstract:** The agricultural sector is highly affected by the weather conditions and losses will likely increase in the future as natural disasters become more frequent (IPCC, 2012). There are a number of tools available in agricultural risk management; in this article we review agricultural insurance schemes of several OECD countries with special attention to the role of the government and the promotion of risk reduction and good agricultural practices. At the end we conclude that while public involvement can significantly increase penetration; the lack of self-efficacy is still a major challenge in many systems, which countries are addressing in different ways. The new Hungarian system could potentially become an example of successful public-private partnership that addresses the self-efficacy problem in an efficient way.

**Keywords:** agriculture, risk management, insurance, climate change, risk reduction, OECD countries.

### Introduction

The agricultural sector, as any other segment of the economy, face risks coming from a wide range of sources. Diverse classifications have been used in the literature to group these risks (USDA, 2014; OECD, 2000; Bielza et al., 2008; Székely and Pálincás, 2008) and the most commonly used one identifies the following five main types of agricultural risk: human risk, asset risk, production risk, price risk and institutional risk. While some of these can be considered as common risks to all businesses (including human factors and uncertain market circumstances for instance), agriculture, due to its close links to climate, is one of the most exposed sector of the economy to weather conditions. Székely and Pálincás (2008) identified natural catastrophes and price fluctuation as the most significant risks in the sector. Although their research focused on five European countries (Hungary, Germany, The Netherlands, Spain and Poland), other parts of the world face similar challenges: in the course of 2012, the Federal Crop Insurance Program (FCIP) paid out USD 17.3 billion in crop losses due to extreme weather events (NRDC, 2013), much of which could have been prevented. While agriculture and non-farm rural employment have a decreasing share in the overall economy of many developed countries, rural people's livelihoods continue to be linked to agricultural production and related services. But the role of the sector goes far beyond the livelihoods of rural population: agriculture is fundamental from the point of view of global food security. Thus the public sector is often involved in the management of agricultural risks (e.g. Common

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Agricultural Policy (CAP) of the EU). Although the latest IPCC assessment report highlighted that some farmers are taking actions to manage their climate-related risks and already adapting to the observed changes by altering cultivation and sowing times for instance, a number of barriers remain and limit these actions including inadequate information and financial constraints (IPCC, 2014).

Risk transfer tools in general, and insurance in particular are major player in risk management. Recently more attention has been paid to the impacts of extreme weather events in the insurance industry in one hand; and the role of insurance to manage disaster risk in the other hand. While these discussions are primarily focused on property damages, agricultural insurance is also getting more traction. For instance, insurance has been included in the risk management toolkit of the recently reformed CAP (European Commission, 2013), while at the same time there are heated debates in the US how to reform their Federal Crop Insurance system in order to better promote appropriate risk management practices among farmers (O'Connor, 2013).

This article reviews agricultural insurance schemes covering natural disaster risk (especially flood) in OECD countries to demonstrate the role of insurance in agricultural risk management. Our investigation pays special attention to the following issues: the role of government (premium subsidies, ad-hoc aid etc.) and promotion of risk reduction and good agricultural practices. The discussion is organised as follows: Section 2 introduces insurance as a tool in agricultural risk management. Section 3 gives an assessment of the agricultural insurance schemes of five OECD countries. Finally Section 4 concludes and summarises the most important findings.

### **Insurance as a tool to manage risk in the agricultural sector**

Risk management involves the identification, measurement and assessment of risk followed by the development of appropriate risk management strategies (Popa et al., 2011). Insurance (and other risk transfer instruments) is one of the tools available in risk management, which operates on the principles of risk pooling. Traditional insurance is a contractual transaction that guarantees financial protection against potentially large loss in return for a premium; if the insured experiences a loss event, then the insurer pays out a previously agreed amount (UNISDR, 2009). Risk-pooling spreads the cost of losses among a large number of policyholders, which helps keeping costs (premiums) low. The insurability of any kind of risk is conditional and it requires the following criteria to be fulfilled: symmetric information between stakeholders, independent risk, large number of exposed units, calculable chance of loss, measurable and determinable loss, significant potential losses (Skees and Barnett, 1999).

While the insurability of risk is certainly essential pre-condition of a functioning insurance market, affordability is an equally important issue. Affordability is an especially relevant topic in the context of farm insurance since the ability of farmers to pay for insurance could potentially be very low, particularly in

developing countries (Singh, 2013). For this reason agricultural insurance against natural hazards – such as flooding – is often publicly supported by the state (Bielza et al., 2008) either in the form of premium subsidies or by the formulation of public private partnerships (Huber, 2004; Green, 2004). In addition governments also often provide ad-hoc aid after major disasters (Bielza et al., 2008). While some authors have criticised subsidised crop insurance on several counts (Skees et al., 2005; Mcleman and Smit, 2006) the market, in general, is characterised by strong public involvement.

The agricultural insurance market has seen a fast growth over the last decade and global agricultural insurance premiums exceeded USD 25 billion in 2012 with the North-American and European markets generating 70 per cent of the premium income (Maureder, 2013). Although emerging markets (especially China and India) are the main source of the recent annual growth, overall, the penetration is still very low in these countries. While the global penetration of agricultural insurance was estimated at 0.83 per cent (insurance premium as a per cent of sector added value), the penetration in China and India remains well below 0.5 per cent (0.36 and 0.19 per cent respectively) (Swiss Re, 2013). Therefore in the next section we will access some insurance schemes of more advanced countries, where agricultural insurance has a longer history and plays a more significant role in the compensation of crop damages.

#### **Agricultural insurance in OECD countries**

In this section we will investigate the agricultural insurance market of five OECD countries including the US, UK, Poland, Greece and Hungary. There are many studies available on this subject (for a good overview see Bielza et al., 2008 and Mahul and Stutley, 2010) therefore our aim is not to present the technical details of each scheme rather to assess against the following three criteria: role of government, promotion of risk reduction and good agricultural practices, and finally affordability. Our investigation will primary focus on flood risk.

#### **United States of America**

The first Federal Crop Insurance Program (FCIP) was set up in 1938 in the US and has been reformed several times since then (IICA, 2012). At the moment four different insurance schemes are available providing policies for more than 100 different crops (Morgen, 2007). Farmers can choose from yield, revenue, whole-farm income and area index insurance, which are all public subsidized (up to 66%) and reinsured by the government, indicating high state involvement on the market (Stebbins, 2014). Moreover catastrophic coverage (CAT) is also available for some policies. It pays 55 percent of the established price of the commodity on crop losses in excess of 50 percent. Premiums on CAT coverage is paid by the Federal Government, farmers have to pay only an administrative fee that is around \$300. It covers losses due to drought, flood and other disasters determined by the USDA.

The availability of CAT is limited (depending on the insurance product), however it is available for “high risk areas” in some cases (USDA, 2009).

While strong governmental involvement (i.e. highly subsidised policies and public reinsurance) made the US agricultural insurance market the largest in the world (The Economic Times, 2014), it is, at the same time, also the most criticised point of the system. Premium subsidies were dramatically increased by the Agricultural Risk Protection Act in 2000 (GPO, 2000) and it is often argued that it over-compensates both the farmers and the insurance companies (Babcock, 2013). Claire O’Connor, agricultural water policy analyst made the following statement concerning the FCIP: “The Federal Crop Insurance Program has failed farmers and taxpayers by ignoring water challenges. The program was designed to be a safety net, not a subsidy for increasingly risky practices and less sustainable food production” (NRDC, 2013).

### **United Kingdom**

There has been such a different system in the UK, where agricultural insurance is fully private, non-subsidised with one dominant company that covers 75% of the market (Bielza et al., 2008). Coverage available for growing crops (only for hail) and livestock (for several disease), but the schemes are not compulsory. Penetration rate is rather low, only 6.9% of the total agricultural area is insured (Bielza Diaz-Caneja et al., 2009). Coverage for flood risk is available only for farm buildings and machinery, but not for growing crops, which might be surprising taking into account that fact that the 2007 floods affected 42000ha agricultural land and caused crop losses between £7.6 and £19.3 million (Posthumus and Morris, 2008).

In order to better understand the reasons behind the less developed agricultural system it is essential to analyse both the supply and demand side. Insurance companies offer insurances in those situations where the conditions of insurability (Skees and Barnett, 1999) are met and the risk /reward ratio is favourable for them. The interview with the dominant insurance company (Lorant, unpublished material) highlighted the lack of sufficiently large pool of risks and customers with the propensity to buy insurance and the existence of adverse selection. It was also confirmed that it is unlikely in the near future that profit-orientated insurance companies will provide wider flood coverage to farmers without the public involvement.

Focusing on the costumers’ side Gene (2011) provides three explanations for low demand: 1. price; 2. liquidity constrains of farmers; 3. lack of trust towards insurance companies. Besides all these, the risk level should be also mentioned as fourth reason. If the risk level is lower than farmers’ risk tolerance it is unlikely that they will voluntary pay for any insurance products. Lóránt and Fekete (2013) investigated this relationship between risk level and willingness of pay in the context of agricultural flood insurance and found the following equation:  $WTP = 0.0237 + 0.4255 * \text{Damage Cost}$ . The same study also highlighted the reasons

behind the low demand from the farmers' side, which is partly related to the low risk level compared to farmers' risk tolerance. In addition farmers had the view that by following good agricultural practices and implementing some additional measures could provide a sufficient protection against flood damages. However it should be kept in mind that until recent years floods seemed to be isolated incidents in the UK (Guide to Floods, 2011).

Agricultural insurance in the UK, similarly to property insurance, can be considered as one end of the liability allocation continuum. There is no public involvement, the government does not provide either premium subsidies or ad-hoc aid to farmers after disasters. On one hand, the lack of liability transfer from farmers to taxpayers can promote self-efficacy and the implementation of risk reduction measures by agricultural producers since they cannot rely on public intervention. On the other hand, public involvement is often desirable to promote solidarity within society and increase affordability. The current insurance uptake is rather limited in the UK partly because premiums are too expensive for farmers. Insurance companies are not interested to broaden type of available policies (to cover more risks for instance) since the demand for these insurance products is low (Morgan, 2007).

### **Poland**

Considering the economical, geographical, cultural and historical ties between Hungary and Poland, the Polish agricultural insurance system can provide some important lessons for agricultural risk financing in Hungary. Similarly to other countries in the region, the agricultural compensation system of Poland had undergone significant changes after the democratic transition. Prior to 1990, insurance was mandatory to agricultural producers, which led to a penetration rate over 90 percent. Once insurance became non-mandatory, penetration started to decrease and, in parallel, ad-hoc compensation required more and more resources from the central budget. This paternalistic approach from the government's side and the lack of self-efficacy of farmers were the main drivers of the reform that policy-makers initiated over a decade ago.

One of the important steps of the reform was the switch to a mandatory insurance system. Farmers receiving direct payments have to have insurance coverage. Producers failing to do so can be imposed by a penalty of 2 EUR per hectare, which is deductible from their direct payments. We will see later in this chapter that Greece also has a mandatory insurance system, however the Polish scheme is significant different with regard to the role of the government. While the mandatory agricultural insurance is provided by the State in Greece, Polish farmers can take out such policies only from the private market. The Polish government provides premium subsidies up to 50 % in case the premium is lower than 6% of the total sum insured. The premium of multi-hazard insurance is often higher than this threshold meaning that farmers insuring against multiple perils are often not entitled for premium subsidies (Kemény et al., 2014; Mahul and Stutley, 2010). It

can be one of the reasons of the low penetration: although the system is mandatory, yet only 10-12 percent of the agricultural producers have insurance and only one quarter of the croplands is insured. In addition, the above mentioned penalty is rarely applied in practice and the government often still steps in to provide compensation on ad-hoc basis, which together provide disincentives for self-efficacy.

The Polish agricultural risk financing system faced similar problems two decades ago as schemes in other countries. Producers rarely took out voluntary insurance policies, instead they intensively relied on ad-hoc compensation from the government after disasters. This was clearly one of the main issues that the reforms at the end of the last century aimed to address. The subsidised insurance premiums and the financial penalty can be both considered as incentives for self-efficacy. Despite these reforms, the current Polish system is still characterised by the lack of self-efficacy. It has three main reasons: firstly, premium subsidies are not available for many farmers (who would like to insure against multiple perils); secondly, penalties are rarely applied in practice; and thirdly, government aid remains available after disasters. In addition, premiums are not fully risk-based and therefore do not provide incentives for risk reduction.

### **Greece**

Unlike at the previously described UK system, the Greek government is highly involved in the provision of insurance to farmers. There are both public and private insurance available for farmers, however the majority of Greek farms are covered by the public scheme due to its compulsory nature and favourable conditions to farmers. This compulsory insurance is provided by the Greek Agricultural Insurance Organisation (ELGA) that is a legal entity fully owned by the State. Since participation is mandatory for agricultural producers, the penetration is one of the highest within the EU (Bielza Diaz-Caneja et al., 2009). ELGA programs cover losses to crops caused by frost, hail, wind, flooding, draught, snow, excessive rainfall and wild animals (ELGA, 2014). Franchises and deductibles are applied therefore farmers have to bear the losses up to 40% of the total sum insured. Agricultural producers can voluntarily take out insurance policies from the private market, in addition, to complement the public coverage. However this does not happen very often, therefore the private agricultural insurance market is less prevalent in comparison to the public scheme. In addition to the above described public and private insurance programs, the government often steps in after serious disasters and provides compensation to farmers on an ad-hoc basis. The condition of receiving such compensation is being covered by ELGA, which, again, provides incentives to farmers to join ELGA.

The above shows that the Greek government plays a prominent role in the compensation of agricultural damages, which has certain advantages and disadvantages as well. On one hand, the public scheme, due to its mandatory nature, covers the majority of farmers, promote self-efficacy. High insurance

uptake can indicate lower need for additional ad-hoc aid since policyholders get compensated by their insurance provider, which could lead to decreased pressure on the central budget. On the other hand, farmers pay a fixed percentage of the total sum insured as premium, so no risk-based pricing is applied. It can have a positive impact on the economic viability of the system since transaction costs are rather low and in addition cross-subsidies can increase affordability. On the negative side, such system does not provide any incentives for farmers to invest to risk reduction since their efforts are not being rewarded by lower insurance premiums. Franchises and deductibles, which are around 25% in the ELGA programs, can potentially provide some incentives to implement risk reduction measures, since, as we have seen before, part of the risk that is not covered by ELGA, is usually retained by farmers themselves (indicated by the low private insurance penetration).

It is also important to note that the current public scheme requires significant financial resources from the government. It is because premiums collected do not cover all the expenses of the system and the shortfall is met from central budgetary resources. Taking into account the high pressure on central budgets in current economic situation, the robustness of the system can be questionable. Statistics between 2000 and 2004 show that payouts from ELGA had increased by a factor of four (Mahul and Stutley, 2009). Such increase is not necessarily caused by more frequent adverse weather conditions but can relate to increased penetration and the price increase of agricultural products. However it is noteworthy that, in parallel with the increased EGLA payouts, financial resources committed to ad-hoc agricultural compensation have also significantly increased. Again, this can create increased pressure on the central budget.

### **Hungary**

Similarly to Poland, the Hungarian agricultural risk financing system has also recently undergone some significant changes. Prior to these reforms, as in many other countries, farmers intensively relied on ad-hoc governmental compensation after disasters. Before 2003 agricultural risk financing had three main components: 1) subsidised insurance, 2) hail-prevention subsidies, and 3) ad-hoc aid. In 2007, the government established a risk mitigation fund that farmers could join voluntarily. During its first year in operation only 5% of the farmers joined the Fund (Dezsény, 2009) that seriously undermined the efficiency and sustainability of the system. In order to increase participation, it became mandatory to join the Fund for the majority of agricultural producers in 2008. The Fund provided coverage against a number of natural risks including hail, frost, inland inundation and drought. The government provided 50% premium subsidies but compensation from the Fund did not cover all the losses due to the application of franchises and deductibles. In addition, the government often provided compensation from ad hoc funds even to those farmers who had no insurance and did not participate in the national compensation fund. While the 2008 regulatory changes increased the

participation rate, farmers had no real interest to take out additional measures (such as insurance) since losses not covered by the Fund were often compensated by the state from ad-hoc resources.

The new legislation entered into force on 1 January 2012 with the aim of increasing the efficiency of farmers' protection against environmental damages. The new system is built on a two-pillar risk management approach. The first pillar is very similar to the above mentioned public damage mitigation fund. Deposit paid by the farmers varies between different land-uses. The sum thus accumulated from farmers' deposits is supplemented by the Government in an equal amount from budgetary sources. However only those producers will receive full damage compensation under the new system, who have acquired insurance from a business insurer with regard to at least 50% of their activities, while those with no insurance may receive only 50% of the maximum possible damage mitigation allowance (Ministry of Rural Development, 2011b).

The second pillar comprises a subsidised, private agricultural insurance construction for those producers who wish to decrease their production risks to a higher level than the protection provided by the public damage mitigation fund. Farmers can take out insurance policy on a voluntary basis, however as we mentioned earlier, the compensation from the mitigation Fund is significantly lower for farmers with no private insurance coverage. Such condition encourages self-efficacy since farmers get only 50% of the public compensation that they would otherwise get with having private insurance in addition.

Insurance premiums are subsidies up to 65% of the insurance premiums and the three types of policies (A, B and C) cover different risks (and crops) including spring frost, flood, storm and drought. The subsidised agricultural insurance has been available for two years therefore it would be difficult to conclude on the efficiency of the new system. However annual premiums paid by farmers have increased from 1.5 billion Forints in 2012 to almost 6 billion Forints in 2014 (Agroinform, 2014). Such increase suggests that the new system can successfully promote self-efficacy and it has the potential to provide a sufficient safety net to agricultural producers in the future. With subsidies up to 65%, insurance premiums are affordable for farmers. However the question is whether budgetary resources allocated will be sufficient to subsidise premiums considering the above mentioned increasing demand. The current regulation state that if allocated resources are depleted, the volume of subsidies will be reduced proportionately (Ministry of Rural Development, 2011a). It is needless to say that such situation can potentially have negative impacts on both affordability and the level of self-efficacy.

## **Conclusions**

The global population growth has already put the agricultural sector under enormous pressure; while farmers had to feed 4 billion people in 1974, this number has almost doubled since then (UNFPA, 2012). While the sector tries to cope with these increased expectations, there are a number of other challenges it has to face.



Extreme weather conditions are one of these challenges, which have caused significant economic losses and, more importantly, could potentially threaten food security. Thus managing these risks require special attention. Among the various risk management tools, we investigated agricultural insurance in five OECD countries. Taking into account the special status and well-known barriers of the sector, we were especially interested if and how the public sector is involved in the compensation, and whether these insurance schemes promote risk reduction among farmers.

While certainly there is no one size fits all solution, we are still able to draw some important conclusions. We start here with the biggest challenge of these systems, which is the lack of self-efficacy from the producers' side. Many countries try to address this problem by making agricultural insurance mandatory, however it does not necessarily provide a sufficient solution as we have seen in the case of Poland. Public involvement, on the other hand, seems to be an essential condition of high insurance penetration. The specific role of the public sector can vary, in extreme cases it there might be fully or almost fully public systems with no/minimal private involvement (like in Greece) but in most cases public and private sectors formulate some kind of partnership to offer agricultural insurance (government provides premium subsidies to enhance affordability and insurance take up etc.). It should be also noted that the provision of ad-hoc aid after disasters is also a common form of public involvement in many countries, which potentially could negatively affect farmers' self-efficacy.

The recently introduced two-pillar Hungarian systems could be a successful example of public-private partnerships on the long-run. Although the system only got fully operationalised two years ago, when premium subsidies became available for farmers, it has successfully promoted self-efficacy so far. The insurance association has a put a great deal of effort to advocate the new system among farmers, they organised several awareness raising events. However the long-term sustainability of the systems remains questionable since the available public resources for premium subsidies are limited. According to the current regulation, if allocated resources are depleted, the volume of subsidies will be reduced proportionately, which will likely have a negative impact on affordability, insurance take up and indirectly on the central budget due to the potentially increasing demand for public (ad-hoc) support.

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## ZARZĄDZANIE RYZYKIEM W SEKTORZE ROLNYM ZE SZCZEGÓLNYM UWZGLĘDNIENIEM UBEZPIECZEŃ

**Streszczenie.** Na sektor rolny bardzo duży wpływ mają warunki atmosferyczne, straty prawdopodobnie wzrosną w przyszłości, jako że katastrofy naturalne stają się coraz częstsze (IPCC, 2012). Istnieje wiele dostępnych narzędzi zarządzania ryzykiem w rolnictwie, w tym artykule dokonujemy przeglądu systemów ubezpieczeń rolnych kilku krajach OECD, ze szczególnym uwzględnieniem roli rządu i promocji redukcji ryzyka i dobrych praktyk rolniczych. Na zakończenie dochodzimy do wniosku, że o ile zaangażowanie społeczne może znacznie zwiększyć przenikanie, brak własnej skuteczności jest wciąż głównym wyzwaniem w wielu systemach, które kraje adresują na wiele sposobów. Nowy węgierski system może potencjalnie stać się przykładem udanego partnerstwa publiczno-prywatnego, które dotyczy problemu własnej skuteczności w efektywny sposób.

**Słowa kluczowe:** rolnictwo, zarządzanie ryzykiem, ubezpieczenia, zmiany klimatu, ograniczenie ryzyka, kraje OECD.

## 風險管理在農業部門 特別注意保險

**摘要:** 農業部門是高度受天氣條件和損失將在未來很可能增加，因為自然災害變得更加頻繁（IPCC，2012）。有一些在農業風險管理工具可用，在這篇文章中，我們回顧幾個經合組織國家，特別重視政府的作用，促進減少風險和良好農業規範的農業保險制度。最後，我們的結論是，雖然公眾的參與可以增加顯著滲透；缺乏自我效能仍然是在許多系統中，哪些國家正在處理以不同的方式的一個重大挑戰。匈牙利新系統可能會成為解決自我效能問題的有效方式成功的公私夥伴關係的範例

**關鍵詞：** 農業，風險管理，保險，氣候變化，降低風險，OECD國家