DEVELOPMENT OF THE WEATHER RISK MANAGEMENT SYSTEM IN THE HUNGARIAN AGRICULTURE

KEMÉNY Gábor – RIEGER László

Abstract

In the last decade, due to extreme weather, climate change and the appearance of new market management concepts an increasing amount of attention has been focused on insurance plans providing cover for weather and market risks. Among these is the development of risk community, strengthening the responsibility of farmers based on self-provision, improving the efficiency of public assistance, and the proportional responsibilities of stakeholders.

Up-to-date knowledge of actual data on production, market, weather and estimates of possible future production conditions, which is increasingly supported by current information technology all play a key role in the management of risks.

Keywords: weather risk management, institutions of agriculture, state mitigation

JEL: Q18 (Agricultural Policy. Food Policy)

Objectives

The examination of the time period of 2011-2013, indicates that the successful cooperation between the state mitigation system and private insurance companies has significantly changed farmers’ and operators’ approach to self-provision and risk management in Hungary. An increasing number of farmers take advantage of the mitigation system, and therefore, the need for ad hoc state intervention and emergency measures has decreased.
The risk management automatisms are increasingly able to neutralize the actual effects of the weather for market participants. The compensation data for 2013 shows that along with the development of the risk management system, the favorable weather of the previous year has helped Hungarian farmers. Due to better-than-average weather conditions and a more accurate damage assessment, only 50% of the available compensation fund had to be used for damages.

Materials and Methods

This study is basically built on secondary research work, describing the behavior of the participants of risk management. We collected the data regarding the operation of the Hungarian agricultural risk management system for the period between 2011 and 2013, relying on the information base of Agricultural Rural Development Agency (ARDA), Association of Hungarian Insurance Companies (MABISZ) and the Research Institute of Agricultural Economics (RIAE) while processing data. This set of data can be used for the further analysis of enhanced systems. The study was duplex, on one hand it reviewed the cooperation logic of the institutional participants, on the other hand, we presented the time series based on ARDA and MABISZ data and its coherence. In the end of the study providing a visual map, we illustrate the change in risk management by micro-regions of Hungary.

The information technology development of the executional system provides further opportunities to enhance the effectiveness of Hungarian agricultural risk management.

Results

The concept of agricultural weather risk management

Agriculture is particularly exposed to adverse natural events, such as floods and droughts, and the economic costs of natural risks may even increase in the future because of climate change (Kemény et al., 2014). Agricultural insurance is one of the possible financial tools that agricultural producers can use to cope with increasing risks in their activity. Experience accumulated in insurance markets demonstrates that the development of a proper agricultural insurance product cannot be reached without government intervention, mainly due to systemic risk and information asymmetries. The systemic risk takes place when a risk affects a large number of farmers simultaneously. Therefore the systemic component of agricultural risks can generate major losses for agricultural insurers (Mahul and Stutley, 2010). The information asymmetries in the case of agricultural insurance are derived from adverse selection and moral hazard. Both are connected to the difficulties associated with measuring risk and monitoring farmer behavior (Moschini and Hennessy, 2001).

The role of insurance in risk management of agricultural production has long been a center of attention for researchers and policy makers. Agricultural insurance products were originally offered by private companies, firstly in Europe and then in the United States (Smith and Glauber, 2012), and these followed different development paths in each agricultural insurance market (Székely and Pálinkás, 2009). The development of agricultural insurance markets implied the increasing role of government due to the persistence of moral hazard, adverse selection and systemic risks problems in agricultural production. Today, almost 90 per cent of global agricultural premium volume is collected in high income countries where agricultural insurance products are heavily subsidized by governments (Mahul and Stutley, 2010). The previous practice of post-disaster ad hoc aid programs weakened the willingness of farmers to participate in commercial insurance programs.
The organizations involved in risk management in Hungary

Before year 2011, agricultural weather risks were treated by the state and private insurance companies quite separately (Kemény G, Rieger L, 2013). The agricultural operators paid relatively little attention to the prevention of such damages, as the state often provided significant ad hoc state compensation without much circumspection (Kemény G, Varga T, et al., 2011). The insurance market offered relatively expensive and limited agricultural compensation constructions, so the stakeholders having interest in agricultural risk management, the farmers, insurers and government could not design truly effective insurance schemes. This realization has led to the development of a new risk management concept, in which the producers, insurers, the government can work together to reduce risks.

The Hungarian agricultural risk management system is based on two pillars:

- Pillar I: State (compensation) mitigation system, and
- Pillar II: Market insurance scheme aided by premium subsidies.

The following organizations are involved in the initial risk-management system: the Ministry of Rural Development (MRD, supervision), the National Food Chain Safety Office (NFCSO, damage assessment); the Agricultural and Rural Development Agency (ARDA, agricultural damages compensation) as well as the Regional Government Offices (RGO) and the Hungarian National Chamber of Agriculture (NCA) (Figure 1.).

Market insurance companies continue to manage insurance market risks with the helpful cooperation of state organizations responsible for mitigation. The implementation of the basic processes are supported by an agricultural risk management database. The database contains information concerning the identity of the farmers along with data concerning their payment of mitigation fees, the data about the agricultural insurance fee assistance issued as well as the data available to the agricultural mitigation bodies, submitted in the entrance application regarding crop growing land and crop value. Communication between the different players is typically paper-based data transmission. Data files are set up, according to regulations, via paper-based information that is recorded manually.

The functions of each of the organizations in the risk management system are as follows:

The Ministry of Rural Development (MRD) is responsible for the general management and development of the Hungarian Agricultural Risk Management System and ensuring its legal and institutional framework.

The National Food Chain Safety Office (NFCSO) works under the supervision of the MRD and within the risk management system to assess the damage reported by agricultural producers, if necessary, using the work of participating institutions. The Regional Government Offices (RGOs) are the state administration bodies with general jurisdiction that carry out damage assessment tasks under the professional guidance of NFCSO. The National Chamber of Agriculture (NCA) has a network of village agronomists and consultants that can be utilized in the damage assessment process.

The Agricultural and Rural Development Agency (ARDA) is an organization supervised by the MRD, it is financed by the European Union and the Hungarian National budget, with the task of governing the operation of market measures. ARDA has a central role within the risk management system of which the main areas are as follows: operation of the compensation
fund, the recording of the compensation contribution payments, assessment of compensation applications, payment of mitigation benefits and agricultural insurance aid.

The work of the damage assessment agency (NFCSO) is supported by several, so called, damage assessment support bodies, bodies that monitor, and gather data about meteorological events that cause damages and gather other data that support the assessment of damages.

The Institute of Geodesy, Cartography and Remote Sensing (IGCRS) as a government organization dealing with surveying and geo-informatics, which has vast experience with remote sensing of events (flood, inland water, drought, hail, pests) which cause agricultural damages. These capabilities are put to use ad hoc, mostly vis major, “after the fact” when the mitigation is managed.

Source: ARDA

**Figure 1**: Flow chart of the Hungarian Risk Management System in 2013,
The basic task of the Research Institute of Agricultural Economics (RIAE), is the scientific analysis of the socio-economic development of the Hungarian food-economy, and to effectively participate in building the foundations of government decisions affecting the agricultural sector.

It is the task of RIAE, within the risk-management system to provide reference, cost and return data needed to estimate the value of damage caused. Based on the analysis of the data about meteorological and other natural risks that affect agriculture that is available within the framework of the risk-management institutions. Furthermore, RIAE carries out an economic evaluation of the second pillar of the risk management system and state compensation insurance market.

One of the basic tasks of the Hungarian Meteorological Service (HMS) is to provide meteorological forecasts that help determine the measures that need to be adopted in agriculture, water-management and water damage control, and in case of extreme weather. It provides the meteorological data to village agronomists and insurers. The information found on the HMS’s homepage provide proof of weather related anomalies that affect the country. HMS provides forecasts of drought, frost, cloudburst and storms.

The General Directorate of Water Management (GDWM) provides forecasts of inland floods that can be integrated into the agricultural risk-management system.

Three of Four insurance companies work together with the state to provide market insurance against agro-weather risks.

The year 2013’s experience

The year 2013 was characterized by positive trends in agricultural risk management system.

The participation of farmers further increased in the Pillar I of the risk management system, which was caused both by voluntary joining and the fact that now even large companies could join (MVH/ARDA, 2013). As a result, the mitigation fund contributions paid by farmers, increased by 4%, from 4.13 billion to 4.30 billion HUF, so the amount in the Mitigation Fund, to which the state matches the farmer’s contributions exceeds 8,60 billion HUF (Table 1.)

In contrast to the growing resources, there was a decrease in compensation claims. Whereas claims amounted to 7.41 billion HUF in 2012, in 2013 only 2.45 billion HUF had been paid from the Pillar I.

Table 1: Operation of the Pillar I (Mitigation Fund) of the Risk Management System (million HUF)

<table>
<thead>
<tr>
<th>Pillar I</th>
<th>Number of accepted applications for compensation (item)</th>
<th>Damaged area (ha)</th>
<th>Amount of accepted request (million HUF)</th>
<th>Mitigation benefits paid (million HUF)</th>
<th>Contribution paid by farmers (million HUF)</th>
<th>Amount of Mitigation Fund (million HUF)</th>
<th>The compensation allowance rate (per cent)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2012</td>
<td>8 017</td>
<td>93922</td>
<td>7 411</td>
<td>7 411</td>
<td>4 135</td>
<td>8 285</td>
<td>100</td>
</tr>
<tr>
<td>2013</td>
<td>2 218</td>
<td>28375</td>
<td>2 453</td>
<td>2 453</td>
<td>4 300</td>
<td>8 600</td>
<td>100</td>
</tr>
</tbody>
</table>

Source: ARDA
There are several reasons for this. Firstly, the farmers understood that the system handles plant-level yield depreciation above 30%. There are still difficulties with paying out mitigation benefits, because a significant proportion of farmers view Pillar I as an alternative to and not a supplement of insurance. Therefore, they do not have adequate insurance which means they are only be able to receive half of the mitigation benefits. Apart from the facts mentioned above, it is important to keep in mind, that there was a significant decrease in the number of weather related damages (such as severe drought or inland floods) in 2013, so legitimate compensation applications fell to nearly a quarter (Table 2.)

Table 2: Operation of the Pillar I (Mitigation) of the Risk Management System by Type of Claims (million HUF)

<table>
<thead>
<tr>
<th>Type of claim</th>
<th>Number of accepted applications for compensation (item)</th>
<th>Damaged area (ha)</th>
<th>Benefits paid from Mitigation Fund (million HUF)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drought</td>
<td>4 417</td>
<td>943</td>
<td>76 951</td>
</tr>
<tr>
<td>Inland water</td>
<td>0</td>
<td>218</td>
<td>-</td>
</tr>
<tr>
<td>Rainstorm</td>
<td>0</td>
<td>(1)</td>
<td>-</td>
</tr>
<tr>
<td>Hail</td>
<td>146</td>
<td>397</td>
<td>671</td>
</tr>
<tr>
<td>Combined event</td>
<td>34</td>
<td>15</td>
<td>205</td>
</tr>
<tr>
<td>Agricultural flood</td>
<td>0</td>
<td>54</td>
<td>-</td>
</tr>
<tr>
<td>Spring frost</td>
<td>1 687</td>
<td>563</td>
<td>6 316</td>
</tr>
<tr>
<td>Winter frost</td>
<td>1 726</td>
<td>8</td>
<td>9 743</td>
</tr>
<tr>
<td>Storm</td>
<td>7</td>
<td>19</td>
<td>37</td>
</tr>
<tr>
<td>Total</td>
<td>8 017</td>
<td>2 218</td>
<td>93-922</td>
</tr>
</tbody>
</table>

Source: RIAE based on data of the ARDA

As the Table 2 illustrates, while in 2012, drought caused damage on more than 76 thousand hectares of land and 62% of mitigation benefits were paid to cover it, there was a significant decrease in both the affected area and the mitigation benefits (nearly 80, over 70%) in 2013. Even though drought remained to be the major cause of damages to farmers. The second greatest factor was spring frosts, fortunately the affected area and the value of damages was also significantly smaller. There was practically no damage caused by frost and only damages due to flood, inland water and hail increased.

As a result, on the whole, all farmers who had insurance policies in place, received 100% of the mitigation benefits for their legitimate claims, making it the second year of 100% compensation.

Table 3 shows that in the case of compensated insurance, 2013 was the year of great growth: the fee based income rose 2,5 fold, and the income from Claim A that provides cover for most local damage types doubled (MABISZ, 2013). The biggest rise occurred in Claim B, which rose tenfold. The reason for this was that opposed to 2012, in 2013 large arable crops fell
under Claim B, like in the case of maize which could previously only be insured with Claim C.

The reason for this significant raise is due to the fact that there was an increase in knowledge about and popularity of subsidized insurance products, both among insurers and farmers, as well as an increase in the number of NGOs joining the system.

**Table 3:** Operation of the Pillar II (Supported Market Insurance) of the Risk Management System by Type of Claims (million HUF)

<table>
<thead>
<tr>
<th></th>
<th>2012</th>
<th>2013</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Number of contacts</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(million HUF)</td>
<td>(million HUF)</td>
</tr>
<tr>
<td>Claim &quot;A&quot;</td>
<td>547</td>
<td>605</td>
</tr>
<tr>
<td>Claim &quot;B&quot;</td>
<td>307</td>
<td>174</td>
</tr>
<tr>
<td>Claim &quot;C&quot;</td>
<td>1 042</td>
<td>688</td>
</tr>
<tr>
<td>A total of</td>
<td>1 896</td>
<td>1 467</td>
</tr>
<tr>
<td>Supplementary insurance for premium subsidy</td>
<td>1 296</td>
<td>56</td>
</tr>
<tr>
<td>Grand total</td>
<td>–</td>
<td>1 523</td>
</tr>
</tbody>
</table>

Source: ARDA, MABISZ

When examining the effect of subsidized insurances within the entire Hungarian insurance market, we can also see very positive results: according to the data provided by the Hungarian Insurance Association, the 2012 aggregate collected premium of 8.8 billion HUF which included both subsidized and unsubsidized insurances, rose to 9.9 billion HUF in 2013. Therefore, it can be stated that basically due to the spread of subsidized insurances, the total value of Hungarian insurances rose by 1.1 billion HUF, which is a 12% annual increase. This means, which from a 154% point jump in subsidized insurances, 84% points are the switches from unsubsidized to subsidized insurances, however a net increase of 64% point increase contributed to the expansion of the risk-community, especially within intensive cultures, fruit and vegetable production.

Therefore, the insurance subsidizing system has achieved its purpose, as following a 4% net growth, the risk community rose by net 12% in 2013. The sector has far surpassed the usual 5-6 billion HUF premium of the 2000s.

Finally, it is worth examining how the compensation and subsidized insurances developed in value over the past two years (Kemény G, Varga T et al., 2013). In 2013, there was a slight
increase in virtually all mitigation fees, which was due to the payments of large companies as well as new voluntary members. (Figure 2.)

Source: RIAE based on data of ARDA

**Figure 2:** Change of mitigation contribution paid by farmers, 2012-2013 by sub regions

Based on the examination of premium value paid by farmers changes of subsidized insurances, it can be said that the growth took shape in a positive structure, as growth was found not only to the Transdanubian region, but also in the middle of the Alföld and in Northeast Hungary, which indicates that farmers found the protection provided by the insurance adequate. Decline only appeared sporadically or regional decline can be found in only in Nógrád County North Heves and West Borsod. (Figure 3.)
Conclusions

It is a generally held view that the closing gap between the state mitigation scheme and market insurance companies, and the coordination of their operations will greatly improve the effectiveness of risk-management for Hungarian farmers. Data from the years 2011 and 2013 show that farmers' willingness to take part in risk-management continues to improve within the Hungarian agro-sector.

In addition to the encouraging data, the organizations taking part in risk-management are going to receive a new information technology (IT) system (with financial support from the EU) that will further improve and update the quality of their services, decrease the administrative costs of the food producers as well as the organizations. Procedural deadlines will be more closely kept and will minimalize the risk of procedural errors. With the help of the IT system, the administration of the determination and control of damages and mitigation would significantly improve.

The expected results following the successful implementation of the EU project on 2014 are as follows:

- the increase in the number of functional areas covered by IT (target: entire electronic coverage)
- a significant improvement in the administrators' time allocation (target: 50% reduction in time spent)
- objectively documented, flexible system using retrospective data built up over several years,
- strengthening relationship between different agro-management subsystems.

Distinct improvements should be expected from the end of 2015.
References


Authors:

Kemény Gábor, PhD
Director of Economic Analysis, Research Institute of Agricultural Economics, Budapest,
kemeny.gabor@aki.gov.hu

Rieger lászló, PhD
Strategic Advisor, Research Institute of Agricultural Economics, Budapest,
riegerl@aki.gov.hu