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## **RISK TRANSFER: A MECHANISM TO MAKE THE MACEDONIAN AGRICULTURAL SECTOR MORE RESILIENT TO CLIMATE CHANGE**

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**ABSTRACT:** Agriculture is an important sector for employment, food supply and trade exchange in N. Macedonia. It's a climate sensitive sector that strongly rely on weather conditions. Therefore, the agriculture sector needs a risk management model that will cope in a most efficient way with the consequences of the climate changes.

The common knowledge is that insurance is the most efficient and economical way to protect against financial losses in agriculture caused by climate changes. However, in Macedonia, despite the existence of a 60% premium subsidy, on average only 2% of registered farmers are insured. As a result, 98% of farmers are vulnerable to weather extremes, which are becoming more frequent due to climate change. This puts the government in the position of insurer of last resort, which in long run is fiscally unsustainable.

To address the challenges with the persistent low insurance penetration, adverse risk selection, and excessive government fiscal exposure to climate change in agriculture the paper identifies the needs of a risk sharing system i.e. agriculture insurance pool. The pool will deliver a universal financial protection for every farmer, fast and fair claims settlement and a better adaptation of the agricultural sector to the climate changes. In parallel, will release the budget burden and allow its better allocation.

This paper provides insight on development of a risk management systematic solution against natural disasters in agriculture. It applies secondary market data comparing the current state with the potential of the agriculture pool. The findings show that implementing an agriculture insurance pool is the most sustainable long-term solution which will reduce the impact of climate changes on the government budget and allow swift assistance to most vulnerable groups.

**KEYWORDS:** *insurance, risk management, risk transfer, agriculture pool, climate change*

## **INTRODUCTION**

The agricultural sector in N. Macedonia will be most impacted by the climate change and it will suffer greatly, due to the lack of capacity to adapt to the climate change on its own. In parallel, the country will not be able to bear the costs from its own budget. This raises the need the country seriously to consider the development of the insurance market against catastrophic risks through partial involvement of the state in order to achieve long-term sustainable effects.

Agriculture is the third most important economic sector by share of GDP, it accounts for 7.9% of total GDP, immediately after service and industry sectors, as stated in a report by MAFWE (2017). In context, Macedonia has 1,266,008ha of agricultural land representing 50% from the total area of the country, while the arable land covers 516,870 ha. Having in mind the high unemployment rate, agriculture is of critical importance to the wellbeing of around half the population of Macedonia, since there are approximately 193,000 family farms, which is high, considering that the population is around 2.1 million, as stated in a report by MAFWE (2017).

According to the World Bank's projections for climate changes (World Bank, 2020) it is expected increase of the temperature by 1.9 degrees by 2050 in Macedonia, as well as shortage on average precipitation by 5% and in summer periods a possibility of no precipitation at all. Due to climate change, it is expected agriculture to be exposed to prolonged heat waves, severe droughts and floods, crop moisture deficits, especially during summer, increased exposure to pests and new diseases. This exposure could be relieve through agriculture insurance coverage, however the interest by the farmers is insignificant which impose the need of re-defining the system.

Currently, the government of N. Macedonia is subsidizing 60% of the insurance premium for every farmer, or in absolute value up till 150.000 MKD and yet, on average only 2% of registered farmers are insured. As a result, 98% of farmers are vulnerable to the weather conditions, which are becoming more severe due to climate change.

In order to mitigate the impact of the climate change and the frequent adverse weather events, the country should focus on development of a risk management mechanism that will offer standardised products with defined price, terms and conditions and claim management process, i.e. agricultural insurance pool, based on the world best practices such as Turkish TARSIM, or the Spanish Agroseguro.

Having in mind the exposure of the government due to climate change in agriculture and the current low agriculture insurance penetration, this paper provides a model of an agricultural insurance pool applicable for N. Macedonia, which in case of natural disasters, will indemnify all insured farmers without burdening the government's budget.

## **LITERATURE REVIEW**

The concept of risk pooling shows that by combining independent losses, the expected total amount of losses stays the same, but the variance of individual losses decreases (Harrington and Niehaus, 1999). Insurance is a type of risk pooling where the insured typically pays a premium to the insurer and receives an indemnity payment from the insurer once an insured loss occurs (Meuwissen, et al., 2001). In order to prevent increase in the costs of risk pooling in the agricultural insurance, governments are usually financially involved in agriculture insurance schemes, where governments subsidize the insurance premiums as well as

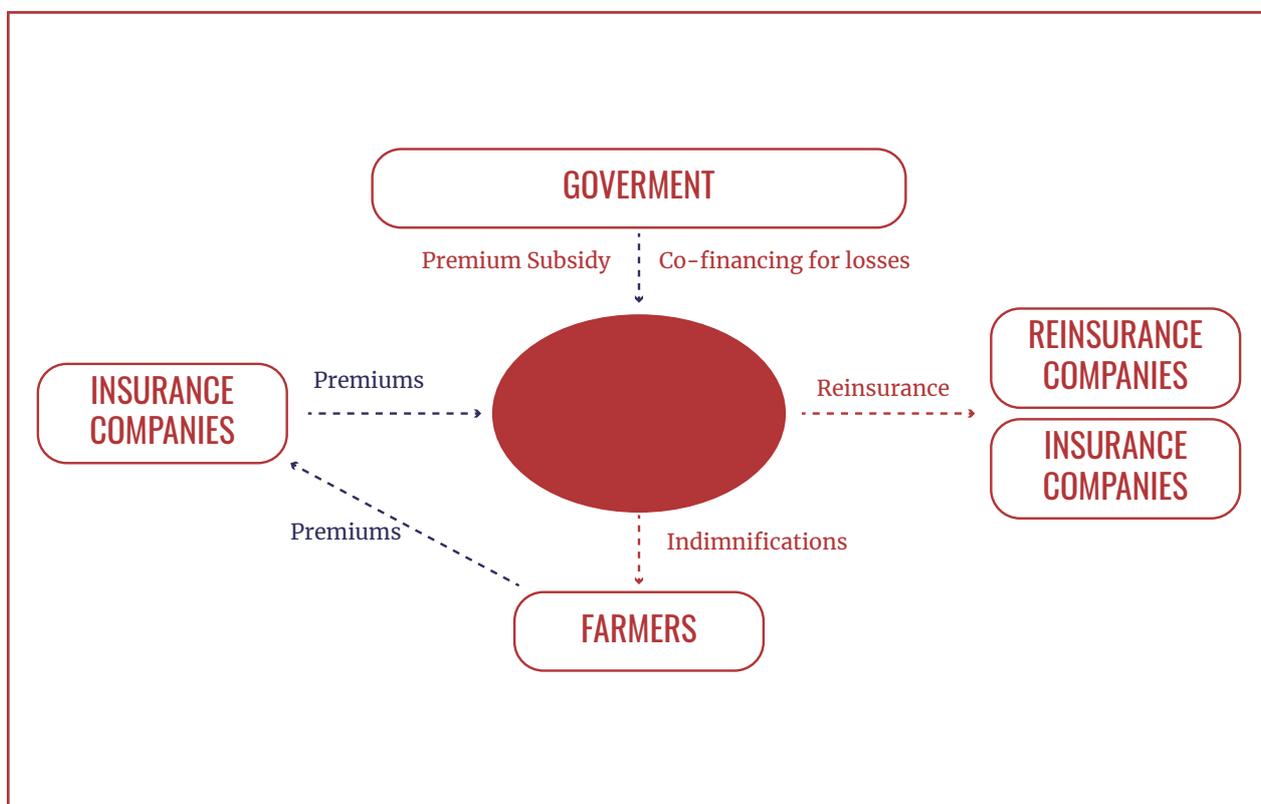
the administrative costs and the reinsurance (Goodwin and Ker, 1998).

In some countries, public-private partnerships do exist where the government provides support to agricultural insurance, through agriculture insurance pools. For example, one of the larger of these systems was created in 1980 in Spain, the Agroseguero Pool, consisted of private insurance companies and a national reinsurer. The Agroseguero Pool sets insurance rates and offers a variety of insurance products to the farmers at subsidized premium (Smith and Glauber, 2012). This is sometimes an essential agriculture policy instrument for promoting stabilization of agriculture sector. With government support to the insurance premium, it is easier to encourage farmers to participate in insurance systems and to have an active role in risk

management. In countries such as Spain, Italy, Austria and Turkey where these kind of pools have been established, insurance systems are developed and wide range of risks affecting agricultural yield are covered (Diaz-Caneja, et al., 2008).

Another well-developed agriculture insurance pool is considered to be the Turkish system, where insurance companies issue policies under the same terms and conditions, with the same premium, while the government offers premium subsidy to farmers. The pool is managed by managing company (TARSIM), established by the insurance companies with the function to carry out all tasks of the pool within the context of the agricultural insurance law (Uçak and Berk, 2009). Below is a graphic display of the functioning of the pool:

**Figure 1.**  
*Functioning of TARSIM*



Source: İçer, N. (2018) *Turkish Experience in Agricultural Insurance*. Presented on: *Agricultural Insurance Conference, Skopje, Macedonia*.

In the first year after the Turkish TARSIM was established, the number of insurance policies increased for 1.600%, and there was, on average 20% growth each year of concluded insurance contracts, the insured area increased from 0,01 million ha to 2,5 million ha and the insurance penetration increased from 1% to 20% (Içer, 2018).

This type of agricultural risk sharing system, exempts the government budget of bearing the risk of natural disasters, it is transparent and claims are evaluated by experts, farmers are included financially in the system and the administrative burden is transferred to the insurers (Anton and Kimura, 2011).

The existence of such agriculture insurance pool, given the experience of the countries which have implemented this mechanism, has proven to increase significantly the agriculture insurance and further develop and protect the agriculture as a sector (Mahul and Stutley, 2010).

Unlike the above mentioned literature of the concept of agriculture insurance pool and the common functioning, in this paper a slightly different approach will be elaborated. Namely, the government would be the main entity that manages the pool, and a compulsory agriculture insurance for the farmers that are applying for production subsidies would be introduced. We believe that such perspective is more suitable for the Macedonian market because it emphasizes the bundling effect (policy – production subsidy) which in long run will bring better results (higher financial protection to the farmers). Under the umbrella of the Government (MAFWE as policy maker), with unified products, T&C, claim management process and compulsory insurance coverage for all registered farmers that are receiving production subsidies the pool will bring positive effect for all involved parties: the Government (budget protection), the insurance companies (low risk), farmers (sustainable financial protection).

## METHODOLOGY

For the purpose of this paper, a quantitative data on insurance premium, insurance contracts and paid claims, per region and per crops was collected from the 8 insurance companies that operate at the Macedonian market and are offering agriculture insurance. A table with description of the needed data was sent to each insurance company, requesting their input for the abovementioned data for the 6 year period (2014–2019). Based on the data provided, the authors calculate the results and analyse and present the agriculture insurance market in N. Macedonia. Additional supporting data on registered farmers and density of farmers per region were collected from the farm registry database within Ministry of Agriculture, Forestry and Water Economy (MAFWE) and data on production and premium subsidy were collected by Agency for Financial Support of the Agriculture and Rural Development (ASFARD). Also, official published data from the Annual Reports of the Insurance Supervision Agency are used, mainly for authors' calculations and comparison purposes as well as, information from the official published Annual Reports of MAFWE were taken into consideration and applied in the calculations. Furthermore, other secondary data and information was collected through a research of different studies and articles on the topic from acknowledged world and European authors in order to support the paper results and concept proposed. To develop the postulates of the agriculture insurance pool, the Turkish TARSIM model was taken as a baseline. Likewise, the World Bank Climate Change Knowledge Portal was used for acquiring data on the climate change predictions for N. Macedonia and effects on the agriculture sector. In addition to this, all terms and conditions of the 8 insurance companies were separately analyzed and compared and an overall risk matrix, taking into account all affected risks and pillars, is assessed.

## RESULTS

Even though the government of N. Macedonia is subsidizing 60% of the insurance premium for every farmer, 98% of farmers are uninsured and thus vulnerable to the weather conditions, which

are becoming more severe due to climate change. This means that whenever there is a collective damage due to extreme weather, the government should be prepared to indemnify those 98% of farmers from the state budget fully or partially.

**Table 1.**  
*Penetration of agriculture insurance*

Year	Registered Farmers	No. of policies	Insured farmers in %
2014	150.000	3.704	2%
2015	145.000	5.021	3%
2016	150.000	4.024	3%
2017	160.000	2.243	1%
2018	169.431	3.493	2%
2019	161.657	3.803	2%

Source: Authors own calculations based on MAFWE and Insurance Supervision Agency data

The farmers' awareness for insurance is very limited and they do not perceive it as protective measure, but as an additional burden to their business. Moreover, there is a perception among the farmers, that, the government is responsible and has a duty to indemnify them in the case of a loss caused by weather extreme. This is indeed supported by the Government (see: Table 2). Such perspective in the implementation of government risk management policies caused by natural disasters and adverse climatic events, additionally impact on decrease of the interest among farmers for insurance. This is well illustrated in table 1 and 2 where the numbers show that after 2 consecutive years (Y2016 and Y2017) of up to 100% pay-outs provided by the Government the interest for buying financial protection among farmers is decreased on only 1% of all registered farmers (manly big business oriented companies that provide export are insuring their crops).

**Table 2.**  
*Post disaster government payments*

Year	Direct payment in EUR
2015	6.128.041
2016	4.587.326
2017	4.541.922

Source: MAFWE and ASFARD internal data

Based on our analysis of the concluded insurance contracts for the period 2014-2019 (see: Graph 1), it is notable that the decline started in 2016, reaching the lowest point of concluded contracts in 2017. In 2018 and 2019 there is a slight growth, but it still can't reach the peak of insurance policies concluded in 2015, according to ISA Annual reports (2018). This growth (2018-2019) is due to the aggressive selling practices of an insurance brokerage company that mainly operates in one specific region, targeting one specific crop for which there is interest among farmers for insurance. Such

concentration of the risk from the other side strongly impacts on decreasing of the interest of the insurance companies to offer this line of business in their portfolio due to constant losses.

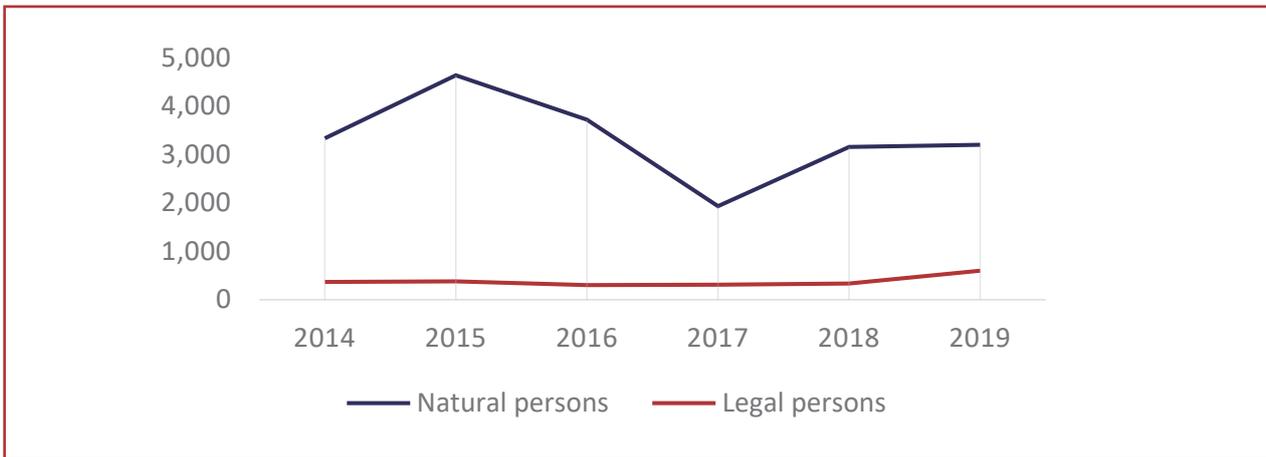
The concentration of the risk is mainly in areas that are mostly exposed to weather risks, and there is a high chance that claims will occur each year. As we can see from the graph 2 below, there is a concentration of agricultural insurance in the Vardar region, while some regions, for example the Polog region is not at all represented. The crops that are insured in the Vardar region are mostly

grapes, apples, peaches and cereals. The second biggest insured region is Pelagonia, where the insured crops are mostly fruits, tomatoes and peppers.

Consequently, the gross written premium and gross paid claims are highest in these two regions, Vardar and Pelagonia. In 2019, the gross paid claims in the Vardar region are 726.520 EUR, while the gross written premium for the same period is 1.081.208 EUR. In the Pelagonia region, the gross paid claims in 2019 are 482.040 EUR, while the gross written premium is 600.854 EUR. (see: Graph 3 and 4).

**Graph 1.**

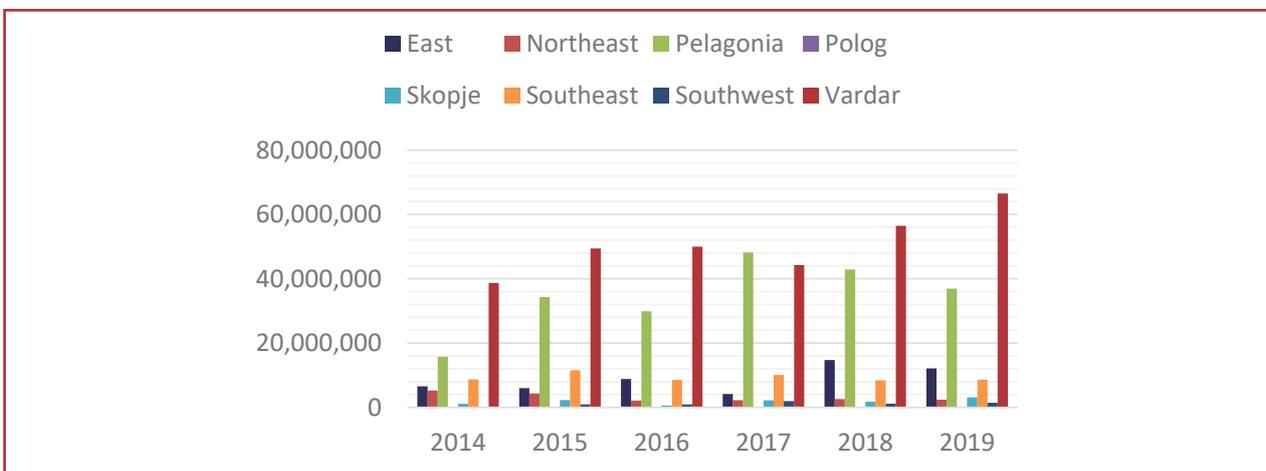
Number of concluded insurance contracts, period 2014-2019



Source: Insurance Supervision Agency, Report on the scope and content of the insurance operations for 2014, 2015, 2016, 2017, 2018 and 2019

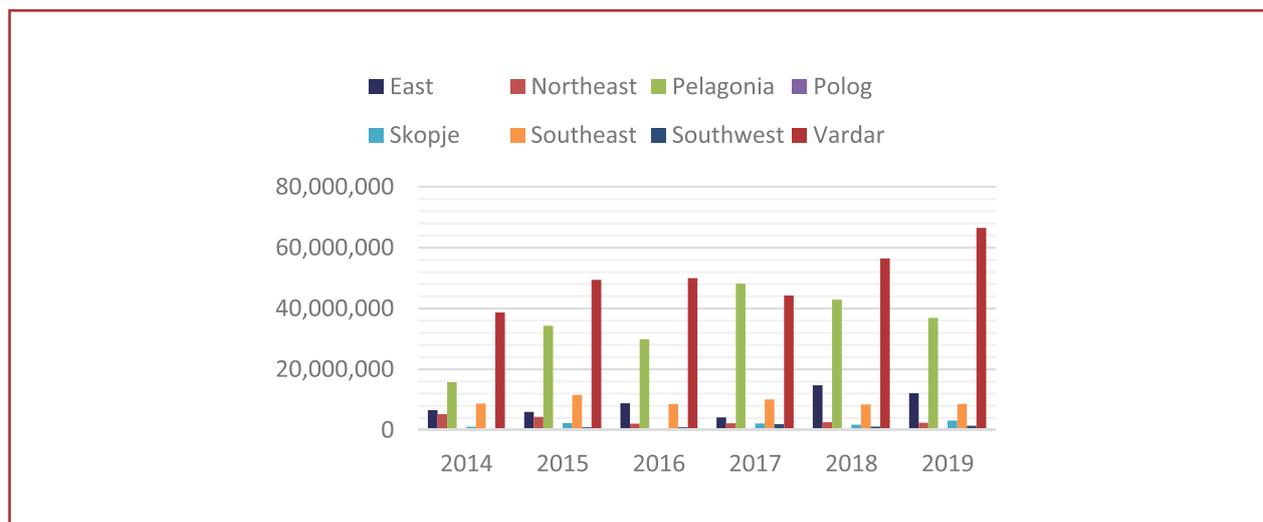
**Graph 2.**

Number of concluded insurance contracts per regions



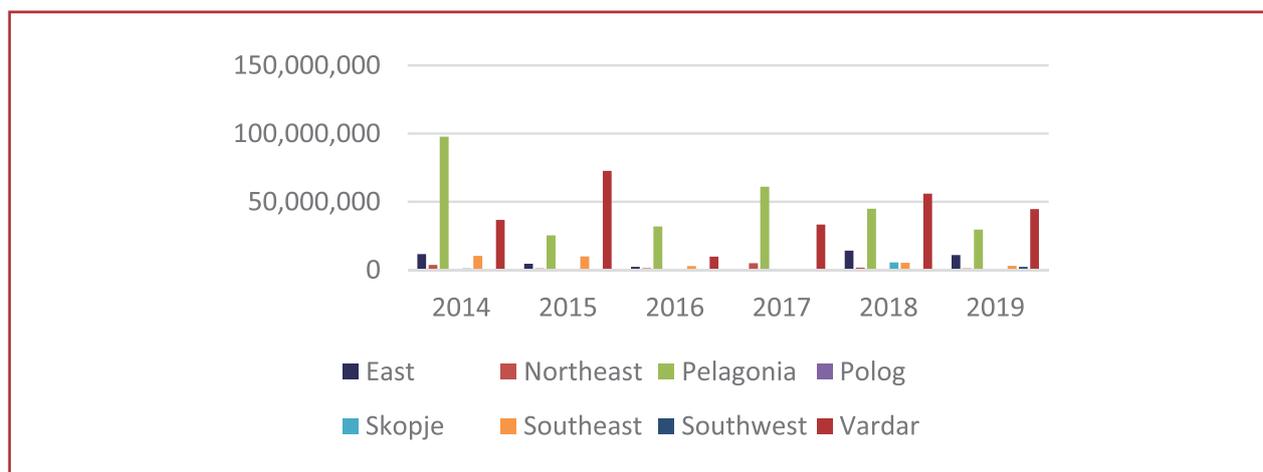
Source: Authors own calculations based on data from insurance market

**Graph 3.**  
Gross Written Premium (GWP) per regions



Source: Authors own calculations based on data from insurance market

**Graph 4.**  
Gross paid claims (GPC) per regions



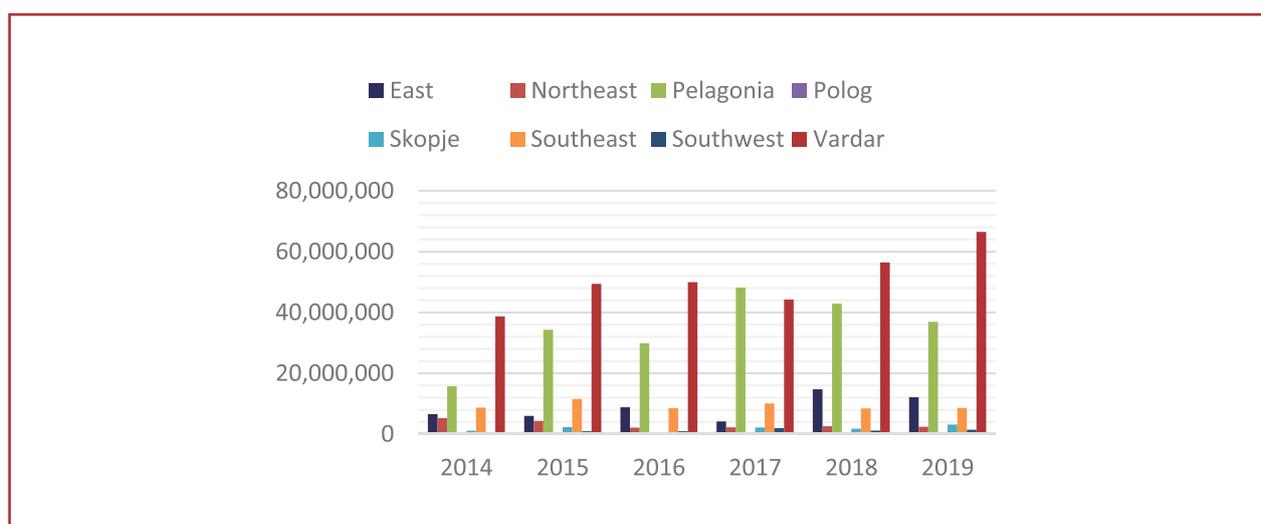
Source: Authors own calculations based on data from insurance market

As illustrated in Graph 5, the line of the GWP and GPC is almost overlapped meaning that insurance companies' technical results are almost zero or in some cases even negative which is a consequence of the concentrated risk and high and frequent losses over the years, which leads to their withdrawal from this line of business.

Additional characteristic of the agriculture insurance market is the non-standardised Terms and Conditions (T&C) which increases the uncertainty of the farmers in the products. Some insurance companies

have a wide range of excluded risks, while some don't have any exclusions in their T&C, which is shown in Table 4 below. Furthermore, the terms and conditions of the agriculture insurance products are somewhat strict, and the coverage is limited, which also contributes for the underdevelopment of the agricultural insurance market. This is clearly presented in our comparison analysis (Table 3) of the T&C of the 8 insurance companies that offer agriculture insurance coverage at the Macedonian insurance market.

**Graph 5.**  
Comparison of GWP with GPC – technical result



Source: Authors own calculations based on data from insurance market

**Table 3.**  
Excluded risks according to T&C

	1	2	3	4	5	6	7	8 <sup>3</sup>
War, invasion, actions of foreign enemies, hostile or military operations (whether war is declared or not), civil war, rebellion, revolution, uprising, civil unrest, considering participation in or the size of the uprising, military or usurper force	✓	✓	✓	✓	✓	✓	X	X
Biological or chemical contamination	✓	✓	✓	✓	✓	✓	X	X
Missiles, bombs, grenades, explosives, due to any act of terrorism	✓	✓	✓	✓	✓	✓	X	X
Floods caused by torrential rains and clogged sewers	X	✓	X	✓	X	✓	X	X
Elemental disasters that are not mentioned in these conditions, as well as damages that are caused by plant diseases and insects as well as the destruction of birds and animals	X	✓	X	✓	X	X	X	X
The insurer is not obliged to pay compensation for repairing a landslide or landslide, as well as any damage caused by wind, torrential rains with wind, as well as the eruption of grains due to overripe, obstruction of flowering and fertilization, lying down due to lushness of crops	X	✓	X	✓	X	X	X	X
The risks of damage are not covered if it did not directly affect the decrease in yield only affected the quality of the fruit and its price	X	✓	X	✓	X	X	X	X
All damages caused by improper maintenance are excluded from the greenhouses the temperature inside, due to lack of fuel or electricity, quarters of heating and ventilation system	X	✓	X	✓	X	X	X	X

<sup>3</sup> The numbers from one to eight in Table 3 refer to the eight insurance companies selling agriculture insurance

	1	2	3	4	5	6	7	8
Damage from excessive or improper use of chemicals is not recognized fertilizer	X	✓	X	✓	X	X	X	X
The insurer is not obliged to pay compensation for damage caused by unnamed risks or risks that are not covered by the policy and Article 13 of the conditions	X	✓	X	✓	X	✓	X	X
The insurer does not cover damages caused by natural disasters that are not listed in these conditions, as well as damages caused by plant diseases.	X	X	X	✓	X	✓	X	X
The insurer does not cover damages caused by an atomic reaction, atomic radiation or radioactive contamination.	X	X	X	✓	X	X	X	X
If it is determined that the insured crop or fruit before the conclusion of the insurance has already been damaged by the risk from which it is insured	X	X	X	X	✓	X	X	X

Source: Authors own comparison analysis of the T&C of the insurance companies

Based on the T&C very often the level of indemnification for the same crop and covered risk, differs from company to company, which has an impact on triggering the claim. This is because there are differences in the definition of a percentage for total damage, so, some companies define it as a damage of 70% or more, some define it as a damage of 80% of the crop or more, and others don't have a defined percentage in their T&C. Besides the definition of total damage, there are also differences in determining the levels of a partial damage and the percentage of deduction from the claim amount, for each damage level due to unfinished business. Further on, the claims settlement pro-

cess is very slow and burdensome for the farmers, which, along with the unstandardized level of indemnification causes a general discontent of the offered settlement amounts. All of this is a cause for mistrust of the farmers in the insurance companies, which leads to a reluctance of the farmers towards insurance.

In short, the current situation of the agricultural insurance market in N. Macedonia can be mainly attributed to some of the following risk factors that impact on the three major pillars: the government (the budget), the agriculture sector operation and the insurance companies.

**Table 4.**

*Risk assessment matrix (the impact of risk factors on the potential consequences of the major pillars in the agriculture insurance market in Macedonia)*

Risk	Government (the budget)	Agriculture sector (operation, protection)	Insurance companies
Lack of public understanding of need and benefit of the agricultural insurance/low awareness	9	6	9
High cost of reinsurance coverage due to low business volumes	1	6	9
Public perception that the state is responsible for covering the losses	9	4	9
Mistrust in claims management systems	6	9	9
High concentration of risk	4	6	9
Lack of interest by the insurance companies to be involved in this line of business	9	6	9
Diversified Terms and Conditions	1	9	2

		potential consequences		
		minor 1	major 2	severe 3
impact	High 3	3	6	9
	Medium 2	2	4	6
	Low 1	1	2	3

Source: Authors own assessment

## DISCUSSION

The effect of the climate change on agriculture in N. Macedonia in compliance with the current structure of the agriculture insurance market requires a different approach toward the agriculture insurance, such as agriculture insurance pool.

In N. Macedonia the current situation shows that whenever there are losses due to weather extremes, the government acts as an insurer of last resort and indemnifies the farmers, thus burdening the budget. In this way, the government encourages 98% of the farmers and discourages even those 2% of insured farmers, not to insure their crops, knowing that they can always rely on the government. Also, there is no developed supply that is covering wide spectrum of risks and the insurance companies are not interested to cover the natural disasters risks because they are frequent, and their occurrence is almost certain (high adverse selection in all parts of the country). The existing concept is not sustainable on the long run and therefore, there is an urgent need of setting up a risk management mechanism in the agricultural sector that will offer standardised products with defined price and terms and conditions, i.e. agricultural insurance pool. The pool will provide a standardised insurance coverage for every farmer that receives a production subsidy. In case of natural disasters and adverse climatic events, the pool will then provide all insured farmers with insurance indemnity payments, which will be backed by the international reinsurance market. The premium will be

paid by an automatic premium surcharge on the production subsidy. To neutralize the impact of the proposed surcharge on the farmers, the current government allocations on post-disaster compensation programs could be added (as a top-up) to the annual production subsidy, and this programme subsequently closed.

Through establishment of a risk transfer mechanism based on agriculture risk management the country will be able to provide financial protection under the umbrella of a single publicly owned insurance company with standardised products with all risks included (especially those such as drought, flood, frost and hail) and participation of the insurance companies. Such instrument will shift the current perception of the farmers that "the state is obliged to cover the agricultural losses" toward a new higher level of perception that each farmer needs to provide financial protection to its business (Boshkovska, 2018).

The experience from establishing insurance pool shows that, all risks get covered, the government budget gets stabilized, farmers gain trust in the system and invest more in their agricultural products as they are better protected against unpredictable weather conditions. The goals of establishing the agricultural insurance pool are: a) *Wide coverage*; b) *Expansion of agricultural insurance*; c) *Affordable insurance premiums*; d) *Stability of farmer income*; e) *Budget discipline of public sector*; f) *Development of the agricultural sector*.

For this insurance pool to be established, first, an Agricultural Insurance Law

should be adopted, which would regulate the following issues: 1. The postulates for establishment of the pool; 2. The management structure and principles of the pool; 3. Risks to be insured by the pool; 4. Income and expenses of the pool; 5. Premium subsidy and financial support for the insured catastrophe losses; 6. Authority, duties, responsibilities, the contribution and participation of the insurance companies.

The management body of the insurance pool, would be a Board, which will include a member of the Ministry of Agriculture, Forestry & Water Economy; a member of the Insurance Supervision Agency; a member of the Government; representative of the insurance industry; a representative of the National Federation of farmers and a representative of the Agriculture and Food-processing Industry Association. Besides the Board of the Agricultural Insurance Pool, a Pool Management Body should be established as well, which will consist of equal share of representatives of all the insurance companies that participate in the pool. The duties of this management body would be to, im-

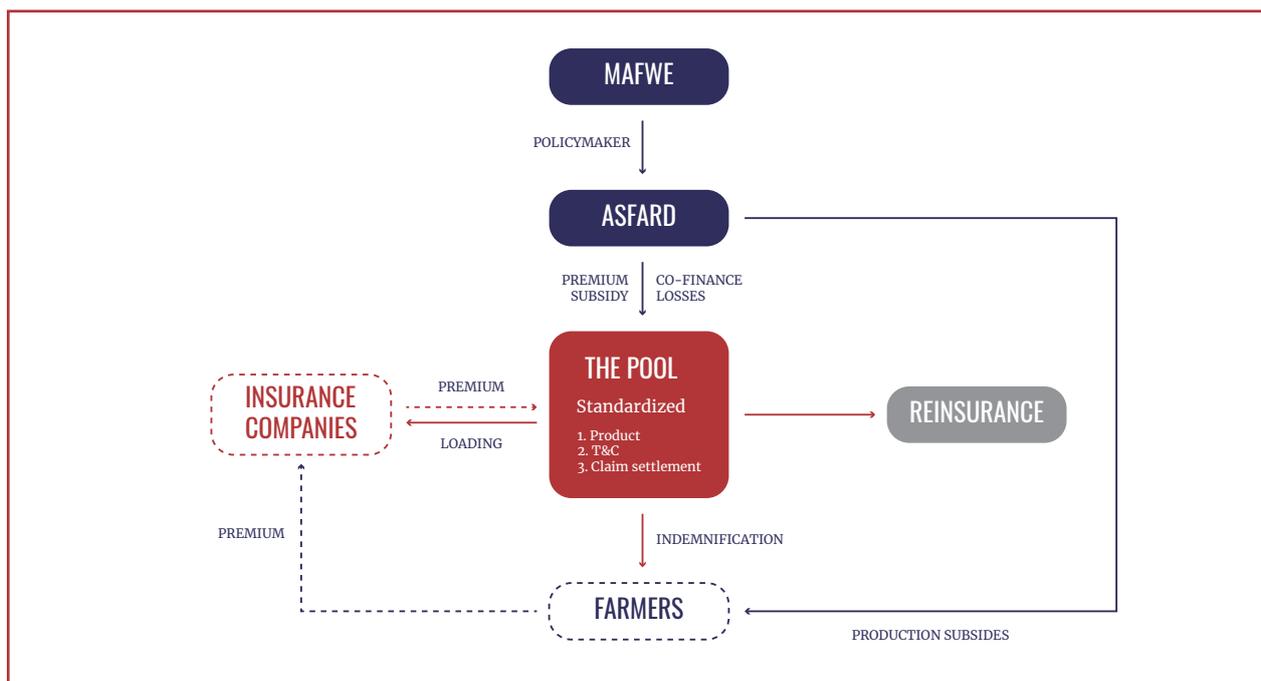
plement the decisions of Board of the Pool, to collect premiums and to pay claims, to develop insurance products, etc.

The functioning of the agricultural insurance pool, should have a form of compulsory character. MAFWE should provide a premium subsidy only to those farmers who purchased insurance from members of the pool, with no insurance subsidies for insurance policies purchased outside the pool. In that case, the base premium will be significantly higher. The amount of premium subsidy would be revised and determined on annual basis, taking into consideration different factors, like crops, risk, region, etc.

Another important element of the insurance pool are the offered insurance products. Unified insurance products that are simple, understandable by the common farmer and cover as much risks as possible should be developed. The insurance policies would be issued by each insurance company, however the risk and 100% of the premium would be transferred to the agricultural insurance pool.

**Figure 1.**

*Proposed draft of the agriculture insurance pool functioning*



Source: Authors own illustration

The illustrated pool functioning in Figure 1 provides secure system for farmers, with standardised products, claim settlement and terms and conditions under the umbrella of the government and involvement of the private sector without burden on the government budget.

## **CONCLUSION**

Through implementing the risk transfer mechanism in a form of an insurance pool we actually build a sustainable financial protection of the farmers and their business against natural dis-

asters and adverse climatic events and as stated by Mahul and Stutley (2010) such mechanism achieves an economy of scale, operating as a single entity with shared administration operating functions that will lead to cost savings (fixed and operational). Through the establishment of a national agricultural insurance risk sharing program - an agricultural insurance pool, there will be a financial protection for all farmers, unified insurance products, wide range of risk coverage, fair claims settlement and better adaptation of the agriculture sector to climate change.

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