

THE PARAMETRIC INSURANCE. CLIMATE CHANGES AND THEIR IMPACT ON THE INSURANCE INDUSTRY

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Abstract: *The insurance industry is an innovative one, constantly moving, because the economic and social environment is also constantly changing. The eight billion inhabitants demand a lot from our planet, which makes efforts to be able to support them; they put enormous pressure on life and living conditions. Nature has changed its behavior. When a series of natural events reach certain parameters, they lead to climate changes and trigger damages (even catastrophes). Thus the insurance industry is seriously activated. Between climate and weather there are both semantic and structural differences. Climate is defined as the totality of prevailing weather conditions, and weather is what we feel daily, in the short term, days or even hours.*

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JEL Classification: *G22, G52.*

1. Introduction

Over time the climate has changed many times, alternating from warm periods to ice ages. Scientists have found explanations in the change of the Earth's position in relation to the Sun, in the intensity of solar activity, and in the last centuries everything is added up with the destructive activity of man on nature. The values of greenhouse gas emissions have increased substantially: CO₂ (carbon dioxide), CH₄ (methane), hydrofluorocarbons, HF₃ (nitrogen trifluoride), which, above normal limits, cause climate changes. In the last 150 years, the global temperature has increased by 1.30C. Sources producing greenhouse gases are:

- the burning of fossil fuels which are necessary for the production of electricity, transport, industry, heating/cooling of households;
- agricultural and related activities: animal digestion, manure;
- storage on the ground and waste incineration;
- deforestation and change of land destination;
- handling of waste water.

As a result of global warming, extreme natural phenomena frequently occur: storms, hurricanes, floods, landslides, heat wave or extreme cold, drought, wildfires. The effects of these natural phenomena are: sea level rise, salinization, changes in the precipitation regime, thawing, the movement of the ice cap and mountain glaciers.

The scale of the disasters can be seen from a few examples:

a) In June 2021, ***Elsa, a category 1 hurricane***, hit the US and the Caribbean area, causing more than 350 million US dollars in damages, which insurers discounted. As a result of the wind blasts, damages of more than 50 million US dollars occurred in the Caribbean area, and more than 250 million dollars in the USA, where vehicles were affected, residential buildings and agricultural areas as well. Although reinsurance contracts were concluded, the losses were borne by the local market (www.mediafax.ro).

b) In July 2021, **floods** in Central and Western Europe generated economic losses of approximately 10 billion US dollars. The most affected countries were Germany (where half of the total damage was recorded) and Belgium, but other countries were also affected: Switzerland, France, Luxembourg, Austria, the Netherlands, Italy, Poland, Slovakia, the Czech Republic and Hungary. More than 200 people died and more than 70,000 buildings were damaged. It is worth noting that a good part of these damages were uninsured (<https://romania.europalibera.org>).

c) In July and August 2021, violent fires occurred in Europe as a result of high temperatures, **drought and strong winds**.

The affected countries were Greece (temperatures of 46,10C and over 100 fires in two days), Turkey (approx. 130 fires), Italy, Albania, North Macedonia, Bulgaria. The worst fires in recent decades were in Turkey and Greece.

Fires also occurred in Russia (in Siberia, the smoke was felt as far as the North Pole), Brazil, USA, Canada, with temperatures of 49,50C. These fires and the emanating smoke caused respiratory problems to the population, aggravated with the COVID 19 pandemic (www.digi24.ro).

A report by the UN Intergovernmental Group (www.agerpres.ro) shows that heatwaves, droughts, torrential rains, etc. will become frequent and extreme as the planet warms. Ten major threats are identified, if urgent measures regarding greenhouse gases are not implemented: heat wave, drought, floods, fires, food, the extinction of some species of animals and plants, the disappearance of vast forest areas, the rise of water levels, ice melting, global economic problems.

Under these conditions, the payment sums for damages are no longer sufficient, the policy rates should increase a lot, and people and organizations will not be able to pay them. States contribute to cover the damage, but it is still not enough.

Insurers:

- are forced to fundamentally change their business models, which are resilient to climate change;
- include harsh conditions in the contracts (for example, a minimum limit of wind speed or the amount of precipitation falling on a surface in a period of time), thus tightening the payment conditions;
- access new data sources: from satellite, distance sensors, meteorological stations.
- implement pricing models based on Machine Learning.
- allocate funds for risk prevention.

All these actions have the effect of offering innovative products, also based on customer experience, but also on empowering the younger generation.

2. Parametric insurance - an innovative product

It is also called insurance based on indices or based on concrete indicators. It is a recent product, implemented most often in developing economies and especially in agriculture, to ensure crops.

It is defined as follows (www.lasig.ro): „*a non-traditional insurance product that offers predetermined payments based on a trigger event, i.e. predetermined risk parameters. The main advantage is that they offer faster payments than traditional insurances, they reduce costs and increase customer satisfaction*”.

This fills the gaps where traditional insurance is deficient, this can also provide alternatives to the payment of claims that are not possible with traditional insurance products that compensate for a real loss, using blockchain and artificial intelligence, smart contracts and digital payments”.

The innovation consists in the fact that the insured is protected against climatic and catastrophic risks. Parameters that correlate with the damage caused to the customer are used, in order to cover the damage. The customer is entitled to compensation if the parametric conditions established from the very beginning are fulfilled. Although the outright loss is not compensated, the parts agree to make a payment upon the occurrence of a triggering event.

Examples of current parametric products (<https://wikicro.icu>) include the Caribbean Catastrophe Risk Insurance Facility (CCRIF), the African Risk Capacity (ARC) and coral reef protection in the state of Quintana Roo in Mexico. In the US, there are proposals to implement parametric policies more often, particularly for flood insurance through the National Flood Insurance Program.

The functioning of this type of insurance allows the client to choose the parameters specific to his needs and shortens the payment of claims to a few days.

Table no. 1

Areas where parametric assurance is useful

Area/Domain	Risks	Natural phenomena causing damage
Energy	Damage to infrastructure/loss of revenue	Mild winter, lack of wind, lack of precipitation, storm, snow
Agriculture	Loss of income and low yield	Drought, frost, excess rain, production decline, hail
Industry	Damage and Business Interruption	Earthquake, fires, river levels, storms, hail, floods
Constructions	Project delay (using the mobile phone)	Strong wind, excessive rain, extreme temperatures, wave height
Travel (transportation)	Means of transport with delayed arrivals (airplane, ship)	Weather conditions

Source: the authors

To put it simpler and understandable to everyone:

In the energy field we can find ourselves in one of the following situations:

The occurrence of moderate winter risk – the effect is lower consumption. The parametric insurance is concluded by the energy and gas suppliers, for their own protection. Its utility is even greater because this risk is excluded through traditional business interruption policies, considering that it does not represent material damage.

The index is tracked during the insured period, namely November 1 - March 31 - HDD and is calculated as the difference between the daily average and 18⁰C. The admissible threshold is 1,190 HDD. The minimum exit/threshold is 910 HDD. Within this gap, daily temperatures are calculated and accumulated. These are multiplied by 17,000 euros per HDD and the compensation is determined. The maximum compensation limit is 6 million euros.

The risk of low or high winds – the effect is to protect wind farms against wind speed fluctuations. This risk is excluded by classic business interruption insurance.

The risk of lack of precipitation – the effect is the financial insurance of electricity production from hydropower plants, using cumulative precipitation as an index. There is a solution to manage the reduction in energy production due to the lack of rain, as follows: the level of the reservoir behind the dam, accumulated over a year, is calculated; The allowed threshold is 800 mm; The exit is 200 mm; Compensation = 1,000 euros x mm below the threshold; The maximum compensation limit is 1 million euros.

In the agricultural field, it is an alternative to the classic insurance through which agriculture and viticulture farmers, as well as specific traders, can be insured against the following:

Risk of frost

The temperature is monitored daily from April 15 to May 31, and the difference is between 0°C and -3°C. The maximum compensation limit is 1 million euros.

The risk of drought

The cumulative precipitation index is followed for three months, respectively June 1 - August 31, measured at the most suitable weather station; The maximum threshold is 150 mm, and the exit at 50 mm; The compensation is calculated by multiplying 30,000 euros to the number of mm below the threshold.

The risk of floods - mirroring the drought risk, compensates for excess water in the soil.

The risk of yield loss

Based on the statistical data, the regional yield is considered to be a reference index. The threshold is set at 10% below the index. The exit is 6 tons/h.

We find that the main parameters (triggers) for agriculture are the amount of precipitations, soil moisture, air and soil temperature, the number of days with drought or frost.

In the business field - new risks constantly appear, the triggers being diverse, Lloyd's (www.lasig.ro) identifying some of them: periods of non-functioning of IT equipment, interruptions of activity for various reasons (including Covid 19).

The stages and procedure for concluding a parametric insurance do not differ from traditional insurance. The steps which are followed: **the preliminary stage** (with information about the insured risk, the insurance period, the territory, the insured amount, the history of damages and the yield of crops), then **the stage of risk analysis** for issuing the offer (it takes into account the established index, the minimum and maximum limits of compensation, its structure, the evolution of the culture during the vegetation periods) and **the stage of concluding the insurance policy** (with the actual issuance of the offer, its analysis, the final choice of parameters and the issuance of the insurance policy).

3. Conclusions

There is a new form of insurance available to everyone, which is quickly proving its effectiveness.

This is not intended to replace traditional insurances and supplement them and speed up the damage recovery.

The two categories can work well together, the parametric insurance becomes useful if there are slowdowns or dysfunctions in the classic markets. For example, in the case of a river shipping company if the direct physical effects of decreasing water levels may be non-existent because vessels are stopped, then the costs of business interruption and associated revenue losses are significant. In this case, a parametric coverage based on water level can be a lifesaver to protect against lost revenue.

The advantages are important: there are no more on-site assessments (the compensation formula is already known to the parties), payment is made much faster and discussions or misunderstandings are avoided.

European states, including Romania (<https://portal.afir.info>), are directly interested in promoting these types of policies and stimulating the farmers, even subsidizing insurance bonuses. Sub-measure 17.1 is published on the website of the most important institution that supports the financing of agriculture through European funds in Romania (Agency for Financing the Rural Investments - AFIR), which farmers can access by submitting the

relevant documentation. A non-refundable support is granted and it consists of 70% of the amount of the eligible insurance bonus actually paid by the farmer.

The outlook is in favor of parametric insurance. Access to parameters is no longer an obstacle, data innovation is continuous. Insurers show their willingness to underwrite parametric offers. They are more economical, and the companies' desire to insure themselves is increasing. They all want to increase their climate resilience, to strengthen their businesses and to quickly recover from damage in case of a disaster.

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