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Nikhil Sharma
MBA Student, Mittal School of Business, Lovely Professional University, Phagwara, Punjab, India

Rohit Bansal
Assistant Professor, Mittal School of Business, Lovely Professional University, Phagwara, Punjab, India

Corresponding Author:
Nikhil Sharma
MBA Student, Mittal School of Business, Lovely Professional University, Phagwara, Punjab, India

Weather risk management and viability of weather insurance in punja

Nikhil Sharma and Rohit Bansal

Abstract
Weather risk means that bad weather may disrupt the company's operations or cause property damage. Climate insurance is a form of financial protection against losses or damages that occur as a result of a moderate, severe weather. Wind, snow, rain / thunderstorms, fog, and unacceptable temperatures are examples of these conditions.it can be help farmers to recover their losses which may happen from weather conditions. Farmers' willingness to pay (WTP) serves as an indicator of the maximum premium they are willing to pay to secure their crop. New options for smallholder farmers include indicative crop insurance or climate insurance against climate control, where payments should be made with very low rainfall, temperature stress, and price-based insurance schemes based on market risk management tools. Instead of covering only a percentage of the risk, such programs may include comprehensive weather risk insurance.

Keywords: Weather risk, weather insurance, crops, farmers, rainfall

Introduction

Weather Risk

Weather risk refers to the possibility of severe weather disrupting company operations or causing property damage. Weather risk has a considerable influence on some businesses, such as buildings and farming. For the most part, this impact can be predicted because severe weather occurs at least once a year. Some years, however, have far more severe weather than others. Weather risk is frequently characterized as weather patterns that deviate from baseline assumptions. Weather risk is also influenced by climate and location. The weather may cause months of delay for outdoor operations such as building in some areas.

Weather risk also exhibits the features that frequently defy traditional insurability criteria. For starters, certain weather hazards, particularly those that emerge slowly, such as drought, are geographically connected and can result in systemic problems. Second, climatic change may increase the volatility of weather variables, resulting in non-stationary loss distributions, making actuarial rate making more complex. Third, the lack of reliable loss distributions is hampered by the scarcity of yield and weather data.

Weather Insurance

Weather insurance is a type of financial protection against losses or damages suffered as a result of quantifiable, bad weather conditions. Wind, snow, rain/thunderstorms, fog, and unfavorable temperatures are examples of these circumstances.

Businesses and their connected activities are frequently covered by weather insurance as a separate policy. As a result, this insurance may be used for a variety of objectives, like protecting an expensive event from being destroyed by poor weather. Insurers compensate covered firms if weather-related occurrences result in a revenue loss

How Weather Insurance Works

- The weather has an impact on our everyday lives and may have a significant impact on company profits and sales. As a result, whether insurance is frequently purchased as a stand- alone policy to cover companies and their connected activities, such as ensuring a costly event that might be wrecked or badly disrupted by bad weather. First Festivals, concerts, trade exhibits, seasonal events, parades, film shoots, fundraisers, and athletic events are all covered by weather insurance. Second Individuals, on the other hand, can utilize it to cover large events such as an outdoor wedding. Hurricanes, eagles, and other low-probability meteorological occurrences are typically covered by traditional weather insurance.

- Weather insurance premiums are determined by several factors, including location and time of year. To put it another way, the cost of coverage is determined by the chance of the insured weather event occurring and the amount of possible loss. To determine how to price a policy, an actuary at the insurance firm examines meteorological data dating back decades.

Purpose of weather insurance

- For many businesses, whether insurance is a must-have and a critical risk management approach. It's also quite adaptable. An insured party, for example, can select the number of days, weather occurrences, and intensity of weather covered by the insurance.
- Businesses will occasionally adopt these regulations as a sales gimmick to attract clients. For example, a furniture business can promote that if it snows more than two inches on Christmas, all furniture sales made in December will be free. In such situations, the store would purchase coverage that would cover this unique occurrence.

Importance of the topic

- Weather risk assessment has two main goals: determining the economic cost of weather unpredictability and climate change and assessing the use of weather insurance in weather.
- Risk and climate change adaptation strategies. This study demonstrates a simple method for calculating weather risk that takes into accounts both the exposure and sensitivity of business and economic indicators to weather variations in Punjab.

Review of literature

- Akter *et al.* (2016) [1] studied the gap and contributed to a better understanding of choice heterogeneity in weather-index insurance by analyzing data from 433 male and female farmers living on a climate-vulnerable coastal island in Bangladesh, where a growing number of farmers are turning to maize as a potentially lucrative but high-risk cash crop. The data of the study was taken from 2014-16 with N-sample size and the regression sampling was used to collect data. The finding was to fulfill gender equity mandates in climate-smart agricultural development programs that rely on weather-index insurance as a risk-abatement tool are therefore likely to require a strengthening of institutional credibility while coupling such interventions with financial literacy programs for female farmers.
- Ben, Shahar, and Logue (2016) [2] found that the important role of insurance risk posed by serve weather the risk of human activity along with the predicted path of storms which can insure human life by cost-justified mitigations efforts in building construction and infrastructure. The data was collected from a government-run insurance program in Florida in 2012 and correlation tools were used. His study explains the major two distortions arising from the government's dominance in these insurance markets first subsidies are allocated differentially across households, resulting in a significant regressive redistribution favoring affluent homeowners in coastal communities. Second subsidies induce excessive development and redevelopment of storm-stricken and erosion-prone areas.
- Bokusheva (2018) [3] studied that the objective of the study is that three selected Archimedean copulas take by taking control of the left tail dependence index. Regression analysis is a standard tool used in empirical studies to estimate the sensitivity of crop yields to a weather index when rating a weather index insurance contract. In this study we will find a copula-based weather index insurance design the copula approach is better suited for modeling tail dependence than the standard linear mathematical relationship-related approach, it may increase the effectiveness of weather insurance contracts designed to protect against extreme weather events in the combined distribution of the farm produce and a specific weather.
- Cai and Song (2016) [16] studied that to know that a greater impact on the farmers of disaster experience on weather insurance. Our sample counties are located in Jiangxi province, which is one of China's major rice bowls. In which probability sampling technique was used to determine the groups of the sample. A two-sample t-test is used to interpret the results. In the research, we find the treatment perceived probability of disasters, or by learning of insurance benefits, but is driven by the experience acquired in the game about the payout probability features a strong positive effect on insurance take-up.
- Castellani and Viganò (2017) [5] studied that the objective of the study is to find the role weather shocks can play in the livestock mortality micro insurance take-up when the insured risk has a prevalent covariant component. The sample size of the study was 360rural Ethiopian households and the data was collected from panel structure at the end of three agriculture seasons (2011- 2013). In this study, we find that the conditional distribution of the WTP shows that other elements can prevail for low values of the conditional distribution.
- Castillo, Boucher, and Carter (2016) [6] studied the development of more efficient and sustainable schemes for index insurance, for small farmers. Mexico was contracted to use publicly available rainfall and temperature data from the government's network of weather stations. These weather data, along with data on soil types from detailed soil maps, are fed into a dynamic crop model that allows estimation of the relationship between yields and the specific weather catastrophic weather insurance in Mexico, satellite-based insurance for pastoralists in Kenya, and a hypothetical area-yield insurance scheme in Ecuador are in three schemes we found that the contract was designed and implemented and therefore the impacts of the insurance on investment, nutrition and income smoothing.
- Ceballos, Kramera, and Robles (2019) [7] studied Picture-based insurance (PBI) as a low-cost way to enhance coverage. When compared to index-based insurance, PBI evaluates insurance claims using farmer-taken smartphone images of insured plots to reduce asymmetric information and claims verification costs while lowering basis risk. The data of the study was taken from 2014 and simple random sampling was used to collect the data. The finding of the study was that farmers can follow picture-taking protocols and send in

smartphone pictures of their crops regularly, expert loss assessments can detect the majority of severe damage cases using these smartphone pictures and PBI reduces downside basis risk compared to both weather index-based insurance and area-yield insurance

- Janvry, Ritchie, and Sadoulet (2016) [8] studied that Weather risk and incomplete insurance markets are significant contributors to poverty for rural households in developing countries. They used the random sampling method of collecting data and used the descriptive method of the statistical tool in 2005-2013. The analysis sample is taken as 976 unique municipalities over 8years with 4,311total.
- Hudson *et al.* (2020) [9] studied the importance of resilience pillars are vital both before and after extreme weather occurrences. The data of the study was taken from 2014-19 and simple random sampling was used to collect data. The finding of the study was that Extreme weather events are becoming more common as a result of a mix of socioeconomic development and climate change. As a result, societal resilience to extreme weather disasters should be promoted, and insurance, if adequately organized and regulated, has the potential to be a transformative resilience tool.
- Horo (2019) studied the Crop insurance is one such option that allows farmers to move their risk to a third party and get compensation in the event of crop failure. The data of the study was taken from 2014-18 and the finding of the study was that Crop insurance is a risk management instrument that farmers may use to mitigate the hazards that they face in today's agricultural environment. Farmers can pass on their weather-related risk to a third party, most preferably insurance firms, to calculate a premium.
- Norton (2016) [11] found that the weather index insurance to planting pest and disease management ways of reaching goals using two models 1 insuring the crops from the harmful fertilizers. Second insuring crops from using pesticides and insuring crops from using pesticides. Weather- based pest incidence models to an insurance product, insuring plant disease incidence models which are not suitable for the insurance market for both scientific and behavioral reasons.
- Pu, Chen, and Pan (2018) [12] studied that China has started using weather index insurance to cover farmers' risk. Through comparisons of weather index futures with index insurance, this study shows the need and importance of using the weather index futures to raised protect farmers and better develop China's financial markets. The methods used in this paper are mixed. It mainly uses a comparison method to match different types of risk management of agricultural products, including traditional weather insurance, weather index insurance, and weather index futures. This paper compares weather insurance, weather index insurance.
- Shirsath *et al.* (2019) [13] studied a heuristic model is created by combining agro- meteorological statistical analysis, crop growth modeling, and optimization methodologies to provide a superior contract design that results in better and more frequent payouts at no additional subsidy cost (in terms of premium rates). The data of the study was taken from 1991-2012 and regression sampling was used to collect data. The finding of the study was that an alternative index-insurance model has improved weather risk by altering existing methodology and integrating crop modeling and optimization techniques with statistical analysis.
- Turenne (2016) [14] was studied that risk base can be influenced by the translation method used to estimate weather conditions. Using fodder plants from Ontario, Canada, for example, a temperature-based insurance index is established. The data is collected from weather stations located in Ontario, Canada from 1967-2004 in April to august, and regression is used to analyze of result that whether what is seen in the stations does not match the climate of the farmer is facing.
- Zada, Mohapatra, and Anand (2021) [15] according to them the PMFBY and MWBCIS programs were not implemented in Punjab, but they were widely publicized at district level camps organized by the Indian Council of Agricultural Research's Krishi Vigyan Kendra (KVK) (ICAR). The data of the study was taken from 2019 with a sample size of 150 respondents that were selected for the study and simple random sampling was used to collect the data. The finding of the study was that in comparison to scientists and extensionist farmers' understanding of PMFBY elements such as crop coverage, risk coverage, post-harvest coverage, and premium subsidies was relatively low. The study's sample consisted of progressive farmers who were thought to have a higher level of awareness. According to the statistics, over half of the progressive farmers were aware of the many features of PMFBY. Through an awareness drive, farmers should be made aware of crop/weather insurance. Insurance education may be included in a variety of risk management training programs.

Conclusion

Weather insurance will remain critical in stabilizing farm revenue and de-risking agriculture. Subsidies on insurance premiums are required to promote farmer enrollment and insurance efficiency. The government faces a hurdle in determining the premium amount (/subsidy necessary). Farmers' willingness to pay (WTP) serves as an indicator of the highest premium they are willing to pay to insure their crop. Innovative options for small farmers include indexed crop insurance or weather insurance against climatic risk management, where payments must be triggered by exceptionally low rainfall, temperature stress, and price insurance schemes based on market-based price risk management instruments. Instead of covering only a percentage of the risk, such programmers could incorporate full climate risk insurance. These programmers can only attain their full potential if the millions of small farmers who are targeted can be reached via a low-cost and effective network for distribution, premium collecting, claim processing, and payout management. When combined with GIS/RS-based technologies like as the Normalized Difference Vegetative Index, a market-based, risk-sharing weather indexed insurance option for agriculture offers several potential benefits. The relationship between risk and credit markets is critical. Credit will become more costly and less easily available if risks are not managed. Credit is one of the keys to progress since manufacturers must typically borrow to invest in new technology. Aside from credit connections, market-based insurance could minimize

the strain on government expenditures. By making insurance available, the government may be able to avoid providing free disaster relief. Other efficiency advantages are likely, as farmers may be more willing to take advantage of the benefits of specialist weather-indexed insurance. To the degree that market-based weather indexed insurance can meet the risk management needs of the country's rural poor; it can also assist address critical food security issues.

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