

Optimal Evaluation of Weather Risk Insurance for Wheat

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Abstract : A model is developed to prevent the risks related to climate conditions in the agricultural sector. It will determine the yearly optimum premium to be paid by a farmer in order to reach his required turnover. The model is mainly based on both climatic stability and 'soft' responses of usually grown species to average climate variations at the same place and inside a safety ball which can be determined from past meteorological data. This allows the use of linear regression expression for dependence of production result in terms of driving meteorological parameters, main ones of which are daily average sunlight, rainfall and temperature. By a simple best parameter fit from the expert table drawn with professionals, optimal representation of yearly production is deduced from records of previous years, and yearly payback is evaluated from minimum yearly produced turnover. Optimal premium is then deduced, and gives the producer a useful bound for negotiating an offer by insurance companies to effectively protect their harvest. The application to wheat production in the French Oise department illustrates the reliability of the present model with as low as 6% difference between predicted and real data. The model can be adapted to almost every agricultural field by changing state parameters and calibrating their associated coefficients.

Keywords : agriculture, database, meteorological factors, production model, optimal price

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