Experience rating by regression techniques in crop insurance.

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Summary: *Crop insurance* is one of the most peculiar lines of business in insurance for its economic, social, and political implications. Also, risk managers must deal with very different severities depending on countries or even regions, because of the different kinds of crops growing, and the geographical, meteorological, and climatic events and conditions. The severities phenomena we find here are quite different than those in other more common lines to the point of constituting quite a particular and difficult case when the stochastic modeling comes up.

Still, the actuarial processes are the same as in other lines, basically rating and safeguarding the *solvency*. Focusing on *posterior rating systems*, among the two methodologies developed in Actuarial Science, *Bonus-Malus Systems (BMS)* and *Credibility Theory*, the first one is applied in many European countries to better track the risk, to strengthen the solvency while simultaneously creating more favorable commercial conditions for the insureds.

In this seminar we will focus on the posterior rating step in crop insurance, explaining the drawbacks of the BMS application to this line of business. We will present some regression methodologies that can better achieve the objectives of the posterior rating step and exemplify their application by means of a Spanish case. These methodologies use *Tobit regression* and *Tweedie regression*, and they will be confronted with the Spanish BMS in one line of crop insurance business, table grapes. By means of real data, we will obtain three sets of premiums, one for each methodology, then compare them through actuarial concepts like the *fairness* and *variability* of the premium scale.