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Innovation in drought risk management: exploring the potential of weather index insurance

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Many family farming and indigenous communities depend on grazing livestock activities and are particularly prone to drought risks. Vulnerability to drought limits the ability of these households to exit poverty and in many cases leads to environmental degradation. It is well known that uninsured exposure exacerbates income inequality in farming systems and eventually results in welfare losses for rural families. The advantages of farmers who have access to financial tools have been widely acknowledged.

However, high administrative costs of traditional insurance hinder small farmers' access to risk management tools. One of the main problems in insurance design relates to the lack of quality data to estimate the risk premium. In rural areas where there are no historical records of farm production data on adverse events such as drought. New technologies such as remote sensing help to overcome this problem and generate information from these areas that otherwise would be impossible or too expensive to obtain.

In this paper, we use a satellite based vegetation index (NDVI) and develop a stochastic model to analyse the potential of index insurance to address the risk of drought in Chilean grazing lands. Our results suggest that contract design is a key issue to improve the correlation of the index with individual farm losses, thus reducing basis risk. In particular, we find that the definition of homogeneous areas and the selection of the triggering index threshold are critical issues and show the incidence of different contract designs on (i) the probability that the farmer experience losses but does not receive compensation (false negative) and (ii) the probability that the index triggers compensation but the farmer does not experience drought losses (false negative). Both aspects are key issues to offer the farmer an adequate protection against droughts and guarantee the affordability of the risk premium.