Pasture, Rangeland, and Forage Rainfall-Index Insurance Program Alternate Index Project

Pasture, Rangeland, and Forage (PRF) is a weather-based index insurance program that uses rainfall as a basis for payout. It is provided through the US Department of Agriculture's Risk Management Agency (RMA) and is intended for grazing livestock and hay production. Grazing production is examined here. With the PRF policyholders will receive a payout if the amount of rainfall, according to an independent and government-measured index, for a given two-month period is below a chosen percentage of the average value for that period in the location of the policy. The percentage of average rainfall that could trigger a payout is between 75% and 90%, in 5% intervals, of average rainfall for each location and time period and is chosen by the policyholder in advance of the insurance year. This percentages is referred to the strike level here. The government subsidizes premiums at rates dependent on the strike level, with the lowest level receiving 59% subsidization and the highest 51%. Higher strike levels increase premiums and decrease subsidies, but also increase the chance of payout. The degree to which a present index falls below the baseline average for a particular interval is taken into account when determining the amount of payout, i.e. an index of .3 pays more than .5.This is done using what is called the payment calculation factor (PCF), which is the ratio of the difference between the strike level and observed index values and the strike level ((strike – index)/strike). Therefore, higher strike levels also increase the chances of larger payouts.

Importantly, it is not possible to insure the entire year and the policyholder must choose how to allocate coverage over the eligible time periods. Eligible time periods are, as mentioned, organized into two-month intervals. These intervals overlap such that the first includes January and February, the second February and March and so on. December and January do not overlap resulting in 11 intervals per year. There are lower and upper limits to the amount of coverage that can be allocated to any one interval, depending on the county. 100% of the total coverage chosen by the policyholder must be split between these intervals, however consecutive intervals may not be chosen because that would result in insurance of the same month twice. It is advised, by the RMA, that the intervals in which rainfall is most important to forage production are chosen for the largest portions of coverage. For example, 30% coverage could be allocated to the March-April interval, 30% to May-Jun, and 40% to July-August. There is, however, significant incentive not to insure growing season months for large portions of the country.

This project examines how payouts patterns would change if the insurance program used any of a collection of alternate indices, with a focus on the seasonality of payment incentive. What is displayed below are potential payments for every interval for a 500-acre policy allocating 50% of protection to each interval. This shows which intervals would have triggered payment should they have been chosen by a policyholder. This is displayed as a map of average payments for each location over time, a bar chart of average payments in each insurance interval for a chosen location over time, and a time series of individual potential payments at a chosen location. Actuarial rates can be based-off of either the 2017 or 2018 insurance year, in case there is interest in the effects of changes on payment distributions. Maps and charts can display potential values of producer premiums after subsidization, total indemnities, net indemnities accounting for premium payments, payment trigger frequencies, payment calculation factors, and unsubsidized loss ratios between indemnities and premiums. Available alternate drought indices include the Palmer Drought Severity Index (PDSI), the self-calibrated Palmer Drought Severity Index (PDSIsc), the Palmer Z-index (Z Index), 1-, 2-, 3-, and 6-month Standardized Precipitation Indices (SPI), and the 1-, 2-, 3-, and 6-month Standardized Precipitation Evapotranspiration Indices (SPEI).

Drought indices were adjusted for outliers, standardized, associated with strike values proportional to those of the rainfall index, and payments were scaled in order to account for an actuarial system designed around rainfall. The results must be interpreted in terms of payout potential and not as a simulation of possible insurance plan configurations.

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