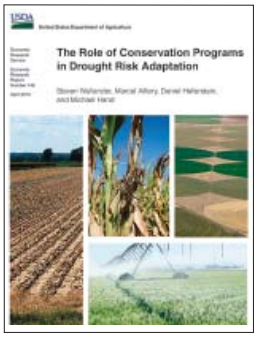
United States Department of Agriculture

A report summary from the Economic Research Service April 2013



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The Role of Conservation Programs in Drought Risk Adaptation

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During the summer of 2012, almost 80 percent of U.S. agricultural land suffered drought. In terms of severity and geographic extent, the 2012 drought approached the peak Dust Bowl year of 1934. However, agricultural production has grown more adaptive since the 1930s, aided by crop genetics, crop insurance, and conservation programs. This report examines the relationship between drought risk and patterns of conservation program participation, and whether regional differences in drought risk can be incorporated into conservation program design.

What Is the Issue?

A major drought is among the most serious production shocks a farm can experience. Over the past decade, total drought-related crop insurance indemnities and disaster relief payments averaged about $4 billion annually, after averaging less than $1.3 billion per year in the 1980s. The rise in total payments is due to a combination of expanded enrollment in crop insurance, increased liabilities due to higher yields and commodity prices, and a series of major droughts in recent decades. Farms in more drought-prone regions may adapt to higher levels of risk by adjusting their crop choices or investing in more efficient irrigation systems. But do existing farm programs encourage or discourage farmers from reacting to drought risk?

What Did the Study Find?

Most prior research on this question has examined the role of crop insurance. Here we hypothesize that participation in the Conservation Reserve Program (CRP) and the Environmental Quality Incentives Program (EQIP) is responsive to drought risk, as evidenced by the role of many funded practices—retirement of sensitive lands, investment in technology that improves irrigation efficiency, and adoption of tillage practices that conserve soil moisture—in improving drought preparedness. Therefore, program outcomes can vary widely between low-risk counties, which are expected to experience fewer than 6 severe or extreme droughts per century, and the highest-risk counties, which are expected to experience between 12 and 20.

We find that differences in climate influence conservation program participation. Farms in more drought-prone regions are more likely to offer eligible land for enrollment in CRP—a 1-percent increase in drought risk leads to a 2.4-percent increase in the offer rate. Irrigators facing higher drought risk are more likely to be enrolled in EQIP contracts with irrigation practices. And crop farms facing higher drought risk are more likely to be enrolled in EQIP contracts with conservation tillage practices.

CRP bid caps for retiring farmland are designed to set the maximum CRP rental rate equal to the expected cash rental rate for a given cropland parcel, so most landowners should be fairly indifferent between putting land into CRP and leaving land in crop production. However, idling crop-

land can be an important way to replenish soil moisture and recharge aquifers, and special grazing provisions under the CRP provide a means of drought response for livestock operations. To demonstrate how existing program designs constrain drought risk adaptation, we create a number of policy scenarios, through which we model changes in factors such as contract rankings or county enrollment caps.

- Revising the Environmental Benefits Index (EBI) to assign points for land in counties facing higher drought risk would lead to a small increase in offer rates and a 1.4-percent increase in total acres offered. Raising the EBI in high-risk counties effectively reduces offer rates in other counties. This suggests that a moderate increase in EBI points, granted to medium- and high-drought-risk (HDR) counties, would have a limited impact nationally (increasing total acres offered by less than 2 percent) but a more pronounced impact within drought-prone counties.
- Since drought risk increases offer rates, HDR counties are more likely to hit the county enrollment caps. Increasing the county CRP enrollment cap from its current 25 percent of cropland acres to 70 percent would increase offered acres almost 28 percent compared to the baseline, over a third of which come from the HDR counties.

We observe a similar relationship between drought risk and program outcomes under EQIP. Irrigators who install improved technology are often able to reduce water lost to evaporation and infiltration, which allows them to provide more water for their crops, particularly during drought years. Similarly, crop producers who utilize conservation tillage are often able to improve the capture and storage of soil moisture, which provides their crops an important buffer against drought impacts. For livestock producers, prescribed grazing plans provide some private benefits in coping with drought risk: forage management, prescribed animal stocking rates or planned grazing, and water supply augmentation for livestock. EQIP program design may also limit the extent to which producers rely on financial assistance for drought risk adaptation, but the impacts of specific policy changes are not as readily modeled given differences in data on program participation.

If climate change increases drought risk, as many studies predict, this may lead to increased demand by farmers for participation in conservation programs. However, both CRP and EQIP have policy designs that may discourage or limit the extent to which farmers rely on the programs for drought risk adaptation, with unintended effects on the geographic pattern of participation. For example, factors that limit participation in CRP, particularly county enrollment caps and program eligibility requirements, are most often binding constraints in the highest drought-risk counties.

How Was the Study Conducted?

Drought risk is measured by the variance in the Palmer Modified Drought Index over the past 100 years. To assess the response of farmers to variation in drought risk, we develop econometric models to separate the effects of drought risk from other factors that influence program participation.

With CRP, we evaluate the effect of drought risk on the probability that eligible land is offered for enrollment. Based on newly constructed estimates of the amount of eligible land within each county, we econometrically estimate a likelihood-to-offer model. With EQIP, we evaluate the effect of drought risk on the share of farms in a county using EQIP contracts for financial assistance with practices—irrigation-related and conservation tillage—that have been demonstrated to have drought-mitigating benefits.

For the livestock sector, we discuss a number of features within conservation programs that may help producers respond to drought risk. CRP includes emergency haying and grazing provisions that are helpful to farms facing severe reductions in forage production. EQIP includes funding for a number of practices that help address water shortages for livestock and drought damages on pastureland. While we do not perform the same type of empirical analysis as for cropland, the available livestock sector data indicate that the connection between drought risk and conservation program participation is not limited to the crop sector.