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March 01, 2012



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Switching the Payment Trigger for an Area-Based Revenue Program Could Increase Participation

by [Robert Dismukes](#), Christine Arriola, Keith H. Coble, and David Ubilava



Highlights:

- The Average Crop Revenue Election (ACRE) program relies on State- and farm-level revenue payment triggers to provide producers with an alternative to price-based and direct payment commodity programs.
- Low participation levels in ACRE as well as interest in replacing direct payment and price-based programs have led farm groups and policy-makers to consider options for

either revising ACRE or establishing a different revenue program.

- Model-based results show that switching from a State-level trigger for the revenue program to a trigger closer to the farm level would generally increase expected payments, but the impact would vary by crop, region, and market price.

The Average Crop Revenue Election (ACRE) program was introduced under the Food, Conservation, and Energy Act of 2008 (the 2008 Farm Act) (see "[New Market Realities Affect Crop Program Choices](#)" in the November 2008 issue of *Amber Waves*). ACRE differs from other commodity programs in two ways. First, the program uses recent crop prices and yields to establish revenue guarantees and benchmarks. Second, State average revenue and farm revenue must both fall below their guarantee or benchmark levels for a farm to receive ACRE payments.

Coverage under the ACRE program is aligned with recent increases in field crop prices. Even so, at the initial enrollment deadline in August 2009, only about 8 percent of U.S. farms with about 13 percent of total eligible acres elected to forgo some of the benefits of the fixed-price and direct payment commodity programs and switch to ACRE. Few additional acres were enrolled in ACRE in 2010 and 2011.

The relatively low ACRE signup rate, as well as rising interest in shifting from direct payment and price-based commodity programs to a revenue-based approach, has spurred considerable discussion among farm groups and legislators about possible changes to ACRE and, more generally, about a new revenue program that would also use average revenue for the area in which a farm is located. For example, one option discussed would be to increase expected payments and make the program more attractive to producers by switching from the State-level trigger of the ACRE program to an area closer to the farm level. Results of model-based analysis by researchers from ERS and Mississippi State University show that such a switch could potentially result in higher payments (see box, "[Modeling an Area Revenue Program](#)"). The gains, however, would vary across crops and regions. A number of other factors, including expected market prices and tradeoffs with other programs, also complicate the outcomes and the potential effects on participation.

Crop Revenue Variability Differs Across the U.S.

Changes in revenue variability depend on the variability of prices and production (yields multiplied by acres) and the interactions between the two. Because crop prices depend largely on world markets, variability in the price of a crop is similar across much of the U.S. Yields, in contrast, depend on weather, disease, pests, and other factors that are often localized. Therefore, the area over which average revenue is measured-national, State, crop reporting district (CRD), county, or farm-will affect variability. If yield variability is greater within a smaller area

than across the entire State, switching the trigger to a smaller area could lead to higher ACRE payments for farmers.

Revenue variability differs by crop, reflecting the variety of conditions under which each crop is produced. For corn and soybeans, county-level revenue variability (measured by the coefficient of variation, or variance relative to mean revenue) is, on average, about 7 percent greater than statewide variation. Average county variability for wheat, cotton, and grain sorghum is about 20 percent greater than statewide variability. Rice is grown under irrigation and has little yield variability, so average county revenue variability is less than 1 percent greater than State variability.

For a particular crop, revenue variability differs by region because of disparity in yield variability and in the local relationship between a crop's yield variability and price variability. For corn and soybeans, revenue tends to vary least in counties that stretch across the center of the Corn Belt, an area with low yield variability and large shares of U.S. production of these crops. Because U.S. corn and soybean production is relatively concentrated geographically and because U.S. production of these crops has a large effect on world prices, prices and yields in the center of the Corn Belt tend to move in the opposite direction (are negatively correlated), which dampens revenue variability. Wheat production, in contrast, is spread over a broader U.S. geographic area and includes several types that are sold in different markets at different times of the year. Revenue variability for wheat is low in irrigated areas in Washington and Oregon and in nonirrigated areas across the middle of Kansas. It is relatively high in the Southern Plains areas of Oklahoma and Texas, in western Kansas and eastern Colorado, and in parts of the Northern Plains in North Dakota, South Dakota, and Montana.

Revenue variability is high for cotton, which is produced in widely separated growing regions and for which correlations between price and yield are weaker than for other crops. Revenue varies least for irrigated cotton production in California and Arizona and is highest for dryland production in the plains of Texas. Grain sorghum revenue variability is generally low in Kansas and high in Oklahoma and Texas. Rice revenue variability differs little across growing regions because yields vary little and price variability, which is the same across regions, largely determines revenue variability.

Grain sorghum, cotton, and wheat would see greatest average increases in expected payments from revenue programs triggered at different levels of aggregation¹

Level	Corn	Soybeans	Wheat	Cotton	Grain sorghum	Rice long-grain	Rice medium short-grain ²
Percent difference in average expected payment ³							

District	10.4	6.8	15.3	13.1	17.1	Less than 1	Less than 1
County	18.8	15.5	28.0	28.5	32.0	2.3	Less than 1

¹To highlight the effect of differences in yield variability, researchers assumed that the expected crop prices would equal the revenue program guarantee price.

²Medium/short-grain rice is for a single State, California. Base case simulations of expected market price equal to revenue program guarantee price.

³Percent differences relative to State-triggered program.

Source: USDA, Economic Research Service using data from USDA's National Agricultural Statistics Service and USDA's Risk Management Agency.

Average Revenue Area Affects Expected Payments

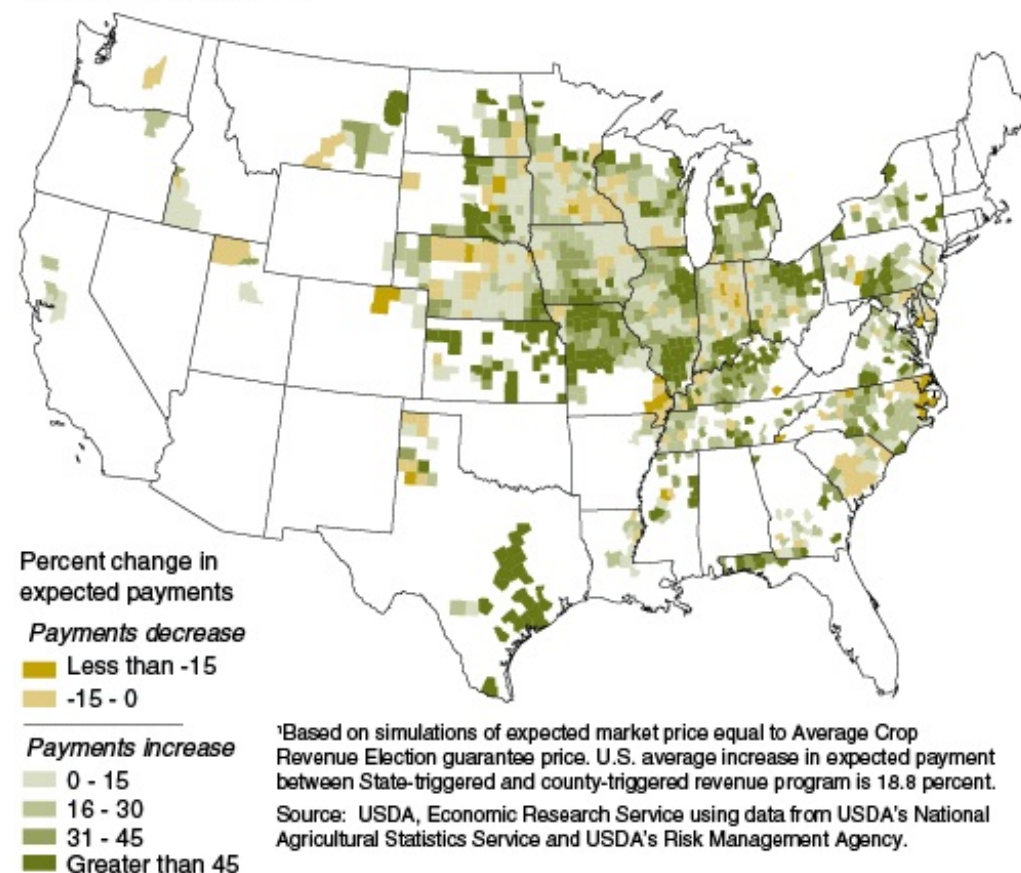
Because the ACRE program and several proposed revenue programs use a double trigger-both the State average revenue and the farm's revenue for a crop must fall below guarantee or benchmark levels-switching the trigger to one more closely aligned with the farm level would change expected program payments. A smaller geographic area would have fewer acres that could have offsetting high and low yields, resulting in greater revenue variability. Such a switch also would likely increase the correlation between the area and farm revenues, increasing the likelihood that they would fall short of guarantees or benchmarks at the same time. As a result, expected payments and risk reduction would generally increase.

To highlight the effect of differences in yield variability, researchers first assumed that the expected crop prices would equal the revenue program guarantee price (crop price used to calculate revenue benchmarks or guarantees). Under that assumption, grain sorghum, cotton, and wheat with their large differences in revenue variability would, on average, see the greatest proportional increases in expected payments among the major crops for which the ACRE program is available. Payments would increase an estimated 28 to 32 percent if a county revenue trigger were used and 13 to 17 percent using a CRD trigger. (A CRD is an aggregation of counties within a State having similar characteristics.) Soybean and corn payments would increase about 16 and 19 percent for a county trigger and 7-10 percent for a CRD trigger. Payments for rice would change little for either trigger.

Not all farms, however, would see average increases in expected payments. When switching from a State trigger to a county-level trigger, farms in counties where revenue variability is high relative to State variability would see higher expected payments. The differences in expected payments would decrease as the difference in variability between the county and the State decreases. Farms in counties with relatively low variability would see smaller increases and could realize lower expected payments.

Switching to a county trigger would result in large percentage increases in payments to participating corn farmers in southern Illinois, southern Iowa, and areas away from the heart of the Corn Belt. Payment increases would be large in northern Iowa and eastern Kansas for soybeans and in the Northern Plains and Kansas for wheat. For cotton and grain sorghum, farms in counties in Texas with high yield and revenue variability would see large increases in payments.

Using a county trigger would increase payments to participating corn farmers in southern Illinois, southern Iowa, and areas away from the heart of the Corn Belt¹



The possible effects of switching to a smaller area trigger in an area-revenue program are more complex than those in the previous analysis, which are based on the simplified assumption that expected crop prices equal the revenue program guarantee price. Under ACRE,

the guarantee prices are averages of marketing year average prices in the 2 previous years. The market price expected for the current year could be either above or below the guarantee price, which is an important consideration for producers deciding whether or not to enter into the program. (Note that once a producer enrolls in ACRE, he or she is enrolled in the program through 2012 crops.) For example, the May 2010 wheat price projection in USDA's World Agricultural Supply and Demand Estimates (WASDE) indicated that the marketing-year average would be about 20 percent below the ACRE guarantee price. In contrast, the May 2011 WASDE price projections for corn and wheat market prices were about 15 percent higher than 2011 ACRE guarantee prices. In general, entry into ACRE would be more attractive to producers in the 2010 wheat situation, when the projected price is, at a point in time close to the end of program signup, projected to be less than the guarantee.

The relationship between the guarantee price and expected market also affects the change in expected payments, and thus potential participation, from switching the area trigger used in the revenue program. This is because the difference in the prices affects the weight of price relative to yield in triggering a revenue payment. Price under ACRE is the same across all areas; therefore, the effect on expected payments of switching the area trigger from the State level would be less when the expected market price is less than the guarantee price. In these instances, the revenue shortfalls would more likely stem from the price decreases. For example, if the expected market price for wheat were 10 percent less than the guarantee price, and if the State trigger were changed to a county trigger, the average expected payment would decrease about 20 percent, compared with 28 percent if the two prices were equal.

If, on the other hand, the expected price were greater than the guarantee price, then yield variability, which changes as the area is adjusted, would become a stronger factor in revenue variability and the effect of switching the area trigger to a smaller geographic area would be heightened. The effect of the difference between expected market price and guarantee price on the change in expected payments as the area trigger is switched would generally be stronger for wheat, cotton, and grain sorghum-crops with greater geographic differences in yield and revenue variability than other crops. For cotton, for example, if the expected price was 10 percent greater than the guarantee price, then the switch to a county revenue trigger would increase the average expected payment by about 60 percent, compared with 28.5 percent when the two prices are equal.

How Would Expected ACRE Payments Stack Up Against Forgone Payments?

Calculating the full effect of switching to a smaller ACRE trigger area also requires considering the value of payments that participating farmers are required to forgo to participate in ACRE. Producers enrolled in the program are ineligible to receive countercyclical payments and

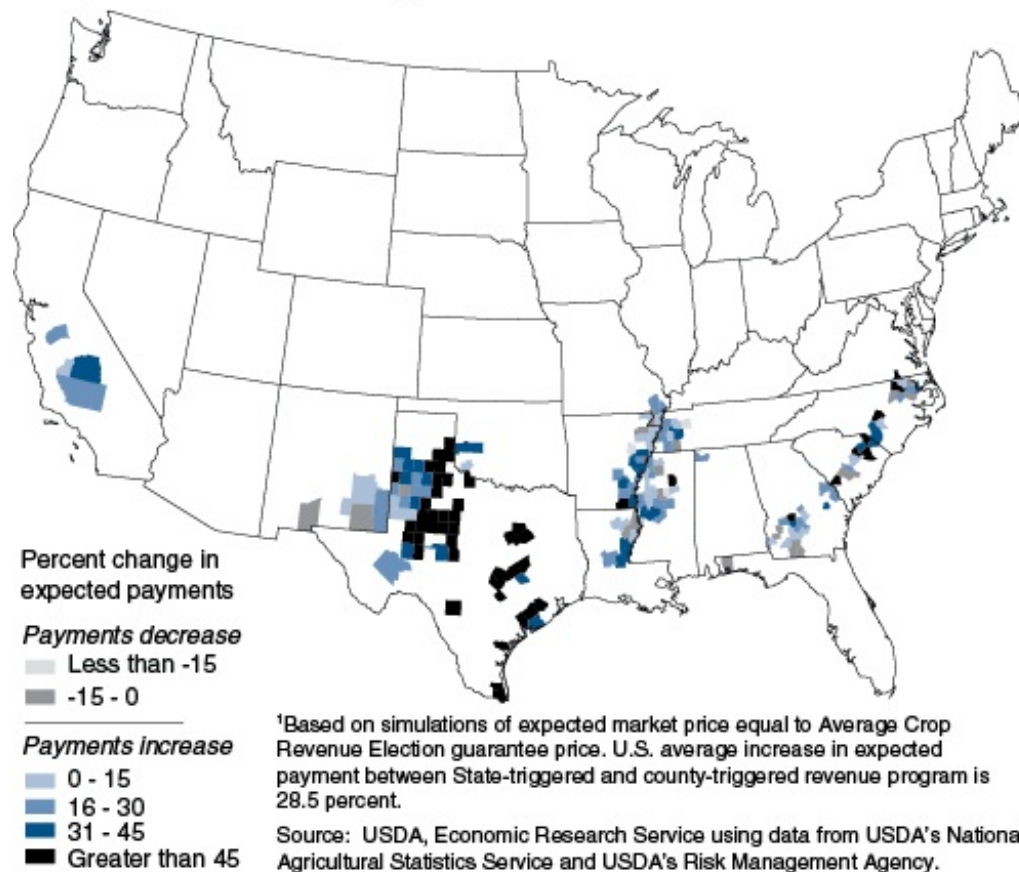
20 percent of direct payments. Participating farmers also face a 30-percent reduction in marketing loan rates. These programs are based on legislatively fixed target prices, payment rates based on statutory formulas, and national average loan rates (with county-level adjustments). In contrast, ACRE benchmarks and guarantees shift to reflect recent prices and yields. As market prices rise, for example, ACRE guarantees increase, while the benefits of fixed target price and loan rate programs and the size of direct payments relative to ACRE payments decrease.

Researchers calculated the potential impact of switching the area trigger in terms of the change in the proportion of crop acres where expected ACRE payments would exceed forgone payments. Continuing the assumption that expected market prices are equal to the 2010 ACRE guarantee prices, switching the area trigger from the State to either a CRD or county-level trigger would not change the proportion of cotton and soybean acres where ACRE payments would exceed forgone payments.

Under this assumption, the soybean market price and ACRE guarantees would be so high relative to target prices, loan rates, and direct payment rates that expected ACRE payments would exceed forgone payments for all acres regardless of the area trigger used. In contrast, cotton prices would be so low that expected ACRE payments would not exceed forgone payments of any acres regardless of the area trigger. Switching the area trigger for rice also would make no difference because there is little revenue variability among different aggregate geographic areas. Expected ACRE payments would exceed forgone payments on only about 20 percent of long-grain rice acres and 100 percent of short/medium-grain rice acres.

The proportion of corn, wheat, and grain sorghum acres where ACRE payments would exceed payments forgone at the 2010 ACRE price levels would increase if a county trigger replaced a State trigger: 82 percent for a State trigger to 88 percent for a county trigger for corn, 32 to 54 percent for wheat, and 44 to 54 percent for grain sorghum.

Cotton farms in counties in Texas with high yield and revenue variability would see large increases in payments when ACRE program trigger is changed from State to county^{1/}



If expected market prices are 20 percent below the 2010 ACRE guarantee prices, switching to a county trigger would reduce the proportion of acres where ACRE payments would exceed forgone payments for corn, wheat, grain sorghum, and rice. For soybeans and cotton, the results are identical at the higher and lower price levels: all soybean acres and none of the cotton acres would have ACRE payments above forgone payments.

While switching the area trigger for rice leads to little change in expected payments, the assumption of lower market prices makes ACRE less attractive: only about 4 percent of long-grain rice acres and about 68 percent of short/medium-grain rice acres would have ACRE payments greater than forgone payments, regardless of the area trigger. For corn, wheat, and grain sorghum, lower prices also would cause

a decline in the proportions of acres where ACRE payments would exceed forgone payments, and switching the trigger from State to county would make a difference in the proportions of acres where ACRE payments exceed forgone payments. Under the lower price scenario, the proportion of corn acres where ACRE payments would exceed forgone payments would shift from 51 percent under the State trigger to 61 percent under the county trigger; for wheat, from 10 to 20 percent; and for grain sorghum, from 6 to 13 percent.

The analysis of expected payments relative to payments forgone under ACRE also illustrates more generally the effect of recent market prices on the attractiveness of a revenue program with guarantees that adjust with recent historical prices relative to the current direct payment and price-based programs. When recent historical prices are high relative to target prices, loan rates, and direct payment rates, as they have been for corn and soybeans, particularly since 2006, many producers could find a revenue program relatively more attractive. In contrast, when recent prices are relatively low, few producers would prefer the adjusting-revenue guarantee program.

While this analysis focuses on expected payments to provide some sense of the potential impact of a change in the area trigger on ACRE participation, the actual participation decisions of producers are more complex. Producers must consider a number of program requirements. ACRE participation applies to all crops on the farm for which ACRE is available, for example, and all landowners for the farm must agree in writing to enroll in ACRE. Participants trade direct payments, which are certain, for payments that depend on the variability of revenue. Finally, a farm may enroll in ACRE during any year covered by the 2008 Farm Act but must remain enrolled for the duration of the act (through 2012), so that expectations about prices in future years become critical.

Modeling an Area Revenue Program

The ERS and Mississippi State University research is based on a model that simultaneously simulates crop yields, prices, and gross revenue at the representative farm (one per crop per county) and county, Crop Reporting District, State, and U.S. levels for corn, soybeans, wheat, cotton, grain sorghum, and long-grain and medium/short-grain rice. The model accounts for correlations among the random variables using empirical sampling techniques. Data for the model came from USDA's National Agricultural Statistics Service, Risk Management Agency, and Farm Service Agency. The data are national in scope and represent about 95 percent of the 2010 planted U.S. acres of corn, 89 percent of soybean acres, 89 percent of wheat acres, 84 percent of cotton acres, 74 percent of the grain sorghum acres, and more than 90 percent of rice acres. To study the effects of changing the area used to trigger ACRE payments, researchers constructed three hypothetical alternatives that maintain the structure and definitions of the ACRE program but substitute national-, district-, and county-level revenue for the State-level revenue trigger.

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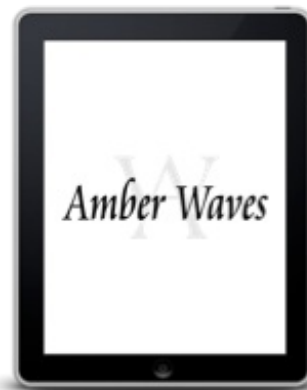
[Alternatives to a State-Based ACRE Program: Expected Payments Under a National, Crop District, or County Base](#) , by Robert Dismukes, Keith Coble, David Ubilava, Joseph Cooper, and Christine Arriola, USDA, Economic Research Service, September 2011

[ACRE Program Payments and Risk Reduction: An Analysis Based on Simulations of Crop Revenue Variability](#) , by Robert Dismukes, Christine Arriola, and Keith Coble, USDA, Economic Research Service, September 2010

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