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## **ANALYSIS OF ACRE'S DRYLAND--IRRIGATED PROVISION**

**J. Clay Francis and Carl Zulauf<sup>1,2</sup>**

### **Introduction**

The Food, Conservation, and Energy Act of 2008 (2008 Farm Bill) provides farm commodity program participants with the choice of a traditional suite of fixed direct payment, marketing loan, and price counter-cyclical programs or a new Average Crop Revenue Election (ACRE) program suite. The ACRE suite consists of (1) 80 percent of the traditional program's direct payments, (2) marketing loans at 70 percent of the traditional program's loan rate, (3) and a new state revenue program. In a departure from the traditional farm programs, the ACRE state revenue program explicitly contains a differentiation by production practice. Specifically, separate ACRE state revenue benchmarks are established for dryland and irrigated acres if total acres planted to a crop in a state are at least 25% dryland and 25% irrigated.

This article presents an analysis of the impact of the dryland-irrigated provision upon the cost and flow of payments by the ACRE state revenue program. Specifically, a historic, counter-factual analysis is conducted using data for the 1969-2008 crop years. Crops included in the analysis are barley, corn, upland cotton, peanuts, oats, rice, grain sorghum, soybeans, and wheat. One of the simulated ACRE programs contained the dryland-irrigated provision in the 2008 Farm Bill. The other simulated ACRE program had a single state revenue benchmark, and thus made no distinction between dryland and irrigated acres. No other difference existed between the simulated ACRE programs.

The ACRE provisions in the 2008 Farm Bill that are germane to this analysis are discussed in the next section. Discussions of the analytical procedures and results follow. The paper ends with a summary and conclusion section.

### **Overview of ACRE State Revenue Program**

The 2008 Farm Bill gives farmers and landowners a choice between the traditional farm program suite and an ACRE farm program suite (U.S. Department of Agriculture (USDA), Farm Service Agency (FSA)). Twenty two crops are eligible for election into ACRE, including barley, corn, upland cotton, peanuts, oats, rice, grain sorghum, soybeans, and wheat. The unit of election is a farm as recorded at FSA. As long as an FSA farm is not in ACRE, election of ACRE remains open. Once ACRE is elected, the FSA farm is enrolled through the 2012 crop.

An ACRE state revenue payment occurs if a state's actual revenue per planted acre is less than the state's revenue benchmark, where, for state  $k$ , crop  $s$ , and crop year  $t$ :

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<sup>1</sup> Masters Graduate and Professor ([zulauf.1@osu.edu](mailto:zulauf.1@osu.edu)), Department of Agricultural, Environmental, and Development Economics, The Ohio State University

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- (1) ACRE state revenue benchmark per planted acre =  $(90\% \bullet \text{Olympic average yield (excludes low and high yield) per planted acre for the 5 most recent prior crop years}_{kst} \bullet \text{average U.S. cash price for the 2 most recent prior crop years}_{st})$ .
- (2) ACRE actual state revenue per planted acre =  $(\text{yield per planted acre}_{kst} \bullet \text{Max}[\text{U.S. cash price}_{st}; 70\% \text{ of U.S. marketing loan rate}_{st}])$
- (3) ACRE revenue payment per planted acre =  $\text{MIN}[\text{ACRE state revenue benchmark per planted acre}_{kst} - \text{ACRE actual state revenue per planted acre}_{kst}; 25\% \bullet \text{ACRE state revenue benchmark per planted acre}_{kst}]$

Coverage level of the ACRE state revenue program is 90 percent (equation 1), and the ACRE state revenue payment is capped at 25 percent of the state revenue benchmark (equation 3).

The ACRE state revenue benchmark cannot increase more than 10 percent from the prior year's level (called a cap) nor decrease more than 10 percent from the prior year's level (called a cup). The 10 percent cap and cup, along with the use of historical moving averages, means that the ACRE state revenue benchmark may adjust more slowly than changes in market revenue. However, no floor exists on the revenue benchmark.

Planted acres equal the conventional definition for most eligible crops, but, for barley, corn, oats, grain sorghum, and wheat; FSA defined planted acres as harvested acres plus acres reported as failed acres to FSA. Failed acres are acres intended for harvest but not harvested. ACRE revenue payments can be received on only 83.3% of planted acres.

Due to a lack of data at the individual farm level, this analysis does not include the individual farm provisions of the ACRE program. These provisions include (1) an FSA farm eligibility condition in which an FSA farm's actual revenue for a crop must be less than the farm's benchmark revenue for the crop, (2) customization of the state revenue payment to the FSA farm by the ratio of farm yield to state yield, (3) a restriction that an FSA farm cannot receive ACRE revenue payments on more acres than the FSA farm's total base acres, and (4) a limit on the amount of ACRE revenue payments a farm entity can receive. For additional discussion of the individual farm provisions as well as other provisions of the ACRE program, see Zulauf, Dicks, and Vitale, Zulauf and Orden, and Zulauf, Schnitkey, and Langemeier.

### **Data and Analytical Methods**

A historical counter-factual analysis was conducted. Specifically, the ACRE state revenue program was assumed to have existed over the 1974 through 2008 crop years with all planted acres enrolled in the ACRE program.

State level production and planted acre data as well as U.S. crop year average price data were obtained from USDA, National Agricultural Statistics Service (NASS). Because of the need to construct the five-year Olympic moving average of yield, data collection started with the 1969 crop year. Information was not available for all states for all of the 1969-2008 crop years, especially by dryland and irrigated production practice. Footnote c of Table 1 contains a list of the states and years for which separate information was available by dryland and irrigated production practice.

Data on failed acres were obtained by personal communication with USDA, FSA. This data began with the 1995 crop. For earlier years, failed acres for a state and crop were estimated by using the average share of planted acres that were failed acres from 1995 through 2008. We also estimated a regression equation in which failed acres for a state were estimated as a

function of the difference between a state's planted and harvested acres. Most of the regression equations were statistically insignificant and explanatory power was generally low even when the equation was statistically significant.

Given the available data, 550 crop-state-year combinations would have qualified for separate dryland and irrigated ACRE revenue benchmarks if the ACRE state revenue program had existed over the 1974-2008 crop years (Table 1). For each of these 550 crop-state-year observations, 25% of the acres planted to the crop in the state for the year were in dryland production and 25% were in irrigated production.

The number of observations in which an ACRE state revenue payment occurred ranged from four for the peanut irrigated ACRE revenue benchmark to 40 for the upland cotton dryland ACRE revenue benchmark (Table 1). The relatively small number of observed payments by crop raises questions about the statistical power of the analysis at the individual crop level. Hence, the discussion of results in the next section is in terms of all crops combined.

Not including the farm related provisions noted in the previous section means that estimated ACRE state revenue payments are high. However, the focus of this article is on the comparative performance of the ACRE program with and without the dryland-irrigated provision. It is not clear that including the farm level provisions would alter the comparative relationships, but the possibility does exist.

**Table 1. Number of Observations, Years and U.S. States That Qualified for Separate Dryland and Irrigated ACRE State Revenue Benchmarks, 1974-2008<sup>a, b, c</sup>**

Crop	Total Observations	Observations when ACRE State Revenue Payment Occurred		
		Single Benchmark	Dryland Benchmark	Irrigated Benchmark
Barley	118	21	26	16
Corn	94	21	31	11
Cotton (upland)	106	32	40	28
Oats	68	32	30	34
Peanuts	8	6	8	4
Sorghum	26	7	5	9
Soybeans	41	10	15	11
Wheat	89	23	27	22
All Crops	550	152	182	135

NOTES:

- Separate state benchmarks exist if at least 25% of a state's planted acres for a given crop in a given year are dryland and at least 25% are irrigated. No state qualified for separate benchmarks for rice.
- An observation is a state-crop-year combination. For example, an observation is barley in 1990 for Colorado.
- Availability of data by dryland and irrigated acres varies by crop and state. Barley: California (1975-2008); Colorado, Idaho, Montana, Oregon, and Wyoming (1969-2008). Corn: Colorado

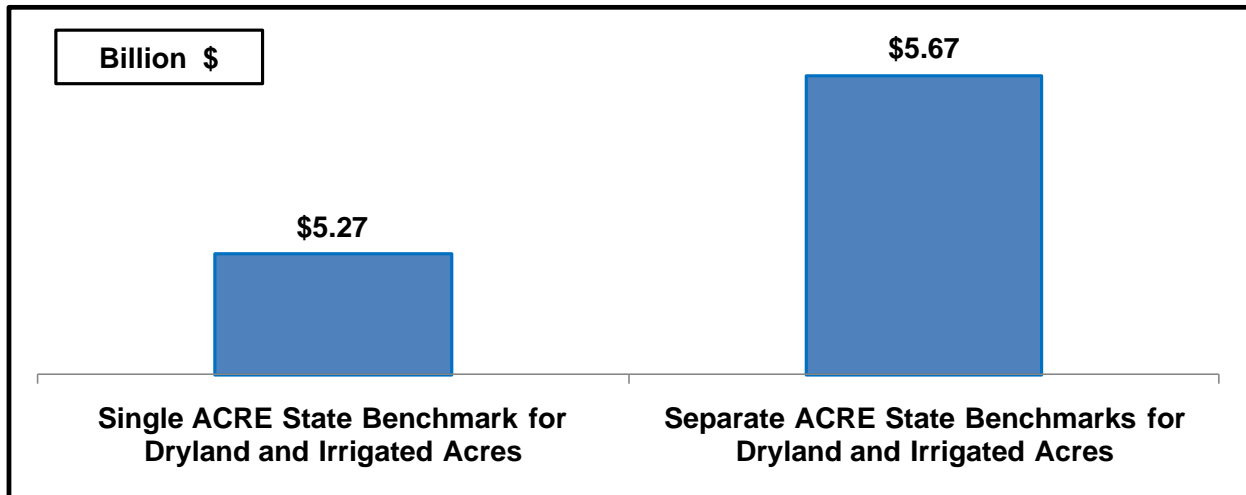
(1975-2008), Kansas (1974-2008), Nebraska (1991-2008), Oklahoma (1985-2008), and Texas (1981-2008). Cotton: Arkansas, Louisiana, Oklahoma, and Texas (1972-2008); Mississippi (1969-2008). Oats: Colorado (1986-2008), Montana (1982-2008), Oregon (1972-2008), and Wyoming (1969-2008). Peanuts: Oklahoma (1993-2003) and Texas (1993-2008). Sorghum: Colorado (1986-2008), New Mexico (1974-2008), and Texas (1971-2008). Soybeans: Arkansas (1991-2008), Nebraska (1974-2008), and Texas (1984-2008). Wheat: California (1974-2008); Idaho, New Mexico, and Utah (1972-2008).

SOURCE: original estimates using data from USDA, NASS and USDA, FSA

**Results**

Over all observations for which separate ACRE state benchmarks would have existed for dryland and irrigated acres had ACRE existed over the 1974-2008 crop years, ACRE state revenue payments were 7.6% larger with separate dryland and irrigated revenue benchmarks than with a single benchmark (Figure 1).

**Figure 1. Comparison of Estimated Total Payments from an ACRE Program with a Single State Revenue Benchmark and an ACRE Program with Separate State Revenue Benchmarks for Dryland and Irrigated Acres, Years and States That Qualified for Separate Dryland and Irrigated ACRE Revenue Benchmarks, Selected U.S. Crops, 1974-2008**



NOTE: see table 1 for information on the number of observations

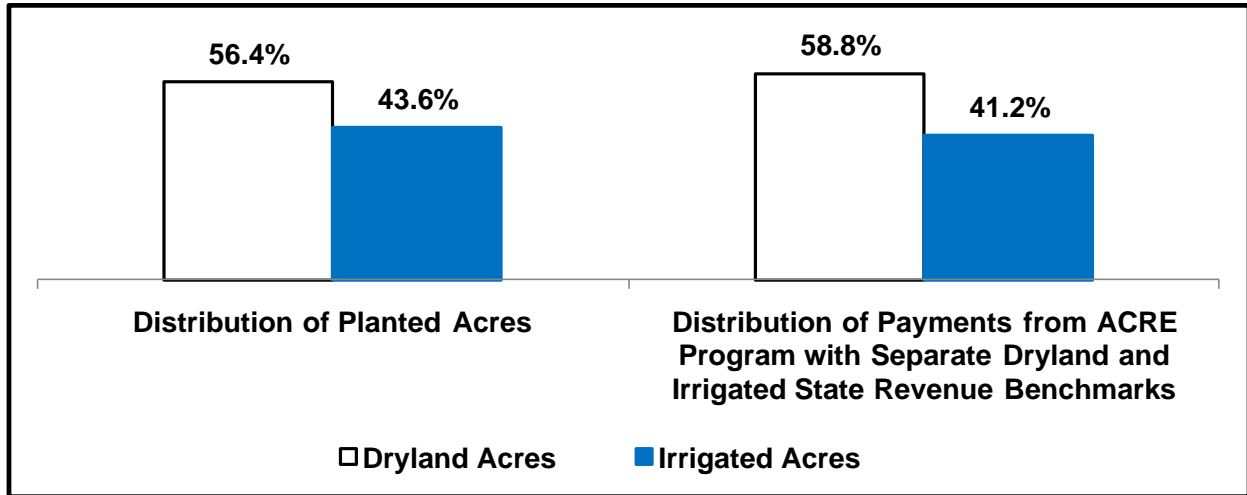
SOURCE: original estimates using data from USDA, NASS and USDA, FSA

For the crops, years, and states in which separate ACRE benchmarks would have existed between 1974 and 2008, a greater share of acres were dryland (56.4%) than irrigated (43.6%) (Figure 2). For the single benchmark program, these shares would be the distribution of ACRE state revenue payments between dryland and irrigated acres. In comparison, the use of separate state revenue benchmarks shifted the share of ACRE state revenue payments to dryland acres, but only by 2.4 percentage points (Figure 2).

Establishing separate benchmarks is expected to result in more frequent payments for dryland than irrigated acres. The reason is that yields, hence revenue, are more variable on dryland

acres. This expectation was confirmed. ACRE revenue payments occurred 8.6 percentage points more often for dryland acres than for irrigated acres (Figure 3).

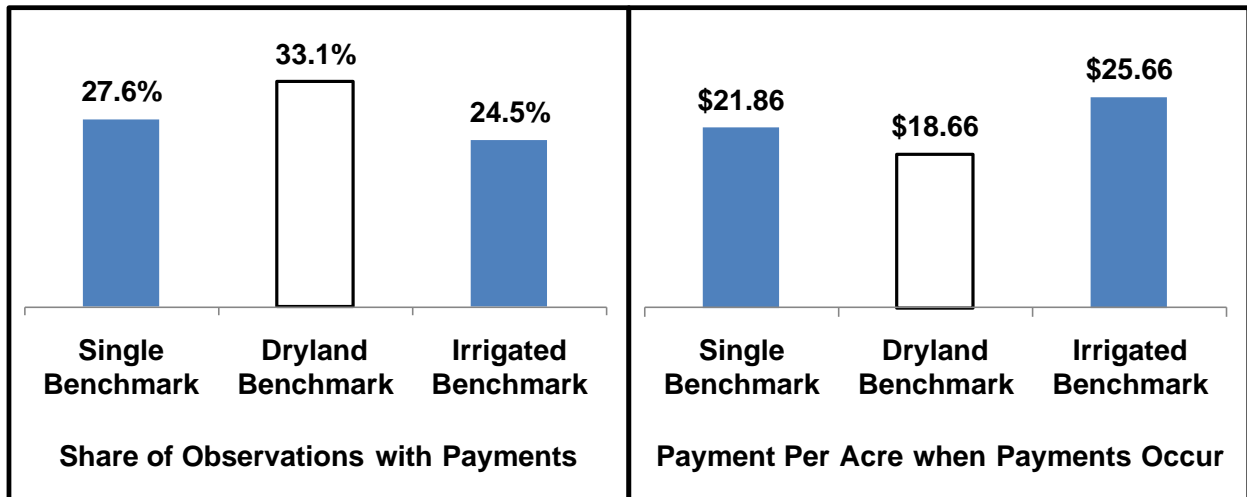
**Figure 2. Distribution of Planted Acres and Estimated ACRE State Revenue Payments by Dryland and Irrigated Acres, Years and States That Qualified for Separate Dryland and Irrigated ACRE Revenue Benchmarks, Selected U.S. Crops, 1974-2008**



NOTE: see table 1 for information on the number of observations

SOURCE: original estimates using data from USDA, NASS and USDA, FSA

**Figure 3. Share of Observations with Estimated ACRE State Revenue Payments and Average State Payment per Acre When Payment Occurs by Type of ACRE State Benchmark, Years and States That Qualified for Separate Dryland and Irrigated ACRE Revenue Benchmarks, Selected U.S. Crops, 1974-2008**



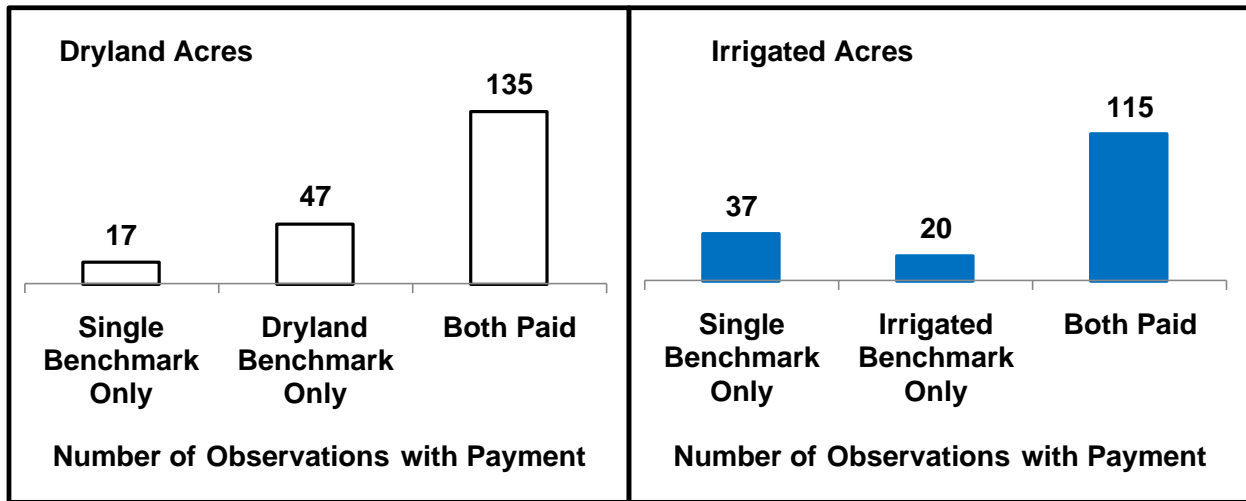
NOTE: see table 1 for information on the number of observations

SOURCE: original estimates using data from USDA, NASS and USDA, FSA

On the other hand, because irrigated yields are higher, per acre payments are expected to be higher for irrigated acres when payments occur. This expectation also was confirmed. Payment per acre was 38% higher for irrigated acres when payments occurred (Figure 3).

For a sizeable majority of observations, the ACRE program made state payments whether single or separate state benchmarks existed (Figure 4). However, there were observations in which state payments occurred when a single state benchmark existed but not when separate dryland-irrigated state benchmarks existed, and vice versa.

**Figure 4. Number of Observations When an Estimated ACRE State Revenue Payment Occurred by Type of ACRE State Benchmark and by Whether Land is Dryland or Irrigated, Years and States That Qualified for Separate Dryland and Irrigated ACRE Revenue Benchmarks, Selected U.S. Crops, 1974-2008**



NOTE: see table 1 for information on the number of observations

SOURCE: original estimates using data from USDA, NASS and USDA, FSA

The results of this study need to be confirmed by other studies. It would be useful to examine different observation periods, use alternative methodologies, and add ACRE's farm revenue loss eligibility condition to the analysis. In regard to the need to examine different observation periods, as a sensitivity test we divided our observation period in half, specifically subperiods of 1974-1990 and 1991-2008. We also examined the last 10 years, 1999-2008. The numerical values presented in Figures 1-4 vary by subperiod, especially the total ACRE payments presented in Figure 1. However; the story of comparative performance presented by Figures 1-4 was similar in each subperiod. Thus, while not a definitive test, the subperiod sensitivity test provides additional support for the results generated by this analysis.

**Summary and Conclusion**

Results of this historical, counterfactual analysis indicate that the creation of separate benchmarks for dryland and irrigated acres by the new Average Crop Revenue Election (ACRE) program is expected to increase the cost of the ACRE program by approximately 8% for those states and crops for which separate benchmarks can be created. It also slightly shifts payments to dryland acres. However, establishing separate revenue benchmarks for dryland and irrigated acres in a state will more accurately reflect the occurrence of gross revenue shortfall for irrigated and dryland acres than does a single benchmark that applies to all acres. Hence, it is

not surprising that the size and timing of ACRE revenue payments change when separate benchmarks are created. In particular, compared with a single benchmark ACRE program, the separate benchmark ACRE program resulted in smaller, more frequent payments for dryland acres and larger, less frequent payments for irrigated acres. Moreover, there were observations in which the separate benchmark program resulted in payments while the single benchmark program resulted in no payment, and vice versa. In short, creating separate ACRE state revenue benchmarks for dryland and irrigated acres improves the risk management assistance provided by the ACRE state revenue program by better matching ACRE state revenue payments with the occurrence of revenue shortfalls on dryland and irrigated acres.

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