Estimated Government Payments with the new Average Crop Revenue Election (ACRE) Program

Kent Olson and Matt DalSanto

Department of Applied Economics

University of Minnesota

The Average Crop Revenue Election (ACRE) program is a new, optional safety net for farmers provided by Congress in the Food, Conservation, and Energy Act of 2008 (commonly called the farm bill). The ACRE program is available starting with the 2009 crop year as an alternative to receiving counter-cyclical payments. ACRE is based on changes in crop revenue; counter-cyclical payments (CCP) are based only on changes in crop prices. Direct payments (DPs) and loan deficiency payments (LDPs) will remain in both programs.

At first, farmers may find the ACRE safety net based on crop revenue (that is, both prices and yield) appealing as an alternative to the CCP safety net based on crop prices only. Choosing this new safety net, however, is not an obvious choice. Farmers who choose to elect ACRE must accept a 20% reduction in DPs and a 30% reduction in marketing assistance loan rates. Choosing ACRE is an irrevocable election meaning a farmer cannot go back to CCP even if future market conditions make the CCP larger than the ACRE payment. The choice between ACRE and CCP depends on whether commodity prices will stay at or near current levels or decrease and on the variability of and correlation between the individual farm's yields and that farm's State yields. As described more fully in Olson and DalSanto (2008), before the government will write a check to an individual farmer, a revenue loss must occur both at the state level and on an individual farm. These

complexities essentially take away any possibility to develop simple decision rules or breakeven prices for farmers to make the decision to choose ACRE.

ACRE Program Payments

Before a payment can be made under the ACRE program, two revenue tests need to be made: (1) a State level revenue loss and (2) an individual farm revenue loss. First, for each covered commodity, the actual State revenue for the crop year has to less than that State's ACRE program guarantee for that crop year. Second, in order to receive a payment, an individual farmer's actual farm revenue has to be less than that farm's ACRE benchmark revenue. The actual ACRE program payment is based on the State's historical and actual yields and national prices.

Actual State revenue is the actual State yield times the national average market price. Actual State yield is the quantity produced divided by the acres planted to that crop—not the harvested acreage. The national average market price is the maximum of the national average market price and that crop's loan rate. The State revenue guarantee for a particular year is 90% of the benchmark State yield times the ACRE program guarantee price for that particular year. The benchmark State yield is the Olympic average[1] of the 5 most recent annual State average yields using National Agricultural Statistics Service (NASS) data. The ACRE program guarantee price is the simple average of the national average market price for the most recent 2 crop years. Thus, the State revenue guarantee will vary from year. However, for the 2010-2012 crop years, the ACRE guarantee cannot change more than 10% from the guarantee for the preceding crop year.

An individual farm's actual farm revenue is the actual farm yield times the national average market price for that crop year. An individual farm's ACRE benchmark revenue is the sum of (1) the Olympic

[1] An Olympic average is the simple average of the remaining three yields in this case after removing the highest and lowest yields from the list of the most recent 5 yields. For example, if the most recent 5 State corn yields are 146, 159, 174, 161, and 165, the Olympic average of these yields is 161.67 which is the simple average of 159, 161, and 165 after throwing out 146 and 174.

average farm yield for the most recent 5 years times the ACRE program guarantee price for the applicable year and (2) the crop insurance premium required to be paid by the farmer.

If the two revenue tests show losses at both the State and individual farm levels, a specific farm's ACRE payment will be the (1) minimum of (a) the difference between the State ACRE program guarantee and the actual State revenue (but not less than zero) or (b) 25% of the ACRE program guarantee times (2) 0.833 (0.85 for 2012) times (3) the farm acreage planted times (4) the farm's five-year Olympic average yield divided by the benchmark State yield. This farm-to-State yield adjustment is made to reflect differences in productivity within a State.

Counter-Cyclical Payments (CCP)

The counter-cyclical program is essentially the same in the new farm bill as it was in the previous farm bill with some changes in target prices and loan rates. A counter-cyclical payment (CCP) is made if the national seasonal average market price is less than the target price minus the direct payment rate (Table 1). The CCP is calculated as the target price minus the direct payment minus the higher of the national season average market price or the loan rate. The total CCP for a farmer is the product of that year's CCP per bushel, the farm's payment yield, and 85% of the farm's acreage base.

Table 1. Direct payments, target prices, and loan rates for corn, soybean, and wheat in the 2002 and 2008 Acts.

	Direct payment ($/bushel)	Target price ($/bushel)	Loan rate ($/bushel)
Corn	0.28	2.63	1.95
Soybean	0.44	5.80*	5.00
Wheat	0.52	3.92*	2.75*

*Target prices will increase to $6.10 for soybean and $4.17 for wheat starting with the 2010 crop. The loan rate for wheat will increase to $2.94 in 2010.

Direct Payments (DPs) and Loan Deficiency Payments (LDPs)

DPs are paid to farmers on the basis of the direct payment specified in the Act, 83.3% for 2009-11 and 85% for 2012 of their base acres for the crop, and their payment yield for the crop. The payment is made regardless of current production levels, market conditions, and price levels. Under the ACRE program, the DP rate is reduced by 20%.

Under the Marketing Assistance Loan Program, farmers can take a loan at harvest at the loan rate set in the Act. This program is designed to provide farmers the cash needed to pay bills without having to sell their product at typically low harvest prices. These are nonrecourse loans so farmers have the option to either pay back the loan plus interest costs or forfeit the crop pledged as collateral to the CCC. Farmers have the option to choose, and usually do choose, to receive an LDP in place of taking the loan. If the local county market price is below the national loan rate, the local LDP is the difference between the local market price and the national loan rate. If the market price is above the loan rate, no LDPs are available. LDPs are calculated as the product of (1) the difference between the Loan Rate and the local price, (2) the payment yield, and (3) the normal acreage. Under the ACRE program, the loan rate is reduced by 30%.

Data and Analysis Methods

The farmer's choice between the CCP and ACRE programs is evaluated on the basis of the potential total government payment (TGP) which is a simple summation of DP, CCP (or ACRE) and LDP. Since so many related variables can affect final payment levels, the expected values of potential payments provide a more accurate view of the impact of choosing CCP versus ACRE compared to making estimates on only a few sets of yields and prices. To estimate the expected payments, the program rules described above and the data described in this section below are incorporated into an Excel© using the add-in program, @Risk© (Palisade Corporation, 2006).

We use the historical yield data from seventeen farms in Minnesota (Table 2). This individual farm data was coupled with historical national prices and State yields and rules for the CCP, ACRE, DP and LDP programs. For the example farms in Cottonwood, Faribault, Goodhue, and Pipestone, each farm's actual acreage was used for the cropping mix. For the example farms in Pennington and Polk, we had data on total planted acreage but not individual crop acreage, so we divided the total acreage into half soybean and half wheat since very little corn is historically grown in these two counties. The example farms had other crop and livestock enterprises, but we focused only on the corn, wheat, and soybean crops for this analysis.

Table 2. Location, acreage, and yields of example farms

County and farm number	Location within Minnesota	Average crop acreage, 2002-2005 (acres)	Average corn yield, 2002-2005 (bu/ac)	Average soybean yield, 2002-2005 (bu/ac)	Average wheat yield, 2002-2005 (bu/ac)
Corn and soybean farms:					
Cottonwood 1	Southwest	1052	171	40	--
Cottonwood 2	Southwest	886	168	44	--
Cottonwood 3	Southwest	1041	170	46	--
Faribault 1	South Central	1043	182	51	--
Faribault 2	South Central	340	186	55	--
Goodhue 1	Southeast	149	158	39	--
Goodhue 2	Southeast	754	168	41	--
Goodhue 3	Southeast	1300	180	43	--
Pipestone 1	Southwest	472	147	44	--
Pipestone 2	Southwest	170	164	49	--
Pipestone 3	Southwest	764	168	47	--
Wheat and soybean farms:					
Pennington 1	Northwest	1976	--	25	45
Pennington 2	Northwest	1653	--	26	52
Pennington 3	Northwest	1758	--	21	41
Polk 1	Northwest	1663	--	34	61
Polk 2	Northwest	1612	--	26	48
Polk 3	Northwest	469	--	26	49

Historical state yields and national crop prices were obtained from National Agricultural Statistics Service (NASS) data. Future yields were projected based on deviations from the yield trend estimated through the standard statistical procedure of ordinary least squares (OLS). The statistical distributions of yields and prices including the correlations between yields and prices were estimated from the historical data and incorporated into the analysis to allow for the joint movements of price and yield.

If the acreage planted for a farm in a given year was missing, the missing acreage value was estimated as the simple average of the planted acreage in the preceding and subsequent years. If there was only acreage data available in subsequent years, the missing value was estimated as the subsequent year's value. If some yield data for a specific farm was missing, its value was estimated as the expected yield estimated from a standard statistical regression on the years we had available. The actual payment yields for commodity crops were not available so, based on historical data, payment yields for individual example farms were assumed to be 93.5% of the average yields for the 1998-2001 seasons. For each example farm, the base acreage for a commodity crop was assumed equal to the average planted acreage for the crop in the 1998-2001 seasons.

Three price scenarios of expected national prices and ACRE guarantee prices were used to estimate potential government payments under the CCP and ACRE programs (Table 3). The first scenario (P1) has the national market price higher than the ACRE guarantee price. This price scenario provides a fairly accurate look at the farmers' choice if the future national price were higher than the ACRE guarantee. In the second scenario (P2), the national prices are the same as in the first scenario, but the ACRE guarantee prices are higher and closer to the market projections. This scenario reflects what might happen in 2009 if national prices stabilized at higher levels for the 2008 crop thus raising the ACRE guarantee price for the 2009 crop. The third price scenario (P3) depicts the conditions if national prices dropped drastically but under ACRE rules, the ACRE guarantee prices would not decrease in the first year of the drop in national prices. In scenarios P1 and P2, the national marketing year price estimates was from the projections for 2007 made in

late 2006 by the Food and Agricultural Policy Research Institute (FAPRI). In scenario P3, the national price was from FAPRI's projection made in 2005. For each of the projections, the national price was assumed to have a mean equal to the projected price and the same standard deviation and correlation with other prices and yields based on historical data.

Table 3. Price scenarios used in the analysis

	Corn	Soybeans	Wheat
P1 – Current situation with guarantee prices lower than market prices			
P1 - National Price	3.97	10.30	6.68
P1 - ACRE Guarantee Price	3.52	8.42	5.46
P2 – Guarantee prices closer to market prices			
P2 - National Price	3.97	10.30	6.68
P2 - ACRE Guarantee Price	3.95	10.07	7.09
P3 – Market prices fall steeply below currently estimated guarantee prices			
P3 - National Price	2.20	5.25	3.39
P3 - ACRE Guarantee Price	3.52	8.42	5.46

The @Risk program© (Palisade, 2006) is used to conduct a Monte Carlo simulation within Microsoft Excel© with draws for price and yield coming from the distributions described above. Each farm's average crop revenue, resulting government payment, and the variation in those revenues are estimated. To establish an accurate distribution of potential results, up to 10,000 statistical estimates of prices and yields are taken from the statistical relationships and used to calculate crop revenue and potential government payments under the rules of the CCP and ACRE programs.

Results

Using the historical information for each of the 17 farms described above and national and state price and yield information, the expected total government payments are estimated for each of the price scenarios (Table 4).

Table 4. Expected total government payments (TGP) with Counter-cyclical Payments (CCP) and the Average Crop Revenue Election (ACRE) programs for the four price scenarios ($/farm)

County & Farm	Price scenario 1		Price scenario 3		Price scenario 3		Price scenario 4	
	CCP	ACRE	CCP	ACRE	CCP	ACRE	CCP	ACRE
Corn and soybean farms								
Co1	23,036	18,602	23,036	20,801	51,121	85,253	50,389	20,208
Co2	19,704	15,807	19,704	16,755	45,542	74,706	43,560	16,731
Co3	25,177	20,334	25,177	22,561	57,880	96,406	55,732	21,957
Fa1	21,435	17,540	21,435	20,964	49,796	94,641	47,076	19,662
Fa2	8,018	6,546	8,018	7,547	19,609	35,360	19,201	7,157
Go1	4,116	3,316	4,116	3,616	8,051	11,167	7,787	3,529
Go2	16,109	13,114	16,109	15,192	36,251	62,155	35,032	14,502
Go3	27,819	22,474	27,819	26,009	68,371	132,411	66,550	25,069
Pi1	12,020	9,691	12,020	10,869	26,024	41,503	24,232	10,599
Pi2	5,214	4,186	5,214	4,554	11,113	16,670	10,658	4,503
Pi3	14,846	11,892	14,846	12,884	14,846	79,142	39,822	13,040
Wheat and soybean farms								
Pe1	24,028	20,072	24,028	33,277	40,968	101,925	37,341	25,749
Pe2	25,354	21,056	25,354	33,444	41,233	93,245	38,211	26,241
Pe3	22,121	18,331	22,121	27,724	36,868	78,891	33,595	22,744
Po1	31,976	25,971	31,976	39,971	52,281	107,538	48,601	32,234
Po2	21,175	17,673	21,175	31,201	35,369	85,328	32,525	23,038
Po3	6,499	5,625	6,499	10,299	9,819	27,589	10,357	7,289

With price expectations set at similar relative levels as they are now (P1), TGP is greater for each farm under CCP compared to the ACRE program. Since expected prices are well above the target prices and loan rates set in the farm bill, the only payments under CCP was direct payments. Under the ACRE program, the example farms do have a small expected ACRE payment which average 1% of TGP. However, the expected ACRE payment is less than the required 20% decrease in direct payments. Thus, under this price scenario of the expected national price being higher than the ACRE guarantee price, expected TGP is greater under the CCP program for each farm. To illustrate this impact easily between the different sizes of example farms, the actual TGPs in Table 4 are converted to indices for each farm with the TGP payment under CCP set to 100 This is easily seen in the indices of the ACRE TGP compared to the CCP TGP (Figure 1).

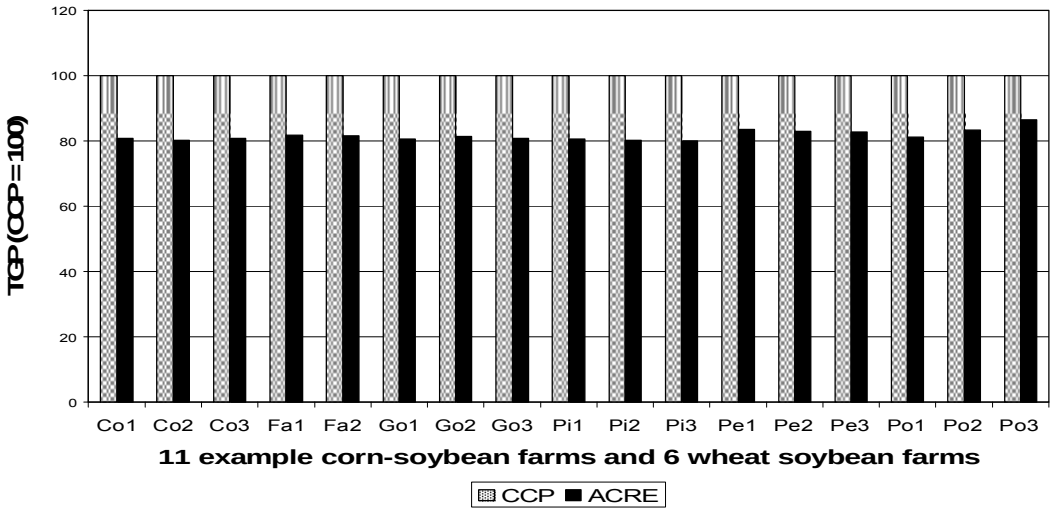

Figure 1. Index of Total Government Payments (TGP) if national market prices are higher than ACRE guarantee prices

In price scenario 2 (P2), market prices are assumed to remain at high levels, thus ACRE guarantee prices would be calculated from higher prices and move closer to expected national prices for corn and soybean and above for wheat. With these price expectations, TGP is greater under CCP for the 11 example corn and soybean farms compared to the ACRE program. However, TGP is greater under ACRE for the six example wheat and soybean farms. This difference in outcome is primarily due to the ACRE guarantee price for wheat is higher than the expected national price wheat in P2 while the opposite relationship is expected for corn and soybean. For wheat and soybean farms, the expected ACRE payment is greater than the required 20% decrease in direct payments. For corn and soybean farms, the expected ACRE payment is less than the required 20% decrease in direct payments. Thus, under this price scenario of the expected national price being similar to the ACRE guarantee price, expected TGP is greater under the CCP program for each farm. This is easily seen in the indices of the ACRE TGP compared to the CCP TGP (Figure 2).

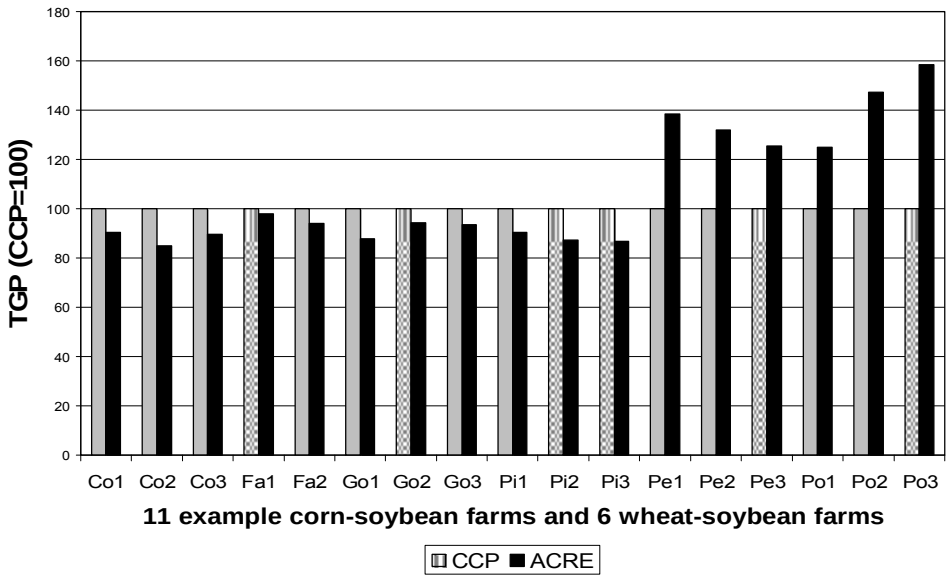

Figure 2. Index of expected total government payments (TGP) if national market prices and ACRE guarantee prices are at similar but high levels

If expectations for the national prices quickly dropped leaving the ACRE guarantee prices at higher relative levels (P3), the benefits under the two programs would be greatly different from the first two price scenarios. Under P3, TGP would be larger for each farm under ACRE compared to the CCP program. Under this price scenario, expected national prices are below target prices and loan rates set in the farm bill, so farms were estimated to receive both direct payments and either CCP or ACRE payments depending on which program they were signed up for. However, TGP is higher for every example farm under the ACRE program since the revenue guarantees were based on the higher prices before the simulated price drop. TGP for the wheat and soybean farms are higher relatively since the wheat yields are also relatively higher compared to corn and soybean yields. Under this price scenario of the expected national price being much lower than the ACRE guarantee price, expected TGP is greater under the ACRE program for each farm. This is easily seen in the indices of the ACRE TGP compared to the CCP TGP (Figure 3).

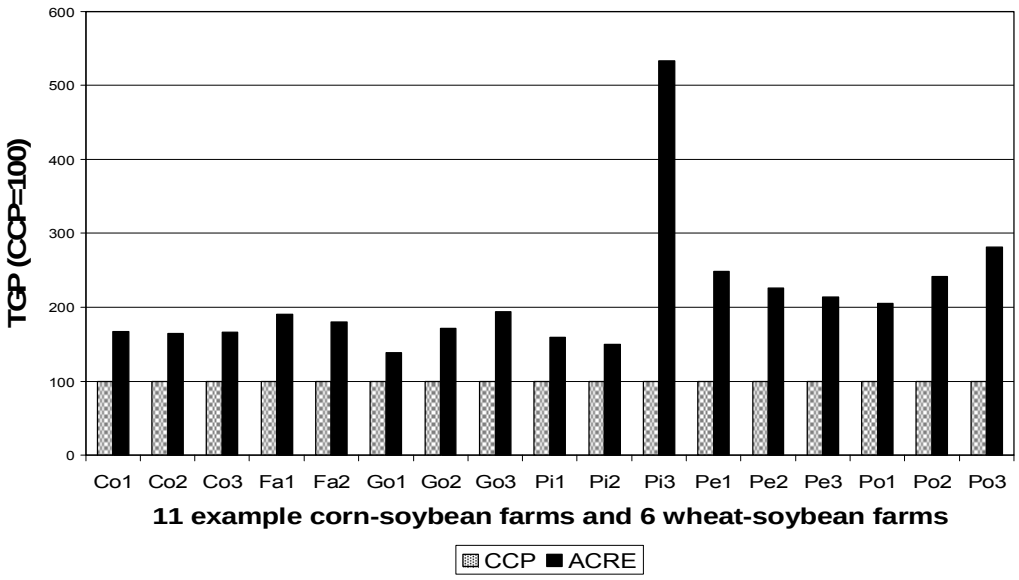

Figure 3. Index of expected total government payments (TGP) if national market prices are considerably lower than the high ACRE guarantee prices

Concluding Comments

As stated earlier, the choice between CCP and ACRE depends in large part on one's view of what the direction of future prices will be. Since choosing the ACRE program requires a 20% cut in direct payments, the choice is not obvious nor is there a simple rule that applies to all farmers or even one farmer. If prices are expected to remain at or above the ACRE price guarantee, CCP is the best choice since government payments are expected to be lower under the ACRE program—as shown in the first price scenario. However, if national market prices fall sufficiently, the ACRE program becomes the best choice since ACRE payments will be higher—as shown in the third price scenario. The national market price does not have to be much lower for ACRE to be the preferred choice—as shown for wheat-soybean farms in price scenario 2.

It is essentially impossible to describe simple rules of thumb or breakeven prices to help farmers decide whether to sign up for ACRE or stay with CCP. This difficulty is due to several factors: the complexity of the program rules, the requirement to sign up all program crops on a farm, the potential government

payment for only one crop even though direct payments and loan rates are cut for all crops, the uncertainty of future prices and yields, and the variation in how an individual farm's yields vary in relationship to its state yields.

Thus, each farmer needs to evaluate their conditions and evaluation of future prices and yields and make a decision for their own farm.

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This work is original research carried by we the authors and has not been published elsewhere.

Short biography of Kent Olson:

Kent Olson is involved in applied research, on-campus teaching, and extension education. He has written many journal articles and publications including a textbook, Farm Management: Principles and Strategies. He has worked in Sweden, Poland, Uganda, and Italy. He joined the faculty of the University of Minnesota in 1985.