



## Should Prospective ARC-CO Payments Impact 2016 Crop Insurance Decisions?

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In efforts to save premium, some farmers are considering lowering coverage levels and relying more on Agricultural Risk Coverage at the county level (ARC-CO) to provide a revenue safety net. Also, there may be a move to yield insurances under the assumption that ARC-CO can provide price protection. Both changes would be moving away from the current practice of using either Revenue Protection (RP) or Area Revenue Protection (ARP) at high coverage levels (see *farmdoc daily* January 20, 2016). The following analysis uses a McLean County example to evaluate protection offered by ARC-CO and plans within the Combo product. This analysis suggests lowering coverage levels may be imprudent. Moreover, yield insurance has limited abilities to reduce downside revenue risks as compared to Revenue Projection (RP). RP at high coverage levels is still a good choice for crop insurance. A possible alternative to RP could be RP with the harvest price exclusion (RPwExcl); however, there are risks associated with using RPwExcl.

### Farm Revenue

Possible harvest prices and county yields were generated for McLean County, Illinois in a [January 12<sup>th</sup> farmdoc daily](#) article. These are 43 possible prices and yields for each year from 1972 through 2014 (see Table 1). These combinations represent 43 possible prices and yields in 2016 given that condition like those in 1972 through 2014 occur in 2016. Procedure to develop these possible outcomes are described in the [January 12<sup>th</sup> farmdoc daily](#) article. These price and yield combinations will be used to generate revenue with ARC-CO and various crop insurance products.

Estimate of 2016 Market Year Average (MYA) prices are needed to estimate ARC-CO payments. Historical price relationships are used to arrive at possible 2016 MYA prices. For each year, the possible MYA price equals the possible harvest price time the ratio of MYA and harvest price in that year. Take 1972 as an example when the MYA price and harvest price were \$1.35 and \$1.57, respectively. The 1972 ratio is 1.16 ( $\$1.57 \text{ MYA price} / \$1.35 \text{ harvest price}$ ). The resulting possible harvest price is \$4.18 ( $\$4.14 \text{ possible harvest price} \times 1.16 \text{ ratio}$ ). Overall, the average of the MYA-to-harvest price ratio is .965, meaning that the MYA price averages 3.5% lower than the harvest price. MYA price is an average national cash price. Part of the difference between harvest and MYA prices is the basis between future and harvest prices.

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**Table 1. Potential 2016 Prices, Yields, and Revenues in McLean County, Illinois, Corn.**

Year	Possible Outcomes <sup>1</sup>		Possible	ARC-CO Payment <sup>4</sup>	Farm Revenue <sup>3</sup>	Farm + ARC-CO Payment
	Harvest Price	County Yield	MYA Price <sup>2</sup>			
	\$/bu	Bu./acre	\$/bu	\$/acre	\$/acre	\$/acre
1972	4.14	206	4.81	0	991	991
1973	6.73	197	6.98	0	1375	1375
1974	4.96	167	3.94	74	658	732
1975	4.08	210	3.57	0	750	750
1976	3.7	205	3	74	615	689
1977	2.91	165	2.81	74	464	538
1978	3.87	194	3.77	14	731	745
1979	4.08	210	3.7	0	777	777
1980	4.4	149	3.79	74	565	639
1981	2.94	193	2.53	74	488	562
1982	2.79	204	3.23	74	659	733
1983	4.59	141	4.23	74	596	670
1984	3.69	171	3.49	74	597	671
1985	3.19	214	3.19	56	683	739
1986	3.06	199	2.72	74	541	615
1987	4.11	192	4.36	0	837	837
1988	5.06	113	4.45	74	503	577
1989	3.35	190	3.31	74	629	703
1990	3.54	188	3.51	74	660	734
1991	3.68	162	3.47	74	562	636
1992	2.94	207	2.91	74	602	676
1993	3.94	182	3.96	23	721	744
1994	3.06	206	3.2	74	659	733
1995	4.78	157	4.79	0	752	752
1996	3.5	195	3.34	74	651	725
1997	3.91	178	3.38	74	602	676
1998	2.93	182	2.6	74	473	547
1999	3.18	192	2.88	74	553	627
2000	3.09	184	2.8	74	515	589
2001	3.21	185	3.04	74	562	636
2002	4.13	169	3.8	74	642	716
2003	3.55	205	3.8	0	779	779
2004	2.75	207	2.76	74	571	645
2005	3.31	181	3.28	74	594	668
2006	4.61	200	4.63	0	926	926
2007	3.35	212	3.93	0	833	833
2008	2.91	204	2.86	74	583	657
2009	3.42	198	3.26	74	645	719
2010	5.2	181	4.93	0	892	892
2011	4	169	3.94	70	666	736
2012	5.02	117	4.61	74	539	613
2013	2.95	194	3	74	582	656
2014	2.87	221	3.04	65	672	737

<sup>1</sup> These are potential harvest prices and County Revenues for McLean County Illinois given a \$3.80 projected price and historical changes. See farmdocDaily on January 12, 2016 for more detail.

<sup>2</sup> Possible MYA price is based historical relationships. For a given year, possible MYA price equals harvest price x (MYA price for that year / harvest price for that year).

<sup>3</sup> Equal county yield times MYA price.

<sup>4</sup> Based on a 2016 ARC guarantee of \$748 per acre. This \$748 is not certain at this point in time. Payments are given per base acre.

The MYA and county yields are used to estimate ARC-CO payments on a per base acre basis (see Table 1). Estimates are based on a \$748 ARC-CO guarantee, a guarantee that will not be known with certainty until the fall of 2016. ARC-CO payments ranges from \$0 per base acre up to \$74 per base acre, the maximum payment given a \$748 guarantee. Overall, the average payment is \$53 per acre. Estimates suggest that odds of receiving payments are high, with payments estimated to be receive in 77% of the possible years.

### Farm Revenue with and without ARC-CO

Farm revenue equals county yields times MYA price (see Table 1). Also shown in Table 1 is farm revenue plus ARC payments.

Average farm revenue without crop insurance across the 43 possibilities is \$667 per acre while the average with ARC-CO payments is \$721 per acre (see Table 2), with the \$53 per acre difference equal to the average ARC-CO payment. Current budgets place non-land costs of corn production at \$552 per acre. Adding a cash rent of \$250 per acre results in total costs of \$802 per acre. At average cost and cash rent levels, costs on cash rent farmland will exceed revenue: \$720 of crop and ARC-CO revenue versus \$802 of expenses giving a loss of \$82 per acre. Only 11 of the yearly observations, or 25%, exceed the average cost level for cash rent farmland. Of course differences in land control, as well as differences in cost and cash rent levels, will influence these loss levels.

	Farm Revenue	Farm Revenue Plus ARC-CO
	\$/acre	\$/acre
Average	667	720
Minimum	464	538
5% VAR <sup>1</sup>	490	564
10% VAR <sup>2</sup>	520	594

<sup>1</sup> Revenue will be below this value 5% of the time  
<sup>2</sup> Revenue will be below this value 5% of the time

Computing 43 possible revenues allows measures of downside revenue. The minimum level as \$464 per acre for farm revenue and \$538 per acre for farm revenue plus ARC-CO (see Table 2). Five and ten percent values-at-risk (VARs) are calculated. A 5% VAR means that 5% of the revenues are below this value. An increase in the VAR indicates a reduction in risk. The 5% VARs are \$490 per acre without ARC-CO and \$564 with ARC-CO, an increase of \$74 per acre. The 10% VAR is \$520 per acre without ARC-CO and \$594 per acre with ARC-CO payments, an increase of \$74 per acre.

The presence of ARC-CO increases the average and lower revenue levels. However, there still is considerable amounts of downside risk.

### Farm Revenues with the Inclusion of Crop Insurance

Downside revenue risks can be reduced with crop insurance. Crop insurance was combined with ARC-CO to quantify the risk reduction benefits of crop insurance. Premium costs were subtracted from revenues so as to consider premiums impacts on downside risks. Premiums were generated for a 100-acre enterprise unit having a 176 bushel per acre APH yield and a 186 bushel per acre TA-APH yield. Downside risk

measures were generated for 75%, 80%, and 85% coverage levels for the three types of farm-level crop insurances offered by the COMBO production:

1. Revenue Protection (RP) – a revenue insurance with a guarantee increase. Premium costs for this product are \$3.92 per acre for a 75% coverage level, \$8.52 for an 80% coverage level, and \$17.47 for an 85% coverage level.
2. Revenue Protection with harvest price exclusion (RPwHPE) – a revenue insurance that does not include the guarantee increase. Premium costs are \$1.67 per acre for a 75% coverage level, \$3.76 for an 80% coverage level, and \$8.02 for an 85% coverage level.
3. Yield Protection (YP) – a yield insurance. Premium costs are \$2.24 per acre for a 75% coverage level, \$3.99 for an 80% coverage level, and \$7.16 for an 85% coverage level.

Crop insurance payments are generated using the county yields and harvest prices shown in Table 1. Note that farm yields tend to be more variable than county yields. Hence, downside risks are understated and crop insurance will tend to be more effective than that shown the following table, particularly relative to farm revenue without insurance. The results shown below between insurance products are consistent with results from our iFARM insurance evaluator.

Minimum revenue with ARC-CO payments is \$538 per acre. RP raised this minimum to \$543 at a 75% coverage level, \$553 at an 80% coverage level, and \$578 at an 85% coverage level (see Panel A of Table 3). At an 85% coverage level, RP raises the minimum revenue by \$40 per acre.

Coverage Level	Crop Insurance Policy		
	RP	RPwExcl	YP
<b>Panel A. Minimum payment (\$538 without Insurance)</b>			
	\$/acre	\$/acre	\$/acre
75%	543	545	536
80%	553	558	534
85%	578	587	531
<b>Panel B. 5% VAR (\$564 without insurance)</b>			
	\$/acre	\$/acre	\$/acre
75%	584	576	561
80%	583	576	561
85%	598	607	558

RPwExcl has higher minimums than RP. Take the 85% coverage level, the minimum revenue is \$578 with RP and \$587 for RPwExcl. RPwExcl raised the minimum slightly more than does RP.

The minimum revenues under YP are \$535 at a 75% coverage level, \$534 for an 80% coverage level, and \$531 for the 85% coverage level. These are all below the \$538 minimum without crop insurance. At low yields, price often increase in the Midwest, resulting in higher incomes. In the Midwest, low revenues often are associated with price decreases than yield decreases.

Panel B gives 5% breakpoints for revenues. Note that the same trends are observed in Panel B as in Panel A:

- Higher coverage levels of RP increase the 5% VARs.
- RPwExcl is as effective as RP in reducing downside revenue risks.
- YP has little impact on downside risks.

## Commentary

Several observations from this analysis:

- Expectations are for costs to exceed revenue even with the inclusion of ARC-CO and crop insurance payments. This is not a year in which crop insurance can be used to assure a profit. Rather, crop insurance use this year will limit losses to hopefully more manageable levels.
- Higher coverage levels of crop insurance will provide higher levels of downside revenue protection. For example, moving from an 80% to 85% coverage level raises the 5% VAR from \$583 to \$598, an increase of \$15 per acre after accounting for the higher premium costs. Of course, whether raising this \$15 is valuable enough for the \$9.45 increase in premium is a decision that a farmer will need to make. I would note that an additional \$15 per acre in a loss situation could be very valuable.
- RPwExcl provides as good as protection as RP. I would note two caveats:
  - Pre-harvest hedging can remove the protection offered by RPwExcl. If RPwExcl is used, limited amounts of pre-harvest hedging should be undertaken.
  - RPwExcl will pay much less than RP in a drought year. Some weather forecasts are projecting a hotter and dryer summer than normal. This may not be the year to remove guarantee increase protection
- Some individuals are considering lowering coverage level. Instead of lowering coverage levels, an alternative may be a switch to RPwExcl and maintaining a higher coverage level. If this option is taken, limited pre-harvest hedging should be undertaken.
- Yield insurance are not that effective at reducing risks even when considering ARC-CO payments.

As noted above, this analysis was done with county yields. Farm yields tend to be more variable than county yields. Use of farm yields would have made downside risks more pronounced without crop insurance.

## References

Schnitkey, G. "[Crop Insurance Premiums and Use in 2015 and 2016](#)." *farmdoc daily* (6):12, Department of Agricultural and Consumer Economics, University of Illinois at Urbana-Champaign, January 20, 2016.

Schnitkey, G. "[Possible Crop Revenues for Corn in McLean County, Illinois](#)." *farmdoc daily* (6):7, Department of Agricultural and Consumer Economics, University of Illinois at Urbana-Champaign, January 12, 2016.