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Comparing ARC-CO and PLC Payment Profiles, 2014-2016 Crops

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Payments by ARC-CO (Agriculture Risk Coverage - County) and PLC (Price Loss Coverage) are examined for 22 program commodities using FSA (Farm Service Agency) reported payments for the 2014-16 crops. Their payment profiles have differed. ARC-CO payments per contract base acre are more uniform across crops. PLC payments per contract base acre tend to be large or $0. Differences by crop in payment per contract base acre by the 2 programs closely reflect the ratio of a crop's reference price to its 2009-13 Olympic average crop year price. Thus, when writing the 2014 farm bill, Congress had the ability to direct payments to crops by how high it set a crop's reference price relative to recent market prices.

ARC-CO vs. PLC Design

A FSA farm had to choose between these 2014 farm bill programs for a crop. ARC-CO is a low revenue program, where low is defined relative to 86% of a county benchmark based on revenue from the market for the 5 prior crop years. Benchmark revenue specifically equals the product of the 5-year Olympic averages (high - low removed) of U.S. crop year price times county yield. PLC is a low national price program, where low is defined relative to 100% of a fixed reference price set by Congress. Payment yield is also fixed. ARC-CO payments are determined on a county-by-county basis. PLC payments are determined on a national basis, implying every U.S. farm enrolled in PLC for a crop receives a payment if a PLC payment is triggered for the crop. Both ARC-CO and PLC make payments on 85% of contract base acres. Contract base acres are base acres elected into the program for a crop and then signed up for the program year. Contract base acres, not base acres, are the payment acres for a given year. ARC-CO payments are subject to a 10% per acre payment cap. PLC payments are subject to a much larger cap determined by the difference between a crop's reference price and loan rate. The ratio of average PLC payment per contract base acre to the product of the reference price and updated PLC

base yield exceeded 10% for canola, peanuts, and long grain rice in 2014, 2015, and 2016; flaxseed, medium grain rice, and sorghum in 2015 and 2016; and wheat in 2016. Highest ratios round to 20% for flaxseed, long-grain rice, and sorghum in 2016. See data notes 1 and 2 for additional discussion of design-related items and Zulauf and colleagues for more discussion of payment cap related issues.

ARC-CO vs. PLC Payments

Sum of ARC-CO payments for the 2014-16 crop years range from $744 for crambe to $10.4 billion for corn (see Table 1). Corn accounts for 75% of the $13.7 billion in ARC-CO payments. The next 2 highest shares are 12% (wheat) and 11% (soybeans). Sum of PLC payments for the 2014-16 crop years range from $0 for 11 crops to $1.6 billion for wheat (see Table 2). Wheat accounts for 32% of the $5.2 billion in PLC payments. The next 2 highest shares are 31% (long grain rice) and 18% (peanuts). All payments have been adjusted by removing payments to generic base acres (see data note 3).

Table 1. ARC-CO 2014-2016 Payments and Average Annual Contract Base Acres, Excludes Generic Base Program, U.S.

covered commodity	sum of payments	share of payments	average contract base acres per year	share of contract base acres	payment per contract base acre
barley	$19,726,736	0.1%	1,084,133	0.6%	$18.20
canola	$961,829	0.0%	29,967	0.0%	$32.10
chickpeas, large	$3,569,512	0.0%	55,167	0.0%	$64.70
chickpeas, small	$186,188	0.0%	14,733	0.0%	$12.64
corn	$10,370,919,640	75.5%	87,851,167	48.7%	$118.05
crambe	$774	0.0%	900	0.0%	$0.86
flaxseed	$2,739,238	0.0%	81,467	0.0%	$33.62
lentils	$1,629,507	0.0%	113,100	0.1%	$14.41
mustard	$164,424	0.0%	9,400	0.0%	$17.49
oats	$39,556,528	0.3%	1,301,133	0.7%	$30.40
peanuts	$660,837	0.0%	5,867	0.0%	$112.64
peas, dry	$4,962,123	0.0%	214,533	0.1%	$23.13
rapeseed	$14,039	0.0%	1,300	0.0%	$10.80
rice, japonica	$16,631,536	0.1%	166,603	0.1%	$99.83
rice, long-grain	$530,667	0.0%	4,833	0.0%	$109.79
rice, medium-grain	$812,324	0.0%	6,105	0.0%	$133.06
safflower	$559,556	0.0%	29,367	0.0%	$19.05
sesame	$1,681	0.0%	800	0.0%	$2.10
sorghum	$139,951,989	1.0%	2,799,133	1.6%	$50.00
soybeans	$1,494,126,148	10.9%	51,479,533	28.6%	$29.02
sunflowers	$19,211,510	0.1%	697,400	0.4%	$27.55
wheat	$1,627,114,185	11.8%	34,276,433	19.0%	$47.47
TOTAL	$13,744,030,971	100.0%	180,223,075	100.0%	

Table 2. PLC 2014-2016 Payments and Average Annual Contract Base Acres, Excludes Generic Base Program, U.S.

program commodity	sum of payments	share of payments	average contract base acres per year	share of contract base acres	payment per contract base acre
barley	$0	0.0%	3,685,900	6.8%	$0.00
canola	$191,104,176	3.6%	1,425,233	2.6%	$134.09
chickpeas, large	$0	0.0%	15,567	0.0%	$0.00
chickpeas, small	$0	0.0%	4,900	0.0%	$0.00
corn	$242,846,167	4.6%	6,529,233	12.1%	$37.19
crambe	$0	0.0%	1,600	0.0%	$0.00
flaxseed	$11,368,328	0.2%	144,533	0.3%	$78.66
lentils	$0	0.0%	146,467	0.3%	$0.00
mustard	$0	0.0%	13,733	0.0%	$0.00
oats	$14,902,245	0.3%	651,300	1.2%	$22.88
peanuts	$924,889,324	17.7%	1,950,867	3.6%	$474.09
peas, dry	$0	0.0%	193,233	0.4%	$0.00
rapeseed	$0	0.0%	1,033	0.0%	$0.00
rice, japonica	$37,680,752	0.7%	341,316	0.6%	$110.40
rice, long-grain	$1,601,208,659	30.6%	3,960,167	7.3%	$404.33
rice, medium-grain	$43,217,571	0.8%	164,299	0.3%	$263.04
safflower	$0	0.0%	49,200	0.1%	$0.00
sesame	$0	0.0%	4,233	0.0%	$0.00
sorghum	$469,495,345	9.0%	5,677,767	10.5%	$82.69
soybeans	$0	0.0%	1,839,900	3.4%	$0.00
sunflowers	$28,517,498	0.5%	911,067	1.7%	$31.30
wheat	$1,673,504,018	31.9%	26,441,733	48.8%	$63.29
TOTAL	$5,238,734,083	100.0%	54,153,282	100.0%	

A crop's contract base acres are an important determinant of ARC-CO and PLC payments to the crop. Using linear regression, contract base acres explain 83% and 54% of the variation across crops in ARC-CO and PLC payments, respectively (see Figures 1 and 2). Since total payment is a product of contract base acres times average payment per contract base acre, the lower explanatory power of contract base acres for PLC implies payment per contract base acre varied more for PLC than ARC-CO. Payment per contract base acre summed over the 2014-16 crops ranged from $0 (11 crops) to $474 (peanuts) for PLC vs. $0.86 (crambe) to $118 (corn) for ARC-CO (see Figure 3). Standard deviation, another measure of variation, was over 3 times larger for PLC than ACR-CO ($134 vs. $41) while average payment was less than 2 times larger for PLC than ARC-CO ($77 vs. $46).

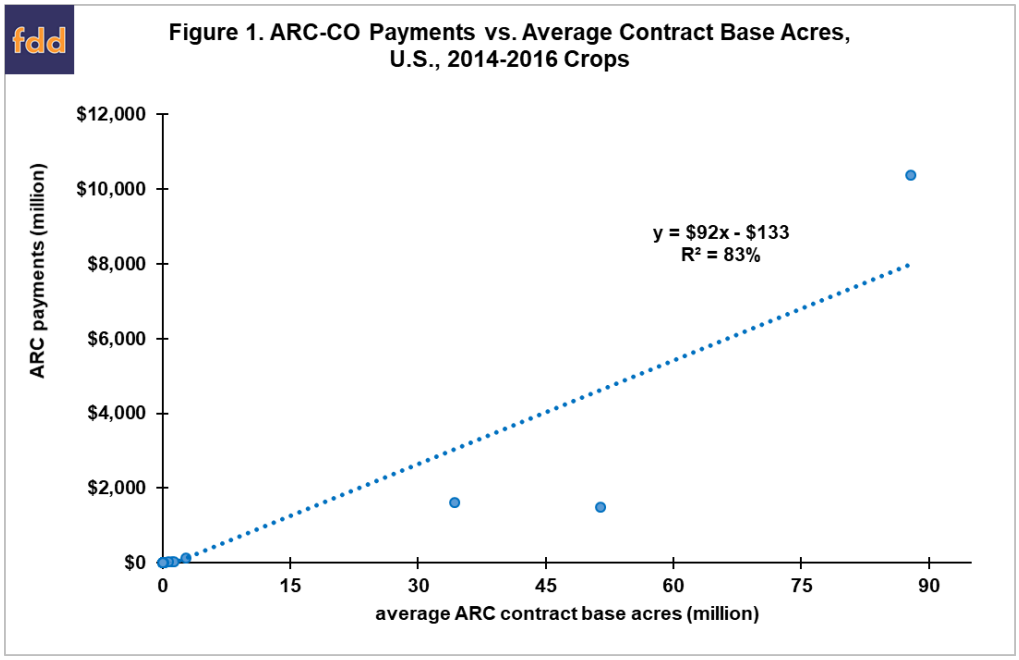
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Figure 1. ARC-CO Payments vs. Average Contract Base Acres, U.S., 2014-2016 Crops
$12,000
$10,000
$8,000
$6,000
$4,000
$2,000
$0
ARC payments (million)
y = $92x - $133
R² = 83%
0
15
30
45
60
75
90
average ARC contract base acres (million)

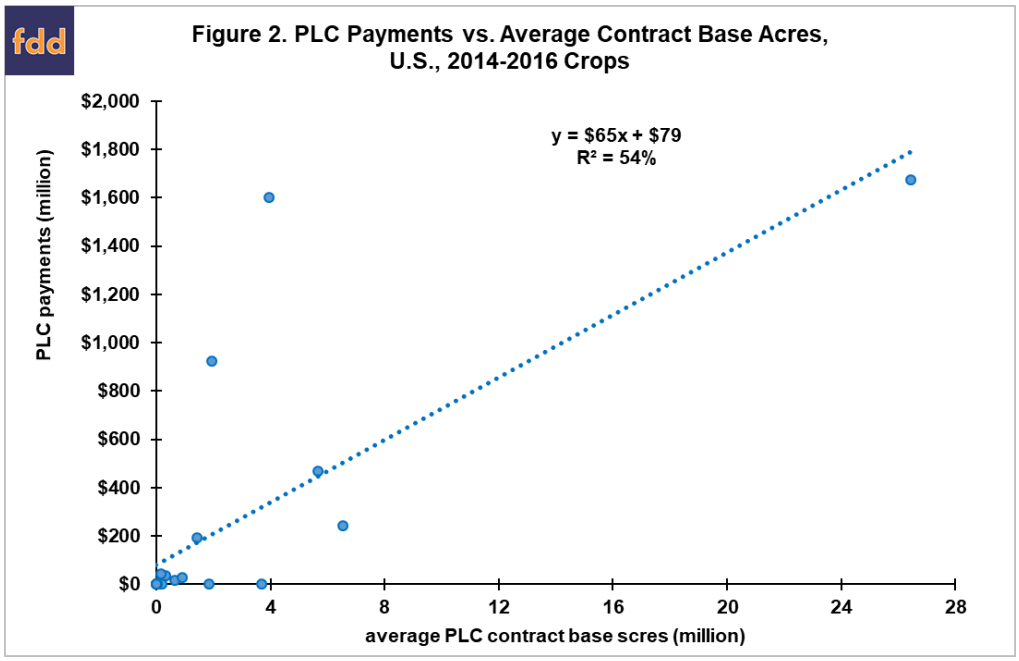
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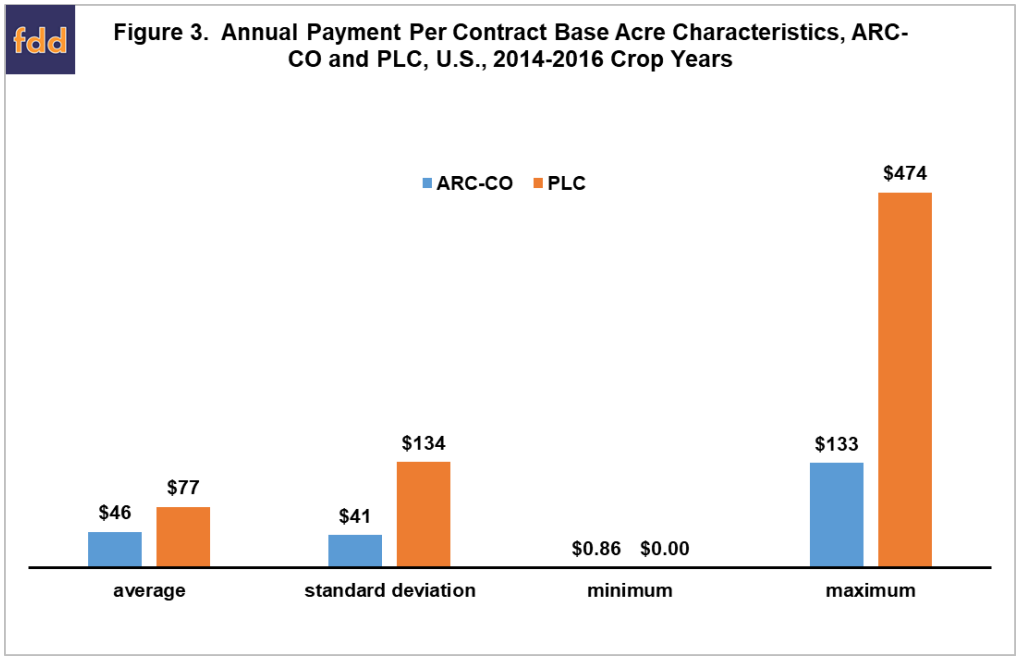
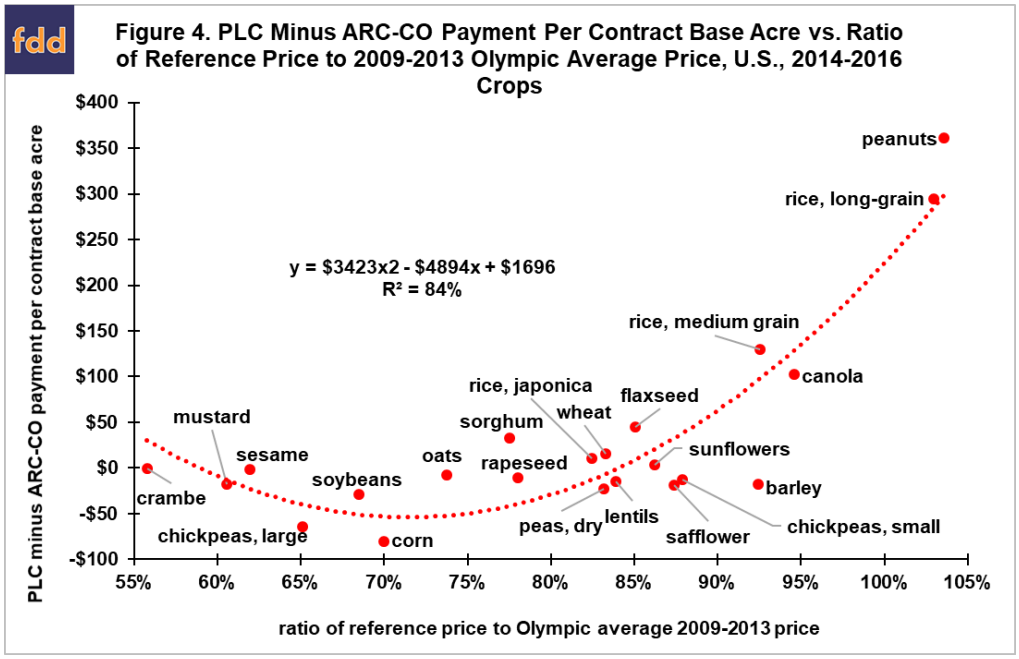
Figure 2. PLC Payments vs. Average Contract Base Acres, U.S., 2014-2016 Crops
$2,000
$1,800
$1,600
$1,400
$1,200
$1,000
$800
$600
$400
$200
$0
PLC payments (million)
y = $65x + $79
R² = 54%
0
4
8
12
16
20
24
28
average PLC contract base scres (million)

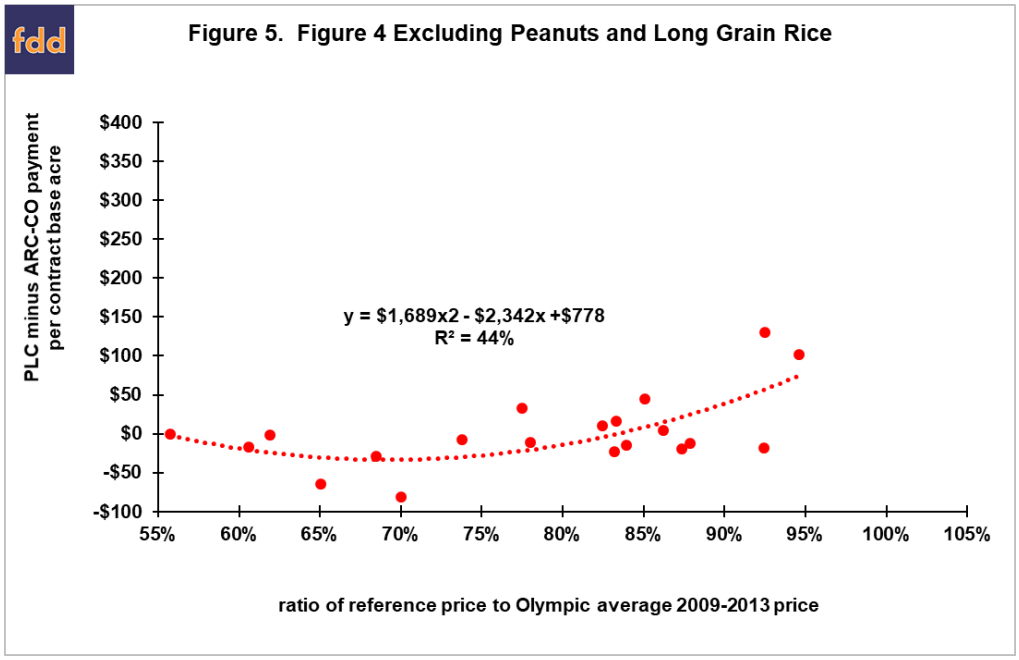


Difference in Payment per Contract Base Acre

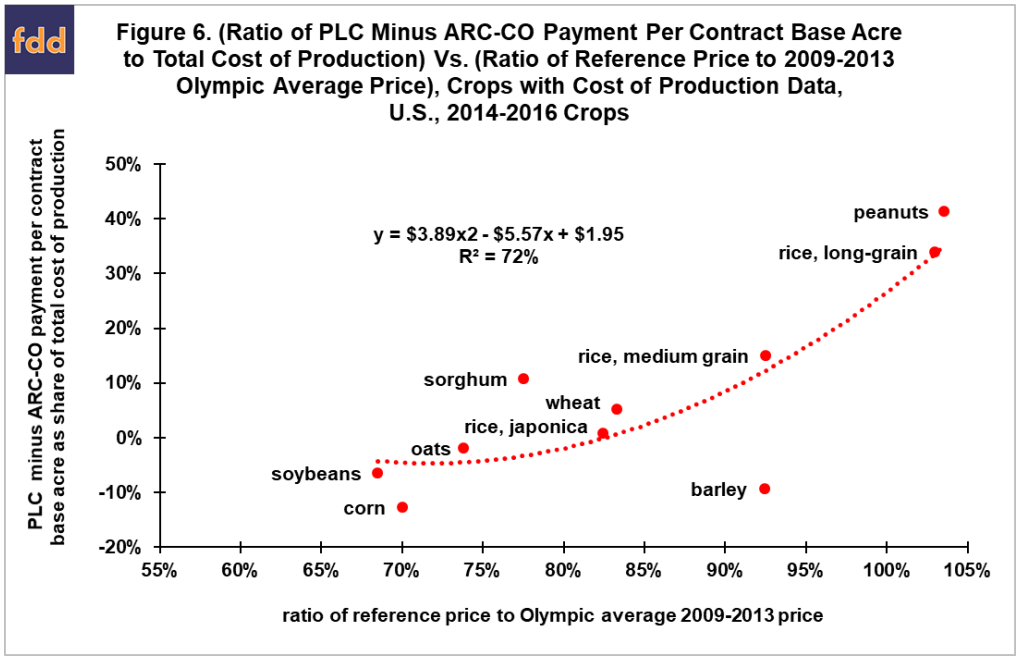
The difference of PLC payment per contract base acre minus ARC-CO payment per contract base acre by crop over the 2014-16 crop years is regressed on the ratio of the crop's reference price to its Olympic average market price for the 2009-13 crop years. Reference price is the key PLC support parameter and is fixed by Congress in the farm bill. The 5-year Olympic average market price is a key ARC support parameter. The Olympic average for the 2009-13 crop years would have largely been known when the 2014 farm bill was written. Only the price for the 2013 crop year was unknown, but a reasonable estimate existed as the crop year was one-third to one half completed, depending on the crop.

The ratio explains 84% of the variation in the difference in payment per contract base acre by the 2 programs (see Figure 4). The relationship is significant with 99.9% statistical confidence. It is highly non-linear, with the payment difference increasing more rapidly than the ratio. For example, setting the reference price at 105% vs. 100% of the 2009-13 Olympic average price increased PLC's payment advantage more than did setting the reference price at 95% vs. 90%.





Regression analysis is sensitive to extreme values. Thus, the 2 crops with the highest difference (peanuts and long grain rice) are removed. As is common when extreme values are removed, explanatory power declines, specifically to 45% (see Figure 5). However, statistical confidence in the relationship is 99.2%. It retains the same form, although the coefficients change.



Given the historic important role of cost of production in U.S. commodity programs, a third analysis considered the total cost of producing a crop. This analysis is limited to crops for which the U.S. Department of Agriculture publishes cost of production data (see data note 4). For each crop, the payment difference per contract base acre is divided by the average total cost of producing the crop in 2014-16. The regression relationship remains significant at the 99% level of statistical confidence and retains the same general form although the regression coefficients change.

Summary Observations

- Payment per contract base acre varied much less for ARC-CO than PLC for 2014-16 crops.

- Likely reasons for ARC-CO's lower variation is its market oriented support price and smaller 10% cap on per acre payment.

- Congress was able to target 2014 farm bill payments to crops by setting the reference price at a higher level relative to market prices at the time the 2014 farm bill was written. Peanuts and long grain rice have the highest reference-to-market price ratio.

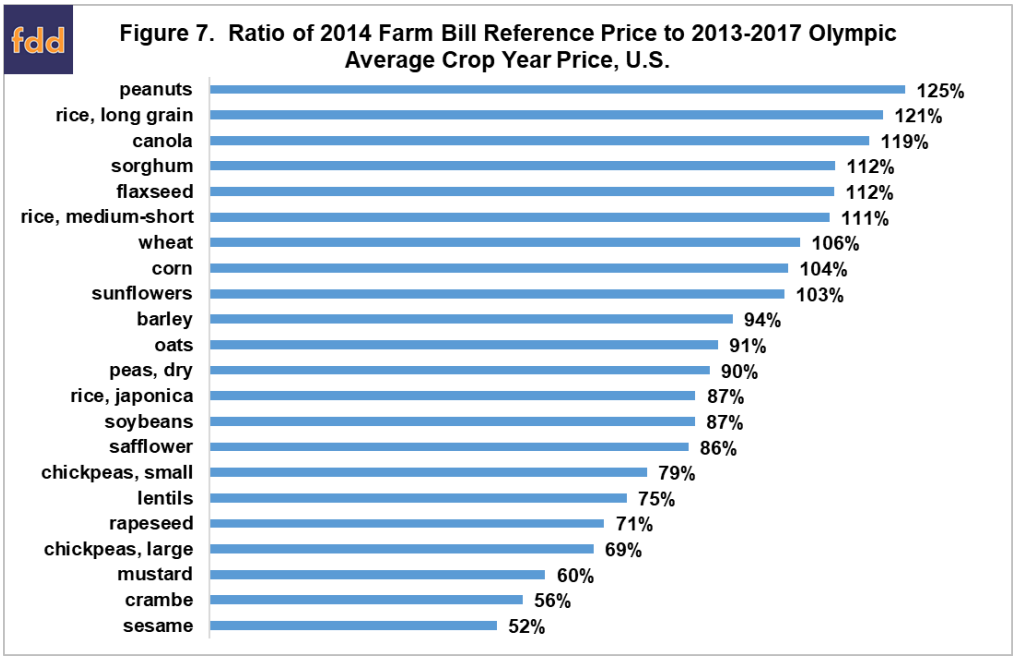
- Extending the current set of reference prices will continue the large variation across crops in the ratio of the reference price to recent market prices (see Figure 7).

- Given the preceding discussion, it is thus not surprising that both the proposed House Farm Bill and the recently released Brown-Thune bill have provisions that speak to this variation. The House farm bill creates an "effective reference price," which is the higher of the reference price or 85% of the 5-year Olympic average of crop year price with a cap at 115% of the reference price (see April 26, 2018 *farmdoc daily* article). Brown-Thune caps the reference price at the average price for the immediately preceding 10 crop years.

- The reference-to-market price ratio could be more contentious than the work requirements for SNAP (Supplemental Nutrition Assistance Program).

- Sub-issues include whether fixed reference prices should include a market orientation component and how large of variation in reference-to-market price ratio across crops is fair.

- A potential related issue is the difference in ARC-CO vs. PLC per acre payment caps.



Data Notes

1) ARC has an individual farm version, ARC-IC. Payment is made if average actual revenue per acre across all program crops planted on an ARC-IC farm is less than 86% of the farm's benchmark revenue per acre. Benchmark revenue is calculated using farm yields. Payment is made on 65% of base acres, with per acre payment capped at 10% of benchmark revenue.

2) A limit exists on the market orientation of both versions of ARC. If a crop's average price for a crop year is less than its reference price, crop year price is replaced by the reference price in the Olympic 5-year average that calculates price for ARC's revenue benchmark. A crop's reference price is thus a floor on the price used to determine the ARC revenue benchmark.

3) Generic base are former cotton base acres as of the 2013 crop year. Cotton was not eligible for ARC and PLC payments for 2014-17 crops, but generic base could receive a commodity program payment if a covered commodity was planted on generic base.

4) Total cost of production used for long grain rice and medium grain rice was the average for the Arkansas non-Delta, Mississippi River Delta, and Gulf Coast regions. Total cost of production for Temperate Japonica Rice was for the California region.

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