Comparison of County ARC and SCO

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Agenda

- SCO, ARC and PLC in the new farm bill
- Methodology
- Results

Policy changes for crop producers

- No more direct, countercyclical or ACRE program payments
- Reallocate base acres and update program yields
  - One time choice, for the life of the farm bill
  - Decision made by land owner
- Must choose (1 time for life of farm bill) between
  - Price loss coverage (PLC, payments when prices fall below a trigger)
  - Agriculture risk coverage (ARC, payments when per-acre revenues fall below a trigger)
  - Decision made by producers
- New crop insurance options
  - STAX for upland cotton producers
  - Supplemental Coverage Option (SCO) for crops not in ARC or STAX

ARC-PLC choice

- Producers on each farm can choose
  - An individual farm version of ARC (ARC-IC) for all crops with base on the farm OR
  - For each crop with base on a farm, they can choose between the county version of ARC (ARC-CO) or PLC
- Choice is made once for the life of the farm bill
- If producers on a farm do not agree on a choice
  - No ARC or PLC benefits are available in 2014
  - PLC is only remaining option for 2015 and beyond

Price loss coverage (PLC)

- Like countercyclical payments in some respects
  - Makes payments when prices fall below a trigger
  - Payments tied to **base** acreage and **program yields**
  - These generally do **NOT** depend on current production choices
    - Except for those with former cotton base or with fruits and vegetables, planting more or less of a given crop will have NO effect on payments
- But different in many ways, including
  - Formula changes slightly: Max (0, (Reference price-max(MYA price, loan rate)) * program yield * base acres (and allocated generic base) * 0.85
  - Reference prices are far higher than old target prices

Agriculture risk coverage (ARC)

- Like ACRE in some respects
  - Makes payments when per-acre revenues fall below a trigger
  - Trigger depends on moving averages of market prices and yields
- But different in many ways, including
  - Paid on base acreage, not planted
  - Tied to county or farm yields, not state
  - Covers losses of 14-24% (ACRE was 10-35%)
  - Don't have to give up direct payments to participate
  - No loan rate penalty

ARC in more detail

- Payments if per-acre revenues fall below 86% of benchmark
- Benchmark:
  - County: 5-yr. Olympic avg. national price * 5-yr. Olympic avg. county yield
  - Individual: Weighted average of the 5-yr Olympic average revenues for the farm
  - Annual prices used are higher of farm price or reference price
- Maximum payment: 10% of benchmark (covers 76-86%)
- Paid on 85% (county yield option) or 65% (farm yield option) of base acres (not planted)

Supplemental coverage option (SCO)

- On top of regular individual coverage (must have individual policy)
- Area-based insurance for range between 86% and individual coverage level
- 65% subsidized
- Only available for crops not in ARC or STAX

SCO, continued

- Intended to be rated actuarially fair
- Starts in 2015 (NOT available in 2014); not available in all counties for all crops
- Operates like underlying individual policy
- Payments are scaled to farm by county loss rate
  - Implication: farms with higher APH can get larger indemnities for a given coverage level and county loss rate

County ARC vs. SCO

- Similarities
  - Coverage begins at 86%
  - Operate at the county level
  - Can both be revenue based
- Differences
  - Producers pay 35% of SCO premium; ARC is "free"
  - SCO utilizes a planting price determined by futures markets while ARC uses Olympic avg. price with floors in determining guarantee
  - SCO uses trend yield while ARC uses Olympic avg. yield in determining guarantee
  - ARC and PLC have $125,000 payment limitation; SCO does not
  - ARC payment rate cannot exceed 10% of benchmark; SCO payment rate limit depends on underlying insurance coverage
  - SCO pays on planted acres while ARC pays on base

Analysis assumptions

- Each county is represented by a single farm
  - Gerlt, et al. (2014) found bias to be small at high coverage levels
- Planted and base area equal
- All payment yields updated
- Underlying crop insurance coverage levels do not change
- All crop insurance policies are Revenue Protection
  - 87% of 2013 insured corn acres were RP
- SCO is assumed (counterfactually) to be available beginning in 2014

Calculating benefits

- With a targeted average loss ratio of one, the SCO premium should equal the average indemnity
- Estimate payments and indemnities from 2014 to 2018 for corn, soybeans and wheat
- Yields used in calculations
  - 1980 to 2013 yields per planted acre from NASS (per harvested for corn and wheat)
  - FSA ACRE data used to augment recent years
  - If county did not have at least 15 observations in the last 20 years, it was dropped

Calculating benefits, cont'd

- Yields, continued
  - Each county and state yield were regressed against a linear trend to get both forecasted yields and standard deviation of errors
  - Missing county residuals were estimated by regressing county yields against state yields
  - Using Latin hypercube, 500 normally distributed draws were obtained for each county, crop and year
    - Normal easy to work with
    - RMA assumes yield normality for farm yields

Calculating benefits, cont'd

- Prices taken from FAPRI-MU stochastic baseline
  - Model consists of approximately 2,000 equations for crops, livestock, biofuels, etc.
  - Correlated draws of selected exogenous variables (both supply and demand shifters) used to generate 500 solutions for endogenous variables
  - Thus 500 farm prices for each commodity in each year
- Correlating county yields and national prices
  - Correlations derived from detrended yields and FAPRI-MU prices
  - For more information, see Gerlt and Westhoff (2013)

Calculating benefits, cont'd

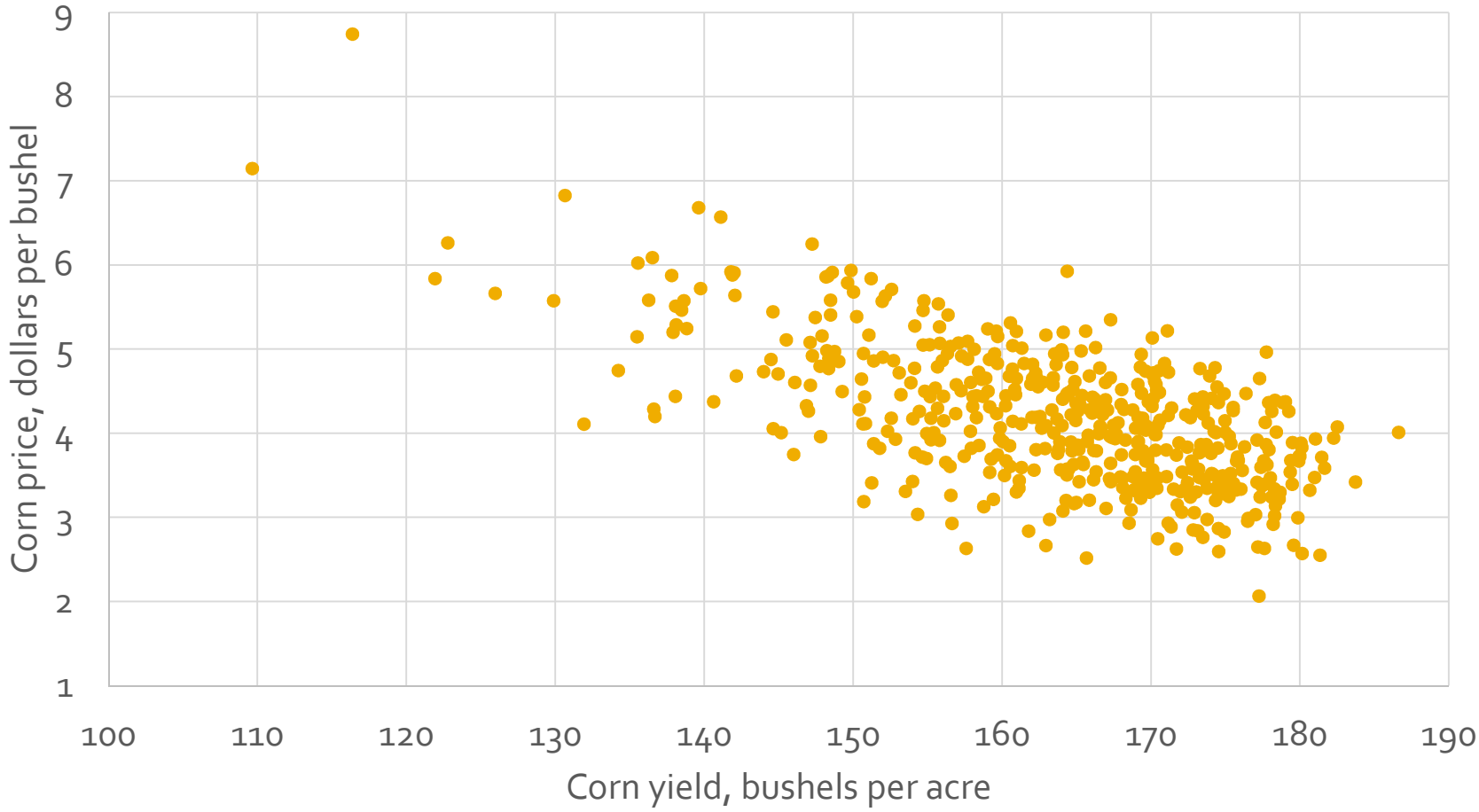
- FAPRI-MU farm average price projections per bushel (March baseline), marketing year

	14/15	15/16	16/17	17/18	18/19	19/20	20/21	21/22	22/23	23/24
Corn	4.17	4.09	4.07	4.06	4.04	4.02	3.97	3.93	3.92	3.87
Soybeans	9.84	9.80	9.68	9.68	9.77	9.85	9.87	9.94	9.89	9.88
Wheat	5.55	5.37	5.32	5.31	5.28	5.26	5.25	5.23	5.23	5.21

Note: More recent FAPRI-MU deterministic projections show lower 2014/15 and 2015/16 corn prices, but most stories are not very different than the March estimates

2014/15 corn yields and prices

FAPRI-MU stochastic baseline, March 2014



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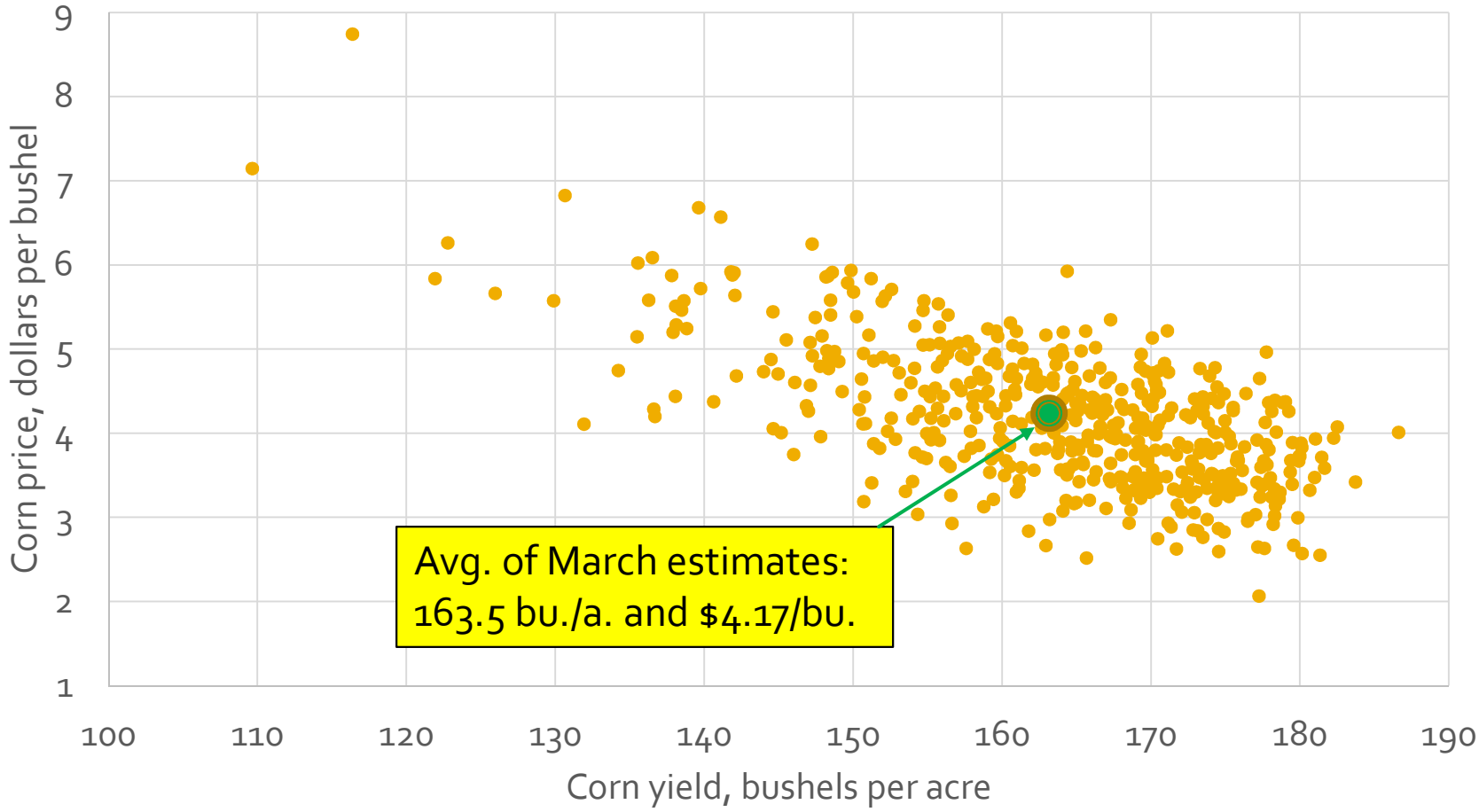
2014/15 corn yields and prices
FAPRI-MU stochastic baseline, March 2014



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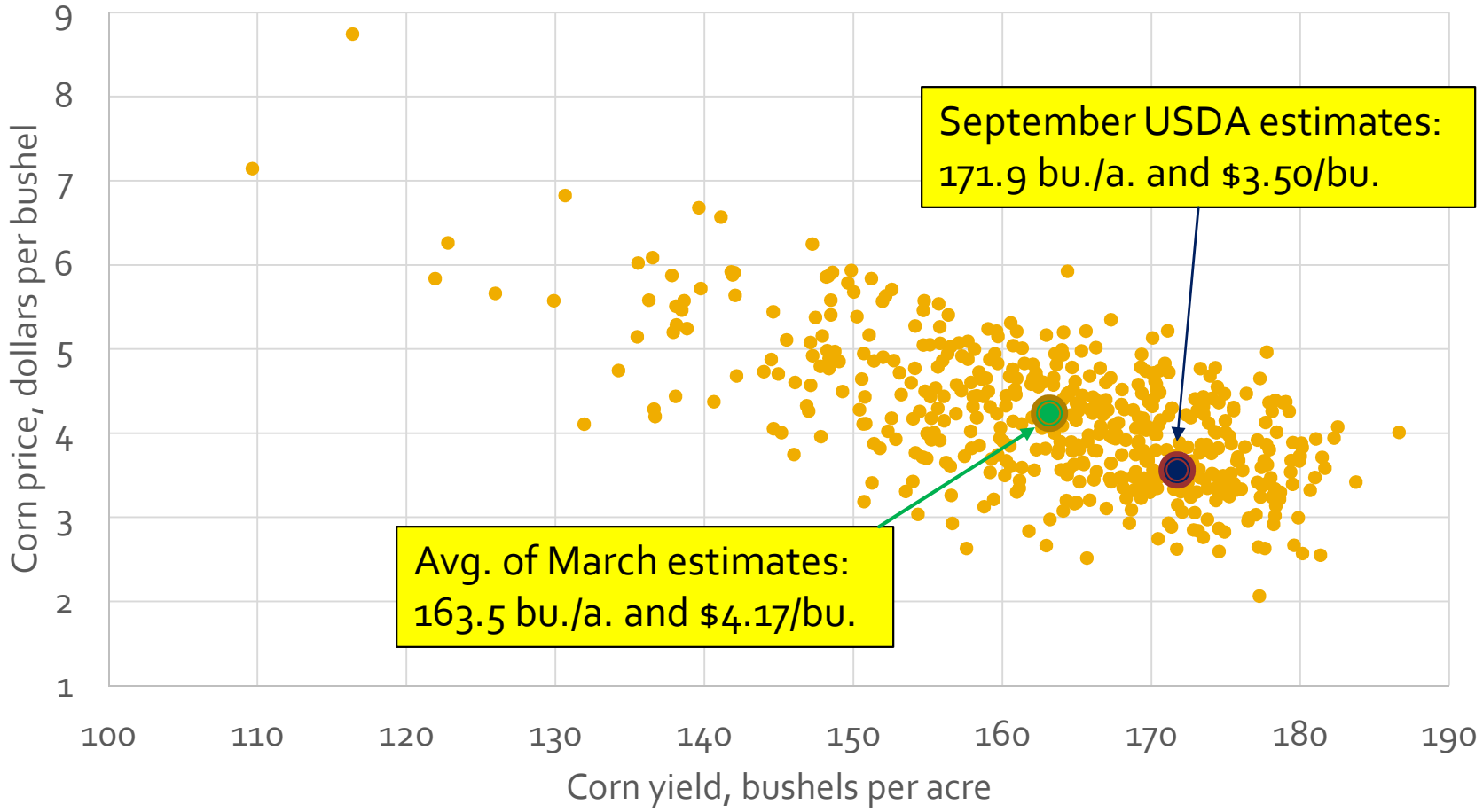

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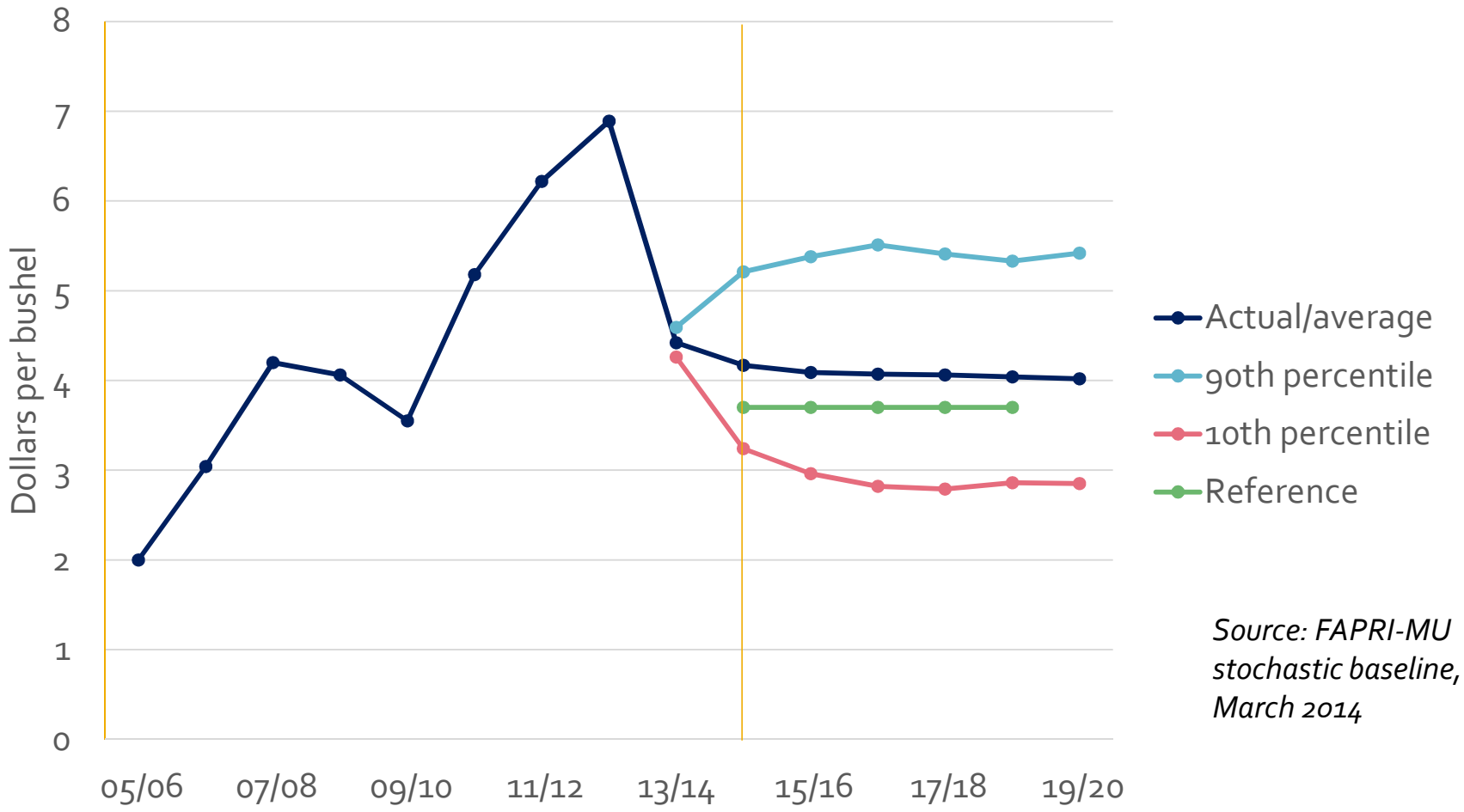
U.S. farm prices for corn



Source: FAPRI-MU stochastic baseline, March 2014

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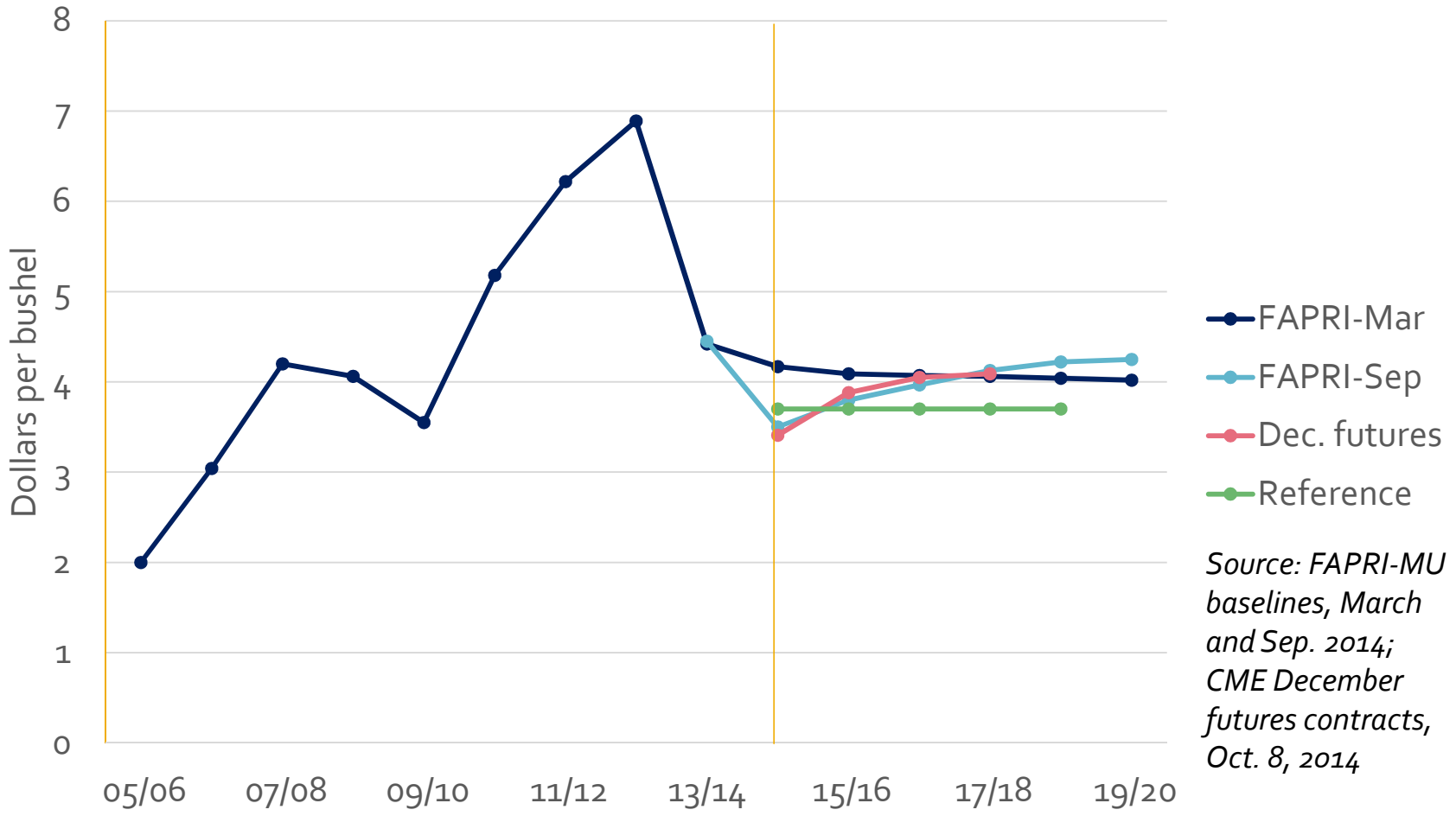
U.S. farm and futures prices for corn



Source: FAPRI-MU baselines, March and Sep. 2014; CME December futures contracts, Oct. 8, 2014

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Calculating benefits, cont'd

- A correlation matrix is built for each commodity with all county yields and national prices
- Matrix is both overspecified and combines multiple data sources, so PSD fails
  - Use Higham (2002) to find nearest "true" correlation matrix
- Use Iman and Conover's (1982) method to rearranged prices and yields to impose correlation
  - Given that FAPRI-MU's prices are exogenous, a reordering algorithm is more appropriate than data generating algorithms that use copulas

Calculating benefits, cont'd

- Futures prices
  - Harvest price obtained directly from farm price
    - Corn: harvest price = farm price + $.103
    - Soybeans: harvest price = farm price + $.067
    - Wheat: harvest price = farm price + $.209
  - Planting price based used random draws from log-normal distribution centered on the harvest price
    - Historical volatility calculated based upon 1980 to 2012 market outcomes
    - Volatilities: 0.1899 for corn, 0.1730 for soybeans and 0.1844 for wheat

Calculating benefits, cont'd

- We assumed that 2013 crop insurance participation rates would continue

Coverage level	Corn	Soybeans	Wheat
50%	6.6%	8.5%	9.0%
55%	0.3%	0.4%	0.6%
60%	1.9%	1.8%	4.8%
65%	6.8%	7.0%	15.0%
70%	20.1%	21.2%	35.0%
75%	29.2%	31.3%	24.6%
80%	22.1%	20.5%	6.5%
85%	10.9%	7.6%	4.1%
90%	2.1%	1.7%	0.4%

Results

- Caveats
  - Only averages reported, will not hold for
    - Particular farms in particular counties
    - With different ratios of planted to base acreage
  - Different price assumptions could significantly alter results

Corn payments

- Corn avg. payments per base or planted acre

	2014	2015	2016	2017	2018
ARC	$33.79	$35.98	$31.49	$19.94	$15.99
SCO	$17.55	$15.16	$14.27	$14.33	$14.76
PLC	$15.94	$25.12	$29.76	$30.35	$30.01
SCO+PLC	$31.09	$36.50	$39.53	$40.10	$40.25

- Corn frequency of payments (share of outcomes)

	2014	2015	2016	2017	2018
ARC	61.9%	63.5%	57.5%	41.3%	35.8%
SCO	29.7%	28.2%	27.8%	26.8%	28.7%
PLC	30.6%	36.8%	39.2%	40.4%	40.8%
SCO+PLC	44.4%	50.5%	52.4%	53.2%	53.6%

Soybean payments

- Soybean avg. payments per base or planted acre

	2014	2015	2016	2017	2018
ARC	$20.98	$21.93	$20.91	$17.39	$12.57
SCO	$9.09	$8.99	$8.93	$8.79	$9.25
PLC	$9.99	$12.79	$14.96	$16.10	$15.73
SCO+PLC	$17.59	$19.87	$21.65	$22.49	$22.64

- Soybean frequency of payments

	2014	2015	2016	2017	2018
ARC	58.5%	59.3%	57.1%	49.7%	39.3%
SCO	26.2%	26.1%	26.1%	25.9%	26.4%
PLC	24.6%	31.2%	30.6%	33.8%	30.4%
SCO+PLC	41.6%	46.9%	45.0%	46.9%	46.0%

Wheat payments

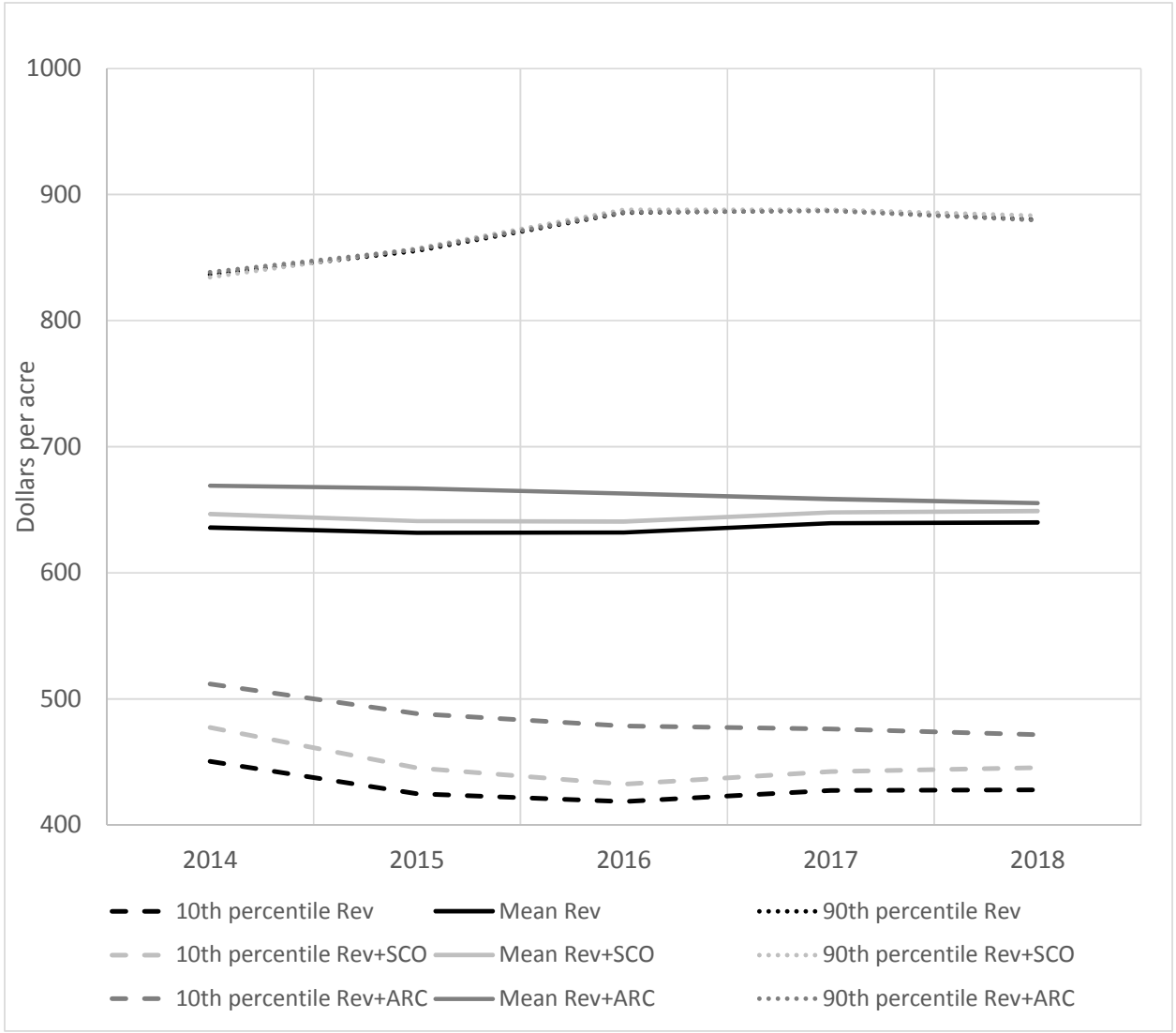
- Wheat avg. payments per base or planted acre

	2014	2015	2016	2017	2018
ARC	$10.42	$12.88	$13.02	$10.98	$8.55
SCO	$8.48	$8.19	$7.90	$7.95	$7.69
PLC	$11.46	$19.14	$19.33	$20.07	$21.03
SCO+PLC	$18.24	$24.47	$24.34	$25.02	$25.57

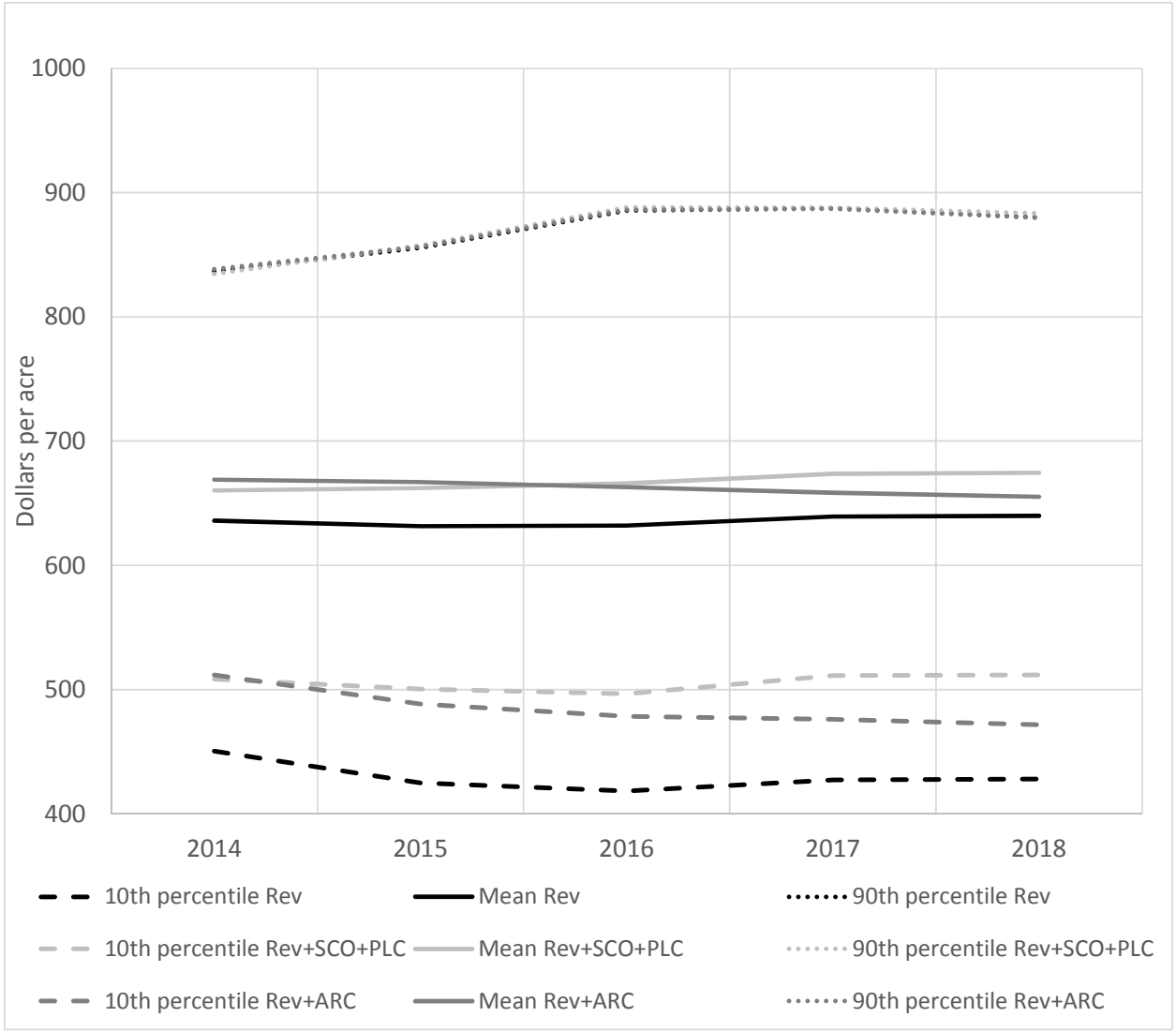
- Wheat frequency of payments

	2014	2015	2016	2017	2018
ARC	53.7%	62.3%	61.8%	56.5%	48.0%
SCO	31.9%	32.4%	32.5%	31.3%	31.6%
PLC	46.8%	57.2%	59.4%	60.0%	59.2%
SCO+PLC	57.7%	65.9%	69.4%	68.1%	68.7%

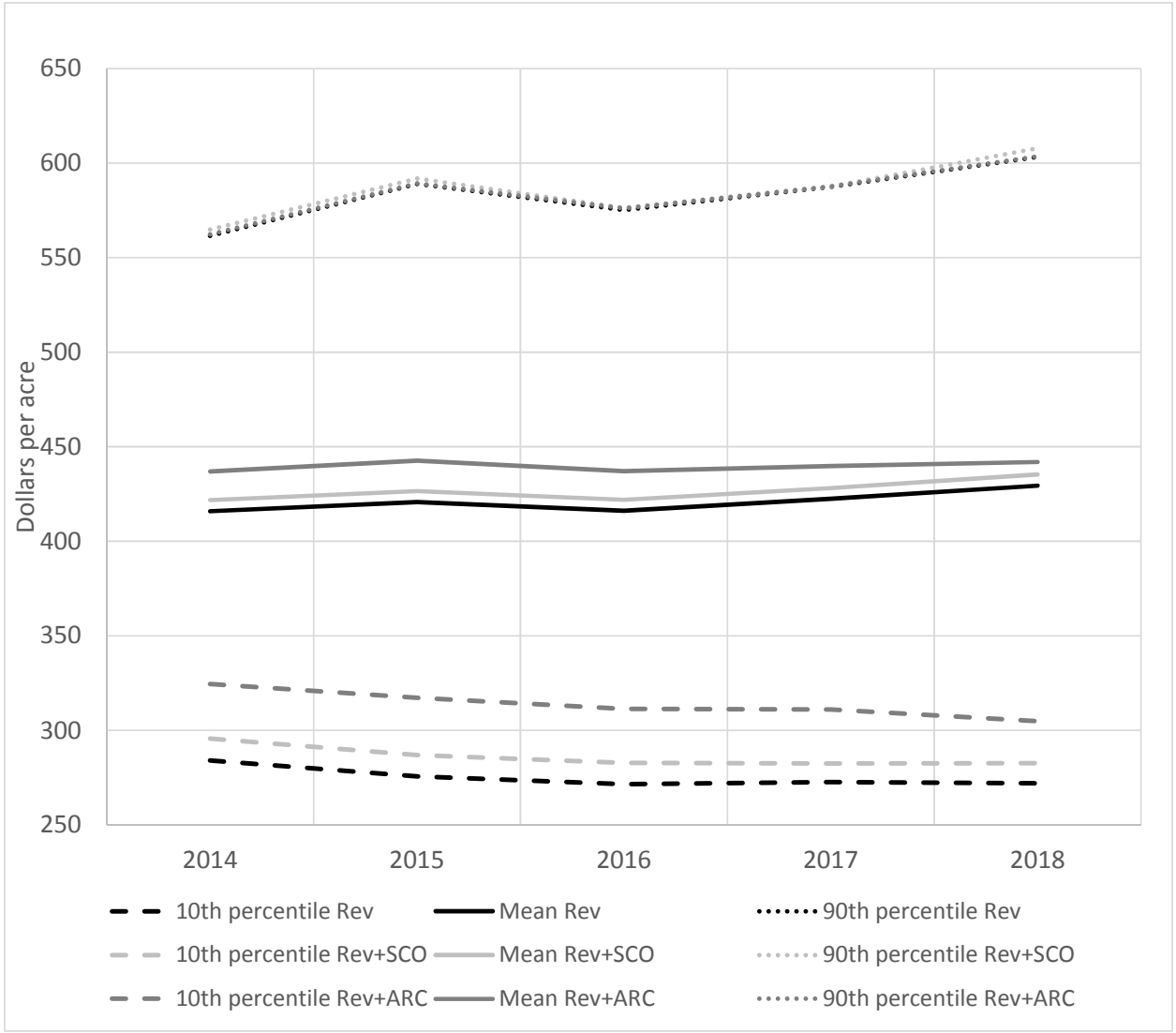
Corn distributions



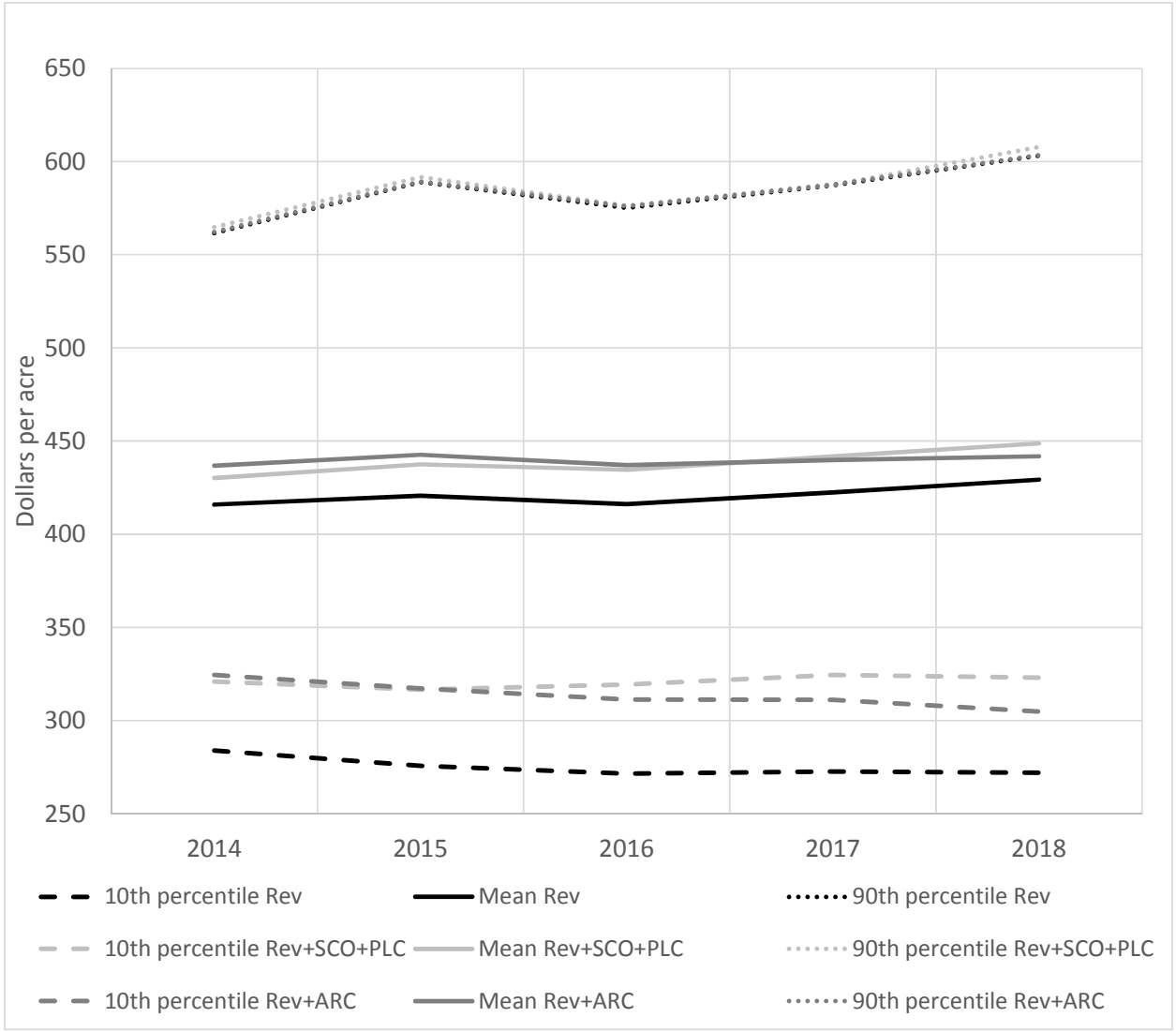
Corn distributions with PLC



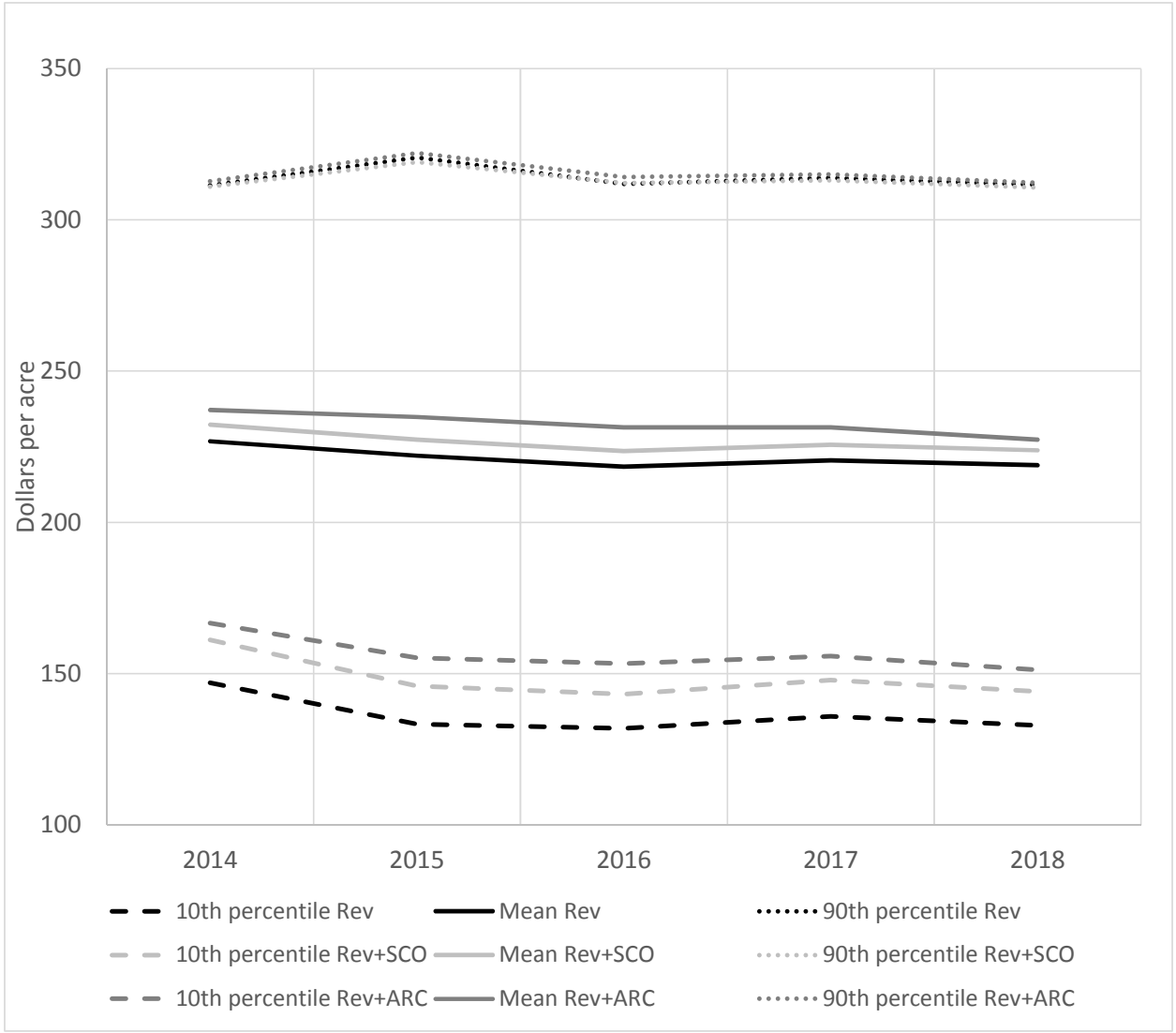
Soybean distributions



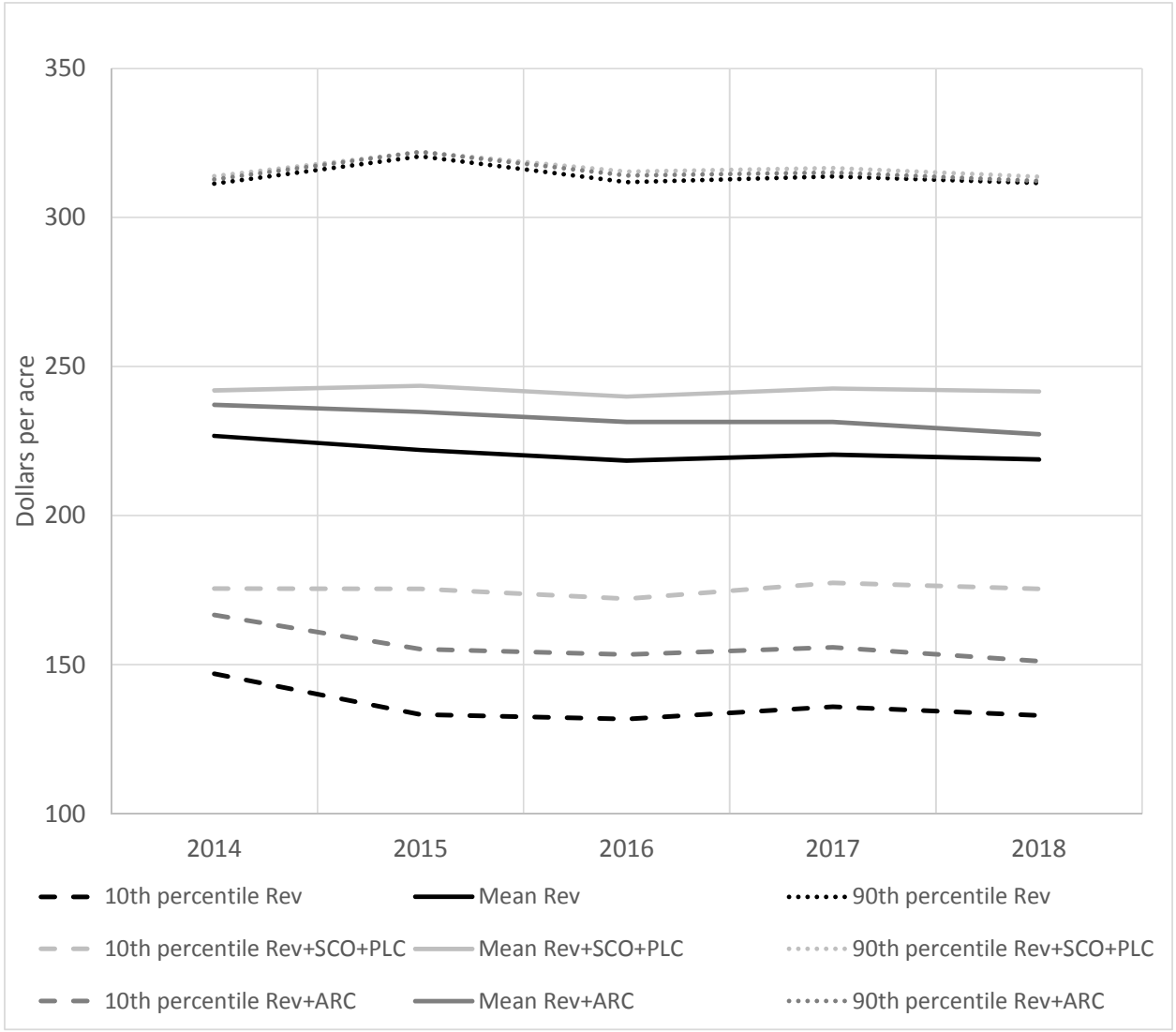
Soybean distributions with PLC



Wheat distributions



Wheat distributions with PLC



Conclusions

- SCO and ARC both provide a safety net
- ARC benefits generally exceed SCO net indemnities for corn, soybeans and wheat
- In many cases, the sum of PLC payments and SCO net indemnities exceed ARC benefits
- Results are sensitive to
  - Price projections
  - Individual crop insurance coverage levels
  - Much more

Thanks!

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