Effects of Supplemental Revenue Programs on Crop Insurance Coverage Levels *

Harun Bulut and Keith J. Collins
National Crop Insurance Services (NCIS)

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Background

- U.S. Senate and U.S. House of Representatives Committee on Agriculture each reported out comprehensive farm bills in 2012.
- Replacement of 2008 Farm bill revenue programs: Average Crop Revenue Election (ACRE) and Supplemental Revenue Assistance Program (SURE). Also eliminating counter-cyclical payments and direct payments.
- Introducing the "shallow loss" revenue programs: both area-based revenue plans and individual revenue plans for a crop on the farm:
  - ARC county and ARC individual, SCO and STAX in the Senate bill.
  - RLC, PLC, SCO and STAX in the House bill.
- Farm programs become more insurance-like, and they are linked to the crop insurance choices available to producers.
- These programs would operate in combination with crop insurance, which offers both individual and area plans.

Objective

- Our interest is in the demand effects of supplemental revenue programs offered either free as a farm program or fairly priced as a crop insurance product) on individual and area crop insurance.
- Bulut, Collins, and Zacharias (AJAE, 2012)
- Literature analyzing the 2012 Farm Bill proposals have not closely looked at the substitution and interaction effects.
  - Paulson, Woodard, and Babcock (2013)
  - Coble, Barnett, Miller and Ubilava (2012)
  - Coble, Barnett and Miller (2012)
  - Outlaw et al. (2012)
- A clear understanding of the interaction of these various programs and how they address the risk management needs of producers and affect their participation decisions is essential for an informed public policy discussion.

Methodology

- The farmer's choice among alternative farm bill and crop insurance options is based on the Certainty Equivalent (CE) measure of wealth.
  - A power utility function with constant coefficient of relative risk aversion is used:

$$U(W;\gamma) = \frac{W^{1-\gamma}}{(1-\gamma)} \qquad W: \text{Wealth} \qquad \gamma: \text{Relative risk aversion.}$$

  - Consistent with the analysis in Vedenov and Power (2008), Power, Vedenov and Hong (2009) and Barnett and Coble (2012).
- Monte Carlo simulations, combined with the copula technique are used.
  - Vedenov and Power (2008); Power, Vedenov and Hong (2009); Coble, Dismukes and Thomas (2007), and Coble and Dismukes (2008).
- The inputs to the simulation are national, state and county level yield data under a given price environment. In three steps, the outputs of the simulation include the simulated farm and county level yields and simulated harvest and U.S. marketing year average prices.
  - Step 1 obtains the simulated county level yields and harvest prices by applying copula techniques on historical data (which covers the time period from 1968 to 2012).
  - Step 2 obtains the farm level yields from simulated county yields by using the relationship between the two as established in Miranda (1991) and RMA's base premium rates.
  - And Step 3 obtains U.S. marketing year average prices from harvest prices using simple regression methods.

Simulated Corn Producer Participation Options under Senate and House Ag Committee Bills

RP	RP-HPE	YP	GRP
RP SCO_2	RP-HPE SCO_3	YP SCO_1	GRIP
RP ARCI	RP-HPE ARCI	YP ARCI	GRIP-HRO
RP ARCC	RP-HPE ARCC	YP ARCC	
RP SCO_2 ARCI	RP-HPE SCO_3 ARCI	YP SCO_1 ARCI	
RP SCO_2 ARCC	RP-HPE SCO_3 ARCC	YP SCO_1 ARCC	
RP SCO_1	RP-HPE SCO_1	YP RLC	
RP SCO_1 ARCI	RP-HPE SCO_1 ARCI	YP PLC	
RP SCO_1 ARCC	RP-HPE SCO_1 ARCC	YP SCO_1 PLC	
RP RLC	RP-HPE RLC		
RP PLC	RP-HPE PLC		
RP SCO_2 PLC	RP-HPE SCO_3 PLC		
RP SCO_1 PLC	RP-HPE SCO_1 PLC		

299 participating options
for a representative corn producer
at the base case and each of the eight scenarios considered (total of 2,691 decision points
to be simulated using 10,000 draws for each)
per county.

# Simulated Cotton Producer Participation Options under Senate and House Agriculture Committee Farm Bills

RP	RP-HPE	YP	GRP	STAX
RP SCO2	RP-HPE SCO3	YP SCO1	GRIP	
RP STAX	RP-HPE STAX	YP STAX	GRIP-HRO	

92 options to evaluate at the base case and each of the seven scenarios considered (total of 736 decision points to be simulated using 10,000 draws for each) per county.

Base Cases for Corn and Upland Cotton Farms

| Crop	Corn	Corn	Upland Cotton
State	Illinois	Texas	Texas
County	Champaign	Hale	Hale
Unit	Enterprise	Enterprise	Enterprise
Base Price	$5.68/bu.	$5.68/bu.	$0.81/lb.
Risk Premium	10%	10%	10%
Relative Risk Aversion [b]	7.17	3.34	1.56
Farm APH	171 bu/ac	179 bu/ac	899 lbs/ac
Farm APH/County Expected Yield	1.0	1.0	1.0
SDEV Farm Yield	36.37	54.27	487.84
SDEV County Yield	29.96	25.74	239.48
Ratio of Farm to County SDEV	1.21	2.11	2.04
Farm Beta	0.85	1.05	1.02
SCO subsidy rate	0.7	0.7	0.7
STAX subsidy rate	n.a.	n.a.	0.8

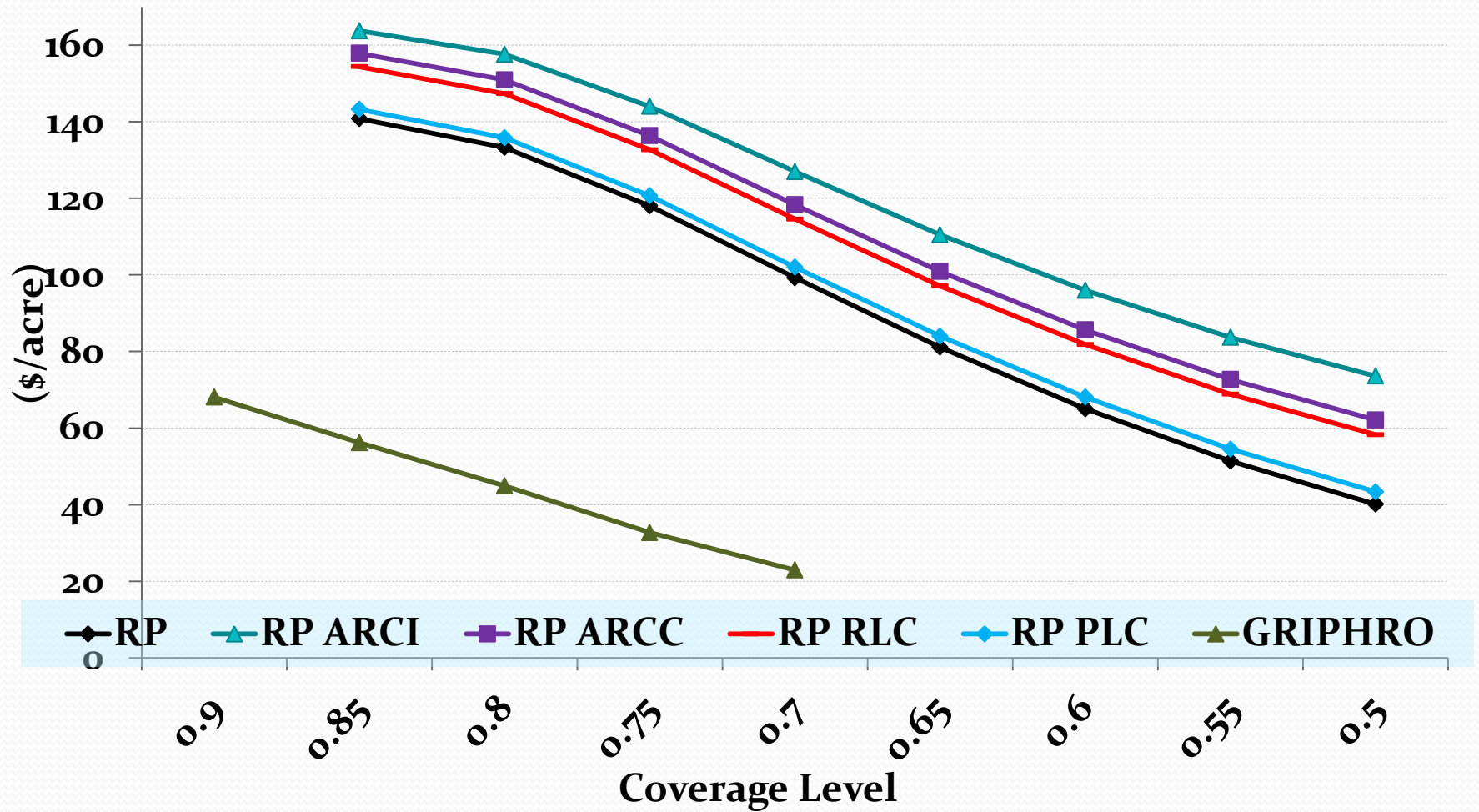# Effect of Selected Farm Bill Proposals on Illinois Corn Farm Revenue Distribution
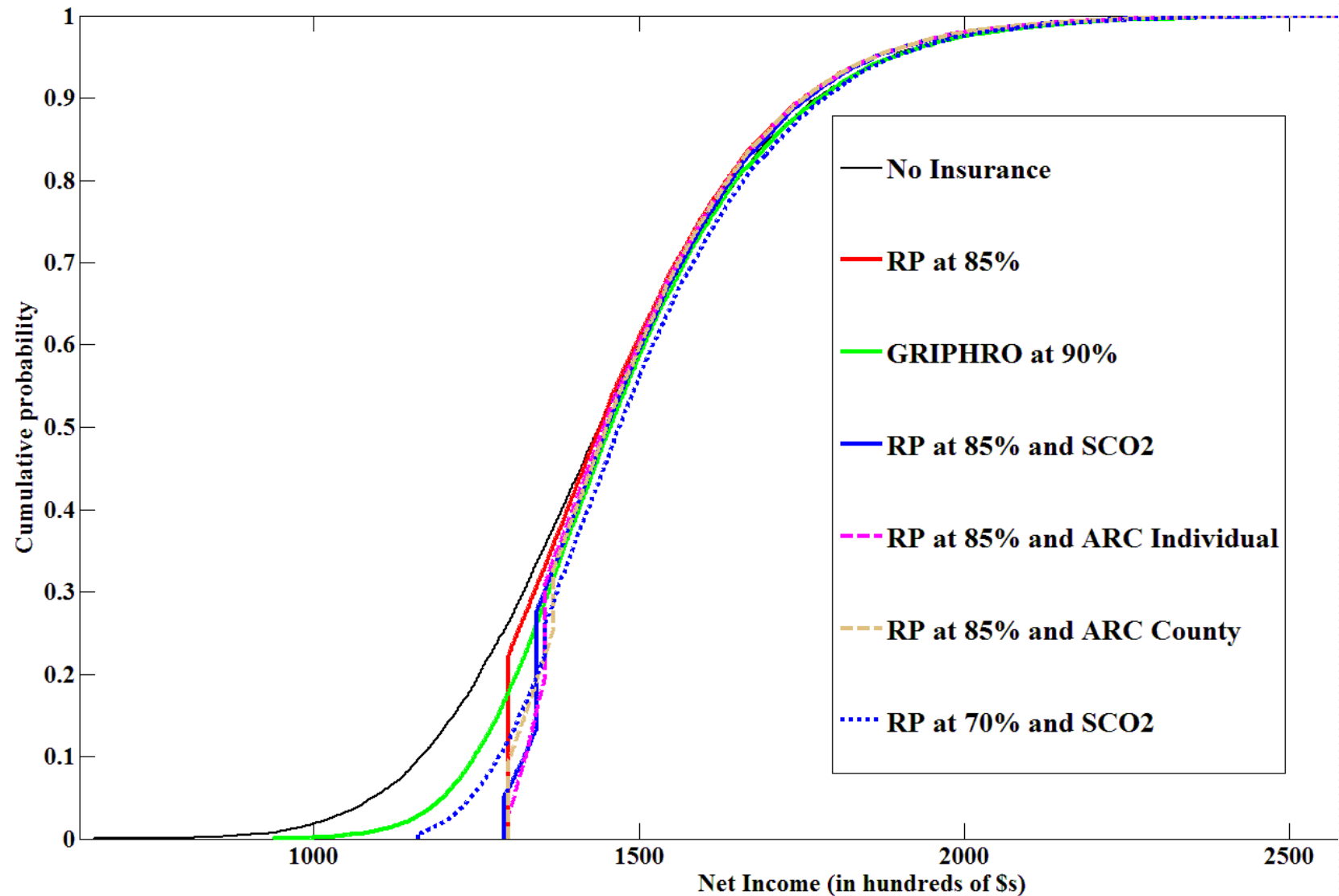
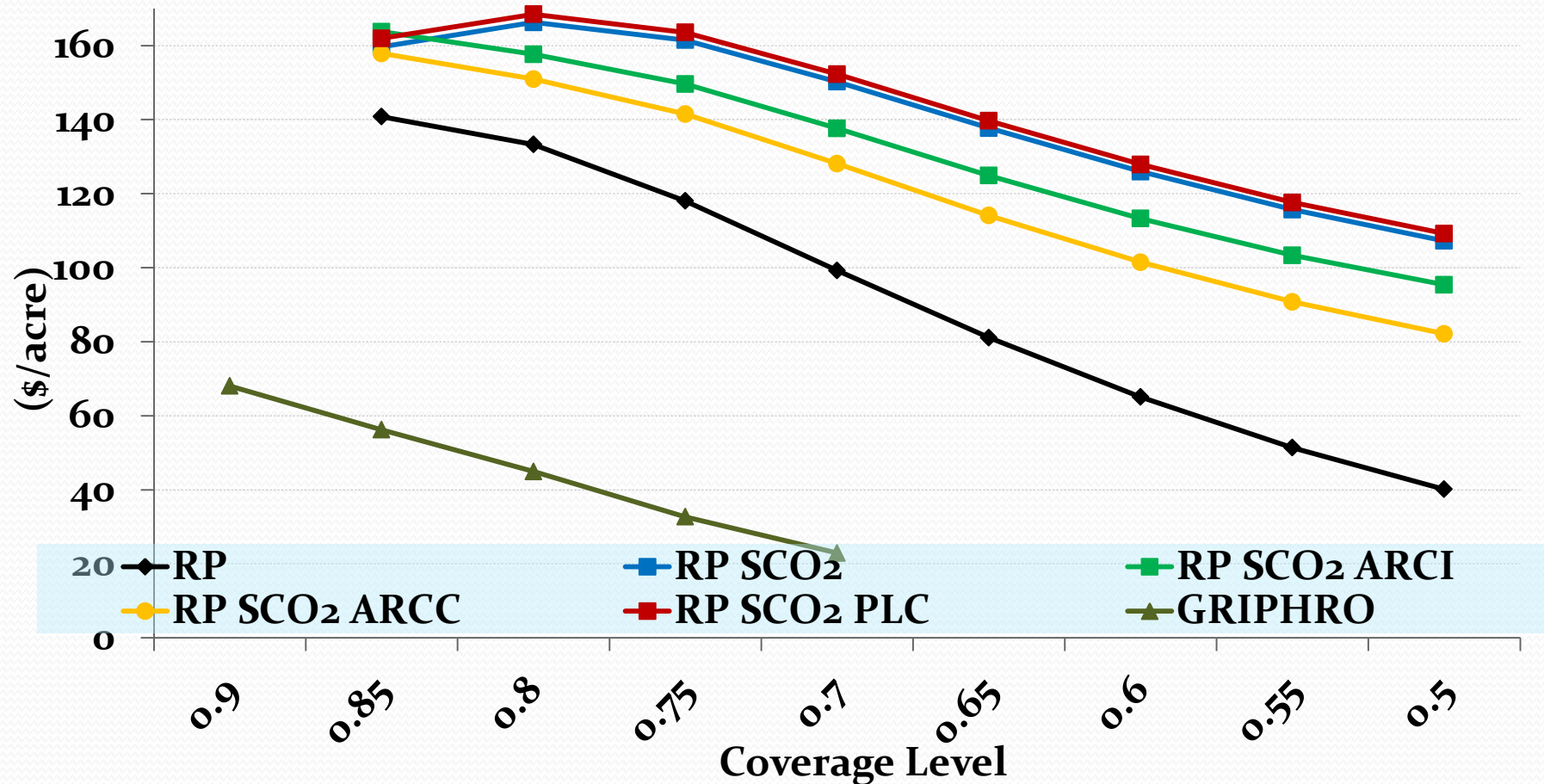# Value of 2012 Farm Bill Programs for IL Corn, 2013
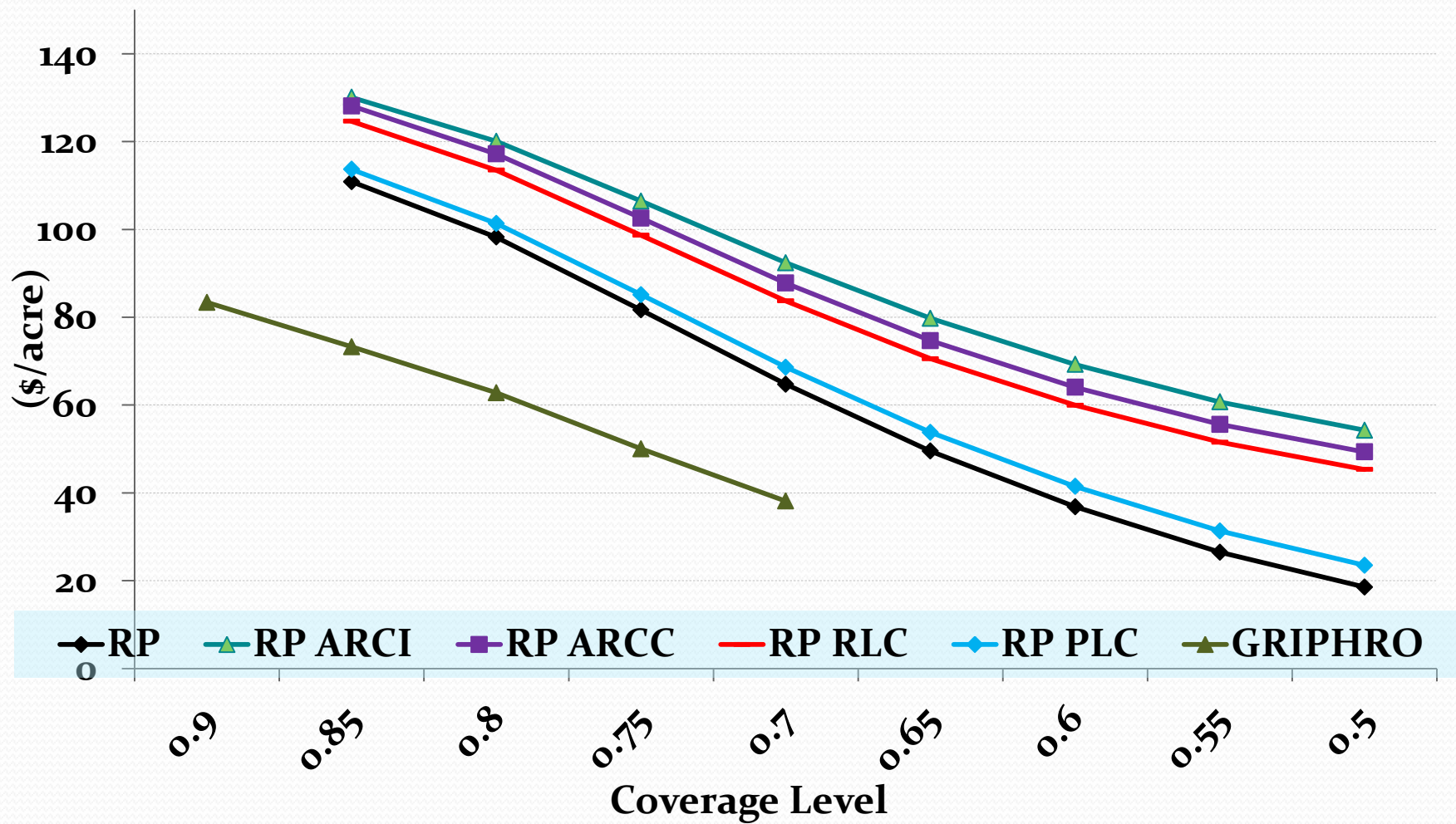
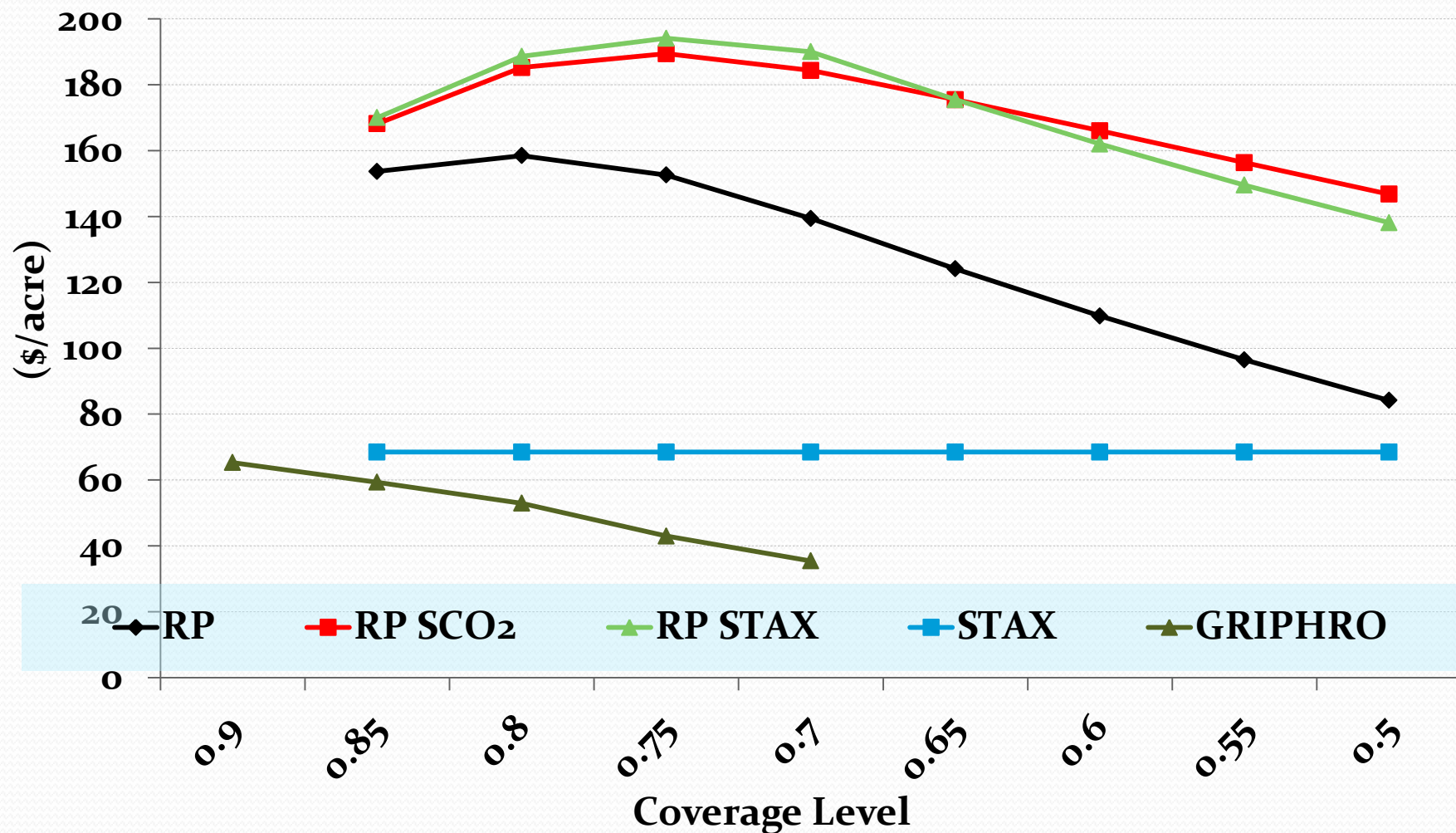# Value of 2012 Farm Bill Programs for IL Corn, 2013, Cont.
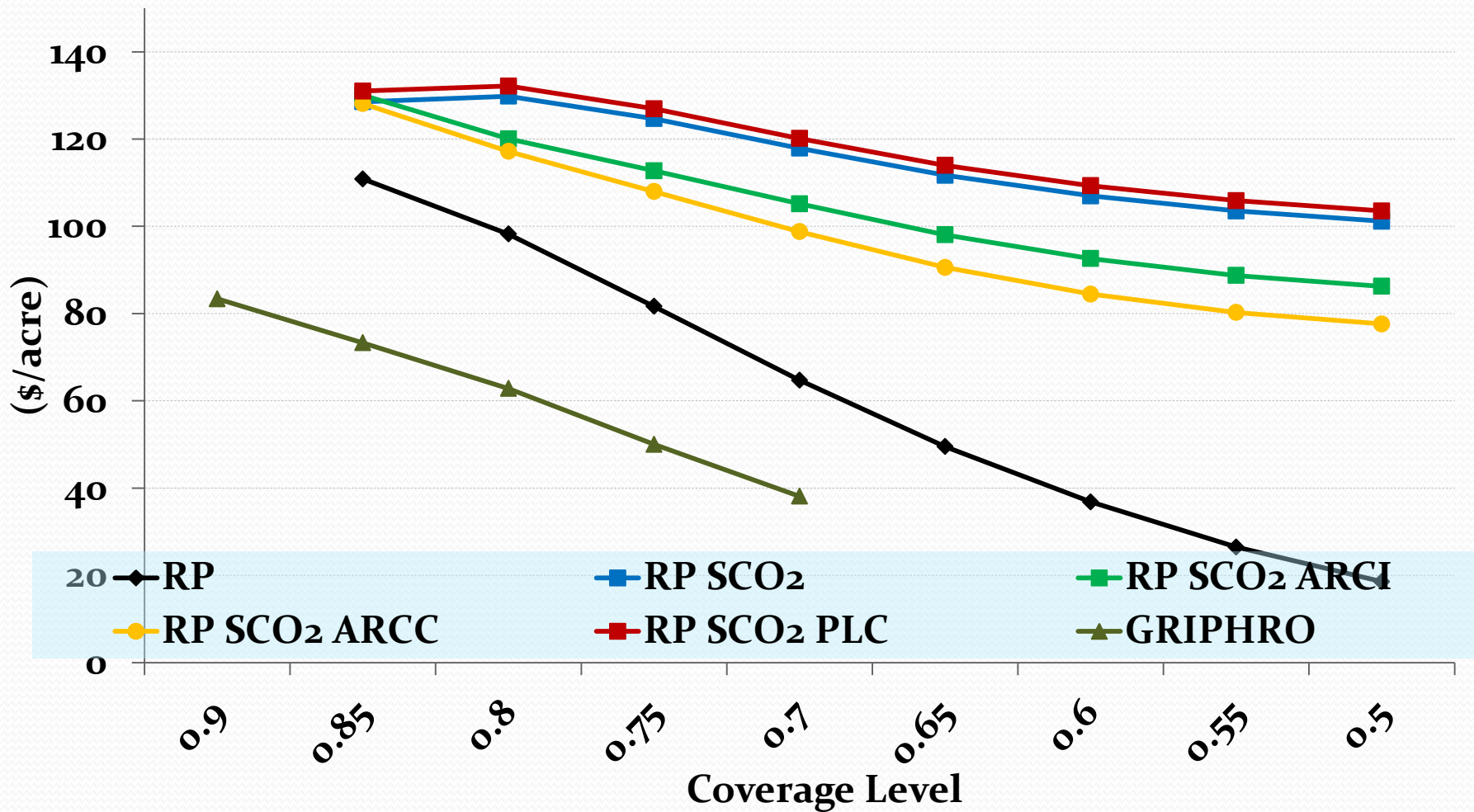
Value of 2012 Farm Bill Programs for TX Corn, 2013

Value of 2012 Farm Bill Programs for TX Corn, 2013, Cont.

Value of 2012 Farm Bill Programs for TX Cotton, 2013

Representative Corn Farmer's Top Choices Pre- versus Post- 2012 Farm Bill Proposals, 100 acres in Champaign County, IL, 2013

Scen-arios [a]	Change from Base Case [b]	Top Choice Pre-Farm Bill	Top Choice Post-Farm Bill	Effect on Base CI Product
BC	None	RP at 85%	RP at 80%;, SCO2; and PLC [c]	Buy-Down (5 ppts)
SA 1	Optional units	RP at 85%	RP at 80%, SCO2 and PLC [c]	Buy-Down (5 ppts)
SA 2	Correlation = 0.9	GRIP-HRO at 90% [h]	RP at 80%, SCO2 and PLC [d]	Switch
SA 3	Correlation = 0.5	RP at 85%	RP at 85% and ARC Indiv. [e]	None
SA 4	APH = 1.2 x ECY	RP at 85%	RP at 80%, SCO2 and PLC [e]	Buy-Down (5 ppts)
SA 5	APH = 0.8 x ECY	GRIP-HRO at 90%	RP at 85% and ARC Indiv. [f]	Switch
SA 6	Risk Premium = 5%	RP at 85%	RP at 80%, SCO2 and PLC [d]	Buy-Down (5 ppts)
SA 7	Base price = $4.94/bu.	RP at 85%	RP at 85% and ARC Indiv. [g]	None
SA 8	SCO subsidy rate = STAX subs. rate = 35%	RP at 85%	RP at 85% and ARC Indiv. [g]	None

Representative Corn Farmer's Top Choices Pre- versus Post- 2012 Farm Bill Proposals, 100 acres in Hale County, TX, 2013

Scenarios[a]	Change from Base Case [b]	Top Choice Pre-Farm Bill	Top Choice Post-Farm Bill	Effect on Base CI Product
BC	None	RP at 85%	RP at 80%;, SCO2; and PLC	Buy-Down 5 ppts
SA 1	Optional units	RP at 85%	RP at 80%, SCO2 and PLC [c]	Buy-Down 5 ppts
SA 2	Correlation = 0.7	RP at 85%	RP at 80%, SCO2 and PLC [c]	Buy-Down 5 ppts
SA 3	Correlation = 0.3	RP at 85%	RP at 80%, SCO2 and PLC	Buy-Down 5 ppts
SA 4	APH = 1.2 x ECY	RP at 80% [e]	RP at 80%, SCO2 and PLC	None
SA 5	APH = 0.8 x ECY	RP at 85% [f]	RP at 85% and ARC Indiv. [c]	None
SA 6	Risk Premium = 5%	RP at 85%	RP at 80%, SCO2 and PLC [c]	Buy-Down 5 ppts
SA 7	Base price =$4.94/bu.	RP at 85%	RP at 85% and ARC Indiv. [d]	None
SA 8	SCO subsidy rate= STAX subs. rate=35%	RP at 85%	RP at 85% and ARC Indiv.	None

Representative Cotton Farmer's Top Choices Pre- versus Post- 2012 Farm Bill Proposals, 100 acres in Hale County, TX, 2013

Scenarios [a]	Change from Base Case [b]	Top Choice Pre-Farm Bill	Top Choice Post-Farm Bill	Effect on Base CI Product
BC	None	RP at 80%	RP at 75% and STAX	Buy-Down 5 ppts
SA 1	Optional units	RP at 80%	RP at 70% and STAX [c]	Buy-Down 10 ppts
SA 2	Correlation = 0.7	RP at 80%	RP at 75% and STAX	Buy-Down 5 ppts
SA 3	Correlation = 0.3	RP at 80%	RP at 75% and STAX	Buy-Down 5 ppts
SA 4	APH = 1.2 x ECY	RP at 80%	RP at 75% and SCO2 [c]	Buy-Down 5 ppts
SA 5	APH = 0.8 x ECY	RP at 80% [d]	RP at 70% and STAX [c]	Buy-Down 10 ppts
SA 6	Risk Premium = 5%	RP at 80%	RP at 75% and STAX [e]	Buy-Down 5 ppts
SA 7	SCO subsidy rate = STAX subs. rate =35%	RP at 80%	RP at 80% and SCO = RP at 80% and STAX [f]	None

Conclusion

- Farm program supplemental revenue programs have no effect on crop insurance choices (given the coverage restrictions).
  - ARC, RLC and PLC make modest payments.
- Crop insurance supplemental revenue programs (SCO and STAX) typically reduce crop insurance coverage at high coverage levels.
  - "Buyer's remorse"?
  - Reduce the subsidy rates of SCO and STAX?
- SCO and STAX cause a switch from a county crop insurance plan to an individual plan of crop insurance combined with SCO and STAX.
- Further analysis is needed to evaluate the net effect on premium, underwriting gains, and A&O.