What is the Impact on Average Return and Risk from Possible Changes in the Crop Insurance Program?

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The 2014 Farm Bill made crop insurance the foundation of a grain farm's revenue safety net. The Title I farm programs, ARC-CO and PLC, were designed to supplement farmer's use of crop insurance as these programs were designed for more shallow-losses instead of a deeper loss protected by insurance. The 2014 legislation was written with budget constraints during a period of record farm profitability. While farm profitability is of greater concern when drafting the next Farm Bill, the budget constraints remain. The state of the current agricultural economy may spur a vigorous debate on the best way to provide a safety net for covered commodities while staying within the budget.

Crop insurance is a public sector/private sector partnership where the public sector provides, on average, 60% subsidy of insurance premiums and 100% subsidy of the administrative and overhead costs (RMA). The public sector's support of crop insurance is instead of ad hoc disaster bills in response to a weather-related disaster. Crop insurance is designed for farmers to be proactive in managing their farm's risk and to provide a more market-based solution to managing disaster recovery.

As policymakers discuss the next Farm Bill, competing ideas will debate over the best policies that help farmers while meeting declining baseline budgets. Critics of crop insurance would like to see the subsidies reduced to minimize the government's obligation and to encourage farmers to pay a more significant percentage of the insurance premium. Other policy alternatives include capping the dollar value of the subsidy or elimination of the harvest price option.

The proposed changes to crop insurance are not defined in policy proposals with rumored changes circulating in agricultural media. One policy alternative is a reduction in the subsidy percentage that farmers receive to reduce their cost of an actuarially fair insurance product.

Another alternative could be a limit on the subsidy dollar value a farm business receives. This policy alternative would adversely affect farms planting more acres to economize on machinery and equipment. Another policy alternative is to eliminate the harvest price option for revenue protection (RP) insurance, which allows the revenue coverage at the larger of the projected or harvest price. The harvest price option allows the insurance policy to protect production contracted before harvest from production risk that would otherwise limit the farmer's ability to fulfill the contract.

Any changes to the insurance program will increase the farmer's cost of the program. However, the impact on revenue variability and the potential managerial response to these changes is not well understood. The farmer's attitude to risk will determine which crop insurance tool, if any, is used to manage revenue or yield risk. Risk-neutral farmers would choose the insurance policy that provides the highest expected revenue net of insurance costs. Risk-averse farmers may choose a policy that provides a lower net revenue if there is sufficient downside risk protection provided by the insurance policy. Some farmers may choose to reduce coverage levels or change from a farm-level product to an area product. Depending on the cost of the insurance and the risk protection provided, some farmers may decide it is better to self-insure.

The objective of this paper is to simulate the revenue for a Western Kentucky corn and soybean farm over a five-year period. The revenue includes the indemnities from purchasing farm-level and area crop insurance products under current and proposed policy alternatives. The annual revenues, net of insurance costs, are discounted to a present value and converted to an annualized per acre value. The distributions of the insurance alternatives are evaluated by certainty equivalent analysis for relative risk aversion coefficients ranging from 0 to 4. The effect of risk aversion on the risk- efficient set of insurance products is determined for corn and soybean for various policy alternatives.

Data and Methods

A stochastic simulation model of a Western Kentucky corn and soybean farm generates distributions of revenue, insurance indemnities, actuarially fair premiums and insurance subsidies. This simulation model includes farm-level and county yield risk, projected price and harvest price variability, and U.S. and Kentucky marketing-year average (MYA) price variability. The model simulates the yields and prices for a five-year period.

A multivariate empirical (MVE) distribution defines corn and soybean yields at the farm and county level. The distributions are the percent deviates from trend yields using data from 1996 to 2016. The farm yields are from the Kentucky Farm Business Management program, which is part of the University Kentucky Extension service, for a farm in Daviess County, Kentucky. County corn and soybean yields for Daviess County Kentucky are from USDA-NASS.

Equation 1 defines the stochastic yields in the model. The deterministic component $\bar{Y}_t^{c,\ell}$ is the trend yield at the farm or county level for corn and soybeans. The stochastic component $\widetilde{\varepsilon\%}_t^{c,\ell}$ is drawn 500 times per year for the five simulated years from the correlated percent yield deviants in the MVE distribution.

1. $$\tilde{Y}_t^{c,\ell} = \bar{Y}_t^{c,\ell} * (1 + \widetilde{\varepsilon\%}_t^{c,\ell})$$

Crop insurance projected prices and the stochastic error terms are simulated from an AR(1,1) model (equation 2a). An AR(1,1) model is used to provide stationary error terms for the multi-year simulation. The Projected Price (PP) for corn and soybean crop insurance is the December corn and November soybean future contracts closing price in February. The crop insurance projected price is simulated in equations 2a and 2b, and the harvest price is simulated by equation 2c.

2a. $$\overline{PP_t^c} = a_0 + b_1 PP_{t-1}^c + b_2 USMYA_{t-1}^c + b_3 D0716$$

2b $$\widetilde{PP}_t^c = \overline{PP}_t^c * (1 + \%\widetilde{\varepsilon_t^c})$$

2c. $$\widetilde{HP}_t^c = \widetilde{PP}_t^c * \frac{\widetilde{HP}}{PP}$$

The deterministic projected price for crop c, corn or soybeans, in year t is a function of last period's projected price, last period's U.S. marketing-year average (MYA) price, and is shifted by an indicator variable equal to one if the year is 2007 or later (equation 2a). The percent deviates from this equation are simulated as an MVE distribution with the deviates used as the stochastic component for each iteration for each simulated year (equation 2b).

The harvest price (HP) is simulated by a distribution of the ratio of the HP to PP from 1996 to 2016 (equation 2c). For each iteration, a random price ratio is drawn and multiplied by the stochastic projected price. The price ratio captures the historical seasonality from Feb to October. The ratios are included in the MVE distribution with the other prices and yields.

The U.S. and Kentucky marketing-year average prices are also simulated with an AR(1,1) model (equation 3a and 4a). The U.S. MYA price forecasts from the USDA *Agricultural Baseline* projections parameterize the model for the five-year simulation and are statistically significant independent variables in the projected price and Kentucky MYA price models.

3a. $$\overline{USMYA_t^c} = a_0 + b_1 USMYA_{t-1}^c + b_2 D0713$$

3b. $$\widetilde{USMYA_t^c} = \overline{USMYA_t^c} * (1 + \%\widetilde{\varepsilon_t^c})$$

The deterministic US MYA price for crop c in period t is a function of last period's price and an indicator variable if the year is 2007 to 2013 (equation 3a). The percent deviates are simulated as an MVE distribution for the stochastic simulation model (equation 3b).

The Kentucky marketing-year average price is used to calculate the stochastic revenue assuming the farmer has average marketing skills. The deterministic component is modeled by an AR(1,1) regression described in equation 4a. The KY MYA price in year t is a function of the U.S. MYA price for that year and the lagged KY MYA price. The percent deviates are drawn from the MVE distribution for each simulated year (equation 4b).

4a. $$\overline{KYMYA_t^c} = a_0 + b_1 USMYA_t^c + b_2 KYMYA_{t-1}^c$$

4b. $$\widetilde{KYMYA_t^c} = \overline{KYMYA_t^c} * (1 + \%\widetilde{\varepsilon_t^c})$$

The stochastic crop insurance indemnities for revenue protection (RP) insurance for corn and soybeans are described in equation 5. The revenue guarantee is the larger of the PP or HP multiplied by the coverage level ($\overline{CL_t^c}$) for crop c in year t and the farm's actual production history (APH yield) for crop c in year t. An indemnity is triggered if the actual harvest revenue, the realized yield multiplied by harvest price, is less than the revenue guarantee.

5. $$\widetilde{RP}_t^c = \max(0, ((\max(\widetilde{PP}_t^c,\ \widetilde{HP}_t^c) * \overline{CL}_t^c * \ \overline{APH}_t^c) - (\ \widetilde{HP}_t^c * \tilde{Y}_t^{c,farm})))$$

The indemnity for revenue protection insurance with the harvest price exclusion (RP-HPE) is similar to equation 5. The only difference between equation 6 and equation 5 is that RP-HPE does not increase the revenue guarantee if the HP is higher than the projected price.

6. $$\widetilde{RPHPE}_t^c = \max(0, ((\widetilde{PP}_t^c * \overline{CL}_t^c * \ \overline{APH}_t^c) - (\ \widetilde{HP}_t^c * \tilde{Y}_t^{c,farm})))$$

Equation 7 describes the indemnity calculation for yield protection (YP) insurance. Yield protection pays an indemnity whenever the harvested yield is less than the bushels guaranteed by the insurance. The yield loss is valued at the PP for the crop insured (equation 7).

7. $$\widetilde{YP}_t^c = \max(0, ((\ \overline{CL}_t^c * \ \overline{APH}_t^c - \tilde{Y}_t^{c,farm}) * \widetilde{PP}_t^c))$$

The farm-level insurance products described in Equations 5-7 provide protection based on the farm's historical yield (APH) and the coverage level purchased. Farm-level products have coverage levels at the 50, 55, 60, 65, 70, 75, 80, and 85 percent coverage levels.

The area-level insurance products use the county's trend yield to base the yield or revenue protection. The farm-level yield or revenue does not matter in determining an indemnity for the area insurance products.

Equation 8 describes the formula that calculates an indemnity for the Area RP insurance product (ARP). The difference in equation 5 and 8 is that the county trend yield is used to determine the revenue guarantee and potential indemnity. Farmers can increase the protection of area insurance by purchasing up to 1.20 of the county coverage as a maximum protection factor. The ability to increase protection for area coverage reflects the yield basis that may exist between the farm and county yields to increase the effectiveness of area-insurance. The indemnity is scaled by the difference between the coverage level and the county loss limit factor, which is 0.18 for Daviess County, KY.

8. $$\widetilde{ARP}_t^c = \max(0, ((\max(\widetilde{PP}_t^c, \widetilde{HP}_t^c) * \overline{CL}_t^c * \bar{Y}_t^{c,county}) - (\widetilde{HP}_t^c * \tilde{Y}_t^{c,county})) * 1.20)/(\overline{CL}_t^c - 0.18)$$

The indemnity for the Area RP-HPE insurance is calculated with a formula similar to equation 8. The only change is that the revenue guarantee is only determined by the projected price (equation 9).

9. $$\widetilde{ARP}_t^c = \max(0, ((\widetilde{PP}_t^c * \overline{CL}_t^c * \bar{Y}_t^{c,county}) - (\widetilde{HP}_t^c * \tilde{Y}_t^{c,county})) * 1.20)/(\overline{CL}_t^c - 0.18)$$

An indemnity for area yield protection (AYP) is triggered whenever the county yield is less than the yield guarantee. Any production loss is valued at the PP and can be scaled up to 120% (equation 10).

10. $$\widetilde{AYP}_t^c = \max(0, ((\overline{CL}_t^c * \bar{Y}_t^{c,county} - \tilde{Y}_t^{c,county}) * \widetilde{PP}_t^c) * 1.20)/(\overline{CL}_t^c - 0.18)$$

The area insurance products (equations 8-10) provide coverage level at the 70, 75, 80, 85 and 90 percent coverage levels for both corn and soybeans.

The actuarially fair insurance premiums are stochastic by crop and year and are simulated as functions of the liability insured. The RMA crop insurance premium calculator was used to calculate historical actuarially fair premiums for the insurance products analyzed for Daviess County for the 2011 to 2016 crop years for the farm's trend-adjusted corn and soybean APH yields and the area products (RMA).

Equation 11 describes the stochastic actuarially fair premium for the farm-level insurance products for crop c in period t. The premiums are stochastic as the projected price (PP) is drawn 500 times for each simulated year. The liability insured is the trend-adjusted APH yield for crop c in year t, and the premium depends on the coverage level purchased as modeled by the indicator variables (Equation 11).

11. $$\widetilde{Prem}_t^{farm,c} = a_0 + b_1(\overline{APH}_t^c * \widetilde{PP}_t^c) + b_2 D50 + b_3 D55 + b_4 D60 + b_5 D70 + b_6 D75 + b_7 D80 + b_8 D85$$

The area insurance products' actuarially fair premium is simulated as a function of the liability insured (equation 12). The liability is the county-trend yield for crop c in period t multiplied by the projected price and scaled by the maximum protection factor of 1.20. Then the premium is adjusted by the coverage level purchased ranging from 70 to 90 percent (equation 12).

12. $$\widetilde{Prem}_t^{county,c} = a_0 + b_1(\bar{Y}_t^{c,county} * \widetilde{PP}_t^c * 1.20) + b_2 D70 + b_3 D75 + b_4 D85 + b_5 D90$$

The farm and area products insurance premiums are subsidized at the percentage rates described in Table 1. The farm-level policies assume the use of enterprise units, which provide a more substantial subsidy than basic or optional, unties. The subsidy for the farm-level products is 80% for 50 to 70 percent coverage. The subsidy declines for the higher coverage levels and is 53% at the 85% coverage level (Table 1). The area insurance products provide 59% subsidy for the 70% coverage level with the subsidy declining as the coverage level increases. The subsidy for area protection at the 90% coverage level is 44% (Table 1).

Table 2 describes the policy scenarios simulated in this paper. The base scenario is the current subsidy schedule defined in Table 1. Alternative 1 assumes a 5% reduction in subsidy for all coverage levels. Alternative 2 is a $40,000 subsidy limit for a 1500-acre corn-soybean farm applied equally to both crops. Alternatives 3 and 4 is the $40,000 subsidy limit for a 2,500-acre and 5,000-acre corn-soybean farm, respectively.

The simulated cash revenue, crop insurance indemnities, premiums, and subsidies are simulated 500 iterations per year for a five-year period. For each iteration, the market revenue and net insurance indemnities are calculated by crop and insurance product for each simulated year. The revenue and net indemnities are discounted to a present value amount using a 5% discount rate (Shepherd). The annualized value is calculated using a 5% discount rate (Shepherd). Certainty equivalents are calculated for each distribution assuming a power utility function for relative risk aversion coefficients ranging from 0 to 4 (Source). The certainty equivalents determine the risk-efficient set of insurance products for various levels of risk aversion.

The stochastic simulation and CE analysis are performed in Simetar (Richardson). The software is an add-in to Excel and provides the tools to perform the multivariate regression analysis, stochastic simulation, and CE analysis.

Results

The regression coefficients for the deterministic crop insurance and marketing-year average corn and soybean prices are shown in Table 3. The coefficients statistically significant at the 5% level or greater are highlighted in bold. The use of AR(1,1) models was necessary to provide stationarity in the stochastic error terms for the simulation model.

The farm and county trend yield regressions for corn and soybean are shown in Table 4. The farm yields have a similar trend to the county yields for both corn and soybean for the 1996 to 2016 crop years. This similar trend and strong correlation in yields between the farm and county level contributes to the area insurance products providing a risk-efficient alternative to the farm-level insurance products.

Certainty Equivalents Analysis for Western Kentucky Corn

The certainty equivalents (CE) reported in Table 5 shows that a risk-neutral farmer would purchase RP coverage at the 85% coverage level, as the CE is higher at the 85% coverage than at the assumed 65% coverage level. The green shaded cells in Table 5 are those alternatives where the CE is greater than the base case and is larger than the "no risk management" alternative. A risk-averse farmer could obtain a higher CE for ARP at the 90% coverage because of the positive correlation with the farm-level risk and yield potential.

A reduction in the premium subsidy by 5% would reduce the benefit of buying higher coverage but still would motivate risk-averse farmers to buy up coverage above the 65% coverage level (Table 6). The Area RP coverage at the 90% level assuming a 120% productivity factor has a larger CE than the farm-level products and the other area products simulated (Table 6).

While the $40,000 subsidy limit is less binding for a 1500-acre farm as compared to the larger farms, the CE's in Table 7 shows the reduced benefit from buying higher coverage levels for the farm-level products. The only farm-level product that is better than "no risk management" is RP-HPE at the 85% coverage level. Similarly, area RP-HPE at the 90% coverage level provides the largest CE for all levels of risk aversion (Table 7).

The $40,000 subsidy limit is more constraining for a 2500-acre farm as risk neutral farmers would choose ARP-HPE at the 90% coverage level. When risk aversion is considered, AYP at the 90% coverage level provides the largest CE (Table 8). The subsidy constraint makes the more-effective farm-level products too expensive for the risk protection provided.

The breaking point on the $40,000 subsidy limit is somewhere between the 2500-acre and the 5000-acre farm as the subsidy constraint creates a policy environment where "doing nothing" has a larger CE than changing the insurance type or coverage level. Tables 7 and 8 show that the constraint on subsidies would motivate farmers to continue to switch to less expensive area products. However, the largest CE for all risk aversion levels for the 5000-acre farm is for the "no risk management" alternative for all levels of risk aversion (Table 9)

<u>Certainty Equivalents Analysis for Western Kentucky Soybeans</u>

The certainty equivalent analysis for a Western Kentucky soybean farm tells a slightly different story than for corn. A soybean farmer purchasing RP insurance at the 65% coverage level would have larger CE's at lower coverage levels. However, the CE for "no risk management" was greater than that of 65% coverage for all risk aversion coefficients (Table 10). The largest CE is from ARP at the 90% coverage for risk aversion coefficients less than 3. For more risk-averse farms, the AYP at the 90% coverage provides the largest CE (Table 10).

A 5% uniform reduction in the premium subsidy makes AYP at the 90% coverage level preferable to “doing nothing” and to purchasing RP at the 65% coverage level (Table 11). A 1500-acre farm facing a $40,000 limit on premium subsidies would prefer AYP at the 90% coverage level for all risk aversion coefficients. This result is because of the positive correlation between the farm and county yields and that AYP has a lower actuarially fair premium than the other area insurance products (Table 12).

The preference for AYP at the 90% coverage level persists for the 2,500-acre and 5,000-acre farms facing the constraint on subsidies (Table 13 and Table 14). The “no risk management” alternative is more risk efficient than purchasing RP insurance at the 65% coverage level.

Conclusions

A reduction in subsidy percentage by 5% increases farmer cost and provides less incentive to increase coverage as compared to the current subsidy levels. More considerable disruptions to the revenue safety net would occur through limits on the dollar value of the subsidy. The results show a preference for area products over the farm-level products as farm-size increases and risk aversion increases. These results hinge on the highly positive correlation between farm and county yields. It is hypothesized that lower correlation would provide a result where area products are not as risk efficient and the “no risk management” would be preferred. This result is especially true for larger grain farms.

An unintended consequence of a limitation on subsidies is that farmers may prefer to reduce insurance coverage and defeat the purpose of the public-private sector partnership. This willingness to purchase lower coverage, area coverage, or “do nothing” may affect the risk-efficient crop mix. Lenders may have a lower safety net with respect to the percentage of the operating note protected through insurance.

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USDA-RMA. Projected and Harvest Crop Insurance Prices for Corn and Soybeans from 1996 to 2016.

USDA-RMA. Cost Estimator Calculations for 2011 to 2016 for Daviess County Corn and Soybeans.

Table 1. Current Crop Insurance Premium Subsidy Percentages for Farm and Area Products.

Coverage Level	Farm Products	Area Products
50%	80%	
55%	80%	
60%	80%	
65%	80%	
70%	80%	59%
75%	77%	55%
80%	68%	55%
85%	53%	49%
90%		44%

Table 2. Policy Scenarios Simulated for a Western Kentucky Corn-Soybean Farm.

Policy Scenarios	Description
Base	Current crop insurance subsidy levels.
Alt. 1	A 5% reduction in all subsidy percentages.
Alt. 2	A $40,000 limit on subsidies for a 1,500-acre farm.
Alt. 3	A $40,000 limit on subsidies for a 2,500-acre farm.
Alt. 4	A $40,000 limit on subsidies for a 5,000-acre farm.

Table 3. Regression Coefficients and Standard Errors for the Price AR(1,1) Regression Models.

Dependent Variable	Intercept	Projected Price Lagged	U.S. MYA Price Lagged	US MYA Price	KY MYA Price Lagged	Dummy 2007-16	Dummy 2007-13
Projected Price	**1.793**	**-1.317**	**0.720**			**1.186**	
Corn	0.267	0.127	0.105			0.248	
Projected Price	**2.492**	**-1.446**	**1.030**			**2.106**	
Soybeans	0.777	0.155	0.165			0.727	
U.S. MYA	**1.162**		**-0.480**				**1.313**
Price Corn	0.447		0.155				0.466
U.S. MYA	**2.318**		**-0.380**				**2.655**
Price Soybeans	0.746		0.101				0.632
KY MYA	**0.240**			**0.916**	**-0.936**		
Price Corn	0.048			0.021	0.022		
KY MYA	**0.204**			**0.950**	**-0.955**		
Price Soybeans	0.075			0.017	0.017		

Note: Bold coefficients are statistically significant at the 5% level or greater.

Table 4. Regression Coefficients and Standard Errors for the Farm and County Yield Regression Models.

	Farm Corn	Farm Soybeans	County Corn	County Soybeans
Interecept	**117.70**	**36.45**	**113.75**	**33.67**
	10.20	2.23	10.08	2.44
Trend	**2.68**	**0.84**	**2.67**	**0.83**
	0.81	0.18	0.80	0.19

Note: Bold coefficients are statistically significant at the 5% level or greater.

Table 5. Certainty Equivalents for a Western Kentucky Corn Farm ($/acre) for the Current Subsidy Schedule.

Certainty Equivalents ($/Acre) Western KY Corn Farm Relative to a Risk Neutral Farmer with RP 65% Insurance					
	CRRA=0	**CRRA=1.1**	**CRRA=2**	**CRRA=3**	**CRRA=4**
No Risk Management	+$0	-$1	-$2	-$3	-$5
RP 65%	+$658	-$1	-$2	-$3	-$4
RP 85%	**+$7**	**+$7**	**+$6**	**+$5**	**+$5**
ARP90	**+$31**	**+$29**	**+$27**	**+$24**	**+$22**
AYP90	**+$10**	**+$9**	**+$8**	**+$7**	**+$6**

Table 6. Certainty Equivalents for a Western Kentucky Corn Farm ($/acre) for a Five Percent Reduction in the Subsidy Schedule.

Certainty Equivalents ($/Acre) Western KY Corn Farm Relative to a Risk Neutral Farmer with RP 65% Insurance					
	CRRA=0	**CRRA=1.1**	**CRRA=2**	**CRRA=3**	**CRRA=4**
No Risk Management	+$2	+$0	-$1	-$2	-$3
RP 65%	+$657	-$1	-$2	-$3	-$4
RP 85%	**+$4**	**+$4**	**+$3**	**+$2**	**+$2**
ARP90	**+$27**	**+$24**	**+$22**	**+$20**	**+$17**
ARPHPE90	**+$23**	**+$20**	**+$18**	**+$15**	**+$13**
AYP90	**+$9**	**+$8**	**+$7**	**+$6**	**+$5**

Table 7. Certainty Equivalents for Corn for a 1,500 Acre Western Kentucky Corn-Soybean Farm ($/acre) with a $40,000 Limit on the Premium Subsidy.

Certainty Equivalents ($/Acre) Western KY Corn Farm Relative to a Risk Neutral Farmer with RP 65% Insurance					
	CRRA=0	**CRRA=1.1**	**CRRA=2**	**CRRA=3**	**CRRA=4**
No Risk Management	+$0	-$1	-$2	-$3	-$5
RP 65%	+$658	-$1	-$2	-$3	-$4
RP-HPE 85%	**+$5**	**+$3**	**+$2**	**+$1**	**+$0**
ARP90	**+$15**	**+$13**	**+$11**	**+$8**	**+$6**
ARPHPE90	**+$23**	**+$20**	**+$18**	**+$16**	**+$13**
AYP90	**+$10**	**+$9**	**+$8**	**+$7**	**+$6**

Table 8. Certainty Equivalents for Corn for a 2,500 Acre Western Kentucky Corn-Soybean Farm ($/acre) with a $40,000 Limit on the Premium Subsidy.

Certainty Equivalents ($/Acre) Western KY Corn Farm Relative to a Risk Neutral Farmer with RP 65% Insurance					
	CRRA=0	**CRRA=1.1**	**CRRA=2**	**CRRA=3**	**CRRA=4**
No Risk Management	+$1	-$1	-$2	-$3	-$4
RP 65%	+$658	-$1	-$2	-$3	-$4
ARP70	**+$3**	**+$1**	**+$1**	-$0	-$1
ARPHPE90	**+$9**	**+$6**	**+$4**	**+$2**	-$1
AYP90	**+$8**	**+$7**	**+$6**	**+$5**	**+$4**

Table 9. Certainty Equivalents for Corn for a 5,000 Acre Western Kentucky Corn-Soybean Farm ($/acre) with a $40,000 Limit on the Premium Subsidy.

Certainty Equivalents ($/Acre) Western KY Corn Farm Relative to a Risk Neutral Farmer with RP 65% Insurance					
	CRRA=0	**CRRA=1.1**	**CRRA=2**	**CRRA=3**	**CRRA=4**
No Risk Management	+$10	+$8	+$7	+$6	+$5
RP 65%	**+$649**	-$1	-$2	-$3	-$4
RP-HPE 65%	+$1	-$1	-$2	-$3	-$4
YP 65%	+$2	+$1	-$0	-$1	-$2
ARP70	+$2	+$1	+$0	-$1	-$2
ARPHPE90	+$7	+$4	+$2	-$0	-$3
AYP80	+$8	+$7	+$6	+$5	+$4

Table 10. Certainty Equivalents for a Western Kentucky Soybean Farm ($/acre) for the Current Subsidy Schedule.

Certainty Equivalents ($/Acre) Western KY Soybean Farm Relative to a Risk Neutral Farmer with RP 65% Insurance					
	CRRA=0	**CRRA=1.1**	**CRRA=2**	**CRRA=3**	**CRRA=4**
No Risk Management	+$3	+$2	+$1	+$1	+$0
RP 65%	**+$552**	-$1	-$1	-$2	-$2
ARP90	**+$11**	**+$10**	**+$9**	**+$7**	**+$6**
ARPHPE90	**+$7**	**+$6**	**+$4**	**+$3**	**+$1**
AYP90	**+$10**	**+$9**	**+$9**	**+$8**	**+$8**

Table 11. Certainty Equivalents for a Western Kentucky Soybean Farm ($/acre) for a Five Percent Reduction in the Subsidy Schedule.

Certainty Equivalents ($/Acre) Western KY Soybean Farm Relative to a Risk Neutral Farmer with RP 65% Insurance					
	CRRA=0	**CRRA=1.1**	**CRRA=2**	**CRRA=3**	**CRRA=4**
No Risk Management	+$3	+$3	+$2	+$2	+$1
RP 65%	+$551	-$1	-$1	-$2	-$2
ARP90	**+$8**	**+$6**	**+$5**	**+$4**	**+$2**
ARPHPE90	**+$4**	+$2	+$1	-$0	-$2
AYP90	**+$9**	**+$8**	**+$8**	**+$7**	**+$7**

Table 12. Certainty Equivalents for Soybeans for a 1,500 Acre Western Kentucky Corn-Soybean Farm ($/acre) with a $40,000 Limit on the Premium Subsidy.

Certainty Equivalents ($/Acre) Western KY Soybean Farm Relative to a Risk Neutral Farmer with RP 65% Insurance					
	CRRA=0	**CRRA=1.1**	**CRRA=2**	**CRRA=3**	**CRRA=4**
No Risk Management	+$3	+$2	+$1	+$1	+$0
RP 65%	+$552	-$1	-$1	-$2	-$2
ARP85	**+$7**	**+$6**	**+$5**	**+$4**	**+$3**
ARP90	**+$8**	**+$6**	**+$5**	**+$3**	**+$2**
ARPHPE90	**+$6**	**+$4**	**+$3**	**+$2**	+$0
AYP90	**+$10**	**+$9**	**+$9**	**+$8**	**+$8**

Table 13. Certainty Equivalents for Soybeans for a 2,500 Acre Western Kentucky Corn-Soybean Farm ($/acre) with a $40,000 Limit on the Premium Subsidy.

Certainty Equivalents ($/Acre) Western KY Soybean Farm Relative to a Risk Neutral Farmer with RP 65% Insurance					
	CRRA=0	**CRRA=1.1**	**CRRA=2**	**CRRA=3**	**CRRA=4**
No Risk Management	+$3	+$2	+$1	+$1	+$0
AYP90	**+$10**	**+$9**	**+$9**	**+$8**	**+$8**

Table 14. Certainty Equivalents for Soybeans for a 5,000 Acre Western Kentucky Corn-Soybean Farm ($/acre) with a $40,000 Limit on the Premium Subsidy.

Certainty Equivalents ($/Acre) Western KY Soybean Farm Relative to a Risk Neutral Farmer with RP 65% Insurance					
	CRRA=0	**CRRA=1.1**	**CRRA=2**	**CRRA=3**	**CRRA=4**
No Risk Management	+$4	+$4	+$3	+$3	+$2
RP 65%	+$550	-$1	-$1	-$2	-$2
AYP90	**+$10**	**+$9**	**+$8**	**+$8**	**+$7**