ECONOMICS AND MARKETING

Understanding Irrigated Cotton Producer's Crop Insurance Coverage Level Choices Under the 2014 Farm Bill

Kishor P Luitel*, Darren Hudson, and Thomas O. Knight

ABSTRACT

   The Agricultural Act of 2014 (2014 Farm Bill) significantly changed the Title I commodity programs, and shallow loss insurance programs were added to the federal crop insurance program (Title XI). Stacked Income Protection Plan and Supplemental Coverage Option were new insurance programs enacted in the 2014 Farm Bill. Participation in these programs is influenced by premium subsidies and the type of coverage provided. Relationships between insurance agents and producers also have the potential to influence program participation. These changes could impact the producer's insurance choice decision. The overall objective of this research is to understand the impact of the new insurance options on Texas cotton producers' risk management decisions and participation and understand the change in coverage level of primary crop insurance due to availably of other protection. A mail survey was conducted among cotton producers in Texas to collect insurance choices data for 2014 and anticipated choices for 2015. Responses from 42% of Texas counties were received. In 2015, the USDA Risk Management Agency reported 155 counties in Texas produced cotton. Regression analysis conducted on anticipated change in coverage level of crop insurance indicated Common Crop Insurance Policy coverage level choice for larger farm size and higher non-farm income had an increase in coverage level effect; whereas enterprise unit, revenue protection, price, yield, and insurance agents had a decrease in coverage level effect. Results suggest that greater insurance agent involvement in program design and implementation of an insurance program could contribute to program success.

K.P. Luitel, P.O. Box 5, School of Agriculture, Middle Tennessee State University, Murfreesboro, TN 37132; D. Hudson and T.O. Knight, Department of Agricultural and Applied Economics, Texas Tech University, Lubbock, TX 79409.
*Corresponding author: kishor.luitel@mtsu.edu

The Agricultural Act of 2014 (2014 Farm Bill) significantly changed the Title I commodity programs, and shallow loss (SL) insurance programs were added to the federal crop insurance program (Title XI). Participation in Title I programs has some limitations to participation in the SL program. The Title I programs include Price Loss Coverage (PLC) and Agricultural Risk Coverage (ARC). But, partially as a result of the World Trade Organization ruling against the U.S. on cotton, that crop was excluded from participation in the new Title I programs. Cotton maintained marketing loan and loan deficiency payment programs under stricter payment limits and attribution constraints, but was excluded from the ARC/PLC programs. The Bipartisan Budget Act of 2018 added seed cotton as a covered commodity associated with Title I. The Title XI insurance programs were expanded to include an SL option called the Supplemental Coverage Option (SCO) for all Title I crop including cotton, and the Stacked Income Protection Plan (STAX) was made available exclusively for cotton. Producer responses to these changes substantially influence program costs.

   U.S. cotton producers use two distinct production practices: irrigated and non-irrigated. Approximately 35% of U.S. cotton acres are non-irrigated and approximately 65% are irrigated (Farahani and Munk, 2012). Between 1993 and 2013, on average, irrigated cotton yield was 1.6 bales per acre and non-irrigated yield was 0.9 bales per acre for Texas (USDA-NASS, 2014). These two production practices result in different quantities, quality of production, production cost, and production uncertainty. The risk-management strategies for irrigated and non-irrigated cotton could be different, especially concerning the choice of insurance purchase and/or coverage levels.

   The 2014 Farm Bill allows producers to purchase different insurance products and coverage levels by type and practice. This policy change allows cotton producers to choose different insurance products and coverage levels for non-irrigated and irrigated cotton. For a farm with both practices, the yield per acre and

revenue from irrigated cotton are higher than non-irrigated, therefore, most insurance decisions were tethered to either irrigated or non-irrigated. Non-irrigated cotton is associated with higher production risk than irrigated cotton, resulting in different risk-management decisions. Due to lower risk in irrigated cotton, this policy change could have a larger change in insurance choice for irrigated cotton compare to non-irrigated.

Observing the change in coverage level between 2014 and 2015 for an irrigated cotton crop could provide insight into producers' risk-management choices under different risk profiles. This study's broad objective is to understand the underlying impact of new crop insurance policy options for cotton on producers' risk-management decisions, especially for irrigated cotton. This study specifically examines the difference in Common Crop Insurance Policy (CCIP) coverage level (change from the previous year) to understand the impact of the coverage options on producer insurance choices and factors leading to the insurance decision for the 2015 crop. The present study uses a 2014 survey of producers regarding planned insurance purchases in 2015 to capture intervening factors not incorporated in typical simulation studies of pure expected utility. Key prior studies have used simulation approaches to examine the potential costs/benefits of insurance choices (Bulut and Collins, 2013; Dismukes et al., 2013; Luitel et al., 2015), but none have directly addressed producer choices by observation of planned or actual decisions. Most previous studies suggested that high participation in the insurance program was expected due to higher subsidies. Klein and Krohm (2006) suggested that government reliance on private insurers can give rise to the principal-agent problem due to changes in incentive structures, which suggests an informational problem not captured in simulated projections of participation.

Difference Between SL Insurances and Literature Review. SCO is a continuous SL and standard insurance product. That is, SCO is an added option on the underlying CCIP purchased by the producer. The SCO provides area-triggered loss coverage with liability based on the individual actual production history (APH) yield for the insured unit. The covered range is from 86% of the area expected yield or revenue down to the purchased level of the CCIP (14% deductible). The premium subsidy on the SCO is 65%.

In contrast, STAX can be purchased as a stand-alone policy or can be combined with an underlying policy. Unlike SCO, STAX liability is based on the county average yield, not the insured unit level APH. The coverage range on STAX is from 70 to 90% (10-30% deductible) with an 80% premium subsidy. However, STAX coverage cannot overlap with CCIP. For example, if the CCIP coverage level is 80% then the available range of STAX coverage is 80 to 90%.

Having SL insurance provides more loss protection against downside risk for a producer, but the choice of coverage level cannot overlap CCIP coverage level. Considering subsidy rates and benefit structures for basic/optimal and enterprise unit policies, the combination of CCIP and SL insurance products could give producers an incentive to change CCIP coverage level and purchase new SL products or just add SL coverage without changing CCIP coverage level. The choice is driven by maximizing expected benefits across both products at the lowest cost.

Even though the new, highly subsidized SL options seem attractive in theory, participation has been low. Producers make most of their insurance decisions in consultation with their insurance agents. Insurance agent knowledge about new policies and incentives for the insurance agent can influence participation in the new policies indirectly through the advice provided to producers. Insurance agents have an incentive to sell more policies, but if the producer does not perceive a benefit or those benefits are not properly explained, they might not participate. The complexity of the SL products (in conjunction with ordinary CCIP) and the relative speed at which they were introduced late in the planning cycle could have contributed to relatively low initial participation for cotton. Because SL insurance policies' benefits are triggered based on county yield, it could have been difficult for producers to assess benefits provided by these policies. The Group Risk Insurance Protection [GRIP] program, which also operates on an area concept, had been widely rejected in many cotton production areas. Between 2015 and 2017 participation in these SL programs decreased from 11 to 10% among the cotton producers in Texas (USDA-RMA, 2014). This could indicate the number of producers who were assessing the net benefit from the SL policies was lower than expected and agents were not pursuing sales of these policies.

Average Crop Revenue Election (ACRE) was a new commodity program in the Food, Conservation, and Energy Act of 2008 (2008 Farm Bill). Producers could choose to participate in ACRE, or they could continue to enroll in traditional commodity programs as a one-time decision for the life of Farm Bill 2008. ACRE was designed to provide revenue support as an alternative to the price support that producers were used to receiving from commodity programs. This represented a significant change in the commodity program and was thought to be complex for producers to understand (Edwards, 2010; Lubben and Novak, 2010; Taylor 2010; Woolverton and Young, 2009). Factors such as producer risk preferences, learning and negotiation costs, decision irreversibility, and the option to enroll in later years were suggested as the reasons for lower than the expected enrollment of producers in the ACRE program (Mitchell et al., 2012; Woolverton and Young 2009). Thus, complexity and the ability to purchase SL products later could be reasons for lower than expected adoption.

DATA AND METHODS

A mail survey (see Appendix) was conducted among cotton producers in Texas to collect data on 2014 insurance choices and anticipated choices for 2015. The questionnaire was mailed in February 2015 at the time when producers were making insurance purchase decisions, which allowed for a better estimate of the producer's behavior (insurance decision sales closing date for cotton in Texas is 15 March). In 2015, USDA Risk Management Agency (USDA-RMA) reported 155 counties in Texas produced cotton. Responses from 42% of these counties were received.

A sample of 4,000 cotton producers was randomly selected from the subscribers to *Cotton Growers Magazine*. Therefore, traditional measures of response rate are not particularity useful on assessing survey success. (Note: because an unknown percentage of these subscribers were not cotton producers, we oversampled the list to ensure a viable number of responses.) The survey package contained a recruitment letter, information sheet, questionnaire, and a postage-paid return envelope. The estimated time to complete the survey was no longer than 20 minutes, and the survey was conducted preserving the privacy and voluntary participation of the producers. After two weeks, a reminder notice was sent to increase the response. Questions included in the survey were about the cotton producer's insurance decisions made in 2014 and anticipated choices for 2015. Some questions were about general information regarding farm financial structure and farm characteristics.

Because the 2014 Farm Bill allowed separation of coverage by practice, one logical question is whether producers would increase or decrease coverage levels for different practices in 2015 versus their common coverage level decision in 2014. Non-irrigated and irrigated cotton can be treated as different farm products having different risk characteristics as they have different yields, yield risk, and costs of production. The coverage level choice can be different for these two products. This analysis focused on irrigated cotton production. Respondents were classified as "irrigated" if they responded that they would be purchasing insurance on any acres classified as irrigated during 2015. These farms may or may not also be insuring non-irrigated cotton (most were).

The analysis of differences in coverage level was conducted using ordinary least square (OLS) regression methods (Equation 1), which provided the best overall fit (Cooper, 2010; Fahad et al., 2018; Kristjanson, 1987). To evaluate the overall fittings of the model, heteroscedasticity, multicollinearity, and endogeneity tests were conducted. White test (special option in SAS Proc Reg) result was not significant, and plot of residuals versus predicted indicated no heteroscedasticity in the model. The multicollinearity test was conducted using the vif (variance inflation factor) option in SAS and its value for all the variables was less than 10. An endogeneity test was conducted regressing model residual on all independent variables. All the variables were not significant, suggesting the model does not have endogeneity issues. The difference in coverage level of 2014 and 2015 (2015 coverage level minus 2014 coverage level) was the dependent variable (a positive value indicated an increase in the coverage level in 2015 versus 2014). Independent variables were the percentage of irrigated acres on the farm (% Irrigated Acres), choice of insurance type in 2014 (D_{RP2014}), choice of enterprise unit ($D_{Enterprise}$) (an enterprise unit consists of all insurable acreage of the same insured crop in the county in which the insured has a share on the date coverage begins for the crop year), expected price (E_{Price}), expected yield (E_{Yield}), SL insurance

purchase decisions (D_{SL}), source of information for insurance decisions (D_{Agent}), and percentage of income from non-farm source (%Non – Farm income). (Note: N for the regression analysis is 99, due to missing observation.)

Equation 1. Δ coverage level (2015 – 2014)=
$\beta_0 + \beta_1 * \%\ Irrigated\ Acres + \beta_2 * D_{RP2014} + \beta_3 * D_{Enterprise} + \beta_4 * E_{Price} + \beta_5 * E_{Yield} + \beta_6 * D_{SL} + \beta_5 * D_{Agent} + \beta_6 * \%Non – Farm\ income + \epsilon$

where the % Irrigated Acres was calculated from irrigated cotton acres divided by total cropland acres. For D_{RP2014}, most of the producers purchased revenue insurance (73%). Therefore, choice of insurance in 2014 was defined as a dummy variable, where $D_{RP2014} = 1$ if the producer chooses revenue protection insurance in 2014, else 0. $D_{Enterprise} = 1$ if the producer intended to choose enterprise unit insurance in 2015, else $D_{Enterprise} = 0$. Expected price (E_{Price}) and expected yield (E_{Yield}) were based on a subjective elicitation using a three-point estimation method (Davidson and Cooper, 1976). We calculated the expected price assuming a log-normal distribution, using the price expectations information provided by the producer. Similarly, we calculated expected irrigated farm yield assuming a beta distribution, using the yield expectations information provided by producers. The producer choice for any SL insurance (SCO or STAX) was defined as a dummy variable, where $D_{SL} = 1$ if the producer anticipated purchasing STAX or SCO in 2015. The sign on this estimated coefficient is of special interest because it showed the potential impact of SL on coverage level choice. Given the higher subsidy rate on SL products (especially STAX), could lead producers to trade-off SL coverage for CCIP coverage.

Producers receive information about insurance policies from the Farm Service Agency, crop insurance agents, extension offices, online sources, private contacts, and others. The source of information has a potentially large influence on the decision-making process. Most producers indicated that their primary source of information regarding crop insurance was their insurance agent (88%). This implied that producers are mostly influenced by their insurance agent in their crop insurance decision. If the agents do not have confidence in a new policy, producers are less likely to purchase the new policy. Therefore, the choice of their primary source of crop insurance information was defined as a dummy variable, where $D_{Agent} = 1$ if the primary source of crop insurance information was the insurance agent. This variable helped identify the influence of an insurance agent in a producer's crop insurance decision. Further, producers were asked to state the percentage of their household income from non-farm sources (%NF) in the questionnaire. The literature on non-farm income suggested non-farm income can complement or substitute for risk-management products (Isengildina and Hudson, 2001; Rejesus et al. 2009). Non-farm income has risk-reducing characteristics; however, the influence on the choice of coverage level might not have significant impact compared to participating in the insurance program itself.

RESULTS

The USDA-RMA reported insurance information for cotton for 155 of 254 Texas counties. We received usable responses from producers in 33 counties with irrigated cotton acres, a 21% irrigated cotton-producing county usable response rate. The survey resulted in 107 usable responses from irrigated cotton farms.

Among the respondents, 97% were male, 44% completed some college or undergraduate degree, and 24% had high school or less level of education. The average years of farming experience was 32.

The total market value of assets in the farming operation was $2,000,000 to $4,999,999 for 36% of the respondents, 20% had $1,000,000 to $1,999,999, and 17% had $500,000 to $999,999. There was considerable heterogeneity among the respondents about borrowed funds percentage, percentage of non-farm income, and acres of irrigated and non-irrigated cotton. On average, borrowed funds accounted for 53% of total dollars invested in the farm, with a standard deviation of 37%. The non-farm income of the household, on average, was 21% of total income, with a standard deviation of 26%. Irrigated cotton farm acres averaged 439 acres with a standard deviation of 626 acres.

Only 28% of the respondents anticipated purchasing SL coverage in 2015. USDA-RMA data subsequently showed approximately 11% of cotton producers in Texas purchased SL insurance coverage in 2015. Of the 72% of producers who did not anticipate purchasing SL coverage, 75% indicated that the cost was too high relative to expected payouts, and 19% reported they did not

understand the policy or were uncertain about its benefits. Approximately 28% of the respondents planned to insure at the enterprise unit level.

According to the survey data (Table 1) among irrigated cotton producers, the difference in coverage level from 2014 to 2015 was 0.23, suggesting that, on average, irrigated cotton producers were planning to purchase higher coverage levels in 2015 compared to 2014. However, the *t*-test shows this change in coverage level between years is not statistically different from a zero. The change in coverage level has a wide range from -20 to 25. Approximately 57% of irrigated cotton producers did not expect to change their coverage level, whereas 26% planned to increase their coverage level from 2014 to 2015. For comparison, the coverage level difference for non-irrigated producers was -0.48, suggesting producers decreased their coverage level. This is consistent with our expectation that coverage levels would diverge based on production practice. Again, the unconditional change is not different from zero.

Insurance agents were the primary source of crop insurance information for 88% of the irrigated cotton producers. The insurance agent was most likely to advise a policy for which the agent is more knowledgeable and comfortable. Thus, insurance agents are a significant factor in producers' participation in new programs. Approximately 73% of irrigated cotton producers bought revenue protection in 2014. Approximately 28% of irrigated cotton producers intended to take SL insurance in 2015, of which 5% and 23% planned to take SCO and STAX, respectively.

The results of OLS regression estimation on the difference in coverage level due to new farm policies focusing on irrigated cotton are shown in Table 2. Given the cross-sectional nature of the data, a 0.29 R^2 value is considered acceptable model performance. Except for the additional SL insurance variable parameter estimate, all parameters are statistically significant at the 10% level or better.

Table 1. Descriptive statistics of the variables used in the analysis for irrigated farm operators

Variable Names	N	Mean
Irrigated coverage level difference (2015-2014)	107	0.23
Non-irrigated coverage level difference (2015-2014)	156	-0.48
% Irrigated cotton acres	107	34.12
Dummy revenue protection 2014	107	0.73
Dummy enterprise unit	99	0.28
Expected price in cents	107	63.41
Expected irrigated yield in bales	107	2.49
Dummy shallow loss	107	0.28
Dummy insurance agent	107	0.88
Non-farm income %	107	21

Table 2. Ordinary least square (OLS) regression estimates for the difference in coverage level between 2015 and 2014 for irrigated cotton farms

Variable Names	Estimate	Standard Error	*t* Value	Approx. Pr > |*t*|
Intercept	35.09	11.20	3.13	0.0023***[z]
% of irrigated cotton acres	0.04	0.025	1.79	0.0773*
Dummy revenue protection 2014	-2.49	1.31	-1.89	0.0614*
Dummy enterprise unit	-5.06	1.31	-3.85	0.0002***
Expected price	-0.38	0.16	-2.37	0.0201**
Expected irrigated yield bales[y]	-2.58	0.87	-2.98	0.0037***
Dummy shallow loss insurance	0.79	1.26	0.63	0.5318
Dummy insurance agent	-4.34	1.99	-2.17	0.0323**
Non-farm income %	0.05	0.02	2.06	0.0424**

[z] Significant level: ***< 0.01, **< 0.05, *< 0.1

[y] 480 pounds = 1bale; N = 99

The magnitude of the estimate on the SL variable is large relative to the mean change in coverage level, but not statistically significant. Thus, it appears that SL products did not significantly alter producers' CCIP coverage level decisions, at least initially. The SL insurance variable is not significant, which could be due to lower participation in the program. Participation in the SL program could result in cotton producers purchasing lower levels of CCIP coverage. If they chose to purchase SL, there would have been a gap in coverage between their CCIP and the lower bound coverage level of SL, which could induce some producers to increase coverage levels to close that gap. This could occur when a producer chooses STAX as SL insurance. Again, the result was not statically significant, but it does point to a potential behavioral change that warrants more research.

The signs on the parameters for a percentage of irrigated cotton acres in 2015 and non-farm income percentage indicate that an increase in those variables is associated with a higher 2015 coverage level relative to 2014. For a one percentage point increase in non-farm income, there is an associated 0.04 percentage point increase in the 2015 coverage level, provided all other variables remain the same. This result suggests that non-farm income has a small relative effect on the change in coverage level. Similarly, with a one-unit increase in the proportion of irrigated cotton acres, there is an associated 0.04 percentage point increase in the 2015 coverage level, provided all other variables remain the same. This suggests a statistically significant result but relatively small numerical impact. Nevertheless, it does provide evidence that the breakout by production practices did result in coverage level adjustments.

The signs on the parameter estimates for revenue protection as an insurance choice in 2014, choice of enterprise unit insurance in 2015, expected cotton price for 2015, expected farm irrigated yield for 2015, and insurance agent as their primary source of information about crop insurance are all negative. The parameter estimates of these variables are marginal, indicating a decrease in coverage level in 2015 relative to 2014. Producers making any one of the following decisions of choosing revenue insurance products, enrolling in enterprise unit policy, increasing their expected yield, or relying on an agent for their insurance decision, result in decrease coverage level choice.

Other things equal, insurance agents as a source of insurance information were associated with a 4.34 percentage point decrease in coverage level in 2015.

This result indicates insurance agents encouraged a reduction in coverage levels between years. Two events were occurring simultaneously. First, with winter rain the cotton production regions of Texas were recovering from significant drought. Producers (and agents) could have expected a good crop and lowered coverage levels to lower insurance costs given the relatively fragile financial state of many farms at that time. Second, yield exclusion (YE) was offered to producers. YE is a policy instrument that allows producers to exclude annual observations on yield from their 10-year actual production history provided their county met certain yield event provisions (lower than 50% of the county 10-year average). This allows producers to increase their coverage guarantee, which also raised insurance costs. However, a producer could potentially lower their coverage level on the new increased yield guarantee and cover the same number of pounds of production as in prior years but at a lower cost. So, the coverage level reduction provided the same number of dollars of revenue guarantee at a lower cost (higher premium subsidy). (Because the final rules were not available prior to this survey, we did not collect data on whether a producer was using the YE option.) These two possibilities could not be disentangle based on our data, but on average, producers that relied on agents for their information decreased their coverage levels between years.

A one-cent increase in the expected price of cotton in 2015 or one-bale increase in the expected yield of irrigated cotton in 2015 would decrease coverage level by 0.38 and 2.58 percentage points, respectively. Producers purchase insurance products to protect themselves from downside risk. When they expect lower prices or yields, they might purchase higher coverage levels and vice versa.

DISCUSSION

In 2014, cotton producers had to combine their insurance for both non-irrigated and irrigated acres. In this study for 2015 insurance choice, we asked producers to separate their insurance choice and coverage level. In 2015, producers had the advantage of choosing separate insurance and coverage levels for irrigated and non-irrigated cotton. Reliance on weather makes yield per acre of non-irrigated cotton farm have higher variance, whereas irrigated cotton has higher average yields and lower yield risk (lower variance). According to the survey, differences in

coverage level between 2015 and 2014 were 0.23 for irrigated cotton (non-irrigated was -0.48), indicating an increase in coverage level in 2015 relative to 2014 (decrease in non-irrigated). This suggests that producers preferred to have higher coverage levels on irrigated cotton compared with the blended single coverage levels, on average. This effect is further reinforced by the impact of the irrigated share in total acres. Irrigated acres were insured at a higher coverage level, but as the proportion of irrigated acres on the farm increased, the coverage level on the irrigated acres rose as well. Irrigated cotton producers decreased their coverage level in 2015 when they increased the percentage of irrigated cotton acres, non-farm income percentage, choice of revenue protection in 2014, choice of enterprise unit in 2015, and choice of an insurance agent as their primary source of insurance information.

From our survey results, producers who have higher non-farm income have higher disposable income, and most producers were willing to take a risk. These results suggest that an increase in non-farm income increases the producer's ability to purchases a higher coverage level. However, the parameter estimate is small and does not have much impact on coverage level change. Cotton producers decided their coverage level by considering various factors including information provided by insurance agents. Insurance agents are the last person the producers talk to before making the insurance decision. Producers have a long-term relationship with agents suggesting a strong influence on insurance decisions. This relation is critical in the implementation of new programs.

For participation in a SL insurance policy, the parameter estimate was not significant. This suggests the policy does not have a significant effect on producer choice of insurance product and coverage level. The survey revealed that most producers either did not understand or thought benefits were not enough for them to enroll in the SL insurance product, which could explain the low participation.

CONCLUSION AND FUTURE WORK

As the results suggested, some factors are guiding irrigated cotton producers to decrease their coverage level; however, the combined impact from the model suggested that producers increased coverage levels in 2015 relative to 2014. The introduction of SL insurance policies (SCO or STAX), and the ability to separate crop insurance by practice and type

has had a significant impact on risk-management strategies for cotton producers. The distinct insurance policies for irrigated and non-irrigated cotton have made it more attractive for producers to take enterprise unit insurance. Higher subsidies could guide producers towards choosing enterprise unit insurance, however, this might discourage producers to purchase SL coverage. Participation in SL insurance programs is low and does not significantly influence CCIP coverage level choice. This could be due to asymmetric knowledge between producers and insurance agents and both agreeing not to change CCIP coverage level in that instance. The influence of insurance agents is critical in implementing any new program. The results suggest that insurance agents can have a significant influence on changing CCIP coverage level and agent involvement while designing and implementing an insurance program would contribute to program success.

The limitation of this study is its inability to differentiate the choice of coverage level either due to weather effect or policy change. This study represents a snapshot in time and results based on a survey might not accurately reflect the producer's actual decision. Further study is needed to understand the broader impact on the decision-making process and behavior of cotton producers from these new policies. There should be more in-depth study regarding the relationship between insurance agents and producers, which could give more insight regarding implementation and awareness about new programs. This study looks at factors affecting the difference in coverage level due to the new policies. The next step is to identify the factors influencing the choice of SL insurance and the influence of insurance agents in the producer's insurance decision-making process.

REFERENCES

Bulut, H., and K.J. Collins. 2013. Effects of supplemental revenue programs on crop insurance coverage levels. no. 152132 *In* Southern Coordinating Committee (SCC)-76 Meeting: Economics and Management of Risk in Agriculture and Natural Resources, Pensacola FL, 14-16 March.

Cooper, J.C. 2010. Average crop revenue election: A revenue-based alternative to price-based commodity payment programs. Amer. J. Agric. Econ. 92(4):1214–1228.

Davidson, L.B., and D.O. Cooper. 1976. A simple way of developing a probability distribution of present Value. J. Petroleum Tech. September: 1069–1078.

Dismukes, R., K.H. Coble, J.C. Miller, and E. O'Donoghue. 2013. The effects of area-based revenue protection on producers' choices of farm-level revenue insurance. Selected Paper prepared for presentation at the Agricultural and Applied Economics Association 2013 Annual Meeting, 4-6 August. Washington, D.C.

Edwards, W. 2010. Enrollment in ACRE related to farm size, risk management. Ag Decision Maker Newsletter, Iowa State University Extension, Ames, IA, August 2010.

Fahad, S., J.Wang, G. Hu, H. Wang, X. Yang, A.A. Shah, N.T.L. Huong, and A. Bilal. 2018. Empirical analysis of factors influencing farmers crop insurance decisions in Pakistan: Evidence from Khyber Pakhtunkhwa Province. Land Use Policy. 75:459–467.

Farahani, H., and D. Munk, 2012. Why irrigate cotton? *In* C. Perry (ed.), Cotton Irrigation Management for Humid Regions. Available online at https://www.cottoninc.com/cotton-production/ag-resources/irrigation-management/why-irrigate-cotton/. Cotton Incorporated, Carey, NC (verified 30 March 2021).

Isengildina, O., and M.D. Hudson. 2001. Factors affecting hedging decisions using evidence from the cotton industry. Proc. NCR-134 Conference on Applied Commodity Price Analysis, Forecasting, and Market Risk Management. St. Louis, MO. Available at http://www.farmdoc.illinois.edu/nccc134/conf_2001/pdf/confp07-01.pdf (verified 31 March 2021).

Klein, R.W., and G. Krohm. 2006. The pitfall of government insurance program: the case of Federal Crop Insurance (pp. 8-14). Working Paper of Center for Risk Management and Insurance Research. Available at http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.492.6709&rep=rep1&type=pdf

Kristjanson, P.M. 1987. The role of information and flexibility in small-farm decision making and risk management: evidence from the West African semi-arid tropics. Ph.D. diss., Univ. of Wisconsin, Madison.

Lubben, B.D., and J.L. Novak, 2010. Discussion: What have we learned from the new suite of risk management programs of the Food, Conservation, and Energy Act of 2008. J. Agric. Appl. Econ. 42(3):537–541.

Luitel, K., T. Knight, and D. Hudson, 2015. Evaluation of crop insurance choices for cotton producers under the 2014 Farm Bill. *In* 2015 Southern Agricultural Economics Association Annual Meeting no. 196882, Atlanta Georgia, January 31-February 3, 2015.

Mitchell, P.D., R.M. Rejesus, K.H. Coble, and T.O. Knight. 2012. Analyzing farmer participation intentions and enrollment rates for the average crop revenue election (ACRE) program. Appl. Econ. Perspectives Policy 34(4):615–636.

Rejesus, R.M., B.J. Sherrick, G.D. Schnitkey, and C.L. Escalante. 2009. Factors influencing producers' perceptions about the importance of government support programs: Application of a semi-parametric ordered response model. Appl. Econ. 41(24):3081–3092.

Taylor, M. Z. 2010. What's wrong with ACRE? DTN/The Progressive Farmer, Minding Ag's Business Blog, June 24, 2010.

United States Department of Agriculture, National Agricultural Statistics Services [USDA-NASS]. 2014. Quick stats [Online]. Available at www.nass.usda.gov/Quick_Stats/ (verified 31 March 2021).

United States Department of Agriculture, Risk Management Agency [USDA-RMA]. 2014. Summary of Business [Online]. Available at https://prodwebnlb.rma.usda.gov/apps/SummaryofBusiness/ReportGenerator (verified 31 March 2021).

Woolverton, A., and E. Young. 2009. Factors influencing ACRE Program enrollment. Economic Research Report 84. USDA-ERS, Washington, D.C.

APPENDIX

Please ignore this questionnaire if you are not a cotton farm operator.

Section 1: Basic Information

Q1. In what **County** are most of your cropland acres located**?**

Q2. **Gender:** □ Male □ Female

Q3.1. **In 2015,** how many **Total acres** of cropland do you expect to farm ?
[Include all acres you expect to farm whether owned or leased]

_____Acres

Q3.2. **In 2015**, how many of the **acres** do you expect to plant in **irrigated cotton?**
[If you don't expect to grow irrigated cotton enter 0.]

_____Acres

Q3.3. **In 2015**, how many of the **acres** do you expect to plant in **dry land cotton?**
[If you don't expect to grow dry land cotton enter 0.]

_____Acres

Section 2: Farm Irrigated Cotton Yields for a Unit

Do you expect to grow irrigated cotton?   Yes -> Continue   No -> Go to Section 3
Choose a typical Irrigated Cotton Farm Unit to answer the following question.
The following questions are about the yield you would expect on your typical **farm-level irrigated cotton unit in 2015**.

Q2.1. What yield do you consider **most likely for this unit in 2015**?
(This is the yield you would give if someone asked you "what do you expect the pivot irrigated cotton yield to be on this unit" and you could give only one number.)

_____ Pounds per acre

Q2.2. What yield do you consider a **low yield** for this unit **in 2015**?
(You expect the pivot irrigated cotton yield to go below this yield in only 1 out of 10 years or only about a **10%** chance of the yield being **below this level)**

_____ Pounds per acre

Q2.3. What yield do you consider a **high yield** for this unit **in 2015**?
(You expect the pivot irrigated cotton yield to go above this yield in only 1 out of 10 years or only about a **10%** chance of the yield being **above this level)**

_____ Pounds per acre

County-level Irrigated Cotton Yield

The following questions are about the **2015 county yield** you would expect on **irrigated cotton in the *county* where most of your farmland is located?**

Q2.4. What yield do you consider **most likely** for irrigated cotton in this **county in 2015**?
[This is the yield you would give if someone asked you "what do you expect the irrigated cotton yield to be for this county" and you could give only one number.]

_____ Pounds per acre

Q2.5. What yield do you consider a **low** irrigated **yield** for this **county in 2015**?
(You expect the irrigated county cotton yield to go below this yield in only 1 out of 10 years or only about a **10%** chance of the yield being **below this level)**

_____ Pounds per acre

Q2.6. What yield do you consider a **high** irrigated **yield** for this **county in 2015**?
(You expect the irrigated county cotton yield to go above this yield in only 1 out of 10 years or only about a **10%** chance of the yield being **above this level)**

_____ Pounds per acre

Relationship between your farm-level and county-level yields for irrigated cotton

Consider the relationship between **irrigated cotton yields** on your **farm level unit** and the **county**. Specifically think about how the two yields go up and down in different types of weather years.

Q2.7. How would you characterize the relationship between your **farm-level yield for the unit** and the **county-level yield** for **irrigated cotton**? **(Check one)**

WHEN THE COUNTY IRRIGATED COTTON YIELD IS HIGH MY FARM-LEVEL IRRIGATED COTTON YIELD IS:
□ **Almost always high.**
□ **Often high.**
□ No more likely to be high than low.
□ **Often low**.
□ **Almost always low**.

Section 3: Farm Dry Land Cotton Yields for a Unit

Do you expect to grow dry land cotton?   Yes -> Continue   No -> Go to section 4
Choose a typical dry land Cotton Farm Unit to answer the following question.
The following questions are about the yield you would expect on your **farm-level dry land cotton unit in 2015**.

Q3.1 What yield do you consider **most likely for this unit in 2015**?
(This is the yield you would give if someone asked you "what do you expect the dry land cotton yield to be on this unit" and you could give only one number.)

_____ Pounds per acre

Q3.2 What yield do you consider a **low yield** for this unit **in 2015**?
(You expect the dry land cotton yield to go below this yield in only 1 out of 10 years or only about a **10%** chance of the yield being **below this level)**

_____ Pounds per acre

Q3.3 What yield do you consider a **high yield** for this unit **in 2015**?
(You expect the dry land cotton yield to go above this yield in only 1 out of 10 years or only about a **10%** chance of the yield being **above this level)**

_____ Pounds per acre

County-level dry land cotton yield

The following questions are about the **2015 county yield** you would expect on **dry land cotton in the** *county* **where most of your farmland is located?**

Q3.4. What yield do you consider **most likely** dry land **yield** for cotton in this county **in 2015**? **(This is the yield you would give if someone asked you "what do you expect the dry land cotton yield to be for this county" and you could give only one number.)**

_____ Pounds per acre

Q3.5. What yield do you consider a **low** dry land **yield** for this **county in 2015**? **(You expect the dry land county cotton yield to go below this yield in only 1 out of 10 years or** only about a **10%** chance of the yield being **below this level)**

_____ Pounds per acre

Q3.6. What yield do you consider a **high** dry land **yield** for this **county in 2015**? **(You expect the dry land county cotton yield to go above this yield in only 1 out of 10 years or** only about a **10%** chance of the yield being **above this level)**

_____ Pounds per acre

Relationship between your farm-level and county-level yields for dry land cotton

Consider the relationship between **dry land yields** on your **farm** and the **county**. Specifically think about how the two yields go up and down in different types of weather years.

Q3.7. How would you characterize the **relationship between** your **farm-level yield** on the unit and the **county-level yield** for **dry land cotton? (Check one)**
WHEN THE COUNTY DRY LAND COTTON YIELD IS HIGH MY FARM-LEVEL DRY LAND COTTON YIELD IS:
□ **Almost always high.**
□ **Often high.**
□ No more likely to be high than low.
□ **Often low**.
□ **Almost always low**.

Section 4: Relation Between Irrigated And Dry Land Cotton Yield

Do you grow both dry land and irrigated cotton?   Yes -> Continue   No -> Go to Section 5

Relationship between your farm-level irrigated cotton yield and farm-level dry land cotton yield

Consider the relationship between **irrigated and dry land cotton yields** on your farm. Specifically think about how the two yields go up and down in different types of weather years.

Q4.1. How would you characterize the **relationship between** your **farm-level yields** on the unit for **irrigated** and **dry land cotton**? **(Check one)**
WHEN MY IRRIGATED COTTON YIELD IS HIGH MY DRY LAND YIELD IS:
□ **Almost always high.**
□ **Often high.**
□ No more likely to be high than low.
□ **Often low**.
□ **Almost always low**.

Relationship between your farm-level irrigated cotton yield and the county-level dry land cotton yield

Consider the relationship between your **farm-level irrigated cotton yields** and the **county-level dry land cotton yields**. Specifically think about how the two yields go up and down in different types of weather years.

Q4.2. How would you characterize the **relationship between** your **farm-level irrigated cotton yield** on the unit and the **county-level dry land cotton yield? (Check one)**
WHEN THE COUNTY DRY LAND COTTON YIELD IS HIGH MY FARM-LEVEL IRRIGATED COTTON YIELD IS:
□ **Almost always high.**
□ **Often high.**
□ No more likely to be high than low.
□ **Often low**.
□ **Almost always low**.

Relationship between your farm-level dry land cotton yield and the county-level irrigated cotton yield
Consider the relationship between your **farm-level dry land cotton yields** and **the county-level irrigated cotton yields**. Specifically think about how the two yields go up and down in different types of weather years.

Q4.3. How would you characterize the **relationship between** your **farm-level dry land cotton yield** on the unit and the **county-level irrigated cotton yield? (Check one)**

WHEN THE COUNTY IRRIGATED COTTON YIELD IS HIGH MY FARM-LEVEL DRY LAND COTTON YIELD IS:
□ **Almost always high.**
□ **Often high.**
□ No more likely to be high than low.
□ **Often low**.
□ **Almost always low**.

Relationship between the farm-level dry land cotton yield and county-level irrigated cotton yield
Consider the relationship between your **irrigated cotton yields** and **dry land cotton yields** in your county. Specifically think about how the two yields go up and down in different types of weather years.

Q4.4. How would you characterize the **relationship between** the **irrigated cotton yield and dry land cotton yield on your county? (Check one)**
WHEN THE COUNTY IRRIGATED COTTON YIELD IS HIGH MY COUNTY DRY LAND COTTON YIELD IS:
□ **Almost always high.**
□ **Often high.**
□ No more likely to be high than low.
□ **Often low**.
□ **Almost always low**.

Section 5: Price Expectation Question
We need your opinion regarding possible price during the month you will harvest your cotton this year.

Q5.1. What do you expect the **most likely harvest time price** will be?

_____ cents per pound

Q5.2. What **harvest price** would you consider to be the **low price** that you have about a **10% chance** of your price falling **below in 2015**?

_____ cents per pound

Q5.3.What **harvest price** would you consider to be the **high price** that you have about a **10% chance** of your price falling **above in 2015**?

_____ cents per pound

Q5.4. What do you expect the **most likely Insurance Guarantee Price (Projected Price)** for cotton in 2015?

_____ cents per pound

Section 6: 2014 Insurance information

Q6.1. In **2014**, did you purchase a **federal crop insurance policy** on **cotton**? □Yes **->** Continue □ No **->** Go to Section 7

Q6.2. In **2014**, what **insurance product** did you **purchase for your cotton crop?**
(On following underlying policies, **Check One** as appropriate)
□ Yield Protection (YP)
□ Revenue Protection (RP)
        (On this Insurance highest of either insurance guarantee price (projected price) or harvest price is used)
□ Revenue Protection with Harvest Price Exclusion (RP-HPE)
        (On this Insurance only insurance guarantee price (projected price) is used)
□ Area Yield Protection (AYP)
□ Area Revenue Protection (ARP)
        (On this Insurance highest of either insurance guarantee price (projected price) or harvest price is used)
□ Area Revenue Protection with Harvest Price Exclusion (ARP-HPE)
        (On this Insurance only insurance guarantee price (projected price) is used)

Q6.3. In **2014,** what **Coverage Level did you choose for the above indicated insurance plan?**
(Check one as appropriate**)**
□ CAT
□ 50%
□ 55%
□ 60%
□ 65%
□ 70%
□ 75%
□ 80%
□ 85%
□ 90%

Section 7: 2015 Insurance for Irrigated cotton
If you **grow Irrigated cotton,** do you expect to **buy insurance** for your irrigated cotton in **2015?**
Yes -> Continue   **No ->** Go to Section 8

Q7.1. For **2015**, what **insurance product** do you expect to purchase for **irrigated cotton**? (On following underlying policies, **Check One** as appropriate)
□ Yield Protection (YP)
□ Revenue Protection (RP)
     (On this Insurance highest of either insurance guarantee price (projected price) or harvest price is used)
□ Revenue Protection with Harvest Price Exclusion (RP-HPE)
     (On this Insurance only insurance guarantee price (projected price) is used)
□ Area Yield Protection (AYP)
□ Area Revenue Protection (ARP)
     (On this Insurance highest of either insurance guarantee price (projected price) or harvest price is used)
□ Area Revenue Protection with Harvest Price Exclusion (ARP-HPE)
     (On this Insurance only insurance guarantee price (projected price) is used)

Q7.2. For **2015**, what is the **coverage level (%)** you expect to choose for **this insurance plan for irrigated cotton? (Check one as appropriate)**
□ CAT
□ 50%
□ 55%
□ 60%
□ 65%
□ 70%
□ 75%
□ 80%
□ 85%
□ 90%

New Insurance policies for Irrigated Cotton

Q7.3. For **2015**, Are you planning to **take an additional new insurance policy** other than above policy?
(If you have Area Risk Insurance Protection, you cannot take SCO Endorsement.)
□ SCO Endorsement **-> Go to Question 7.4**
□ STAX-RP **->** Continue
□ STAX-RP-HPE **->** Continue
□ None **-> Go to Question 7.4**

Q7.3.1. For **2015**, what is the **coverage level (%)** you expect to choose **in STAX policy for irrigated cotton?**
In STAX policy, coverage level is between 90% - 70%, without coverage overlap with underling policy insurance. The coverage range could be maximum of 20% and minimum of 5% between those intervals.
Please check one your expected coverage range among 10 possible choices below.
□ 90% to 85%
□ 90% to 80%
□ 90% to 75%
□ 90% to 70%
□ 85% to 80%
□ 85% to 75%
□ 85% to 70%
□ 80% to 75%
□ 80% to 70%
□ 75% to70%

Q7.3.2. For **2015**, what is the **Protection Factor** nearest the one that you expect to choose for **STAX** coverage on irrigated **cotton**? **(Check one)**
□ 0.8
□ 0.9
□ 1.0
□ 1.1
□ 1.2

Q7.4. Is the **Insurance Policy** you choose above **recommended** by your **Insurance Agent for 2015**?   □ **Yes**   □ **No**

Section 8: 2015 Insurance for Dry land cotton

If you **grow Dry land cotton,** do you expect to **buy insurance** for your dry land cotton in **2015?**
Yes -> Continue   **No ->** Go to Section 9

2015 insurance for Dry land cotton

Q8.1. For **2015**, what **insurance product** do you expect to purchase for **Dry land cotton**? (On following underlying policies, **Check One** as appropriate)
□ Yield Protection (YP)
□ Revenue Protection (RP)
        (On this Insurance highest of either insurance guarantee price (projected price) or harvest price is used)
□ Revenue Protection with Harvest Price Exclusion (RP-HPE)
        (On this Insurance only insurance guarantee price (projected price) is used)
□ Area Yield Protection (AYP)
□ Area Revenue Protection (ARP)
        (On this Insurance highest of either insurance guarantee price (projected price) or harvest price is used)
□ Area Revenue Protection with Harvest Price Exclusion (ARP-HPE)
        (On this Insurance only insurance guarantee price (projected price) is used)

Q8.2. For **2015**, what is the **coverage level (%)** you expect to choose for **this insurance plan for Dry land cotton? (Check one as appropriate)**
□ CAT
□ 50%
□ 55%
□ 60%
□ 65%
□ 70%
□ 75%
□ 80%
□ 85%
□ 90%

New Insurance policies for Dry land Cotton

Q8.3. Are you planning to **take an additional new insurance policy** other than above policy?
(If you have Area Risk Insurance Protection, you cannot take SCO Endorsement.)
□ SCO Endorsement **-> Go to Question 8.4**
□ STAX-RP **->** Continue
□ STAX-RP-HPE **->** Continue
□ None **-> Go to Question 8.4**

Q8.3.1. For **2015**, what is the **coverage level (%)** you expect to choose **in STAX policy** in **for Dry Land cotton?**
In STAX policy, coverage level is between 90% - 70%, without coverage overlap with underling policy insurance. The coverage range could be maximum of 20% and minimum of 5% between those intervals.
Please check one your expected coverage range among 10 possible choices below.
□ 90% to 85%
□ 90% to 80%
□ 90% to 75%
□ 90% to 70%
□ 85% to 80%
□ 85% to 75%
□ 85% to 70%
□ 80% to 75%
□ 80% to 70%
□ 75% to70%

Q8.3.2. For **2015**, what is the **Protection Factor** nearest the one that you expect to choose for **STAX** coverage on Dry Land **cotton? (Check one)**
□ 0.8
□ 0.9
□ 1.0
□ 1.1
□ 1.2

Q8.4. Is the **Insurance Policy** you choose above **recommended** by your **Insurance Agent for 2015**?   □ **Yes**   □ **No**

Section 9: Other Insurance Policy Question

Q9.1. If you **do not plan to choos**e either **SCO endorsement or STAX** for **2015 cotton**, what is **the most likely reasons** for not buy it? (Choose one)

□ Don't understand the policy or Uncertain about its benefits (May be next year (2016))
□ Cost is too high relative to expected pay-outs
□ Others (Specify) _____

Q9.2. Do you plan to **take enterprise unit insurance policy** for **2015 cotton crop**?   □ YES   □ NO

Q9.3. What are the **primary sources of information about Crop Insurance Policy,** for **your crop insurance decision**?
(PLEASE Choose the top three in rank order, 1- high and 3 low source of information)
□ FSA office
□ Insurance Agent
□ Extension office or farm agency
□ Online Sources
□ Private Contacts
□ None
□ Others (Specify) _____

Q9.4. Have you taken or plan to take SCO Endorsement insurance policy for crops other than cotton?   □ YES   □ NO

Section 10: **Other information**

Attitudes toward risk taking
Q10.1. **Relative to other farmers**, how would you describe **your willingness to accept risk in your farm business?**
1   2   3   4   5

1 Much less willing   5 Much more willing

Q10.2. In what **range** would you place **the total market value of the assets in your farming operation?**
(Include the value of land you own, machinery, equipment, and all other farm assets you own. Don't include leased land or equipment. Don't report "book value")
□ Less than $499,999
□ $500,000 to $999,999
□ $1,000,000 to $1,999,999
□ $2,000,000 to $4,999,999
□ $5,000,000 or more

Q10.3. What is **your approximate household percentage of income from non-farm sources?**

_____ %(percentage)

Q10.4. What **approximate percentage of the total dollars invested in your operation are borrowed?**

_____ %(percentage)

General

Q10.5. **What is the Highest level of formal Education you have completed?**
□ Less than high school or High school level
□ Some college level or Undergraduate degree
□ Graduate or professional degree

Q10.6. **For how many years you have been farming?** _____

Thank you for taking time to complete this questionnaire. Please return the questionnaire in the postage paid envelope available in this package.
If you have any questions about the survey please don't hesitated to ask us. Thank you.