EXAMINING ALTERNATIVE FARM PAROGRAM SELECTION ON LOUISIANA COTTON FARMS USING A RISK RETURN FARMEWORK

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Abstract

Beginning with the 2018 crop year, cotton producers became eligible to participate in the seed cotton Price Loss Coverage (PLC) or Agriculture Risk Coverage program (ARC-CO). Most producers elected the PLC option, citing that the need to mitigate cotton lint and cottonseed price risk was paramount in their risk management strategy. The 2018 farm bill, covering crops from 2019 through 2023, extends PLC or ARC program participation for the seed cotton program. Evaluation of the performance of the ARC program for a representative farm is warranted as to measure the effectiveness in mitigating revenue risk while the PLC program is modeled to determine its effectiveness in mitigating price risk. This economic analysis incorporates stochastic efficiency with respect to a function (SERF) to rank farm program selection alternatives by providing a cardinal measure of the producer's conviction for preferences among alternatives at each risk aversion level by interpreting the differences between certainty equivalent (CE) values as risk premiums.

Introduction

Beginning with the 2018 crop year, cotton producers became eligible to participate in the seed cotton PLC program or ARC-CO program. Most producers elected the PLC option, citing that the need to mitigate cotton lint and cottonseed price risk was paramount in their risk management strategy. The 2018 farm bill, covering crops from 2019 through 2023, extends PLC or ARC program participation for the seed cotton program. Evaluation of the performance of the ARC program for a representative farm is warranted as to measure the effectiveness in mitigating revenue risk while the PLC program is modeled to determine its effectiveness in mitigating price risk. This economic analysis incorporates SERF to rank farm program selection alternatives by providing a cardinal measure of the producer's conviction for preferences among alternatives at each risk aversion level by interpreting the differences between CE values as risk premiums. The differing objectives and mechanics of ARC and PLC create different payment levels and projections.

Materials and Methods

A farm level simulation model was constructed that combined actual parish (county) seed cotton yields and national marketing year average prices of seed cotton to develop a multi-variate empirical yield and price distribution for a geographical specific farming operation in northeastern Louisiana. The prices of selected farm inputs (e.g. nitrogen fertilizer and diesel fuel) are also simulated stochastically, as fertilizer and fuel typically account for a large share of variable production costs. The overall objective of this stochastic simulation model is to simulate the grower's share of net returns above variable costs under alternative farm program choice.

Ten years of historical (2009-2018) lint price, cottonseed price, yield/production, nitrogen fertilizer price, and diesel fuel price data were simulated in order to model ARC-CO and PLC program performance for irrigated cotton. A partial budgeting approach was utilized to reflect current production practices in northeast Louisiana Delta region. National and state level price data corresponding to the study period (2009-2018) for lint and cottonseed were obtained from the USDA-NASS. Yield data reflects regional averages for the selected study area (Delta region) over the previous ten years. This study accounts for price and yield variability while simultaneously imposing alternative farm program selection in order to estimate the grower's share of net returns above per acre variable costs.

Alternative risk preferences of different agricultural producers can be evaluated using SERF criteria. SERF operates by identifying utility efficient alternatives for ranges of risk attitudes. Following research by Hardaker et al. 2004, this study examines different levels of alternative farm program choice that will compare uncertain outcomes, so the values of net returns are generated stochastically. The values of net returns are viewed as measures of utility amongst producers. These utility values are then converted into CE's by taking the inverse of the utility function. SERF is used to rank various systems (eg. ARC or PLC) using utility weighted CE's as a means of expressing

various degrees of risk aversion. These CE's are used to calculate risk premiums at each risk aversion level. The risk premium for a risk averse producer reflects the minimum amount ($/acre) needed for that producer to switch from the preferred program to the less preferred program under a specified risk aversion coefficient.

Results and Discussion

Net returns above variable costs for alternative farm program choice are calculated as a function of market receipts and government payments for a predominantly cotton producing operation for the 2019 crop year. Net return variability is a function of the historic regional yield trend, national price trend, and program choice. The financial measure of the farm's earning performance represents the average return across 1,000 iterations. Results in Table 1 indicate that policy option 1 generates the higher level of cumulative net returns to the grower during the 2019 crop year.

Table 1. Mean net returns above variable production cost, alternative program choice.

Policy Opt. 1 (PLC)	Policy Opt. 2 (ARC-CO)	Net Return Premium of Opt 1 vs Opt 2
$238.63	$187.38	$51.25
$232.47	$183.01	$49.45
$226.46	$178.73	$47.73
$220.64	$174.54	$46.10
$215.00	$170.44	$44.56
$209.54	$166.43	$43.11
$204.28	$162.52	$41.76
$199.21	$158.70	$40.50
$194.32	$154.99	$39.34
$189.63	$151.37	$38.26
$185.11	$147.85	$37.26

For the risk neutral grower (risk aversion coefficient = 0), net returns from policy option 1 ($238.63) is $51.25 greater than policy option 2. Policy option 1 dominated policy option 2 as evidenced by the net return premium at each level of risk aversion. Figure 1.

Figure 1. Mean net returns per acre for competing program choices on a representative Louisiana cotton farm.
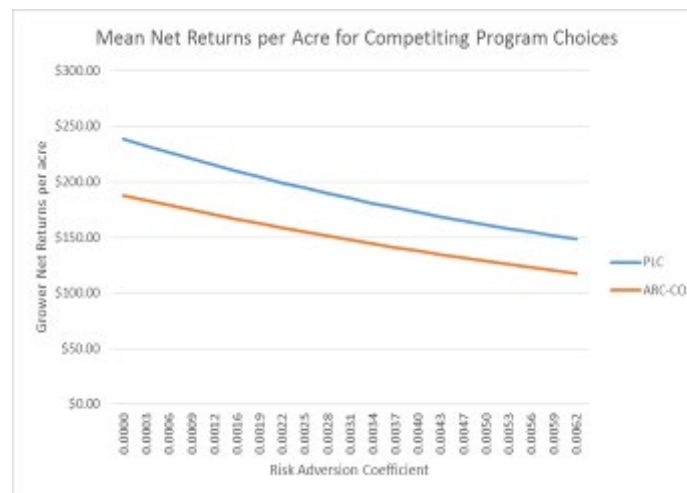
Summary

Growers will likely place a great deal of weight on expected returns from each program option when making their farm program election decision. The differing objectives and mechanics of ARC and PLC create different payment levels and projections. The PLC farm program election was the dominant option that, in conjunction with the price, yield, and production cost variability imposed across the model, outperformed the remaining ARC-CO program election as the risk aversion coefficient was increased. This infers that seed cotton producers viewed the decision of choosing between PLC and ARC-CO programs as a straightforward decision.

The decline in farm program payments and support, even as market prices are slow to recover, will stress farm income and cash flow projections through 2019/20. For commodities enrolled in the PLC program (e.g. seed cotton), where payments are projected to be sizable given the early market price projections for the 2019/20 crop year, farm organization could be one factor that could preclude a farm from maximizing program participation coverage.

References

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