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Department of Agricultural Economics
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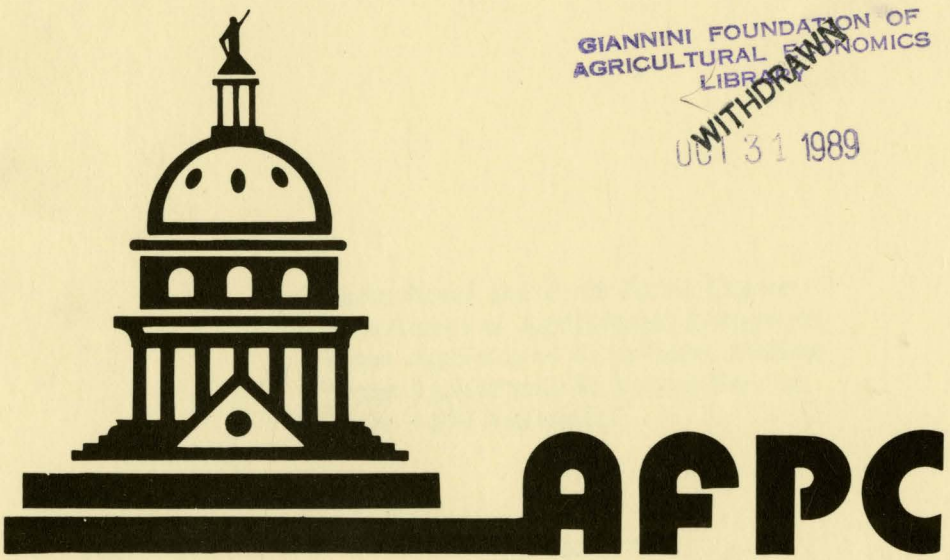

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James W. Richardson
Gary L. Helms
Charles F. Miller
Ronald D. Knutson

Agricultural and Food Policy Center
Department of Agricultural Economics
Texas Agricultural Experiment Station
Texas Agricultural Extension Service
Texas A&M University

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Multi-peril crop insurance provided by the Federal Crop Insurance Corporation (FCIC) was first authorized for wheat in 1938. The purpose of multi-peril crop insurance was to provide subsidized crop insurance to producers unable to obtain adequate crop insurance on their own. In 1981, FCIC coverage was extended to all counties in the United States and to most major crops. This expansion of FCIC coverage provided a substitute to the low yield disaster program.

The low yield disaster program was first authorized by the 1973 farm bill. Disaster payment benefits were available from 1973-81 to producers who were in compliance with other program provisions. Low yield payments were made to eligible cotton producers who were prevented from harvesting less than 75 percent of their normal yield. The provisions of the disaster program were dropped in 1982. Provisions in both the 1981 and 1985 farm bills permit the Secretary of Agriculture to reinstate the low yield disaster program in cases of extreme emergency.

The purpose of this study was to compare the economic benefits of the current multi-peril crop insurance program to the 1981 low yield disaster provisions. Family-size farms in four cotton producing regions were analyzed over a four year planning horizon (1988-91) to determine if FCIC provided an adequate substitute for the low yield disaster program.

Procedure

Three cotton producing regions in Texas (Southern High Plains, Rolling Plains, and Coastal Bend) and one region in Mississippi (Delta) were simulated using the Farm Level Income and Policy Simulation model (FLIPSIM). A brief description of the four farms is presented in Table 1. Data for the Texas farms were developed from producer panel interviews in each region by economists at Texas A&M. Data for the Mississippi farm were developed from a producer survey conducted by economists at Mississippi State University.

For all regions except the Coastal Bend, the representative farm had the majority of its cropland devoted to cotton (Table 1). The farms were assumed to be part owner/operator farms with 45 percent initial debt on owned assets. Cropland was leased on a crop share basis so the landlord received his/her share of insurance or disaster payments and paid his/her share of FCIC premiums. Cotton was the only crop involved in the yield protection analysis. To simplify the results, the other crops on the farms were assumed to be produced without insurance or disaster coverage. The absence of yield protection for these other crops may reduce the chance of survival for the farms, but this reduction in survival is the same for all insurance and disaster scenarios and, thus, does not bias the results for cotton.

Historical price and yield variability faced by producers in the regions was incorporated into the simulation model. Ten years of actual crop yields for producers in the four regions were used to develop the probability distributions for the crops in each region. Probability distributions for crop prices were developed from actual prices in local markets for the most recent ten year period.

Each representative farm was simulated over the 1988-91 planning horizon for each of the eleven possible situations listed below:

- No insurance and no disaster program (Base)
- Low yield disaster program for cotton
- Low yield/low price multi-peril insurance for cotton
- Low yield/medium price multi-peril insurance for cotton
- Low yield/high price multi-peril insurance for cotton
- Medium yield/low price multi-peril insurance for cotton
- Medium yield/medium price multi-peril insurance for cotton
- Medium yield/high price multi-peril insurance for cotton
- High yield/low price multi-peril insurance for cotton
- High yield/medium price multi-peril insurance for cotton
- High yield/high price multi-peril insurance for cotton

The farm's after-tax net present value was calculated for each scenario and used to estimate the economic payoffs relative to the Base. Net present value is the discounted value of the annual change in net worth over the four year planning horizon (a 5 percent discount rate was used). Thus, net present value provides a means of summarizing the effects of a policy or insurance change on the economic well-being of a whole farm.

Economic payoffs for the alternative yield coverage scenarios (disaster and insurance programs), relative to the Base, were calculated as the average after-tax net present value for a particular scenario minus the average after-tax net present value for the Base. A positive economic payoff indicates the alternative is superior to the Base (no insurance and no disaster program). Because crop insurance premiums have a government subsidy of up to 30 percent, one expects the loss ratio to exceed 1.0 and, therefore, result in a positive economic payoff for most insurance scenarios. If premiums are actuarially sound, producers in all regions would experience similar loss ratios and economic payoffs from multi-peril crop insurance.

Results

The economic payoffs for each of the four farm's ten alternative scenarios are summarized in Table 2. The economic payoffs to the disaster program are positive, indicating the disaster program is superior to no yield protection for all four farms. The disaster program was responsible for increasing average net present value ranging from $350 (Coastal Bend) to $19,840 (Rolling Plains) for the four farms (Table 2). The economic payoffs to this program are expected to be positive because it provides protection from low yields at no cost, and because the disaster program was based on farm program yield and not actual yields.

The economic payoffs from multi-peril crop insurance for cotton are negative at all levels of coverage in the Southern Plains, the Coastal Bend, and the Mississippi Delta. This indicates the producer would be better off not to buy insurance at any level of coverage. As the level of coverage (yield and price election) increases, the economic payoff from insurance diminishes. This result suggests that the premiums are not accurately structured

across the low and medium yield levels to provide a constant loss ratio. For the Southern High Plains farm, the economic payoffs to crop insurance range from -$22,860 (low yield and price elections) to -$92,910 (high yield and price elections).

An exception to these results is the Rolling Plains farm which experiences positive economic payoffs from purchasing multi-peril crop insurance for cotton (Table 2). All but one insurance scenario (low yield and price election) result in a positive economic payoff for this farm. On the Rolling Plains, the best insurance option would be to purchase a medium yield, medium price coverage level for cotton ($9,540 payoff). However, comparing the economic payoffs for the disaster program to the best insurance option reveals that the farm has a $10,300 lower average net present value with insurance than with the disaster program.

Summary

The purpose of this study was to compare the economic payoffs of the multi-peril crop insurance program to the low yield disaster program for cotton producers. Family-size farms in four regions (Texas Southern High Plains, Rolling Plains, Coastal Bend, and Mississippi Delta) were simulated with FLIPSIM for four years under the 1981 low yield disaster program and nine alternative levels of crop insurance. The results of these alternative yield protection strategies were compared to a Base situation of purchasing no crop insurance and not having a low-yield disaster program.

The results revealed that producers in three of the four regions would be better off financially to not purchase multi-peril crop insurance. In all four regions, the low yield disaster program provided greater economic benefits than crop insurance because, in part, the disaster program provided yield protection at no cost to the producer. In addition, the study revealed major differences in the economic payoffs to multi-peril insurance across regions and insurance levels. These results reveal that the multi-peril crop insurance premiums result in loss ratios less than 1.0 in some regions and greater than 1.0 in others. This result would not be observed if the insurance premiums were actuarially sound across regions.

The results for the Southern High Plains stand in marked contrast to research done in 1982 by Lemiuex, Richardson, and Nixon. For a similar size farm, and using the same methodology, they found that the economic payoffs from multi-peril crop insurance were positive and quite large in 1982. The high price and yield coverage level of insurance even resulted in greater economic payoffs than the low yield disaster program in the 1982 study. Lovell, Knight, and Richardson analyzed multi-peril crop insurance for cotton produces in three Southern High Plains counties (Crosby, Hockley, and Lynn) in 1985. They reported that federal crop insurance generally provided a small but positive economic payoff when compared to no insurance.

An explanation of this change in economic payoffs to crop insurance is that FCIC has increased the premiums in the Southern High Plains to make the program actuarially sound in the face of very low producer participation. It is hypothesized that this has also been the case for producers in the Coastal Bend and the Mississippi Delta. The insurance premiums have either not been significantly increased in the Rolling Plains, or program participation has been sufficient to allow FCIC to offer lower rates for this region. Instead of setting the premiums to result in actuarial soundness within a county, greater producer participation and lower premiums could be obtained by making multi-peril crop insurance for cotton actuarially sound across the Cotton Belt.

References

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Table 1. **Characteristics of Moderate-Sized Cotton Farms in the Texas Southern High Plains, Rolling Plains, Coastal Bend, and the Mississippi Delta.**

	Southern Plains	Rolling Plains	Coastal Bend	Mississippi Delta
County	Gaines	Jones	San Patricio	Cahoma
	(Acres)			
Total Cropland	1,360	1,750	1,200	1,457
Owned	340	490	300	1,000
Leased	1,020	1,260	900	457
Planted Acres:				
Irrigated Cotton	449	---	---	---
Dryland Cotton	911	606	456	865
Dryland Wheat	---	390	---	---
Dryland Grain Sorghum	---	---	589	---
Dryland Corn	---	---	95	---
Dryland Soybeans	---	---	---	592
	($'s)			
Total Assets	260,956	344,150	473,600	1,055,321
Land & Buildings	116,800	190,000	342,500	822,000
Machinery	114,156	124,150	126,100	196,271
Other	30,000	30,000	5,000	37,050
Total Liabilities	105,930	141,367	217,370	482,092
Long-Term	52,560	85,500	154,125	369,900
Int.-Term	51,370	55,867	56,745	88,322
Other	2,000	---	6,500	23,870
Net Worth	155,026	202,783	256,230	573,229
Off-Farm Income	12,000	7,500	15,000	10,000

Table 2. **Economic Payoffs to Low Yield Disaster Program and Multi-Peril Crop Insurance For Moderate-Sized Cotton Farms in the Texas Southern High Plains, Rolling Plains, Coastal Bend, and the Mississippi Delta.**[1]

	Southern Plains	Rolling Plains	Coastal Bend	Mississippi Delta
	($1,000)			
Disaster Program	12.37	19.84	.35	1.11
Multi-Peril Insurance				
Low Yld/Low Price	-22.86	-.30	-11.06	-15.76
Low Yld/Med Price	-28.43	.08	-14.12	-20.27
Low Yld/High Price	-37.35	.34	-17.83	-25.07
Med Yld/Low Price	-28.67	7.56	-16.44	-21.29
Med Yld/Med Price	-35.85	9.54	-19.95	-27.75
Med Yld/High Price	-48.62	3.68	-25.24	-34.18
High Yld/Low Price	-52.82	3.68	-31.43	-37.23
High Yld/Med Price	-70.14	5.00	-38.44	-48.08
High Yld/High Price	-92.91	5.94	-48.82	-60.90

[1]Economic payoff is the difference in average net present value for the no insurance/no disaster program scenario and an alternative scenario. A positive economic payoff indicates that a particular scenario is superior to having no yield protection (no insurance and no disaster program).