

## The Viability of a Crop Insurance Investment Account: The Case for Obion, County, Tennessee

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### Abstract

This paper evaluates the feasibility of farmer-owned crop insurance accounts. The accounts, similar to retirement accounts, accumulate pre-subsidy premiums and dispense indemnities. Government involvement is that of guaranteeing loans if indemnities exceed the account balance. Substantial government savings occur through insurance premium subsidy elimination.

Keywords: crop insurance; risk management; farm policy

## Introduction

The current crop insurance program includes subsidies as high as 2 billion dollars annually. These subsidies help make premiums “affordable” but are a substantial budget item. Additionally, short term disaster aid increases government outlay while blurring the decision making process on whether to invest in crop insurance at the farm level. Historically there have been accusations of unethical production practices aimed at maximizing indemnities.

An innovative program that would decrease or eliminate government subsidies and reduce the incentive to overstate claims by allowing producers to manage their own crop insurance accounts could be a win/win situation. This paper investigates the feasibility of such a program by evaluating a farmer owned investment account, which accumulates premiums and pays out indemnities. The account is allowed to be invested by the farmer. For the purpose of this paper, this new program is named a “Crop Insurance Investment Account”, or CIIA.

## Literature Review

Davis compares CRC with other insurance for South Carolina cotton growers in 2001 and 2002. Davis concludes that at higher coverage levels, CRC generated higher net revenues compared to other insurance instruments in 2001. MPCCI generated large net revenues in 2002.

Wirtz quotes a grain industry representative: “Coverage levels that are higher than 75 percent are impractical.... at the 65 percent to 70 percent level, a substantial shortfall occurs whenever there are crop problems.” Babcock and Hart conclude that “the 75 percent premium rate is a

reasonable estimate of an actuarially fair rate if the 65 percent premium is actuarially fair and if marginal moral hazard is insignificant”.

Dismukes and Glauber conclude that the use of premium subsidies are costly and that additional subsidies would not likely increase participation in crop insurance where participation is already high. The Congressional Budget Office estimated crop insurance spending between 2.2 and 3.3 billion dollars annually from 2000 to 2005.

### Model/Methodology

To evaluate the viability of a Crop Insurance Investment Account (CIIA), economic indicators were simulated over a 44 year period, from 1959-2003. A comparison was made between a current crop insurance program and a proposed CIIA. To simulate the current crop insurance program, Crop Revenue Coverage (CRC) provisions were assumed for each year of the study. The CRC provides indemnities to farmers when certain production and market conditions occur. CRC guidelines include (USDA):

- 1) Producers enroll and pay premiums (premiums are subsidized by the government).
- 2) An Approved Yield (or Actual Production History (APH)) based on at least 4 years of production records must be provided by the producer.
- 3) The producer selects a Coverage Level Percentage from 50 to 85 percent, which defines the policy’s coverage and premium.
- 4) A base price is determined from the February’s average settlement price for the December futures market.

- 5) A harvest price is determined from the October's average settlement price for the December futures market. The harvest price must be within a range of the base price plus/minus \$1.50.
- 6) The minimum guaranteed CRC revenue is the base price times the approved yield times the coverage level selected.
- 7) The harvest revenue is the APH yield times the coverage level times the harvest price.
- 8) The calculated revenue is the actual yield times the harvest price
- 9) Indemnity is paid if the greater of the minimum and harvest revenue exceeds the calculated revenue.
- 10) Insurance premiums are calculated by multiplying amount of coverage, in dollars, by the premium rate. Premium rates vary by crop, location, and risk level. For this paper, a rate of 7% was used (Dismukes and Vandever).

A Crop Insurance Investment Account was defined as an account that allowed farmers to invest the non-subsidized portion of the annual crop insurance premiums in an open account. No tax incentives were assumed for investing nor were any penalties assessed for withdrawing from the account. While no such account currently exists, it is proposed that such an account could create funds in "good" years that could be withdrawn in "poor" years. The account is allowed to increase in value similar to an investment account. The account is managed such that:

- 1) Only the non-subsidized premiums are invested in the account annually.
- 2) If there are no indemnities, the account carries over funds to the following year.
- 3) The account varies according to the returns of the underlying investment.
- 4) Funds are paid out of the account to cover the indemnities as defined in the CRC program.

- 5) If indemnities exceed the account balance, the account becomes a loan account and interest is charged on the account balance until all loans are paid.
- 6) No tax implications are assumed on account deposits, withdrawals, profits, or losses.
- 7) An annual account fee is charged for managing the funds.

To compare the CRC with the CIIA, it is helpful to calculate premiums, indemnities, and account balances over a number of years. Production and price data were collected since 1959 for the comparisons. The CRC program was not in effect in 1959 and has changed since it was first introduced. The most recent provisions were used in comparing it to the CIIA.

If the CIIA would be a feasible alternative to crop insurance, there would be several impacts. First, only the non-subsidized portion of the premiums are used in the CIIA. If feasible, this eliminates a sizable outlay of funds. It also allows producers more control in their risk management decisions. Producers could choose coverage levels, for example, relative to the size of their CIIA account. The incentive to take advantage of crop insurance provisions would also be reduced, as indemnity payments would come from the producer's own managed account.

#### Data

Corn yield data for the years 1955-2003 were collected from the Tennessee Agricultural Statistics Service for Obion County, Tennessee. Obion county was selected because it is the top producing corn county in Tennessee. APH yields were calculated beginning with 1959. February

and October average monthly corn prices for the December futures market were calculated annually using the Chicago Board of Trade daily closing prices.

Annual changes in the Dow Jones Industrial Average were used to adjust the CIIA account balance. When the CIIA account balance was negative, interest was charged using the government prime rate for that year. The account was charged a management fee of 5% annually. Coverage levels (CL) range from 50% to 85%, with their respective subsidies ranging from 67% to 38%. In this paper, two coverage levels were analyzed - a 65% coverage level with a 59% premium subsidy, and a 75% coverage level with a 55% premium subsidy.

## Results

Annual results for the value of production, indemnity, premiums paid, subsidies, CRC and CIIA returns were simulated from 1959 through 2003. Assuming a 75% coverage level, results indicate that for 1959-2003, total crop revenue would have been \$8,788 per acre (Table 1). Total crop revenue is defined as the average Obion county yield times the October average of the December futures contract, adjusted for basis. Over the same time period, utilizing CRC each year, would have returned \$8,664 per acre. Using the CIIA, returns would have been \$8,796 per acre. The CIIA returns include \$131 per acre in the ending value of the investment account.

Assuming a similar analysis using a 65% coverage level, CRC returns \$8,630, while the CIIA returns \$8,794. The greater difference between CRFC an CIIA with the lower coverage level is

due to fewer indemnities being paid over the time period, and the CIIA growing to \$164, compared to \$131 with the 75% coverage level.

The 1959-2003 time period may not be a viable test of the model. A shorter time horizon could produce different results. For example, it may be more feasible for a beginning farmer, faced with a highly leveraged financial situation, to use crop insurance. But after some debt is retired and the farm is in a lower leverage situation, crop insurance might be dropped. In a shorter time period, the CIIA may be negative, especially if the beginning years have large indemnities.

Table 2 lists results of 10 year simulations, beginning with 1959-1968 and ending with 1994-2003, at the 75% coverage level. The crop sales revenue with no insurance coverage exceeds the CRC returns for each ten year period. Crop sales revenue with no insurance exceeds CIIA revenue until the 1981-1990 time period. From that time period through 1994-2003, the CIIA exceeds crop sales revenue with no insurance. In 3 time periods, 1978-1987, 1979-1988, and 1980-1989, CRC revenue exceeds CIIA revenue. For those 3 time periods there was a loan balance at the end of the 10 years. Those time periods included 1980, in which yields were only 46 bushels per acre, compared to the 10 year APH of 81 bushels per acre. The longest time period in which the CIIA was negative was 12 years, between 1980 and 1992.

Table 3 lists results of 10 year simulations for the 65% coverage level. Like the 75% coverage level scenario, crop sales revenue with no insurance exceeds CRC revenue for each time period. The CIIA revenue exceeds CRC revenue for each time period and exceeds crop sales revenue

with no insurance from 1975-1984 through 1994-2003. In the years that CIIA is second to the no insurance alternative, the difference is less than \$2/acre.

Table 4 lists results of 5 year simulations for the 75% coverage level. The no insurance alternative revenue exceeded the CRC revenue in all but 5 time periods, from 1975-1979 through 1980-1984. During those time periods, CRC revenue equaled or exceeded CIIA revenue also. CIIA revenue exceeded the no insurance alternative revenue in 1959-1963, 1960-1964, 1961-1965, 1971-1975, 1975-1979, 1976-1980, and time periods 1981-1985 through 1996-2000.

Table 5 lists results of 5 year simulations for the 65% coverage level. The no insurance alternative revenue exceeds the CRC revenue for all time periods. The CIIA revenue exceed or equaled the no insurance alternative revenue in 1959-1963, 1960-1964, 1961-1965, 1971-1975, 1975-1979, and time periods 1978-1982 through 1997-2001.

Comparing the 75% and 65% coverage levels for the ten year time periods (Tables 2&3) shows little difference in CRC revenue for most time periods. When there are indemnities paid, however, the 75% coverage level revenue generally exceeds the that of the 65% level. The CIIA comparisons are opposite. When time periods contain relatively higher indemnities, the 65% coverage level revenue exceeds that of the 75% level. This same relationship holds for the 5 year time period comparison. This would seem to indicate that the CIIA works well both as an insurance instrument and as an investment instrument compared to CRC. It also compares well to the revenue stream from the no insurance alternative.



## Conclusions

During the 1959-2003 time period, cumulative corn revenue from Obion County, Tennessee was greater with no insurance coverage compared to current CRC provisions. Revenue from a proposed CIIA program was greater than the no insurance alternative.

At the 75% coverage level, when divided into 10 year and 5 year time periods, there were time periods where the CIIA program gave lower revenue than either the CRC or no insurance alternatives. In those instances the CIIA had a loan balance at the end of the time period.

But when the coverage level was set at 65%, CIIA revenue was greater than CRC revenue for each time period. CIIA revenue was also greater than the no insurance alternative revenue for most years, and was never more than \$2/acre less than the no insurance alternative revenue.

Of greater importance, CIIA returns at the 65% coverage level were almost identical to those of the 75% coverage level. This result indicates that the lower coverage level, which gave positive investment accounts for all time periods had greater revenue for CIIA than CRC at the higher coverage level for every time period in the ten year study. Likewise the CIIA revenue was higher than the no insurance alternative for most time periods and never more than \$2/acre below then the no insurance alternative revenue.

At the 5 year planning horizon, the CRC revenue at the 75% coverage level dominated the CIIA revenue at the 65% coverage level for only 5 time periods. CIIA revenue at the lower coverage level dominated the no insurance revenue similar to the 10 year planning horizon.

The implications of these results are that farmers may be able to self insure their crops and accumulate more revenue. In addition, government spending could be reduced by as much as 2 to 3 billion dollars annually if farmers adopted the self insured CIIA.

Other implications may include a diminished incentive to “farm the program” in that farmers may be reluctant to claim unwarranted indemnities because doing so reduces their own investment account.

### Limitations

County average yield data could mask some of the yield variance in determining indemnities. Farm level yield data would be preferable. The proposed insurance program does not currently exist, and as such, legislative action would likely be necessary to implement it. Program specifics, including tax implications, multi-year producer agreements, and others would have to be implemented before such a program would be available.

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Table 1. Total Crop Revenue and Revenue from CRC and CIIA programs, 1959-2003

Coverage Level	Total Crop Revenue	Premium	Premium Subsidy	Net Premium	Indemnity	CRC Revenue	CIIA Investment Account	CIIA Revenue
75%	\$8,788	\$460	\$253	\$207	\$84	\$8,664	\$131	\$8,796
65%	\$8,788	\$399	\$235	\$164	\$6	\$8,630	\$164	\$8,794

Table 2. Total Crop Revenue and Revenue from CRC and CIIA programs, 1959-2003, Ten Year Intervals, 75% Coverage Level, Dollars/Acre

Time Period	Total Crop Revenue	Premium	Premium Subsidy	Net Premium	Indemnity	CRC Revenue	CIIA Investment Account	CIIA Revenue
1959-1968	653	30	16	13	0	639	13	653
1960-1969	688	31	17	14	0	675	14	688
1961-1970	701	33	18	15	6	692	9	701
1962-1971	728	35	19	16	6	718	10	728
1963-1972	784	37	20	16	6	773	11	784
1964-1973	899	39	21	17	6	887	11	899
1965-1974	1,084	46	26	21	6	1,069	14	1,082
1966-1975	1,215	54	29	24	6	1,196	18	1,214
1967-1976	1,396	61	33	27	6	1,374	21	1,396
1968-1977	1,497	68	37	30	6	1,472	23	1,496
1969-1978	1,592	73	40	33	6	1,565	26	1,590
1970-1979	1,774	80	44	36	6	1,743	29	1,772
1971-1980	1,885	90	49	40	35	1,880	4	1,884
1972-1981	2,083	101	55	45	35	2,072	8	2,081
1973-1982	2,199	110	60	49	35	2,185	13	2,198
1974-1983	2,214	118	65	53	46	2,208	6	2,214
1975-1984	2,256	120	66	54	46	2,248	8	2,256
1976-1985	2,306	122	67	55	46	2,296	5	2,301
1977-1986	2,217	122	67	55	46	2,208	3	2,210
1978-1987	2,245	120	66	54	46	2,237	0	2,235
1979-1988	2,372	121	67	55	46	2,363	0	2,356
1980-1989	2,390	125	69	56	46	2,380	0	2,366
1981-1990	2,457	125	69	56	11	2,412	49	2,460
1982-1991	2,390	124	68	56	11	2,346	50	2,396

1983-1992	2,452	126	69	56	11	2,406	49	2,455
1984-1993	2,462	126	70	57	0	2,405	61	2,466
1985-1994	2,443	130	71	58	0	2,384	62	2,446
1986-1995	2,635	133	73	60	0	2,575	65	2,640
1987-1996	2,825	142	78	64	0	2,761	69	2,830
1988-1997	2,927	151	83	68	0	2,859	75	2,933
1989-1998	2,840	158	87	71	33	2,802	46	2,847
1990-1999	2,777	159	87	71	33	2,739	46	2,785
1991-2000	2,800	161	89	73	33	2,760	47	2,807
1992-2001	2,871	162	89	73	33	2,831	46	2,877
1993-2002	2,850	163	89	73	33	2,809	45	2,854
1994-2003	2,932	164	90	74	33	2,891	46	2,937

Table 3. Total Crop Revenue and Revenue from CRC and CIIA programs, 1959-2003, Ten Year Intervals, 65% Coverage Level, Dollars/Acre

Time Period	Total Crop Revenue	Premium	Premium Subsidy	Net Premium	Indemnity	CRC Revenue	CIIA Investment Account	CIIA Revenue
1959-1968	653	26	16	11	0	642	11	653
1960-1969	688	27	16	11	0	678	11	688
1961-1970	701	28	17	12	0	690	11	701
1962-1971	728	30	18	12	0	716	12	728
1963-1972	784	32	19	13	0	771	13	784
1964-1973	899	34	20	14	0	885	13	899
1965-1974	1,084	40	24	17	0	1,068	15	1,083
1966-1975	1,215	47	27	19	0	1,196	19	1,215
1967-1976	1,396	53	31	22	0	1,375	21	1,396
1968-1977	1,497	59	35	24	0	1,473	23	1,496
1969-1978	1,592	64	38	26	0	1,566	25	1,591
1970-1979	1,774	70	41	29	0	1,745	28	1,773
1971-1980	1,885	78	46	32	6	1,859	25	1,884
1972-1981	2,083	87	52	36	6	2,053	28	2,081
1973-1982	2,199	95	56	39	6	2,166	32	2,199
1974-1983	2,214	102	60	42	6	2,179	36	2,215
1975-1984	2,256	104	61	43	6	2,220	37	2,257
1976-1985	2,306	106	63	43	6	2,268	38	2,306
1977-1986	2,217	106	63	43	6	2,179	39	2,218
1978-1987	2,245	104	61	43	6	2,208	39	2,247
1979-1988	2,372	105	62	43	6	2,335	40	2,374
1980-1989	2,390	108	64	44	6	2,352	41	2,393
1981-1990	2,457	108	64	44	0	2,413	47	2,460
1982-1991	2,390	107	63	44	0	2,347	48	2,395

1983-1992	2,452	109	64	45	0	2,407	48	2,455
1984-1993	2,462	110	65	45	0	2,417	48	2,465
1985-1994	2,443	112	66	46	0	2,397	49	2,446
1986-1995	2,635	115	68	47	0	2,588	51	2,639
1987-1996	2,825	123	72	50	0	2,775	55	2,829
1988-1997	2,927	131	77	54	0	2,873	59	2,932
1989-1998	2,840	137	81	56	0	2,784	62	2,846
1990-1999	2,777	138	81	56	0	2,721	62	2,783
1991-2000	2,800	140	82	57	0	2,743	63	2,806
1992-2001	2,871	141	83	58	0	2,813	62	2,875
1993-2002	2,850	141	83	58	0	2,792	61	2,853
1994-2003	2,932	143	84	58	0	2,874	62	2,936



Table 4. Total Crop Revenue and Revenue from CRC and CIIA programs, 1959-2003, Five Year Intervals, 75% Coverage Level, Dollars/Acre

Time Period	Total Crop Revenue	Premium	Premium Subsidy	Net Premium	Indemnity	CRC Revenue	CIIA Investment Account	CIIA Revenue
1959-1963	279	13	7	6	0	274	6	279
1960-1964	296	13	7	6	0	290	6	297
1961-1965	321	14	8	6	0	315	7	321
1962-1966	344	15	8	7	0	338	7	345
1963-1967	368	16	9	7	0	362	7	369
1964-1968	373	17	9	8	0	366	8	373
1965-1969	392	18	10	8	0	384	7	392
1966-1970	380	18	10	8	6	378	2	380
1967-1971	384	20	11	9	6	380	3	383
1968-1972	415	21	11	9	6	412	4	416
1969-1973	526	22	12	10	6	522	4	525
1970-1974	692	29	16	13	6	685	6	690
1971-1975	834	35	19	16	0	819	16	835
1972-1976	1,012	40	22	18	0	994	18	1,012
1973-1977	1,082	47	26	21	0	1,061	20	1,080
1974-1978	1,066	51	28	23	0	1,043	22	1,065
1975-1979	1,082	51	28	23	0	1,058	23	1,082
1976-1980	1,050	55	30	25	35	1,061	0	1,061
1977-1981	1,070	60	33	27	35	1,078	0	1,065
1978-1982	1,118	63	34	28	35	1,125	0	1,112
1979-1983	1,149	66	37	30	46	1,165	0	1,140
1980-1984	1,175	69	38	31	46	1,190	0	1,159
1981-1985	1,255	68	37	30	11	1,236	21	1,257
1982-1986	1,147	62	34	28	11	1,129	21	1,150

1983-1987	1,127	57	31	26	11	1,112	17	1,129
1984-1988	1,223	55	30	25	0	1,198	27	1,225
1985-1989	1,215	56	31	25	0	1,190	28	1,218
1986-1990	1,202	57	31	26	0	1,176	28	1,204
1987-1991	1,244	62	34	28	0	1,216	29	1,245
1988-1992	1,324	69	38	31	0	1,294	32	1,326
1989-1993	1,239	71	39	32	0	1,207	34	1,241
1990-1994	1,227	73	40	33	0	1,194	34	1,228
1991-1995	1,433	76	42	34	0	1,399	37	1,437
1992-1996	1,581	80	44	36	0	1,545	40	1,585
1993-1997	1,602	82	45	37	0	1,565	42	1,607
1994-1998	1,601	86	48	39	33	1,595	12	1,607
1995-1999	1,550	86	47	39	33	1,544	13	1,557
1996-2000	1,367	86	47	39	33	1,361	10	1,370
1997-2001	1,290	82	45	37	33	1,286	4	1,289
1998-2002	1,248	80	44	36	33	1,244	0	1,242
1999-2003	1,331	78	43	35	0	1,296	35	1,330

Table 5. Total Crop Revenue and Revenue from CRC and CIIA programs, 1959-2003, Five Year Intervals, 65% Coverage Level, Dollars/Acre

Time Period	Total Crop Revenue	Premium	Premium Subsidy	Net Premium	Indemnity	CRC Revenue	CIIA Investment Account	CIIA Revenue
1959-1963	279	11	7	5	0	275	5	279
1960-1964	296	12	7	5	0	292	5	297
1961-1965	321	12	7	5	0	316	5	321
1962-1966	344	13	7	5	0	340	5	345
1963-1967	368	14	8	6	0	363	6	369
1964-1968	373	15	9	6	0	367	6	373
1965-1969	392	15	9	6	0	386	6	392
1966-1970	380	16	9	7	0	374	6	380
1967-1971	384	18	10	7	0	376	7	383
1968-1972	415	18	11	7	0	408	7	416
1969-1973	526	19	11	8	0	518	7	526
1970-1974	692	25	15	10	0	682	9	691
1971-1975	834	30	18	12	0	822	13	835
1972-1976	1,012	35	21	14	0	998	14	1,012
1973-1977	1,082	41	24	17	0	1,065	16	1,081
1974-1978	1,066	45	26	18	0	1,048	18	1,065
1975-1979	1,082	45	26	18	0	1,063	18	1,082
1976-1980	1,050	47	28	19	6	1,037	12	1,049
1977-1981	1,070	52	31	21	6	1,055	14	1,069
1978-1982	1,118	54	32	22	6	1,101	17	1,118
1979-1983	1,149	58	34	24	6	1,131	18	1,149
1980-1984	1,175	59	35	24	6	1,156	19	1,175
1981-1985	1,255	59	35	24	0	1,231	25	1,257
1982-1986	1,147	54	32	22	0	1,124	25	1,150

1983-1987	1,127	49	29	20	0	1,107	22	1,129
1984-1988	1,223	48	28	20	0	1,204	21	1,225
1985-1989	1,215	49	29	20	0	1,195	22	1,218
1986-1990	1,202	50	29	20	0	1,181	22	1,203
1987-1991	1,244	53	32	22	0	1,222	23	1,245
1988-1992	1,324	59	35	24	0	1,300	26	1,326
1989-1993	1,239	62	37	25	0	1,213	27	1,240
1990-1994	1,227	64	37	26	0	1,201	27	1,228
1991-1995	1,433	66	39	27	0	1,406	29	1,436
1992-1996	1,581	69	41	28	0	1,552	32	1,584
1993-1997	1,602	71	42	29	0	1,573	33	1,606
1994-1998	1,601	75	44	31	0	1,571	35	1,605
1995-1999	1,550	74	44	30	0	1,520	36	1,555
1996-2000	1,367	74	44	30	0	1,336	34	1,370
1997-2001	1,290	71	42	29	0	1,261	30	1,291
1998-2002	1,248	70	41	29	0	1,219	28	1,247
1999-2003	1,331	68	40	28	0	1,303	27	1,330