

The Politics and Economics of the U.S. Crop Insurance Program

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I. Introduction

Agricultural subsidies have been part of U.S. agriculture since the 1930s, when support for agriculture was a major part of the national economic stabilization effort of the New Deal. With the exception of the World War II period, the structure of subsidies from the 1930s until 1996 consisted of price supports that were defended by commodity storage and supply controls. Supply control and government storage were largely eliminated in 1996. The main form of support for agriculture today is a combination of \$5 billion per year of fixed direct payments that are decoupled from production, and crop insurance, which has turned into a \$7 billion program.

It could be argued that deadweight losses from the current system of subsidies are lower than the past combination of supply control and price supports if government revenue is raised efficiently and if the crop insurance program provides farmers with an efficient risk transfer mechanism that the private sector cannot provide. Glauber and Collins, in their review of the history of the crop insurance program, note that private crop insurance markets have routinely failed in the past because of the systemic nature of crop losses. However, they also note that another explanation for the lack of a private crop insurance market may be a lack of demand. If the private sector cannot provide adequate crop insurance then it is possible that government provision of this missing risk transfer

market could improve welfare. But if private insurance markets do not exist because of a lack of demand, then government creation of a crop insurance industry likely leads to large welfare losses.

In this paper I first explore in some detail whether there is empirical evidence of unmet demand for crop insurance that could justify government creation of the market. I use two year of cross section data to make this determination. The two years span a large change in the actuarial fairness crop insurance premiums that allows revelation of the farmer demand for actuarially fair insurance. Determination of whether crop insurance contracts that are offered to farmers are actuarially fair is not trivial because the rate making methods used by the responsible government agency were not consistent with actuarial fairness. One contribution of this paper is the construction of a data set that estimates the degree to which corn, soybean and wheat farmers were offered contracts that were over-rated, under-rated, and that were actuarially fair.

The empirical section of the paper finds support for the notion that a substantial number of farmers will buy more actuarially fair insurance. Although this result accords well with standard expected utility theory, it runs counter to current large crop insurance policy, and much of the literature that maintains that farmers need to be heavily subsidized before they will increase their purchase of insurance. One explanation for the large premium subsidizes can be found by looking at interest groups who gain from large premium subsidies. A detailed examination of the interest groups who capture rents from the program provides insight into the political forces that have worked to defend and expand the program subsidies. The program serves as a case study that follows closely the

predictions of Becker's theory of legislation as a reflection of economic payoffs from the application of pressure by affected interest groups.

The paper begins with a general overview of the program. This overview is needed to understand how interest groups extract rents from the program. The construction of a unique dataset is then detailed to show how expected producer returns for increased crop insurance coverage can be estimated. The demand for increased insurance coverage is estimated for the subset of the data that includes actuarially fair insurance contracts and for the entire sample. The paper then moves to an exploration of competition within the crop insurance program and identifies which interest group, other than farmers, captures the lion's share of rents in the program. A brief examination of legislative history that corroborates who benefits from the program concludes the paper.

II. Overview of the U.S. Crop Insurance Program

Public statements about the purpose of the U.S. crop insurance program are not difficult to find. They mainly claim two broad public policy objectives: help farmers manage financial risk and eliminate the need for Congress to pass supplemental ad hoc disaster assistance programs. Congress dramatically restructured the program in 2000 with the Agricultural Risk Protection Act (ARPA). The reform was justified by President Clinton in his statement upon signing the Agricultural Risk Protection Act (ARPA) of 2000: "I have heard many farmers say that the crop insurance program was simply not good value for them, providing too little coverage for too much money. My FY 2001 budget proposal and this bill directly address that problem by making higher insurance coverage more affordable, which should also mitigate the need for ad hoc crop loss disaster assistance

such as we have seen for the last three years.” And in 2006 testimony before the House Subcommittee on Agriculture, Rural Development, Food and Drug Administration, and Related Agencies, former USDA under secretary J.B. Penn said, “One of the overarching goals of the crop insurance program has been the reduction or elimination of ad hoc disaster assistance.”

By all accounts, Congress has seemingly succeeded in its objective to help farmers manage risk. Coverage is provided to more than 350 commodities in all 50 states and Puerto Rico. And more than 80 percent of eligible acres are now insured under the program. The Congressional Budget Office projects crop insurance outlays in excess of \$7 billion for the foreseeable future.

Table 1 provides summary program information since 2001. Taxpayer costs equal Administrative and Operating (A&O) subsidies plus net underwriting gains paid to crop insurance providers plus total indemnities paid to farmers minus farmer-paid premiums. Each of these is discussed in turn.

Administrative and Operating Subsidies

In 1980, Congress decided that delivery of the crop insurance program should be given to the private sector so that the program could be expanded as rapidly as possible. Companies had an incentive to expand sales because they were essentially paid a sales commission. For each dollar of premium they brought in, companies were given a percentage. That percentage, called A&O, was reduced by 2.3 percentage points (from approximately 20.7 percent of premium) beginning in 2009.

Table 1. National crop insurance data

Year	Insured Acreage^a (million acres)	Total Premiums^a (\$ million)	Total Indemnities^a	Premium Subsidies^a (\$ million)	A&O Subsidies^b	Underwriting Gains^c
1998	182	1,876	1,678	946	445	279
1999	197	2,310	2,435	955	499	272
2000	206	2,540	2,595	951	554	282
2001	211	2,962	2,960	1,772	634	348
2002	215	2,916	4,067	1,741	627	-47
2003	217	3,431	3,261	2,042	734	378
2004	221	4,186	3,210	2,477	887	692
2005	246	3,949	2,367	2,344	829	965
2006	242	4,579	3,503	2,682	930	887
2007	272	6,562	3,547	3,824	1,339	1,682
2008	272	9,857	8,664	5,693	2,011	1,163
2009 ^d	264	8,938	4,032	5,418	1,622	2,000

^aTaken from Summary of Business reports of the Risk Management Agency of the US Department of Agriculture.

^bCalculated from Exhibit 5 Table 5.1 of Grant Thornton and Total Premiums in this table.

^cUnderwriting gains taken from Exhibit 1 in Grant Thornton LLP.

^dCurrent as of January 18, 2010. Total 2009 indemnities will rise substantially. A&O estimated by multiplying 2009 estimated premium by 18.1%, reflecting the cut in A&O reimbursement enacted in 2009. Underwriting gains in 2009 will likely be greater than the \$2 billion shown here.

Net Underwriting Gains

A gross underwriting gain occurs in the crop insurance program when premiums exceed indemnities. In these years, crop insurance companies get to keep a portion of the difference. In these years, crop insurance companies get to keep a portion of the difference. The portion they keep is called the net underwriting gain. For example, in 2004, premiums exceeded claims by \$979 million. Companies were allowed to keep \$848 million of this difference. In years in which premiums are less than insurance claims, companies may have to pay a portion of the difference, an underwriting loss. In 2002, claims exceeded premiums by \$1.15 billion. Companies had to pay the government \$52 million of this amount.

The 2002 and 2004 examples nicely illustrate why, on average, crop insurance companies expect to generate underwriting gains. In years in which underwriting gains are positive, companies get to keep a larger proportion of the gain than they have to pay the government in years in which there are underwriting losses. The mechanism by which net gains and losses are determined is the Standard Reinsurance Agreement (SRA).

Companies generate net gains from the SRA in three ways. The first is by determining which of their customers are most likely to generate claims and then giving the premium from these customers and responsibility for any subsequent losses directly to the government. The average customer retained by a company therefore has a better risk profile than the average customer in the overall pool. Thus, average claims from the retained pool will be lower than the overall average, and the company will tend to make money.

However, the overall risk of loss from retained customers is still too large for companies to be willing to take on all losses. Hence the SRA is designed to have the government take on a portion of company losses when claims exceed premiums in exchange for companies giving the government some of their gains when premiums exceed claims. In exchange for companies taking on some of the risk of the crop insurance program, the government is allowing companies to generate some gains. It is almost as if crop insurance companies are selling taxpayers an insurance policy. In years where crop losses are high, taxpayer losses are reduced because some of the losses are covered by the “policy.” The premium that taxpayers pay for this policy are the underwriting gains that companies garner in years where crop losses are small. Whether taxpayers are getting a

good deal by this bargain depends on the size of the premium paid in good years relative to the payments received in bad years.

Table 2 summarizes one set of conservative estimates of the potential gains and losses to private crop insurance companies from operation of the current SRA. These estimates are based on loss experience from 1993 to 2005 and likely understate the actual underwriting gains that companies currently expect to make. The table presents four equally likely scenarios regarding crop insurance claims. With \$8 billion in premiums, companies should expect to make \$850 million per year in net underwriting gains. In exchange for paying companies an average of \$868 million per year, taxpayers reduce their loss exposure by \$440 million in one year out of four. Program costs would be much lower if the Federal government simply and directly took all the risk from the crop insurance program rather than buying an over-priced insurance policy from the crop insurance companies.

Table 2. Potential gains and losses to crop insurance companies under the Standard Reinsurance Agreement

Insurance Claim Loss Scenario	Loss Ratio (Indemnity over Premium)	Ratio of Gain to Total Premium	Total Gain to Companies (\$ million)
Very Low	0.53	0.238	1,904
Moderately Low	0.72	0.136	1,088
Moderately High	0.76	0.115	920
Very High	1.28	-0.055	-440
Average	0.82	0.108	868

Source: Estimated by author.

The third way that companies make money from the SRA is that gains and losses are calculated for each state separately. Given the asymmetry of net gains and losses

separate ceilings on losses for each state will result in lower overall losses that more than compensate the benefits of separate ceilings on gains.

Producer Premium Subsidies

The last taxpayer cost category is premium subsidy. Farmers must pay for crop insurance, but they pay only a portion of the amount needed to cover insured losses. Throughout the 1980s and 1990s, farmers were reluctant to buy enough crop insurance to satisfy Congress. So to get farmers to buy more insurance, ARPA dramatically decreased the portion that farmers must pay. Currently, farmers pay about 41% of the amount needed to cover insured losses. This large subsidy means that most farmers will get substantially more back from the program than they pay it. As will be shown, the large increases in premium subsidies under ARPA also allows for estimation of producer demand for actuarially fair insurance contracts because before the change, most farmers needed to pay more than actuarially fair amounts for low deductible policies, and after the change, many farmers needed to pay less than actuarially fair amounts for increased coverage.

III. Demand for Crop Insurance

One justification for Federal provision of the crop insurance program is the inability of the private sector to meet risk averse farmers' demands for insurance. The primary reason given for this inability is lack of poolability in insurance claims (Miranda and Glauber). Indeed, crop risk bears many of the characteristics of an uninsurable risk. As noted by Miranda and Glauber the coefficient of variation of loss ratios is much higher than most other forms of property and casualty insurance. One solution to this lack of poolability is to reinsure in capital markets with catastrophic bonds. In 2009, in excess of \$3.4 billion of

cat bonds were issued (Johansmeyer (2010)), which implies that the total amount of at-risk capital now exceeds \$12 billion (GC Securities). Whether the current crop insurance liability of \$80 billion could all be reinsured in capital markets is untested because the U.S. taxpayer currently provides reinsurance for the program. Thus, there is at least some possibility that without public intervention there could be under-provision of insurance in agriculture. However, a necessary condition for under-provision is an excess demand for insurance by farmers at the level of insurance that the private sector would offer.

The evidence for unmet demand seems weak. Goodwin (1993) showed that demand for insurance is driven primarily by increases in expected indemnities in excess of premiums. His analysis covered a period of quite low participation (1985 to 1990) when adverse selection was likely widespread. Goodwin (1993) estimated expected indemnities by a 10 year average ratio of indemnities received to premiums paid. Just, Calvin and Quiggin (1999) modeled farmer participation in crop insurance by comparing farmers' expectations of indemnities with insurers' expectations of indemnities and found that asymmetric information was significant in explaining which farmers purchased crop insurance in 1988. They find that risk aversion played a minor role in explaining the incentive to buy insurance. Rather, the opportunity to obtain positive expected returns provides the primary motivation.

These two studies provide little evidence of unmet demand for actuarially fair insurance. However, both studies were conducted when crop insurance participation was quite low. For example, in 1988, only 24.5% of eligible acres were enrolled in the program (FAPRI). Thus, it is not surprising that adverse selection was important in determining who participated in the program. More recently, however, participation has

become much higher. In 1998 and 2002 (the two years studied here), participation increased to 67.9% and 80.2% of eligible acres respectively. The importance of adverse selection in the participation decision should be much lower with such a large share of producers now participating in the program. The question that motivated the study by Just, Calvin and Quiggin whether the pursuit of higher expected returns or risk aversion is what drives crop insurance demand is still key to determining whether producer welfare gains from provision of a missing risk transfer market can justify government provision of crop insurance.

Consider a risk averse, expected-utility-maximizing farmer who grows a single crop. The farmer can choose to insure crop yield at any coverage level α . The insurance contract is of the form $I = \max(\alpha\bar{y} - y, 0)$ where I is the insurance indemnity, \bar{y} equals expected yield, and y is realized crop yield. Normalizing crop price to unity, and denoting the distribution of yield as $g(y)$, $0 \leq y \leq y_{max}$, and the insurance premium as $r(\alpha)$, expected utility for the producer with this insurance contract is

$$EU = \int_0^{\alpha\bar{y}} U[\alpha\bar{y} - c - r(\alpha)]g(y)dy + \int_{\alpha\bar{y}}^{y_{max}} U[y - c - r(\alpha)]g(y)dy .$$

If $r(\alpha)$ is actuarially fair, then $r(\alpha) = \int_0^{\alpha\bar{y}} (\alpha\bar{y} - y)g(y)dy$. Risk averters will

demand full insurance if insurance is actuarially fair (Arrow) or if premiums are subsidized at lower-than-actuarially fair levels. In either case, expected utility is increasing in

$\alpha < \frac{y_{max}}{\bar{y}}$. Risk averters will also demand full insurance even if insurance premiums are

higher than actuarially fair levels if risk premiums are large enough. Risk neutral producers, however, buy insurance only if expected indemnities exceed premiums paid.

The U.S. crop insurance program limits α to a maximum of 0.85, a minimum of 0.5, and increments of 0.05. Thus, if risk averse farmers were offered actuarially fair yield insurance, then all would tend to buy the maximum amount of coverage with $\alpha = 0.85$.

This observation would indicate excess demand for insurance by risk averse producers and evidence that demand for crop insurance is sufficient to potentially justify government support for the market.

However, it is easily verified that farmers do not, in fact, all buy 85% coverage.

Figure 1 shows that the 85% coverage level was actually one of the least popular deductible levels among corn, soybean and wheat farmers in 2009.

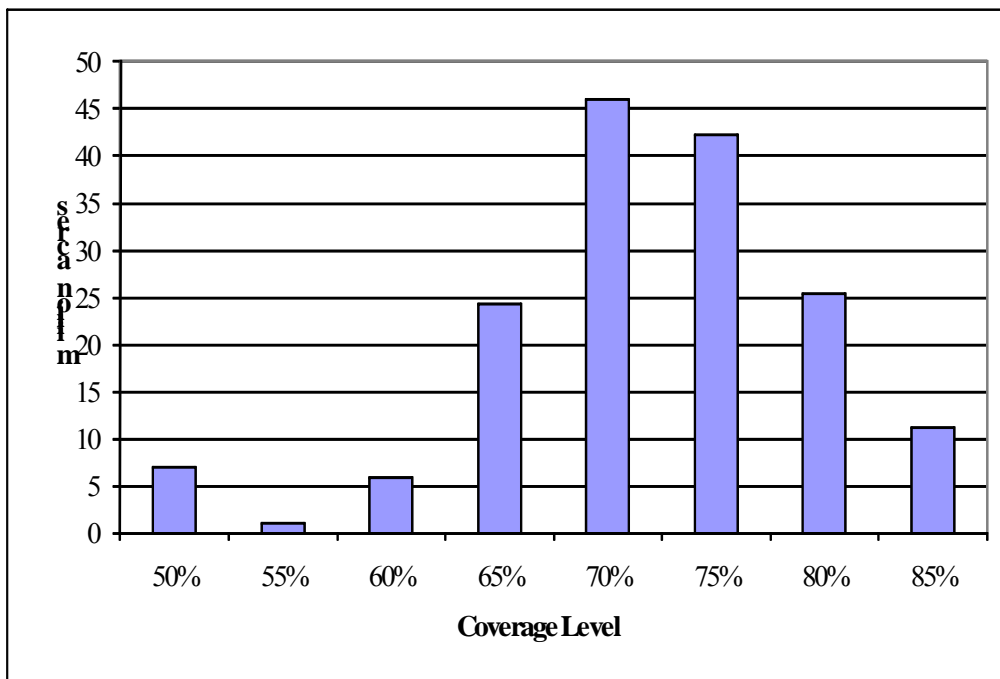


Figure 1. Acres insured at different coverage levels for corn, soybean, and wheat producers in 2009.

Source: Summary of business reports from the Risk Management Agency of the U.S. Department of Agriculture.

The paucity of 85% policies in 2009 by itself is not sufficient evidence to conclude that there is no excess demand for crop insurance. An alternative explanation is that the incremental price that farmers must pay for 85% policies are higher than actuarially fair levels. Although USDA's Risk Management Agency (RMA) is supposed to set premium rates that are actuarially fair, RMA places a surcharge on low-deductible policies in an effort to combat adverse selection. Loss experience data that RMA considered in the early 2000's convinced RMA that farmers who were more likely to suffer crop losses tended to purchase low deductible policies. In addition, the percent premium subsidy declines as farmers move to higher coverage levels. Babcock and Hart (2005) demonstrated that many of the insurance contracts offered to farmers for 85% coverage decrease expected returns relative to 80% coverage.

The hypothesis to be tested here is whether expected utility is increasing in α when farmers are offered actuarially fair insurance. Evidence in support of this hypothesis would be a large preponderance of farmers moving to high coverage levels when offered increased coverage at an actuarially fair price. To test this hypothesis requires data that measures farmers' coverage level purchase decisions that are matched up with an estimate of the incremental (to coverage level) actuarial fairness of the crop insurance contracts that are offered to farmers. It is not sufficient to look at participation decisions to answer this question because large premium subsidies make expected returns to participation positive for most farmers. However, wide variations in incremental actuarial fairness across crops, space, and time allows identification of farmer demand for actuarially fair insurance. Insurance data from corn, soybeans, and wheat in 1998 and 2002 are used to test the

hypothesis. Because this time period had similar participation rates to current participation, the results from this analysis are more relevant for the current program than results that relied on pre-1995 data.

Construction of a Data Set Measuring Variation in Actuarial Fairness of Low Deductible Policies

Although RMA has an objective of setting premiums at actuarially fair levels for all coverage, most of its efforts at doing so are concentrated on determining actuarially fair rates when $\alpha = 0.65$. RMA uses historical loss data as the base for determining premiums for a crop in a county. To account for the different coverage levels that farmers purchase, RMA recalculates historical losses as if all farmers purchased 65% policies. Babcock, Hart, and Hayes (2004) demonstrated that RMA's method that was in place until 2003 for determining the incremental premium cost for crop insurance for non-65% policies did not lead to actuarially fair incremental premiums even if the 65% premium was actuarially fair. For high-risk crops and regions, the incremental cost was too high, leading to higher-than-actuarially-fair premiums. For the lowest-risk crops and regions, the incremental cost was too low.¹

As shown in Figures 2 and 3 there exists tremendous spatial variation in the riskiness of corn and soybean production. Risk here is measured by the average premium rate charged in a county for a 65% policy that protects against yield loss (Actual

¹ RMA changed their rating methods not in response to the publication of the Babcock, Hart, and Hayes paper but rather to an external review of their rating methods in response to concerns by the crop insurance industry that the incremental cost of Revenue Assurance, which incorporated the Babcock, Hart, and Hayes rating methods, was too low. The external review concluded that the incremental cost of Revenue Assurance premium rates were correct. RMA responded to this finding by making the incremental costs of Crop Revenue Coverage and Actual Production History correspond to those of Revenue Assurance. A note of disclosure: The author of this article was responsible for developing the rating methods for Revenue Assurance.

Production History of APH insurance). This variation in riskiness combined with the Babcock, Hart and Hayes (2004) result implies that there are large variations in the degree to which incremental crop insurance premiums are actuarially fair.

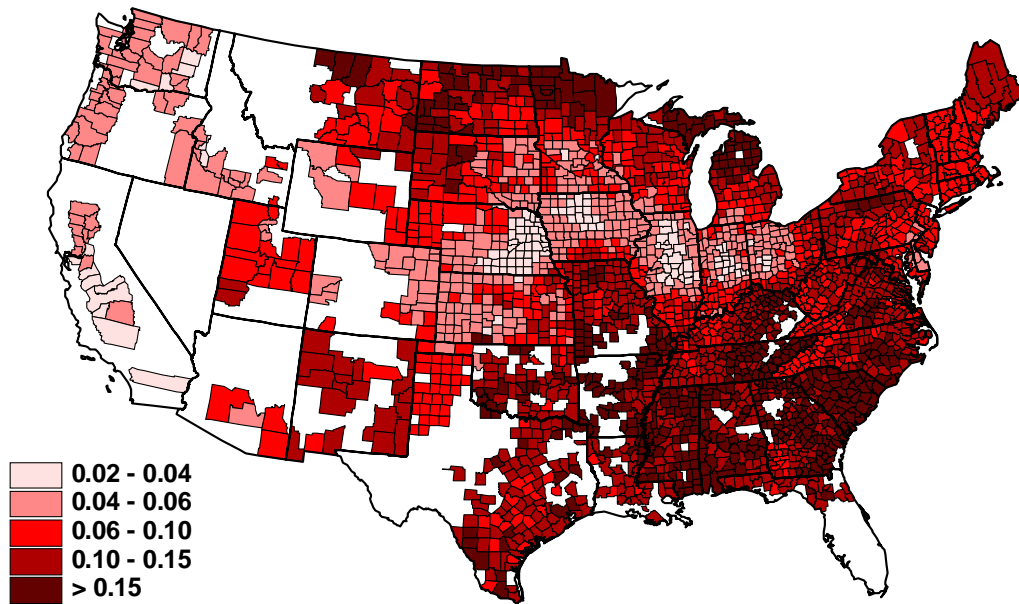


Figure 2. Premium rates for 65% APH corn insurance for the 2002 crop year

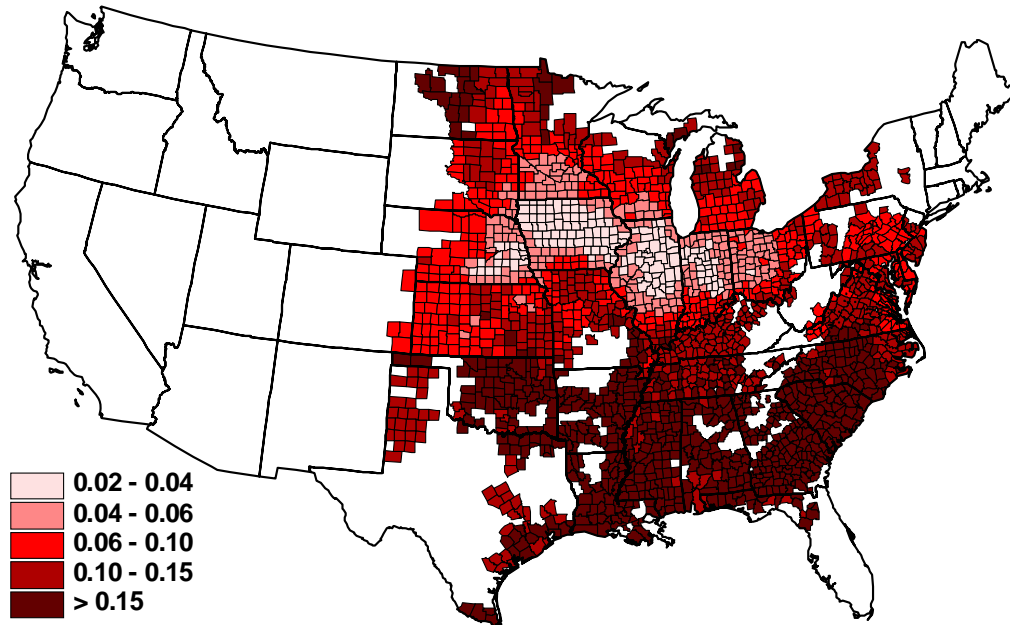


Figure 3. Premium rates for 65% deductible APH soybean insurance for the 2002 crop year

The premium rates illustrated in Figures 2 and 3 express premium as a percent of liability. These rates vary across counties by a factor of more than seven with the lowest rates in the Central Corn Belt and the highest rates in the Southeast. To measure the incremental farmer cost and expected indemnity of increasing α , the costs and expected indemnities could be calculated at all coverage levels. However, in the late 1990s, many farmers could not buy policies with $\alpha > 0.75$. Thus, to allow data from 1998 to be combined with data from 2002, incremental expected returns of moving from $\alpha = 0.65$ to $\alpha = 0.75$ are calculated.

Output prices, expected yields, and production costs are independent of α . Thus the change in expected returns equals the change in expected indemnities (I) minus the change in producer paid premiums (PP).

$$(1) \quad \Delta\pi = E(I_{75}) - E(I_{65}) - (PP_{75} - PP_{65}) = \Delta I - \Delta PP$$

where the subscript denotes α . If premiums are actuarially fair and unsubsidized, then $\Delta\pi = 0$.

Incremental costs of crop insurance coverage

To estimate ΔPP in equation (1) requires an accounting of the actual subsidies and premiums charged. The 2002 Agricultural Risk Protection Act (ARPA) changed the subsidy structure but not the premium structure, so we need to estimate ΔPP both before and after ARPA. It is straightforward to calculate ΔPP . Denoting 65% and 75% premium rates (premium divided by liability) as $rate65$ and $rate75$, the premium subsidy rates at 65% and 75% as $psub65$ and $psub75$, and the insurance price as p , the change in the producer premium for the APH plan of insurance is

$$(2) \quad \Delta PP = (1 - psub75) * rate75 * p * 0.75 * \bar{y} - (1 - psub65) * rate65 * p * 0.65 * \bar{y}.$$

Both before and after ARPA, 75% deductible premium rates (dollars of premium per dollar of liability) for the APH program for corn, soybeans and wheat equal the 65% deductible premiums multiplied by the constant 1.538. Therefore,

$$(3) \quad \Delta PP = p * \bar{y} * rate65 * (1.538 * 0.75 * (1 - psub75) - 0.65 * (1 - psub65)),$$

which under pre-ARPA conditions equals approximately $0.5 * p * \bar{y} * rate65$. After ARPA, premium subsidy rates were increased from 41.7% to 59% for 65% coverage and from 23.5% to 55% for 75% coverage. Thus ΔPP after ARPA is approximately $0.25 * p * \bar{y} * rate65$, which demonstrates that ARPA cut the incremental cost of moving to $\alpha = 0.75$ in half for all U.S. corn, soybean, and wheat farmers.

Incremental expected indemnities from higher coverage levels

If unsubsidized premium rates were set at actuarially fair levels for all α , then the change in expected indemnities from moving to $\alpha = 0.75$ would equal the change in unsubsidized premium:

$$(4) \quad \Delta I = p * \bar{y} * (0.75 * rate75 - 0.65 * rate65).$$

Babcock, Hart, and Hayes demonstrate that a negative relationship must exist between $rate65$ and the ratio of $rate75$ to $rate65$ if both rates are to be actuarially fair. That is, in high risk regions, the incremental rate as one moves to a 75% policy is much lower than the incremental increase in low risk regions. But crop insurance rates for APH had, until 2003, a constant ratio of $rate75$ to $rate65$. Thus the actual premiums charged cannot be used to estimate ΔI as in (4).

Figure 4 shows the relationship between ΔI , expressed as a percent change, and alternative premium rates for $\alpha = 0.65$. This relationship was estimated using Monte Carlo integration of yield draws from a beta distribution. The beta parameters were calibrated to generate draws that lead to average indemnities that equal each alternative premium rate on the horizontal axis. The beta distribution is regularly used to model yield distributions for crop insurance because of its flexibility. The relationship between the change in expected indemnities and the 65% premium rates illustrated in Figure 4 is robust across alternative functional forms for the yield distribution. Thus, if the 65% premium rate is actuarially fair, then applying the Figure 4 relationship will lead to an estimate of ΔI

given any 65% premium rate.

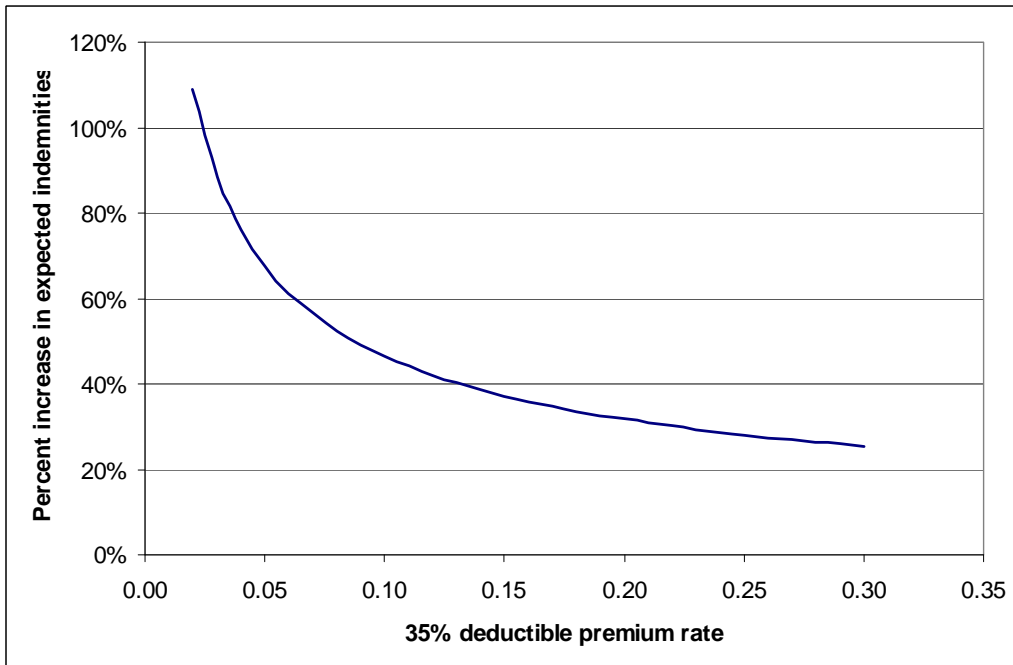


Figure 4. Increase in expected indemnities from moving to 75% from 65% coverage

What we want to determine is whether farmers who are offered incrementally actuarially fair insurance increase their insurance coverage. The data that will be used includes only those farmers who have already decided to purchase crop insurance. The purchase decision means that farmers have already decided that crop insurance generates net benefits, either in the form of higher expected returns or reductions in risk.

With $\alpha = 0.65$, farmers received a 41.7% premium subsidy in 1998 and a 59% subsidy in 2002. These large premium subsidies imply that nearly all farmers are offered a base level of coverage that generates positive expected returns. Thus it is not surprising that even risk-neutral farmers would find it beneficial to participate in the program. But the Figure 4 negative relationship combined with RMA's rule of a constant ratio between

premiums rates at 75% and 65% means that there was a wide variation across crops and regions in expected returns from increasing α .

The change in premium and expected indemnities measures the degree to which insurance is actuarially fair at the margin. I measure demand for incremental insurance as the ratio of acres insured at $\alpha > 0.65$ to acres insured at $\alpha = 0.65$. The unit of observation is the county, as in Goodwin (1993). A unit of observation is a county-crop combination. Demand for more insurance is calculated in 1998 and 2002 for each county where corn, soybeans and wheat were insured.

The number of insured acres at each coverage level for all insurance products is available from RMA's Summary of Business reports. Data for 1998 and 2002 were used for a number of reasons. ARPA was passed in June of 2000. Its subsidy provisions went into effect immediately, but farmers had already made their decisions about which coverage level to purchase so there would be little or no impact from ARPA in 2000. Crop year 2001 data could have been used but it takes time for farmers and the industry to learn about significant changes in policy. Insurance agents must be notified and trained, quoting software must be adjusted, and then farmers must be made aware of the impacts of change. Hence, the 2002 data should more fully reflect awareness of the ARPA policy changes and subsequent changes in coverage levels.

We could also extend the analysis to 2003 and 2004 crop year data, but beginning with the 2003 crop year, RMA began to implement a new set of premium rates and surcharges at higher coverage levels. RMA phased these changes in so it would be difficult to accurately calculate the actual insurance offers being made to farmers in these years.

A special 25% premium reduction program was implemented late in, reducing producer paid premiums by an additional 25%. Undoubtedly some proportion of agents and their farmer clients were aware of this program, but many were not. Thus, assuming that all farmers made their 1999 coverage level decisions with full information would be incorrect. The 25% premium reduction program was also in place in 1998, but it was announced after farmers had made their crop insurance decisions. Thus, we can assume that 1998 decisions reflect their prior knowledge about premium and subsidy rates.

In 1998, 71% of corn, soybean, and wheat acres were insured with APH. In 2002, only 34% of acres were insured with APH. To account for the rapid movement of producers away from APH insurance to revenue insurance products over this time period, the analysis is extended to estimating the actuarial fairness of the offer price for increased Crop Revenue Coverage (CRC) from 65% to 75%. First, an explanation of how expected returns to incremental APH coverage is explained.

I estimate the actuarially fair cost of moving to 75% coverage from 65% coverage as being equal to the product of the average 65% premium rate offered to producers in a county who chose to buy at least 65% coverage and one plus the percentage increase in expected indemnities shown in Figure 4. The procedure used to measure the average 65% premium rate for those producers who purchased at least 65% coverage is best explained with an example.

Table 3 presents 2002 corn data for Cass County, Illinois. At each coverage level, the average rate is calculated by dividing total premium by total liability. The average rate at each coverage level is then converted to the corresponding average 65% rate by dividing it by the appropriate rate relativity factor used by RMA. These rate relativity factors are

1.0 for 65% coverage, 1.215 for 70% coverage, 1.538 for 75% coverage, 1.954 for 80% coverage, and 2.462 for 85% coverage. The result of this multiplication is reported in the last column on Table 3. The average 65% rate is then calculated by taking the acreage-weighted average of the results in the last column. In this example the average rate 0.0591.

Table 3. Data for Cass County used to calculate average 65% premium rates

Coverage Level (percent)	Insurance Plan	Insured Acres (acres)	Total Liability (\$)	Total Premium (\$)	Average Rate	Average 65% Rate
65	APH	2,446	456,555	28,563	0.0626	0.0626
70	APH	113	21,138	1,269	0.0600	0.0494
75	APH	341	75,912	4,590	0.0605	0.0393
80	APH	36	8,525	651	0.0764	0.0391
85	APH	0	0	0	na	na

Source: Summary of business reports from USDA RMA:
<http://www3.rma.usda.gov/apps/sob/>

Given this estimate of the average rate we can estimate the average expected gain from moving to 75% coverage. Using the beta distribution that generated the relationship in Figure 4, the actuarially fair 75% premium rate is 0.0825. Then using the above expressions for ΔI and ΔPP after ARPA, we have $\Delta I = 0.02346 * p * \bar{y}$ and $\Delta PP = 0.014927 * p * \bar{y}$. Thus the change in expected profits is $0.008533 * p * \bar{y}$. This change in expected profits is normalized by dividing through by the estimate of ΔI . The result then represents the change in expected profits as a percent change. In this example, the result is 0.36, or that the change in expected profit amounts to 36% of the change in expected indemnity. In this case the percent subsidy is positive. If the change in expected profits is negative, then farmers would be forced to pay more than actuarially-fair amounts for lower deductible policies. The above procedure was implemented for every county in 1998 and 2002 in which corn, soybeans, or wheat was insured under the APH plan of insurance.

Before moving to a discussion of the results, it is instructive to calculate the percent subsidy for Cass County before ARPA. Assuming that the average 65% premium rate in 1998 was 0.0591, the change in expected profit is $-0.006296 * p * \bar{y}$, which translates to a -27% subsidy. That is, Cass County farmers were being asked to pay 27% more than the actuarially fair incremental cost for 75% coverage in 1998. This switch from a 27% tax to a 36% subsidy is illustrative of the magnitude of the change in actuarial fairness of the choices facing U.S. farmers after passage of ARPA.

Calculating the change in expected profits from higher coverage levels with CRC would seem more difficult than with APH because the CRC rating structure contains three separate components (yield risk, revenue risk, and price risk) and a portion of the change in expected indemnities is due to price variability. However, examination of the relationship between 65% APH premium rates and CRC premium rates at the 65%, 75%, and 85% coverage levels reveals an exact linear relationship. Thus the 65% APH premium rate can be used to the change in producer premium for CRC as coverage increases from 65% to 75%. What remains is how to calculate the change in expected indemnities for CRC.

Because CRC premiums used the same constant rate relativities that were used to determine APH premium rates, they cannot be used to calculate expected indemnities. What is needed is an independent measure of the change in expected indemnities that is based on a revenue distribution, much like the beta yield distribution was to generate Figure 4. The rating equations from a competing revenue insurance product, RA (Revenue Assurance), that had lower market penetration than CRC during this period can be used to estimate the change in expected indemnities. The coverage provided by RA with the

harvest price option is nearly identical to CRC. The RA rating equations are based on Monte Carlo integration of revenue draws as discussed in Babcock and Hennessy.²

Before moving to a discussion of results, it is useful to pause and consider the accuracy of my measure of actuarial fairness. First, as stated above, my measure is conditionally accurate insofar as RMA's premium rate for 65% coverage is actuarially fair. Coble et al recommend that RMA continue to use its loss-cost method of rate making, which suggests that they conclude there is no better alternative. Loss experience in the period 2000 to 2008 has led some to conclude that premium rates are higher than actuarially fair in Corn Belt states and lower than actuarially fair in Great Plains states (Woodard et al). If true, then my estimate of what is an actuarially fair offer for marginal coverage in the Corn Belt would actually be a subsidized offer. And for Great Plains farmers, my estimate of an actuarially fair offer would actually be an offer that is priced too high. Evidence of this bias would be a greater take-up of actuarially fair offers in Corn Belt counties relative to Great Plains counties.

The next source of possible error in measurement arises from my using the county as my observational unit. Farmers in a county face different 65% coverage rates because they are judged to present different amounts of risk to the insurance pool. I implicitly assume that there is a single representative farmer in a county that faces an incremental price of higher coverage. If my estimate of actuarial fairness is accurate for the mean farmer in a county and farmers in a county are actually distributed around that mean farmer, then about half of farmers were offered more subsidized margin premiums than I

² The RA rating equations are available upon request from the author.

measure and half were offered less subsidized marginal premiums. There are two factors that mitigate against this being a source of inaccuracy. First, the variability in risk across counties is much larger than the variability in risk within a county. Second, I account for intra-county distributions by defining actuarially fair premiums as being within 10 percentage points of what my measure takes to be as being absolutely fair.

As with all empirical studies, sample selection bias warrants discussion. My sample consists of all farmers who chose to insure their corn, soybeans, and wheat in 1998 and 2002. Between 20% and 30% of acreage was not insured in this time period. Nonparticipating farmers felt that they had more cost effective means of risk management than crop insurance, which could imply that they were being offered insurance on too unfavorable terms. Thus, my analysis is only relevant for those farmers who chose to participate. That the increase in premium subsidies in 2000 brought increased participation suggests that participating farmers in 2002 were, on average, of lower risk than farmers who participated in 1998. To the extent that the average 65% premium offered to these farmers was actuarially fair, then this difference in level of risk is accounted for.

Finally, some explanation for why nobody else has conducted this type of analysis is needed. I am not the first to estimate the actuarial fairness of insurance offers to farmers. For example, Just, Calvin and Quiggin (1999) estimated differences between farmers' perceptions of actuarial fairness and the actual premiums they were being charged. They used these differences to predict which farmers chose to buy insurance. One explanation for the differences in actuarial fairness was a lack of rating data caused by low participation. Nobody, to my knowledge has focused on putting together a data set to calculate the actuarial fairness of the offer that farmers faced for higher coverage levels.

Perhaps this is not too surprising because most crop insurance demand studies have focused on the participation decision, rather than on the demand for higher coverage. My focus on marginal coverage arose because in 2002 I was in the unique position of having to defend the large discrepancies between how fast RA premium rates increased as farmers chose to buy more coverage relative to how fast premium rates for competing products increased. Farmers in high-risk counties were moving rapidly to RA from CRC because RA marginal premiums were sometimes less than half what they would have had to pay for CRC. Because the crop insurance industry obtained far fewer premium dollars because of this movement, they forced RMA to review whether RA premium rates were too low. My work in showing RMA and the industry that RA marginal rates were accurate is what provided me with the background to put together this data set.

IV. Results

Table 4 provides summary statistics of the entire data set. As shown, the number of counties where farmers purchased APH and CRC insurance is higher in 2002 than 1998 for each crop. The percent subsidy across all crops in 1998 ranged from a low of -73% for wheat to a low of -63% for soybeans. This meant that, on average, farmers were forced to pay more than actuarially fair amounts for higher levels of yield insurance in 1998. In contrast, in 2002, farmers on average were offered higher levels of insurance at close-to-actuarially fair premiums.

Table 4. Data Summary by Crop, Year and Insurance Type

	1998		2002	
	APH	CRC	APH	CRC
Corn				
Observations	1,878	1,026	2,022	1,730
Average Subsidy ^a	-65%	-60%	17%	-1%
Acre Ratio ^b	0.09	0.18	0.39	0.62
Soybeans				
Observations	1,520	947	1,707	1,384
Average Subsidy	-62%	-83%	18%	-11%
Acre Ratio	0.10	0.21	0.50	0.67
Wheat				
Observations	1,621	806	1,664	1,403
Average Subsidy	-72%	-82%	16%	-7%
Acre Ratio	0.16	0.16	0.37	0.60

^aRatio of change in expected returns from insuring at 75% coverage level to change in expected indemnities from moving to 75% coverage from 65% coverage.

^bRatio of acres insured at greater than 65% coverage to acres insured at 65% coverage or above.

Histograms that show the distribution of the degree to which buying additional coverage was subsidized in 1998 and 2002 across counties are presented in Figures 5 and 6 for APH and CRC respectively. For counties with more than one crop, the average percent subsidy across crops is used. As shown, the change in subsidy structure that took place in 2000 dramatically moved these distributions to the right. This move coincides with the large increase in the percent of acres insured above the 65% coverage level as shown in Table 4. These histograms also show that there are many more counties that were offered actuarially fair increases in insurance in 2002, thus allowing for a better estimation of how many farmers will increase coverage when offered with an actuarially fair premium.

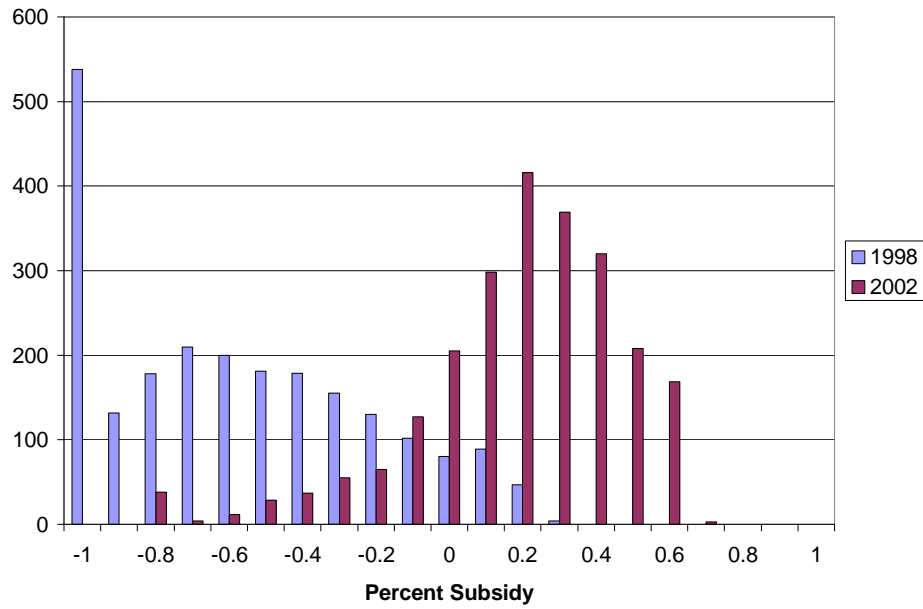


Figure 5. Distribution of Percent Subsidy for APH across Counties in 1998 and 2002

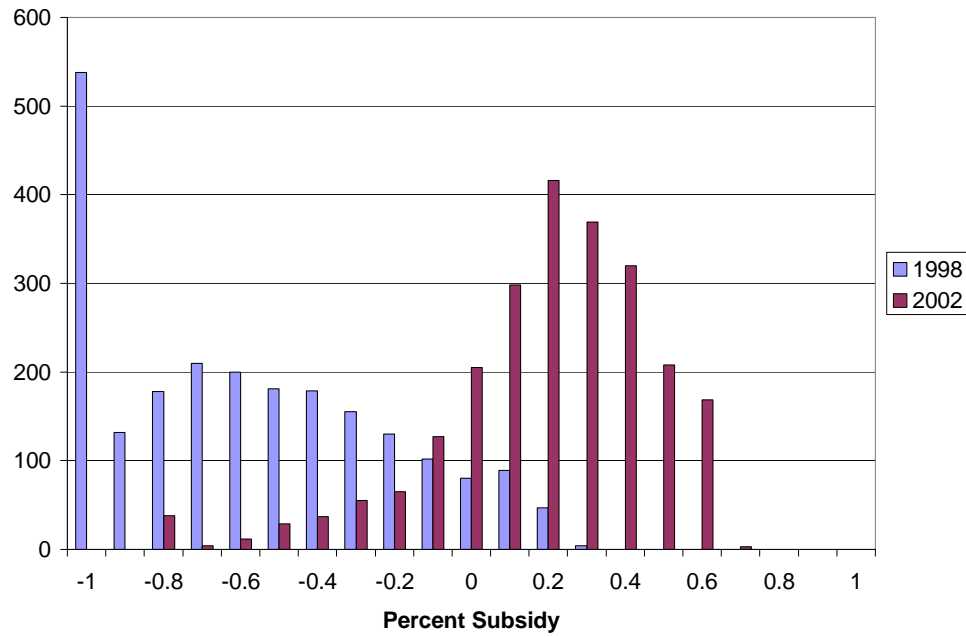


Figure 6. Distribution of Percent Subsidy for CRC across Counties in 1998 and 2002

A straightforward method for estimating the demand for actuarially fair insurance is to use only those observations where the offer is actuarially fair. Table 5 presents results

that parse the data differently using a range of -10% to +10% in the percent subsidy as being actuarially fair. Overall, almost 50% of acreage is insured at higher coverage levels by farmers when offered actuarially fair premiums for the higher coverage. This proportion seems to have increased in 2002 relative to 1998, but a large part of this apparent increase is caused by the increase in acreage insured under CRC. Farmers are about twice as likely to take the offer of actuarially fair insurance when they buy CRC than when they buy APH. Given the low number of observations of available in 1998, and the small increase from 1998 to 2002 in the proportion of acreage insured at higher coverage levels for APH, it is not apparent that the demand for actuarially fair insurance increased in 2002.

Table 5. Share of Acres Insured at Higher Coverage under Actuarially Fair Insurance

	Acre Ratio ^a	Number of Observations
Entire Sample	0.47	3,425
1998	0.27	562
2002	0.51	2,863
APH	0.30	1,565
CRC	0.62	1,860
APH-98	0.26	528
APH-02	0.32	1,039
CRC-98	0.40	36
CRC-02	0.62	1,824

^aDefined in Table 4.

To determine whether the point estimates of differences in demand for actuarially fair insurance are statistically different can be examined by regressing the proportion of observed acres insured at higher-than-65% coverage level on indicator variables that control for plan of insurance, year, and crop. Because this proportion cannot exceed 1.0 or fall below 0.0, a two-limit Tobit regression procedure is appropriate to use. Two sets of

regression results are reported in Table 6. The first column of results use only 2002 data to indicate if the difference between the demand for actuarially fair insurance by producers who buy CRC is statistically different than for producers who buy APH. As shown, the results support this difference. In addition, the demand for actuarially fair insurance for soybeans is statistically higher than the demand from farmers who buy insurance for their corn and wheat crops. This sample was defined by the percent subsidy. Within the range of plus or minus 10% in percent subsidy, the dollar per acre value of the subsidy could still affect the demand for insurance. Thus, the dollar value of the subsidy was included in the regressions. As one would expect, increases in the dollar value of subsidy increases the demand for insurance.

The second set of results is used to test if the demand for actuarially fair insurance increased in 2002. This test is best run using only APH observations because the first regression results indicate that the demand is higher for those who buy CRC and this demand is primarily exhibited in 2002. The hypothesis that demand did not change between 1998 and 2002 cannot be rejected.

Table 6. Regression Results for Observations where Percent Subsidy is Between +/-10%

Sample	2002 Only	APH Only
Constant	0.713* (0.0157)	0.241* (0.0217)
APH Dummy	-0.377* (0.0164)	
Corn Dummy	-0.107* (0.0190)	-7.84E-03 (0.0232)
Wheat Dummy	-0.099* (0.0200)	8.79E-03 (0.0255)
Dollar Subsidy	0.112* (0.0264)	0.123* (0.0381)
2002 Dummy		0.026 (0.0208)

Sigma	0.404*	0.375*
	(0.0067)	(0.0084)

*Denotes an asymptotic t-statistic that is significant at the 0.01 level. Standard errors are shown in parentheses.

These results indicate that the demand for actuarially fair insurance is most important to those producers who buy CRC. Furthermore, more than half of U.S. corn, wheat, and soybean acreage that was able to be insured at higher insurance levels at actuarially fair rates was insured at the higher rates for producers who chose CRC. This insurance product is designed not only to reduce the risk of revenue falling short of a targeted amount, but it is also designed to offset the added financial risk of forward contracts. Many farmers hesitate to forward contract because if they do not produce enough to deliver against the contract, and if market prices have risen above the forward contract price, then they must enter the market to buy expensive grain to fulfill their contract. Thus, the risk management benefits of CRC should be expected to be higher. The results indicate that this is so.

The final regression is to estimate the response of farmers' decisions about buying additional coverage as the percent subsidy increases. Table 7 provides the regression results for CRC only. Following (1990, p. 738), predicted values from a two-limit Tobit model were calculated and reported in Figure 7. For all three crops, the expected proportion of acres that would be insured at greater than the 65% coverage is above 50%. That the predicted value from the regression crosses the zero-subsidy point above 50% implies decreasing amounts of acreage being insured at higher coverage levels as subsidies increase.

Table 6. Regression Results for All CRC Observations

Sample	CRC Only
Constant	0.734* (0.0174)
Percent Subsidy	0.854* (0.168)
Corn Dummy	-0.152* (0.023)
Wheat Dummy	-0.094* (0.024)
Sigma	0.385* (0.0077)

*Denotes an asymptotic t-statistic that is significant at the 0.01 level.

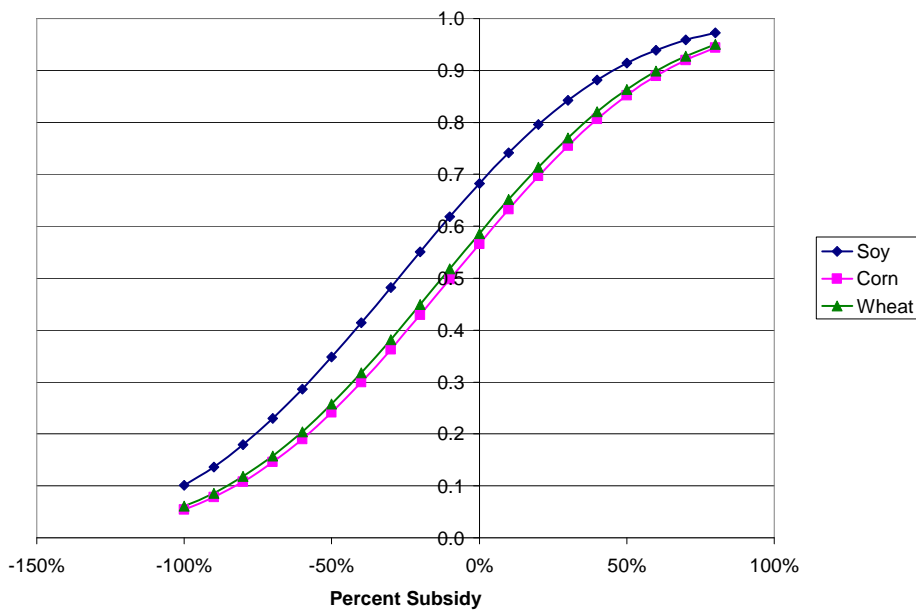


Figure 7. Expected Response of Increased Coverage to Increased Incremental Subsidies

As Babcock and Hart (2005) demonstrate, most farmers are now offered higher revenue insurance coverage (up to 80%) at producer premiums that generate positive expected returns. The results of this paper demonstrate that many farmers will buy higher levels of revenue insurance even if it was offered to them at actuarially fair levels. Given that farmers have shown that they will buy significant amounts of actuarially fair

insurance, it is somewhat of a puzzle why premium subsidies for incremental crop insurance are so large. The results of this paper suggest that a fixed amount of subsidy per-acre to entice an adequate number of farmers to enter the program, and then a contract schedule of actuarially fair premiums would result in a large number of farmers buying a significant amount of insurance. As with so many government programs, one explanation for why premium subsidies are so large can be found by a more careful look at those interest groups who benefit from farmers buying high levels of insurance.

Stigler explains why government regulations often seem to chiefly benefit those who are regulated by the regulators being captured by the industry that they are regulating. And there is ample evidence that the crop insurance industry has a large amount of influence on the Risk Management Agency. But Becker's theory of interest group influence over the political process is perhaps a better starting point for an explanation because the House and Senate Agricultural Committees have taken an unusually direct role in dictating how the crop insurance program is run.

Becker argues that the outcome of the legislative process reflects the pressures brought to bear by interest groups. The influence of powerful interest groups is only limited by increasing deadweight losses from their favored policies and by increased pressure from less-favored groups who increasingly are affected by adopted policies. The next section explains competition in the crop insurance program to explain who in the industry actually benefits from the industry subsidies shown in Figure 8.

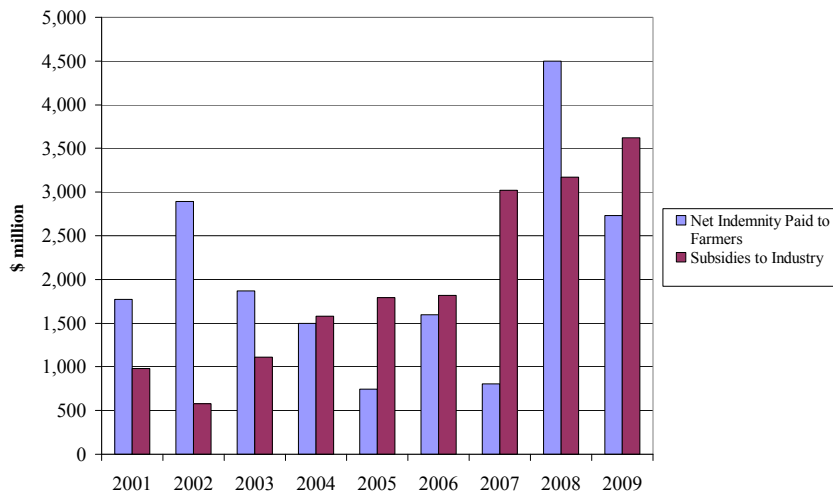


Figure 8. Revenue from the Crop Insurance Program

V. Crop Insurance Competition

In this section a descriptive model of competition in the public/private partnership that characterizes the crop insurance industry is developed. Data is used to validate the main prediction of the model that crop insurance agents are the residual claimants of rents that accrue to the industry.

There are six main interest groups in the crop insurance industry: taxpayers, Congress, government regulators, farmers, crop insurance agents and crop insurance companies. Taxpayer subsidies created and provide continual support to the industry. Congress reacts to political pressure by passing laws that regulate and subsidize the industry. Regulators implement those laws. Farmers buy crop insurance from a crop insurance agent. Crop insurance agents decide which crop insurance company will receive each farmer's business. Agents make money by earning commission on each policy that

they sell. The variable cost of selling policies is much less than the commission on most policies so the more policies they sell, the more money agents make. Thus agents have an incentive to compete with other agents for a farmer's business. Crop insurance companies make money from underwriting gains and from A&O reimbursements. The non-commission variable costs are much lower than A&O and expected underwriting gains in almost all states. These variable expenses include loss adjustment costs and labor. Thus crop insurance companies make more money the more policies that they can obtain. This creates an incentive for companies to compete for agents' books of business. Agents, companies, and farmers have an incentive to lobby Congress to pass laws that work to their favor. As always, because the aggregate cost of the crop insurance program is spread among all taxpayers, opposition to the program by taxpayer groups is unfocused and ineffective.

There exist three sources of competition in this descriptive model. The first is the competition between groups that lobby the House and Senate Agricultural Committees for part of the baseline agricultural budget. This competition pits the crop insurance industry against advocates for more farmer subsidies and advocates for greater spending on nutrition spending. For example, in 2007 the crop insurance industry argued against the reforms of commodity subsidies advocated by the National Corn Growers Association because the reforms would have transferred a large portion of the risk from the crop insurance program directly to taxpayers. More recently, a Des Moines Register article about proposed cuts to crop insurance reported that "One of the industry's leading allies in Congress, Sen. Charles Grassley, R-Ia., said he believes the administration wants to use the \$4 billion in savings it would get from the cuts to increase spending for child nutrition

programs, including school lunches.” The outcome of this first competition is the aggregate amount of support that the industry receives from taxpayers.

The second source of competition is the competition between agents for farmers’ insurance business. This competition cannot include price competition because of laws passed by Congress at the behest of agents. For example, the chief lobbying arm of crop insurance agents, the Independent Insurance Agents & Brokers of America, sought a ban on a program that allowed crop insurance companies to reduce farmer-paid premiums by passing on a portion of agent commissions to farmers. Congress delivered a final ban on this type of price competition in the 2008 Farm Bill.

Because there is no possibility of price competition, agents must compete in terms of service. The types of service that can be offered include educating farmers about the types of insurance coverage offered; lowering the farmer cost of filling out required forms; and keeping farmers informed of any new information that may prove useful. All of these services are of second-order importance to farmers because either they are one-time benefits or because they do not directly increase farmers’ profits. By default, a farmer’s business remains with an agent year after year. So unless an agent convinces a farmer to switch agents, no switch will take place.

To a farmer the benefit of switching must be greater than the cost of switching. The cost of switching includes a bit of paperwork, any social costs involved in moving business from one local neighbor or business person to another who may not be local, and the cost of searching for an agent that can provide superior service. Because there are positive switching costs and only indirect benefits, the incentive for most farmers to switch is not very high, although exact measurement of the incentive would be difficult.

Consequently, the payoff from agent investments designed to induce farmers to switch will not be high. In equilibrium each agent invests an optimal amount to keep their business and to perhaps attract new business, and each farmer has found the agent where the benefits of further switching are outweighed by the costs. Entry costs for new agents, involving the successful passing of a test on crop insurance are nominally low. But the real entry costs are actually quite high because new entrants will find it difficult to build up their book of business by inducing an adequate number of farmers to switch. Thus each agent has essentially a captive book of business.³

Crop insurance companies use price to compete for agents' books of business. The price of an agent's business is the agent commission. Because most agents act independently of companies, they are free to sell their book to the highest bidder. There are approximately 15 companies bidding for business. The maximum bid that a company will likely make is the difference between the expected revenue that an agent's book of business will bring in minus all non-commission variable costs. With sufficient competition, commission rates will exactly equal this difference. Thus price competition between companies along with regulatory barriers that limit competition in premium rates make agents the residual claimant in the crop insurance industry. Evidence for agents being the residual claimant is that agent commissions vary dramatically across states. High commissions are paid where companies expect to make large underwriting gains; low commissions are paid in states with low or negative underwriting gains. The other possible

³ An indicator of the degree to which an agent has a captive book of business is the market value of the book. If the cost of switching were low and the benefits were high, then the market value of an agent's book of business would be low. But anecdotal evidence suggests that the market value of an agent's crop insurance book of business is multiples of the annual profit that can be generated from the book.

residual claimant would be the owners of crop insurance companies; the management and staff of crop insurance companies; or loss adjusters. There may be a limited number of specialized crop insurance actuaries who are efficient at managing the risk profile of crop insurance companies, who may capture increased rents. But there is no reason to think that the salaries paid to non-specialized staff or executives should be above market rates of compensation. The Grant Thornton study on returns to the owners of crop insurance companies shows that the companies are actually making less than the return they have obtained from other lines of property and casualty insurance. The same Grant Thornton study provides convincing evidence that it is the crop insurance agents that are the residual claimant.

Figure 9 breaks shows how per-unit crop insurance costs have changed since 2001. Agent commissions are calculated by dividing total commission paid by the number of crop insurance policies. Other costs include crop insurance company salaries, computers, travel, and overhead. These costs are also expressed on a per policy basis. Loss adjustment costs are calculated by dividing total loss adjustment costs by the number of units on which a loss was paid. The average annual growth in other costs is 5.61%. The average annual cost in loss adjustment costs is 6.1% per year. The Bureau of Labor Statistics reports that the average annual increase in civilian compensation over this time period was 3.4%. This suggests that some rents have accrued to claims adjusters and to staff of the crop insurance companies. But the growth and magnitude of compensation paid to agents is convincing evidence that agents are the primary beneficiary of increased government support to the crop insurance program, as would be predicted if companies bid for agents' captive books of business.

Agents are not the only group that receives rents from the crop insurance program. As shown in Table 1 farmers have garnered about \$18 billion more in payments than they have paid in premiums since 2001. However, not all regions of the United States have benefited equally from the program. Figure 10 shows that the Great Plains states have benefited by a much greater from the crop insurance program than have the Corn Belt states. This difference in benefits means that there is a natural alliance between crop insurance companies and members of Congress who represent areas outside of the Corn Belt.⁴

⁴ Evidence for of this alliance is contained in a press released from the National Corn Growers Association, quoted in a farm policy blog (<http://www.farmpolicy.com/?p=520>): “The National Corn Growers Association (NCGA) is pleased the Senate Agriculture Committee included a revenue option in the 2007 farm bill, but is disappointed by the committee’s action to strip a key component of the optional revenue-based countercyclical program, the integration with federal crop insurance. It is a missed opportunity to provide a better risk management tool in the new farm bill, said NCGA President Ron Litterer. An amendment accepted by the committee on a voice vote stripped the crop insurance integration from the revenue package. Corn growers support an optional revenue program starting in 2010. The ACR plan initially put forward by Agriculture Committee Chairman Tom Harkin (D-Iowa) would have allowed farmers to insure part of their farm revenues directly through the government, costing private crop insurance companies an estimated \$2.2 billion over five years, according to the Congressional Budget Office. Along with an outcry from the industry, Harkin’s plan ran into objections from Western senators who feared that insurance costs would rise as corn growers in the rainy Midwest shifted to the government plan.

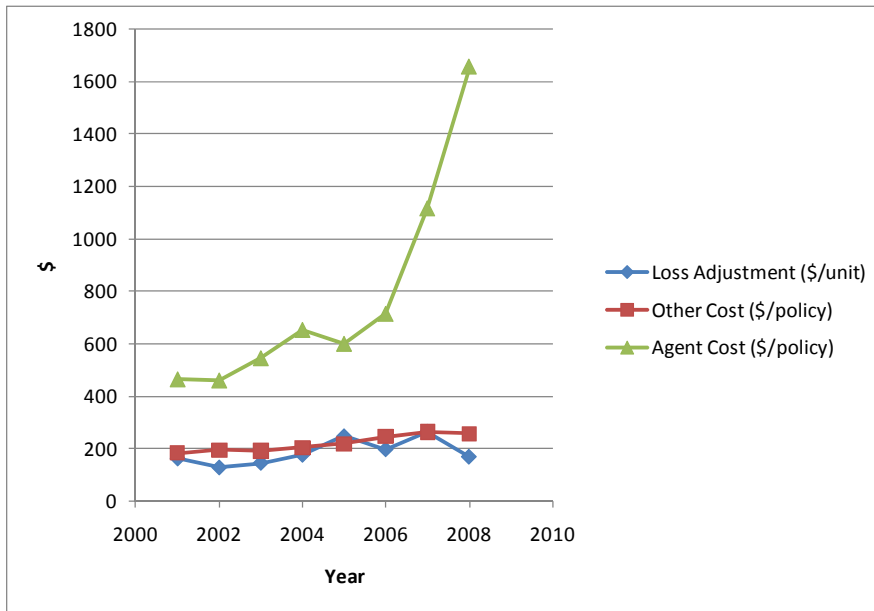


Figure 9. Breakdown of crop insurance program costs (Source: Calculated from Grant Thornton reports Prepared for the National Crop Insurance Services.

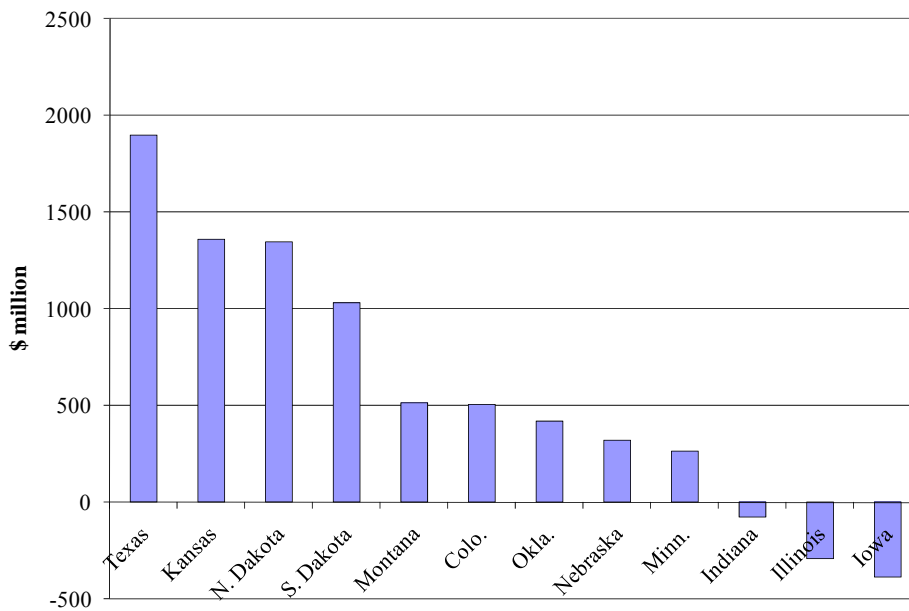


Figure 10. Net Indemnities Received by Farmers: 2000 to 2007
Source: Calculated by author from Summary of Business Reports, Risk Management Agency. U.S. Department of Agriculture.

The outcome of this type of pressure group politics is a crop insurance program that operates for the benefit of crop insurance agents and that has generated positive expected

returns for farmers in the Great Plains. The results of this study, combined with the Figure 10 results, indicate the Corn Belt farmers have received more in risk management benefits that they have received in expected returns.

Becker's theory of competition between pressure groups shows that a limiting factor on the benefits bestowed on more powerful groups is that opposition to these benefits increases by losing groups the more that is given to winners. An implication of this part of his theory is that politicians will work to neutralize opposition by giving them benefits that do not come at the expense of the favored powerful group. In this case, in the new Farm Bill that was passed in 2008, Corn Belt farmers were given a new subsidy program called ACRE (Average Crop Revenue Election), which is a farm program that is not integrated with crop insurance. Thus Corn Belt farmers obtained a new subsidy program and Great Plains farmers and crop insurance agents were able to keep the crop insurance program.

VI. Conclusions

The demand for crop insurance is motivated by both expected returns and risk reduction. This study presents estimates of demand for crop insurance that isolate the demand for risk reduction from the demand for expected returns by construction of a data set from which the farmer response to actuarially fair contract offers can be estimated. The results indicate that more than half of CRC-insured acreage that was able to be insured at higher coverage levels at actuarially fair incremental premiums were so insured. This suggests that a large number of producers find that the risk reductions offered by revenue insurance generate significant value. This provides the possibility that some public support for crop insurance

could be justified if private provision were infeasible because of a lack of reinsurance markets.

These results also indicate that the stated motivation of Congress to offer large premium subsidies to induce farmers to buy increased amounts of insurance are not needed if farmers were offered actuarially fair contracts. An examination of the vested interests of groups that comprise the crop insurance industry offers an alternative explanation for why farmers receive large subsidies to induce them to buy more insurance. Great Plains farmers receive, in aggregate, large positive expected returns from the program. Crop insurance agents are the residual claimants of rents that accrue to private industry. These two groups have been instrumental in pressuring Congress to expand the program and protect it from reform.

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