

Risk Management



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Crop & Revenue Insurance: Bargain Rates but Still a Hard Sell

Risk management in agriculture is aimed, in general, at attaining a desired combination of risk and return. Some producers strive to obtain the highest possible return for an acceptable level of risk, while others may seek to minimize the risk associated with a desired level of return. The ability of different strategies to reduce risk, and the cost of adopting different risk management strategies, varies with each individual situation. But whatever approach is taken, implementation of most risk-reducing strategies involves some trade-off between expected income and risk exposure.

Federal subsidization of crop and revenue insurance programs alters the tradeoff so that operators may attain significant risk reduction at relatively low cost, while actually increasing expected (i.e., long-run) returns. Yet the rate of participation in insurance programs has remained significantly less than universal, with about 61 percent of eligible acres insured in 1998. This may be because the potential benefit of insurance is largely unrecognized and undervalued, or other factors may be at work in the farm operator's decisionmaking process.

In agriculture, as in most other industries, the activities associated with the highest expected returns are often associated with the greatest level of risk. As a result, a producer may be forced to forego those activities with the most potential for profit in favor of other activities with lower but less risky returns.

For example, corn production might promise a farm the highest net returns per acre if favorable weather is combined with heavy input use. However, unfavorable weather could result in low yields and large losses, and gambling on favorable weather by putting all the farm's acreage into corn may be a perilous undertaking for all but the most financially secure operations. A risk-averse producer confronting this situation may be inclined to opt for lower potential profit by partially diversifying the acreage into soybeans and some other grains with lower input costs (e.g., oats, wheat, or sorghum). If, instead, that risk-averse producer faces price prospects that are particularly poor and off-farm employment opportunities exist, renting out or fallowing a large portion of the acreage and devoting a share of household labor time to earning off-farm wages may be a preferred strategy.

The level of risk an individual is willing or able to bear varies with the person's financial situation, attitude toward risk, availability of other opportunities, and ease of transitioning to alternative activities. A variety of strategies is available to enable agricultural producers to achieve an acceptable balance between expected return and risk.

But some risk-reducing strategies may involve substantially lower expected net returns—for example, diversifying production to grow some commodities where returns per acre may be lower but less variable. On the other hand, competitive risk transfer markets—e.g., futures and options exchanges or agricultural insurance programs provide a means of lowering risk with little change in expected net returns. Purchasing crop or revenue insurance is a risk transfer strategy that can be used to obtain varying degrees of revenue-risk reduction at very low cost. A distinguishing feature of this strategy is the Federal subsidies available to crop and revenue insurance market participants.

Subsidies Lower Premiums for Crop & Revenue Insurance

Crop and revenue insurance are low-cost tools to help farmers guard against risk of revenue losses due to yields and prices that fall short of planting-time expectations. Crop yield insurance provides payments to producers when realized yield falls below the producers' insured yield level, whereas crop revenue insurance pays indemnities based on revenue shortfalls that result from yield or price shortfalls (AO April 1999). But unlike most other risk management tools, crop and revenue insurance also provide a special case where income risk is reduced *and* expected returns are increased because of Federal government intervention in premiums charged to farmers. The Federal Crop Insurance Corporation (FCIC) provides subsidies to private companies, eliminating much of the delivery cost and underwriting risk from premiums, and helping to ensure that premiums are a close representation of longrun expected indemnities. In addition, the FCIC subsidizes producer premiums to lower the cost of acquiring insurance so that, in the aggregate, total

This article continues *Agricultural Outlook's* series on risk management.

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How Are Insurance Premium Rates Set & Subsidies Applied?

An *insurance premium* is the amount an individual or business pays for purchase of insurance. For crop and revenue insurance, premiums are generally expressed on a dollars-per-acre basis, but are calculated as a percent of the total liability. *Total liability* is the maximum loss exposure of the insurer—the amount of indemnity payment required if yield were to fall to zero.

Because premiums for crop and revenue insurance are designed to cover losses over time, insurers project yield and revenue distributions to show expected losses and payouts at different levels of insurance guarantees. Premium rates are determined by several factors:

- the type of crop, size of insured unit, and coverage level selected;
- the farm's loss experience and APH (actual production history) yield; and
- the county yield and its historical variability.

For a given crop at a given price, premium rates are highest for land where risk of production loss is greatest—i.e., where yields are the most variable.

USDA's Risk Management Agency (RMA) subsidies encourage participation in crop insurance by reducing producer premiums. The amount of the subsidy depends on the type of insurance and the coverage level in accordance with the 1994 Federal Crop Insurance Reform Act. For minimum CAT (catastrophic) coverage—i.e., 50-percent yield coverage at 55 percent of the expected harvest-time price—the premium is entirely subsidized, and a policy may be purchased for a small processing fee. At higher levels of coverage—referred to as “buy-up” coverage—subsidies are calculated in accordance with yield/price rules:

Calculation of “buy-up” coverage subsidy:

- Yield/price guarantees below the 65/100 level (65-percent yield coverage at a 100-percent price coverage election) are subsidized at a rate equivalent to CAT coverage.
- Yield/price guarantees at or above 65/100 level are subsidized at a rate equivalent to a 50/75 guarantee.
- For each of the above two ranges the subsidy is first calculated as a fixed amount. That amount is then applied to the higher premiums associated with higher coverage levels.

Thus the *subsidy share* of the premium rate declines as coverage rises, with the exception of a kink at the 65/100 coverage break-point where the subsidy share attains a maximum value of nearly 42 percent of the premiums. Premium subsidies are also available for revenue insurance but are based strictly on the yield portion of coverage. As a result, revenue insurance subsidies are generally a lower proportion of total premiums than their yield-based crop insurance counterparts.

expected returns over the long term are greater than farmers' total actual premium costs. In other words, a dollar's worth of expected return can be purchased for less than a dollar of premium.

Substantial taxpayer dollars have been expended over the years to make insurance available on a widespread basis and to increase producer participation in insurance programs. Between 1981 and 1998, Federal risk management outlays included \$5.7 billion in producer premium subsidies, \$3.9 billion in administrative reimbursements to

private insurance deliverers (plus another \$1.6 billion in other administrative costs), and \$3 billion in net underwriting losses which, in the absence of Federal risk sharing, would have been borne by the private companies selling the policies.

Since passage of the 1994 Federal Crop Insurance Reform Act, total insurance-related outlays have averaged nearly \$1.4 billion per year, with premium subsidies comprising the bulk of the transfer. The premium subsidy share of those outlays has also increased. The larger outlays are

due in large part to a significant rise in participation. Insured acreage peaked at 75 percent of eligible acres in 1995 when participation in crop insurance was mandatory for farmers to be eligible for other Federal program benefits—e.g., deficiency payments. The mandatory participation requirement was dropped for 1996 and subsequent years, and as a result, participation has declined.

Under most private insurance policies:

Total premiums = expected indemnities + administrative costs + profit margin

What makes government-subsidized insurance such a good deal? Under most private insurance programs—e.g., automobile, homeowners, health—premiums are set to include all expected *indemnities* (payments made on qualifying losses), plus all the costs of administering the policies, plus a reasonable profit. If premiums fall short of this goal, the company loses money and must either raise premiums or go out of business. Competition among private companies helps to minimize increases in profit margins, keeping premium increases down.

Under FCIC-backed crop insurance:

Total premiums = expected indemnities

Under the FCIC-backed crop insurance program, government payments to insurance carriers are used to ensure that total premiums are set to cover expected indemnities only, which reduces the premiums paid by farmers. Federal crop insurance subsidies are designed, in large part, to equate premium rates with the long-term chance of loss.

To achieve this objective, USDA's Risk Management Agency (RMA), through the FCIC, subsidizes private insurance companies that sell and deliver crop and revenue insurance, by reimbursing them for the costs of selling and underwriting policies, adjusting losses, and processing policy data. The government also lowers the risk associated with underwriting crop and revenue insurance by sharing the risk of loss (and the possibility of gain) on policies sold by private companies.

To encourage producer participation in agricultural insurance markets, the government also pays a portion of producers'

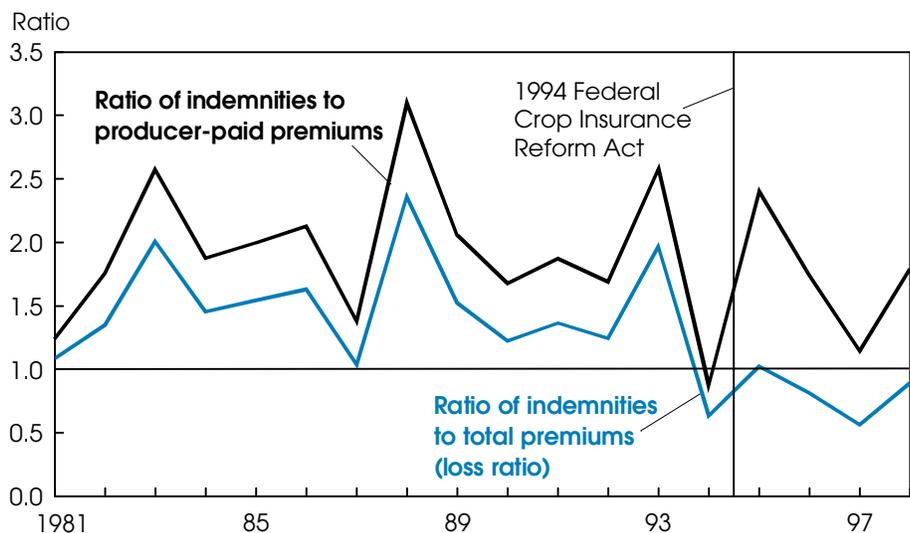
premiums on FCIC-approved policies, ranging from 13 to 100 percent depending on the type of insurance and the coverage option chosen. Premium subsidies are based only on the yield portion of federally backed insurance policies. Subsidies on revenue insurance plans are limited to the amount payable if the producer had elected the yield-based coverage. From 1981 to 1994 these subsidies averaged about 25 percent of total premiums. Beginning with the Federal Crop Insurance Reform Act of 1994, government subsidies have averaged about 50 percent of total premiums across all policies—comprised of a 100-percent share of premiums for minimum catastrophic coverage (CAT) and a 40-percent share of premiums for additional yield loss “buy-up” protection.

Under actuarially fair insurance rate setting—where total premiums equal indemnities paid out, and the insurance program “breaks even”—the premium subsidies represent a positive expected benefit to producers who purchase insurance. In other words, with the government paying part of farmers’ insurance premiums, expected net returns per acre are greater with insurance than without.

How does this work? If the insurance company writing the policy and the producer buying the policy have equal information about risk, and if the insurance premium is set to correctly reflect that risk, then the premium should exactly equal the expected indemnity. With no government subsidy, the producer would pay the full premium and no expected benefit would ensue beyond being able to transfer some production risk. However, when the government subsidizes a portion of an actuarially fair premium, the producer pays less than the full premium but still can expect to obtain the full indemnity. Thus, a dollar of a farmer’s premium returns more than a dollar of expected benefit over the long run.

A measure of the actuarial success of premium rating for crop insurance is the *loss ratio*—total indemnities paid divided by total premiums received. Because rates are set to reflect the longrun chance of loss, actuarial fairness equates to a loss ratio of approximately 1.0. However, in any given year, the loss ratio for a crop in

Since the 1994 Reform, Total Crop and Revenue Insurance Premiums Have Generally Exceeded Indemnities Paid Out



Total premiums = Producer-paid premiums plus Federal Crop Insurance Corporation (FCIC) premium subsidy. A longrun average loss ratio of 1.0 implies actuarial soundness—i.e., an insurance program “breaks even” with regard to premiums and indemnities.
Source: Risk Management Agency, USDA.

Economic Research Service, USDA

a specific area is unlikely to equal exactly 1.0, due to variations in weather. In a year with extremely unfavorable weather, the sum of crop and revenue insurance policies would be expected to show a loss ratio greater than 1.0, implying net underwriting losses (although reimbursement subsidies to private companies for administrative costs could potentially make up for the losses). In years with more normal weather, a loss ratio less than 1.0 may result, with net underwriting gains.

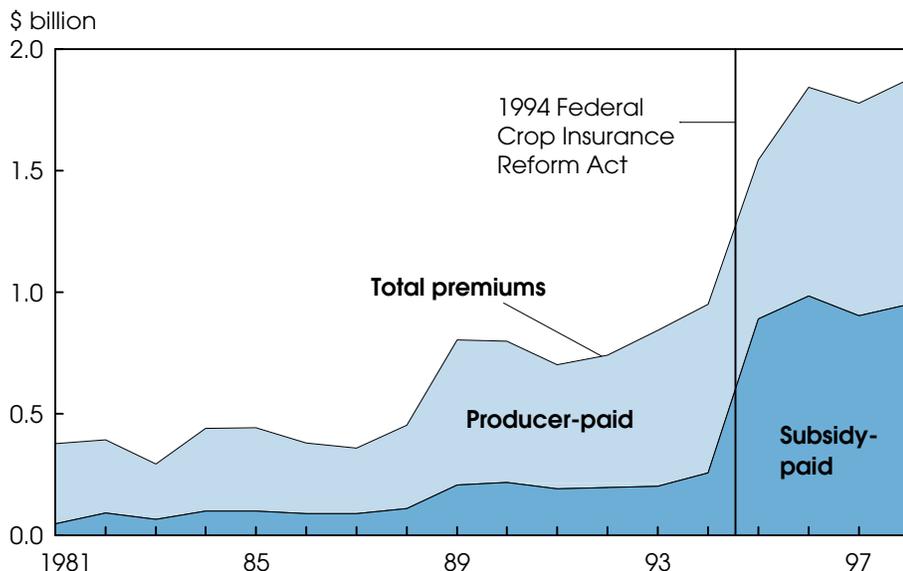
From 1981 through 1993, annual loss ratios (based on total premiums, including subsidies to producers) exceeded unity, suggesting that ratings on subsidized insurance were not actuarially sound. Since 1990, many features of the FCIC-backed crop insurance program have been improved in an “actuarial” sense. For example, rates have been raised, and more stringent penalties for yield data inadequacies have been imposed on insured farmers. These changes, in combination with several years of moderate weather, have helped to improve loss ratio performance significantly since 1993. In addition, private companies have been asked to bear a greater share of the underwriting risk, while reimbursement for administrative costs has declined.

From the producers’ point of view, the relevant ratio is based on actual premiums they pay—the farmers’ cost after subtracting out the Federal subsidy portion of the premium. The ratio based on the producer-paid premium has exceeded unity in every year since 1981 with the exception of 1994 when it dipped below unity. Since 1995 the national aggregate producer-paid indemnity/premium ratio has averaged nearly 1.77, implying that \$1 of premium has bought \$1.77 of expected indemnity benefit “on average,” plus some additional unquantified “benefit” from risk reduction.

If federally subsidized crop and revenue insurance is such a good deal, why don’t all eligible producers take advantage of it? While the answer to this question is debatable, there are several possible reasons why participation in crop and revenue insurance programs is less than universal (in 1998 about 65 percent of acreage planted to major field crops was insured). A key to understanding these reasons rests on the premise that risk-averse farmers can be expected to purchase correctly rated insurance (where the premium accurately reflects the true risk of loss), and both insurer and insured regard the premium as accurately reflecting risk.

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Subsidy-Paid Share of Crop and Revenue Insurance Premiums Increased Sharply in 1995



Premium subsidies are paid by the Federal Crop Insurance Corporation (FCIC).
Source: Risk Management Agency, USDA.
Economic Research Service, USDA

Under this premise, there are several characteristics of crop and revenue insurance programs that help explain less-than-universal participation. First and foremost, it is likely that many farmers simply do not believe expected indemnities exceed their producer-paid share of the premium. These farmers believe (rightly or wrongly) that premium rates fail to reflect their specific situation. In other words, many farmers feel that the premium rates they face (or the processing fee in the case of CAT coverage) overstate their risk of loss. Imperfections in the rate setting scheme probably make this true for some, while others may be poorly informed about the true extent of farm-level risk.

There may also be some misunderstanding or general lack of information concerning how crop and revenue insurance programs work and the advantages they impart. This problem is compounded by the growing array of available insurance products, which strengthens the perception that crop and revenue insurance programs, like many other risk management programs, are too complicated to understand and use correctly.

Other reasons that are frequently cited as contributing to less-than-universal partici-

pation in subsidized crop insurance include:

- 1) An operator's overall level of wealth can have a strong bearing on risk decision-making. For many large commercial operations with substantial equity values, the potential magnitude of a crop loss relative to the equity base may be very small, so the incentive to buy insurance is low.
- 2) Management objectives such as profit maximization or enterprise growth may supersede risk management goals and diminish the demand for insurance.
- 3) Many farmers have some ability to reduce yield and revenue risk through the use of alternative strategies—stable off-farm wage opportunities or diversification of on-farm activities—which may be more cost-effective under some circumstances. Some farms may reduce yield risk simply by altering cultivation and crop management practices, at lower cost than the producer-paid share of the premium on a crop insurance policy.

Finally, many researchers have cited the frequent use of Federal ad hoc disaster assistance payments (from 1988 through 1994 and again in 1998) as a principal deterrent to purchasing crop insurance.

Why pay a premium for something that you would likely get for free?

Do FCIC Subsidies Alter Producer & Carrier Behavior?

The goal of FCIC subsidies is to alter behavior—namely, increase participation in crop and revenue insurance markets. If successful, this contributes to the higher goal of encouraging farmers to reduce their risks, thereby increasing the viability of agriculture and reducing the need for publicly funded disaster assistance programs. But do FCIC subsidies have other consequences? The answer appears to be yes, for several reasons.

First, when viewed as an increase in expected revenue, the subsidy provides not only an incentive to purchase insurance, but also to marginally expand area under crop production, since a producer's total expected return increases with every insured acre.

Second, since premium subsidies are calculated as a percent of total premium, and premiums are higher for production on riskier land, the subsidies are weighted in favor of production on land with the greatest yield variability. As a result, subsidies may encourage production on land that might otherwise not be planted. And to the extent that yield risk varies across both crops and fields, distortions are likely to occur across both regions and commodities.

Third, in the absence of FCIC subsidies, crop insurance premiums would include markups for the insurance companies' administrative costs and profit margin. These added costs could make premium rates prohibitively expensive in high-risk areas. If the higher premium rates discourage participation, such areas would be less attractive markets to private companies selling the policies. To this extent, Federal subsidies increase the likelihood of insurance delivery, and consequently production, in high-risk areas, such as various locations in the Great Plains. **AO**

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