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Understanding Crop Insurance Principles: A Primer for Farm Leaders

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Contents

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INTRODUCTION

U.S. agriculture has undergone significant change in recent years. Perhaps the biggest change for many crop growers has been the shift in federal agricultural policy from a system of subsidy payments that were inversely related to market prices to a system of fixed government entitlement payments. Other changes include the impact of various international trade agreements and congressional efforts to limit the availability of federal disaster assistance payments to growers. Many argue that the net result of these changes is an increase in crop growers' exposure to risk. That is to say that these changes increase the probability that a grower will experience one or more years of very low net income.

In recent years, federal policy makers have increasingly emphasized the Federal Crop Insurance Program as *the* future federal risk management program for farmers (see inset information). This publication briefly describes various federal crop insurance products, but the principal focus is on understanding fundamental aspects of insurance products, in general. For more detailed information on federal crop insurance products and how they can be used by crop growers, see MSU Extension Publication 2198. If federal crop insurance products are to be important components of future federal agricultural policy, farm leaders need to understand the underlying mechanics of insurance products so they can effectively argue their interests and contribute constructively to future agricultural policy dialogue.

Recent Legislative History of Federal Crop Insurance

Crop Insurance Improvement Act (1980)

- •Shifted the policy focus from free disaster assistance to federal crop insurance.
- •Introduced a premium subsidy for federal crop insurance.
- •Allowed the private sector to deliver federal crop insurance.
- •Greatly expanded insurable crops and areas.

Federal Crop Insurance Commission Act (1988)

- •Mandated "the thorough review of the federal crop insurance program and the development of recommendations . . . to improve the program."

Food, Agriculture, Conservation, and Trade Act (1990)

- •Included a special title for crop insurance and disaster assistance that emphasized fixing the problems with federal crop insurance.
- •Federal Crop Insurance Corporation mandated to test market new products. Private insurance companies authorized to develop supplemental products that could be packaged together with the federal crop insurance product.
- •Mandated a premium rate increase for federal crop insurance to reduce excess losses.
- •Federal Crop Insurance Corporation mandated to take actions to control fraud.

Crop Insurance Reform Act (1994)

- •Developed more restrictive procedures for passage of future free disaster assistance.
- •Required farmers to sign up for catastrophic federal crop insurance (CAT) in order to be eligible for price and income support programs.
- •Increased premium subsidies.

Federal Agricultural Improvement and Reform Act (1996)

- •Severed the cross-compliance linkage between CAT and farm program benefits. Farmers could opt out of CAT by waiving rights to future disaster payments.

Overview of Federal Crop Insurance

"Federal crop insurance" is a comprehensive term used to describe a family of insurance products. Some of these products provide crop growers with insurance protection against yield losses from a variety of natural causes. Others protect against losses of revenue (the product of yield and price). Though typically called "federal" crop insurance, these products are actually provided through a public-private partnership between the federal government and private-sector insurance companies. Historically, the Risk Management Agency (RMA) of the U.S. Department of Agriculture (USDA) designed and rated all federal crop insurance products. These products were then sold and serviced by private-sector insurance companies. Currently, private-sector companies are also involved in the design and rating of many new federal crop insurance products. The RMA also subsidizes the premiums that crop growers pay for federal crop insurance policies. Grower premiums and potential loss exposure are shared between the RMA and private insurance companies.

Yield Insurance

The traditional federal crop insurance product was long known as multiple-peril crop insurance (MPCI), and many still refer to this product as MPCI. This name is not only descriptive, it also differentiates the product from named-peril products, such as hail or fire crop insurance. These named-peril products are sold exclusively by private-sector insurance companies with no federal involvement.

In recent years, additional federal crop insurance products have become available. Since these new products also provide protection against multiple perils, some now refer to the traditional product as the Actual Production History Program (APHP). The lack of generally accepted terminology causes great confusion among those who work on crop insurance issues. As more new products become available, some agreement on distinctive, descriptive terminology will be required. For the sake of clarity, the term "APHP" is used to describe the traditional multiple-peril crop insurance in this bulletin.

Traditional multiple-peril crop insurance is designed to protect against shortfalls in expected yield caused by a variety of natural occurrences. The expected yield is calculated using the grower's actual verifiable production records. Growers who cannot provide at least 4 years of actual production records are penalized by receiving less insurance protection per premium dollar.

The federal government provides growers with a low level of APHP protection at nominal cost. This low level of protection is known as catastrophic (CAT) coverage. Growers must experience a yield loss of at least 50% to receive an indemnity (50% deductible). Indemnities paid for CAT policies have been equal to only 60% of the expected value of the lost production (40% co-payment on insured losses). The Crop Insurance Reform Act of 1994 stipulated that CAT co-payments would increase to 45% for crop year 1999 and beyond. Growers may choose to "buy-up" to higher levels of insurance protection. Buy-up policies reduce deductibles and/or co-payments. Deductibles can be reduced to between 25% and 45% of expected yield as opposed to the 50% deductible on CAT policies. For selected states and crops, deductibles as small as 15% are available. Purchasers of buy-up policies can also receive indemnities equal to 100% of the expected value of the lost production (no co-payment on insured losses). The smaller the deductible and co-payment, the higher the premium cost of the buy-up insurance policy.

Revenue Insurance

Recently, various revenue insurance products have been introduced into the federal crop insurance program. These products have names such as Crop Revenue Coverage (CRC), Income Protection (IP), and Revenue Assurance (RA). CRC has been available in Mississippi for several crops since 1998. As of summer 1999, no other revenue insurance products have been approved for sale in Mississippi. While there are differences among these products – primarily in the level of protection offered and rating methods employed – they all provide protection against shortfalls in a grower's gross revenue (yield x price). An insurance indemnity may be triggered by low yields, low prices or the combination of low yields and low prices.

County Yield Put Option

A final federal crop insurance product is the Group Risk Plan (GRP). GRP policies pay an indemnity if the county-average yield for a crop falls below a specified yield guarantee (Skees, Barnett and Black).

Technically, the GRP is not insurance but rather a put option on the National Agricultural Statistical Service (NASS) county-average yield estimate for a crop. It is conceptually similar to put options traded on major commodity exchanges, which gain value if the price of the associated futures contract falls below a specified strike. A minor difference is that most options

traded on U.S. commodity exchanges can be exercised at any time during the life of the option. Options with this characteristic are called American options. The GRP, by contrast, is technically a European option since the option cannot be exercised until the expiration date. The modifier refers only to the exercise provisions and is not geographically exclusive. American options are widely traded in Europe, and European options are traded in North America (see Hull).

As with exchange-traded put options, holders of GRP policies are faced with basis risk. Specifically, a local farm can experience a yield shortfall when the county-average yield does not fall. Therefore, GRP policies are said to protect *only* against widespread, or systematic, yield losses such as might be caused by a major drought.

Mississippi Experience with Federal Crop Insurance

This section describes Mississippi experience with federal crop insurance. The focus is exclusively on buy-up APHP policies since CAT provides very limited protection, and revenue insurance has been available in the state only since 1998. GRP has been available in some Mississippi counties since 1993 for limited crops, but very few policies have been sold.

Figures 1 and 2 compare Mississippi and U.S. loss cost experience for APHP insurance on cotton and soybeans, respectively. Loss cost is the sum of all indemnities paid divided by the total dollar amount of all insurance protection outstanding. It will be shown later that historical loss cost is the starting point for developing premium rates.

Figure 1 shows that Mississippi has generally experienced losses per dollar of protection that are lower than national averages for cotton. The U.S. loss experience for cotton reflects extremely high losses in Texas. In contrast, Figure 2 shows that soybean insurance losses in Mississippi have been well above national averages.

Figures 3 and 4 compare Mississippi and U.S. loss ratios for APHP insurance on cotton and soybeans, respectively. The loss ratio is the sum of indemnities paid divided by the sum of total premiums (farmer-paid premiums plus government subsidies) collected. Thus, loss ratios greater than one indicate that the insurer has paid out more in indemnities than was received in premiums. Both Mississippi and U.S. cotton have experienced many years with loss ratios greater than one. In the 1980s, the APHP program for Mississippi soybeans experienced loss ratios that were well above national averages for soybean insurance.

Figure 5 compares 1997 participation in buy-up APHP between Mississippi and the U.S. for cotton, corn, and soybeans. For each crop, Mississippi farmers insure less of their eligible acreage under buy-up APHP than do farmers nationally.

While differences exist across crops, it can generally be said that Mississippi loss experience has been higher than national averages. Participation rates in buy-up APHP are generally lower than national averages. These factors have caused many in the state to become interested in developing new crop insurance products that will "work" in Mississippi. However, insurance products are not simple. The remainder of this publication addresses important items that one should consider when thinking about developing either alternative crop insurance products or revising current products.

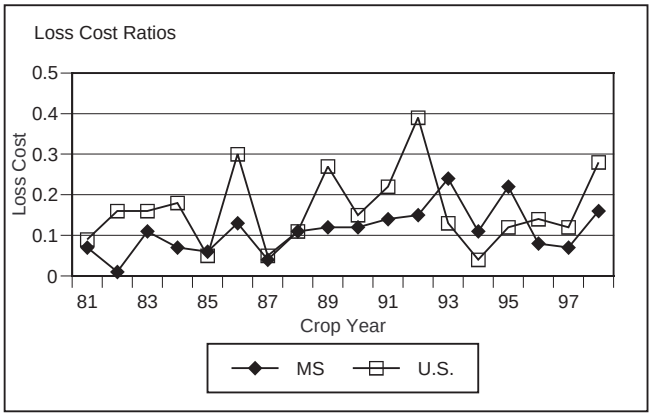

Figure 1. Mississippi and U.S. Cotton Buy-up Insurance Loss Cost Ratios.

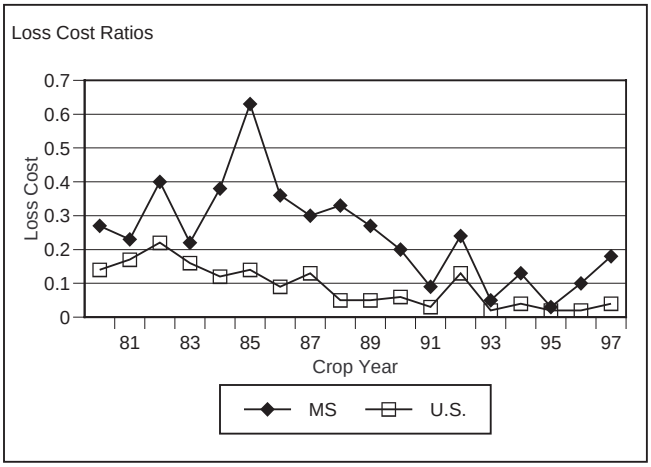

Figure 2. Mississippi and U.S. Soybean Buy-up Insurance Loss Cost Ratios.

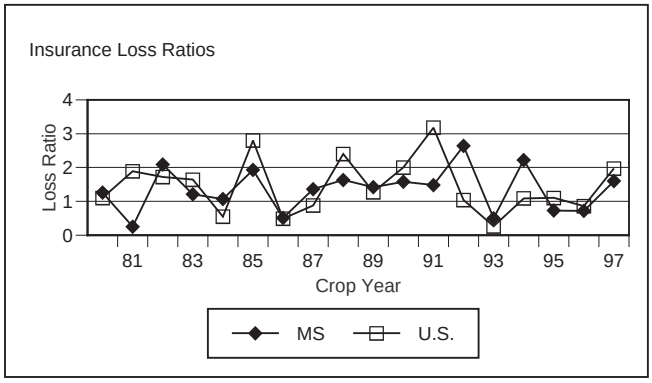

Figure 3. Mississippi and U.S. Cotton Buy-up Insurance Loss Ratio.

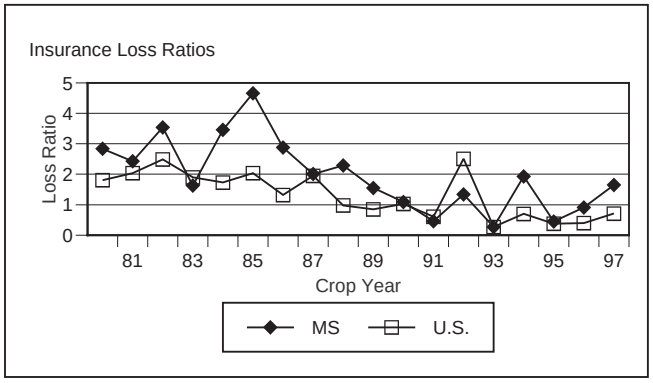

Figure 4. Mississippi and U.S. Soybean Buy-up Insurance Loss Ratios.

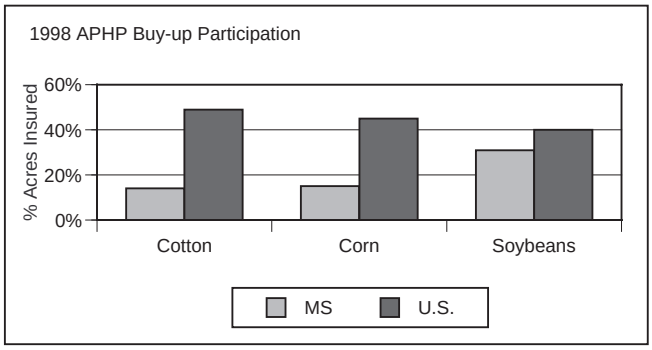

Figure 5. Mississippi and U.S. 1998 APHP Buy-up Participation.

DIFFERENT TYPES OF RISK

Risks are not all alike. Figure 6 contains examples of risks faced by crop growers. These risks are presented along a continuum between independent and systematic risks. Hail risk is largely independent. If one grower suffers crop damage due to hail, this does not necessarily imply that other growers in the area, county, or state will suffer similar losses. Price risk tends to be systematic. If one cotton grower is faced with low prices, every other cotton grower will likely face the same low prices. Common causes of yield loss, such as insufficient or excess moisture, are neither wholly independent nor wholly systematic.

As indicated later in this bulletin, insurance markets provide protection against independent risks. Futures and options exchange markets provide opportunities for shedding systematic risks. The problem for crop growers is that most sources of yield risk are neither wholly independent nor wholly systematic – that is, they are not well suited for either insurance markets or exchange markets.

Independent Risk	Hail	Insufficient or Excess Moisture	Prices	Systematic Risk

Figure 6. Continuum of Risks.

CONDITIONS FOR INSURABILITY

Insurance products allow policyholders to share part of their exposure with a larger pool of insurance purchasers. By purchasing an insurance policy, a policyholder chooses to accept a relatively small, consistent stream of losses (the insurance premiums) rather than face the risk of a large loss that is unlikely but possible. Policyholders are so determined to avoid the risk of a large loss that over the long run they are willing to pay more in insurance premiums than they can expect to receive in indemnities. This is how insurance companies earn profits.

Yet, not every risk is inherently insurable. Over time, insurance experts have identified at least six *ideal* conditions (see box below) for a risk to be considered insurable (Rejda, pp. 23, 24)

In reality, most insurance products deviate, at least slightly, from these ideal conditions. Very few risks are totally independent as required by condition number two. Estimating the expected frequency and severity of loss, as required by condition number five, is harder for some lines of insurance (e.g., crop insurance or earthquake insurance) than for others (say, automobile or life insurance). And, contrary to condition number three, most lines of insurance are susceptible to at least some fraudulent, intentional losses. Yet, those who insure risks that stray too far from these ideal conditions are likely to experience huge losses that will threaten the solvency of the insurance company and leave unsuspecting policyholders unprotected. The sections immediately following contain further discussion of the conditions for insurability. Emphasis is placed on violations of these conditions that can potentially destroy the viability of insurance products.

Ideal Conditions for Insurability

(1) ***Determinable and measurable loss —*** It must be possible to determine clearly when a loss has occurred and the magnitude of the loss.

(2) ***Large number of roughly homogeneous, independent exposure units —*** Insurance works by pooling large numbers of independent exposure units so that the statistical law of large numbers can provide an accurate prediction of expected future losses.

(3) ***Accidental and unintentional loss —*** Losses should be paid *only* on "acts of nature" or other seemingly random occurrences.

(4) ***No risk of catastrophic losses —*** If losses are positively correlated across exposure units (i.e., the risk is systematic, not independent), the statistical law of large numbers does not hold. A catastrophic event may cause huge losses for the insurer.

(5) ***Calculable chance of loss —*** To develop a premium rate, the insurer must be able to estimate accurately both expected frequency and severity of loss.

(6) ***Economically feasible premium —*** Potential purchasers must consider the insurance premiums to be affordable.

IDENTIFYING WORKABLE TRIGGERING CRITERIA

There has been an unprecedented number of new crop insurance products developed in recent years, and even more designs are possible. However, all these products contain the same basic elements. To illustrate, consider the design of APHP yield insurance. The structure of APHP indemnities may be written as in equation 1. An indemnity is paid only when the actual yield falls below the covered yield. When a loss occurs the producer receives the yield shortfall valued at the price guarantee.

Equation 1

$$\text{Indemnity} = \text{Price Guar.} \times \max[0, (\text{Covered Yld.} - \text{Actual Yld.})]$$

Equation 2 is mathematically equivalent to equation 1, but it more clearly shows the two main components of an insurance policy. In equation 2, the insurance protection (or liability from the perspective of the insurer) is the dollar amount covered by the insurance policy. One can think of protection as the maximum amount of indemnity that a policyholder could collect on the insurance policy. For example, a cotton grower with 800 pounds per acre of covered yield and a price guarantee of 70 cents per pound has protection valued at $560 per acre. This is the amount the grower would collect if the crop was completely lost.

Equation 2

$$\text{Indemnity} = \underbrace{\text{Price Guar.} \times \text{Covered Yld.}}_{\text{Protection}} \times \underbrace{\frac{\max[0, (\text{Covered Yld.} - \text{Actual Yld.})]}{\text{Covered Yld.}}}_{\text{Trigger}}$$

When considering insurance policies, individuals often focus on the level of protection. *But the triggering mechanism is the defining characteristic of an insurance policy*. The trigger defines when an indemnifiable loss has occurred and the magnitude of the indemnity relative to the protection.

It is relevant to consider how the triggering mechanisms differ for alternative insurance products. If one were to replace yield with revenue (price x yield) in the trigger component of equation 2, the result would be the trigger for revenue insurance products. Likewise, by substituting county yield for farm yield, one creates the trigger for GRP.

As this publication later describes, premium rates are conditioned on expectations of the frequency of loss and magnitude of loss. When developing insurance products, there are two critical questions: (1) Is the nature of the loss event such that an objective observer can accurately identify whether the triggering criteria have been met?; and (2) Can a knowledgeable and objective observer estimate the true magnitude of loss? If the triggering mechanism is vague or unmeasurable, the first condition for insurability is violated, and there is little potential for a workable insurance product.

UNDERWRITING

Policyholders typically know far more about their risk exposure than does the insurance company. Underwriting is the mechanism by which insurance companies attempt to redress this information asymmetry.

There are four basic components of underwriting: (1) developing risk assessment instruments; (2) using the risk assessment instruments to assign a risk classification to potential policyholders; (3) designing an insurance policy that reduces the incentives for policyholders to take advantage of their superior information; and (4) monitoring the actions of policyholders. The first two components relate to accurate risk classification. The last two relate to product design and monitoring of policyholder behavior.

Classification

Underwriters must determine what information is required to estimate the risk exposure of a potential policyholder adequately. For example, insurance companies have determined that age and the number of prior speeding tickets are relevant variables when estimating risk exposure on an automobile insurance policy. Information on a relatively small number of variables is sufficient to estimate risk exposure for most lines of insurance adequately.

Underwriters use the information elicited to assign a risk classification to potential policyholders. The intent is to create risk classes that are relatively homogeneous in the sense that the individuals assigned to any given class are exposed to approximately the same amount of risk. This is a requirement of the second condition for insurability listed previously. For most federal crop insurance products, potential policyholders are assigned to risk classes according to expected yield – the assumption being that higher expected yields are associated with lower relative risk and *vice versa*. Premium rates are developed for each class. Those who are assigned to higher risk classes are charged higher premium rates.

If underwriters cannot develop a classification system that accurately assigns potential policyholders to insurance pools of relatively homogenous risk exposure units, *adverse selection* will result and only the higher risk members within any given risk classification will purchase insurance. Underwriters will think that they have assigned a relatively homogeneous group of individuals to each risk classification. A premium rate will be charged that reflects the expected risk exposure of these individuals. If, in reality, the level of risk exposure varies widely within each risk classification, potential policyholders use their superior proprietary information to make an optimal insurance purchase decision. Those who perceive that the premium rate for their assigned risk classification overestimates their actual risk exposure will be less likely to purchase insurance. Those who perceive that the premium rate for their assigned risk classification underestimates their actual risk exposure will be more likely to purchase insurance. Thus, the insurance company is left with pools of insurance purchasers who are actually riskier than had been assumed when premium rates were assigned.

Not surprisingly, the insurance company is likely to experience operating losses on these lines of insurance. Assuming that poor profitability is evidence that premium rates are too low, the company will likely respond by raising premium rates. But this action only exacerbates the problem. Former insurance purchasers with moderate levels of risk exposure now cease purchasing insurance, leaving only the very high-risk individuals in the insurance pool. Unless the underwriting problem is addressed, adverse selection will ultimately lead to a market characterized by poor profit performance, high premium rates, and only high-risk individuals purchasing insurance. Some would suggest that this accurately describes the current market for APHP crop insurance in Mississippi.

Policy Design and Monitoring

Underwriters are concerned that indemnities be paid only as a result of random loss events – that is, that insurability condition number three listed previously not be violated. *Moral hazard* occurs when, as a result of purchasing insurance, policyholders make decisions that significantly increase the probability of losses and/or the extent of losses.

Most insurance policies contain deductibles and/or co-payments. For example, a typical health insurance policy might have a $500 deductible. This feature requires the policyholder to bear all of the first $500 of covered medical expenses per year. Similarly, a health insurance policy might have a 20% co-payment for the next $10,000 (beyond the deductible) of covered medical expenses per year.

The purpose of both deductibles and co-payments is to help control moral hazard. Without these features, the cost to policyholders of one more visit to a doctor or hospital would be zero. Some policyholders could go see a

doctor every time they had a headache. They would also have less incentive to practice preventive health care. Underwriters attempt to design the deductible and co-payment features of insurance policies to give policyholders adequate coverage but not create incentives for moral hazard. Most federal crop insurance products have a minimum deductible of 25% of the expected yield or revenue. The grower must absorb the first 25% of loss before becoming eligible for an insurance indemnity.

Monitoring the activities of policyholders is the final component of underwriting. Again, the intent is to combat moral hazard. Monitoring includes investigations of suspected fraud. It also includes the use of highly sophisticated statistical analysis to determine if the purchase of an insurance policy causes policyholders to take on more risk. If this happens, profitability will suffer as policyholders file more claims than expected or file claims for amounts larger than expected. The insurance company will likely respond by raising insurance premiums for all policyholders.

RATE MAKING

A premium rate is the total amount charged for the insurance product (the premium) divided by the dollar amount of protection. For example, if a farmer is required to pay $4 in premium for every $100 of crop insurance protection, the premium rate is 4%. But how did the insurer determine that premium rate?

Loss Cost

"Loss cost" is the starting point for rate making. Recall that loss cost is the sum of all indemnities paid divided by the sum of all insurance protection purchased. If, over a 1-year period, an insurance product has paid $2,000 in indemnities for every $100,000 of insurance protection in force, the loss cost for that year is 2%.

Generally, if an insurance product has been in existence for many years, historical average loss cost is used as an estimate of expected future loss cost. But the interpretation of historical loss costs is highly dependent on the nature of the risk being insured. If your neighbor has an automobile accident today, that does not imply that you are any more likely to have an automobile accident today. Largely, automobile accidents are uncorrelated, independent events. For automobile insurance, the pooling of these independent risks (as indicated in the second condition for insurability) should result in relatively little variability in the annual loss cost over time.

But loss costs for non-independent risks will vary greatly over time. This violation of the fourth condition for insurability means that the insurer does not have the benefit of risk pooling. Classic examples of non-independent risks are widespread natural disasters. If an insurer sells policies that protect against a natural disaster and the disaster does not occur, the loss cost will be very low. If the disaster does occur, the loss cost will be very high. Thus, the loss cost for any given year does not contain much information about long-run expected losses. Likewise, historical average loss costs may not provide an accurate estimate of expected loss cost for future years. This violates the fifth condition for insurability.

Drought, excess rainfall, and extreme temperatures are examples of non-independent weather phenomena that create yield losses across large areas. The 1988 drought across much of the U.S. agricultural heartland is a fairly recent example. Historically, the federal government became involved in the market for crop insurance after private-sector companies proved unable to pay indemnities to large numbers of farmers who suffered yield losses from non-independent weather phenomena. The historical variability in loss cost shown in Figures 1 and 2 is characteristic of insurance products with significant exposure to non-independent risks.

Premium Rate

Even when insuring against independent loss events, actual loss costs will vary somewhat from year to year. Therefore, private-sector insurers typically load premium rates to build reserves that can be used if indemnities exceed premiums in a given year. The more variable the expected loss cost, the more important it is to maintain adequate reserves. Private-sector companies also must generate sufficient revenue to cover administrative costs and a required rate of return to investors. The sum of these additional costs (expressed as a percentage of protection outstanding) and the expected loss cost is the minimum required premium rate. In other words, this is the premium rate that is just sufficient to cover expected indemnities, reserve loads, administrative costs and required returns to investors.

PROFITABILITY

The "loss ratio" is a common measure of annual operating performance for insurance products. It is simply the sum of all indemnities paid divided by the sum of all premiums collected for a given period (typically a year). If the loss ratio is greater than one, the insurance company lost money on the insurance product for that period, since more was paid out in indemnities than was received in premiums. Likewise, a loss ratio less than one indicates that the product generated a surplus for the period.

For any given year, the loss ratio on an insurance product may exceed a value of one due to an unusually large number of loss events. But over the long run, profitability requires that premiums collected exceed indemnities paid – that is, that loss ratios be less than one. Further, premiums collected must exceed not only indemnities paid but also the administrative costs of developing and delivering the product.

It is important to note that, as with loss cost, the interpretation of loss ratios is highly dependent on the nature of the risks being insured. When the insurance pool is exposed to non-independent risks, loss ratios may vary greatly over time (see Figures 3 and 4). When insuring largely independent risks, an unusually high annual loss ratio would be a reason to question the actuarial soundness of the insurance product.

REINSURANCE

Reinsurance is insurance purchased by primary insurance companies to protect against unusually high losses in the company's book of business. Annual loss experience can vary even when insuring largely independent risks, but the likelihood of a year with devastating losses increases with the level of exposure to non-independent risk.

In the federal crop insurance program, the federal government functions as a reinsurer by sharing both premium revenue and loss exposure with private insurance companies. The insurance companies may choose to purchase additional reinsurance in private markets to offset their retained risk on federal crop insurance products.

PUBLIC-PRIVATE PARTNERSHIP

For many years, federal crop insurance was provided solely through a federal agency. Product design, rating, sales, and claims adjusting were all handled by employees of the USDA. During the 1980s, sales and claims adjustment activities began shifting from the public sector to the private sector. These activities were taken on largely by companies that had in the past sold named-peril hail and fire crop insurance policies. With this transition came a standard reinsurance agreement (SRA) between the private companies and the RMA. Under the SRA, companies are liable for the policies they write but are protected from catastrophic losses by the USDA. The SRA is a complex reinsurance contract that specifies how private companies and the USDA share premium revenue and loss exposure (U.S. General Accounting Office). The SRA also provides an expense reimbursement for the cost of handling policies.

Under the SRA, companies can designate business into three pools. A certain percentage of policies in each state can be designated for the "assigned risk" pool. This pool of contracts is the most highly reinsured. In other words, the USDA accepts most of the risk on these contracts. The remaining policies are placed in either the developmental or commercial pools. Companies retain the greatest share of profits and losses from contracts assigned to the commercial pool. This system of reinsurance pools provides incentives for companies to operate in states where past actuarial experience would suggest it may not be profitable for the company to operate.

CROP INSURANCE SUBSIDY

Federal crop insurance legislation mandates specific producer subsidies. There are two major forms of subsidies provided. These can best be described relative to what a private insurance company would charge for insurance. First, the overhead cost of rating, underwriting, and servicing crop insurance policies is borne by the USDA. These administrative costs include both the cost of RMA operations and reimbursement of private companies for expenses incurred for selling and servicing insurance policies. Second, premium subsidies reduce the producer-paid premium rates from the "actuarially fair" rate. The actuarially fair rate is one that RMA believes will result, on average, in premiums paid exactly equaling the indemnity. The premium subsidy is meant to create a situation where, over a number of years, producers will collect more in indemnities than they pay in premiums. For example, a policy with a 65% coverage level (35% deductible) receives a premium subsidy of approximately 42%. If RMA premium rates are accurate, the grower over time would expect to receive approximately $1.70 for every $1 spent on crop insurance. Deviations from the assumed subsidy levels will occur if RMA premium rates are not accurate due to problems such as adverse selection.

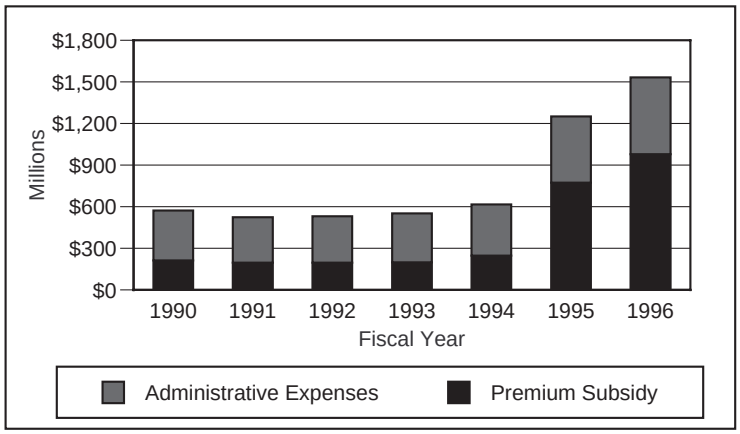

Figure 7. Federal Crop Insurance Premium Subsidies and Administrative Expenses from 1990-96 (Source: GAO).

Figure 7 shows the U.S. total outlays for administrative expenses and premium subsidies from 1990-96. In 1990-94, premium subsidies grew slowly but never exceeded $300 million per year. Administrative expenses were generally the larger of the two costs during this period, averaging near $400 million. An obvious increase in both cost categories occurred in 1995 and 1996. The increase resulted from changes mandated by the 1994 Crop Insurance Reform Act. Insurance participation increased dramatically in 1995 with the introduction of catastrophic coverage insurance and increased subsidy levels.

Total premium subsidies in 1996 were near $900 million. This increase more than tripled the pre-reform premium subsidy level. Administrative expenses also increased under the reform legislation because of the expense reimbursements associated with the larger volume of policies.

Underlying the current subsidy cost is the subsidy structure created by the Federal Crop Insurance Reform Act of 1994. Under this legislation, subsidy levels for various coverage choices are defined relative to the value of the catastrophic coverage policy. Figure 8 shows the percent subsidy for selected combinations of yield coverage percentages and percent price election percentages. The legislation provided a 100% subsidy for the catastrophic coverage policies that are insuring at the 50% yield coverage and at 55% of the maximum price election. By multiplying the two percentages together it can be shown that 27.5% of the expected value of the crop is covered. Premiums for higher coverages are higher

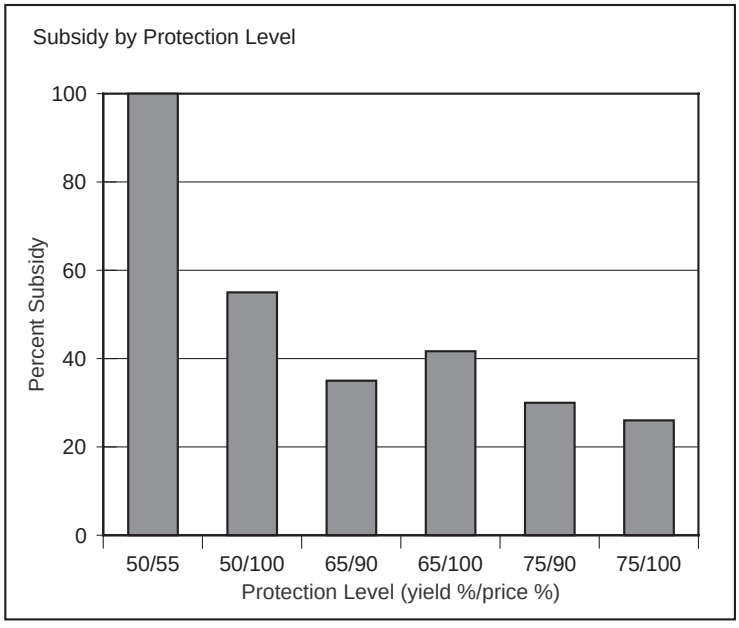

Figure 8. Assumed Crop Insurance Premium Subsidy by Protection Level.

because of the greater risk protection provided. "Limited buy-up" policies provide coverage up to 65% of the expected value. Combinations that guarantee more than 65% of expected crop value are considered "full buy-up" policies.

The current subsidy system provides the same dollar subsidy for limited buy-up policies as is given to a catastrophic coverage policy. For example, if a catastrophic coverage policy for a producer is worth $5 per acre, then a limited buy-up policy would also receive $5-per-acre subsidy. As a percentage of premium, the subsidy falls as coverage increases due to the higher insurance premium. A producer choosing to purchase a full buy-up policy receives an additional 25% subsidy over the lower levels of coverage. This bumps the subsidy percentage up to 42% for the 65/100 policy. But again, as premium rates increase for coverages above the 65% level, the percent subsidy declines to the point where the highest coverage (75/100) policy receives the lowest percentage subsidy of 23.5%.

New Product Development

Until recently, the RMA had developed all federally subsidized and reinsured crop insurance products. In 1995, a private insurance company developed a new revenue insurance design called CRC. The product was submitted to the RMA to be considered for reinsurance and federal subsidies. RMA was in the process of developing its own revenue product, IP. Ultimately, both products moved forward as 1996 pilot programs receiving reinsurance and federal subsidies. CRC marked the first time that RMA did not control the design and rate making of a federally reinsured and subsidized crop insurance product. Since 1996, private companies have been much more aggressive in developing new crop insurance products. In fact, RMA has received pressure to leave new product development entirely in the hands of private firms. At least two more privately developed products have been accepted since CRC, and others are in development.

Some have argued that new crop insurance product development is hampered by a lack of exclusive property rights. Current RMA rules state that once a product is accepted for reinsurance and federal subsidies, the product enters the public domain and is available to all crop insurance companies. This lack of exclusive property rights makes it difficult for companies to recover development costs – limiting incentives for new product development. Companies must forego the federal subsidy if they want to maintain proprietary control over crop insurance products they develop. Unsubsidized products would find it difficult to compete against federally subsidized products.

Crop Insurance and Agricultural Policy

If insurance programs are so complicated and difficult to implement, why do policy makers seem so enamored with them? Why not return to traditional disaster payment programs?

From a policy maker's perspective, insurance has several benefits relative to free federal disaster payments. The first benefit is equity. Disaster payments are typically made only after widespread (systematic) losses. A crop grower who suffers severe crop losses due to a localized, independent, event (hail, for example) will not receive disaster payments. Crop insurance products (except for GRP) provide risk protection regardless of whether the loss was caused by localized or widespread phenomena. Most policy makers also believe that insurance programs are less prone to fraud and abuse than disaster payment programs.

Another benefit of insurance programs is that individuals are made aware of their risk exposure. The cost of flood insurance should make someone think twice before building a house in a flood plain. The cost of crop insurance should make growers think twice about planting water-dependent crops in arid regions. In contrast, the availability of free disaster payments allows individuals to discount their risk exposure. If loss events do not occur, individuals reap the profits from their investments. However, if loss events do occur, taxpayers pay compensation for part of the loss. Kaplow argues that disaster payments are self-perpetuating since individuals never get proper economic signals about their exposure to loss. Between 1987 and 1993, 107,040 farmers received federal disaster payments in 4 or more years. While these farmers were only 8% of the total number of farmers who received disaster payments during this period, they received almost 29% of the total payments disbursed (Hoffman, et al.).

CONCLUSIONS

Before passage of the Federal Agricultural Improvement and Reform Act of 1996, federal price support and deficiency payment programs provided a degree of price risk protection to growers of selected commodities. Over time as growers desired marginal changes in these programs, farm leaders simply contacted the appropriate federal policy makers and voiced their concerns. Elected officials frequently modified the programs in response to grower concerns – even if the modification required expenditures of more federal dollars.

But the Federal Crop Insurance Program is different. It is a public-private partnership. And while policy makers might agree to modifications of existing products or the introduction of new products, they cannot compel their private-sector partners to actually sell the products. Private-sector companies are motivated by profits. They expect to earn a return on crop insurance products that equals or exceeds returns on other product lines that have similar risk exposure.

Many Mississippi crop growers are displeased with current crop insurance products. Farm leaders in the state are discussing modification to existing crop insurance products or the introduction of new products.

It is important to remember that these ideas must be sold not only to federal policy makers but also to private-sector, profit-seeking insurance companies whose perceptions will be guided largely by the insurability conditions described in this bulletin.

REFERENCES

Hoffman, W., C. Campbell, and K. Cook. July 1994. *Sowing Disaster: The Implications of Farm Disaster Programs For Taxpayers and the Environment*. Washington, D.C.: Environmental Working Group.

Hull, J.C. 1997. *Options, Futures, and Other Derivatives*. 3rd ed. Upper Saddle River, NJ: Prentice Hall.

Kaplow, L. 1991. Incentives and Government Relief for Risk. *Journal of Risk and Uncertainty* 4:167-175.

Rejda, G.E. 1995. *Principles of Risk Management and Insurance*. New York: Harper Collins College Publishers.

Robinson, J., B. Barnett, and S. Martin. 1998. Managing Revenue Risk on Mississippi Farms. Mississippi State University Extension Service Publication 2198.

Skees, J.R., J.R. Black, and B.J. Barnett. 1997. Designing and Rating an Area Yield Crop Insurance Contract. *American Journal of Agricultural Economics* 79:430-438.

U.S. General Accounting Office. 1997. Crop Insurance: Opportunities Exist to Reduce Government Costs for Private-Sector Delivery. RCED-97-70.