*Expanded Federal Crop Insurance: A Better Way for Taxpayers to Share Farmers' Risks**

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In 1977, Secretary-designate of Agriculture Bob Bergland told Congress that "the disaster programs of the Department of Agriculture are for the most part, . . . in and of themselves, a disaster" (U.S. Congress 1977b, p. 23). The largest of the disaster programs Bergland criticized were the federal insurance, loan, and grant programs designed to assist crop producers who could not plant their crops or who harvested crops of below-average yield as a result of uncontrollable natural forces. Bergland and other critics believed that the riskiness of crop production justified this sort of federal assistance, but they claimed that the programs used to help farmers with crop losses in the 1970s distributed aid inefficiently, treated farmers inconsistently, and encouraged farmers to misuse the nation's productive resources. Many of these critics claimed (for vague or unspecified reasons) that federal insurance was the most appropriate way for taxpayers to share farmers' risks, and they proposed that federal subsidies for the loan and grant programs be shifted to an expanded crop insurance program.

Through the Federal Crop Insurance Act of 1980 and a series of related acts and administrative changes, Congress and the U.S. Department of Agriculture (USDA) adopted this proposal and set in motion major changes in the federal crop-loss assistance system. Much of the federal assistance formerly channeled through the loan and grant programs was redirected to an expanded and more heavily subsidized all-risk crop insurance program. All-risk crop insurance was made available to more farmers than before, and more farmers are expected to buy it, primarily because coverage was increased, premium subsidies were added, and policy writing procedures were changed to more accurately reflect the risks confronting individual policyholders. Although the new insurance-based system may still encourage misuse of resources, it appears to relieve some of the problems that had prompted Bergland to label the old system "a disaster."

Three Forms of Crop-Loss Aid

Like most enterprises, farming is risky. An important source of risk in farming is the uncertain outcome of efforts to grow crops, for even excellent farm managers cannot completely protect their crops from such uncontrollable natural threats as drought, hail, flood, frost, disease, and pests. Damages that natural forces cause to crops on a well-managed farm are known as *uncontrollable crop losses.*

For several decades, taxpayers have supported federal programs to assist farmers who incur uncontrollable crop losses. These federal crop-loss assistance programs have taken three forms—all-risk insurance, low-interest loans, and, since 1974, direct grants.[1]

Insurance

Generally under *all-risk crop insurance* (also known as *multiperil crop insurance*), farmers pay an annual premium in return for protection against low crop yields caused by almost any uncontrollable force. The premium a farmer pays for all-risk crop insurance is based on the

*Many individuals and several federal agencies contributed to this study, but Alan Walter deserves special thanks.

[1]For a discussion of the history of federal crop-loss assistance programs, see Benedict 1953, 1955; Mont. Ag Exp. Sta. 1967; U.S. Congress 1978c; USDA 1980.

insurer's estimate of the indemnities the farmer will receive. This estimate depends on estimates of the farmer's average crop yield, the annual variability of the farmer's yield around its average, the dollar value placed by the insurance policy on units of lost output, and the percentage of average yield guaranteed by the policy.

Virtually the only source of all-risk insurance in the United States since 1939 has been the Federal Crop Insurance Corporation (FCIC) of USDA. Specific hazard, or named-peril, crop insurance has been widely offered by the private insurance industry in this country, but it covers only crop losses caused by such specific hazards as hail or fire.[2] Insurance coverage for other important crop destroyers—droughts and floods, for example—has been available only through all-risk policies. The few attempts to offer private all-risk crop insurance have failed.

Taxpayers have helped to make FCIC's all-risk crop insurance available to many farmers. FCIC has not insured all crops in all counties, but it has concentrated on major U.S. crops and the counties heavily dependent on them. From 1948 to 1980, cumulative indemnities for crop losses, FCIC's largest single expense, nearly equaled the cumulative total of premiums collected from policyholders, but taxpayers contributed over $12 million annually for FCIC's operating expenses and provided the capital reserves needed to pay claims in years of extensive crop losses.

Loans

Crop-loss assistance loans are loans made at below-market interest rates to eligible farmers. To be eligible, a farmer must, principally, have incurred uncontrollable crop losses and be unable to obtain credit from commercial lenders. The Actual Loss Emergency Loan program of USDA's Farmers Home Administration (FmHA) was the primary source of crop-loss assistance loans from 1946 to 1980, but the Physical Disaster loan program of the Small Business Administration (SBA) also disbursed over a billion dollars of these loans from 1977 through 1980. Taxpayers have paid directly for the costs of administering the loans and for the loss to the federal treasury that has resulted when the government's cost of borrowing has risen above the interest rate on crop-loss assistance loans.

Grants

Direct grants of funds to farmers sustaining uncontrollable crop losses have been fully subsidized by taxpayers through the Disaster Payments Program (DPP) of USDA's Agricultural Stabilization and Conservation Service (ASCS). These grants were available from 1974 through 1981 to most producers of corn, sorghum, barley, wheat, cotton, and rice. Producers of these six crops received DPP grants of up to roughly 30 percent of the value of lost output when uncontrollable natural forces either prevented producers from planting any of the crops or significantly reduced their yields.

Insurance—Crop-Loss Aid of the '80s

For the last two decades, but especially in the 1970s, insurance has been a relatively minor form of federal crop-loss assistance. Farmers were not getting much of this assistance in any form in the 1960s. The only crop-loss programs available were FCIC's all-risk insurance program and FmHA's loan program, and each of these paid out less than $100 million annually.[3] Things changed in the 1970s. A series of floods, frosts, and droughts caused widespread crop losses, and rising agricultural prices made such losses more costly to farmers. Congress and USDA responded by increasing crop-loss assistance. FmHA's loan eligibility criteria were liberalized, permitting the annual volume of FmHA crop-loss assistance loans to increase roughly tenfold in real terms during the 1970s. Congress created DPP in 1974 and brought SBA into agricultural lending in 1977; each of these agencies began to dispense hundreds of millions of dollars annually. FmHA's and SBA's loans, with their 3 to 5 percent interest rates, became even more attractive to borrowers in the late 1970s, when market interest rates rose above 10 percent. While the loan and grant programs were expanding, however, Congress left the federal crop insurance program unchanged, and its annual indemnity payments grew very little in real terms. By 1980, when drought and high temperatures extensively damaged crops, FCIC's indemnity payments of $378 million were overshadowed by DPP grants totaling $942 million and new crop-loss

[2]This paper does not deal with private risk-bearing arrangements in agriculture, including private hail or fire insurance. This is not meant to imply anything about the importance of private, named-peril crop insurance. The appropriate role for the federal government in providing crop insurance remains controversial. See, for example, remarks by John Ames (U.S. Congress 1978c, pp. 248–51).

[3]Annual FCIC indemnities between 1948 and 1969 peaked on 1967 crops at $55 million (current dollars). Over the same period, total FmHA emergency loans peaked at $125 million in fiscal year 1968 (which roughly corresponds to the time of FCIC's peak indemnities). However, these loans were made for losses to livestock and farm property as well as to crops. Separate figures for FmHA emergency loans solely for crop losses in fiscal year 1968 are not available, but they were very likely less than $100 million.

assistance loans totaling more than $1 billion.

Insurance won't remain a minor form of aid for another decade, however. In the late 1970s, the crop-loss assistance system had its critics, and in 1980, even as drought and heat withered crops and triggered billions of dollars of loans and grants to farmers, Congress and USDA began to restructure the system. By the end of 1981, they had put in place new laws and regulations to increase the amount of crop-loss assistance delivered through crop insurance and decrease the amount delivered through loans and grants—changes which should soon make the FCIC's all-risk crop insurance program the dominant form of federal crop-loss assistance (see the table). Later in this paper I will discuss whether or not the new insurance-based system should solve some of the problems critics saw in the old system. First, though, let's look closely at how the old system was changed.

Insurance More Available and Attractive

☐ *More Farmers Eligible*

The Federal Crop Insurance Act of 1980 gave FCIC the resources and authority to offer all-risk crop insurance to nearly all farmers. Previously, Congress had severely restricted FCIC's operations by placing a ceiling of $12 million on appropriations for the corporation's administrative expenses and by limiting the rate at which it could expand to new crops and counties. As a result, although FCIC policies were widely available on many important crops by 1980, federal crop insurance was still unavailable in almost 40 percent of the 2,740 agricultural counties in the United States and on hundreds of potentially insurable crops. The Federal Crop Insurance Act of 1980 eliminated both the ceiling on FCIC's appropriations and the limit on its expansion to new crops and counties.

Congress and FCIC are using the provisions of the Federal Crop Insurance Act to extend crop insurance to more farmers. Although FCIC contemplates eventually insuring hundreds of crops nationwide, its current efforts are focused on expanding coverage on the 28 crops it insured in 1980 to every county in which they are grown (Fletcher 1981; USDA 1981b). The first step is to offer insurance in 1982 on essentially all of the nation's acres of corn, sorghum, barley, wheat, cotton, and rice and on 95 percent of the acres of soybeans. FCIC plans to extend coverage to all soybean acres by 1983 and to all acres of the other 21 crops by 1984. Congress has supported these plans by increasing FCIC's appropriations for operating expenses from $12 million in fiscal year 1980 to $58 million in 1981 and $118 million in 1982, and the administration has asked Congress for $294 million for FCIC in fiscal year 1983. So far, FCIC seems to be meeting its targets; insurance on corn, sorghum, oats, wheat, cotton, and rice is now available everywhere these crops are normally grown.

☐ *Bigger, Cheaper Policies*

All-risk insurance will not necessarily become the primary form of crop-loss assistance just because crop insurance will be widely available. In 1980, for example, farmers chose to insure only a small percentage of total insurable acres. However, the Federal Crop Insurance Act also gave FCIC the power and responsibility not only to offer expanded coverage but also to offer policies that more farmers will want to buy. To make crop insurance more attractive to farmers, Congress directed FCIC to increase the amount of insurance coverage farmers can buy while lowering the premiums they pay for that coverage.

The coverage of a crop insurance policy depends on two factors—the number of units of output the policy guarantees and the value the policy attaches to each unit of guaranteed output that is lost. If uncontrollable natural forces cause a policyholder's output to drop below the guaranteed level, FCIC pays the policyholder an indemnity equal to the difference between the number of guaranteed and actual units of output multiplied by the per unit value specified in the policy.

Coverage can be increased by raising either the guaranteed level or the per unit value attached to lost output, and Congress took direct actions to raise both. The Federal Crop Insurance Act directs FCIC to offer policies with a choice of guaranteed output levels, including levels equal to 50 percent and 75 percent of the farmer's estimated average yield. Previously, only some farmers were offered the 75 percent option, while others could insure only 30 percent of estimated average yield (Trapnell and McFadden 1978, p. 24; U.S. Congress 1977a, p. 9). The act also mandates a choice of per unit values, including a value equal to or exceeding 90 percent of the projected market price of the crop. The 90 percent value option was not available to all farmers before.

Before 1980, FCIC tried to set each policyholder's premium equal to FCIC's estimate of the value of the coverage selected by the policyholder. Since the value of coverage is the average indemnity a policyholder is likely to receive, this procedure made FCIC's total premiums

Recent Changes in the Federal Crop-Loss Assistance System

New Laws and Regulations	Effects on the System
Federal Crop Insurance Act of 1980 Public Law 96-365	Extended crop insurance to more counties and crops; provided higher coverage, cheaper premiums, and policies better tailored to individuals
Small Business Act of 1980 Public Law 96-302	Transferred most of SBA's crop-loss loan programs to FmHA
1981 FmHA regulations USDA 1981a	Tightened eligibility requirements for FmHA loans and reduced the maximum size of these loans
Omnibus Budget Reconciliation Act of 1981 Public Law 97-35	Permitted higher interest rates on FmHA loans
Agriculture and Food Act of 1981 Public Law 97-98	Severely restricted eligibility requirements for DPP grants

approximately equal to its total indemnities for the period 1948–80, as required under previous legislation. A premium that just equals the value of coverage and includes no charge for the insurer's operating expenses is known as an *actuarially fair premium,* because a policyholder paying at this rate is equally likely to make or lose money on the insurance policy. Actuarially fair premiums rise and fall with the value of the insurance coverage in the policy, so that, under the previous procedures, the increase in the value of FCIC insurance coverage brought about by higher guaranteed yield levels and higher per unit values on lost output would have been matched by an equal increase in the premium charged.

However, Congress decided in 1980 to subsidize crop insurance premiums, to let policyholders pay less than full value for the increased coverage they receive. Under the new law, crop insurance premiums are set below actuarially fair levels, and policyholders receive, on average, more in indemnities than they pay in premiums. Farmers who take out policies guaranteeing 65 percent or less of estimated average yield pay only 70 percent of FCIC's estimate of the actuarially fair premium. Policyholders who choose higher guarantees pay at actuarially fair rates for the additional coverage but still pay only 70 percent of the actuarially fair premium on the first 65 percent of estimated average yield that they insure. The balance of the actuarially fair premium is paid to FCIC from funds appropriated by Congress.

☐ *Policies Better Tailored to Individuals*

In addition to mandating higher coverage and subsidized premiums on all policies, Congress gave FCIC the means and responsibility to attack an adverse selection problem that had made crop insurance coverage and premiums very unattractive to many farmers.

Adverse selection can result when an insurance organization does not accurately estimate the average indemnities that individuals are likely to receive under its insurance policies. The average indemnity an individual is likely to receive under a given policy is known as the *expected indemnity.* If an insurer's estimates of a policyholder's expected indemnities are so inaccurate that the insurer

cannot distinguish between individuals likely to receive high indemnities and those likely to receive low indemnities, then the insurer has no choice but to let both types of individuals buy the same policy at the same price. The tendency in this sort of situation is for more high expected indemnity than low expected indemnity individuals to select the policy, a costly tendency for the insurer—hence, its name, *adverse selection.*

To see how this happens, suppose, for example, that the insurance organization initially offers a policy that seems actuarially fair according to the average characteristics of the population to which it is offered. Most individuals with below-average expected indemnities will not find this policy very attractive, but many with above-average expected indemnities certainly will, and more of the latter individuals are likely to buy the policy. As a result, those who actually buy the policy will receive larger indemnities than the insurance organization had anticipated when it designed the policy to fit characteristics of the entire population, and the insurance organization will lose money on the policy.

If the insurer reacts by raising premiums or lowering coverage, the policy will become even less attractive to individuals with below-average expected indemnities. As many of these individuals cancel their policies, the average expected indemnity of the remaining policyholders will rise, which may require further premium increases or coverage decreases. Eventually, one of two equilibrium states will probably be reached. In one, the policy will become unattractive to almost all individuals and will be withdrawn from the market. In the other, the insurance organization will be left with a sufficiently large and homogeneous group of high expected indemnity policyholders (plus perhaps some very risk-averse policyholders with lower expected indemnities) to support an insurance pool. In this situation, the final insurance policy will be approximately actuarially fair to the high expected indemnity individuals who remain in the insurance pool, but low expected indemnity individuals will, in effect, be excluded from insurance.

To accurately estimate a farmer's expected indemnity and avoid the problem of adverse selection, FCIC needs to have good estimates of the farmer's average yield and the variability of the farmer's yield about its average. For example, if the average yield is actually 20 bushels but FCIC estimates it at 28 bushels, then FCIC's highest coverage option would be 21 bushels (75 percent of 28 bushels), or more than the actual average yield. Indemnities in this situation would be well above FCIC's expectations. Similarly, if FCIC correctly estimates the average yield at 20 bushels but guesses that the odds of yields below 15 bushels in any year are one in six when in fact they are one in three, then indemnities would again exceed expectations.

Despite the importance of accurately estimating the average yield and the variability about average yield for individual policyholders, in the past FCIC's limited budget generally did not permit it to collect and analyze historical data on individual farmers' yields (Trapnell and McFadden 1978, pp. 33–40). Instead, FCIC grouped farms into county or large subcounty areas and then estimated each area's average yield and pattern of variations in yield, primarily from data on the area's soil type and historical records of countywide yield. Other factors were sometimes considered, including individual farmers' yield histories, but the method used most often was to estimate expected indemnities from areawide rather than individual data (Trapnell and McFadden 1978, p. 30; USDA 1980, pp. 11–12).

FCIC's method of estimating the average yield and the pattern of yield variability frequently failed to distinguish between high and low expected indemnity farmers and consequently led to adverse selection. In a study of federal crop insurance, for example, the General Accounting Office (GAO) found that the average yield and the pattern of yield variability varied substantially among farmers who were being offered identical FCIC contracts; GAO concluded that federal crop insurance was "ineffective primarily because guarantees and premiums, set on a county or areawide basis, are excessive for some producers and too low for others" (U.S. Congress 1977a, front cover). A study prepared for FCIC found that "many farmers are not offered insurance at rates that reflect the expected losses on their farms" and that this "limited the attractiveness of the insurance to a relatively small proportion of farms" (Trapnell and McFadden 1978, p. 34).

The Federal Crop Insurance Act of 1980 should help reduce FCIC's adverse selection problem, making FCIC crop insurance more attractive to many farmers. The additional funds the act allows for FCIC's operating expenses will let the corporation estimate farmers' expected indemnities more accurately. This could be done, for example, by maintaining areawide policies but using better data and more analysis than before to ensure that each area contains a more nearly homogeneous group of farmers. The act also requires FCIC to conduct pilot programs of individual yield coverage, under which crop insurance policies are based on individual farmers' yield data. Finally, the premium subsi-

dies provided by the act may induce some farmers with small expected indemnities to remain in the insurance pool long enough for FCIC to discover that they merit lower premiums or higher coverage.

FCIC introduced pilot individual yield coverage crop insurance programs in 1981, as required, and exceeded the requirements of the Federal Crop Insurance Act by making individual yield coverage standard in 1982 for most spring-planted acres of corn, sorghum, barley, wheat, cotton, rice, and soybeans. To be eligible for individual yield coverage, producers must furnish FCIC with at least three years' production data, and up to ten years' data will be used by FCIC to estimate the producer's average yield and variability about average yield. Even ten-year histories of individual farmers' production may not completely eliminate adverse selection, but these histories should at least help FCIC identify and offer more attractive policies to individuals whose average yields are well above the local norms.

Loans and Grants Less Available and Attractive

Another reason more farmers are likely to use federal crop insurance to share their crop production risks with the public is that federal subsidies have been reduced for the other crop-loss assistance programs, those offering farmers loans and grants.

The Agriculture and Food Act of 1981 will reduce and possibly even eliminate DPP grants. Producers of DPP crops in counties where FCIC insurance on these crops is not available will continue to receive the grants under the same circumstances as before. Where crop insurance is available, however, the Agriculture and Food Act of 1981 stipulates that producers can receive DPP grants only if the Secretary of Agriculture determines that the producers face an economic emergency because of substantial uncontrollable crop losses and that other forms of federal crop-loss assistance received by the producers, including federal crop insurance indemnities, are not sufficient to alleviate the emergency (Johnson et al. 1982). The amount of DPP grants for crop losses in 1982 and beyond will therefore depend on the availability of crop insurance and the way the Secretary of Agriculture interprets these somewhat imprecise conditions. Since crop insurance is already available on essentially all acres of the six original DPP crops and on over 80 percent of the nation's acres of oats (which were added to DPP in 1981), and since USDA's current position is to interpret the conditions stringently, DPP grants may nearly vanish in 1982.

Crop-loss assistance loans may also be harder to obtain under the new laws and regulations. The Small Business Act of 1980 transferred most of SBA's agricultural lending authority to FmHA (ABA 1980). Eligibility requirements for FmHA's crop-loss assistance loans were, in turn, tightened under regulations published last spring (USDA 1981a). The new regulations increase from 20 to 30 percent of average yield the loss a farmer must incur to be eligible for a loan. The new regulations also stipulate that losses be calculated on the total production of all related crops on the farm rather than on each crop individually. Because high yields on some crops can compensate for low yields on other crops under this method of figuring losses, fewer farmers than before will qualify for loans. Finally, the new regulations give the Secretary of Agriculture more discretion to limit crop-loss assistance loans. By law, FmHA can make these loans only for losses in counties that have been officially declared disaster counties, and the new regulations shift the responsibility for designating disaster counties from state and local officials to the Secretary of Agriculture. The Secretary's current administrative guideline is to limit disaster designations to counties where a weighted average of countywide yields on all crops grown in that county is at least 30 percent below average, a much stricter standard than before.

Farmers who qualify for crop-loss assistance loans will find that the new laws and regulations have made these loans smaller and more expensive than before. FmHA regulations have reduced the maximum amount of these loans from 90 to 80 percent of the value of the crop loss (USDA 1981a). FmHA has also used authority it received in the Omnibus Budget Reconciliation Act of 1981 to raise the minimum interest rate on crop-loss assistance loans from 5 to 8 percent and has indicated that it will eventually set these rates at the government's cost of borrowing (USDA 1981c, d).

The Result: Insurance to Dominate

Even before some of these changes in the federal crop-loss assistance system were made, the popularity of crop insurance increased: between 1980 and 1981, the value of crops insured by FCIC doubled. As a result, FCIC paid almost as much in indemnities on 1981's bumper crops as it had on 1980's meager harvest. At the same time, the popularity of the other forms of assistance may have declined. According to preliminary estimates, the 1981 insurance payments either matched or exceeded the value of both loans and grants provided to farmers on the same crops. With the legal and regulatory changes now in place,

crop-loss insurance is likely to continue to expand at the expense of loans and grants. FCIC projects that it will insure 50 percent of all crop producers by 1985. Although it may not be quite that successful, if it continues to receive the support of Congress and USDA, all-risk crop insurance should become the primary way farmers share their crop production risks with U.S. taxpayers.

A Better System

Public records from the 1970s do not completely explain why Congress and USDA chose to restructure the crop-loss assistance system as they have. The records do reveal, however, that the growth in the system in the 1970s was accompanied by growing concern in Congress and USDA that the system before 1980 distributed assistance inefficiently, treated farmers in a somewhat arbitrary, inconsistent manner, and encouraged farmers to misallocate the nation's productive resources by taking risks they would have avoided had federal assistance not been available (U.S. Congress 1976; 1977a; 1978a, b, c; 1979a, b, c, d; 1980a, b). The system Congress and USDA have now put in place, concentrating crop-loss assistance in the crop insurance program, should be more efficient and consistent than the old system, but its impact on the allocation of the nation's resources is ambiguous.

More Efficient

Under the old system, farmers with crop losses faced a complicated array of overlapping programs from which they could seek help. Four nearly independent agencies—SBA, FmHA, ASCS, and FCIC—offered three different types of crop-loss assistance—loans, grants, and insurance. The eligibility requirements differed for each program but overlapped considerably. Crop insurance policyholders who produced crops covered by the grant program, for example, could qualify for both indemnities and grants, and if a producer's loss less grants and indemnities was large enough, FmHA or SBA loans might be available for the remaining portion of the loss. It was sometimes difficult for farmers to determine which program or combination of programs was best for them, and no government agency coordinated crop-loss assistance (U.S. Congress 1978c, pp. 61, 110–11, 113).

The overlapping eligibility requirements, by encouraging farmers to apply for aid from more than one agency on the same loss, led to inefficient duplication of effort by both farmers and crop-loss assistance agencies. Many producers who received indemnities for a loss on a DPP crop applied for grants on the same loss. Some farmers applied for loans from both FmHA and SBA. Such duplicate applications meant, as Congress was told, that a farmer was "generally required to prove the same loss in a variety of different methods in order to qualify for each of the types of assistance . . . available" (U.S. Congress 1978c, p. 113). Although the crop-loss assistance agencies sometimes worked together to evaluate a farmer's requests for aid, the extra applications also meant that as many as four agencies were engaged in collecting almost the same information and keeping almost the same records. The same amounts and types of assistance could have been provided at less cost to both farmers and taxpayers if farmers had filled out one application for evaluation by one smaller but more coordinated bureaucracy.

The new system isn't quite that streamlined, but it should be simpler and more efficient than the old. The new system offers primarily two forms of assistance—insurance and loans—from primarily two agencies—FCIC and FmHA. The virtual elimination of DPP grants and the highly restrictive eligibility requirements for what remains of SBA's crop-loss assistance program should sharply reduce the duplication of effort that used to result when farmers applied to more than one agency for aid. Some farmers will still be able to supplement indemnities with crop-loss assistance loans from FmHA, but even this duplication will be limited by FmHA's tighter eligibility requirements and FCIC's higher coverage.

More Consistent

The complicated eligibility requirements of the programs in the old crop-loss assistance system also resulted in inconsistent treatment of farmers. A *consistent* system would apply a single set of standards, all pertaining to the purpose of the programs, to determine the amount of assistance each farmer receives. Farmers in comparable situations, therefore (comparable in ways relevant to receiving crop-loss assistance, that is), would be eligible to receive comparable amounts of assistance. This was not true under the old system.

Eligibility standards pertinent to the purpose of providing crop-loss assistance include extent of loss and, possibly, ability to withstand loss; and both of these standards have been used in both the old system and the new system. Now, as before, the size of the loans, grants, and indemnities that farmers receive depends directly on the losses they incur. A related concept, expected loss, determines a farmer's insurance premium and premium subsidy. In ad-

dition, a requirement designed to measure ability to withstand loss, the test for credit elsewhere, partly determines eligibility for crop-loss assistance loans. This test was designed to direct these loans to farmers less able to withstand losses because of their inability to obtain credit from commercial lenders "at reasonable rates and terms" (U.S. Congress 1978c, p. 58).

However, under the old system there were other conditions, less pertinent to the purpose of assisting farmers with crop losses, which were also important in determining the type and amount of assistance farmers received. The type of crops that farmers produce was one nonpertinent condition. The arbitrary nature of this eligibility requirement was most obvious in the grant program, which offered assistance to producers of only 6 crops [and so became a favorite target for critics of the old system (U.S. Congress 1979a, p. 9; 1979d, pp. 7, 40; 1980a, p. H9015)]. Crop insurance was available on more crops—28 in 1980—but producers of hundreds of other crops were excluded from this assistance program even if their expected loss and ability to withstand loss were comparable to those of FCIC policyholders.

Location of their farms also influenced the types and amounts of aid farmers received. The crops that FCIC did insure were not insurable in all counties where they were grown, and even where these crops were insured, FCIC's method of calculating premiums and coverages on an areawide basis meant that the premium and coverage offered to an individual producer depended mostly on the area's, not the individual's, average yield and pattern of yield variability. Crop-loss assistance loans were available only in counties officially designated as disaster counties, a subjective requirement that was allegedly subject to political influence and may have been biased against producers who incurred uncontrollable crop losses as a result of very localized natural phenomena (U.S. Congress 1978c, p. 197).

Finally, strictness in administering the loan programs' test for credit elsewhere varied widely among the hundreds of local FmHA and SBA officials, with many officials turning producers down on this basis while other officials granted loans to farmers who actually could have borrowed elsewhere (LaDue 1980, p. 21; U.S. Congress 1978b, pp. 38–39). The result of all these nonpertinent eligibility factors was that farmers with comparable losses and comparable abilities to absorb losses received different types and amounts of assistance.

As insurance becomes the primary source of crop-loss assistance, with coverage and premiums set according to uniform actuarial standards nationwide, this sort of inconsistent treatment of farmers should be reduced. The importance of the nonpertinent eligibility factors should decline under the new system. Choice of crop will be less important as the virtual demise of DPP will eliminate a great disparity between producers of DPP crops and other producers. Location of an individual producer's farm should become less important as FCIC extends its insurance on 28 crops to all counties where they are grown and replaces areawide policies with coverage based on individual farmers' yield histories. Arbitrariness in the administration of the test for credit elsewhere should also decrease under the stricter new procedures FmHA has instituted. Some seemingly nonpertinent factors will continue to affect the distribution of assistance: many crops will still not be insured for at least the next few years, and the FmHA's stricter guidelines on designating disaster counties will be even more likely to exclude producers with isolated losses. Overall, however, the new system appears to treat farmers more consistently than the old system did.

Still Encouraging Resource Misuse?

Some critics felt the old crop-loss assistance system led farmers to adopt overly risky production techniques and so use the nation's resources in ways not best for U.S. society as a whole. The form in which most assistance will be distributed under the new system—as a premium subsidy proportional to policyholders' expected indemnities—may lead to the same problem.

All subsidized crop-loss assistance programs cause farmers to take additional risks. Farmers allocate their land, labor, and capital resources among a variety of crop production activities, some of which are more prone to crop losses than others. Farmers also allocate resources between crop production and other activities. The risks of crop failure in the various crop production activities restrict the amount of resources farmers are willing to devote to these activities. However, by reducing the financial impact of crop losses, subsidized crop-loss assistance programs encourage farmers to allocate more resources to risky crop production activities than the farmers would allocate without the programs. The greater the subsidy, the greater the additional risks farmers are likely to assume.

While subsidized crop-loss assistance will encourage farmers to take more risks than they would have taken if the subsidized assistance were not available, it is not

always easy to determine if the allocation of resources this leads to is too risky from society's point of view. To say that resources are being misallocated because of crop-loss assistance, we need to know that farmers would have chosen a more nearly socially optimal level of risk in the absence of the subsidized assistance. Determining what farmers would have done without subsidized assistance requires an analysis of their risk aversion and the nature of private security and insurance markets which is beyond the scope of this paper.

Because of the difficulties in evaluating how producers would have handled risk without the old system of crop-loss assistance, it is not possible to know whether or not the old system caused resource misallocation. However, many policymakers believed that the old system caused producers to take too many risks, especially the growing of certain crops in areas where these crops frequently failed. Some criticized the loan programs (U.S. Congress 1979b, p. 65), but most of the critics focused on the more lucrative DPP grants (U.S. Congress 1979a, p. 9; 1979d, p. 57; 1980a, p. H9015; 1980b, p. S13285).

If these critics were right about the old crop-loss assistance system, then it is not clear that they should be satisfied with the new one, for it changes but does not clearly lessen the incentives for farmers to take more risks. Some farmers have less incentive now because the federal government will pay for a smaller portion of their losses. Many producers of former DPP crops, for example, will average about half as much federally subsidized assistance under the premium subsidies of the new all-risk insurance program as under the fully subsidized grants of the old DPP program, and this may alleviate some of the worst cases of resource misallocation under the old system.[4] However, other farmers now have more incentive to adopt risky practices. Producers of non-DPP crops now insured by FCIC will be able to receive subsidies as large as 30 percent of their premiums, larger subsidies than many normally received under the old insurance and loan programs. By 1984, FCIC's expansion will spread this incentive to all counties where these crops are grown. As a result, the encouragement for producers to take additional risks will now be more pervasive, even if less extreme.

Concluding Remarks

The possible resource misallocation caused by both the old and the new federal crop-loss assistance systems is, of course, just part of the more fundamental question of why the federal government should subsidize crop-loss assistance at all. No attempt was made to answer this question here, but in one way or another it will probably arise in federal policymaking, for the recent changes in the federal crop insurance program are not likely to be the last. Already some people envisage phasing out the subsidy and turning all-risk crop insurance over to the private sector.[5] Others appear to want to move in the other direction; they see all-risk crop insurance as a possible stepping-stone to

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[4]Compare the average annual compensation received under DPP and the new insurance program. Let A be average yield, $A - D$ be the guaranteed level of yield (that is, D is the deductible), x be actual crop production, and $f(\cdot)$ be the probability density function of x. Then the covered loss, under either program, is given by

$$\text{covered loss} = \begin{bmatrix} 0, \text{ if } x \geq A - D \\ A - D - x, \text{ if } x < A - D \end{bmatrix}.$$

For corn, soybeans, barley, and wheat under DPP, $D = .4A$, while the current federal crop insurance program's maximum subsidy is obtained when $D = .35A$. However, there is evidence that the level of A as set by ASCS for DPP was slightly higher than the level set by FCIC's actuarial methods. Hence we can regard $A - D$ as roughly constant under the two programs. Then the annual average compensation for feed grains and wheat under DPP was given by

$$\int_0^{A-D} .5P_t(A-D-x)f(x)\,dx$$

where ASCS set P_t, the target price, at roughly a break-even price for an average producer. This compares to annual average compensation of

$$.3\int_0^{A-D} .9P_m(A-D-x)f(x)\,dx$$
$$= \int_0^{A-D} .27P_m(A-D-x)f(x)\,dx$$

under the new crop insurance program, with coverage equal to 65 percent of average yield valued at 90 percent of projected market price (P_m) and with a 30 percent premium subsidy. Since ASCS's target price was generally greater than $.27/.5 = .54$ of the projected market price, DPP provided higher average compensation than the new insurance program does. In fact, under the assumption that $P_t \approx P_m$ on average, DPP's subsidy was about twice what FCIC's subsidy is.

For cotton and rice, the result still holds but the reasoning is different. For these two crops, a higher portion of loss is covered under DPP (.75 of ASCS's higher estimate of A, as opposed to .65 of a lower estimate of A under crop insurance), but the amount of subsidy per unit of loss covered is almost identical, provided the target price is near the projected market price. (DPP pays .25 of P_t on covered loss, while federal crop insurance pays .27 of P_m.) That is,

$$\int_0^{.75(A+\varepsilon)} .25P_t[.75(A+\varepsilon) - x]f(x)\,dx$$
$$> \int_0^{.65A} .27P_m(.65A-x)f(x)\,dx$$

provided $P_m \approx P_t$ and $\varepsilon > 0$.

[5]The Federal Crop Insurance Act of 1980 directed FCIC to use private insurance companies and agents to sell and service its policies, and the corporation has already turned much of these marketing functions over to the private sector. The act also created an FCIC reinsurance program, under which private companies are to develop and market their own all-risk crop insurance policies but receive from FCIC premium subsidies and insurance against unusually large amounts of claims. Some policymakers envisage phasing out FCIC's role in this mixed system, leaving the markets for crop insurance and reinsurance completely in private hands.

federal farm income insurance, with policies covering market price risks along with production risks. Still others, particularly those who will receive less federal assistance under the new system than under the old (like producers of DPP crops), may push to simply reverse the recent changes. Economic analysis of these or other proposals for federal crop insurance should be improved by recent advances in the theory of insurance. Economists and agricultural policymakers are being challenged to apply these advances to the market for crop insurance.

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