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Risk Modeling in Agriculture: Retrospective and Prospective

Program proceedings for the annual meeting of the Technical Committee of S-232, held March 24-26, 1994, Gulf Shores State Park, Alabama.

Musser/Progress in Risk Analysis in Regional Projects

Patrick/Risk Research and Producer Decision Making: Progress and Challenges

Segerson/Environmental Policy and Risk

Coyle/Duality Models of Production Under Risk: A Summary of Results for Several Nonlinear Mean-Variance Models

Buschena/The Effects of Similarity on Choice and Decision Effort

Thompson and Wilson/Common Property as an Institutional Response to Environmental Variability

Moss, Pagano, and Boggess/Ex Ante Modeling of the Effect of Irreversibility and Uncertainty on Citrus Investments

Schnitkey and Novak/Alternative Formulations of Risk Preferences in Dynamic Investment Models

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Alderfer/ELRISK: Eliciting Bernoullian Utility Functions

Zacharias, Driscoll, and Kunkel/Update on Crop Insurance

Centner and Wetzstein/Automobile and Tractor Lemon Laws

Miller/Entropy Methods for Recovering Information from Economic Models

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UPDATE ON CROP INSURANCE

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Introduction

Product Lines

The U.S. crop insurance industry currently supports two major product lines, Multiple Peril Crop Insurance (MPCI) and Crop-Hail (C-H). Nineteen ninety-three premium volume was approximately \$754 million and \$487 million for MPCI and C-H, respectively with 1993 losses totalling \$1,648 million for MPCI and \$370 million for C-H. Resulting loss ratios (losses/premium) were 2.19 and 0.81 for MPCI and C-H, respectively. FCIC's current target loss ratio is about 1.00 and a loss ratio of 0.60 or less is considered satisfactory for C-H.

In addition to these two major products, industry and Federal Crop Insurance Corporation (FCIC) is attempting to market and underwrite a diversity of "supplemental" products to complement MPCI and C-H. Examples of these products include:

Group Risk Plan (GRP);

MPCI Add-Ons which tie directly to current MPCI coverages;

Named weather peril coverages for specialty crops;

Price Guarantee Products.

Overview of Multiple Peril Crop Insurance (MPCI)

Federal crop insurance was established as a pilot program in the 1930's. Prior to 1980, crop insurance was available only on major crops in major producing areas. The loss ratio has exceeded the break-even amount of 1.00 in every year since 1980. Cumulative losses for the years 1980-1992 were approximately \$2.9 billion, with a cumulative loss ratio of about 1.45 for the 13 years.

MPCI is a program jointly provided by the United States Department of Agriculture (USDA) and private sector insurance companies. The Federal Crop Insurance Corporation (FCIC) is the federal agency within USDA responsible for program oversight, reinsurance and regulation.

MPCI is essentially an all-risk policy for farmers. Farmers can select four yield coverage levels (35, 50, 65, and 75%) and a wide range of price elections for the purpose of establishing the appropriate liability for their crops. Yield coverage levels are determined by an averaging

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procedure which utilizes the farmer's previous crop-yield history. Price elections are determined by FCIC. In addition, policy provisions and underwriting rules are ultimately determined by FCIC although industry input is solicited and utilized.

As in other lines of insurance, premium is the product of "rate" and liability. The MPCPI "rate" the farmer pays is in reality a subsidized pure premium or loss cost. This is the "rate" published in the MCPI actuarial documents. The government subsidy varies by coverage level and is roughly 25 to 30% of the pure premium. The MPCPI pure premium "rate" varies by crop, average yield, and farming practice. For example, irrigated cotton has a different rate than non-irrigated cotton. The rate is determined actuarially using a loss cost experience rating methodology.

The expense portion of the rate is allocated through an administrative expense reimbursement from FCIC to the private sector insurance companies which write MPCPI. The expense reimbursement is determined by FCIC.

Private sector insurance companies writing MPCPI are primarily reinsured by FCIC. Each reinsurance year, FCIC issues a document referred to as the Standard Reinsurance Agreement (SRA). The SRA stipulates the terms for reinsurance and the rules for risk sharing between FCIC and private companies. Risk sharing rules vary by state. Private companies can retain certain levels of risk for individual states and, in turn, privately reinsure a portion of their retained book.

MPCPI in the 1990s (A Chronology of Events)

It may be useful to recall that federally supported MPCPI got off to a rocky start in the 1990s with the exclusion of FCIC program funding from the President's Budget. Funding was later restored, but this set the stage for continued attention and controversy over the MPCPI program. Reported below are some of the major program changes and highlights which have occurred within the MPCPI program during the 1990s. The "list" is not all inclusive, but should provide the reader with a good feel for current issues in the MPCPI program.

Nonstandard Classification System (NCS)

FCIC instituted NCS in 1990 because evidence indicated that a small percentage of insureds had losses in nearly every year. The losses paid far exceeded paid premiums. For various reasons, the insured yields for these individuals exceeded their apparent capabilities, and the premium rates were not representative of the risks posed by these persons. NCS was intended to reduce the insurance guarantee and increase the premium rate for such individuals.

The Agriculture, Rural Development, Food and Drug, and Related Agencies Appropriation Act for the 1994 fiscal year prohibited FCIC from using any funds appropriated to insure crops in certain counties unless an NCS program had been implemented in those counties. Counties were affected if the loss ratio, after applying the 1993 premium rates, was greater than 1.10 more than 70 percent of the years that the crop had been insured in that county. Approximately 2,100 county crop programs were affected by this provision.

For the 1994 crop year, NCS has been extended to 11 crops encompassing over 90 percent of the total value of insurance in force. Additionally, all of the county crop programs affected by the Appropriations language have been included under the NCS. Over 25,000 individuals (about 3.6 percent of all active policies for the 1993 crop year) were included under this program. Not all of these persons had been insured during the base period. NCS also extends to persons who participated in growing the crop in some way but who may not have been insured. These persons also are classified under NCS so that the acreage cannot simply be insured under a different name to avoid the NCS classification. In 1993, FCIC commissioned a study of the NCS to determine its effectiveness. A draft report of that study indicates that the NCS reduced the loss ratio by 5 to 10 points.

Changes in the 1992 Standard Reinsurance Agreement

Amendments to the Crop Insurance Act in 1990 directed FCIC to assure that adequate risk is borne by commercial insurance companies reinsured by FCIC, consistent with their ability to bear risk and the availability of commercial reinsurance. For the 1992 reinsurance year (a 12 month period that began on July 1, 1991, and ended on June 30, 1992), FCIC substantially modified its Standard Reinsurance Agreement (SRA) with the commercial insurers participating in the program. Both the amount and the probability of losses on the part of the commercial insurers were increased in this agreement. Additional incremental changes in the amount of potential SRA gains and losses were made for 1993 and 1994.

The GAO has reported that changes in the 1992 SRA are not significant enough in the area of risk bearing by the commercial insurance companies (GAO/RCED 92-25, January 13, 1992). Still, the 1992 SRA fundamentally changed the manner in which gains and losses are calculated. The amount of potential loss increased, but the change in the formula increased the chances that the company would lose in years of poor experience. As a comparison, the commercial industry lost approximately \$8 million in 1988 when the crop insurance program sustained a loss ratio of 2.45 primarily due to drought in the Midwest. If that experience is restated to the larger 1993 premium amounts, the loss still would have amounted to only about \$10-15 million. Results from the 1993 crop year are not yet complete, but current estimates indicate that commercial insurers will sustain losses of \$80-85 million although the loss ratio will be less than in 1988. The difference is caused by the SRA changes.

Introduction of Group Risk Plan

FCIC introduced the Group Risk Plan in 1993 for soybeans in 96 counties. The GRP is a program based on the average yield of an area, not upon individual yield coverage. It was expanded for the 1994 crop year to include seven additional crops encompassing 1,872 county crop programs (one crop in one county) in 27 states. Crops now included under GRP are barley, corn, cotton, forage, grain sorghum, peanuts, soybeans, and wheat.

GRP is intended to protect against the financial consequences of a disaster that strikes all or nearly all farmers in an area. It sets an expected county yield for each year based on historical yields, adjusted for any trends. Whenever the actual county average yield for the year is less than the expected county yield by a predetermined amount, an indemnity is paid.

Adequate data are a limitation to further significant expansion of GRP. The concept as presently developed uses 30 years or more of county yields data. These data are routinely available only for counties in which the crop has been grown in commercially significant quantities.

Customer acceptance of the soybean GRP for the 1993 crop year was limited. Fewer than 500 policies (of nearly 700,000 total for the crop insurance program) were sold. Even if the plan improves the actuarial soundness of crop insurance, the present volume of business is not sufficient to make any noticeable difference in program results. Further, acceptance of GRP by bankers as collateral for loans is yet to be determined.

Preemption

In 1992, the state of Kansas brought suit against USDA/FCIC concerning federal preemption of state insurance regulation. The purpose of the suit was to basically clarify the position between state insurance regulation and FCIC authority in delivering a federally sponsored insurance program. In certain situations, provisions of FCIC MPCI policies conflict with individual state insurance regulations. This issue is a major source of concern for private sector insurance companies delivering MPCI. The case was heard in the 10th Circuit Court of Appeals and the ruling was in favor of FCIC. The ruling is currently limited to crop insurance in the 10th Circuit, however, the precedent established in this case could have implications for other lines of insurance and federal programs.

1993 Flood and Excess Moisture

The record-breaking floods of 1993 in the Mississippi River basin resulted in massive damage to property and agriculture. There were many severe impacts on agriculture, including flooding of already planted crops, prevention of planned plantings, and yield reductions due to overly wet fields.

As reported in the introduction, 1993 MPCI losses were approximately \$1,648 million nationally. Midwest states (Illinois, Iowa, Kansas, Minnesota, Missouri, Nebraska, North Dakota, South Dakota, and Wisconsin) were hardest hit with estimated premiums of \$363 million and \$621 million in losses due to flood and excess moisture.

During the course of the 1993 growing season, NCIS sponsored a crop-model simulation study conducted by the Midwestern Climate Center. The simulations were based on 1993 growing season weather data through early summer, then the models were run using historical weather for the period 1949-1992. Results of the analysis indicated yield reductions for major portions of the midwestern states due to excess moisture and risk of early frost. This study is available from the authors.

It should also be pointed out that the Southeastern states experienced severe drought conditions during the 1993 season. For the states of Alabama, Florida, Georgia, North Carolina, South Carolina, and Virginia, MPCI premium was approximately \$90 million with losses in excess of \$277 million at the time of this writing.

1993 Budget Act

The Omnibus Budget Reconciliation Act of 1993 (OBRA 93) contains provisions concerning the Federal crop insurance program. These provisions direct the Federal Crop Insurance Corporation (FCIC) to take steps necessary to improve actuarial soundness of the Federal crop insurance program and to achieve, by the fiscal year beginning October 1, 1995, a projected overall loss ratio not to exceed 1.10.

The projected loss ratio of 1.10 (dollar amount of losses paid as a percent of the total premiums collected) is intended to be a performance standard, not an absolute ceiling for the operations of any particular crop year. Congress recognizes that adverse weather conditions (such as extreme drought or flood) will influence the financial results of each year's operations; however, when good and poor years are averaged over a long period of time, the expectation is that the program will operate with an average loss ratio of 1.10 or less.

Modified APH

From the 1985 through 1993 crop years, insured yields were based on Actual Production History (APH). The program was designed to obtain 10 previous yields to establish the insured yield for the next crop year. Proxy yields largely based on ASCS farm program payment yields or county averages were allowed whenever farmers would not or could not provide 10 years of history. Analysis by FCIC and others determined the proxy yields were benefiting farmers whose yields tended to be lower than average and discouraging farmers whose yields tended to be above average. Consequently, a modified APH program that reduced the influence of the proxy yields was introduced beginning with the 1994 crop year.

The Modified APH program works as follows. Only 65 percent credit is given to the proxy yield if no actual yields are reported, 80 percent credit is given if one actual yield is reported, 90 percent if two actual yields are reported, and 100 percent if three actual yields are reported. The proxy yields are not used after four actual yields are available. The insured yield is a simple average of the 4 years of actual and modified proxy yields for the first 4 years, and then (after 4 years) is the simple average of the actual yields reported. Acquiring 10 years of production history remains the goal of the program.

Catastrophic Yield Adjustment

FCIC recognizes that the average of a series of observations as short as 4 years is subject to significant variations due to abnormally large or small yields during that time. Thus, FCIC is examining certain adjustments to the modified-APH rules with a goal to assign more appropriate probabilities to the individual observations. These adjustments commonly are called catastrophic yield adjustments. FCIC will evaluate alternative methods to recognize catastrophic and unusually good crop years, and consider implementing appropriate adjustments to the modified-APH plan effective for the 1995 crop year.

Crop Insurance Reform

Currently, crop insurance is the subject of a major reform legislative package. The major components of the proposed reform package include:

1. A catastrophic coverage level of 50% yield guarantee and 60% price election. The farmer would pay a nominal servicing fee for this coverage.
2. Catastrophic coverage would be mandatory for participation in other USDA programs.
3. Catastrophic coverage would involve dual ASCS/private sector delivery.
4. Previous ad hoc disaster expenditures would become annualized funding for the crop insurance program.

The specifics of the reform legislation have yet to be worked out and will continue to be the subject of much debate in the coming months. However, the basic components of the reform appear in place and represent a clear departure from the current program.

Summary

This paper has attempted to provide an overview of the major events which have been taking place in the crop insurance arena. Crop insurance continues to receive considerable attention from policy makers and economists alike, and this will probably be the case for some time to come. It is unlikely that the program will stabilize to any great extent within the near future. As such, it will be interesting to observe the changes in the MPCI program and the impacts of these changes on the risk management decisions of the farmer.