The US Federal Crop Insurance Program: A Case Study in Rent-Seeking

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Abstract

This study examines how, in the context of three major crop insurance legislative initatives by the US government in 1989, 1994, and 2000, regulatory and other innovations to the federal crop insurance program have been designed to jointly benefit farm interest groups and the agricultural insurance industry, with spillover benefits for credit institutions that make loans to farmers. The analysis clearly demonstrates that those initiatives have resulted in considerable and generally increasing costs to US taxpayers and that they evolved as the result of explicit or implicit coalitions between farm interest groups and crop insurance interest groups.

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Vincent H. Smith

Rent-seeking is endemic to the process through which any policy or regulatory initiative is developed in the United States and, for that matter, almost all other countries. The process has been well understood by economists for many years (see, e.g., Olson 1971; Buchanan and Tullock 1962; Becker 1983, 1985; Peltzman 1976). However, farm lobbies have become some of the finest artists in seeking benefits from the public purse and, especially, in developing effective alliances with other interest groups to protect and expand their economic rents (Babcock 2015a; Carter, Loyns, and Berwald 1998; Constantine, Alston, and Smith 1994; Goodwin and Smith 2013; Orden and Zulauf 2015; Rausser and Foster 1990; Rausser, Swinnen, and Zusman 2011; Smith and Glauber 2012).[1] Over the past eight decades, those coalitions have involved downstream and upstream agricultural businesses (e.g., food processors and chemical companies), environmental lobbies (especially in relation to the current smorgasbord of conservation programs offered under the 1985 and subsequent farm bills), agricultural insurance companies, and urban and rural groups concerned with the food security and nutritional status of the poor.

The focus here, however, is on the federal farm subsidy program and how, in the context of three major legislative initiatives, regulatory and program innovations for the most part were designed to jointly benefit farm interest groups and the agricultural insurance industry at

[1] Generally, economic rents are defined as the difference between what the owners of resources receive and the minimum payments they need to provide those resources. In that context, the owners of resources can be viewed as the primary insurance and reinsurance companies and the independent insurance agents who, between them, sell, service, and reinsure federally subsidized agricultural insurance policies. Rent-seeking is widely defined as participation in the political process by interested parties to increase the rents accruing to those parties from regulatory and policy initiatives.

considerable and generally increasing expense to US taxpayers. The three major initiatives are the 1980 Federal Crop Insurance Act, through which private agricultural insurance companies gained a foothold in the federal crop insurance program; the 1994 Federal Crop Insurance Reform Act; and the 2000 Agricultural Risk Protection Act. The historical evidence indicates that many key aspects of those legislative initiatives jointly served to benefit farm interests and the interests of the crop insurance industry.

The approach is as follows. After an initial discussion of whether there is any market failure justification for crop insurance subsidies in the United States, a brief history of federally subsidized agricultural insurance is presented[2] in which the core provisions of the 1980, 1994, and 2000 acts are described and the general structure of the federal crop insurance program is discussed. A theoretical model of the impacts of the crop insurance program on the economic well-being of farmers and the crop insurance industry is outlined in the third section, with a formal model presented in the appendix. The next section presents an assessment of the most important changes in the federal crop insurance program mandated by each of the three acts, the extent to which those changes reflected the joint and separate interests of the farm sector and the crop insurance industry, and how those changes have been structured to permit the two groups to form a coalition around the entire structure of each legislative initiative. The impacts of the coalition consensus on federal budget expenditures also are evaluated.

The central conclusion is that for the most part, the changes in policy embedded in the 1980 Federal Crop Insurance Act and especially in the 1994 Federal Crop Insurance Reform Act and the 2000 Agricultural Risk Protection Act indicate that, at least implicitly, coalitions have been formed between the farm lobby and the insurance lobby to obtain policy changes that in the

[2] More detailed discussions of the program's history are presented by, among others, Kramer (1983), Goodwin and Smith (1995), and Glauber (2013).

aggregate benefit both groups, as well as banks with substantial agricultural lending portfolios. The upshot has been a 35-year evolution of the crop insurance program into a large and costly (over $8 billion annually) subsidy program that mainly redistributes tax revenues to relatively wealthy farm operators and landowners and to a crop insurance industry that in all likelihood would not exist absent the federal subsidy program.[3]

Economic Efficiency of the Federal Crop Insurance Program

At the outset, it is useful to ask whether there is any economic efficiency argument to justify the existence of the United States federal crop insurance program or whether it is simply an income transfer program. The answer is that the program is almost certainly economically inefficient because there is no evidence of any substantive market failure and that, as discussed later, as a means of transferring income to farmers, subsidized crop insurance turns out to be expensive (Glauber 2013). Wright (2014), Goodwin and Smith (1995, 2013), Smith and Glauber (2012), and many other analysts consistently point out that, absent substantial government subsidies, at commercially viable prices, farmers do not purchase either index insurance products or farm-specific insurance products that protect them against yield shortfalls on their operations, low prices, or both.

The authors cited above emphasize that by itself, the absence of a product in the marketplace does not imply a market failure; it just means that the cost of providing the commodity by the private seller exceeds the price the buyer is willing to pay. For the same reason, no insurance company offers insurance products that guarantee restaurant owners an

[3] Smith and Glauber (2012) provide a summary of the (then) extant analysis of farmers' willingness to pay for crop insurance. Those studies uniformly reported that almost no farmers were willing to purchase commercially offered crop insurance if loading factors for A&O costs exceeded 9 percent of the actuarially fair premium required to cover indemnities. Loading factors required by companies for even the least costly forms of crop insurance are likely to exceed 20–25 percent of the actuarial fair premiums (Smith and Glauber 2012; Goodwin and Smith 2013).

estimated monthly gross income from sales. The empirical evidence with respect to farm-level and index-based crop insurance products is simply that insurance companies require larger premiums than most, if not all, farmers are willing to pay for multiple-peril or index insurance (Smith and Watts 2009; Miranda and Farrin 2012; Smith and Glauber 2012; Goodwin and Smith 2013).[4] However, as Smith and Glauber show, creating a crop insurance market through subsidies has substantial costs in terms of the standard welfare loss measures used by economists.[5]

The absence of a market for a product is not evidence of market failure, and so the question is whether there are market failures that prohibit or impede the provision of crop insurance products and especially multiple-peril crop insurance, the type of product that in value terms accounts for 94 percent of all federally subsidized insurance. Multiple-peril products pay farmers indemnities when their farm yields or revenues from a specific crop fall below expected levels, almost regardless of the reason for the loss (other than poor management or clear evidence of fraud). The claim made by some advocates for the US agricultural insurance program, however, is that insurance companies are unwilling to offer multiple-peril insurance because of what they call *systemic risk*.

[4] Multiple-peril or all-risk crop insurance policies are based on a farmer's expected yields for the insured crops, which typically are established using data on the farm's actual yields over the past 4–10 years. Index insurance policies are based on indicators of crop yields in the area in which a given farm is located—for example, countywide yields or a weather indicator such as rainfall (which is closely correlated with crop yields) within an area of 12 × 12 miles using data from weather stations.

[5] Smith and Glauber (2012) show that the net economic welfare loss associated with federally subsidized crop insurance, measured as the sum of the changes in producer surplus and consumer surplus less government subsidies, is a trapezoid, not a triangle, and is likely to be large, even when the deadweight costs of raising taxes are ignored, because the price at which the quantity demanded is zero is lower than the marginal cost of providing the product at zero output. Several studies indicate that disaster aid programs in the United States have adversely affected participation in crop insurance programs (e.g., Goodwin 1993). But as discussed by Smith and Watts (2009) and Wright and Hewitt (1994), the empirical evidence is consistent with the conclusion that, absent substantial subsidies, farmers will not purchase all-risk or index-based crop insurance because they have more efficient and less costly ways of managing risk. As Goodwin (2011) demonstrates, other rationales for government subsidies widely asserted by farm interest groups, such as saving family farms and national food security, are as implausible in the context of the federal crop insurance program as they are for other subsidy programs.

Systemic risk, in this context, is defined as the following phenomenon. Frequently, and mainly because of droughts or other weather events that typically affect large regions, when one farmer experiences a crop loss, so do many other farmers. As a result, it has been argued, insurance companies that offer coverage for crops cannot hold enough reserves to meet their indemnity obligations in the event of a major drought or other extensive sources of crop losses. That analysis, however, reflects a misunderstanding of how the insurance industry is organized because it ignores the existence of reinsurance companies.

For a fee, any primary insurance company can effectively pass on much or even all of the risk associated with its crop insurance portfolio to a reinsurance company. A reinsurance company's portfolio will include many different forms of liability—for example, hurricane insurance, auto insurance, property and casualty insurance—with which agricultural insurance losses are essentially uncorrelated or only weakly correlated. Thus, other things being equal, agricultural insurance policies are in fact relatively attractive to reinsurers (Wright 2014). The major market failure justification for why multiple-peril and index-based crop insurance are not offered by the private sector, the systemic risk proposition, is therefore an argument whose basis is a flawed understanding of the role of reinsurance markets and not an example of market failure (Goodwin and Smith 1995, 2013; Wright 2014).

A related claim has been that reinsurance companies do not have the financial depth to cope with the excessively large losses associated with systemic risk-related crop insurance events. As Goodwin and Smith (2013) note, however, the worst adverse outcome for reinsurance companies that took on all the risks associated with this country's current heavily subsidized federal crop insurance program's book of business would not require them to pay more than $25 billion in indemnifiable losses in excess of premium revenues. For example, in 2012, the worst

year for the federal crop insurance program in the past 25 years, total indemnities amounted to about $18 billion and net indemnities to about $12 billion. Over the past 15 years, major hurricanes have resulted in net outlays in indemnity payments over current-year premiums that have been in excess of $60 billion by the companies that have reinsured much of the federally subsidized US crop insurance book of business (e.g., Munich Re, Zurich Re). As Goodwin and Smith (2013) point out, agricultural insurance represents a small portion of the portfolios held by the large reinsurance companies, which can cope with much larger losses in other sectors.

Thus, the financial-depth argument is also fundamentally a red herring justification for what is in fact an income transfer program from US taxpayers to farmers and a corresponding risk transfer program from farmers to taxpayers, rather than a genuine risk management program that reduces the amount of aggregate risk taken by farmers. In fact, as pointed out by both Goodwin and Smith (2013) and Ramirez, Carpio, and Collart (2015), there is a substantial body of evidence that the US subsidized crop insurance program encourages farmers to take on more risk, not least by reducing their use of risk-reducing inputs, such as pesticides and herbicides, and by planting crops on highly erodible land where crop loss risks are greater.

Brief Legislative History of the Federal Crop Insurance Program

The United States federal crop insurance program was initiated through landmark New Deal–era legislation proposed by President Franklin Roosevelt in 1937 and signed into law in 1938 (Kramer 1983). Multiple-peril crop yield insurance, which no private-sector company had successfully offered before 1938 (Goodwin and Smith 1995) and which paid farmers an indemnity when actual yields fell sufficiently below estimated yields, was first offered in 1939 by the newly established Federal Crop Insurance Corporation (FCIC; part of the US Department of Agriculture) but only for wheat. Coverage for a second crop, cotton, was made available in 1941, partly because of intensive

lobbying by Edward O'Neil, then president of the American Farm Bureau and a cotton producer from Alabama (Kramer 1983). Subsequently, coverage for additional crops such as corn, barley, and potatoes was introduced; by 1980, federal crop insurance policies were available for 27 different crops in at least some counties (Goodwin and Smith 1995).

Between 1938 and 1980, for the most part, Congress wanted the federal crop insurance program to be managed by the FCIC so that farmer-paid premiums covered expenditures on indemnities. In addition, the federal government covered all A&O expenses. The objective of covering indemnities with premiums often was not achieved. Thus, when the ratio of indemnities to farmer-paid premium payments (defined as the program's loss ratio) seemed likely to persistently exceed 1, Congress tended to step in with legislation that required changes to return the program to solvency. Goodwin and Smith (1995) note that in 1970, after a sequence of years in which underwriting losses were relatively high, the Nixon administration brought in new managers for the FCIC whose specific mandate was to reduce the program's loss ratios.

In 1980, however, in actions strongly supported by the Carter administration, Congress radically altered the direction of the federal crop insurance program. The Federal Crop Insurance Act of 1980 ushered in an era replete with efforts by Congress—consistently in response to pressures and campaign contributions from a plethora of agricultural and crop insurance lobbying groups—to expand the size and scope of the program and the level of federal subsidies for insurance premiums. Those pressures were successful in generating substantial growth in both the size and the scope of the federal crop insurance program over the next 35 years.

The core provisions of the 1980 legislation were as follows:

- First—and in terms of the long-term impacts of federal legislation on subsidy costs, perhaps most substantively—the 1980 act explicitly authorized subsidies at the rate of 30

percent of the actuarial fair premium, reducing farmer-paid premiums to an average of 70 percent of the total premium paid into the insurance pool. The 30 percent premium rate subsidy was to be paid for coverage levels up to 65 percent of a farm's expected yields. Farmers selecting the higher coverage levels of 70 or 75 percent would receive only the dollar amount of the subsidy associated with the 65 percent coverage policy. The principle of reduced subsidy rates for higher coverage levels and zero or smaller proportional additional subsidies for the highest coverage levels would be included in subsequent legislative initiatives.[6]

- Second, the 1980 act provided a mandate for the FCIC to expand access to yield-based crop insurance as rapidly as possible, including expansion of coverage to all counties in which corn, rice, and wheat were grown. The 1980 act also increased the scope of insurance coverage, requiring the FCIC to develop contracts for new crops. Over the period 1981–2015, the number of covered crops increased from 31 to more than 130.
- Third, the 1980 act required the FCIC to establish procedures through which private insurance companies could sell and service federally subsidized crop insurance policies. Under the legislative provisions, the FCIC would (a) pay insurance companies an amount to cover their A&O costs for compliance with FCIC policies, (b) pay the premium rate subsidy for each policy into the insurance pools, and (c) provide reinsurance to the companies for the policies they sold. The FCIC was also required to have in place for the 1982 crop year a test plan for the sale of federal crop insurance policies by private insurance companies. Before the passage of the 1980 act, independent agents called

[6] The structure of declining subsidy rates as coverage levels selected by a farmer increase has been embedded in the rate-setting process since at least the mid-1980s, when coverage-level options were expanded. The initial principle underlying that structure was that, when a farmer selected coverage levels in excess of 70 percent, the farmer should pay the full cost of the additional premium for the higher level of coverage (75 percent and more recently 80 and 85 percent).

master marketers, most of whom had no association with private crop insurance companies, had sold federal crop insurance, but the policies were serviced (in terms of loss adjustment, payment of indemnities, etc.) by the FCIC.

Figure 1 (page 39) shows how the federal crop insurance program expanded over the period 1981–2014 in terms of total acres insured by farmers for all crops and the estimated rate at which farmers participated in the program. From 1981 to 1993, the consequences of the 1980 legislation for farmer participation in the federal crop insurance program were relatively modest. In 1981, farmers insured approximately 48 million acres of crops through the program, but by 1989 the number had changed very little.

In 1990 and 1991, however, the number of insured acres effectively doubled in response to a 1989 congressional mandate that farmers would be eligible for ad hoc disaster aid payments only if they carried insurance.[7] After 1991—when because of substantial lobbying by farm interest groups, the mandate no longer applied—participation fell. In 1992, the country's insured area declined from just over 100 million acres to 82 million acres (Goodwin and Smith 1995); over the period 1992–1994, insured acres remained in the 80 million to 83 million acre range. The participation rate was correspondingly relatively low. Between 1980 and 1989, participation remained below 15 percent of planted acres and even by 1993 was still well below 30 percent.

What had changed was the delivery system for crop insurance policies. Insurance companies had lobbied vigorously for the 1980 act's mandate that they, the insurance companies, replace the FCIC as the entities that would sell and service crop insurance products. Despite reports that indicated the companies were a more costly vehicle for delivering the program (GAO

[7] In 1988, and to some extent in 1989, major drought in the northern and southern Great Plains states and parts of the Corn Belt led Congress to pass substantial disaster aid bills. Farmers with crop insurance also collected substantial indemnity payments.

1986, 1988), the FCIC provided the companies with a substantial A&O subsidy equal to 33 percent of the total premium paid into the insurance pools to encourage expansion of the public-private partnership. Thus, by 1989, effectively all crop insurance policies were being sold and serviced by crop insurance companies. At the margin, the shift to the private-sector delivery system provided some benefits for farmers as private insurance agents now had incentives to market policies and aggressively ensure more rapid loss adjustment and indemnity payments in order to build longer-term relationships with farmers. In the 1980s and early 1990s, insurance companies were largely unconcerned about the size of indemnity payments as their primary source of revenue was the A&O subsidy, and they had little or no responsibility for underwriting losses or gains. Hence, they had little or no incentive to monitor losses.

The federal crop insurance program's persistently low participation rates were a cause for concern for the agricultural committees of the US Senate and House of Representatives, in large part because various farm interest groups continued to lobby for and receive substantial ad hoc disaster aid (Goodwin and Smith 1995; Zulauf and Hedges 1988). In addition, by 1994, farmers were arguing that the crop yield insurance policies available then provided neither sufficient indemnities to guarantee that farmers could cover their production costs nor protection against unexpected declines in crop prices.[8]

At the same time, there was a push in Congress for the crop insurance companies to take on more of the underwriting risks associated with the insurance policies they marketed. One

[8] For example, GAO (1993a) had reported that 25 percent of farmers included in a US Department of Agriculture national survey stated they did not participate in the federal program because available coverage levels were too low, and 37 percent said the availability of disaster aid programs influenced their decision not to participate. In a March 3, 1994, *New York Times* article on proposed reforms to the 1994 Federal Crop Insurance Reform Act, then-Representative Tim Johnson (D-SD) is quoted as having said, "the idea is to get out of crop disaster spending altogether and use some of that money to enhance the crop insurance program," by which he presumably meant the funds would be used to increase premium subsidies and other initiatives to increase incentives for farmers' participation in the crop insurance program (Michael Quint, "Crop Insurance Plan to Improve Protection and Cut Costs").

argument for the shift was that, if the companies were more fiscally liable for paying indemnities on farm losses, they would be more diligent about both ensuring that loss adjustments were carried out accurately and preventing fraud.[9] Thus, in 1992, the FCIC and the insurance companies negotiated a new standard reinsurance agreement (SRA) in which the companies took on more risk but were given a relatively large share of any underwriting gains while accepting some responsibility for any underwriting losses. However, the companies' shares of any underwriting losses would be substantially smaller than their shares in any underwriting gains.

Such concerns contributed to initiatives that led Congress to pass the Crop Insurance Reform Act of 1994, the major provisions of which were as follows:

- Premium subsidies were to be increased to an average of 50 percent of total premium payments.
- The FCIC was given a mandate to develop crop revenue–based insurance products where feasible and to explore innovative products that might cover farmers' production costs rather than their crop yields or revenues. Subsequently, the FCIC, through its administrative agency (now known as the RMA, which was formally established in 1996) determined that revenue insurance would be viable only for crops for which futures markets were well established or for crops whose prices were closely correlated with those of the crops for which futures markets did exist.
- Participation in the federal crop insurance program became mandatory for farmers to be eligible for deficiency payments under other government subsidy programs, such as price

[9] GAO's (1993b) study of the federal crop insurance program reported that a substantial number of farmers were overstating yield losses. A subsequent Senate Agricultural Committee inquiry limited to eight crops in nine states reported that questionable payments to farmers for losses in the amount of $92.5 million had been identified over the period 1988–1993 (Douglas Franz, "Reports Describe Widespread Abuse in Farm Program," *New York Times*, October 3, 1994).

support programs and loan programs. However, that requirement was vitiated one year later in 1995.

- A catastrophic coverage option was created to allow farmers to obtain minimal coverage through which they were compensated for losses exceeding 50 percent of expected yields at 60 percent of the crop's expected price. The coverage would allow farmers to meet the mandatory participation requirement. However, farmers had to pay only a $50 administrative fee to obtain catastrophic coverage for each crop, up to a maximum of $150 per farm. Although the mandate was terminated in 1995, catastrophic coverage was retained and remains available to this day at a fee of $100 per crop up to a maximum of $300 per farm.
- The Federal Crop Insurance Reform Act of 1994 also required the FCIC to add a catastrophic loading factor to every estimated actuarial fair premium rate, essentially guaranteeing that, over the long run, insurance pools would experience positive underwriting gains.[10] In response, the FCIC required that a loading factor of 13.64 percent be applied to all estimated actuarially fair premium rates.[11] It is worth noting that the A&O subsidy rate had been lowered from 33 to 31 percent under the terms of a new SRA negotiated in 1993.

[10] A catastrophic loading factor is often added to the price of an insurance policy to account for potentially catastrophic losses not observed in the historical data used by an insurance company to establish a policy's premium. For example, a homeowner may live in a western Kansas town where a tornado has not been observed in living memory, but the homeowner's house may still be at risk of complete loss from a tornado. The insurance company will therefore take into account that possibility by adding a catastrophic load to the home insurance premium.

[11] The language mandating this approach in the 1994 act formally required that a loss ratio of 1.075 be achieved, with the loss ratio defined as "the ratio of all sums paid by the Corporation [FCIC] as indemnities under any eligible crop insurance policy to that portion of the premium designated for anticipated losses and a reasonable reserve, other than that portion of the premium designated for operating and administrative expenses" (Federal Crop Insurance Reform and Department of Agriculture Reorganization Act of 1994, Section 102 (a)).

The latter provision has had important long-run effects on underwriting gains and was actively sought by the insurance companies. The argument was that a catastrophic event risk surcharge on actuarially fair premium rates was required to account for potential catastrophic losses not reflected in the data used by the FCIC or its contractors to establish the actuarially fair premium rates for each crop in each county (as premium rates were and are for the most part still established at the county level).

As Pearcy and Smith (2015) point out, although that may make sense in the context of a single county-based insurance product, in the aggregate it does not. Extreme loss events are included in the data used by RMA and its contractors to establish many actuarially fair premium rates. For example, the 100-year extreme drought years in the northern Great Plains in 1983 and 1988 are used to compute premium rates for many wheat insurance products, and the 200-year catastrophic flood in 1993 and the extreme drought year of 2012 are included in the data used to calculate premium rates for corn and soybean insurance products in the Corn Belt states. Effectively, the 1994 mandate for adding a 13.64 percent catastrophic risk loading factor to estimated actuarially fair premiums amounted to guaranteeing on average a substantial positive underwriting gain for crop insurance companies. Between 1981 and 1994, net underwriting gains accruing to the companies (the sum of all underwriting gains and losses on all policies sold) averaged 1.7 percent per year. Subsequently, between 1995 and 2014, annual net underwriting gains accruing to the insurance companies averaged 13.4 percent of total premiums paid into the federal crop insurance pools.[12]

[12] These estimates were calculated by the author using annual data on company underwriting gains and losses and total premiums available online from RMA for the years 1997 to the present and, for data before 1997, from RMA and FCIC annual reports on the federal crop insurance program's book of business. Note that one important reason for the amount of underwriting gains accruing to the companies is the structure of the SRA under which the companies operate. The SRA disproportionally allocated underwriting gains to the companies and underwriting

The effects of the 1994 legislation on crop insurance program participation and size are illustrated in figure 1. Figure 2 (page 40) shows the growth of the federal program from 1981 to 2014 in terms of dollars of coverage or liability, and figure 3 (page 41) shows total premium payments, premium subsidy payments, and farmer-paid premiums for the years 1981–2014.

Between 1994 and 2000, as illustrated in figure 1, the total acreage of insured crops more than doubled to just over 200 million acres; participation, defined as the ratio of the area of insured crops to the total area planted to all crops, increased from a little less than 30 percent to 63 percent of the area planted with crops. The dollar value of total coverage (measured by total liability) also increased at a commensurate rate from $13.6 billion in 1994 to $36.7 billion in 2000 (figure 2). Similarly, insurance premiums and premium subsidies grew rapidly over the same period. Also, between 1994 and 2000, premiums paid into the insurance pools increased from just under $1 billion to $2.5 billion, and premium subsidies paid to farmers more than tripled from $255 million to $941 million (figure 3). The more rapid rate of increase in premium subsidies was a direct result of the increase in the average subsidy rate from 30 percent to 50 percent of total premiums mandated by the 1994 legislation. Program growth was directly linked to the increase in the subsidy rate and to the introduction of revenue insurance.

In 1995 and 1996, prices for major crops such as corn and wheat were relatively high. However, by 1998, prices for many major crops had substantially moderated. As is their wont, farm interest groups took advantage of the price environment to argue that agriculture producers were in dire financial straits and sought further protections from Congress against

losses to the taxpayers through stop-loss provisions (Smith, Glauber, and Dismukes 2016). As underwriting losses increase, stop-loss provisions reduce the share of any additional losses that must be funded by the insurance companies and increase the share of additional losses paid by the government. However, the catastrophic loss premium rate loading factor provides a long-run guarantee of positive underwriting gains.

fluctuations in farm incomes. Congress responded to those pressures in 1998 by effectively doubling payments to farmers, through what became known as the direct payments program, from about $2.5 billion a year in 1997 to over $5 billion a year in 1999 and 2000.[13] Also, in 2000, with the support of the Clinton administration, farm lobbies, and the crop insurance industry, Congress made major changes to the federal crop insurance program through the Agricultural Risk Protection Act of 2000.

The 2000 legislation involved many initiatives, but the key elements of the legislation were as follows:

- Premium subsidy levels were substantially increased, with average subsidy levels rising from 50 percent between 1995 and 2000 to 62 percent between 2001and 2015.
- Subsidies were extended to include premiums paid by farmers for the harvest price option (HPO). The HPO, described in more detail below, is an add-on or endorsement to revenue insurance contracts for which farmers were required to pay the additional actuarially fair premium before passage of the 2000 act.
- Pilot insurance programs were authorized for livestock that were not served by crop insurance.
- The 508(h) process was established by which private-sector and other entities could propose new types of insurance products for various commodities, for which they would receive compensation for the development costs of a product approved by the FCIC's board of directors.

The 508(h) process was proposed by RMA as a vehicle for addressing requests for insurance coverage for a wide range of crops not previously covered by federal crop insurance

[13] See table 35 of various fiscal years' President's Budget publications available at http://www.fsa.usda.gov/about-fsa/budget-and-performance-management/budget/commodity-estimates-book-and-reports/index.

policies. A case can be made that the 508(h) program has been a complete waste of US taxpayer funds (Goodwin and Smith 2013). The program created incentives for special interest groups and their consultants to propose heavily subsidized policies for very-small-acreage crops (e.g., citrus trees in a small number of Texas counties, strawberry crops in North Carolina).[14] Goodwin and Smith note that many policies approved by the FCIC under the 508(h) process generate very small volumes of premiums and in some cases almost surely fewer premiums than the administrative costs incurred by RMA in reviewing and maintaining the policies.

Expanding subsidies to the HPO also had a substantial impact, estimated by the Congressional Budget Office to have increased total subsidies to farmers by about $1.8 billion.[15] Under a standard crop revenue insurance contract, the futures contract for a crop such as corn that expires at harvest time is used at planting time to establish the expected price of the crop. Coupled with a farmer's expected yield, that price provides an estimate of the revenue the farmer can expected from the crop. The farmer chooses a coverage option, say 80 percent of expected revenue. At harvest time, the farmer's yield is multiplied by the average price of the crop in the futures contract over the month before the contract expires to estimate the farmer's revenue. If the amount is less than the farmer's coverage level (say 80 percent of the expected revenue), the farmer receives an indemnity equal to the difference between the coverage level and the farmer's estimated revenue.

The HPO works by allowing a farmer to value expected revenues at the harvest time price if that price is higher than the price that was expected at planting time. The effect is to

[14] Descriptions of the products proposed and approved by the FCIC under the 508(h) process can be gleaned from the agendas and minutes of the quarterly meetings of the FCIC's board of directors since passage of the 2000 act. Many of those agendas are available at http://www.rma.usda.gov/fcic/archive.html. For example, the August 2016 agenda included consideration of privately developed submissions for insuring Louisiana sweet potatoes and apiculture.
[15] The Congressional Budget Office estimates (cited in Shaheen 2015) for ending HPO premium subsidies were provided to Congress in October 2015 with respect to provisions of the proposed Assisting Family Farmers through Insurance Reform Measures Act, which was introduced by Senators Jeff Flake (R-AZ) and Jeanne Shaheen (D-NH).

increase the amount of the indemnity a farmer receives when crop revenues are relatively low because of poor yields. By subsidizing the HPO, the 2000 Agricultural Risk Protection Act essentially provided farmers with a heavily subsidized put option. The result was that many producers of crops eligible for revenue insurance switched into HPO revenue contracts, substantially increasing their coverage. Also, because HPO contracts have higher total premiums than standard revenue contracts, total premium subsidy payments to farmers are larger (as subsidies are proportional to total premiums), and taxpayer expenditures on the federal crop insurance program are higher.

In terms of affecting program growth—as measured by participation, premium subsidies, and insurance company revenues—the two most important innovations were the substantial increase in premium subsidies from about 50 percent to over 60 percent of total premiums and the extension of subsidies to the HPO component of revenue insurance contracts. Between 2000 and 2015, at the national level, the area of insured crops expanded from about 200 million acres to 294 million acres, from just over 60 percent to 90 percent of the area estimated to be eligible for insurance coverage.

Total liability, total premiums, and premium subsidies also increased rapidly over the 2000–2015 period. Liability more than tripled, from $34.4 billion in 2000 to $109.8 billion in 2014. Over the same period, total premiums increased fourfold, from $2.5 billion to $10.1 billion, and premium subsidies increased by over 500 percent, from $1.6 billion to $9.1 billion. Total revenues received by crop insurance companies also increased substantially, from $0.8 billion in 2000 to a peak of $4.7 billion in 2008.

In fact, the crop insurance companies enjoyed exceptional earnings between 2007 and 2010, which averaged $3.4 billion a year over the four-year period, in large part because of high

crop prices, which led to substantial increases in premiums and A&O subsidy payments. Those earnings attracted considerable criticism from Congress and the media. In response, under a new SRA negotiated between RMA and the insurance companies in 2010, A&O subsidies were capped at approximately $1.4 billion a year, a provision that has reduced insurance company revenues.[16] However, under that SRA, as Smith, Glauber, and Dismukes (2016) show, RMA effectively enabled the companies to lower their costs by capping the commissions they could pay to insurance agents for selling policies.

Understanding Incentives for Crop Insurance Policy-Related Coalitions between Farm and Crop Insurance Interest Groups

Explicit or implicit coalitions among politically influential interest groups form around legislative initiatives when the initiatives are structured in ways that, on a net basis, benefit each group. Often, if not always, to achieve such outcomes, government programs become more complex than would otherwise be the case as behind-closed-doors agreements are negotiated among otherwise competing interest groups, program administrators, and legislators. Understanding why policies are complex therefore requires an appreciation of how different elements of government programs serve the ends of different interest groups. Further, some components of a government program may benefit certain groups but adversely affect other groups engaged in the policy debate. The federal crop insurance program represents a classic example of that process.

The two major groups of interest here are the farm lobby and the crop insurance industry lobby. Within those groups, there are subgroups whose agendas are somewhat different.

[16] After 2010, insurance company revenues declined, in large part because of the new cap on A&O payments but also because of a substantial underwriting loss in 2012 (when the Corn Belt states experienced an exceptionally severe drought) and lower underwriting gains in other years.

Horticultural and livestock producers, for example, are interested in different insurance products than producers of corn and wheat. Similarly, reinsurance companies may have different interests than primary insurance companies that manage crop insurance policies or the independent insurance agents who market policies to farmers (Smith, Glauber, and Dismukes 2016).

Here, however, the focus is on the economic gains and losses that accrue to farmers in general and to the crop insurance industry as a whole as a result of essentially simultaneous changes and innovations in multiple aspects of the federal crop insurance program. The relatively weak assumption is that initiatives that increase economic benefits for the farm sector and increase gross revenues for the insurance industry are likely to be supported by the subgroups in each sector. Sectorwide gains (losses) for the farm sector are therefore defined as resulting from policy initiatives that lower (raise) the prices paid for crop insurance coverage out of farmers' own pockets. Gains (losses) for the insurance industry are defined as resulting from policy initiatives that increase (reduce) industrywide revenues.[17]

The federal crop insurance program is replete with subtle policy and regulatory complexities, but the core of the program's structure in transferring taxpayer funds to farmers and the crop insurance industry derives from four major components of the program. Two components flow from the fact that the market for federally subsidized crop insurance policies has an unusual and important feature. All the products are designed by RMA (and its contractors), which also sets the price and all other terms for any federally subsidized crop insurance policy a farmer purchases. None of the private companies that sell and service a federally subsidized crop insurance product can alter the price paid for coverage by a farmer or

[17] Ramirez, Carpio, and Collart (2015) and Lusk (2015) both note that there are heterogeneous distributional impacts among farms with respect to both the crops and the value of farm output, with benefits mainly concentrated among larger farms raising crops such as corn, wheat, and soybeans.

the terms of the farmer's contract. There is therefore *no price or product competition* among the companies, although, as discussed by Smith, Glauber, and Dismukes (2016), the companies and insurance agents can compete on other dimensions, including offering supplementary services and visiting customers more frequently.

Under the terms of the Federal Crop Insurance Reform Act of 1994, RMA is explicitly mandated by Congress to use the following procedures in setting prices for each insurance product. First, to the best of its ability, typically using historical data on yields and price volatilities, RMA is required to estimate the actuarially fair premium rate for a policy, which is defined as the premium rate required to cover the expected indemnity payment associated with a policy. A mandatory loading factor, currently 13.64 percent, is then added to the actuarial fair premium rate, notionally to account for potential catastrophic events not accounted for in the data used to compute the actuarially fair premium rate.[18]

The actuarially fair premium rate, r, is therefore a central feature of the federal crop insurance program, and the methods used to estimate that rate have been a focus of considerable technical debate (see, e.g., Coble et al. 2010). Those methods have also been a focus of political debate because changes in the way actuarially fair premium rates are estimated can affect both the out-of-pocket price paid by farmers for crop insurance coverage and the revenues generated for crop insurance companies. Lower estimated actuarially fair premium rates will lower the prices paid by farmers. However, other things being equal, they also reduce expected underwriting gains for the companies and, by reducing total premiums, direct subsidies paid to the insurance companies by the federal government to cover A&O

[18] Following the 1994 legislation mandate, RMA requires that each estimated actuarially fair premium rate be divided by 0.88 to account for catastrophic risks not represented in the data used to compute the initial premium rate, which is equivalent to a 13.64 catastrophic risk loading factor.

expenses (which for most of the life of the federal crop insurance program have been proportional to total premiums).

The second important feature of the program is the catastrophic loading factor, β. Adding a proportional loading factor to the estimated actuarially fair premium rate increases the total premium rate, p, where $p = (1 + \beta)r$, to which any premium subsidy is applied to lower the out-of-pocket price of insurance to a farmer. At the same time, a higher total premium rate has the effect of increasing the amount of revenue paid into the insurance pool from the sale of any given insurance policy, increasing the expected underwriting gains associated with the sale of a policy.

The third major component of the federal crop insurance program is the producer premium subsidy rate, s, which currently averages 62 percent of the total premium rate, p. That subsidy rate is applied to the estimated total premium rate to determine the amount of the total premium that US taxpayers fund, sp, and the farmer's out-of-pocket premium rate for coverage, denoted by $p_f = (1 - s)p$. As discussed, an explicit premium subsidy rate was first introduced in the Federal Crop Insurance Act of 1980 and was set at a target level of 30 percent. It was increased to about 40 percent by the Federal Crop Insurance Reform Act of 1994 and further increased to an average of 62 percent by the Agricultural Risk Protection Act of 2000. Note that p_f can also be written $p_f = (1 - s)(1 + \beta)r$. Clearly, any decreases in the actuarially fair premium rate, r, and increases in the premium subsidy rate, s, lower p_f, which directly benefits farmers. Increases in the catastrophic loading factor, β, raise p_f, which adversely affects farmers.

The fourth component is the A&O subsidy rate, denoted by α, which provides a direct subsidy payment to crop insurance companies. Until 2010, as discussed, the companies received an A&O subsidy for each policy. On a per-dollar-of-liability basis, the amount of the subsidy is defined as the A&O subsidy rate multiplied by the full premium rate, or αp. On a per-policy

basis, the insurance company would then receive the per-dollar-of-liability subsidy multiplied by the amount of liability or coverage purchased by a farmer, l, or αpl. The industry as a whole would receive the per-dollar-of-liability A&O subsidy multiplied by the total liability purchased in the marketplace by all farmers, L, or αpL. As discussed, after 2010, total industry A&O payments were capped at approximately $1.4 billion.

Total payments to the crop insurance industry therefore flow from two sources: A&O subsidies and underwriting gains. Any policy initiatives that increase the sum of those two revenue streams therefore increase crop insurance industry revenues. The effects on industry revenues of changes in two of the four policy variables—the catastrophic loading factor and the actuarially fair premium rate—are potentially ambiguous because increases in those variables also increase the out-of-pocket prices paid by farmers and therefore are likely to reduce the amount of insurance that farmers purchase. The subsequent reduction in overall participation may then, at the margin, reduce underwriting gains by increasing adverse selection problems for the overall program (Smith, Glauber, and Dismukes 2016). Increases in the A&O subsidy rate have no effect on farmers' out-of-pocket prices and therefore have unambiguous positive effects on crop insurance industry total revenues. Similarly, increases in premium subsidy rates lower the prices paid by farmers and increase the amount of insurance purchased by them, reducing adverse selection problems[19] and potentially increasing average underwriting gains on a per-policy basis, but leave the total premium rate unchanged and therefore increase industry revenues.

[19] Insurance policies often face an adverse selection problem. The problem is that an individual buying an insurance policy may have a better assessment of the likelihood of a loss (and the size of a loss) than does the insurance company. Individuals with higher probabilities of losses are therefore more likely to buy an insurance policy than individuals with lower probabilities of losses if the policy premium rate is based on average probabilities of losses among all insured individuals. As a result, low-risk individuals are more likely not to buy insurance, which raises the loss ratio for the pool of individuals who do obtain coverage.

These potentially complex effects on industry revenues and farm-level benefits are examined in detail in the appendix in a formal model of the market for crop insurance. The key findings with respect to policy change effects can be summarized as follows:

- An increase in the A&O subsidy rate increases insurance company revenues but has no effect on farmers. However, taxpayers lose because subsidies paid directly to the insurance companies increase while subsidies paid to farmers remain constant (as total coverage purchased remains constant). For example, in the absence of any cap on A&O payments, an increase of two percentage points in the A&O rate (from, say, 18 to 20 percent) would increase government subsidy payments to crop insurance companies by 2 percent of the total premiums paid into the federally subsidized crop insurance pools. In 2016, when total premiums amounted to $9.3 billion, a two-point increase (decrease) would have increased (decreased) the taxpayer costs of the A&O subsidy by $186 million had the current cap on A&O subsidies of approximately $1.4 billion a year not been in effect.
- An increase in premium subsidy rates increases both the economic benefits that farmers obtain from the program and the total revenues obtained by crop insurance companies from the program. Taxpayers, of course, lose because each dollar of coverage receives a larger premium subsidy and coverage increases (L increases). For example, the average current premium subsidy rate is 62 percent, and government payments into the federal crop insurance pools were $5.14 billion in 2016. Were the premium subsidy to be increased by six percentage points—an increase of approximately 10 percent in subsidies on a per-dollar-of-coverage basis—and were farmers not to change their insurance purchases, government subsidies would increase by at least half a billion dollars (about $514 million). However, lower premium rates are likely to result in increased

participation in the crop insurance program. Estimates of price responsiveness in the academic literature suggest that a 10 percent reduction in premium rates would cause insurance purchases to increase by 2–10 percent. An increase of six percentage points in the subsidy rate would therefore lower the average out-of-pocket prices paid by farmers by 3.7 percent, increasing their purchase of coverage by about 1.0–2.7 percent. That increase in purchases would add $47 million to $235 million to the premium subsidy costs incurred by taxpayers. However, the taxpayer burden would not necessarily end there. An increase in crop insurance sales could potentially increase total premiums paid into the insurance pool, increasing A&O subsidies in proportion to the increase in total premiums. A reduction in the subsidy rate by a similar amount (six percentage points or 10 percent of the current subsidy rate) would reduce total annual taxpayer outlays on the federal crop insurance program by similar amounts (from $550 million to $770 million).

- An increase in the catastrophic loading factor almost certainly increases total revenues obtained by the crop insurance companies but lowers economic benefits to farmers by increasing the out-of-pocket price they pay for coverage. Taxpayers almost certainly lose because an increase in the catastrophic loading factor increases the total premium rate and, given a constant subsidy rate, the amount of subsidy per dollar of coverage increases. For example, an increase in the catastrophic loading factor from 13.64 percent to about 15 percent would increase premium rates by a little over 1 percent. Assuming farmers continued to purchase the same amount of insurance coverage, total premiums would increase by 1 percent. In 2016, as previously noted, total premiums amounted to $9.3 billion. Therefore, as long as participation in the program remained unchanged, an increase of one percentage point in premium rates would increase total premiums by

$93 million and, over the longer term, increase average underwriting gains by the same amount, which would largely accrue to the insurance companies. Farmers, however, would pay only an additional 38 percent of that amount—$35 million, or 1 percent of what they currently paying—because of the premium rate subsidy (which averages 62 percent). Such an increase would be unlikely to have a large negative effect on participation, but to the extent that farmers were to drop coverage, adverse selection would likely increase, reducing expected underwriting gains on a per-policy basis. However, those effects are likely to be small, given that even if farmers' responses to changes in premium rates were at the top end of the estimated range described above, a 1 percent increase in premium rates would also reduce participation by 1 percent. Finally, it should be noted that, as discussed below, there has been no change in the catastrophic loading factor since 1994, when such a factor was first mandated by the provisions of the Federal Crop Insurance Reform Act of 1994.

- When, as a result of changes in the way premium rates are calculated, there is an increase in the actuarially fair premium rate, there is almost certainly an increase in insurance company total revenues. Further, by reducing the amount of insurance sold through higher farmer-paid prices, insurance companies are also likely to incur lower costs. Farmers receive fewer benefits because they now face higher out-of-pocket costs for coverage. Taxpayers almost surely lose because the increase in the actuarially fair premium rate increases the total premium rate for each dollar of coverage and, therefore, the amount of subsidy for each dollar of coverage.

Effects of the Joint Provisions of the 1980, 1994, and 2000 Crop Insurance Legislative Initiatives on Farmers and Crop Insurance Companies

The 1980 Federal Crop Insurance Act, the 1994 Federal Crop Insurance Reform Act, and the 2000 Agricultural Risk Protection Act all included important provisions that affected both farmers and crop insurance companies. Those provisions also provided benefits to agricultural lenders, many of which are small rural banks. By effectively guaranteeing farmers a revenue floor for many of their crops through substantial taxpayer subsidies, as well as increasing their expected revenues, crop insurance reduces the risk of nonrepayment of loans, through either default or delay of repayment of principal or interest (see, for example, Atwood, Watts, and Baquet 1996). The expansion of participation in the federal crop insurance program engendered by those legislative initiatives has therefore generated substantial benefits for private lenders to the agricultural sector. Thus, the banking sector has also become an advocate for expanding and sustaining the federal crop insurance program. However, the main focus of the present study concerns the relationship of the provisions of those three legislative initiatives to the coalition between farmers and insurance companies as lobbyists for the program.

The case with respect to the 1980 act is straightforward. First, the act introduced a mandate for private companies to enter the federal crop insurance market and effectively to eventually become the sole providers of federally subsidized crop insurance products to farmers. The incentive was a substantial A&O subsidy rate ($\alpha = 0.33$, or 33 percent) that had no implications for any premium subsidies that would benefit farmers. However, one potential benefit for farmers was that the companies would perhaps be more eager to provide services such as loss adjustments and indemnity payments more rapidly than would the FCIC (Pearcy and Smith 2015). The reason, as Smith, Glauber, and Dismukes (2016) note, was that insurance

companies and insurance agents could only compete on service dimensions and not on price or other aspects of the insurance policies.

A second issue was that, until the 1992 SRA, the insurance companies bore minimal risks associated with underwriting gains. Further, as previously noted, annual underwriting gains averaged less than 2 percent of total premiums over the period 1981–1994. In addition, before 1992, net underwriting gains never exceeded 6.3 percent and, in the three years in which underwriting gains were negative, the losses were less than 1.9 percent of total premiums. Hence, farmers are likely to have believed that the insurance companies would be relatively generous in assessing underwriting losses, as was the assessment of a series of reports (GAO 1986, 1988, 1993a, 1993b) and by the findings of a 1994 Senate inquiry into the performance of the federal crop insurance program (as discussed earlier).[20]

In addition, the 1980 act introduced a 30 percent premium subsidy for most federal crop insurance policies (*s* increased from close to zero to 0.3). As discussed, an increase in premium subsidy rates increases both the economic benefits farmers obtain from the program and the total revenues obtained by crop insurance companies from the program. Both groups therefore expected to benefit from the subsidy provision. Further, the 1980 act required the FCIC to expand the availability of crop insurance as rapidly as possible. Between 1980 and 1992, therefore, the number of crops covered by federal crop insurance products increased from 27 to 51, and coverage for major crops became available in almost all counties in which major crops were grown. Both farmers and the insurance companies benefited from the expansion that increased access to and the demand for crop insurance coverage at the national level.

[20] See Douglas Franz, "Reports Describe Widespread Abuse in Farm Program," *New York Times*, October 3, 1994.

The provisions of the 1994 Federal Crop Insurance Reform Act seem to be more complicated when considered in isolation from one another. The insurance companies were disadvantaged by a reduction in the A&O subsidy rate from 33 to 31 percent. In addition, although not an explicit part of the 1994 act, Congress gave the FCIC signals that further cuts in the A&O rate would be appropriate; subsequently, in 1997, the A&O subsidy rate was further reduced to 27 percent. However, as discussed, the 1994 act included two important additional provisions. The first was a substantial increase in the premium subsidy rate, from an average of 30 percent of total premiums to 50 percent of total premiums. The second provision was the introduction of a mandatory 13.64 percent catastrophic loading factor on all estimated actuarially fair premium rates.

As discussed, by itself, the catastrophic loading factor almost surely was likely to benefit the insurance companies at the expense of raising farmer-paid premiums and increasing taxpayer subsidies, effectively resulting in an income transfer from farmers and taxpayers to the insurance companies. However, the joint impact of the catastrophic loading factor and the increase in the premium subsidy was to benefit both the companies and farmers. Before the 1994 act, when the subsidy rate was 30 percent and the catastrophic loading factor was zero, farmers were paying on average 70 percent of the estimated actuarially fair premium for their coverage. Subsequently, when the subsidy rate was 50 percent and the catastrophic loading factor was 13.64 percent, farmers were paying on average 57 percent of the actuarially fair premium. Thus, the net effect of the simultaneous reduction in the premium subsidy rate and the introduction of the catastrophic loading factor was substantially to reduce farmers' premiums by an average of 13 percent. The result was a substantial increase in both program participation and farmers' benefits from the program over the next five years. Those changes also resulted in much lower overall

loss ratios for the program and substantially higher underwriting gains for the companies. The expansion of the federal crop insurance program, in terms of participation, also expanded the benefits derived from the program by agricultural lenders because more of their potential customers now obtained crop insurance and, as such, became less risky borrowers.

The 1994 act also required the FCIC to introduce new revenue crop insurance products, new products that would guarantee farmers could cover their production costs, and a catastrophic coverage option for which no premiums were charged to enable farms that would not otherwise buy insurance to comply with a subsequently short-lived mandate to have insurance coverage in order to be eligible for other subsidies. The act also required the FCIC to continue to expand the national program in terms of the crops eligible for insurance. As noted, effectively those initiatives can be viewed as increasing the demand for federally subsidized crop insurance to the benefit of both the farmers and the companies.[21]

In relation to the 1994 legislation, two additional observations are noteworthy. First, although the act reduced the insurance companies' A&O subsidy rate from 33 to 31 percent (and shortly thereafter in effect to 27 percent of total premiums), the introduction of a 13.64 percent catastrophic loading factor generated subsequent annual average underwriting gains for the insurance companies of more than 13 percent. Almost surely, those companies, and behind them the reinsurance companies, such as Zurich Re and Munich Re, that took on much of the risk the insurance companies now faced, were well aware that the 1994 legislation would substantially increase their revenues. Second, it is worth noting that since 1994 there have been no subsequent actions by Congress, the FCIC, or RMA to alter the catastrophic loading factor even though, as Pearcy and Smith (2015) note, the original statistically based rationale for that initiative was flawed.

[21] Although the companies received no premiums from catastrophic coverage policies, they did receive administrative fees to cover A&O expenses.

Finally, the major provisions of the 2000 Agricultural Risk Protection Act also were designed to benefit both farmers and the companies. Most obviously, the mandated increase in premium subsidy rates, which subsequently averaged 62 percent of total premiums, was intended to increase participation. As discussed, the extension of such subsidies to the additional premiums associated with the HPO was also designed to increase the total amount of crop insurance coverage purchased by farmers. Before 2000, relatively few farmers purchased revenue insurance coverage that included the HPO. However, in 2015, in Corn Belt states such as Iowa, Illinois, Indiana, and eastern Nebraska, over 90 percent of the insurance contracts purchased by farmers for corn, which is the most heavily insured crop in the federal crop insurance program, were revenue insurance contracts, most of which included the HPO (Smith 2016).

Summary

This paper provides a case study of how the provisions of three major legislative initiatives—the 1980 Federal Crop Insurance Act, the 1994 Federal Crop Insurance Reform Act, and the 2000 Agricultural Risk Protection Act—were designed to benefit both farmers and the private-sector crop insurance industry. The three initiatives form the basis of the current federal crop insurance program, which is estimated to cost taxpayers $8.5 billion a year (CBO 2015), making it the most expensive farm subsidy program over the next decade.

Using an illustrative model of the market for crop insurance, this study shows how all three acts included provisions that, when taken as a whole, were very likely to benefit both the insurance companies and farmers in terms of industry revenues and economic rents. In effect, the evidence indicates that the provisions of the 1980 act and especially the 1994 and 200 acts were designed to meet both interest groups' objectives, reflecting the implicit formation of a coalition between the groups to support passage of the legislation in its final form. This study also

indicates that banks with substantial amounts of agricultural loans are a third group that has benefited relatively substantially from the three acts by improving the creditworthiness of farm enterprises (at the very least in terms of default risk). Thus, this country's federal crop insurance program provides clear examples of legislative change that, most of the time, benefits multiple special interest groups that form coalitions to increase both the probability that a program will be maintained and that the size of the program's income transfers to those special interest groups will increase over time or at least not be diminished.

In the case of the federal crop insurance program, an important and politically sensitive question concerns where the income transfers built into the program flow. Because there are no caps on the subsidies that accrue to individual farms and premium subsidies are paid on a per-acre basis, it is clear in absolute terms that larger farms receive much larger benefits than do small farms (as illustrated by GAO 2012; Smith 2016). Further, as discussed by Goodwin, Vandeveer, and Deal (2004), Smith and Glauber (2012), and Smith and Goodwin (2013), the federal crop insurance program engenders complex environmental impacts, many of which are adverse.

As always, the limits of this study should be acknowledged. The analysis focuses on the three major legislative initiatives associated with the federal crop insurance program. Thus, it is not a comprehensive assessment of all policy actions that have affected the economic rents obtained by farmers from the program or the revenues and profits obtained by the crop insurance industry. Examples that have not been carefully considered include the 2011 cap on A&O payments to insurance companies associated with the 2011 SRA and the 2013 shift in the methodology used to compute actuarially fair premium rates for crops that had increasing average yields over time. The latter tended to reduce those rates, lowering total premiums and farmer-paid premiums to the economic benefit of farmers and the detriment of the insurance

industry. Finally, as Babcock and Hart (2006), Babcock (2015b), and Smith, Glauber, and Dismukes (2016) demonstrate, the crop insurance industry is complex, consisting of the insurance companies, independent insurance agents, and multinational reinsurance companies. The potential for federal policy changes to have different impacts on the subsectors of the crop insurance industry also is not considered in any detail in this study.[22]

Nevertheless, despite its limitations, this study of the evolution of this country's federal crop insurance program provides compelling evidence of the extent to which the program is designed to benefit both farm groups and the private insurance industry because of persistent and to some extent coordinated lobbying by both interest groups. Finally, it is no small irony that a program whose claim to fame is that it enables farmers to manage risks in fact encourages farmers to adopt more risky production and business practices, mainly because taxpayers foot most of the bill for any losses associated with those risky practices. Further, for every dollar of subsidy a farmer receives, crop insurance companies are paid over 40 cents by the federal government. That makes crop insurance subsidies one of the most costly ways in which the government transfers taxpayer revenues to farmers and a classic example of crony capitalism at its most effective.

[22] In addition, this study does not consider another set of issues important to the insurance companies with respect to management of the insurance pool, specifically changes in the rules governing risk sharing and use of assigned risk pools, as well as, prior to the 2011 SRA, the development pool into which the insurance companies could assign individual farm policies that were assessed to be at high risk of experiencing losses. More detailed discussions of these issues are provided by Smith, Glauber, and Dismukes (2016) and Pearcy and Smith (2015).

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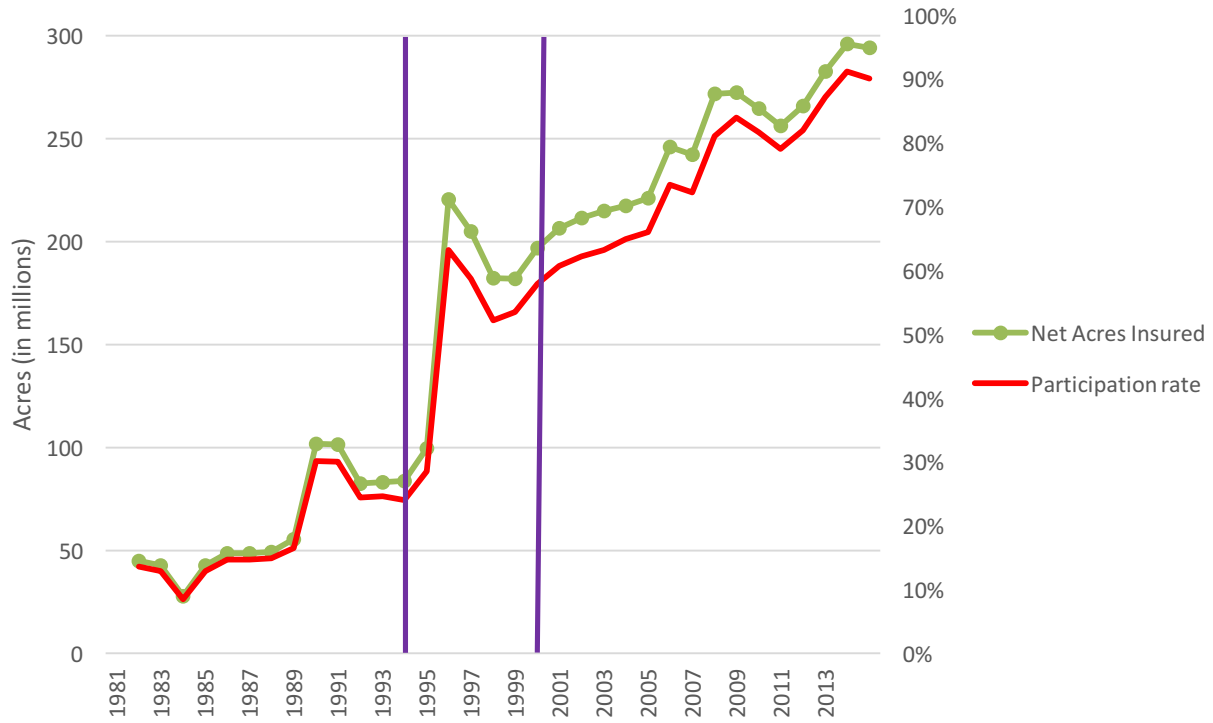
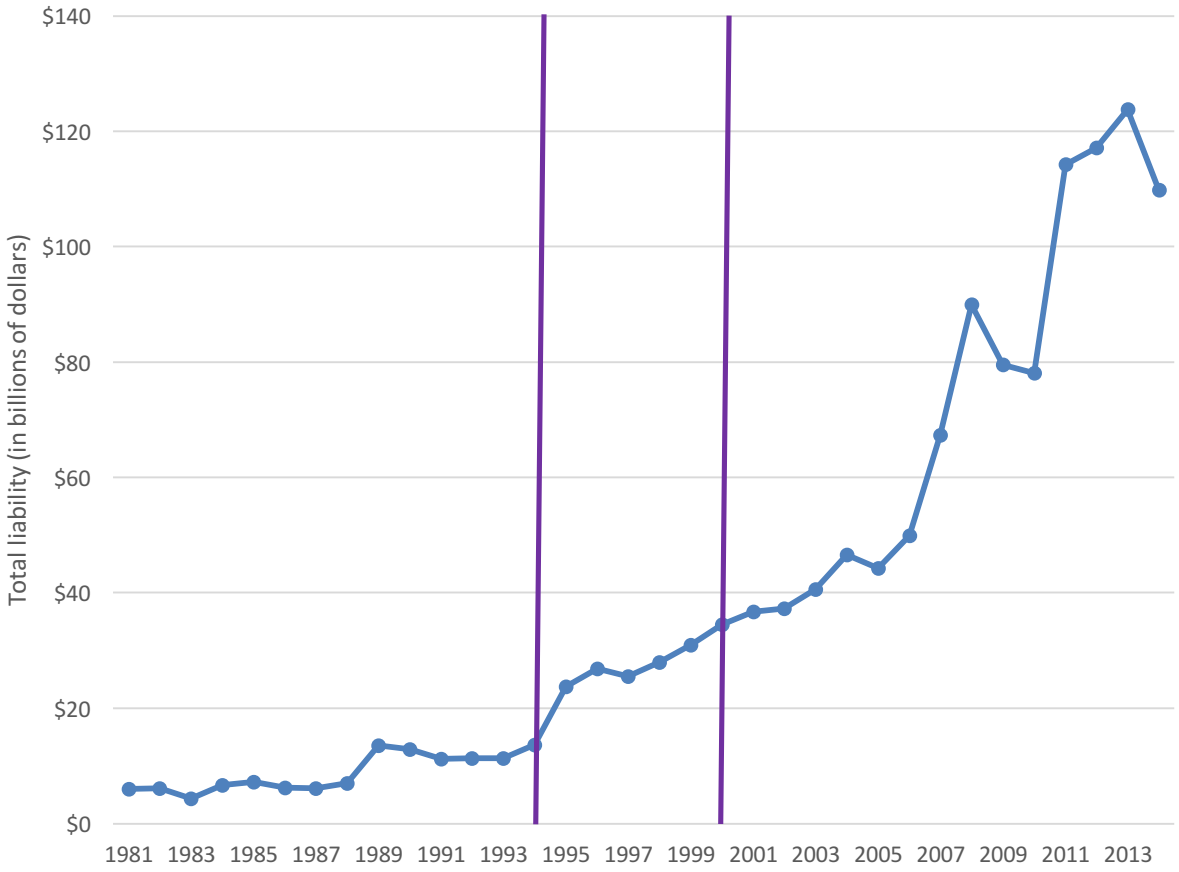
Figure 1. Total Acres Insured and Estimated Federal Crop Insurance Program Participation Rates, 1981–2014



Note: The participation rate is defined as the ratio of total acres insured through the federal crop insurance program to total acres planted for all crops in the United States.

Sources: USDA Risk Management Agency, USDA National Agricultural Statistical Service, and the author.

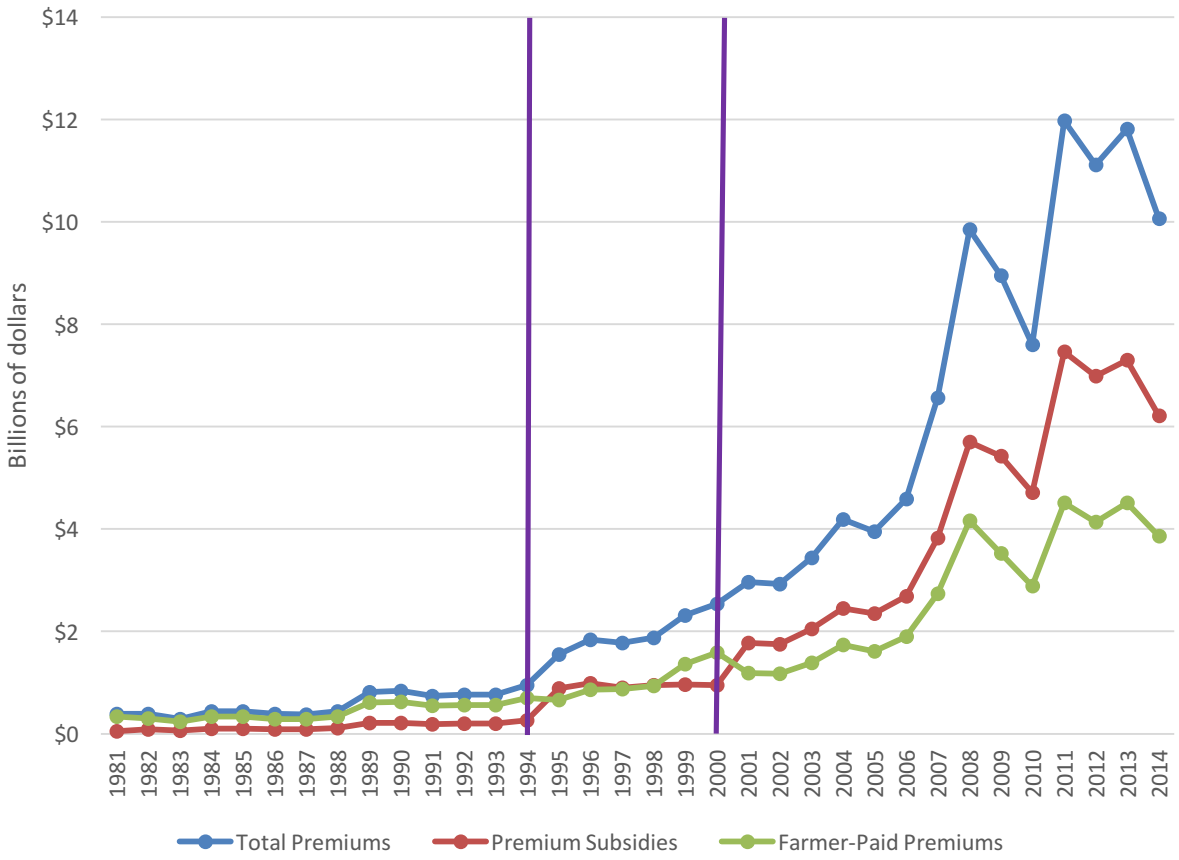
Figure 2. Federal Crop Insurance Program Total Liability, 1981–2014



Note: Amounts are in nominal dollars.Total liability is defined as the maximum amount that would have to paid in indemnity for a total loss of all insured crop production.

Source: USDA Risk Management Agency.

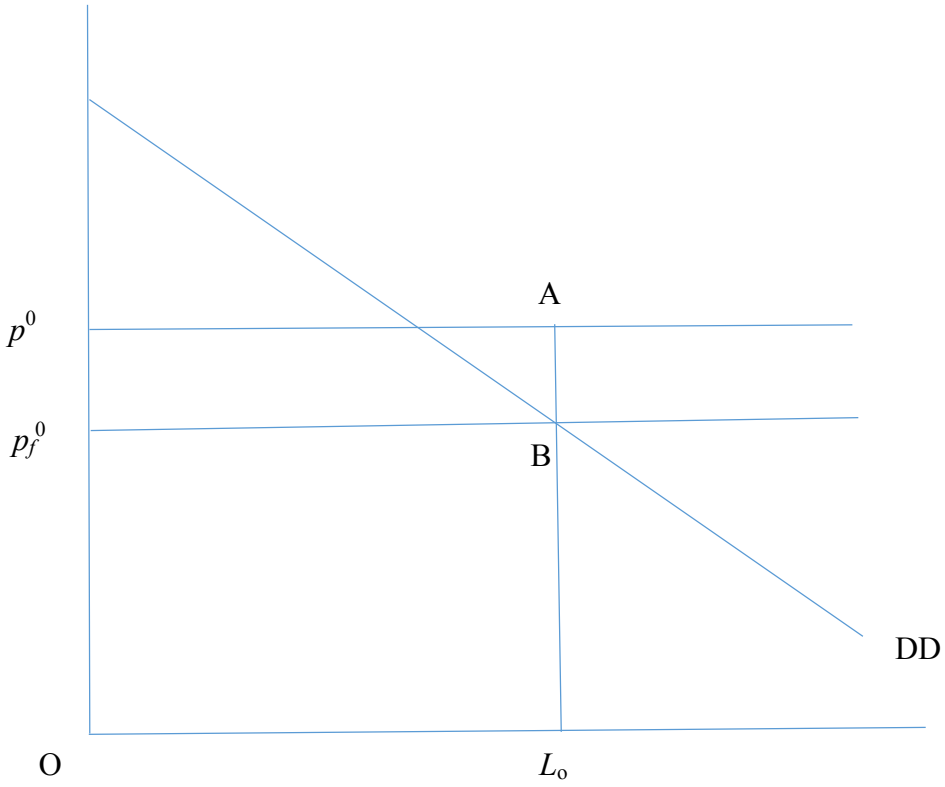
Figure 3. Federal Crop Insurance Program Total Premiums, Premium Subsidy Payments, and Farmer-Paid Premiums, 1981–2014



Note: Amounts are in nominal dollars.

Source: USDA Risk Management Agency.

Figure 4. US Market for Crop Insurance Coverage



Note: p denotes premium rates, L denotes total liablity purchased by farmers, and DD denotes the market demand curve for liablity.

Appendix: A Formal Model of the Market for Crop Insurance in the United States and Its Implications for the Formation of Political Coalitions between the Farm and Crop Insurance Lobbies

The market for federally subsidized crop insurance policies in the United States has an unusual feature. In effect, the products are designed by the US Department of Agriculture's Risk Management Agency (RMA), which sets the price and all other terms of the crop insurance policies that farmers purchase. Further, none of the private companies that sell and service a federally subsidized crop insurance product can alter the price paid for coverage by a farmer or the terms of a farmer's contract. There is *no price or product competition* among the companies.

In addition, under the terms of the 1994 Federal Crop Insurance Reform Act, RMA is explicitly mandated by Congress to use the following procedures in setting prices for each insurance product. First, to the best of its ability, RMA is required to estimate the actuarially fair premium rate for a policy, which is defined as the premium rate required to cover the expected indemnity payment associated with a policy. A mandatory loading factor of 13.64 percent of the estimated expected indemnity is then added to the actuarial fair premium rate, notionally to account for potential catastrophic events not accounted for in data used to compute the actuarially fair premium rate.[23] The government then pays a subsidy equal to a predefined proportion of that premium amount, and the farmer pays the rest.

Formally, let r be the actual actuarially fair price of \$1 of coverage for crop loss (r is also called the actuarially fair *premium rate*), and let l be the amount of coverage purchased by a

[23] The 1994 legislation mandates that each estimated actuarially fair premium rate be divided by 0.88 to account for catastrophic risks not represented in the data used to compute the initial premium rate, which is equivalent to a 13.64 catastrophic risk loading factor.

representative farmer. Then, rl equals the actuarially fair premium for a contract that provides l dollars of coverage, where l, the coverage purchased by the farmer, is measured as the maximum indemnity that can be paid to the farmer in the event of a complete crop loss. Note that l is also widely described in the insurance literature as the company's liability under the contract. Let β denote the catastrophic premium rate loading factor required by congressional mandate (thus β = 0.1364 under the current mandate). The total premium rate, p, is then defined as $p = (1 + \beta)r$. The premium rate paid by the farmer, however, is equal to the difference between p and the subsidy provided by the federal government. That subsidy is equal to the premium subsidy rate, s, multiplied by the total premium rate p or sp. As a result, the price paid by the farmer for \$1 of coverage, p_f, is defined as

$$p_f = (1 - s)p = (1 - s)(1 + \beta)r. \quad (1)$$

The standard reinsurance agreement is the agreement between the federal government (through the Federal Crop Insurance Corporation) and the insurance companies that are approved to sell federally subsidized crop insurance policies that governs those companies' actions. Under the agreement, in states in which an approved insurance provider operates, any such provider must sell policies to any farmer who wants to purchase coverage at the contract terms established by RMA. Thus, p_f is the price paid for coverage by each farmer. Hence, in the context of a simple supply-and-demand model, *the supply curve for coverage or liability can be viewed as perfectly elastic* at any given value for p_f.

The market demand curve for coverage by farmers can be viewed as downward sloping with respect to the price paid by farmers, an assumption consistently supported by numerous studies of crop insurance demand over the past 30 years (e.g., Goodwin 1993; Smith and Baquet

1996; Knight and Coble 1997). Thus, *when the price paid by farmers is lower, farmers' expected benefits are higher,* as measured by the analog of consumer surplus in an input market.

Figure 4 (page 42) provides a graphical representation of the market for federally subsidized crop insurance. The supply curve of total coverage or liability, defined as L, where L is the sum of the amount of liability coverage purchased by each farmer ($L = \sum_i l_i$), is perfectly elastic at p_f^0, and the farmer's demand curve is downward sloping. As defined in equation (1), the values for r (the actuarially fair premium rate), β (the catastrophic loading factor), and s (the premium subsidy rate), determine p_f^0. Given that the price for coverage is p_f^0, the market clears at L_0, and farmers' total out-of-pocket expenditures for crop insurance coverage are $p_f^0 L_0$, represented by area $0L_0Bp_f^0$.

The revenues paid into the crop insurance pool, however, are equal to the sum of farmer-paid premiums and the government premium rate subsidy or, equivalently, the total premium rate, p, multiplied by the total liability purchased by farmers. Given that $p = (1 + \beta)r$, where r and β are determined by the federal government, there is a predetermined value of p, p^0, for any given value of r and β, r_0, and β_0. Thus, total revenues paid into the insurance pool are $p^0 L_0$, as illustrated by area $0L_0Ap^0$ in figure 4. In the figure, premium subsidy payments received by farmers therefore equal the difference between pL_0 and $p_f^0 L_0$ or area $p_f^0 BAp^0$.

As discussed, insurance companies have two sources of revenue from the federal crop insurance program: underwriting gains and direct subsidies from the government for their administrative and operating (A&O) expenses. The government pays each company a predetermined proportion, α, of the total premiums paid into the insurance pool for the policies the company sells to cover A&O expenses. Thus, as a group, the companies receive A&O subsidies equal to αpL.

The companies also receive a relatively large share of any underwriting gains and, as discussed in the previous section, pay a smaller share of any underwriting losses associated with the insurance pool. Let the expected loss ratio for the insurance pool, k, be defined as the ratio of the expected amount of indemnities to total premiums paid into the insurance pool.

Underwriting gains are expected to be positive for two reasons, and thus the value of k is expected to be less than 1. First, as discussed, applying a catastrophic loading factor to all estimated actuarially fair premium rates introduces an effective guarantee that over time underwriting gains will, on average, be positive. Second, as discussed, the standard reinsurance agreement guarantees that insurance companies receive a larger share of any underwriting gains than the share they pay of any underwriting losses. Thus, the companies can expect to receive underwriting gains equal to the difference between total premiums, pL, and total indemnities paid out of that pool, which equal the loss ratio multiplied by total premiums, kpL. Their expected underwriting gains are therefore $(1 - k)pL$.

The companies' expected total revenues, TR, are the sum of their expected underwriting gains and the A&O subsidies they receive from the government; that is,

$$TR = (1 - k)pL + \alpha pL. \tag{2}$$

Using the fact that $p = (1 + \beta)r$ to substitute for p, the companies' total revenues can be expressed in terms of the actuarially fair premium rate, the catastrophic loading factor, and the expected loss ratio, k, all of which are policy-related variables determined by federal legislation and regulation; that is,

$$TR = (1 - k + \alpha)(1 + \beta)rL. \tag{3}$$

Two additional steps, however, are required before the model can be used to assess the impacts of regulatory and policy innovations on the revenues received by the insurance companies and the benefits accruing to farmers from the federal crop insurance program.

First, it is helpful to specify a demand function for the quantity of crop insurance coverage purchased by farmers, *L*. For simplicity, the marketwide demand for crop insurance coverage is assumed to be a linear function of the price farmers pay for coverage; that is,

$$L = G - Hp_f, \tag{4}$$

where *G* and *H* are constants.

Second, the role of adverse selection may be important in determining the expected loss ratio. As *L* increases, participation in the program increases, which reduces adverse selection and lowers the expected loss ratio (Goodwin and Smith 1995; Smith and Glauber 2012; Glauber 2013; Wright 2014). Thus, *k* is an inverse function of *L*, *k*(*L*), where $\frac{dk}{dL} < 0$. Using the fact that $p_f = (1 - s)(1 + \beta)r$ and substituting for *L* in equation (3) using equation (4), the companies' total revenues are

$$TR = (1 - k(L) + \alpha)(1 + \beta)(G - H(1 - s)(1 + \beta)r)r. \tag{5}$$

Equations (3) and (5) are both helpful in examining the effects of policy and regulatory innovations on insurance company revenues, illuminating their incentives for lobbying for regulatory changes and therefore indicating when their interests and the interests of farm groups coincide or conflict. Thus, the model provides insights about how mixes of policy innovations can be, and have been, constructed to allow the crop insurance and farm lobbies to jointly benefit from legislative initiatives.

Farmers' benefits are directly affected by federal crop insurance program policy initiatives through the out-of-pocket price they pay for coverage, p_f. A lower (higher) out-of-

pocket price increases (decreases) their benefits from the program by increasing (decreasing) their economic surplus. Given that $p_f = (1 - s)(1 + \beta)r$, the following four policy-related results immediately follow:

- An increase in the subsidy rate, s, increases benefits for farmers as $\frac{\partial p_f}{\partial s} = -s(1 + \beta) < 0$.
- Assuming $s < 1$ (the subsidy rate is less than 100 percent), an increase in the catastrophic loading rate, β, reduces farmers' benefits as $\frac{\partial p_f}{\partial \beta} = (1 - s)r > 0$. Holding the subsidy rate constant, an increase in the loading factor increases the total premium, p, and therefore p_f.
- Assuming there is no impact on the budget available for premium subsidies if a change is mandated in the A&O subsidy rate, α, an increase or decrease in the subsidy rate has no effect on the price paid by farmers for crop insurance coverage.
- An increase or decrease in the estimated actuarially fair premium does affect farmers' benefits as $\frac{\partial p_f}{\partial r} = (1 - s)(1 + \beta) > 0$. So, for example, if a new rate-setting procedure is approved by RMA that systematically reduces r, as occurred for two major crops in many midwestern counties in 2013 (Coble et al. 2015), farmers benefit through lower farmer-paid premiums.

The effects of changes in the four policy variables—α, β, s, and r—on insurance company total revenues are somewhat more complex. From equation (5),

$$TR = (1 - k(L) + \alpha)(1 + \beta)[G - H(1 - s)(1 + \beta)r]r.$$

Thus, the effects of changes in each of the four policy variables on crop insurance revenues are as follows:

- The effect of a change in the A&O rate, α, on TR is positive as

$$\frac{\partial TR}{\partial \alpha} = (1 + \beta)[G - H(1 - s)(1 + \beta)r]r = (1 + \beta)Lr > 0.$$

The reason is straightforward. A change in α has no impact on p_f and therefore no effect on *L.* Insurance companies will therefore always be likely to lobby for increases and against any cuts in the A&O subsidy rate, a practice in which they have consistently engaged over the past 30 years. Only if the companies are offered offsetting or more favorable benefits through another aspect of the program—for example, the introduction of a catastrophic loading factor that increases premiums and expected underwriting gains, as in the 1994 Federal Crop Insurance Reform Act—are they likely to accede to a lower A&O rate without too much fuss.

- The impact of a change in the premium subsidy rate is as follows:

$$\frac{\partial TR}{\partial s} = (1 - k(L) + \alpha)(1 + \beta)[H(1 + \beta)r]r.$$

This term is strictly positive. Note that the size of the marginal effect of *s* on *TR* increases if the loss ratio, *k*, decreases as *L* increases. For example, if *L* increases because the price paid by farmers declines as a result of an increase in the premium subsidy rate, *k* may decrease as adverse selection moderates, further increasing the impact of the subsidy rate on insurance companies.

- A change in the catastrophic loading factor, β, has the following effects:

$$\frac{\partial TR}{\partial \beta} = (1 - k(L) + \alpha)[G - 2H(1 - s)(1 - \beta)r]r.$$

The first term in the derivative, $(1 - k(L) + \alpha)$, is strictly positive as long as the loss ratio, *k*, remains less than 1. The second term, $[G - 2H(1 - s)(1 - \beta)r]$, which shows the impact on total revenue paid into the insurance pool as a result of a marginal increase in the price paid for coverage by farmers, may be positive or negative. As such, it is the price analog of marginal revenue and may be positive or negative depending on the

elasticity of demand.[24] The term reflects the negative (positive) impact on insurance coverage purchased by farmers in response to the increase (decrease) in the price they pay for coverage resulting from an increase (decrease) in the catastrophic loading factor, because, from above,

$$\frac{\partial p_f}{\partial \beta} = (1 - s)r > 0.$$

However, if the marginal effect on the quantity of coverage purchased of a change in the price paid by farmers is small (*H* is small), almost surely the term $G - 2H(1 - s)(1 - \beta)r = L - H(1 - s)(1 - \beta)r$ is positive.

The remaining issue is whether an increase (decrease) in β will have a sufficiently large negative (positive) effect on participation, *L*, to affect the loss ratio, *k*. If the impact of a change in β on *L* is small, the impact on *k* is likely to be small and an increase in β is likely to have a positive effect on insurance companies' total revenues.

If an increase or introduction of a positive catastrophic loading factor is accompanied by an increase in premium subsidy rates, the net effect of the joint changes in β and *s* on the price paid by farmers for coverage may be negative. Such was the case under the terms of the 1994 Federal Crop Insurance Reform Act when the 13.64 percent catastrophic loading factor was introduced. But at the same time, the average premium subsidy rate was increased from 30 percent to 50 percent. Before the 1994 act, as $s = 0.3$ and $\beta = 0$, $p_f = (1 - s)(1 + \beta)r = (1 - 0.3)r = 0.7r$. After the reform, $s = 0.5$ and $\beta =$

[24] The proof of this result is straightforward. From equation (4), $L = G - Hp_f$, and therefore total revenue paid into the insurance pool by farmers is $p_f L = (G - Hp_f)p_f$. Thus, $\frac{\partial p_f L}{\partial p_f} = G - 2Hp_f$. Substituting for p_f yields the expression $G - 2H(1 - s)(1 - \beta)r$. More generally, letting η represent the absolute value of the elasticity of demand for agricultural insurance, $\frac{\partial p_f L}{\partial p_f} = L(1 - \eta)$, and if, as most studies of the demand for crop insurance indicate (e.g., Knight and Coble 1997; Goodwin 1993; Smith and Baquet 1996), in the aggregate the demand for crop insurance is price inelastic, then $\frac{\partial p_f L}{\partial p_f} > 0$.

0.1364, $p_f = (1 - 0.5)(1 + 0.1364)r = 0.5682\ r$. Thus, the joint changes in s and β substantially reduced p_f, thereby increasing program participation, L, and lowering loss ratios. All these effects increased the revenues of the crop insurance companies while also increasing farmers' economic well-being. Thus, the 1994 act is perhaps a classic example of two interest groups obtaining program changes that had positive effects on both groups' economic welfare.[25]

- The effect of a change in the estimated actuarially fair premium on crop insurance companies' total revenues is

$$\frac{\partial T}{\partial r} = (1 - k(L) + \alpha)(1 + \beta)[G - 2H(1 - s)(1 + \beta)r].$$

As with the effect of a change in β, an increase in r increases the price paid by farmers for insurance coverage and reduces L, the amount of coverage they purchase. Therefore, the impact on crop insurance companies' revenues is ambiguous. However, the effect on crop insurance companies' total revenues will be positive as long as the term $G - 2H(1 - s)r$, the marginal effect of a change in the price paid by farmers on the amount farmers pay into the insurance pool, is positive and the impacts on the loss ratio, k, are negligible. An increase in r unambiguously increases p_f and reduces L and therefore is potentially likely to increase adverse selection and increase k.

Certainly, insurance companies, as well as reinsurance companies such as Zurich Re, Munich Re, and Allianz, have viewed recent changes in the way in which RMA calculates the actuarially fair premium rate for corn and soybeans in the Corn Belt states

[25] Other provisions of the 1994 act also benefited both farmers and the crop insurance companies, including a mandate to develop a range of new crop insurance products, including revenue insurance and area yield insurance policies. In the context of this model, those initiatives can be viewed as causing an outward shift in the demand for crop insurance (i.e., an increase in G). It is straightforward to show that an increase in G increases both farmers' economic surplus and total expected revenues for the crop insurance companies as long as the expected loss ratio, k, is not affected or also declines.

with some concern. The new methodologies, by accounting for upward trends in yields, may have resulted in lower estimates of actuarially fair premium rates, potentially reducing both expected underwriting gains and A&O payments. Perhaps not surprisingly, shortly after reductions were made in the premium rates for corn and soybeans in major corn-producing states in 2013, some larger companies with crop insurance subsidiaries announced they were considering divesting those subsidiaries.[26]

[26] For example, in 2015, Wells Fargo announced it was selling its Rural Community Insurance Agency and its subsidiary Rural Community Insurance Company to Zurich American Insurance Co. for $700 million, which it obtained through a takeover in 2004. See http://www.bloomberg.com/Research/stocks/private/snapshot.asp ?privcapId=4476557.