

Theme Overview: Crop Insurance in the 2018/2019 Farm Bill

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The Farm Bill, passed every four or five years, is a large piece of legislation which includes agricultural, food, conservation, and rural development programs. The most recent bill, passed in 2014, made significant cuts to commodity programs and increased budgeted spending on crop insurance. This change shifts the focus of farm risk management toward crop insurance, making it an even more important part of a producer's toolkit. Looking ahead to the next farm bill in 2018/2019, this focus on crop insurance will likely continue.

The articles in this issue anticipate three discussions surrounding crop insurance's role in the next farm bill: the political economy of crop insurance by Barnaby and Russell, economic evaluation of crop insurance's role in the safety net by Zacharias and Paggi, and crop insurance's role in specialty crop agriculture by Paggi.

Barnaby and Russell examine three crop insurance alternatives which are likely to be proposed in the debate over the next farm bill:

1. Replacing crop insurance with a free, area-based disaster program,
2. Making modifications to existing policy which would significantly reduce support to farmers and jeopardize the private delivery system, and
3. Complete elimination of the safety net.

The article summarizes the political factors and their interaction with the economic effects of these proposals.

Zacharias and Paggi identify the key considerations for improving crop insurance's role in the farm safety net. Among these are regional and commodity-specific considerations, government budget constraints, and interactions between crop insurance and other titles in the farm bill. They emphasize the importance of developing appropriate metrics for evaluating the simultaneous performance of crop insurance and commodity programs and conclude with a research agenda for examining these issues.

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Paggi discusses the broader role of crop insurance as a risk management tool for specialty crop producers. Specialty crops are of interest due to the increase in specialty crops' share of the total crop insurance liability over the last 15 years. Paggi details the connection between crop insurance and specialty crops and provides a discussion of factors affecting the future of this connection.

Finally, Woodard addresses the elasticity of demand for crop insurance issues. This key value will determine the maximum achievable size of any cuts in USDA's share of the crop insurance premium and still maintain a politically acceptable level of farmer participation in crop insurance needed to prevent any future ad hoc disaster program. It is critical for policy makers to understand the impact of elasticity of demand to prevent unintended consequences by making Federal budget cuts to crop insurance. All budget cuts are not equal so how those cuts, if any, are made is extremely important.

Given the important role of crop insurance in the future of the farm safety net, political and economic factors affecting policy decisions are particularly of interest. This issue provides a first look at the conversations policy makers, industry representatives, and academic economists will have leading up to the next farm bill.

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Crop Insurance Will Be at the Center of the 2019 Farm Bill Debate

G.A. Barnaby and Levi A. Russell

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Net farm income has fallen dramatically from its recent high in 2013 due to lower grain and cotton prices (Figure 1), setting the stage for a contentious debate over the next Farm Bill. With lower prices and continued record-setting corn yields in the Midwest, the discussion will likely shift to issues of price risk rather than revenue. For example, if corn prices remain at current levels below the Reference Price, triggering 2018/19 Agriculture Risk Coverage (ARC) payments on corn will require a Marketing Year Average (MYA) Price below \$3.18 per bushel, assuming the actual 2018 county yield is equal to the 5-year Olympic average county yield (Barnaby, 2016a). An Olympic average eliminates very high and very low values, before averaging and the ARC program uses Olympic averages. The Office of Management and Budget's (OMB) 10-year budget line assumes most ARC enrolled farmers will switch to Price Loss Coverage (PLC) in 2019-2020 after the current commodity title ends. Farmers had a choice of programs under the 2014 Farm Bill and, given their price and yield expectations, many chose ARC over PLC.

Figure 1: Net Farm Income and Net Cash Farm Income, 2000-2016F



Source: USDA-ERS Service, Farm Income and Wealth Statistics. Data as of February 9, 2016.

Note: Data for 2015 and 2016 are forecasts.

In addition to price risk, much of the debate focus for the next Farm Bill will be on crop insurance. Besides the status quo, three policy options are being proposed by supporters and critics of current crop disaster policy:

1. replace crop insurance with a free area-based Farm Service Agency, U.S. Department of Agriculture (FSA, USDA) administered disaster program;

2. eliminate the subsidy on the harvest price option, mandate means testing, put dollar limits on USDA's share of the premium, and reduce the Risk Management Agency's (RMA) share of the premium cost; and
3. eliminate the agricultural safety net completely.

Replacing Crop Insurance with a Free Area-based Disaster Program

Some agricultural economists have proposed a dramatic shift away from privately-delivered crop insurance to a county-triggered disaster program administered by the FSA (Babcock and Hart, 2005a; Babcock and Hart, 2005b; Collins and Bulut, 2011). These public sector disaster protection delivery plans assume savings by eliminating premium subsidies on individual plans, eliminating private sector delivery and individual field level lost adjustment costs, and assume the public sector can deliver an area based disaster program with no additional public employees and operation costs. These savings are assumed to be large enough to eliminate any need for farmer paid premiums. Therefore, a proposed area-based disaster program would be free to the farmer in the sense that it would not have a premium, but relative to the current crop insurance program, it could involve substantial costs to farmers in other ways and may run into serious practical difficulties.

Table 1: Glossary of Selected Terms

A&O	Administrative and Operating Expenses
AIP	Approved Insurance Provider
ARC	Agricultural Risk Coverage
HPO	Harvest Price Option
MPCI	Multiple-Peril Crop Insurance
MVP	Market Value Protection
MYA	Marketing Year Average
PLC	Price Loss Coverage
RP	Revenue Protection
RP-HPE	Revenue Protection with Harvest Price Exclusion
SCO	Supplemental Coverage Option
STAX	Stacked Income Protection
YE	Yield Exclusion
YP	Yield Protection

A free, area-based alternative to crop insurance would be different from individual, privately-delivered crop insurance in several ways. The program likely wouldn't provide any individual farm coverage because this policy would require individual farm loss adjustment and reduce any savings claims for public sector crop disaster aid delivery. Individual farm level loss adjusting would require contracting private loss adjusters or a dramatic increase in FSA personnel. The proposed disaster program would be similar in structure to ARC, except that it likely wouldn't have the 10% stop loss (Barnaby, 2016a). Like ARC, payments under this program would likely come a year after harvest since payments would be based on county yields and MYA prices. Due to its lack of an individual loss adjustment, an area-risk disaster program would likely be less expensive from the taxpayer's point of view than the current crop insurance program, especially if the producer is required to pay a share of the premium cost.

One important function of crop insurance is to provide collateral for farmers' operating loans. The difficulty in forecasting county yields—similar to ARC—would likely preclude the use of disaster program payments as collateral for individual farm loans. Furthermore, the program would be of limited use in guaranteeing bushels to offset forward crop sales or replacing a feed supply for crop-livestock producers. Both of these issues would likely weigh more heavily on smaller, younger producers with limited equity. Unlike current crop insurance policy, disaster payments would be subject to means testing, payment limits, and sequestration cuts, which would increase farmers' exposure to political risk. Additionally, farmers would have no recourse if an FSA employee made a mistake that reduced their payment. By contrast, private crop insurance agents carry errors and omissions insurance to cover liability exposure for errors in farmers' crop insurance contracts.

Significant data problems would face any move to an area-based disaster program. USDA's National Agricultural Statistics Service (NASS) is currently missing county yield estimates for many counties (Barnaby, 2016b). When practices such as irrigation are considered, the data problems are even more severe. Without individual farmer-reported crop insurance yield data from RMA, the USDA would not be able to fill in the gaps in the NASS county data as readily.

Since farmers would pay no premium under the area-based FSA disaster program, adverse selection—the greater likelihood of choosing more insurance when you know you face greater risks—would be an even bigger issue than it is for crop insurance. Since area coverage would have no premium, farmers would likely choose maximum coverage. This would result in the greatest benefits flowing to high-risk counties that have a large amount of yield variability.

An area-wide insurance product for upland cotton, the Stacked Income Protection Plan (STAX) is similar to the area-based FSA disaster program. Even with its large premium subsidy, however, only 30% of upland cotton acres were covered by STAX. It is important to note that this product, in addition to the Supplemental Coverage Option (SCO) and the Yield Exclusion (YE) were intended to function in the place of ARC and PLC commodity programs. Except for hail coverage, all private insurance coverage would likely be crowded out in the case of a free disaster program.

ARC has demonstrated many limitations of area crop insurance-disaster programs. Nearly all Iowa counties had NASS county yields used by FSA to determine the ARC payments. Outside of Iowa, county yield based disaster programs run into problems with administration due to limited data availability. Many counties have no NASS yields or the yields are not split between irrigated and non-irrigated acres for counties that split the ARC county yield by practice.

Determining county yields for ARC is even more difficult for wheat. When NASS wheat yields are not available the next best alternative is the RMA's published county yields for SCO if provided by irrigated compared to non-irrigated production practices. RMA offers SCO by practice for Washington, Idaho, and Oregon wheat, but it is the same guarantee offer for both irrigated and non-irrigated. RMA reported the same county yield to settle SCO claims for irrigated, non-irrigated, spring wheat, winter wheat, and soft white wheat. As a result, RMA's county yields for Washington, Idaho, and Oregon wheat are of little use for estimating FSA county yields that are split into irrigated and non-irrigated practices. With no published RMA SCO insured acres by practice, there is no method for using RMA county yields to estimate FSA county yields that are used to settle ARC claims in counties split by FSA between irrigated and non-irrigated. For example, Yakima County, Washington's five-year Olympic average FSA 2015-2016 benchmark county wheat yield was 112 bushels for irrigated and 17 bushels for non-irrigated wheat. RMA published a final SCO county yield of 30.8 bushels for all practices and types of wheat for the 2015 crop. FSA will publish their 2015 county wheat yield for Yakima County, Washington in the fall of 2016, but it is obvious this single RMA published county yield is not correct for irrigated or non-irrigated wheat as required by ARC.

Many Corn Belt farmers were very surprised to learn ARC paid nothing, but paid the maximum in the county across the road. There are many causes for this result. If a county had suffered multiple yield losses in the five years prior to 2014, then they started with a low ARC guarantee. In a five-year Olympic average yield, if two of those historical yields are bad, then one of the bad yields will be in the three-year average, after excluding the high and low yield. The order of the yields makes a difference, too. It is more advantageous for farmers to have low yields in 2009 and 2010, and higher yields in 2012 and 2013 (Barnaby, 2016a).

However, Iowa Senators Grassley and Ernst publicly released a letter sent to Agriculture Secretary Tom Vilsack concerning the yield data used to calculate ARC payments. The letter is evidence that Iowa corn growers are questioning why, with the same prices, contiguous counties have large differences in corn ARC payments. The Senators note in their letter that there are “several instances of significant discrepancies in payments between adjacent counties.” Historical yields used to set the Olympic average yields are one of the main reasons for this discrepancy (Barnaby, 2016b). If a county has a crop disaster in 2 or more years of the five-year history, it really lowers the benchmark yield and the resulting ARC guarantee. For example Ringgold County, Iowa had multiple year county yield losses prior to 2014 resulting in a reduced benchmark yield of 110 bushels that is lower than the long run average yield as compared with the crop insurance T-yield of 133 bushels. Using such a short history can produce Olympic average county yields below the expected county yield and limit the effectiveness of ARC as a risk management tool. This method can also inflate Olympic average county yields if there are multiple historical county yields that were above trend yield.

In addition, there is basis risk between county yields and farm level yields. Many farmers have already discovered they can have a loss and the county does not trigger a payment. That is no surprise in the Great Plains where it can rain on one side of the road and not the other side.

Replacing crop insurance with an FSA-administered area disaster program is unlikely, but it is expected in the 2019 Farm Bill debate critics will again make this same argument that the public sector can deliver area based coverage for less taxpayer costs than the current privately delivered crop insurance program. There is no doubt the critics will point to FSA’s successful delivery of ARC, which is an area based disaster program. Most farmers like the service they receive from their crop insurance agent because if the service is poor they can simply change agents. Farmers can’t change FSA offices. The ARC program was the first experience most farmers have had with an area disaster and crop insurance programs and it was not a good experience for some farmers. A common complaint was why “the county across the road received a maximum ARC payment, while my county received no payment” (Grassley and Ernst, 2016). As a result of that experience, farmers will now better understand area based crop insurance and disaster program proposals.

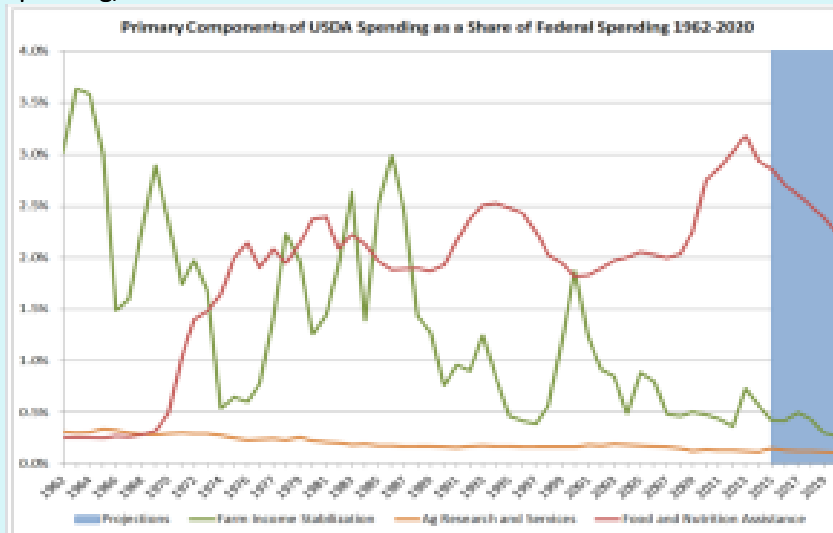
In cases where farmers are required to pay part of an area crop insurance premium, participation has been far below the expected participation forecasted by the experts. An example is the low STAX participation that replaces the ARC and PLC programs for cotton farmers, but requires cotton farmers to pay 20% of the premium. Even with an 80% subsidy rate, only 30% of insured acres were covered by STAX in 2015. Participation may have been higher if individual coverage had not been improved with the yield exclusion option, but it is difficult to determine whether or not this is the case. Historical performance has demonstrated it will require a 100% subsidization of an area disaster program to achieve politically acceptable participation levels. Agricultural economists seem to like area-based disaster/crop insurance programs better than farmers and lenders.

Those critics who want to replace private delivered crop insurance with a “free” area based FSA-administered disaster program will find the debate more difficult after farmers’ experience with ARC. Farmers will remember when they were paid nothing and the county across the road was paid the maximum. We should point out that ARC worked exactly the way it was intended to work. Even if the major farmer complaints are addressed, many farmers would still not be willing to pay any of the “premium” cost for an ARC program.

Modifications to Crop Insurance

Many of the modifications to the crop insurance program that are likely to be proposed in the context of the next Farm Bill were included in bills introduced in the House and Senate in late 2015 but which failed to become law. In November 2015, Senator Jeff Flake (R-AZ) and Representatives Jim Sensenbrenner (R-WI) and Ron Kind (D-WI) introduced the AFFIRM Act in both Houses of Congress which proposed several changes to crop insurance that would directly impact farmers and Approved Insurance Providers (AIP). The impetus behind the bill was curtailing federal government spending, but cuts to agricultural spending are unlikely to have much of an effect on the federal budget

Figure 2: Primary Components of USDA Spending as a Share of Federal Spending, 1962-2020F



Source: Office of Management and Budget, Historical Tables

(Figure 2). The bill would limit RMA's premium share—often referred to as a subsidy—to \$40,000 per person, shifting a larger share of the total premium to farmers. The bill would also eliminate the government's share of paid premiums for all farmers with an adjusted gross income (AGI) over \$250,000 per person. AIP's Administrative and Operating (A&O) costs would be limited to \$900 million per year—currently \$1.3 billion—which would likely cause a cut in agent commissions.

These limits would likely result in the creation of “paper farms” that would allow more farmers to get under the Adjusted Gross Income (AGI) limit, similar to the response in the commodity programs that have payment limits. These additional “paper farms” would create no new insured acres, but they would create additional paper work for all involved. More “paper farm” contracts would clearly impose additional costs on AIPs and independent crop agents, but would provide no new revenue. Farmers would also have additional costs for accountants and lawyers required to set up these paper entities. In addition, farmers would have additional administrative cost tracking these multiple entities. However, these limits on farm size would create additional paper work for RMA and that would likely create the need for more Federal employees to track and audit these additional “paper farms”.

Finally, the bill would eliminate RMA's share of the premium on the Harvest Price Option (HPO). This provision accounts for \$19 billion of the \$24 billion of the total budget savings and would apply to all farmers regardless of AGI. In addition, AFFIRM would also reduce the rate of return to the AIPs.

The elimination of the HPO subsidy could have serious consequences for farmers. Once farmers plant their crop, they are long the market! All farmer marketing plans including feeding their crop to livestock or dairy cows, storing the crop for later sales, deferred price contracts, forward cash contracts, minimum price contracts, hedge to arrive contracts, selling futures, buying put options, buy puts-sell calls, cash sales off of the combine at harvest, etc. assume production. At some point all farmers will liquidate their long position, even if it only means selling cash grain off of the combine.

The Revenue Protection (RP) that includes the HPO is the only crop insurance contract that will replace lost production at its current market value (less the deductible) and maintain the “hedge” on the long position for all farmers’ marketing plans. The other crop insurance contracts do not provide a full hedge on the insurable production. RP is similar to paying an indemnity at “replacement value” in a homeowner’s insurance policy. Although the elimination of the RMA’s premium share for HPO doesn’t eliminate HPO directly, it will increase farmer paid premiums by more than 50% in many Corn Belt counties, potentially pricing HPO out of the market. HPO covers a price increase and it also covers the yield loss that is not covered by Revenue Protection-Harvest Price Excluded (RP-HPE) when prices increase. Unsubsidized HPO coverage adds to the farmer paid premium because it eliminates subsidy on some of the yield risk in addition to the price risk.

Table 2: Comparison of Revenue Protection (RP), Yield Protection (YP) + Market Value Protection (MVP), Revenue Protection-Harvest Price Excluded (RP-HPE) and RP-HPE + MVP for an example corn farm with 187.5 bushel APH, 80% coverage, and 2012 Corn Belt \$5.68 base price that increased to \$7.50 at Harvest

	RP	YP + MVP		RP-HPE	RP-HPE + MVP	
APH	187.5	187.5		187.5	187.5	
Coverage	80%	80%		80%	80%	
Bushel Guarantee	150	150		150	150	
Base Price	\$5.68	\$5.68		\$5.68	\$5.68	
Revenue Guarantee	\$852			\$852	\$852	
Harvest Yield	120	120		120	120	
Yield Loss		30	30			30
Price Increase			\$1.82			\$1.82
Harvest Price	\$7.50			\$7.50	\$7.50	
Final Guarantee	\$1,125			\$852	\$852	
Revenue to Count	\$900			\$900	\$900	
Indemnity	\$225	\$170	\$55	\$0	\$0	\$55
Total	\$225		\$225	\$0	\$0	\$55
Percent of Indemnity						
Bushels Replaced	100%	76%	100%	0%	0%	24%

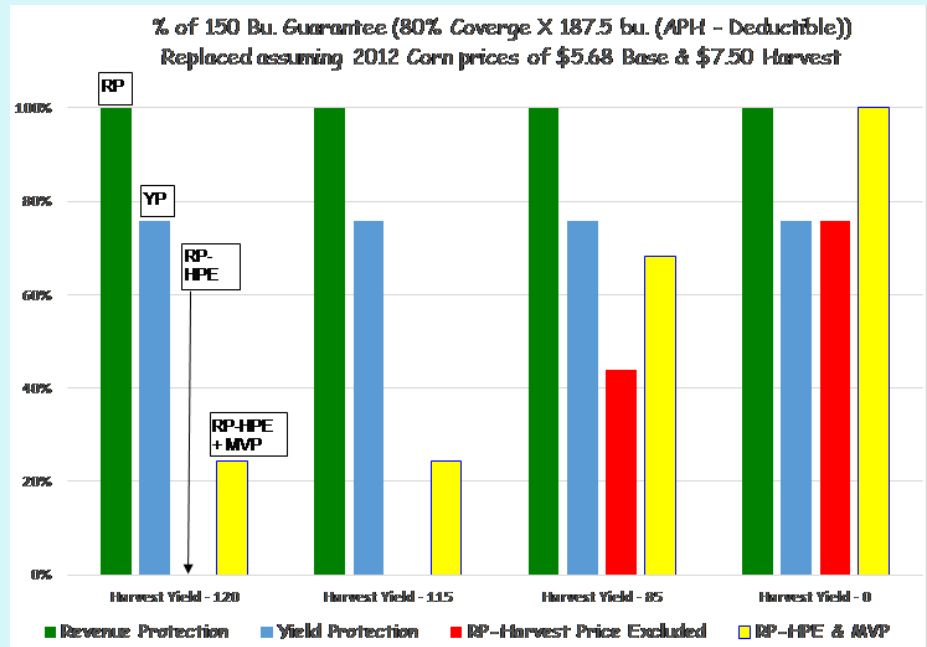
Source: Authors’ calculations

A real example of a 2012 Corn Belt farm was created to demonstrate the “yield coverage hole” in RP-HPE that occurred on 2012 corn. The Corn Belt was in a drought in 2012 when the base price for corn was \$5.68 and the harvest price was \$7.50 (USDA-RMA, 2016). Assume a corn farm has an approved 187.5 bushel Actual Production History—APH, “farm’s proven 10-year average yield”—insured with 80% coverage under the current RMA-approved individual farm coverage contract (Table 2 and Figure 3). The Yield Protection (YP) contract is the replacement for the original Multiple-Peril Crop Insurance (MPCI) contract that has undergone a number of name changes. YP is a yield triggered contract, but it only guarantees bushels at replacement value if the price forecast is correct. Under short crop scenarios combined with a price increase, like crop year 2012, YP will not provide enough indemnity dollars to replace those lost bushels that are needed to fill a forward contract, replace the feed supply, offset a futures hedge, or provide expected bushels needed for cash sales “off of the combine.” Crop insurance, futures, options, and commodity programs are all in some way tied to production. If production didn’t matter then there would be no need to farm. Trading the commodity markets would be sufficient for these products and programs to operate.

The example farm in 2012 lost 67.5 bushels below its expected production of 187.5 bushels. The first 37.5 bushels of the 67.5 bushel loss is the deductible and farmers must cover that loss from their equity. The next 30 bushels of the 67.5 bushels lost are indemnified at a fixed price of \$5.68 set prior to planting corn in 2012 under YP. The example YP insured farm will receive an indemnity payment equal to \$5.68 times 30 indemnity bushels that is equal to \$170 before the premium was deducted. However, the 2012 corn harvest price increased to \$7.50 and the indemnity payment only replaced 22.7 bushels or about 76% of the lost production. Farmers had to replace those bushels that are not replaced by YP from their equity to offset their automatic long position. Effectively this is a second deductible in the YP contract.

Very few corn farmers insure with YP. Nationally 92% of the insured corn acres were insured under one of the revenue plans in crop year 2015. The revenue plans account for 97% of corn premiums. Among the revenue products RP and RP-HPE account for 90% of the insured corn acres and 94% of the corn premium. Less than 1% of RP insured acres have the harvest price excluded, accounting for less than half of a percent of the premium (USDA-RMA, 2016.)

Figure 3: Percent of Guaranteed Bushels (APH - Deductible) Replaced at Current Market Value



Source: Authors' calculations

Farmers have voted with their pocketbook and it is clear they prefer RP policies that include the HPO. The

AFFIRM Act is targeted at the very product that farmers prefer and there are solid risk management reasons why farmers prefer RP over RP-HPE. If a policy similar to AFFIRM would have passed in to law, Corn Belt farmers would face a premium increase of more than 50% on corn. In that scenario, will there be a significant number of farmers drop their coverage or switch from RP to YP, rather than pay the higher premiums? If a large number of farmers are uninsured or under-insured, would a future Congress provide ad hoc disaster aid for a drought similar to 2012? The elasticity of demand for crop insurance is the key to these questions and is under some debate by some agricultural economists (Woodard, 2016).

The original argument for the HPO was based on the 1989 Kansas wheat drought losses and the price increased eliminating winter wheat farmers' deficiency payments. In some cases farmers had winter wheat yields near zero and they argued that YP type crop insurance did not cover their loss. YP paid the loss at a below market price at harvest, while the deficiency payment was determined by the post-harvest price that eliminated the 1989 deficiency payment—deficiency payments are similar to the current PLC payments. As a direct result, Congress passed an ad hoc disaster program in 1989 to cover the winter wheat losses that were not covered by crop insurance under a short crop and a price increase. Congress passed a similar ad hoc disaster program in 1988 to cover spring crop losses due to drought, but the legislation did not cover winter wheat losses for a winter wheat crop planted in the fall of 1988 during the same drought.

Under the scenario of a short national crop and market price increases, farmers will have less protection under RP-HPE than was the case under YP (MPCI) on the 1989 winter wheat crop or the 2012 corn crop. Under this scenario, policy experts will often show that farmers are better off because the USDA aggregate farm sector income is often near record highs. While some farmers will have major crop losses, other farmers in other states with no crop losses will sell their crop at the drought-induced higher prices. Because of the inelastic demand for grain, it is not uncommon for the price to increase by

a greater percentage than the percentage reduction in yield, resulting in a record aggregated farm income.

The problem with this argument is that farmers do not farm in the aggregate, no farm is the "average" farm. Farmers that happen to be in the state with major losses will not have record incomes. This is the difference between macroeconomics and farm-level economics. Under a scenario of the Western Corn Belt being in a drought while the Eastern Corn Belt has record yields, Eastern Corn Belt farmers will have record incomes while farmers in the Western Corn Belt will have little or no production to sell at higher prices. If our example farm is in the drought area and suffers a 67.5 bushel loss, the farm will collect no indemnity payment if the farm manager has excluded the HPO by selecting RP-HPE (Table 2, Figure 3). In fact under the scenario of 2012 corn prices that increased from \$5.68 planting price to a \$7.50 harvest price, the example RP-HPE insured farm at the 80% coverage level will need a yield loss greater than 113 bushels to trigger any indemnity payments. It will require a farm yield equal to zero for the RP-HPE indemnity payment to equal the YP indemnity payment.

The RP-HPE provides little risk protection for the farmer-feeders who will need to replace their feed supply. Even if a farmer sells a crop "off of the combine," the manager will have fewer bushels to sell for cash and the indemnity payment will not make up the difference. Often economists don't include the deductible and the farmer paid premiums when evaluating the net farmer position provided by RP-HPE when a major crop loss occurs.

The argument has been made that HPO is not needed because the private sector will offer the coverage. The example cited is the Market Value Protection (MVP) that was released in 1991 as an endorsement to the MPIC, renamed YP, coverage and provided a yield replacement contract. Notice that the farm's yield has to reach zero before RP-HPE plus MVP would replace 100% of the insurable lost bushels (Figure 3). For example, with yield loss of 67.5 bushels, the RP-HPE triggers no payment and MVP would have paid \$55 that only covers the price increase. The RP-HPE has a hole in the yield coverage of \$170 that would have been paid by YP or RP (Table 3).

RP will cover the hole in the yield coverage that is not covered by RP-HPE and also covers the price increase. Because of this, there would be a large increase in farmer paid premium costs if the subsidy were removed from the HPO. The premium increase will likely double if the HPO risk were covered privately because the AIPs will need to load for expenses and catastrophic risk, too.

RP combines revenue coverage and yield replacement in one convenient product. If prices fall, RP will pay the same as RP-HPE. If prices fall far enough it is possible the yield deductible will disappear in both the RP and RP-HPE contract. If this happens it will require an actual harvest yield that is greater than the APH—no yield deductible—to eliminate indemnity payments. If prices increase the RP will replace lost bushels at current market cost after the deductible is met. When prices increase, the RP deductible never shrinks, but the RP-HPE deductible increases and requires a larger yield loss to trigger any indemnity payments.

If a price option or its subsidy must be eliminated from RP for budget reasons, it should be the "put." Lower market prices are covered by PLC or in some cases ARC from the FSA program. Therefore, it is at lower prices where, under some conditions, the crop insurance and commodity programs will overlap. The harvest price option included in RP is a complement to FSA's commodity program since higher prices reduce or eliminate PLC and under some conditions the ARC payments, too.

Other costs associated with the provisions in the AFFIRM Act would fall on insurance companies and the RMA. For example, farmers electing to exclude the harvest price in RP may cause underwriting losses,

unless one assumes actuarial soundness. For example, in Iowa, eliminating the HPO on corn may cut premiums more than it has historically cut claims but the public data is limited to years after 2011. For the five-year period 2011-2015, the Iowa five-year average RP corn loss ratio was 1.66 on \$566 million of premium versus an RP-HPE loss ratio of 2.27 on \$7 million of average premium over the same period (USDA-RMA, 2016).

An alternative to the elimination of the HPO premium share paid by RMA is to give producers the option of eliminating the subsidy on either the “put” or “call” built into RP. Producers who use marketing tools or who have strong downside price protection from the commodity program might prefer the harvest price over the insurance “put.” Another alternative to reduce taxpayer cost would be to cut RMA’s share of the premium by five percentage points across all crop insurance contracts, including CAT. Unlike altering specific contracts, this wouldn’t bias farmers’ decisions.

Complete Elimination of the Agricultural Safety Net

Several economists have published papers advocating for the elimination of ARC, PLC, and crop insurance and replacing them with a free market policy (Smith, 2012; Bakst, 2014; and American Enterprise Institute, 2016). If the farm safety net were completely eliminated as a number of groups have advocated, would Iowa still be planted to corn? The answer is “yes,” but many other aspects of the farm economy would change. Over time, land prices and cash rents would adjust to an agricultural economy without USDA support. Farmers’ rates of return would eventually normalize. However, there would likely be fewer producers. Young farmers with limited equity would lose the most were this policy implemented. The elimination of the safety net may make U.S. farmers less competitive on a global scale because foreign governments will likely continue a preference for local production. For example, refusing importation of GMO corn for safety concerns, foreign central banks’ influence on currency exchange rates to benefit their own exporters, and expanded EPA regulations on commercial agriculture will likely disadvantage U.S. producers.

It’s unlikely that a free market crop insurance industry would form unless all government subsidies were eliminated. Few farmers would be willing to pay the higher premiums required by a fully-private market as long as the USDA infrastructure is in place for some future Congress to provide ad hoc disaster aid or other cash transfers to farmers. Congress would need to close all forms of support including commodity program payments, disaster payments, and conservation payments. If not, producers would be reluctant to pay unsubsidized premiums for fully-private insurance and would instead push for the reinstatement of disaster payments using the existing infrastructure.

Only Minor Tweaks Expected Moving Forward

It is very unlikely that the current crop insurance program will be replaced with a free, FSA-administered disaster program. Most farm groups would oppose this change, in addition to the independent crop insurance agents, agricultural lenders, and AIPs. As a result, a return to an FSA-administered disaster program is not likely. The structure of the current crop insurance program was passed into Law in 1980 to replace an FSA standing disaster program.

Though some agricultural economists and other groups would like to see a more free market policy implemented, given the expected political opposition from the crop insurance coalition, it is unlikely the current farm safety net will be eliminated and replaced with a free market policy. Assuming some parts of the country will have private insurance offers for selected perils, the private premiums paid by farmers will be much higher. Private premiums would have to cover the operating expenses, likely more expensive re-insurance premiums because USDA would no longer provide any re-insurance, and cover the entire current premium subsidy. Since premiums will likely double, it will be necessary to remove

the USDA delivery infrastructure; otherwise a future Congress could provide an ad hoc disaster aid program. As long as the USDA delivery infrastructure is in place, few farmers will be willing to pay private crop insurance rates as most will continue to assume government will provide support when there is a disaster, until proven otherwise.

For the foreseeable future, the risk management policy will likely remain as it is with some “minor tweaks” to crop insurance. In the last Farm Bill, the conservation coalition was able to add the conservation requirement to crop insurance and other critics were able to secure cuts to the AIPs and agents. Many of the same groups will be back to attack the harvest price, propose means testing, subsidy limits or payment limits, more cuts to agent commissions, and cuts to the AIP’s rate of return. Crop insurance critics’ success will likely depend on how well the crop insurance coalition holds together. Some of these proposals are more damaging to producers than others and may lead to some unintended consequences. While it is easy to see the financial interest of those who favor the current system, who have a financial interest in the crop insurance and commodity programs, many of the critics also come with conflicts of interest. Though it is not easy to do, one needs to follow the money to identify conflicts of interest in the crop insurance debate.

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Current Perspectives on the Crop Insurance Farm Safety Net

Thomas P. Zacharias and Mechel S. Paggi

JEL Classifications: G22, G28, H30, Q12, Q14

Keywords: Agriculture, Farm Safety Net, Insurance

In 2013, *Choices* featured an article entitled, "Ten Considerations Regarding the Role of Crop Insurance in the Agricultural Safety Net" (Zacharias and Collins, 2013). The "Ten Considerations" was "penned" during the course of debate over what would ultimately become the 2014 Farm Bill, which was signed into law February 7, 2014. Fast forward to 2016 and there is an opportunity to once again contribute to the discussion on crop insurance and the safety net.

Since February 2014, the crop insurance industry—as currently represented by 17 insurance companies, 12,000 to 15,000 licensed agents, and about 5,000 certified crop adjusters—has been actively implementing and delivering the provisions of the new legislation. Provisions of the bill were implemented during the 2014 crop year and most of the new policies were in place for the 2015 crop year. With respect to crop insurance, an abbreviated list of the provisions and policies include: Conservation Compliance, Beginning Farmer and Rancher Benefits, Whole Farm Revenue Protection, Supplemental Coverage Option (SCO), Stacked Income Protection for Cotton, and the Actual Production History (APH) Yield Exclusion (YE) Provision. Implementation of the 2014 Farm Bill crop insurance provisions was an incredible demonstration of what was achieved by an effective public-private partnership.

That said, no sooner had the "ink" of the 2014 Bill "dried", when the farm sector and the crop insurance industry lived through the last quarter of 2015 under the storm clouds of the Bipartisan Budget Act of 2015. The Budget Act proposed a \$3 billion reduction in crop insurance private sector delivery funding over ten years. Ultimately funding was restored, but not without a rapid Herculean effort on the part of farm and commodity groups as well as the uncompromising support of Congressional proponents of farm policy and crop insurance.

In the "Ten Considerations" a case was made for public support of an insurance-based farm safety net. The operational characteristics of the insurance component of the safety net are:

1. farmers pay a portion of the cost of crop insurance,
2. farmers only receive a payment in the event of an insurable loss,
3. insurance is delivered through the private sector, and
4. taxpayers share in the cost of the insurance safety net component with both farmers and insurance companies.

As the farm safety net evolves either through agency action or a new farm bill, now is the time to add to "the List" of considerations that will need to be evaluated as an ongoing process of reforming and improving upon the U.S. farm safety net. The list is not intended to be all inclusive. The issues raised are

ripe for economic and political analysis, and as always, it is imperative that the analyst attempt to provide a tangible metric or set of objective criteria for evaluating the issues.

Intra Versus Inter Seasonal Safety Net Concerns

There is a fundamental issue in the tradeoff between the "within-season risk management farm safety net" and the "across-season" farm safety net design. The current crop insurance system is the policy instrument used to address intra-seasonal revenue risk. Title I of the 2014 Farm Bill addresses inter-seasonal risk with commodity specific provisions. Both crop insurance and Title I provisions cover price and yield risk at varying levels of spatial and temporal aggregation. A further consideration, well beyond the scope of this piece, is farmers' use of privately available risk management tools and the use of these tools in conjunction with the publicly provided safety net. Barring any fundamental paradigm shift, crop insurance with continuous "tweaks" will most likely be used to address intra-seasonal revenue risk. Inter-seasonal risk management solutions are no doubt more difficult to design and prescript. It is not clear that there are well defined "policy metrics" for evaluating the simultaneous performance of both intra and inter-seasonal policy instruments. Until such "metrics" are established and a few more data points are observed, it would seem to be premature to unfairly criticize or advocate any radical departure from the current path.

Regional and Commodity Considerations

The 2014 Farm Bill attempted to address both regional and commodity specific risks on several different levels. It did so by allowing choices with respect to Title I provisions and expanded crop insurance coverages. Given that agricultural risks vary across regions and commodities, the elements of choice and flexibility are important considerations in the political economy of the farm bill process. No doubt, these elements will be a prominent feature in the policy mix going forward.

Individual versus Area Coverage and the Crop Insurance Product Mix

The dichotomy between individual coverage and area coverage stills plays a role in the discussions of current and future reforms to the farm safety net. For the most part, farmers consistently select individual crop insurance coverage over area plans. Area and similarly designed index plans appear to require further refinement if these plans are to have greater market penetration.

The Government Budget Constraint

On a practical policy level, the government budget constraint is referred to as the "baseline." In the broader context, it represents society's willingness and ability to pay for a given policy. With respect to crop insurance, this essentially comes down to premium support for farmers and crop insurance delivery expense. Somewhat akin to issues surrounding inter versus intra seasonal safety net considerations, the budget will have to be allocated across programs and then a determination will have to be made within a specific program area. The essential question is how is the budget to be allocated among competing ends? In terms of contributions by agricultural economists and other analysts, what metrics and criteria can be used to better understand the allocation process?

Related Policy Objectives and Concerns

Environmental and Conservation Considerations

Conservation Compliance provisions were put in place with the 2014 Farm Bill. At this stage, it would appear that sign-up and participation have gone reasonably well with more than 98% of insured growers (Willis, 2016). It would also appear that additional environmental and conservation objectives will continue to be "interwoven" into the design features of the safety net. An example of a "concern" would

be the introduction of a new farming practice that is considered to be environmentally beneficial yet risk increasing. Careful attention will need to be given to both short-term implementation of such initiatives and longer-term incentives.

Trade Issues

The value of crop insurance premium support is one component of U.S. product-specific amber box domestic support. Under existing World Trade Organization (WTO) rules, the combined value of all support in this category is counted against a permitted total aggregate measure of support (AMS). If the total value exceeds the permitted AMS, adjustments to programs would have to be made. At this time, it is not expected that the total value of U.S. amber box support programs will exceed our current AMS allowance for the foreseeable future. Unless there is a new agreement on domestic agricultural support programs, the potential risk for changes in the U.S. crop insurance program from the WTO lies more in the potential for a “Brazil Like” challenge. In this case the challenge would come from the assertion that crop insurance increases production and decreases world prices. That said, while there may be general agreement that crop insurance subsidies affect production there is no agreement on how much or even in what direction. However, any effect on production will have an effect on commodity prices. This is clearly another issue of importance for policy analysts to address.

A Longer Implementation "Runway"

Although not a specific policy objective per se, a relevant concern is the issue of implementation. Implementation of any new legislation is a difficult task. Both USDA's Risk Management Agency (RMA) and the private sector delivery system did yeomen's work in implementing the 2014 Farm Bill. Going forward, it would be highly desirable, yet highly unlikely, that the implementation "runway" be given more careful consideration. Implementation is a costly enterprise, and mistakes and poor timing can lead to dreaded "unintended consequences."

Critical Research Agenda

Relevant Demand and Supply Elasticities

Although there have been some recent developments in the estimates of revised demand elasticities for crop insurance, more effort is required. Supply elasticities, that is, farmer participation and production responses with respect to farm safety net policy provisions, specifically crop insurance, are even less well developed. Reasoned policy analysis and debate simply cannot take place without robust estimates of these effects.

Optimal Program Design

In addition to more relevant econometric analysis of the safety net, it would be highly desirable to see more effort expended on what can be defined as "optimal program" design. Examples of this type of analysis include the works of Innes (2003) and more recently Bulut, Collins, and Zacharias (2012) and Bulut (2016). It often seems to be the case that safety net design is analyzed from an ad hoc formulation rather than a formal and explicit objective or criterion function. The debate would benefit greatly from better use of theoretical and analytical constructs as opposed to piecemeal policy prescriptions. The reality is, of course, that policy determinations will not be the result of a formal modeling structure. However, understanding the realized policy relative to an “optimal design” will provide meaningful insights and improve the decision making process going forward.

Performance Evaluation and Chance

Before proceeding further, farm policy analysts and practitioners—including these authors—should probably read or re-read Kahneman's 2011 *Thinking, Fast and Slow*. Two thoughts come to mind: 1)

sample size considerations and 2) the role of luck or chance. Regarding sample size, there are not many, and almost not any, actual data points to critically evaluate the performance of the current Farm Bill. Regarding the role of chance, it matters a great deal when certain events occur and how such uncertainty is resolved. These events can be political—such as the outcome of the 2016 election, or weather-related—such as the 2012 drought, or economic—such as the recent downturn in the farm economy.

There is a considerable policy literature on the timing of uncertainty and resolution of temporal lotteries (Kreps and Porteus, 1978). Previous reviews of the agricultural economics literature suggest a dearth of analysis on this subject matter (Taylor and Zacharias 2002; Zacharias 1993). The sequence and occurrence of political and economic events will no doubt shape future policy perspectives and prescriptions. Perhaps, the next iteration of the farm safety net debate could be an interesting case study of the policy instruments selected relative to the timing of uncertain events occurring during the debate. It will be interesting to observe if these considerations filter into future analytical and empirical efforts. Hopefully, attempts will be made to minimize the bias associated with particular "anchoring" events.

Lastly, analysis of farm safety net policy is likely to be a mainstay for the foreseeable future. The importance of quality peer-reviewed empirical and theoretical work in this area cannot be underestimated.

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The Use of Crop Insurance in Specialty Crop Agriculture

Mechel S. Paggi

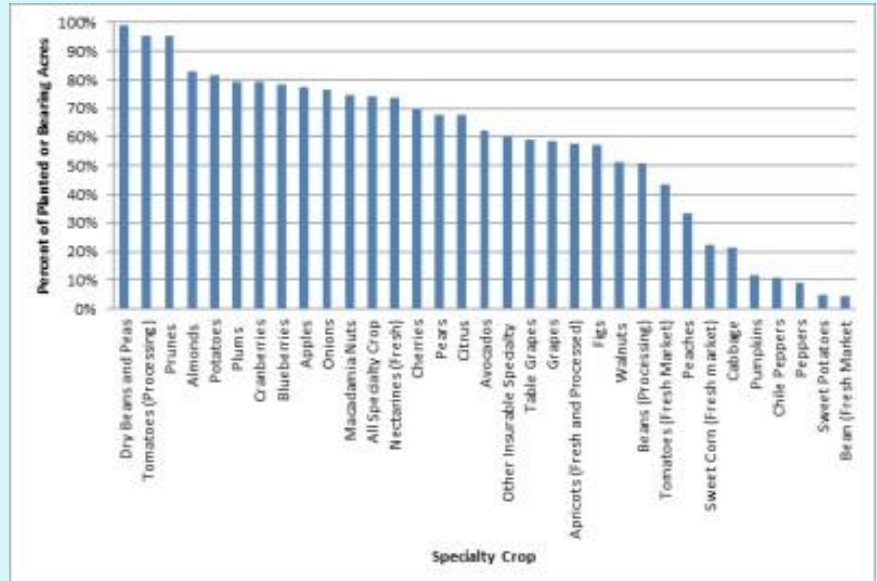
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Keywords: Agriculture, Insurance, Policy

The federal crop insurance program has been the focus of increased attention following its enhanced role in the farm safety net resulting from the 2014 Farm Bill (Zuluf and Orden, 2014). Most often that attention has been directed at coverage for crops associated with traditional federal farm support programs, such as corn, wheat and soybeans (Babcock, 2016). However, as some researchers have pointed out, crop insurance is also a risk management tool for U.S. specialty crop producers, such as, fruit, vegetables, tree nuts (Coble, 2016). According to the most recent U.S. Department of Agriculture, Risk Management Agency (USDA-RMA) report around 73% of the acres devoted to specialty crop production have been covered by federal crop insurance programs (Figure 1) (FCIC, 2015).

Efforts by USDA-RMA to develop risk management programs for specialty crops were encouraged by the Federal Crop Insurance Reform and Department of Agriculture

Figure 1: Specialty Crops Insured as Share of Planted or Bearing Acres, 2014



Source: USDA, RMA, 2016.

Table 1: Specialty Crops in U.S. Farm Cash Receipts for Crops

	Cash Receipts, 2010 (bil. \$)	% of Total	Cash Receipts, 2014 (bil. \$)	% of Total
Fruits & Nuts	21.6	12.0%	30.1	14.4%
Vegetables & Melons	17.4	9.6%	18.8	9.0%
Greenhouse & Nursery	15.6	8.6%	19.3	9.2%
Grains & Feed Crops	69.4	38.5%	82.0	39.2%
Oil crops	36.5	20.2%	42.7	20.4%
Cotton, Tobacco, Other	19.9	11.0%	16.4	7.8%
Total Crops	180.4	100.0%	209.3	100.0%

Sources: USDA-ERS, 2016; FCIC, 2015

Reorganization Act of 1994. During the period 1995 to 2003 USDA-RMA had policies in place that covered 32 specialty crops with active pilot programs for an additional 30 crops (USDA-RMA, 2004). In their latest Specialty Crop Report to Congress, the USDA provides a list of 38 specialty crops that are currently covered by federal crop insurance plans (FCIC 2015).

The 2014 Farm Bill continued the move toward enhancement of specialty crop insurance coverage. One example was the call for the development of a whole farm revenue protection policy tailored to specialty crop producers.

What Crops are Specialty Crops?

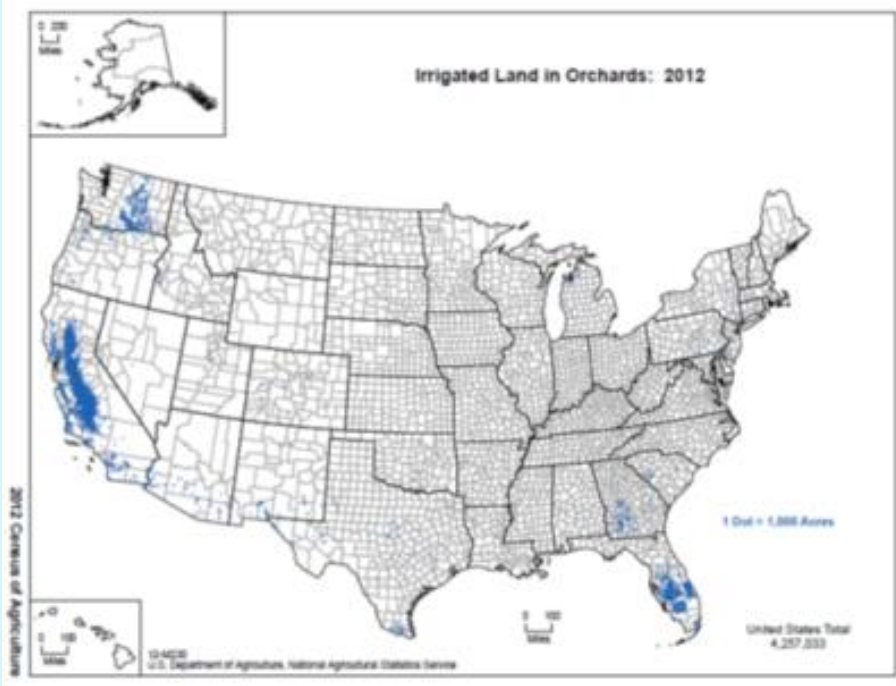
When the USDA initially reported on the progress of crop insurance for specialty crops, it used the definition of specialty crops provided in the Agricultural Economic Assistance Act of 2001: “any agricultural crop, except wheat, feed grains, oilseeds, cotton, rice, peanuts, and tobacco”, essentially defining what they were not. The Specialty Crops Competitive Act of 2004 refined the definition of specialty crops as “fruits, vegetables, tree nuts, dried fruits, and nursery crops (including floriculture)”. The Food, Conservation, and Energy Act of 2008 further refined the definition and is the

Figure 2: Vegetable Production by State



Source: USDA, 2014.

Figure 3: Irrigated Orchard Production by State



Source: USDA, 2014.

one currently used by USDA: “fruits, vegetables, tree nuts, dried fruits, horticulture, and nursery crops (including floriculture)”. The specialty crop category is relatively comprehensive, the Agricultural Marketing Service (AMS) maintains a list of over 300 commodities including 46 fruits and tree nuts, 49 vegetables, 109 culinary and medicinal herbs and 117 floriculture and nursery crops. Currently, the National Agricultural Statistical Service (USDA-NASS) reports acreage for 38 specialty crops. In their most recent report, RMA reported 7.7 million of the USDA-NASS estimated total of 10.7 million acres were enrolled in crop insurance.

The value of U.S. farm cash receipts from the sale of fruits, tree nuts, vegetables, melons, greenhouse, and nursery was \$68.2 billion in 2014 up from \$54.6 billion in 2010 (Table 1). The value of specialty crops accounts for over 30% of the cash receipts for crop sales in the United States.

The commercial production of one or more specialty crops takes place in every state in the United States (Figures 2 and 3; Johnson, 2014). However, the majority of production is concentrated in three coastal states, and the distribution varies according to commodity. California is the top value producer for vegetables and melons, at 44%, followed by Florida with 6.8% and Washington with 6.4% of production in 2014. By value California accounted for 71% of U.S. fruit and tree nut production in 2014, followed by Washington at 10.5% and Florida with 6.4%. In addition, Oregon, North Dakota, and Michigan play an important role in the production of certain specialty crops (FCIC 2015).

The Specialty Crop Insurance Connection

Specialty crops accounted for just over 8% of total crop insurance premiums in 2014 (Table 2). Corn, soybeans, wheat, and cotton account for the vast majority of crop insurance premiums. Specialty crops share of total premium reflects

Table 2: Specialty Crops in U.S. Farm Cash Receipts and Crop Insurance, 2014

Crop	Cash Receipts 2014 (bil \$)	% of Total	Crop Insurance Premiums	% of Total
Fruits & Nuts	30.1	14.4%	0.50	5.0%
Vegetables & Melons	18.8	9.0%	0.32	3.2%
Corn	54.6	26.1%	3.65	36.2%
Soybeans	41.0	19.6%	2.26	22.4%
Wheat	12.6	6.0%	1.45	14.4%
Up. Cotton	7.4	3.5%	0.72	7.1%
Other Crops	44.8	21.4%	1.17	11.6%
Total Crops	209.3	100.0%	10.07	100.0%

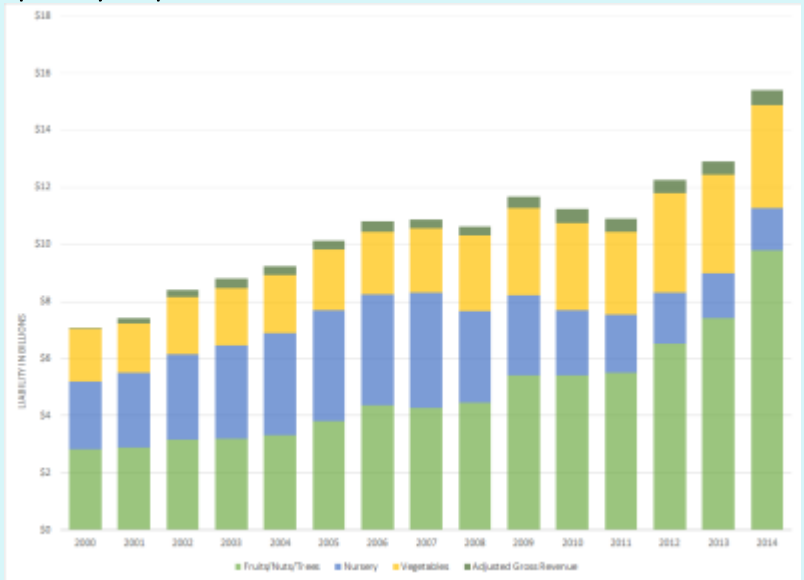
Source: USDA-RMA, 2016

lower coverage levels, particularly for nursery where catastrophic coverage is widely used along with a smaller insurable acreage base (Collins, 2012). The liability associated with crop insurance for specialty crops has continued to grow (Figure 4).

In 2000, it was around \$7 billion and by 2014 total liability was close to \$15 billion. It was a relatively small—but important—portion, about 13.6%, of the overall crop insurance total liability of \$109.9 billion in 2014. The growth in the liability associated with specialty crop insurance is due to the increase in value and expansion of the fruit, vegetable, and tree nut commodity coverage. Increase in the value of tree nuts and the addition of coverage for pistachios increased the liability for tree nuts from around \$500 million in 2000 to \$3.1 billion in 2014. The expansion of coverage to include an addition of 13 commodities also contributed \$521 million to total liability in 2014.

USDA reports that the vast majority, 87%, of specialty crop insurance coverage is for fruits, nuts, and vegetables. However, crop insurance also plays an important role for the nursery industry. In large part because the demand for nursery products is linked to the housing market, the nursery industry decreased over the past few years as the housing industry cooled due to the Great Recession. The USDA reported liability for nursery coverage was about \$1.6 billion in 2014. The small amount relative to the total value of nursery production eligible for coverage—\$15.7 billion or about 10%—results from a majority of policies being at catastrophic level coverage of 50% yield protection at 55% of the price. Accordingly, about 27.5% of the value of the crop for which coverage is currently available is insured, around \$4.3 billion (FCIC, 2015).

Figure 4: Federal Crop Insurance Corporation Program Growth for Specialty Crops



Source: FCIC, 2015

Unlike the nursery sector, other specialty crop producers make use of additional coverage options available among insurance products to help manage risk. Estimates from the RMA Summary of Business indicate that the majority of other specialty crop producers purchase some form of buy-up coverage above the catastrophic level of 50%. As a percent of premiums paid, those purchasing buy-up coverage exceed 80% for fruits, nuts, vegetables, and melons. In terms of acres enrolled, around 60% of the fruits and nuts plans purchased had additional levels of coverage compared to over 80% of the plans purchased for vegetables and melons.

In addition to individual specialty crop insurance coverage, growers have participated in the Adjusted Gross Revenue (AGR) insurance plan. The AGR plan provided protection against a fall in revenue and covers income from agricultural commodities, animal products, animals, and aquaculture species reared in a controlled environment (USDA-RMA 2014). As described by the USDA, the AGR uses documentation of participants from historical Internal Revenue Service Schedule F or equivalent forms and an annual farm report to establish a base; provides insurance for multiple agricultural commodities in one product; and establishes revenue as a common denominator for the production of all agricultural commodities. The level of participation has been lower than that of other plans, with under \$400 million in liability reported for 2014. For purposes of illustration all AGR plan liabilities are attributed here to specialty crops.

What does the Future Hold?

USDA is continuing its efforts to enhance crop insurance coverage to under-served agricultural commodities, in particular specialty crops. In the past four years, for example, private initiatives have resulted in the creation of six new specialty crop products. Over the same period, pilot programs initiated by Federal Crop Insurance Corporation resulted in five new specialty crop insurance programs.

In accordance with the 2014 Farm Bill, the AGR program was converted to the Whole Farm Revenue Protection (WFRP) plan for the 2015 crop and a pilot program was introduced for a majority of the counties in the United States. Starting in 2016, the WFRP will be available for all counties in the country. The program was specifically designed to assist producers with diversified operations and provides a wide variety of coverage levels. It is expected to expand the options of the risk management insurance program to those farms whose revenue derives from the sale of organically produced commodities, and/or those marketing to local, regional, farm-identity preserved, or directly to consumers.

All signs point to USDA moving forward with its efforts to expand the role of crop insurance as a risk management tool for specialty crop producers. However, it is important to understand that the pace of progress will be tempered by a number of headwinds. For example, in its most recent report to Congress, USDA noted that some growers have expressed concerns, and requested that crop insurance programs not be developed for their specialty crop. This request is driven, in part, by fears that the introduction of crop insurance could provide the incentive for rapid expansion of specific crops acreage, potentially disrupting markets and driving down prices (FCIC, 2015). Others have commented on technical difficulties associated with developing new insurance products for specialty crops such as price discovery, non-weather risks and premium rating (Collins, 2012).

The future will also require the crop insurance program to address longer term issues related to increased weather variability and global warming. The concentration of specialty crop production is in the western United States in areas where water availability and water quality are being challenged. Changing weather patterns such as more frequent and longer drought conditions and increasing temperatures affects the mix of specialty crop production and the risk associated with crop yields. The development of irrigated agriculture infrastructure and the ability to manage watering schedules contributed to the expansion of specialty crop production in areas like the California San Joaquin Valley. At the same time the production system dependence on surface water delivery makes it vulnerable when those supplies are curtailed and fragile ground water sources are subject to depletion. In addition, many specialty crops are dependent on chilling temperatures in certain stages of development. Increasing temperatures, limiting the number of chill days coupled with limited water availability can have dire consequences for crop yields.

Summing Things Up

Crop insurance plays a valuable role for specialty crop producers in managing risk. There is increasing focus on improving U.S. consumers' dietary habits by promoting increased consumption of fruits, vegetables, and tree nuts. Providing the producers who supply U.S. specialty crops with a risk management safety net will likely continue to be a farm policy priority. There have been substantial improvements in the coverage levels and products available in recent years. Additional progress will likely depend on the decisions of policy makers in the future as they struggle to allocate increasingly scarce budgetary resources.

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Crop Insurance Demand More Elastic than Previously Thought

Joshua D. Woodard

JEL Classifications: Q10, Q14, Q18

Keywords: Agricultural Insurance, Government Subsidized Insurance, Insurance Demand

Government subsidization of insurance is commonly employed as a policy tool to incentivize risk management activities. In the United States, a number of examples of subsidized insurance or reinsurance markets exist, including health insurance markets, agricultural insurance, flood insurance, and terrorism insurance, among others. There has also been an explosion in subsidizing agricultural index insurance programs in developing countries. Risk management programs have taken on a central focus in the current U.S. agricultural policy debate, as the environment has shifted from one that historically was more focused on direct payment programs and other income support measures, to one which today is more focused on agricultural insurance and providing risk management support to farmers (Woodard, 2013). The United States Federal Crop Insurance Program (FCIP) is the largest agricultural insurance program globally and historically. It has grown from a small pilot to what is now the cornerstone of agricultural support in the United States, with around \$100 billion in liabilities and \$10 billion in taxpayer costs annually. Due to its drastic growth and the subsidies involved, increased attention and scrutiny has been placed on its functioning—including rating, design, and other aspects—as well as cost effectiveness (GAO, 2014).

Understanding the impact of subsidies, program design, and premium rate changes on program participation is important given that one of the primary motivators for expanding the FCIP through time has been the argument that it is a superior alternative to ubiquitous *ad hoc* disaster assistance. A key to any analysis of insurance alternatives is knowledge of the underlying insurance demand elasticities—a measure of the level of insurance coverage demanded as the price of coverage varies. More specifically, to predict the level of subsidy required to reach a given level of participation or coverage in the market, one must have sound estimates of insurance demand elasticities that appropriately model subsidy and related effects. A recent report by the U.S. Government Accountability Office (GAO) concluded—based on elasticity estimates in the literature—that subsidization in the FCIP could be cut without significantly affecting program participation (GAO, 2014). This is somewhat difficult to reconcile, however, given the large increases in participation seen through time in response to increased subsidization and product offerings, despite that it is true that the empirical literature tends to find that crop insurance demand—or participation—is "inelastic", or relatively unresponsive to price changes. The GAO report then goes on to estimate cost savings under the assumption that farmers do not change anything about their insurance purchases as subsidies are removed—that is, perfectly inelastic demand.

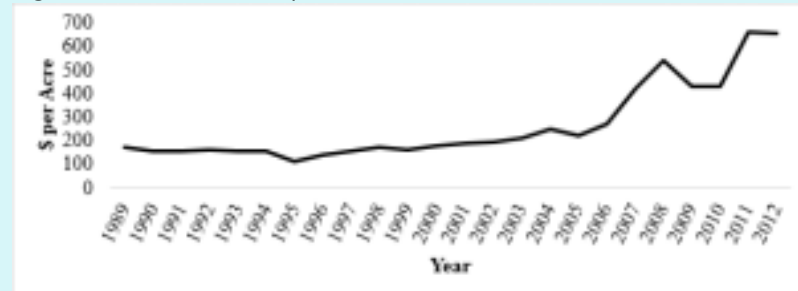
Though there is a large insurance demand literature, studies that model aggregate demand responses to changes in crop insurance subsidies are somewhat scarce in recent years. With some exceptions, the vast majority of studies tend to find inelastic demand responses (Goodwin, 1993; Coble et al., 1996; O'Donoghue, 2014; Shaik et al., 2008). Such conclusions can be fairly counterintuitive upon casual inspection of some programs when evaluating uptake in response to increases in subsidization. If

demand were nearly perfectly inelastic, this could be interpreted to suggest that these programs accomplish little if subsidizing them does not change behavior or lead to insurance purchases. To better understand alternative policy designs it is useful to review a brief historical perspective on U.S. crop insurance participation trends and outline some core empirical considerations that arise when estimating insurance demand.

Historical Experience in the Federal Crop Insurance Program

Crop insurance in the United States was introduced in 1938, but was limited to a small handful of crops and experienced very limited participation. The modern era of crop insurance in the United States began with the *Federal Crop Insurance Act of 1980*. The Act led to an expansion in offerings to include all crops and counties where sufficient data existed to estimate premiums. Since the 1990's, we have witnessed a dramatic increase in acres enrolled, subsidization, and average coverage levels in the program, as well as a movement towards revenue insurance, which was introduced in the late 1990's.

Figure 1: FCIP Liabilities per Insured Acre

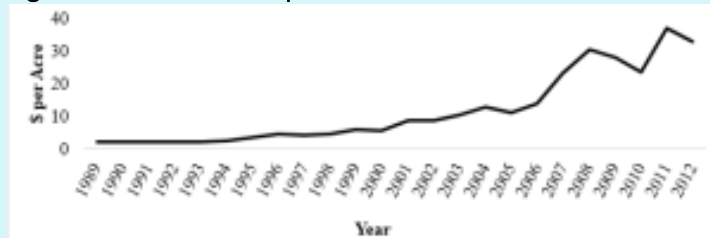


Source: U.S. RMA, 2016.

The *Federal Crop (FCIRA)* made participation mandatory at the 50% deductible level in order to be eligible for other government programs—such as deficiency payments—although this coverage was 100% subsidized. This was known as Catastrophic, or CAT coverage under the FCIP. The effective subsidy rate on products sold from 1994-1995, a period when only yield insurance was available, jumped from 26% to 55% as a result of FCIRA, a 110% increase in the effective premium subsidy rate. Insured acreage increased from 29.3 million acres in 1994 to 59.4 million in 1995, a 102.6% increase. Since 1989, liabilities per acre insured have tripled from roughly \$200 per acre to more than \$600 per acre (Figure 1). This change can be attributed to both increases in coverage levels as well as increases in commodity prices.

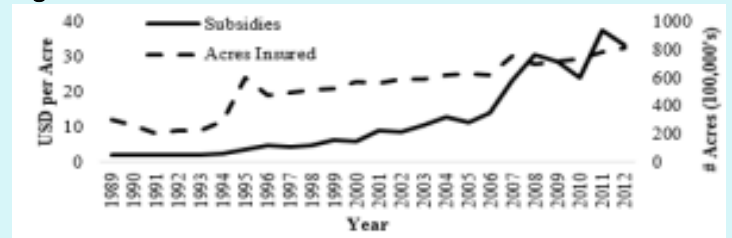
The *Agricultural Risk Protection Act* in 2000 saw further increases in subsidy rates. Over the same period, program subsidies per insured acre increased by more than 600% (Figure 2). However, subsidies have increased at a much faster pace than premium rates, as the subsidy adjusted premium rate increased by only 400%. The upswing in commodity prices also led to large increases in per acre premiums and subsidies, as well as acres enrolled (Figure 3).

Figure 2: FCIP Subsidies per Insured Acre



Source: U.S. RMA, 2016.

Figure 3: Total FCIP Subsidies vs. Insured Acres



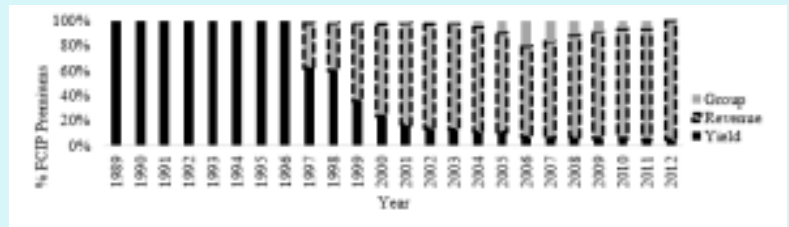
Source: U.S. RMA, 2016.

The primary insurance products available today are Revenue Protection (RP), Yield Protection (YP), and area-based index protection (ARP, formerly GRIP). RP was the most popular plan in 2012 with 83% of total insured land, followed by YP with 11%, and ARP/GRIP with 3%. RP premiums—due to the fact that they are priced to cover crop price drops and yield losses—tend to have premium rates between two and three times those of YP, but also on average will provide larger indemnities. Coverage is typically available for 50%-85% of expected yield or revenue—that is, 50%-15% deductible. Within a few years of the introduction of revenue insurance, it accounted for more than half of FCIP Premiums (Figure 4).

Every four to six years, Congress passes a major package of legislation which sets national nutrition, food welfare, agriculture, conservation, and forestry policy—known as the Farm Bill. The most recent was the *Agricultural Act of 2014*. With this legislation, the FCIP became the primary financial risk management tool for commercial-scale U.S. agricultural producers, and also introduced several “revenue insurance-like” programs that stack on top of existing Federal Crop Insurance. This includes the Supplemental Coverage Option, or SCO; Areas Revenue Coverage, or ARC, as well as the Stacked Income Protection Program, or STAX, for cotton.

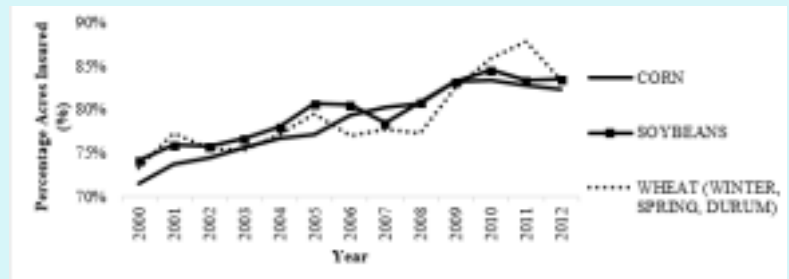
The three crops with the highest percentage of planted acres enrolled are corn, soybeans, and wheat (Figure 5). These three crops accounted for 69% of all enrolled acres and 77% of all program premiums in 2012. There are notable patterns in terms of insurance plan type and coverage level chosen through time. For revenue insurance (RP), participation has shifted significantly through time toward higher coverage levels. Liabilities per insured acre have also increased substantially through time (Figure 6). Even after adjusting for changes in base commodity prices, in just thirteen years, liabilities per insured acre for major commodities have increased by 55%, 31%, and 45% for yield, revenue, and area plan types, respectively.

Figure 4: Group, Revenue, and Yield Type Insurance Premiums as a Percent of Total Premiums



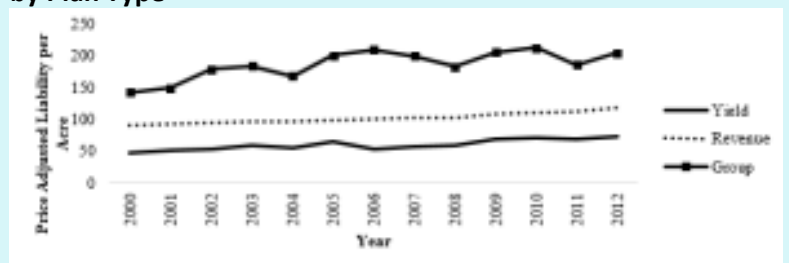
Source: U.S. RMA, 2016.

Figure 5: FCIP Insured Acres as a Percentage of Overall Planted Acres Per Crop



Source: U.S. RMA, 2016.

Figure 6: Price-Normalized Liabilities per Insured Acre for Corn by Plan Type



Source: U.S. RMA, 2016.

Determinants and Measures of Insurance Demand

Demand for insurance is motivated through two primary avenues: risk reduction effects and expected income effects. In private insurance markets, the expected value of indemnities to be received by the person insured is less than the premium cost. In Federal Crop Insurance, however, the expected return from buying insurance minus the farmer paid premium is typically positive since it is subsidized—if it is priced correctly. Effectively, subsidies change the “price” that producers pay for insurance, which affects demand. In general, demand models attempt to estimate the relationship between the quantity demanded for some good or service, as a function of its price and other factors. While many metrics have been proposed for measuring insurance demand, importantly for policy design, there is no generally accepted approach for which metrics should be used or how they should be modeled. Candidates for insurance “quantity” that have been evaluated in previous work include coverage level (or deductible), liability (or total covered value of asset being insured), total premium, product type and unit structure choice, as well as percent of acreage insured. Typically, one or more models are estimated with alternative quantity metrics, then the elasticities interpreted *ad hoc* in isolation as alternatives for policy inference. How these component measures relate to each other—or how they add up to reflect overall demand impacts—has, however, received much less attention.

An exception is Woodard (2015), which lays out a framework for evaluating how different quantity measures relate to each other—and to rate changes from subsidies versus outright rate changes—in order to determine aggregate market responses for various different target measures of insurance quantity. That study also finds that elasticities are mediated by other factors such as geography, and moreover that producers respond differently to changes in farmer paid premium rates associated with changing subsidy rates than they do from other sources of rate change. Different elasticities from models with different quantity measures should not be interpreted interchangeably or as substitutes in isolation, but rather are structurally related to one another. Overall, the study indicates that demand is likely far more elastic than previously thought.

Another common practice is to use premium rate observed—premium divided by liability—as the “price” variable in crop insurance demand models. In reality, producers do not face a single “price”, but rather a menu of prices for different coverage levels they may elect. Most previous studies either:

1. ignore this,
2. used a baseline premium rate from one coverage level (for example, a rate for the 65% coverage level) to model impacts from shifts in the menu of rates, and
3. resort to complex statistical approaches to model discrete choices which treat different coverage levels as if they are a wholly separate good or service (these are known as discrete choice models in econometrics).

The issue with estimating demand models in this context is that higher coverage level products (that is, insurance coverage with a lower deductible) are always going to be more expensive than lower coverage level products, as a simple actuarial matter (resulting in a positive relationship between “quantity” and “price”). On the other hand, as we increase the price of insurance, we would expect that this should cause a reduction in demand (that is, a negative relationship between quantity and price). If observed data on purchases are then modeled using standard statistical regression techniques, then this will result in faulty analysis. This is an instance of what is known as the “endogeneity” or “simultaneity” problem in econometrics.

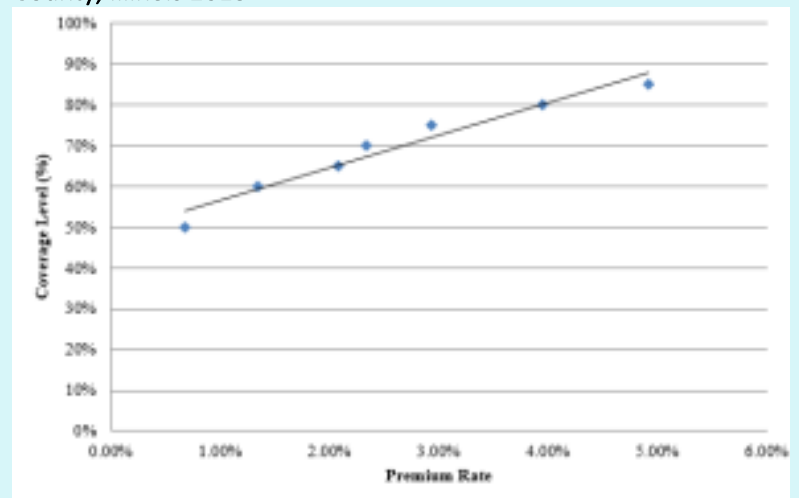
For example, Figure 7 shows actual observed premium rates by coverage level in McLean County, Illinois, in 2013. The curve is upward sloping simply because the government prices higher coverage levels products to have higher premium rates than lower coverage level products, since they have greater expected payouts. Figure 8 shows the same but for observed liability. These both clearly show an upward sloping relationship between coverage level (or total liability) and premium rate, which on its face might be the opposite one would expect to see if the law of demand holds (that is, that price and quantity demanded are inversely related).

The idea of estimating demand is that the analyst would obtain data from many counties and years of data, then estimate models to see how much less insurance farmers buy when the price is increased. In agricultural insurance, the issue is that unless some account is taken of the simultaneity in the *choice* of coverage level and the corresponding *price* (or rate) which is charged for it, then these two effects are muddled. In the case of agricultural insurance, if the level of liability or average coverage levels are being modeled as "quantity" of insurance, then the premium rate observed from that purchase is "endogenous" to the observations of the purchase amount. A recent study by Woodard (2016c) proposes an econometric solution to this problem in the case of insurance, and finds elasticities that are three to five times more elastic when properly accounting for this endogeneity. That work also shows that the scaling of the coverage level is also important when interpreting demand elasticity estimates.

Room for Improvement

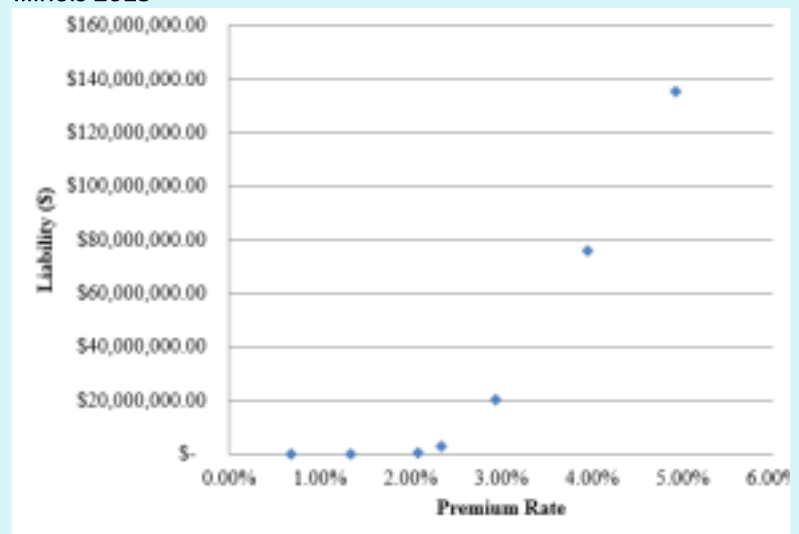
As crop insurance is the primary safety net for U.S. agriculture, understanding producer demand responses is critical. However, much of the historical economic analysis falls short in providing useful information or models to infer likely demand responses from changes in subsidy policy, program

Figure 7: Observed Premium Rate by Coverage Level - McLean County, Illinois 2013



Source: U.S. RMA, 2016.

Figure 8: Observed Rate Per Unit by Liability- McLean County Illinois 2013



Source: U.S. RMA, 2016.

structure, or rates. More developments are needed to properly address these questions, including approaches that:

1. explicitly relate various dimensions of quantity of insurance to aggregate market responses,
2. consider differential demand responses due to changes in menu premium rate (certain costs now) and the expected value of the return embodied in the subsidy (risky payments later), and
3. the endogeneity between the premium rate and the deductible chosen.

The danger in making policy inference based on *ad hoc* single dimensions of insurance quantity, as well as improper specification and estimation of statistical models was highlighted by a recent U.S. Government Accountability Office report (GAO 2014). Quite aside from whether or not it is a wise idea to subsidize Federal Crop Insurance, accounting for these issues leads to different conclusions regarding the elasticity of demand for crop insurance. Policy-makers should be properly informed about the likely impacts from altering program structure.

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