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Capping the Farmer Premium-to-Liability Ratio for the Major Federal Crop Insurance Coverages: An Evaluation of the Potential Economic Implications

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Executive Summary

- The federal crop insurance program administered by the USDA Risk Management Agency (USDA-RMA) is critical for farmers and ranchers in managing risk associated with crop yield and revenue variability. Because of the high levels of risk present in production agriculture, the USDA-RMA subsidizes the insurance premium paid by farmers and ranchers, and in 2022, this subsidy totaled $11.6 billion. The benefits of the crop insurance program include lowering risk, enhancing farm revenue, and ensuring a stable food supply and lower food prices.
- A key metric of the relative expensiveness of crop insurance to farmers is the ratio of the net premium farmers pay to the total dollar value of the liability insured. This study examines the economic implications of limiting the farmer premium-to-liability ratio to 4.0 percent for enterprise unit coverage under the four major types of insurance (Actual Production History, Yield Protection, Revenue Protection, and Revenue Protection with Harvest Price Excluded) for crop production. For the highest level of coverage (85 percent), this ratio averaged 5.0 percent across all participating farmers in 2022. This compares to 3.0 percent for the following three lower levels of coverage (70, 75, and 80 percent).
- The results indicate that capping this ratio at four percent via additional premium subsidies would lower farmer premiums by 8.0 percent at an overall cost of $186.0 million based on the 2022 coverage and participation levels. In addition, the adjustment would primarily benefit farmers with a coverage level above 70 percent, lowering farmer premiums by $1.40 per acre on average.
- The benefits are distributed as follows: Cotton ($66.4 million), corn ($58.1 million), wheat ($23.3 million), and soybeans ($22.1 million) would benefit the most from this adjustment. Texas farmers would receive the largest share of additional subsidies ($69.8 million), followed by those from North Dakota ($16.0 million), South Dakota ($14.2 million), and Kansas ($13.8 million).
- A scenario-based analysis of acreage shifting in response to the additional subsidy indicates that the subsidy could move 9.2 million acres to the 85 percent coverage level while keeping overall farmer premiums the same and crop insurance actuarially sound. The additional subsidy would allow 25 percent of the acreage to switch to a higher coverage level at an increased subsidy cost of $67.3 million.

Introduction

Over the past thirty years, the U.S. federal crop insurance program has significantly grown, resulting in more insured acres, a growing liability, and higher insurance subsidies (Glauber, 2013). Crop insurance is crucial for farmers and ranchers to manage the risks associated with lower crop yields and revenue. The USDA Risk Management Agency (USDA-RMA) and the Federal Crop Insurance Corporation (FCIC) manage the program. Private insurance providers offer and distribute crop insurance products to farmers, while the government funds the administrative and operational costs, reinsurance expenses, and insurance premiums.

Crop insurance products are developed either by the FCIC or private insurance companies, subject to

approval by the FCIC. The FCIC and USDA-RMA determine and regulate the premiums for these insurance products. Premiums are charged based on the amount of insured liability, historical yield experience, and market prices. Over time, the rating process has undergone multiple revisions to achieve premium rates closer to being actuarially fair (Goodwin, 1994; Glauber, 2013; Jisang et al., 2017).

In 2022, Yield Protection (YP) and Revenue Protection (RP) were the two most popular products for major field crops, making up about 80 percent of the total liability. YP, previously known as Actual Production History (APH), pays out when the actual yield is lower than the historical average yield. In contrast, RP pays out when the actual yield multiplied by the harvest price is less than the historical average yield multiplied by the higher of either the projected price or the harvest price. As a result, the premium rate for revenue protection is generally higher than yield protection per dollar of liability.

The amount of premium a farmer pays is the difference between the total premium and the premium subsidy. The total premium for a specific crop on a farm is calculated by multiplying the premium rate by the insured liability, which is the maximum amount of compensation available. The insured liability for a particular crop depends on the acreage of the crop that is insured, the chosen coverage levels of the farm, the insured price of the crop, and the historical yield of the crop.

The premium rate for crop insurance is established by the USDA-RMA, which considers various factors, such as the level of risk associated with the insured crop in the county, the chosen coverage level of the farm, the insurance product, and farm-specific practices like irrigation. The agency strives to set premium rates that are actuarially fair, which means that the premium rates are equivalent to the expected indemnities per dollar of liability. Therefore, premium rates are usually higher for ris-

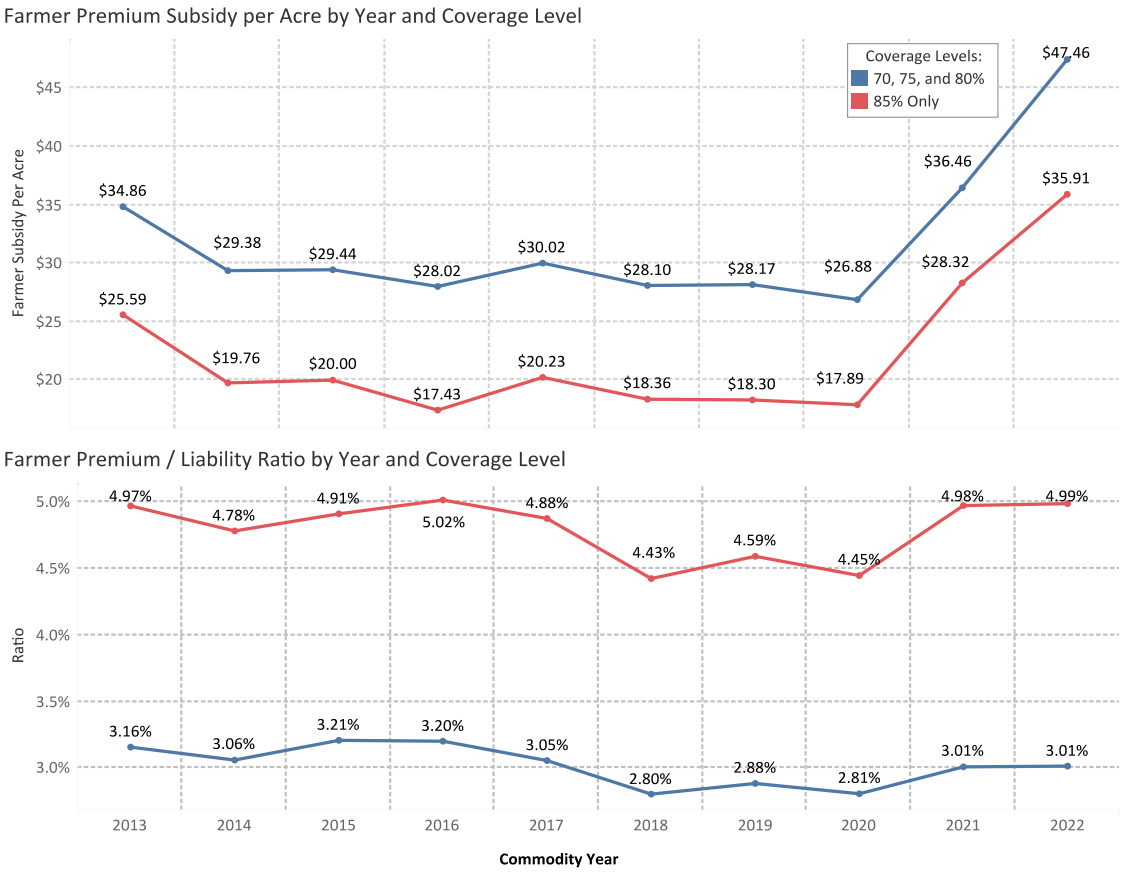


Figure 1. Farmer Premium Subsidy and Farmer Premium / Liability per Acre in 2022.

kier crops grown in higher-risk counties (Coble & Barnett, 2013).

The premium subsidy is calculated by multiplying the subsidy rate by the total premium. The subsidy rates differ according to the crop insurance product, coverage level, and unit type. Each crop has the same subsidy rate across insurance products for a given coverage level and unit type. Group or area-based products linked to county-level yields or revenue have higher subsidy rates and indemnity payout schedules. If the premium rate were actuarially fair, the farm's expected net profit gain from purchasing insurance would be the same as the premium subsidy. The subsidy per $ of insured liability determines how much subsidy participating farmers receive.

The total crop insurance premium subsidy grew from $205 million in 1989 to $11.6 billion in 2022. This considerable increase aligns with the growth in crop insurance products available to farmers. On average, the farmer subsidy per acre at the 70 to 80 percent coverage levels was $29.40 from 2013 to 2020. At the same time, the rate was only $19.70 at the 85 percent level. Thereby, the subsidy rate per acre at the 70 to 80 percent coverage levels was 49.1 percent higher than that at the 85 percent coverage level, with both rates increasing by 61.9 and 54.8 percent since the start of the pandemic. This discrepancy implies that the farmer premium per liability ratio is considerably higher at the 85 percent coverage level (5.0 percent) than at the 70 to 80 percent coverage levels (3.0 percent), implying that the premium costs for crop insurance in high-risk counties are considerably higher, making it less affordable for farmers to buy a higher coverage level in climatically disadvantaged counties.

Objectives

The study has three objectives:

(1) Estimate the economic impact of limiting the farmer premium to liability ratio for enterprise units to four percent for crop and revenue insurance (APH, YP, RP, and RPHPE) in 2022.

(2) Evaluate the distributional consequences of additional subsidies by coverage level, commodity, and state.

(3) Simulate the farmer premium, subsidy, and insured acreage implications of limiting the farmer premium to liability ratio allowing for acreage shifting to higher coverage levels.

Approach

This study used county-level crop insurance data at the coverage, county, and commodity levels for 2013 to 2022 from the Risk Management Agency (2023). We limited the main analysis to the Actual Production History (APH), Revenue Protection with (RPHPE) and without (RP) the harvest price exclusion option, and Yield Protection (YP) insurance plans. The following unit structures were considered in this study: enterprise unit, enterprise unit separated by cropping practice, and enterprise unit separated by irrigation practice.

The 2022 crop insurance data were used to estimate the economic impact of limiting the ratio of farmer premium to liability for enterprise units to four percent (objective 1). Coverage level, commodity, and state were used to summarize the distributional consequences (objective 2). The simulation of acreage shifting to higher coverage levels assumed that 10 percent, 20 percent, and 30 percent of the insured acres move to the next higher insurance level (objective 3) in response to the subsidy shift. The optimal level of acreage shift was calculated by fixing the overall total farmer premium to the pre-subsidy level.

Results

The simulation results with crop insurance data for 2022 indicate that limiting the farmer premium to liability ratio for enterprise units to four percent for crop and revenue insurance would reduce the farmer premium by 8.0 percent at an overall cost of $186.0 million based on the 2022 coverage levels. The additional subsidy would primarily benefit farmers with coverage levels above 70 percent. They would receive 97.0 percent of the additional subsidy, lowering the average farmer premium from $18.2 to $16.7 for the 70 to 85 percent coverage levels. The premium reduction would be highest for farmers with a 70 percent coverage level, followed by those that buy 85 percent coverage. In terms of subsidy distribution across coverage levels, we find that farmers insured at 75 percent cov-

Table 1. Added Subsidy Based On the 2022 Participation Levels.

Coverage Level (in percent)	Commodity (Top 4 and All Others)					
	Cotton	Corn	Wheat	Soybeans	All Others	Grand Total
50	$16,278	$34,394	$42,229	$12,101	$29,047	$134,048
55	$2,928	$15,754	$2,257	$2,389	$18,642	$41,969
60	$1,471,554	$88,371	$224,772	$18,042	$83,394	$1,886,134
65	$2,582,560	$190,596	$522,936	$47,287	$166,207	$3,509,586
70	$35,976,337	$1,867,751	$3,733,959	$366,086	$1,531,834	$43,475,966
75	$20,524,940	$11,541,018	$8,978,372	$2,327,630	$7,350,844	$50,722,804
80	$4,189,298	$24,832,206	$5,423,188	$8,808,374	$4,675,859	$47,928,926
85	$1,630,437	$19,487,160	$4,355,633	$10,560,851	$2,295,039	$38,329,119
Grand Total	$66,394,332	$58,057,250	$23,283,346	$22,142,759	$16,150,864	$186,028,552

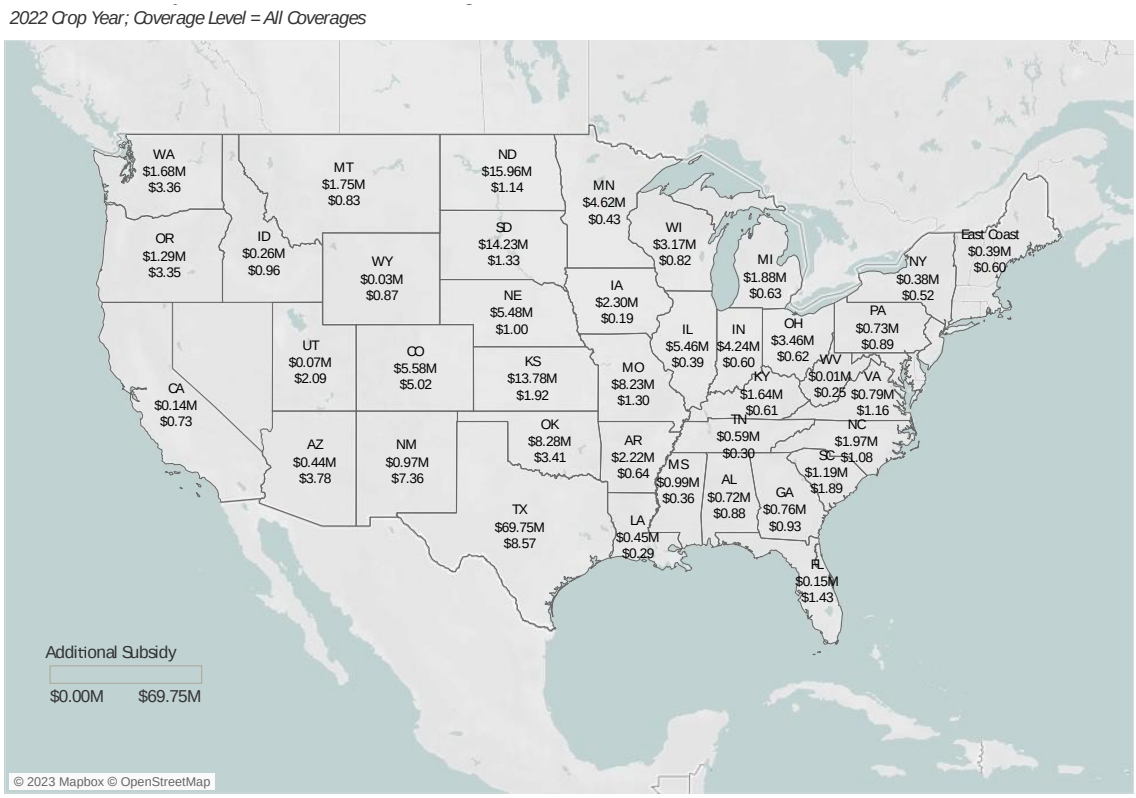
age level would receive the largest subsidy share (27.3 percent), followed by those at 80 percent (25.8 percent), 70 percent (23.4 percent), and 85 percent (20.1 percent).

The additional subsidiary required to limit the farmer premium to liability ratio for enterprise units to four percent is heterogeneously distributed across commodity groups. Cotton ($66.4 million), corn ($58.1 million), wheat ($23.3 million), and soybeans ($22.1 million) would benefit the most from this adjustment. Notably, those farmers insured at the 70 and 75 percent coverage levels would receive the largest subsidy increase for cotton. In contrast, corn farmers would see higher subsidy increases at the 80 and 85 percent coverage levels. The additional subsidy for wheat farmers would be highest at 75 percent and for soybeans at 85 percent coverage level. This pattern speaks to the spatial nature of the yield and revenue risk distribution across commodities and coverage levels.

The spatial pattern of yield and revenue risks and coverage levels dictate the distribution of additional subsidies across states. Texas farmers would receive most of the additional subsidies ($69.8 million), followed by those from North Dakota ($16.0 million), South Dakota ($14.2 million), and Kansas ($13.8 million). Interestingly, the additional subsidy per acre follows a different distribution. Texas farmers would receive an average of $8.57 additional subsidy per acre, followed by Oklahoma, Washington, and Oregon (each at about $3.40 per acre). Not surprisingly, the additional subsidy would primarily benefit those states that produce cotton, corn, wheat, and rice. In contrast, those states that focus on other commodities would benefit less from the additional subsidies.

An important assumption taken up to this point is that the additional subsidy to limit the farmer premium to liability ratio to four percent would maintain the distribution of coverage level that farmers purchase which is fixed at 2022 levels. Under this assumption, the additional subsidy would reduce the total farmer premiums by $186.0 million. However, if it is assumed that farmers would use the freed-up premium expense to purchase a higher coverage level, additional adjustments to the acreage distribution need to be made.

To approximate potential farmer responses to the increased premium subsidies, scenarios covering an upward shift in 2022 insured acres by 10 percent, 20 percent, and 30 percent were analyzed. Also, a breakeven analysis was conducted to determine the percent farmer shift at which the policy would remain premium neutral (in terms of total farmer premiums paid).



For each state, the top number is the total additional subsidy in millions of dollars and the bottom number is the total additional subsidy per covered acre. East Coast contains the states of Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, New Jersey, Maryland, and Delaware. Nevada reported no coverage in 2022.

Figure 2. Additional Subsidy by State (Total and per Acre).

If farmers shifted 25 percent of currently insured acreage to the next highest coverage level, the total farmer premiums paid would remain unchanged while requiring additional subsidies of $67.3 million. Therefore, switching up to 25 percent of the acreage to the higher coverage level would be cost-neutral for farmers and lower the overall subsidy increase.

The additional subsidy would significantly increase the acreage insured at higher coverage levels. At the sweet spot of 25 percent of shifting to a higher coverage level, the average coverage level would increase from 75.5 percent to 76.6 percent. At the same time, the acreage under 85 percent coverage level would increase from 16.3 million acres to 25.5 million acres, significantly expanding the crop insurance options that farmers have available for high-risk commodities in counties experiencing increased yield and revenue risks. Therefore, limiting the farmer premium to liability ratio for enterprise units to four percent for crop and revenue insurance and allowing 25 percent of the acreage to switch to a higher coverage would be actuarially fair at an additional subsidy cost of $67.3 million.

Conclusion

The federal crop insurance program is vital for farmers and ranchers as it helps them manage the risks associated with crop yields and revenue variability. However, the distribution of farmer premiums per liability varies significantly across different coverage levels. The study proposes limiting the farmer premium per liability ratio to four percent for enterprise units with the major crop and revenue insurance types to address this issue. The modeling results indicated that such a change would lower farmer premiums by 8.0 percent, benefiting primarily those with coverage above 70 percent. Cotton, corn, wheat, and soybean farmers would benefit the most, with Texan farmers receiving the most significant additional subsidies, followed by those in North Dakota, South Dakota, and Kansas. Furthermore, the analysis suggests that the additi-

Table 2. Changes in Total Subsidy and Total Farmer Premium Under Alternative Scenarios.

Scenario	Total Subsidy	Net Change[a]	Total Farmer Premiums	Net Change[a]
Current Situation in 2022	$6,003,195,662	$0	$2,336,702,471	$0
Increased Subsidy with No Shift in 2022 Acres	$6,189,224,214	$ 186,028,552	$2,150,673,919	-$186,028,552
Increased Subsidy with 10% Upward Shift in 2022 Acres	$6,141,628,305	$138,432,643	$2,225,205,069	-$111,497,402
Increased Subsidy with 20% Upward Shift in 2022 Acres	$6,094,032,396	$90,836,734	$2,299,736,218	-$36,966,253
Increased Subsidy with 30% Upward Shift in 2022 Acres	$6,046,436,487	$43,240,825	$2,374,267,368	$37,564,897

[a] *The net change is relative to the current situation in the 2022 scenario.*

onal subsidy could increase 9.2 million acres or 56.4 percent to the 85 percent coverage level while maintaining overall farmer premiums.

This study implies that the current distribution of farmer premiums per liability in the federal crop insurance program is inequitable across different coverage levels. The proposed change in the program would benefit farmers with a coverage level above 70 percent, which is significant given that these farmers are at the highest risk of crop or revenue losses. The study also highlights the importance of considering the impact of program changes on different commodities and states. Moreover, the analysis suggests that the proposed change could encourage farmers to shift their acreage to higher coverage levels, further improving their risk management strategies. Overall, the study provides valuable insights into the federal crop insurance program's distributional consequences and highlights the potential benefits of program changes that aim to make it more equitable for farmers and ranchers.

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