Simulating Prevented Planting Coverage Factors based on Cost Reimbursement



By Christopher N. Boyer, W. Hence Duncan, and Eunchun Park

Christopher N. Boyer is a Professor in the Department of Agricultural and Resource Economics, University of Tennessee. W. Hence Duncan is a Graduate Research Assistant in the Department of Agricultural and Resource Economics, University of Tennessee. Eunchun Park is an Assistant Professor in the Department of Agricultural Economics and Agribusiness, University of Arkansas.

Acknowledgments

We thank the editor and reviewers for providing feedback to improve this manuscript. This research was supported by Agriculture and Food Research Initiative Competitive Grant no. 2021-67023-33819 from the United States Department of Agriculture National Institute of Food and Agriculture.

Abstract

The prevented planting provision in United States crop insurance reimburses producers when they are unable to plant. These indemnities are calculated by using a coverage factor (CF) of the insurance level. We simulated CFs that reimburse land rent and two payment values for inputs for corn and soybean production. Simulations were established to generate county-level distributions of CFs as well as changes in U.S. expenditures if the CFs were established to reimburse land rent and input costs. We found that the CF for corn is likely compensating claims more than the soybean CF, despite the soybean CF being higher than corn.

INTRODUCTION

U.S. crop insurance has a provision that pays producers an indemnity when they are prevented from planting due to an insurable loss such as excess moisture. While there is a short window of time during the production year for crops to be lost, prevented planting indemnity payments and the acres lost can account for substantial portions of U.S. crop insurance claims each year. In 2010, 2011, 2015, and 2019, more than 20% of all U.S. crop insurance payments were for prevented planting claims (Wu, Goodwin, and Coble, 2020; USDA-RMA, 2023a). In 2019, prevented planting claims hit a record high of 19 million acres lost and $4.3 billion in indemnity payments, followed by prevented planting claims made on 10 million acres (about 22% of total acres indemnified) in 2020 (USDA-RMA, 2023a).

Prevented planting indemnity payments were established in 1994 to offer a financial safety net for standard production expenses that occur prior to planting (USDA-RMA, 2021). These costs are considered to include machinery, pesticide, fertilizer, land rent, property taxes, and labor (USDA-RMA, 2021), but the provision is set up to pay policyholders based on their coverage level without considering their costs of production. The USDA Office of the Inspector General (OIG) investigated this provision and found that prevented planting indemnity payments can exceed pre-planting costs (USDA OIG, 2013), which researchers have suggested could be a moral hazard issue (Adkins et al., 2020; Boyer and Smith, 2019; Kim and Kim, 2018; Wu, Goodwin, and Coble, 2020).

Prevented planting moral hazard concerns are different from typical claims such as under-applying fertilizer or chemicals during production because economic losses from low yields are insured (i.e., *ex-ante* moral hazard) (Horowitz and Lichtenberg, 1993; Smith and Goodwin, 1996; Sheriff, 2005). Moral hazard

in prevented planting is often referred to as an *ex-post* moral hazard because a producer's choice to not grow a crop for an insurable reason keeps them from planting (Rees and Wambach, 2008; Zweifel and Eisen, 2012). An *ex-post* moral hazard in prevented planting, which was defined by Kim and Kim (2018) and used by other researchers (Adkins et al., 2020; Boyer and Smith, 2019; Wu, Goodwin, and Coble, 2020), occurs when a producer chooses to take the prevented planting indemnity payment during the late planting window or switches to an alternative crop.

The USDA OIG (2013) report recommended changing the prevented planting provision to align indemnity payments with actual pre-plant production costs. This would require decreasing the prevented planting coverage factor (CF), i.e., the percentage of the policyholder's guaranteed revenue or yield coverage purchased in their crop insurance policy for various crops. In 2017 and 2019, the prevented planting CF was decreased by the USDA-RMA for corn and other crops, but soybeans were not adjusted. Policy analyses of these changes have found that lowering the prevented planting CF would likely reduce the moral hazard concerns for corn by incentivizing producers to switch from corn to soybeans, for example[1] (Adkins et al., 2020; Boyer and Smith, 2019; Kim and Kim, 2018).

Often, the literature focuses on regions such as the Prairie Pothole Region that are potentially overcompensated or more likely to have a moral hazard concern (Wu, Goodwin, and Coble, 2020). However, there might also be other counties and regions that are being undercompensated due to varying cost structures (such as land rent) and low yields. Currently, the prevented planting CF for a given crop is uniform across the U.S., that is, a corn producer will receive 55% of their guaranteed revenue or yield coverage purchased in their crop insurance policy if they are unable to plant. This has been speculated to be driving some disparities in prevented planting indemnity payments across regions (Agralytica Consulting, 2013; USDA OIG, 2013). Therefore, it is of interest to explore prevented planting CFs based on various region-specific factors such as land rent (pre-plant costs) and yields, then explore how these estimated prevented planting CFs might impact federal expenditures for the prevented planting provision. This analysis is also relevant given that farm input prices such as land rent have recently reached record levels (USDA-NASS, 2023). This type of investigation could provide insight into how higher costs impact the returns producers receive from prevented planting claims.

The objective of this paper is to calculate a U.S.-level prevented planting CF that considers county-level variation in land rent, yields, planted acres, and prevented planting acres for corn and soybeans. We estimated these CFs by assuming two threshold levels of $100/acre and $200/acre above the land rent cost to demonstrate how higher input costs could influence CFs. We developed simulation models to generate distributions of county-level prevented planting CF based on costs and yields across the U.S., then we estimated a weighted average CF based on insured crop acres and simulated U.S. federal crop insurance expenditures for prevented planting indemnities by using these CFs. Our results will be useful for producers and federal agencies to assess if the prevented planting CF is covering pre-plant costs and how higher costs might impact total prevented planting payments in the U.S. for corn and soybeans.

ECONOMIC FRAMEWORK

Producers who have insurance policies that are eligible for prevented planting have the same options if they are unable to plant within the designated window. One option is planting the insured crop during the 25-day late planting window, but if this option is chosen, the guaranteed coverage level of the policy declines 1% each day during that period. Another option is to switch from the original insured crop to a different insured crop after the late planting window expires, e.g., corn could be shifted to soybeans because the soybean planting window extends past corn for most regions. A producer could also shift to an uninsured secondary crop like an annual grass for haying and/or grazing without impacting their payment.

The most selected option is to forgo planting and take the full prevented planting indemnity (USDA OIG, 2013). This option pays a percentage (i.e., CF) of the guaranteed insured amount, but a harvestable crop cannot be planted on the field with a prevented planting claim in place, instead, the prevented planting field could be left fallow or planted to an unharvested cover crop. Returns to the full prevented planting payment option is mathematically defined as

$$NR_{ik} = p_i^G y_i^{APH} \delta_k \gamma_i - x_i - IP_{ik} \quad (1)$$

where NR_{ik} is the net return to the full prevented planting payment ($/acre) for the *i*th crop (*i* = corn or soybeans) with a *k*th crop insurance coverage level (*k* = 50%, 55%, 60%, 65%, 70%, 75%, 80%, and 85%);

p_i^G is the insured price; y_i^{APH} is the actual production history (APH) yield; is the coverage level of the crop insurance; is the prevented planting CF, where corn is 55%, soybeans 60%; is the pre-plant production cost ($/acre); and IP_{ik} is the producer's crop insurance premium ($/acre).

To illustrate this payment for corn, assume there is an RP policy with 75% coverage level, the APH is 190 bu/acre, and the insured price of $4.25/bu would have a guaranteed revenue minimum of $605.62/acre ($605.62 = $4.25 x 190 x 0.75). Prior to planting, assume the producer has spent $200/acre on the land rent, chemicals, insurance premium, and machinery. The full prevented planting payment would pay 55% of the guaranteed revenue minimum, which is $333.09/acre ($333.09 = $605.62 x 0.55), resulting in net returns of $133.09/acre ($333.09 - $200).

This example demonstrates how a higher coverage level, yield, or price can increase the prevented planting payment. Furthermore, land rents vary across the U.S. and are a function of cost structures, yield potential, government payments, and land use and amenities (Allen and Borchers, 2016; Kirwan, 2009), likely impacting the regional disparities in prevented planting payments. These determinants are state- and county-specific, so considering this variability in estimating a prevented planting CF would be helpful to ensure that producers are being reimbursed for their prevented planting costs. Equation (1) provides insight into how to solve for a prevented planting CF that would consider this variability. By setting (1) equal to some revenue minimum (RM) that considers land rent and input costs, we can solve for a prevented planting CF at the county level, which is expressed as

$$\gamma_{ikc}^{*} = \frac{x_i + RM_{ic}}{p_{is}^{G} y_{ic}^{APH} \delta_{ic}} \qquad (2)$$

where γ_{ikc}^{*} is the CF for county c (c=1,...,C) and δ_{ic} is the weighted average across coverage levels (of the crop insurance. This would estimate geographic and coverage level variation in the prevented planting CF and would provide producers with a financial safety net if they were unable to plant. The producers' premium cost was not considered in this calculation since crop insurance does not reimburse the premium but the losses.

Simulation Model

Agralytica Consulting (2013) in their analysis of prevented planting provision recognized the limitation of setting a U.S.-level prevented planting CF but cited a large "administrative burden of determining appropriate CFs at the regional, state, or sub-state level" as the reason for using a U.S.-level prevented planting CF. The report also stated that providing a stable and uniform prevented planting CF is vital for producers to efficiently manage their risk. While a prevented planting CF that provides equal returns to all producers without overcompensating would likely reduce moral hazard in prevented planting, the cost would likely be higher than the savings to administer. However, these county- and policy-specific prevented planting CFs can be averaged to find a U.S. average from a distribution of prevented planting CFs. Therefore, we established a simulation model by using stochastic prices, yields, average crop insurance coverage levels, land rents, percent of acres indemnified due to prevented planting, and total acres for a commodity at the county level. First, we simulated Equation (2), which can be re-written as

$$\tilde{\gamma}_{ic}^{*} = \frac{\widetilde{LR}_c + \pi}{\tilde{p}_{is}^{G} \tilde{y}_{ic}^{APH} \tilde{\delta}_{ic}} \qquad (3)$$

where "~" denotes a randomly drawn parameter from a distribution; $\widetilde{LR}_c$ is county-level land rents for cropland; and π is a set payment above land rent.

Pre-plant costs typically include land rent along with chemical and machinery costs for burndown and pre-emerge herbicides (Boyer and Smith, 2019). Land rent data are available, but county-level production costs are not recorded and are hard to estimate. Therefore, we simulated the prevented planting CF by assuming a set payment (above land rent of $100/acre and $200/acre. These values were selected to show how the prevented planting CF might vary as input costs increase.

To aggregate these values to the national level, we calculated an acre-weighted average prevented planting CF. The prevented planting CF is weighted with total insured acres within a county and expressed as

$$\bar{\gamma}_i^{*} = \sum_c^C \left[\frac{\tilde{\gamma}_{ic}^{*} \times TA_{ic}}{TA_{ic}} \right] \qquad (4)$$

where $\bar{\gamma}_i^{*}$ is a weighted average prevented planting CF for commodity i and TA_{ic} is the county total insured acres of commodity i.

Next, we substituted the estimated prevented planting CFs found in (3) into (1) to calculate payments. After

that, we aggregated the prevented planting payments across the counties to calculate total prevented planting expenditures with the current prevented planting CF and the hypothetical prevented planting CF that would provide a $100/acre and $200/acre payment above the land rent. This calculation required us to find the total acres lost to prevented planting in a county and the total insured acres in a county. Like Boyer, Park, and Yun (2023), we divided the total lost acres to prevented planting by county by the total insured acres (PV_{ic}). These equation are specified as

$$\widehat{TPP_i} = \sum_c^C \square \tilde{p}_i^G \times \tilde{y}_i^{APH} \times \tilde{\delta}_k \times \gamma_i \times (\widehat{PV_{ic}} \times \widehat{TA_{ic}}) \qquad (5)$$

where TPP_i is the total prevented planting payment and PV_{ic} is the ratio of corn and soybean acres prevented from being planted. We estimated the same payment by using the hypothetical prevented planting CF $(\tilde{\gamma}_{ic}^*)$ at the two threshold payment levels above land rent. We note here that the model assumes the entire crop's insurance unit is indemnified. Also, we do not account for yield adjustments to policies over time due to frequent prevented planting claims.

Prices, yields, average crop insurance coverage levels, land rents, percent of acres indemnified due to prevented planting, and total acres for a commodity were randomly drawn from a PERT (Project Evaluation and Review Technique) distribution at a county level. We chose this distribution because we simulated county-level distributions individually. By aggregating counties into one distribution, the distribution could be disproportionally weighted: some counties with few acres but a higher prevented planting CF would receive equal weight as those counties with low prevented planting CF but higher acres. Therefore, we ran a simulation for each county using this distribution and weighted the prevented planting CF and expenditures by the insured acres. The PERT distribution is useful when minimal information is available because it requires only minimum, midpoint, and maximum values as the bounds for the distribution (Richardson, 2008). We used Simulation and Econometrics to Analyze Risk (SIMETAR©) to develop the distributions and perform the simulations (Richardson et al., 2008). We simulated a total of 1,000 observations for each distribution.

Data

Data were collected from USDA-RMA and USDA-NASS from 2011 to 2022 for the U.S. The USDA-RMA Summary of Business database provided data on all the sold insurance policies for corn and soybeans (USDA-RMA, 2023b). These county-level data include the number of insurance policies sold, policies indemnified, acre coverage, total premiums, subsidies, and indemnity payments by county, state, year, coverage plan, and coverage level. For example, in a specific county, there could be five observations in a year for RP policies with 50%, 55%, 65%, 75%, and 80% coverage levels, meaning there could be multiple observations within a county.

We used these data to calculate an acre-weighted average coverage level for corn and soybean insurance policies by county. They also provided each county's total number of insured acres by crop. Next, we gathered USDA-RMA cause of loss data to find county-level acres of corn and soybeans lost to prevented planting (USDA-RMA, 2023a). We divided the county-level acres lost to prevented planting by the total insured acres to calculate the ratio of acres lost to prevented planting, which matches the Boyer, Park, and Yun (2023) calculation.

Figures 1 and 2 show the average ratio of acres lost to prevented planting divided by the total insured acres by county for corn and soybeans, respectively; the ratio of insured acres of corn lost to prevented planting is higher on average than soybeans. The Mississippi River Basin has a higher intensity of corn prevented planting acres frequently designated as prevented planting acres due to excessive moisture (USDA OIG, 2013; USDA-RMA, 2023; Boyer, Park, and Yun, 2023). The Prairie Pothole Region also frequently has corn acres indemnified as prevented planting (Wu, Goodwin, and Coble 2020).

APH yield data are not publicly available, which is a challenge for researchers who analyze crop insurance policies, so studies typically use USDA-NASS yields (Kim and Kim, 2018; Seo et al., 2017). We collected county-level NASS yields for corn and soybeans for all the counties that experienced a prevented planting loss in the study period (USDA-NASS, 2023). USDA-NASS was also used to find the county-level cropland cash rent values measured in dollars per acre (USDA-NASS, 2023). Unlike the other data, land rent values were not available for 2015 and 2018 but were available for the remaining years between 2011 and 2022. Finally, the USDA-RMA Price Discovery database provided the states' projected prices set by RMA for corn and soybeans (USDA-RMA, 2022). We excluded counties for both soybean and corn that did not have at least five years of reported data within a county over the study time.

Table 1 shows the summary statistics of the input data in the simulation. The average USDA-RMA-projected

price of corn during this time was $4.84 per bushel, and the yield was 149 bushels/acre. The average price for soybeans was $11.45 per bushel, and yields were 45 bushels/acre. The average land rent was $110/acre and $117/acre for the corn counties and soybean counties, respectively. On average, about 3% of the counties in this study area reported prevented planting claims on their insured acres for corn; this was about 2% for soybeans. However, the maximum for the prevented planting ratio for corn and soybeans within a county was 89% and 83%, respectively.

RESULTS

Simulation

Table 2 shows the simulated weighted average prevented planting CF for corn and soybeans, assuming a payment of $100/acre and $200/acre above land rent for a county. Currently, the prevented planting CF for corn is 0.55 and 0.60 for soybeans (USDA-RMA, 2021). Assuming a payment of $100/acre over land rent values, the prevented planting coverage level was found to be 0.49. If pre-plant costs were $200/acre above land rent, the prevented planting CF was 0.70. This means that the current prevented planting CF is likely paying more than $100/acre above land rent but probably not more than $200/acre above land rent. The soybean prevented planting CF was found to be 0.62 and 0.92 when paying $100/acre and $200/acre above land rent, respectively.

Figures 3 and 4 show the simulated prevented planting CF across the study region for corn and soybeans, respectively. The variation of these county-level CFs ranges from as low as 0.2 to over 1, which means the producer would need to be compensated more than their guaranteed coverage payment to cover their land rent. The prevented planting CF is lower in the southern states, where land rents are less the northern states and land rent is higher. Figures 3 and 4 show how geographic factors such as costs, land rent, and yields can impact prevented planting CF.

Table 3 shows the simulated U.S. federal crop insurance expenditures for prevented planting for corn and soybeans. The simulation model estimated the average annual payment for prevented planting to be around $1.1 billion for corn and $216 million for soybeans. The USDA-RMA cause of loss data reported average annual expenditures of prevented planting indemnities to be $733 million for corn and $259 million for soybeans. Therefore, our simulation model estimated higher expenditures for corn but lower expenditures for soybeans. That said, the simulated expenditures with the current CFs served as a baseline to adjusting for $100/ and $200/acre over land rent. For corn, total U.S. expenditures for prevented planting indemnities would decrease if the provision paid $100/acre plus land rent to $929 million but increase to $1.3 billion if the CF paid $200/acre plus land rent. Therefore, the current CF is likely reimbursing producers on average between $100/ and $200/acre plus their land rent. For soybeans, the total U.S. expenditures for prevented planting indemnities would increase to $404 million if the CF paid $100/acre plus land rent and $616 million if the CF paid $200/acre plus land rent. Therefore, the current CF is likely not reimbursing producers $100/acre over land rent for soybeans.

Implications

The findings of this study suggest that the producer's net returns to prevented planting are likely higher for corn than soybeans, thus the incentive to take the full prevented planting payment for corn is higher than for soybeans. This would align with what Boyer and Smith (2019) found when analyzing *ex-post* moral hazard in prevented planting for corn and soybeans. They reported that the incentive for moral hazard in the prevented planting provision is stronger for corn than soybeans. Conversely, they found *ex-post* moral hazard is unlikely to occur for soybeans.

Additionally, the USDA cause of loss data report 29.4 million corn acres indemnified as prevented planting cause of loss from 2011 to 2022. The total soybean acres during the same period (2011 to 2022) are about 15.5 million acres. Many producers who are planting corn could switch to planting soybeans in the same growing season since soybean planting extends later than corn if the herbicide program allows for it. In fact, Adkins et al. (2020) reported a corn producer would maximize their net returns by planting soybeans instead of taking their prevented planting indemnity from corn. Therefore, it is possible a portion of the $29.4 million corn acres indemnified to prevented planting could have been planted in soybeans, but prevented planting CFs for corn provide an optimal incentive to not switch to an alternative crop.

The implication of this study is that the CF for corn is compensating producers more than the soybean prevented planting CF, despite the soybean CF being higher than corn. This higher payment is likely causing more corn prevented planting acres. Our study shows that insuring both corn and soybean producers to be paid $100/acre over there land rent would mean the corn CF would need to be lowered to 0.49 and

increased to 0.62 for soybeans. This would result in total expenditures decreasing for corn and increasing for soybeans. Taking the total simulated payments for corn and soybeans at the current CF was found to be $1,370,853 ($216,465,652 + $1,154,387), but if both corn and soybean producers were compensated $100/acre over land rent, the total expenditures would decrease to $1,333,990 ($404,596,475 + $929,393,541).

CONCLUSIONS

The purpose of this study was to generate a distribution of prevented planting CFs that considers county-level variation in land rent, yields, planted acres, and prevented planting acres for corn and soybeans. Simulation models were developed for corn and soybeans assuming input costs of $100/ and $200/ acre plus land rent cost to show how higher input costs could influence CFs. While these two values likely do not represent all farmers, they were selected to show how the prevented planting CF might vary as input costs increase. We used these county-level CFs, USDA data to estimate a weighted average CF, and changes in U.S. federal crop insurance expenditures for prevented planting indemnities. These results will be useful for federal agencies to assess if the prevented planting CF is covering the cost thresholds for producers and how this might impact total prevented planting payments in the U.S. for corn and soybeans.

When assuming a payment of $100/ and $200/acre over land rent values, the expected prevented planting CF for corn was 0.49 and 0.70, respectively. The CF for soybeans was 0.62 and 0.92 when paying $100/ and $200 /acre above land rent, respectively. The current CF is 0.55 for corn and 0.6 for soybeans, which is within range of the simulated CF for corn and lower than the average CF for soybeans. The implication of this study is that the CF for corn is compensating producers more than the soybean prevented planting CF, despite the soybean CF being higher than corn. This would match other findings (Boyer and Smith, 2019) and align with USDA-RMA prevented planting acres.

U.S. expenditures for prevented planting indemnities would decrease corn if the CF reimbursed $100/acre plus land rent went to $929 million but increase to $1.3 billion if the CF paid $200/acre plus land rent. The corn CF appears to be reimbursing on average between $100/ and $200/acre plus land rent. U.S. expenditures for prevented planting indemnities for soybeans would increase to $404 million, with a CF paying $100/acre plus land rent and $616 million with a CF paying $200/ acre plus land rent. Therefore, the current CF is likely not reimbursing producers $100/acre over land rent for soybeans.

FOOTNOTES

1 An herbicide program would need to be established to allow a producer to switch from corn to soybeans during the planting window.

2 Eligible policies include Revenue Protection (RP), RP with the Harvest Price Exclusion (RPHPE), and Yield Protection insurance plans. The insured must have been prevented to plant the lesser of 20 acres or 20% of a unit.

3 The final planting date is the last day an insured crop can be planted and remain eligible for full crop insurance coverage. After the final planting date, the late planting period begins and lasts for 25 days.

REFERENCES

Adkins, K. et al. 2020. "Analyzing Corn and Cotton Producers Optimal Prevented Planting Decision on Moral Hazard." *Agronomy Journal* 112 (3): 2047–2057.

Agralytica Consulting. 2013. "Evaluation of Prevented Planting Program Contract Number D13PD001146: A Report for Acquisition Services Directorate and Risk Management Agency." September 3, 2013. http://www.rma.usda.gov/pubs/2015/ppevaluation.pdf.

Allen, D.W., and A. Borchers. 2016. "Conservation Practices and the Growth of U.S. Cash Rent Leases." *Journal of Agricultural Economics* 67 (2): 491–509.

Boyer, C.N., E. Park, and S.D. Yun. 2023. "Corn and Soybean Prevented Planting Acres Response to Weather." *Applied Economic Perspectives and Policy* 45 (2): 31–45.

Boyer, C.N., and S.A. Smith. 2019. "Evaluating Changes to Prevented Planting Provision on Moral Hazard." *Journal of Agricultural and Applied Economics* 51: 315–327.

Horowitz, J.K., and E. Lichtenberg. 1993. "Insurance, Moral Hazard, and Chemical Use in Agriculture." *American Journal of Agricultural Economics* 75 (4): 926–935.

Kim, T., and M. Kim. 2018. "Ex-post Moral Hazard in Prevented Planting." *Agricultural Economics* 49 (6): 671–680.

Kirwan, B.E. 2009. "The Incidence of U.S. Agricultural Subsidies on Farmland Rental Rates." *Journal of Political Economy* 117 (1): 138–164.

Rees, R., and A. Wambach. 2008. "The Microeconomics of Insurance." *Foundations and Trends in Microeconomics* 4 (1-2): 1–163.

Richardson, J.W., K.D. Schumann, and P. A. Feldman. 2008. "SIMETAR Simulation for Excel to Analyze Risk." Agricultural and Food Policy Center, Department of Agricultural Economics, Texas A&M University.

Seo, H., T. Kim, M-K. Kim, and B.A. McCarl. 2017. "Introduction of the Trend-Adjusted Crop Insurance Program: Participation and Coverage Level Responses." *Agricultural Finance Review* 77 (3): 429–444.

Sheriff, G. 2005. "Efficient Waste? Why Farmers Over-Apply Nutrients and the Implications for Policy Design." *Review of Agricultural Economics* 27 (4): 542–557.

Smith, V.H., and B.K. Goodwin. 1996. "Crop Insurance, Moral Hazard, and Agricultural Chemical Use." *American Journal of Agricultural Economics* 78 (2): 428–438.

United States Department of Agriculture Office of Inspector General. 2013. “RMA: Controls Over Prevented Planting, Audit Report.” Audit Report 05601-0001-31. I.

United States Department of Agriculture National Agricultural Statistics Service (USDA NASS). “2023 Quick Stat.” https://www.nass.usda.gov/Quick_Stats.

United States Department of Agriculture Risk Management Agency (USDA RMA). 2021. “Prevented Planting Coverage.” https://www.rma.usda.gov/News-Room/Frequently-Asked-Questions/Prevented-Planting-Coverage.

United States Department of Agriculture Risk Management Agency (USDA RMA). 2023a. “Cause of Loss.” https://www.rma.usda.gov/SummaryOfBusiness/CauseOfLoss.

United States Department of Agriculture Risk Management Agency USDA RMA). 2023b. “Summary of Business.” https://www.rma.usda.gov/SummaryOfBusiness/.

United States Department of Agriculture Risk Management Agency (USDA RMA). 2022. “Price Discovery.” https://prodwebnlb.rma.usda.gov/apps/PriceDiscovery/GetPrices/ManyPrices.

Wu, S., B.K. Goodwin, and K. Coble. 2020. “Moral Hazard and Subsidized Crop Insurance.” *Agricultural Economics* 51: 131–142.

Zweifel, P., and R. Eisen. 2012. *Insurance Economics.* Berlin, Heidelberg: Springer Texts in Business and Economics.

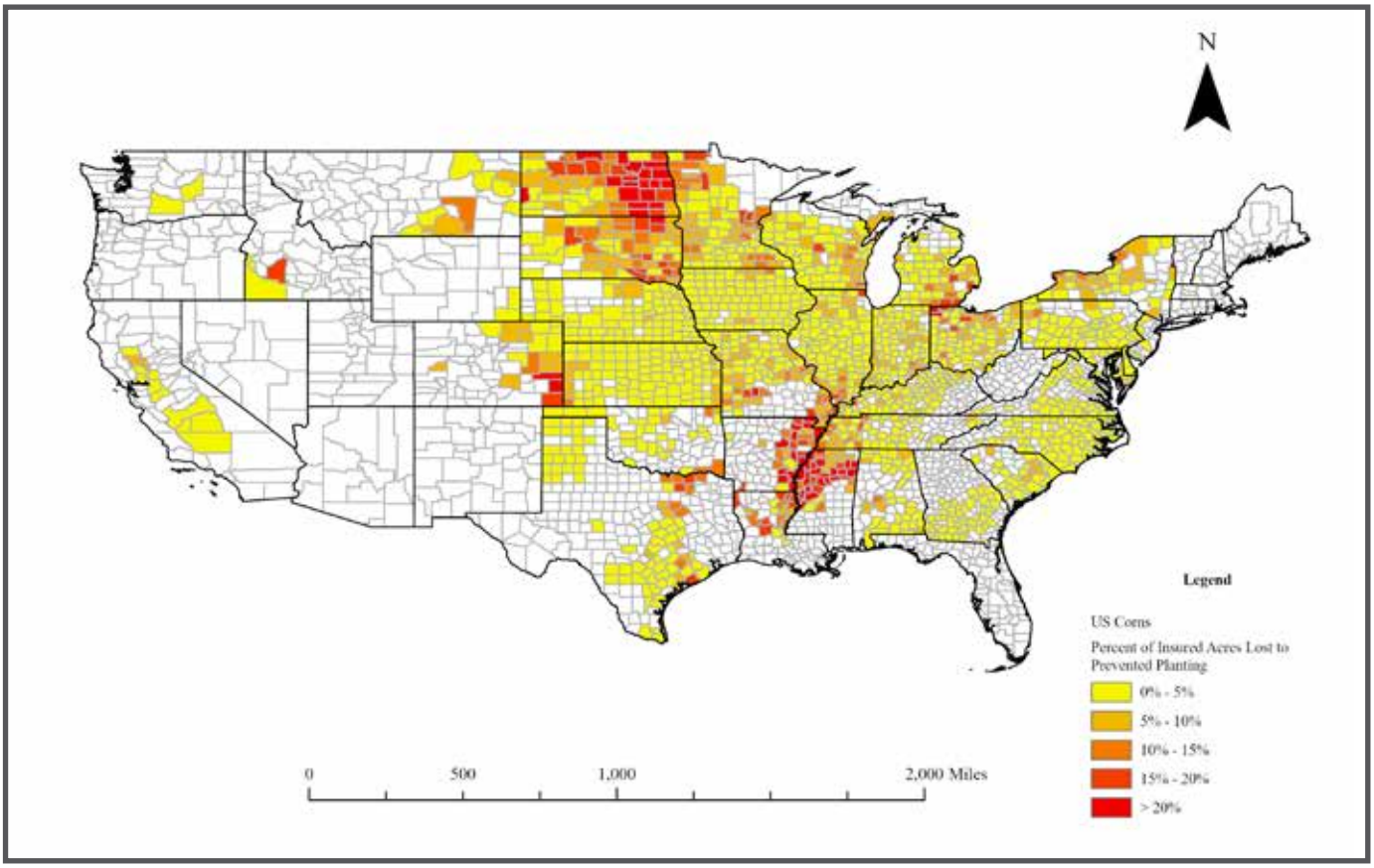

Figure 1. Ratio of prevented planted to total insured acres for corn from 2011 to 2022

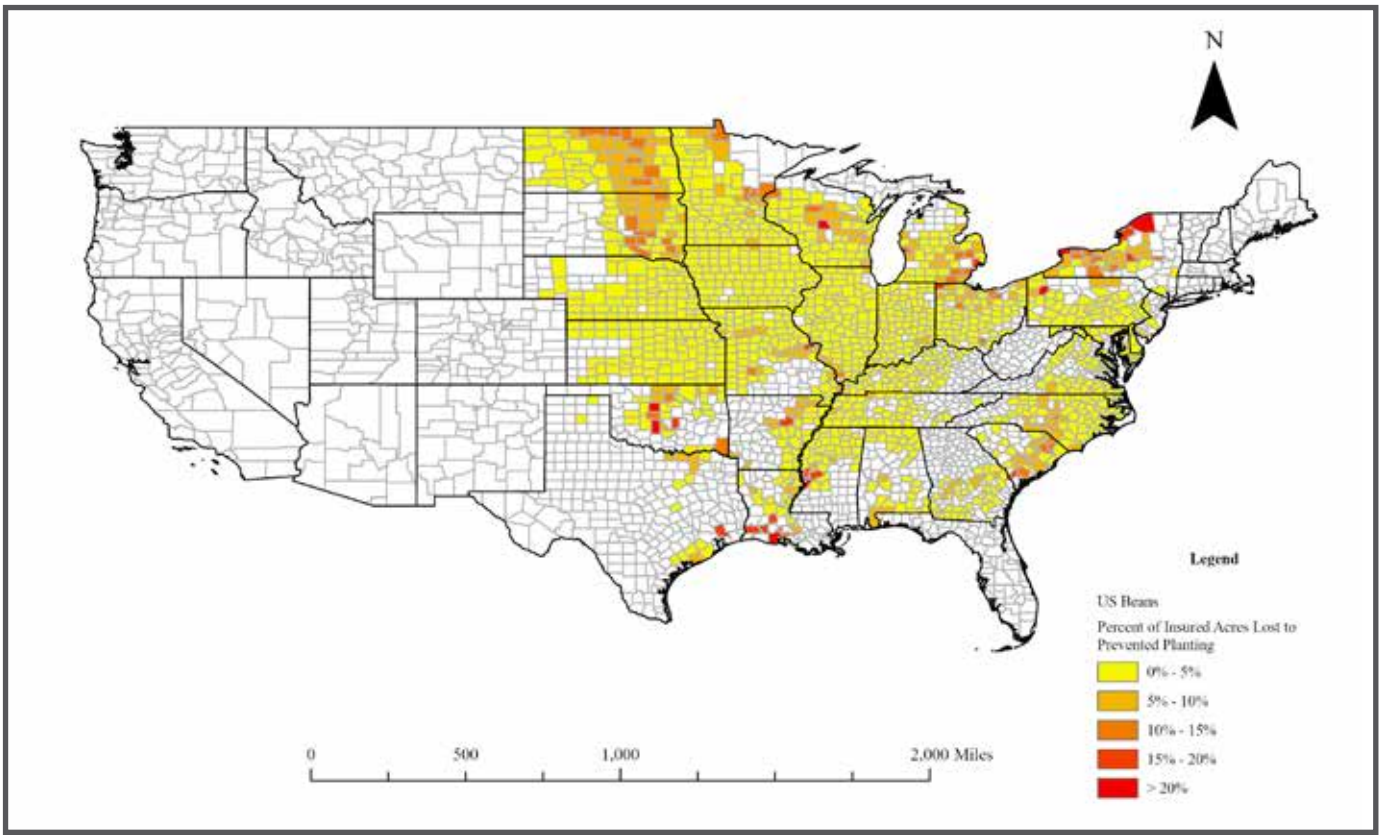

Figure 2. Ratio of prevented planted to total insured acres for soybeans from 2011 to 2022

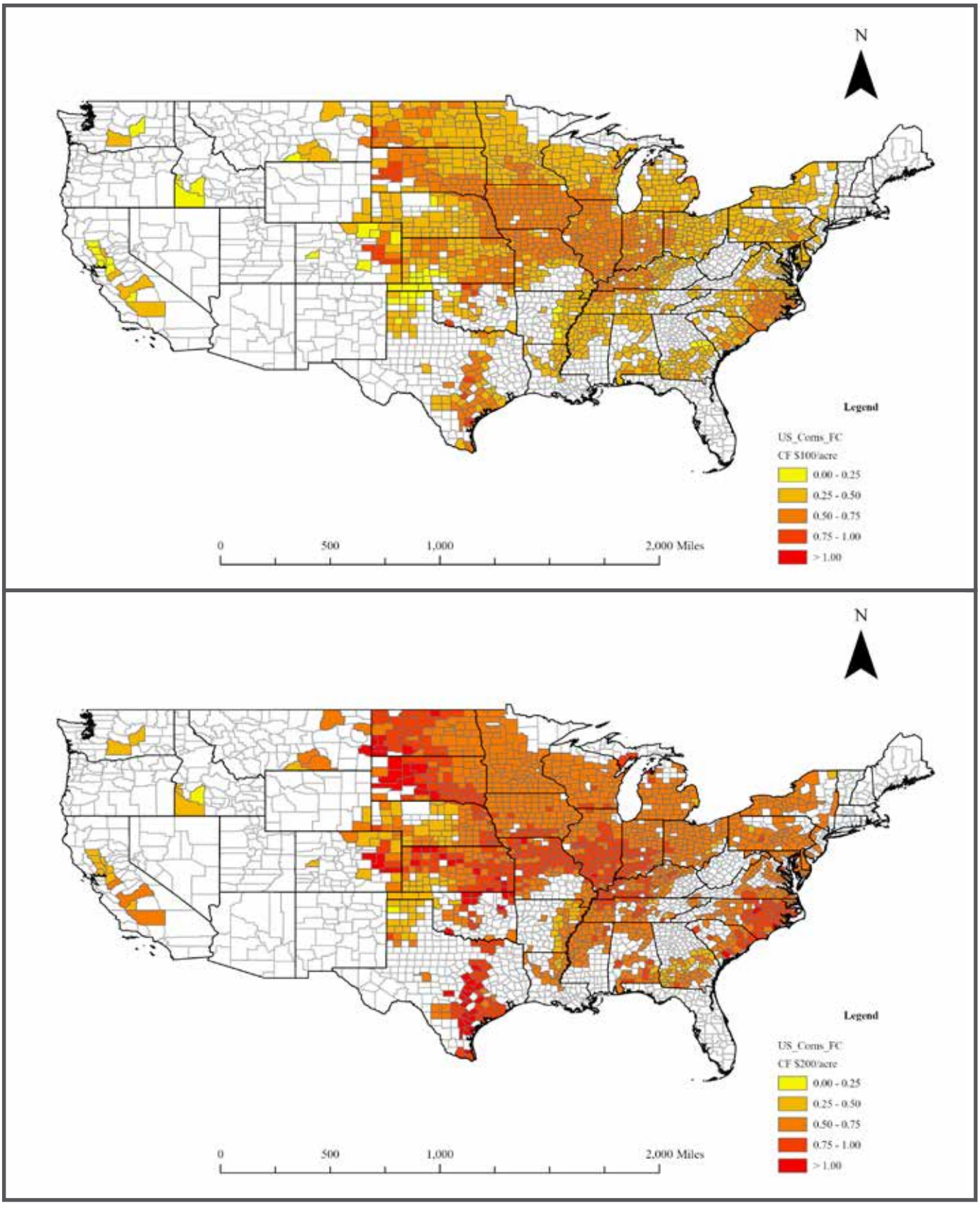

Figure 3. Expected prevented planting CF from simulation model for corn by county and payment threshold level with top map being $100/acre and bottom map being $200/acre

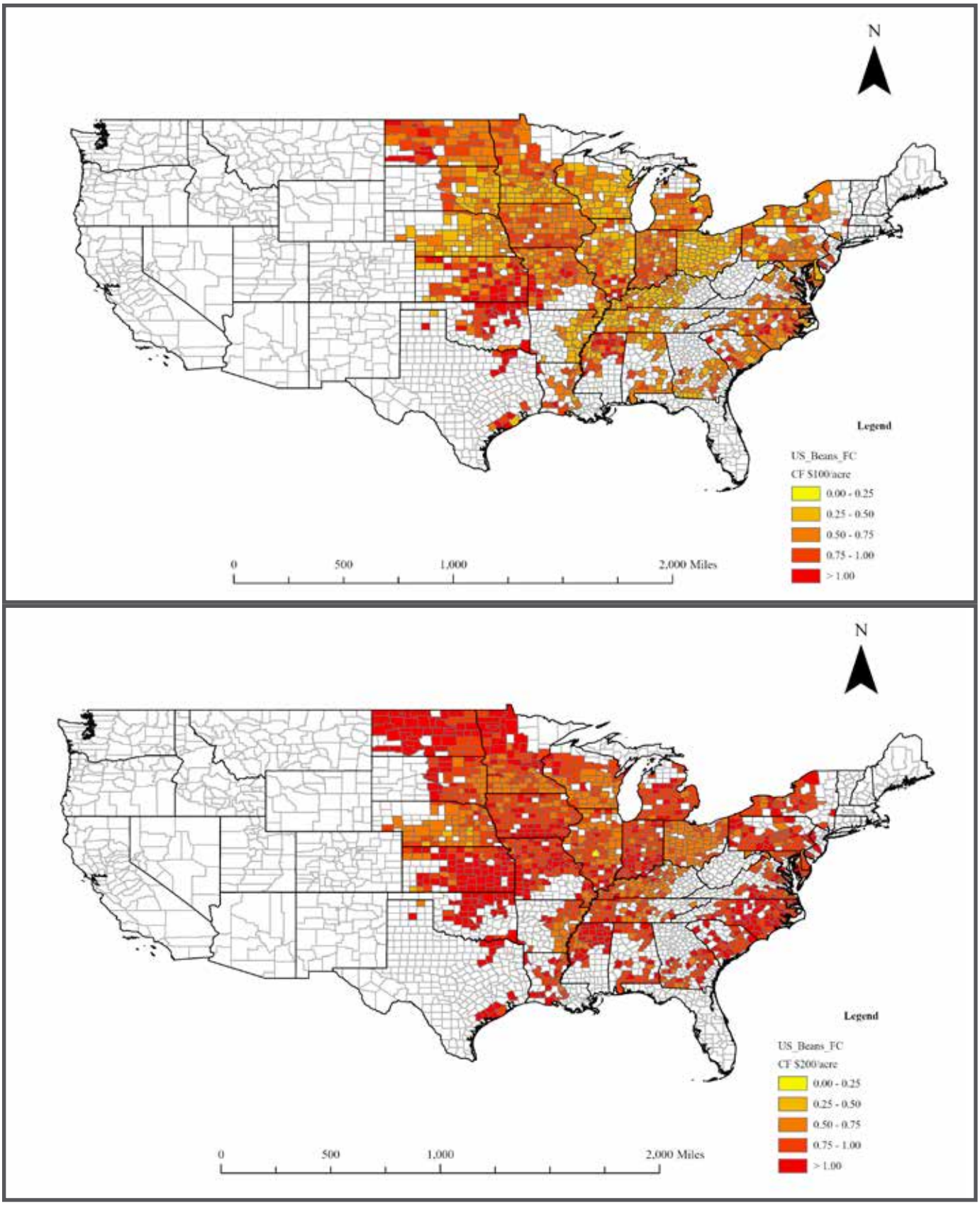

Figure 4. Expected prevented planting CF from simulation model for soybeans by county and payment threshold level with top map being $100/acre and bottom map being $200/acre

Table 1. Summary Statistics of County-Level Data Used in the Simulation Models for Corn (n = 12,782) and Soybeans (n = 11,749) from 2011 to 2022

Variable	Average	Standard Deviation	Minimum	Maximum
	Corn			
Price	$4.84	0.87	$3.81	$6.32
USDA-NASS Yield[1]	149.55	40.19	10.40	277.10
Weighted Average Coverage Level	0.67	0.03	0.50	0.80
Cropland Rent	$110.85	69.66	$10.50	$371.00
Total Insured Acres	47,807	54,299	123	336,382
Percent of Insured Acres Lost to Prevented Planting	0.03	0.09	0.00	0.89
	Soybean			
Price	$11.45	1.79	$8.85	$14.33
USDA-NASS Yield[1]	45.38	11.01	5.10	77.30
Weighted Average Coverage Level	0.67	0.03	0.54	0.80
Total Insured Acres	$117.11	68.28	$12.50	$371.00
Percent of Insured Acres Lost to Prevented Planting	47,675	51,295	339	473,921
Total Insured Acres	0.02	0.05	0.00	0.83

[1] United States Department of Agriculture National Agricultural Statistic Service.

Table 2. Simulated Weighted Average Prevented Planting Coverage Factors for Corn and Soybeans to Reimburse Producers $100/ and $200/Acre Over Land Rent

CF	Corn		Soybean	
	Mean	Standard Deviation	Mean	Standard Deviation
$100/Acre Over Land Rent	0.49	0.01	0.62	0.05
$200/Acre Over Land Rent	0.70	0.02	0.92	0.08

Table 3. Simulated Weighted Average Prevented Planting Indemnity Payment for Corn and Soybeans to Reimburse Producers $100/ and $200/acre Plus Land Rent

Prevented Planting Payment	Mean	Standard Deviation
	Corn	
Current CF	$1,154,387,804	$39,248,315
CF Paying $100/Acre Plus Land Rent	$929,393,541	$31,492,164
CF Paying $200/Acre Plus Land Rent	$1,339,041,412	$44,922,118
	Soybeans	
Current CF	$216,465,652	$9,617,786
CF Paying $100/Acre Plus Land Rent	$404,596,475	$14,211,034
CF Paying $200/Acre Plus Land Rent	$616,793,007	$21,683,207