

# Margin Protection Crop Insurance: A Way to Manage the Risk of High Input Costs

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## Introduction

On farms where crops are not irrigated, drought tends to cause yield loss or an increase in acres prevented from being planted. This risk is more output-oriented relative to plots of land that are irrigated, since irrigation costs are removed from the margin consideration. Most row crop acres in Arkansas are irrigated. With an increase of roughly 40 percent<sup>1</sup> in diesel cost and a 25 percent increase<sup>2</sup> in water being pumped, profit margins are shrinking. One consideration for next year would be to ask your crop insurance agent about Margin Protection insurance.

Margin Protection (MP) insurance provides a margin guarantee thereby protecting your margin from dropping below a margin guarantee, called a Trigger Margin defined below, based on a chosen coverage level. It is currently offered to medium and long grain rice producers in Arkansas under provisions in the 2018 farm bill (P.L. 115-334). MP protects a farmer's expected operating margin, that is, the difference between county-level expected revenue and county-level expected costs. It protects against volatility in crop prices and yields like traditional crop

insurance, as well as against volatility in the prices of inputs used to grow the crop (USDA-RMA, 2017). Additionally, MP may be purchased with your underlying traditional multi-peril crop insurance election, such as Yield Protection and Revenue Protection, which means any indemnities received from your underlying multi-peril product may be used to pay for the premium due on your MP product.

## Margin Protection Calculation

Here is how a per acre MP trigger is calculated:

1. Calculate an expected margin<sup>3</sup>:

$$\text{Expected Margin} = (\text{Expected Yield} \times \text{Projected Futures Price}) - \text{Expected Cost}$$

2. Calculate the margin deductible:

**This will vary based on the coverage level chosen. For a list of possible coverage level choices, see Appendix A.**

$$\text{Margin Deductible} = \text{Expected Revenue} \times (1 - \text{Coverage Level})$$

### Footnotes

<sup>1</sup>The change in price given is for Arkansas diesel price in July 2022 relative to the national diesel price in July 2021 (AAA, 2022).

<sup>2</sup>This amount was provided by UADA Extension faculty.

<sup>3</sup>We emphasize that this is a product with a county-level margin trigger not an individual, farm-level trigger.

For more information, see Appendix B.

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3. Calculate the Trigger Margin:

$$\text{Trigger Margin} = \text{Expected Margin} \\ - \text{Margin Deductible}$$

4. Calculate the Realized Margin:  
(i.e. the margin at harvest):

$$\text{Realized Margin} = (\text{Harvest Yield} \times \text{Harvest Price}) \\ - \text{Harvest Cost}$$

5. Calculate the Margin Loss:

$$\text{This will simply be the difference in the Trigger} \\ \text{Margin in Step 3 and the Realized Margin in Step 4.} \\ \text{Margin Loss} = \text{Trigger Margin} - \text{Realized Margin}$$

6. Calculate the Margin Indemnity  
net of Premium:

$$\text{Margin Indemnity} = \text{Margin Loss} - \text{Premium}$$

## Long-Grain Rice Example

We will now provide an example for long-grain rice. We will assume county-level expected yield for rice to be the same as the 2021 state average given by USDA's National Agricultural Statistics Service. Projected futures price will be the average of daily futures closing prices for November 2022 rough rice futures in the projected price discovery period defined by USDA's Risk Management Agency (Jan. 15 – Feb. 14). For the expected cost<sup>4</sup>, we will use prices from the University of Arkansas Field Crop Enterprise Budgets for the 2021 crop year. This will provide an illustration of a producer making a decision in the same period as defined above. We will use the 95 percent coverage level which has a producer paid<sup>5</sup> premium per acre of \$12.00/acre and assume no other crop insurance has been purchased. A list of these values is given here:

$$\begin{aligned} \text{Expected Yield} &= 170 \text{ bushels/acre} \\ \text{Expected Price} &= \$6.53/\text{bushel} \\ \text{Expected Cost} &= \$368.54/\text{acre} \\ \text{Coverage Level} &: 95 \text{ percent} \\ \text{Producer Paid Premium} &= \$12.00/\text{acre} \end{aligned}$$

In order to calculate the realized margin, we will need the realized yield, output price, and input cost. We will provide three different scenarios to address this:

1. Yield remains constant, output price and input cost increase

2. Yield falls, output price remains constant, and input cost increases

3. Yield falls, output price increases, and input cost remains constant

*Scenario 1: Yield Remains Constant, Output Price and Input Cost Increase*

$$\begin{aligned} \text{Harvest Yield} &= 170 \text{ bushels/acre} \\ \text{Harvest Price} &= \$7.03 \text{ bushels/bushel} \\ \text{Harvest Cost} &= \$540.80/\text{acre} \end{aligned}$$

1. Calculate the expected margin:

$$\begin{aligned} \text{Expected Margin} &= (170 \times \$6.53) - \$368.54 \\ &= \$741.56 \end{aligned}$$

2. Calculate the margin deductible<sup>6</sup>:

$$\text{Margin Deductible} = (170 \times \$6.53) \times 0.05 = \$55.51$$

3. Calculate the trigger margin:

$$\text{Trigger Margin} = \$741.56 - \$55.51 = \$686.05$$

4. Calculate the realized margin:

$$\begin{aligned} \text{Realized Margin} &= (170 \times \$7.03) - \$540.80 \\ &= \$654.30 \end{aligned}$$

5. Calculate the margin loss:

$$\text{Margin Loss} = \$686.05 - \$654.30 = \$31.75$$

6. Calculate the margin indemnity  
net of premium:

$$\text{Net Indemnity} = \$31.75 - \$12.00 = \$19.75$$

Under this scenario, MP at the 95 percent coverage level would have allowed you to recover 3 percent of your expected margin, or \$19.75/acre.

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### Footnotes

<sup>4</sup>For more information on the costs included in the margin loss calculation, see Appendix B.

<sup>5</sup>The producer paid premium is the unsubsidized portion of the premium paid per acre. For a breakdown of the subsidy percentages by coverage level see Appendix A. The dollar amount provided here comes from the USDA Cost Estimator (USDA-RMA, 2022).

<sup>6</sup>We note that the deductible calculated here is only based on county-level expected revenue, rather than the county-level expected margin. This is different than traditional crop insurance products producers would normally purchase. A faculty reviewer notes that in this specific example, the 5 percent deductible on expected revenue is equivalent to about a 7.5 percent deductible on the expected margin.

*Scenario 2: Yield Falls, Output Price Remains Constant, and Input Price Increases*

**Harvest Yield = 153 bushels/acre**  
**Harvest Price = \$6.53 bushels/bushel**  
**Harvest Cost = \$540.80/acre**

1. Calculate the expected margin:

$$\text{Expected Margin} = (170 \times \$6.53) - \$368.54 \\ = \$741.56$$

2. Calculate the margin deductible:

$$\text{Margin Deductible} = (170 \times \$6.53) \times 0.05 = \$55.51$$

3. Calculate the trigger margin:

$$\text{Trigger Margin} = \$741.56 - \$55.51 = \$686.05$$

4. Calculate the realized margin:

$$\text{Realized Margin} = (162 \times \$6.53) - \$540.80 \\ = \$517.06$$

5. Calculate the margin loss:

$$\text{Margin Loss} = \$686.05 - \$517.06 = \$168.99$$

6. Calculate the margin indemnity net of premium:

$$\text{Net Indemnity} = \$168.99 - \$12.00 = \$156.99$$

Under this scenario, MP at the 95 percent coverage level would have allowed you to recover 21 percent of your expected margin, or \$156.99/acre.

*Scenario 3: Yield Falls, Output Price Increases, and Input Cost Remains Constant*

**Harvest Yield = 153 bushels/acre**  
**Harvest Price = \$7.03 bushels/bushel**  
**Harvest Cost = \$368.54/acre**

1. Calculate the expected margin:

$$\text{Expected Margin} = (170 \times \$7.03) - \$368.54 \\ = \$741.56$$

2. Calculate the margin deductible:

$$\text{Margin Deductible} = (170 \times \$7.03) \times 0.05 = \$55.51$$

3. Calculate the trigger margin:

$$\text{Trigger Margin} = \$741.56 - \$55.51 = \$686.05$$

4. Calculate the realized margin:

$$\text{Realized Margin} = (162 \times \$7.03) - \$368.54 = \$770.22$$

5. Calculate the margin loss:

$$\text{Margin Loss} = \$686.05 - \$770.22 = -\$84.17$$

**Since the calculated Margin Loss is less than 0, the Margin Loss is 0.**

6. Calculate the margin indemnity net of premium:

$$\text{Net Indemnity} = 0 - \$12.00 = -\$12.00$$

Under this scenario, MP at the 95 percent coverage level would not have triggered an indemnity payment since the realized margin is greater than the trigger margin.

## Looking Ahead

In this high input price environment, margin protection is an effective way to manage the risk of losing margin for long-grain rice producers. Given the impact of a relatively high rate of inflation and the war in Ukraine on input prices, MP can provide protection where it is needed most right now. For Arkansas farmers who mostly irrigate, MP may help stabilize the margin needed to keep operations afloat in the coming years. Although output prices are projected to be relatively higher than they were at planting (UADA Cooperative Extension Service, 2022), input costs will most likely increase, especially the portion of costs attributed to irrigation. While we remain in a La Nina, we anticipate more of the same weather and recommend producers ask their local crop insurance agent if they offer margin protection and consider purchasing it next spring.

## Appendix A: Note on Premium Subsidy by Coverage Level

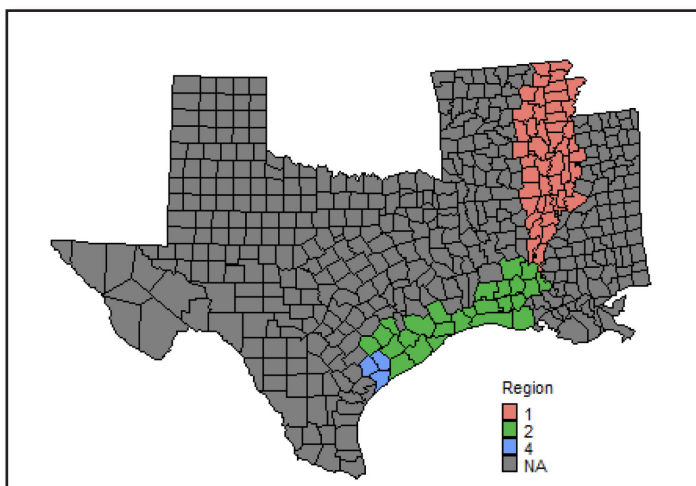
Coverage levels for MP range from 70-95 percent in 5 percent increments (USDA-RMA, 2018). The subsidy rates by coverage level are given below:

Coverage Level	Premium Subsidy	Producer Paid Portion
70%	59%	41%
75%	55%	45%
80%	55%	45%
85%	49%	51%
90%	44%	56%
95%	44%	56%

## Appendix B: Note on Margin Protection Costs used in Margin Loss Calculation

USDA-RMA makes no effort to calculate cost at the farm-level, so all margin calculations are done at the county-level. Hence, the indemnity trigger is different for MP compared to the more popular products YP, RP, and RP-HPE which have an individual indemnity trigger. The costs that are considered in the expected cost calculation, and hence the realized cost calculation, are broken into three different components. These components are costs not subject to price change (i.e. price per unit in the margin calculation is fixed), costs subject to price change (i.e. price per unit in the margin calculation is allowed to change at the county level) and interest rate cost. The fixed input costs are comprised of maintenance, chemicals, and applications and vary based on the Cost Region a farm is in (see figure 1). For more information on Cost Regions,

Figure 1. Margin Protection Cost Regions Determined by USDA-RMA



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please visit [marginprotection.com](http://marginprotection.com). The variable costs consist of urea, DAP, potash, and diesel expense for tractors and irrigation equipment and will also vary by the Cost Region. Lastly, the interest rate costs account for the change in interest rates between planting and harvest by using the Federal Funds Rate Futures interest rate. Therefore, these costs will not be fully reflective of what a farmer would incur at the farm level but will rather be used to replicate how RMA calculates MP payments.

## References

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