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Individual Crop Insurance: Revenue Protection and Revenue Protection - Harvest Price Exclusion

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Introduction

A producer has many tools available to them to mitigate the potential revenue losses resulting from production and price risks in the form of lower-than-expected yields or from a fall in the crop price in the form of lower-than-expected prices at harvest. One way to manage both risks is to buy an individual revenue plan of insurance, such as Revenue Protection (RP) or Revenue Protection - Harvest Price Exclusion (RP-HPE). We will explain the design of each tool and provide examples of how an indemnity is calculated.

Revenue Protection

Revenue Protection (RP) provides protection against price and production risk. Coverage is based on a revenue guarantee which is the product of expected yield, a futures price, and a coverage level. Expected yield is measured by the Actual Production History (APH[2]) which is the average of a producer's yield for a given insured unit across the years for which a producer has approved yields. The futures contract used to calculate the revenue guarantee is the harvest-month contract and varies by crop. The harvest-month contracts[3] for corn, soybeans, rice, cotton, and winter wheat are December (ZCZ), November (ZSX), November (ZRX), December (CTZ), and July (ZWN), respectively. The last piece of the revenue guarantee is the coverage level. RP has eight coverage level options[4] to choose from which range from 50-85% in 5% increments.

The revenue guarantee is set based on the higher of the Projected Price and the Harvest Price, both of which are determined by the USDA Risk Management Agency (RMA). The Projected Price is determined for each crop by taking an average of the daily closing futures prices across a 30-day window,

[1] See Biram and Connor (2023) for a discussion of individual versus area plans of insurance.
[2] For details on the case where there is not enough historical yield data to calculate an APH, please read about T-yields in Biram and Rainey (2023).
[3] The harvest-month futures contracts for corn, soybeans, rice, and wheat are traded on the Chicago Mercantile Exchange (CME), and the futures contract for cotton is traded on the Intercontinental Exchange (ICE).
[4] In addition to these coverage levels, there is catastrophic coverage (CAT) available. CAT coverage provides an indemnity when losses fall below 50% of APH yield and is paid at 55% of the Projected Price. For more information on CAT coverage see Biram and Coble (2023) and Biram and Rainey (2023).

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Table 1. Price Discovery Periods for Arkansas (USDA-RMA)

Crop	Futures Contract	Projected Price	Harvest Price
Corn	DEC (ZCZ)	1/15 - 2/14	8/15 - 9/14
Cotton	DEC (CTZ)	1/15 - 2/14	10/1 - 10/31
Rice	NOV (ZRX)	1/15 - 2/14	9/1 - 9/30
Soybeans	NOV (ZSX)	1/15 - 2/14	10/1 - 10/31
Winter Wheat	JUL (ZWN)	8/15 - 9/14	6/1 - 6/30

Note: Price Discovery periods for all covered program crops can be found in the Commodity Exchange Price Provisions (Link)

in early spring when crop planting would normally occur, for a given crop's harvest month contract. Similarly, the Harvest Price is determined for each crop by taking an average of the daily closing futures prices across a 30-day window, in the fall when harvest would normally occur, for a given crop's harvest month contract. A table of Projected Price and Harvest Price discovery periods by crop and their respective harvest month futures contracts is given above (Table 1).

The producer paid premium, or cost of insurance, for RP and RP-HPE has many similarities to those of Yield Protection[5] (YP) crop insurance. In fact, the premium for individual revenue insurances is built upon the base premium rate used for YP since all three products offer some level of yield risk protection. The key difference is that the premium for RP and RP-HPE includes the cost of protection against price volatility, so the premiums for RP and RP-HPE are generally higher compared to those of YP. All individual insurance premiums are shared by both the producer and the federal government (see Biram, 2023).

In calculating the indemnity, or the cash value of the loss, the realized revenue will be calculated by taking the product of a producer's realized yield, determined by a producer and crop insurance adjuster, and the higher of the Projected Price or Harvest Price determined by RMA. If the realized revenue is less than the revenue guarantee, then an indemnity equal to the difference in the revenue guarantee and the realized revenue is paid. If the realized revenue is greater than the revenue guarantee, then no indemnity is paid.

Revenue Protection - Harvest Price Exclusion

Revenue Protection - Harvest Price Exclusion (RP-HPE) also provides protection against price and production risk but faces a lower premium cost. This is because RP-HPE revenue guarantees are only based on the APH yield, Projected Price, and coverage level. The RMA-determined Harvest Price is not considered in calculating this revenue guarantee and so does not provide the opportunity for a higher revenue guarantee calculation at harvest time. If a producer has no reason to believe the crop price will rise above the Project Price, then RP-HPE is the product to choose given it faces cheaper premiums and will provide the price floor needed to keep their operation afloat. RP-HPE is calculated in a similar way to RP with the key difference being the RP-HPE revenue guarantee is found only by using the Project Price and does not allow for the option to use the higher of the RMA-determined Project Price or Harvest Price.

Examples of the Indemnity Calculation and Impacts to Revenue

This section provides scenarios to use these tools in order to minimize revenue losses experienced throughout an example growing season. We will use soybean prices and irrigated yields from the 2022 growing season and provide per acre returns over cost in each scenario. We assume an APH

[5] See Biram and Rainey (2023) for a breakdown of the determinants of YP insurance premiums.

yield of 50 bushels per acre. The Projected Price is from the USDA-RMA Price Discovery Tool, Spot Price is from USDA-AMS Arkansas Daily Cash Grain Bids as of August 30, 2022, and crop insurance premiums for RP and RP-HPE come from the USDA-RMA Cost Estimator and are for Woodruff County, AR. We chose the Woodruff County producer premium because it is representative of the average premium rate paid by Arkansas producers. Key parameters[6] are given below:

- APH Yield = 50 bu/acre
- Realized Yield = 35 bu/acre
- Projected Price (USDA-RMA) = $13.65/bu
- Harvest Price (Forecast) = $13.87/bu
- Spot Price (USDA-AMS) = $13.62/bu
- Crop Insurance Premium (80% RP) = $35.00/ac
- Crop Insurance (80% RP-HPE) = $30.00/ac

Scenario 1: No Crop Insurance

In this scenario, a producer chooses to take the spot price at the local grain elevator for their soybeans and realized yield is 35 bu/ac. If this were the case, revenue would be $476.70/ac (35 bu/acre X $13.62/bu).

Scenario 2: 80% RP Crop Insurance

I will now provide an example of using RP crop insurance. Based on the parameters above, the realized yield fell relative to the APH yield and the Harvest Price increased relative to the Projected Price so the Harvest Price will be used for the revenue guarantee calculation. This also means the revenue guarantee will be greater for RP than for RP-HPE but at a higher premium.

- Expected Revenue (Actual Yield X Harvest Price) = $693.50/ac
- Revenue Guarantee (Expected Revenue X 80% Coverage Level) = $554.80/ac
- Realized Revenue (Realized Yield X Harvest Price) = $485.45/ac
- Indemnity (Revenue Guarantee - Realized Revenue) = $69.35/ac
- Producer Premium = $35.00/ac
- Indemnity net of Premium (Indemnity - Premium) = $34.35/ac
- Farm Revenue (Realized Yield X Spot Price) = $476.70/ac
- Farm Revenue with RP Indemnity net of Premium = $511.05/ac

In this scenario, RP at 80% coverage would provide a producer with 7% more revenue compared to Scenario 1.

Scenario 3: 80% RP-HPE Crop Insurance

I will now provide an example of using RP-HPE crop insurance. Under the assumptions made above, the revenue guarantee for RP-HPE will be less than the revenue guarantee for RP since the Harvest Price is higher than the Projected Price and the revenue guarantee is based on the Projected Price. However, the premium paid by the producer will be less for RP-HPE relative to RP.

- Expected Revenue (APH Yield X Projected Price) = $682.50/ac
- Revenue Guarantee (Expected Revenue X 80% Coverage Level) = $546.00/ac
- Realized Revenue (Actual Yield X Harvest Price) = $485.45/ac
- Indemnity (Revenue Guarantee - Realized Revenue) = $60.55/ac
- Producer Premium = $30.00/ac
- Indemnity net of Premium (Indemnity - Premium) = $30.55/ac
- Farm Revenue (Realized Yield X Spot Price) = $476.70/ac
- Revenue with RP-HPE Indemnity net of Premium = $507.25/ac

In this scenario, RP-HPE at 80% coverage would provide a producer with 6% more revenue compared to Scenario 1.

[6] For an analysis using a different county, crop, irrigation practice, unit structure, and coverage level, contact Dr. Hunter Biram.

Conclusion

Producers face price and yield uncertainty every growing season. Individual crop revenue insurances like RP and RP-HPE provide a guaranteed revenue which is designed to minimize losses experienced from low yields and prices. However, these two products differ in the type of protection offered with RP providing protection against both the potential for price upside and downside and RP-HPE only providing protection against price downside potential. We have provided examples of how each individual crop revenue insurance product indemnity is determined and shown how RP provided more price protection than RP-HPE since the harvest-month futures contract for soybeans increased between planting and harvest. This will not always be the case, and producers should consult with their crop insurance agent before making any decisions regarding coverage.

References

Biram, H.D. and Coble, K.H. (2023). A Brief History of Crop Insurance. University of Arkansas System Division of Agriculture, Cooperative Extension Service Fact Sheet No. FSA70. (Link)

Biram, H.D. (2023). Why does the federal government subsidize crop insurance?. University of Arkansas System Division of Agriculture, Cooperative Extension Service Fact Sheet No. FSA74. (Link)

Biram, H.D. and Connor, L. (2023). Types of Federal Crop Insurance Products: Individual and Area Plans. University of Arkansas System Division of Agriculture, Cooperative Extension Service Fact Sheet No. FSA75. (Link)

Biram, H.D. and Rainey, R. (2023). Individual Crop Insurance, Yield Protection. University of Arkansas System Division of Agriculture, Cooperative Extension Service Fact Sheet No. FSA78. (Link)

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