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# Margin Protection Insurance

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Margin Protection is a new insurance product available for insuring corn and soybeans in Illinois. Some farmers may find Margin Protection beneficial. Farmers who purchase Area Risk Protection (ARP) may find switching to Margin Protection attractive if they want to increase the coverage level to 95%. Purchasers of Revenue Protection (RP) could use Margin Protection in conjunction with their RP product. Doing so would allow a band of county coverage from 95% roughly to the coverage level of the RP policy. This band will not be exact because expected costs entering into the calculation of Margin Protection payments. If adding this band is the desire, premiums will cost over $20 per acre for Margin Protection given that a RP policy at 85% is purchased.

**What is Margin Protection Insurance?**

Margin Protection comes in two forms: 1) with the harvest price option and 2) without the harvest price option. Focus in this article is given to Margin Protection with the harvest price option (MP-hpo) because most crop insurance policies sold in the U.S. have the harvest price option (e.g., Area Revenue Protection (ARP) and Revenue Protection (RP)).

MP-hpo is similar to ARP. ARP is a county-level product, making payments when county revenue falls below a county guarantee. County yields are used in the calculation of county revenue. The innovation of MP-hpo is that it makes payments based on an "expected margin" rather than crop revenue. Expected margin equals:

> Expected revenue minus expected costs.

Expected revenue is the same as used by ARP in calculating it guarantee. ARP does not have expected costs. Within MP-hpo, expected costs are based on prices of inputs times quantities of inputs. During the insurance period, quantities of inputs will not change. Expected costs will change if prices of inputs change during the insurance period.

The following points come from a comparison of MP-hpo and ARP:

- Both products are based on county yields. Actual results on a farm do not matter. This fact extends to the costs included in MP-hpo. Prices farmers pay for inputs or amount of inputs

purchased by farmers do not enter into the calculation of MP-hpo guarantees and indemnity payments.

- ARP has a 90% coverage level, which is higher than the 85% offered in RP. MP-hpo has at a 95% coverage level, which is higher than the maximum coverage levels in either ARP or RP. MP-hpo has coverage levels from 70% to 95% in 5% increments.

- Both ARP and MP-hpo have protection factors that range from .8 to 1.2. Purchasers make a choice of the protection factor. Under both ARP and MP-hpo, higher payments will occur with higher protection factors.

- At the same coverage level and same protection factor, MP-hpo and ARP will not have the same indemnity payments, even if expected costs are the same as the harvest costs used in calculating indemnities. There are different mechanisms for calculating payments. MP-hpo generally pays less than ARP given the same lose in harvest revenue.

- Choices for ARP and MP-hpo will be 1) coverage level and 2) protection factor.

- ARP and MP-hpo do not have replant or prevented planting payments.

- The period for setting the projected price differs between ARP and MP-hpo. For corn and soybeans in Illinois, ARP sets its projected price during the month of February while MP-hpo sets it projected price from August 15 to September 14 of the year before harvest. There is some value in setting a projected price earlier. On average, the projected price used by MP-hpo will equal the projected price for ARP and RP; however, there will be differences between the two in each year. By the September 30th sales closing date for MP-hpo, there will be little information for determining the direction of future prices in the next period.

- MP-hpo sales closing date is September 30th. In Illinois, all other Federal products for corn and soybeans (including ARP and RP) have a closing date is March 15th.

- Premiums supported by the Federal government are the same for MP-hpo and ARP. Premium support levels are 59% at the 70% coverage level, 55% at the 75% and 80% coverage levels, 49% at the 85% coverage level, and 44% at the 90 and 95% coverage levels.

- MP-hpo allows an individual to buy an underlying RP or any other Combo plan. This is not the case for ARP. If an RP policy is purchased, indemnity payments on the RP policy will reduce MP-hpo payments one for one. Suppose, RP indemnity payment is $40 and MP-hpo payment without considering RP payments is $100. The MP-hpo payment will be reduced to $60. Because payments are reduced, purchasers of MP-hpo will receive a premium discount on the RP policy.

**Should Users of ARP Switch to MP-hpo?**

Given that MP-hpo is similar to ARP, there may be some incentive for ARP users to switch to MP-hpo. In my opinion, however, there is not a compelling reason to make the switch to MP-hpo. Those ARP users who place high values on the following may find a switch to MP-hpo useful:

- Desire a 95% coverage level. MP-hpo has a 95% coverage level while ARP's highest coverage level is 90%.

- Desire to have the projected price set earlier. MP-hpo will set its projected price on settlement prices for August 15 to September 14 while RP sets its projected price based on settlement prices in February.

- Desire protection against margins as specified in the MP-hpo product.

**Should Users of RP add MP-hpo?**

Users of RP likely prefer the farm-level protection offered by the RP policy compared to area products. This farm-level protection includes use of farm yields in calculating payments and the existence of prevented planting and replant payments. This preference argues for maintaining the RP policy.

An RP user could maintain the RP policy and add a purchase of MP-hpo. If a MP-hpo policy is purchased, a credit will be applied to the purchase of the RP policy. Even given this credit, the purchase of the MP-hpo can be costly. Take a case of corn grown in Sangamon County, Illinois. Purchasing MP-hpo at the 95% coverage level and having an 85% RP would add from $20 to $32 in farmer-paid premium per acre, depending on the protection factor selected given that an RP 85% product is used. Adding a 90% MP-hpo product adds $10 to $20 in farmer-paid premium costs depending on the protection factor In Sangamon County, Illinois. Other counties will be higher. Those values are averages and will depend on the year. The projected price of the underlying RP policy will influence the credit.

Over time, expected payments from MP-hpo should be above what the farmer pays in premiums. If MP-hpo is rated accurately, roughly $1.60 in payments should be received for each $1 of premium paid into the product. Of course, that will vary from year-to-year. In many years, MP-hpo will not generate payments.

**Example of MP-hpo**

An example of MP-hpo will be given for corn in Sangamon County, Illinois. The example is for 2018. At the time of the writing of this article, the price discovery period (August 15th to September 14th) is not over. Values used in this example were pulled from the Margin Protection site on September 6th. As a result, values are not final for 2018.

**Expected Margin:** Expected margin is critical for determining guarantees offered by MP-hpo (see Table 1). The expected margin calculation begins with expected revenue. Expected revenue equals expected county yield times the margin projected price. Expected county yield is set by RMA and represents the most likely yield for the county. The margin projected price is the average of settlement prices during the period from August 15th to September 14th. In the example, Sangamon County has an expected revenue of $756.68 per acre (190.6 expected yield x $3.96 margin projected price).

Expected costs also enter the calculation of expected margin. Expected costs are composed of six items:

- Urea costs are based on 343.91 pounds of urea. The pounds of urea are based on the expected yield for the county (expected yield x .83 / .46). Those pounds will be lower if the expected yield for a county is lower. The projected price is based on settlement prices of urea contract (UFN) on the Chicago Mercantile Exchange (CME).

- DAP costs are based on 145.02 pounds. Pounds will vary across counties based on expected yield. The projected price is based on settlement prices of the DAP contract (DFL) on the CME.

- Potash costs are based on 79.42 units, which again are a function of expected yield. Projected price for potash is set based on National Agricultural Statistical Service (NASS) prices and will not vary during the insurance period.

- Diesel fuel costs are based on 10.12 gallons per acre, which again is a function of expected yield. The projected price for diesel fuel is based on the Diesel contract on the NYMEX contract.

- $206.90 per acre, which represent other costs. This value does not vary across counties and stays fixed across the insurance period.

- Interest costs. Interest costs equal an interest rate times “all costs except interest” time one-half. The interest rate is the CME futures contract representing federal funds rate. Settlement price are taken from August 14th to September 15th. Six percentage points are added to the Federal funds rate.

In the Sangamon County example, expected costs are $302.34 per acre. In this case, the expected margin is $454.34 per acre (see Table 1).

**Table 1. Calculation of Expected Margin Margin Protection Insurance with Harvest Price Option, Corn, 2018, Sangamon County, Illinois**

| | | | | |
|---|---|---|---|---|
| Expected yield | | 190.6 | | |
| Margin projected price[1] | | $3.97 | | |
| Harvest price[2] | | | | |
| **Expected Revenue (Exp Yield x Higher of Margin Projected Price or Harvest Price)** | | | | **$756.68** |
| | Units[3] | Projected Price[4] | Item Costs | |
| Urea | 343.91 | $196.40 | 33.77 | |
| DAP | 145.02 | $300.00 | 21.75 | |
| Potash | 79.42 | $323.81 | 12.86 | |
| Diesel fuel | 10.12 | $1.61 | 16.29 | |
| Unallocated costs[5] | | | 206.90 | |
| All Costs Except Interest | | | 291.58 | |
| Interest Cost | | 7.38% | 10.76 | |
| **Expected Costs** | | | | **$302.34** |
| **Expected Margin (exp revenue - exp costs)** | | | | **$454.34** |

[1] Average of settlement prices from August 15 to Sept 14, 2017 of December 2018 CME contract.

[2] Average of settlement prices during October 2018 of December 2018 CME contract.

[3] Units are a function of expected yield
Urea: expected yield x .83 / .46
DAP: expected yield x .35 / .46
Potash: expected yield x .25 / .60.
Diesel fuel: expected yield x .04 + 2.5

[4] Except for potash, prices are based on settlement prices averaged from August 15 to September 14 of
Urea: Urea contract on CME (UFN),
DAP: DAP contract on CME (DFL)
Potash: Based on NASS prices.
Diesel: Diesal contract on NUMEX (ULS)
Interest rate: 30 day FED funds rate (CME) plus 6 percentage points.

[5] Always $206.90 for corn in all counties.

[6] Interest costs are All costs except interest x 1/2 x interest rate.

[7] Expected revenue minus expected costs.

**Trigger Margins:** The expected margin enters into the calculation of trigger margins. A trigger margin is the level of margin insurance offered by the product. Payments will occur when the harvest margin is below the trigger margin. Trigger margins will depend on the coverage level chosen, which can range from 70% to 95% in 5% increments.

Table 2 shows calculation of trigger margins for the Sangamon County case farm for coverage levels from 70% coverage level to 95% coverage level. For each coverage level, the trigger margin equals:

Expected margin – (1- coverage level) x expected revenue.

Take a 90% coverage level as an example. In this case the (1 – coverage level) is 10%. Multiplying the 10% times the $756.68 expected revenue gives $75.69 per acre. This $75.69 is the deductible. Harvest margins must decline by this amount for a MP-hpo payment to occur. Subtracting the $75.69 from the $454.34 expected margin gives the trigger margin of $378.67.

**Table 2. Calculation of Trigger Margins, Margin Protection Insurance with Harvest Price Option, Corn, 2018, Sangamon County, Illinois**

| | |
|---|---|
| Expected Revenue (from Table 1) | $756.68 |
| Expected Margin (from Table 1) | $454.34 |

Trigger Margin for Different Coverage Levels[1]

| Coverage Level | Trigger Margin |
|---|---|
| 70% | $227.34 |
| 75% | $265.17 |
| 80% | $303.00 |
| 85% | $340.84 |
| 90% | $378.67 |
| 95% | $416.51 |

[1] Trigger margin = expected margin - (1 - coverage level) x expected revenue.

Given that expected costs do not change and margin projected price equals the projected price, both ARP and MP-hpo at the same coverage level will begin paying at the same harvest revenue. At a 90% coverage level, harvest revenue would have to decline by $76.69 per acre, given that harvest costs do not differ from expected costs in the MP-hpo calculation.

**Harvest Margin:** Payments will occur when the harvest margin is below the trigger margin (see Table 3). Harvest margin begins with the calculation of harvest revenue. Harvest revenue is based on:

- Harvest yield is the county yield. These county yields for the 2018 year will be released in spring of 2019. Hence, payments of MP-hpo will not occur till after the harvest yields are released. Harvest yields also are esed in the calculation of ARP payments.

- Harvest price is the settlement price of Chicago Mercantile Exchange contract during the month of October. The harvest price is the same as for ARP and RP.

In the example, harvest revenue is $680 based on 200 bushels per acre yield and a $3.40 harvest price.

Harvest costs are also calculated. Quantiles used for urea, DAP, potash, and diesel fuel are the same as when calculating the expected margin. Unallocated costs will be the same. Potash price will be the same. The only items that potentially vary are the interest rate and prices for urea, DAP, and diesel fuel. Urea, DAP, and diesel fuel price will be based on settlement prices on the appropriate contracts during the period from April 1 to April 30. The interest rate is based on the average CME Fed funds contract from October 1 to October 30. To this rate, 6% will be added.

In the example in Table 3, the same prices are used as in calculating harvest costs as were used in calculating expected costs. Of harvest costs, only $82.40 are in items that can vary (urea, DAP, Potash, Diesel fuel, and interest). Hence, only 27% of the harvest costs can vary from the expected costs. In most years, variability caused by changes in these input prices will have modest impacts on harvest margin when compared to changes in the harvest yield and harvest price. Payments from MP-hpo mainly will be determined by changes in harvest prices and harvest yields

**Table 3. Calculation of Harvest Margin, Margin Protection Insurance with Harvest Price Option, Corn, 2018, Sangamon County, Illinois**

| | | | | |
|---|---|---|---|---|
| Harvest yield[1] | | 200 | | |
| Harvest price | | $3.40 | | |
| **Harvest Revenue** | | | | **$680.00** |
| | Units | Harvest Price[2] | Item Costs | |
| Urea | 343.91 | $195.43 | 33.61 | |
| DAP | 145.02 | $300.00 | 21.75 | |
| Potash | 79.42 | $323.81 | 12.86 | |
| Diesel fuel | 10.12 | $1.61 | 16.29 | |
| Unallocated costs | | | 206.90 | |
| All Costs Except Interest | | | 291.41 | |
| Interest Cost | | 7.38% | 10.75 | |
| **Harvest Costs** | | | | **$302.16** |
| **Harvest Margin** | | | | **$377.84** |

[1] Will be released in 2019

[2] Average of settlemetn prices during October 2018.

[3] Except for Potash, average of settlement prices. The month of April is used for urea, DAP, and diseal. The month of October is sued for interest rates. See footnote 4 of table 1 for contracts and exchanges.

**Insurance payments:** MP-hpo will make a payment when the harvest margin is below the trigger margin. Payments for three different coverage levels are shown in Table 4. The 95% coverage level has a $416.51 expected margin. In Table 3, the harvest margin was calculated at $377.84. The margin loss is $38.67 per acre for the 95% coverage level ($416.51 expected margin - $377.84 harvest margin).

**Table 4. Calculation of Per Acre Indemnity Payment, Margin Protection Insurance with Harvest Price Option, Corn, 2018, Sangamon County, Illinois**

| | Coverage Level | | |
|---|---|---|---|
| | 85% | 90% | 95% |
| Expected Margin (see Table 1) | 340.84 | 378.67 | 416.51 |
| - Harvest Margin (see Table 3) | 377.84 | 377.84 | 377.84 |
| Margin Loss | 0 | 0.83 | 38.67 |

**Per Acre Indemnity Payments[1]**

| Protection Factor | Coverage Level 85% | 90% | 95% |
|---|---|---|---|
| 0.8 | 0.00 | 0.66 | 30.94 |
| 0.9 | 0.00 | 0.75 | 34.80 |
| 1.0 | 0.00 | 0.83 | 38.67 |
| 1.1 | 0.00 | 0.91 | 42.54 |
| 1.2 | 0.00 | 1.00 | 46.40 |

[1] Equals margin loss x protection factor.

The per acre indemnity payment then equals the margin loss times the protection factor. Higher protection levels result in higher payments. For the $38.67 margin loss at the 95% coverage level, a choice of a protection factor of 1.0 results in a payment of $38.67 ($38.67 x 1.00 protection factor). A 1.2 protection factor results in a $46.40 payment ($38.67 margin loss x 1.2 protection factor).

**Insurance Premium**: Insurance premium will increase with higher coverage levels and protection factors, as is illustrated in Table 5. These premium are not final but should be fairly representative of the premiums that will be paid in Sangamon County. At a 95% coverage level, farmer-paid premiums range from $26.76 per acre for a .8 protection factor up to $40.14 per acre for a 1.2 protection factor.

**Table 5. Farmer-Paid Premiums[1], Margin Protection Insurance with Harvest Price Option, Corn, 2018, Sangamon County, Illinois**

| Protection Factor | Coverage Level 80% | 85% | 90% | 95% |
|---|---|---|---|---|
| **Panel A. Farmer-Paid Premium for Margin Protection** | | | | |
| 0.8 | $4.97 | $9.38 | $16.95 | $26.76 |
| 0.9 | $5.59 | $10.56 | $19.07 | $30.11 |
| 1.0 | $6.21 | $11.73 | $21.19 | $33.45 |
| 1.1 | $6.83 | $12.90 | $23.31 | $36.80 |
| 1.2 | $7.45 | $14.08 | $25.43 | $40.14 |
| **Panel B. Producer Credit for an RP 85% Product[2]** | | | | |
| 0.8 | $1.60 | $3.23 | $5.33 | $6.76 |
| 0.9 | $1.75 | $3.49 | $5.66 | $6.98 |
| 1.0 | $1.89 | $3.73 | $5.92 | $7.12 |
| 1.1 | $2.02 | $3.94 | $6.13 | $7.21 |
| 1.2 | $2.14 | $4.12 | $6.27 | $7.26 |

[1] Final premiums will vary from those shown above.
[2] Based on a 185 APH and a projected price of $3.96 projected price.

**Purchasing RP along with MP-hpo**

Farmers can purchase RP with the MP-hpo product (YP and RP with the harvest price exclusion could be purchased as well). In this case, RP insurance payments will reduce MP-hpo payments. As a result, a credit will be given to reduce the RP product.

As an example, take the Sangamon County case. MP-hpo will be purchased at a 95% coverage level and a 1.0 protection factor. MP-hpo will cost $33.45 per acre (see Table 5). The credit for this policy is estimated at $7.12. This credit is based on the farm's previous yields and an estimated of the projected price. A $3.96 projected price was used in estimates. For enterprise units, an 85% RP policy would have a premium around $23 per acre. Given a purchase of the RP 85% policy, the farmer could add a 95% MP-hpo policy for $26.39 per acre ($33.45 MP-hpo premium - $7.96 credit). This would offer a zone of protection from 95% down to 85% coverage of the RP policy. This zone will be area based and not based on farm results. The zone also is a margin and not revenue.

**Summary**

MP-hpo will have benefits to certain users. Purchases of ARP may find a switch to MP-hpo beneficial. Also, RP purchasers may find adding MP-hpo of benefit. More on these decisions will be discussed in a September 12th *farmdoc daily* article.