Evaluating Prevented Planting Coverage as a Risk Management Tool in Rice

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FRYAR PRICE RISK MANAGEMENT CENTER OF EXCELLENCE

UNIVERSITY OF ARKANSAS
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Introduction

Every year producers face price and production risks which impact expected returns net of costs (i.e., expected profits). Crop insurance is one risk management tool which provides yield and revenue guarantees to stabilize income. Among the suite of crop insurance plans available, Yield Protection (YP) and Revenue Protection (RP) are the most popular products, comprising 76% of the $173.6 billion in total Federal Crop Insurance Program liability in 2022. YP provides yield guarantees against harvest production losses, and RP provides yield and price guarantees against price and production losses. In addition, both YP and RP policies include an embedded coverage called Prevented Planting (PP). PP provides protection against losses solely associated with the insured being unable to plant a crop by the Final Planting Date declared by USDA-RMA. This report examines PP coverage as an effective risk management tool by considering various choices faced by a producer with individual crop insurance coverage.

PP coverage is designed to provide an indemnity for losses associated with preparing an insurable unit for planting a crop and so provides protection against pre-production losses. These losses consist of the sunk costs associated with planting, which vary on average by crop and county. The USDA-RMA determines PP base coverage factors, applied as a proportion of the chosen coverage level, for each crop based on the percentage of the total cost of production associated with planting. For administrative feasibility, the coverage factor is determined nationally by crop and considers in its determination costs associated with the purchase of machinery, land rent, fertilizer, pesticides, labor, and repairs. For an additional premium, the RMA also provides a 5% buy-up band of coverage beyond the base coverage provided by the underlying individual (e.g., YP and RP) coverage (see table 1). For example, the base PP coverage for rice is 55% of purchased liability which means that RMA has determined that the average producer has incurred 55% of the total cost to produce the crop in planting cost alone.

Table 1. Prevented Planting Coverage Levels Across Major Principal Crops

Crop	Base Coverage*	Buy-Up Coverage
Corn	55%	60%
Soybeans	60%	65%
Rice	55%	60%
Cotton	50%	55%
Sorghum	60%	65%
Wheat	60%	65%
Peanuts	55%	60%

*The base coverage is the coverage that is included in the underlying individual crop insurance policy purchased by the producer. It does not cost a producer an out-of-pocket premium to buy the base prevented planting coverage.

This analysis is concerned with quantifying expected returns net of costs, including crop insurance premiums, for taking PP vs planting a rice crop, with soybeans as an option for planting a second crop after PP. While RMA has determined[1] 55% to be the PP coverage factor for rice, the costs accounted for without land rent consists of 50% of the total cost to produce a crop for a typical rice producer in Arkansas, according to the University of Arkansas Crop Enterprise Budgets (UADA, 2023). The budgets considered for both rice and soybeans are

[1] The costs RMA accounts for in the coverage factor percentage consist of machinery, land rent, fertilizer, pesticides, labor, and repairs (USDA-RMA, 2018).

given in tables 2-3. Therefore, this analysis will consider both 55% and 50% as the percentage of total cost incurred leading up to planting of the rice crop. Sensitivity analysis will examine the planting cost percentage of total production cost which will render the decision to take a PP payment more profitable than growing and harvesting a rice crop (i.e., take a PP payment and forego planting a rice crop).

Table 2 - UA Crop Enterprise Budget - Rice (Full Page Hybrid)

		Units	Value
Gross Revenue	Harvest Price (Cash)	$/bu	7.63
	Basis	$/bu	0.00
	Yield	bu/ac	164.96
Gross Value of Production		**$/ac**	**1,257.97**
Operating Costs	Seed	$/ac	176.18
	Fertilizer	$/ac	211.72
	Chemicals	$/ac	155.57
	Custom services	$/ac	58.40
	Fuel, lube, electricity	$/ac	20.89
	Irrigation (12 ac-in)	$/ac	166.66
	Repairs	$/ac	18.28
	Interest on operating capital	$/ac	58.15
Operating Costs (Total)		**$/ac**	**865.85**
Allocated overhead	Hired labor	$/ac	43.58
	Scouting, Hauling, Check-off	$/ac	122.67
	CRC and Machinery	$/ac	129.76
Allocated overhead (Total)		**$/ac**	**296.01**
Specified costs (Total)		**$/ac**	**1,161.86**

Table 3. UA Crop Enterprise Budget RRXtend2Flex, Furrow

		Units	Value
Gross Revenue	Harvest Price (Cash)	$/bu	13.69
	Basis	$/bu	-0.30
	Yield	bu/ac	51.80
Gross Value of Production		**$/ac**	**709.14**
Operating Costs	Seed	$/ac	91.50
	Fertilizer	$/ac	81.55
	Chemicals	$/ac	139.14
	Custom services	$/ac	16.00
	Fuel, lube, electricity	$/ac	16.21
	Irrigation (12 ac-in)	$/ac	66.66
	Repairs	$/ac	15.41
	Interest on operating capital	$/ac	30.71
Operating Costs (Total)		**$/ac**	**457.18**
Allocated overhead	Hired labor	$/ac	10.50
	Scouting, Hauling, Check-off	$/ac	23.84
	CRC and Mahinery	$/ac	128.83
Allocated overhead (Total)		**$/ac**	**163.17**
Specified costs (Total)		**$/ac**	**620.35**
Returns over Specified Costs		**$/ac**	**88.80**

Indemnities for PP are calculated in the same way for acreage enrolled in YP and RP policies. A full PP payment for a given crop is calculated as the product of the base coverage percentage, the coverage level, RMA projected price, and the farm-level Actual Production History (APH). For example, a full PP indemnity for rice in 2023 under a 75% YP or RP policy would be:

$$55\% \times 75\% \times 164.96\ bu/ac \times \$7.63/bu = \$505.82/ac \qquad (1)$$

where 55% is the base PP coverage for rice, 75% is the coverage level of the underlying YP or RP policy, 164.96 bu/ac[2] is the APH yield, $7.63 bu/ac is the RMA projected price based on the budget values presented in Table 2. Importantly, this amount will first have to pay any per acre producer paid premium for the policy insuring rice, and a second crop must not be planted following rice. If a second crop, such as soybeans, is planted on the same acreage indemnified with the PP payment for rice, then the PP payment is reduced by 65%. In other words, the payment would be $174.04/ac which is 35% of $505.82. While the payment rate is reduced, the premium is also reduced by 65%. However, if the second crop, soybeans, does not incur any losses, then the other 65% of the PP payment for rice is given and the full premium must be paid. However, we assume there will be losses for soybeans since it is more likely that soybeans will incur losses given that the yield potential for late-planted soybeans falls relative to the optimal planting window in the earlier part of the year (UADA Soybean Verification Program, 2021). Therefore, we do not provide results for the scenario when soybeans incur no losses.

Risk Management Alternatives

This report analyzes the effectiveness of PP coverage as a risk management tool by comparing expected profits among three main choices facing a producer. This work is based on a representative farm model for Lawrence County, Arkansas in order to leverage the UADA Soybean Verification Program data, which contains yields on soybeans following rice. The choices facing a representative rice producer in Lawrence County, Arkansas are:

1. Enroll in crop insurance for rice and choose not to take a PP payment.
2. Enroll in crop insurance for rice, take a PP payment on rice, and do not plant a second crop (i.e., soybeans).
3. Enroll in crop insurance for rice and soybeans, take a PP payment on rice, and plant soybeans on the same acres within the unit the PP payment was collected for rice.

Alternative one is the ideal crop year where a producer is able to plant a rice crop by the RMA final planting date[3] for rice (i.e. May 25th) and chooses to take on the risks faced in a growing season leading to harvest. Net returns for this alternative are:

$$Net\ Return = Farm\ Yield \times (Futures\ Price + Harvest\ Basis) - Total\ Cost + Indemnity - Premium \qquad (2)$$

Alternative two is the case when a rice crop is not able to be planted by the final planting date, a PP payment is received, and a second alternative crop is not planted on the acreage for which the PP payment is taken. Net returns for this alternative are:

[2] While the Chicago Mercantile Exchange (CME) and RMA report rice prices and yields, respectively, in terms of hundredweights (cwt), we convert these values to bushels. For example, the yield of 164.96 is found by dividing 7,243 pounds/acre by 45, and the price of $7.63/bushel is found by dividing the futures price of $16.93/cwt by 2.22.

[3] Visit Arkansas Row Crop Risk Management for a breakdown of the final planting dates for all major principal crops by county.

$$Net\ Return = Prevented\ Planting\ Indemnity - Premium - (Total\ Cost \times Planting\ Cost\ Percentage) \quad (3)$$

Notably, returns for rice fall to zero since a crop was not planted and harvested. Further, input costs are incurred but only those that are paid pre-planting. The percentages of total costs associated with planting considered in this analysis are 55%, 50%, 15%, and 10%. These percentages are considered to compare the RMA design of PP coverage and the alternatives in which the coverage factor for rice leads to a PP payment that is greater than the cost of attempting to plant rice and the producer paid premium associated with the underlying coverage, in a specific county/year.

Alternative 3 considers planting a second crop on the rice acres on which a PP payment was received. Net returns for this alternative are:

$$Net\ Return = 35\% \times Prevented\ Planting\ Indemnity\ for\ Rice - 35\% \times Premium\ for\ Rice\ Insurance\ Policy - Total\ Cost\ of\ Producing\ Rice \times Rice\ Planting\ Cost\ Percentage + Soybean\ Yield \times (Soybean\ Futures + Soybean\ Basis) - Total\ Cost\ of\ Producing\ Soybeans + Indemnity\ for\ Soybeans - Premium\ for\ Soybeans \quad (4)$$

In this scenario, the PP payment rate and producer premium for rice is reduced to 35% of the full PP payment and producer premium. The percentage of the total cost of producing rice associated with planting rice is accounted for since it is assumed that the producer attempts to plant a rice crop. A further assumption is that inputs to production are not stored and must be purchased every year. Lastly, the usual farm-level return net of total input cost for soybeans is considered along with any indemnity net of the producer premium for the underlying YP or RP coverage chosen for soybeans. Notably, the expected farm yield calculated for soybeans is the yield for a soybean crop planted after June 1st soil that is more suitable for producing rice (UADA Soybean Verification Program, 2021). We capture the fall in yield potential for soybeans through the late planting date as yield potential has been reported to fall by at least 16 percent for soybeans planted in northeast Arkansas on June 1 or later (Salmeron, Purcell, Earnest, and Ross, 2015).

Results

This section discusses the results of expected net returns estimated from a simulation of correlated random crop prices and yields under the three alternatives discussed above for a representative farm from Lawrence County, Arkansas. Results can be found in figures 1-8 below. Results for the 50% and 55% rice input cost scenarios do not suggest that opting to receive a PP payment is more profitable than planting and producing a rice crop conditional on the ability to plant a rice crop before the final planting date for rice. However, results do show that the choice to receive a PP payment is profitable for certain coverage levels when the pre-planting cost percentage falls below 15% of total rice production cost. This finding holds for both the case when no second crop soybeans is planted and when a second crop of soybeans is planted.

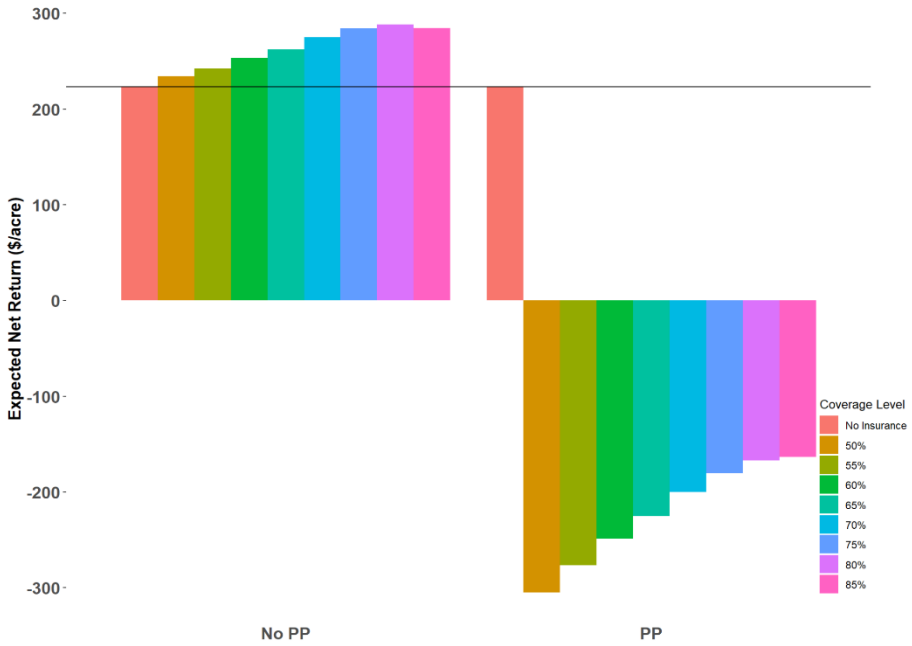
Results are presented for a YP policy insured under Optional Units, which incurs the highest premium rate and lowest premium subsidy rate relative to a YP policy insured with Basic and Enterprise Units. One can use this as the base scenario for underlying coverage since the producer paid premium cost only decreases with Basic and Enterprise units. Therefore, any scenarios in which the net returns are positive for receiving a PP payment will only be increasing under instances with Basic and Enterprise Units. Further, results under the scenarios

where no PP payment is received for RP are comparable to results under the same scenarios for YP. A full set of results across all unit structures and both insurance plans discussed is available upon request.

Conclusion

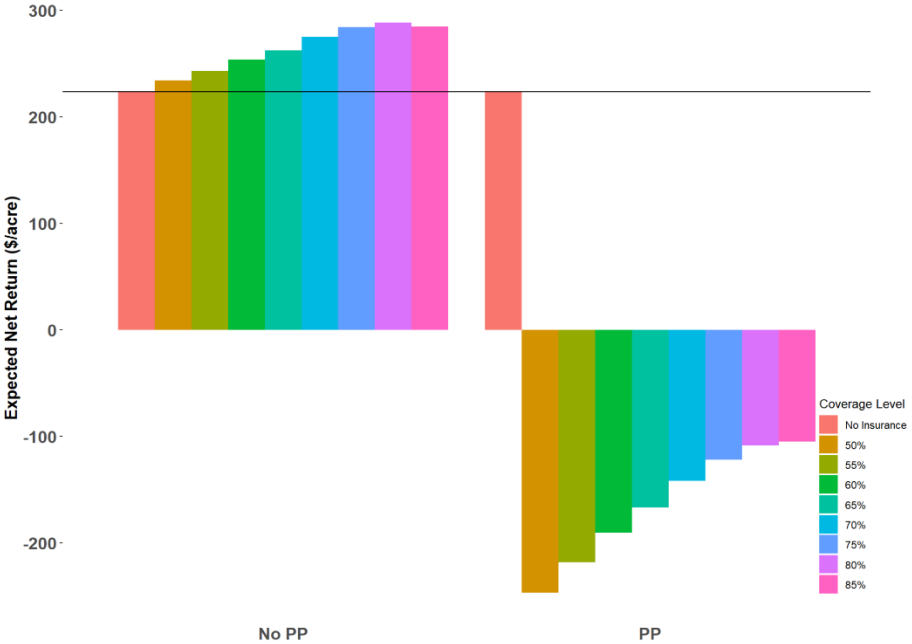
Rice producers face production and price risks every year. One risk management tool available to mitigate losses from these risks is crop insurance plans, such as YP and RP. PP coverage is included as a coverage option in all YP and RP policies with coverage factors which vary depending on the crop. This report considers the effectiveness of PP as a risk management tool and the expected profits between scenarios which consist of a typical production year and a year in which a PP indemnity is received for rice. Preliminary analysis suggests that the input cost percentages of 55% and 50% do not make the PP decision profitable and the choice to plant and harvest a rice crop is more profitable relative to not planting the rice crop and receiving a PP payment. However, at the 10% and 15% input cost percentages, the decision to plant and harvest a rice crop rather than receive a PP payment for rice is more unclear as results from the simulation suggest receiving a PP payment to be more profitable producing a rice crop. Given the analysis does not address how common these pre-planting cost percentages are at the farm level, further research which considers the farm-level pre-planting cost for rice should be considered before drawing final policy implications.

Figure 1. Expected Net Returns of Producing a Rice Crop Versus Receiving a Prevented Planting Payment (Yield Protection, Optional Units) - 55% of Total Input Cost Incurred at Planting



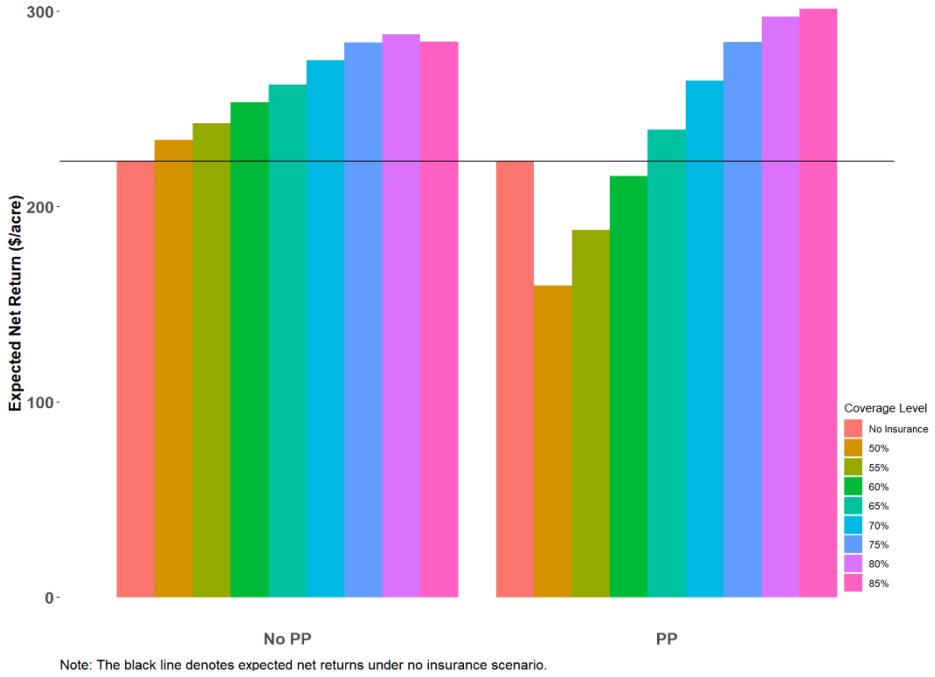
Note: The black line denotes expected net returns under no insurance scenario.

Figure 2. Expected Net Returns of Producing a Rice Crop Versus Receiving a Prevented Planting Payment (Yield Protection, Optional Units) - 50% of Total Input Cost Incurred at Planting



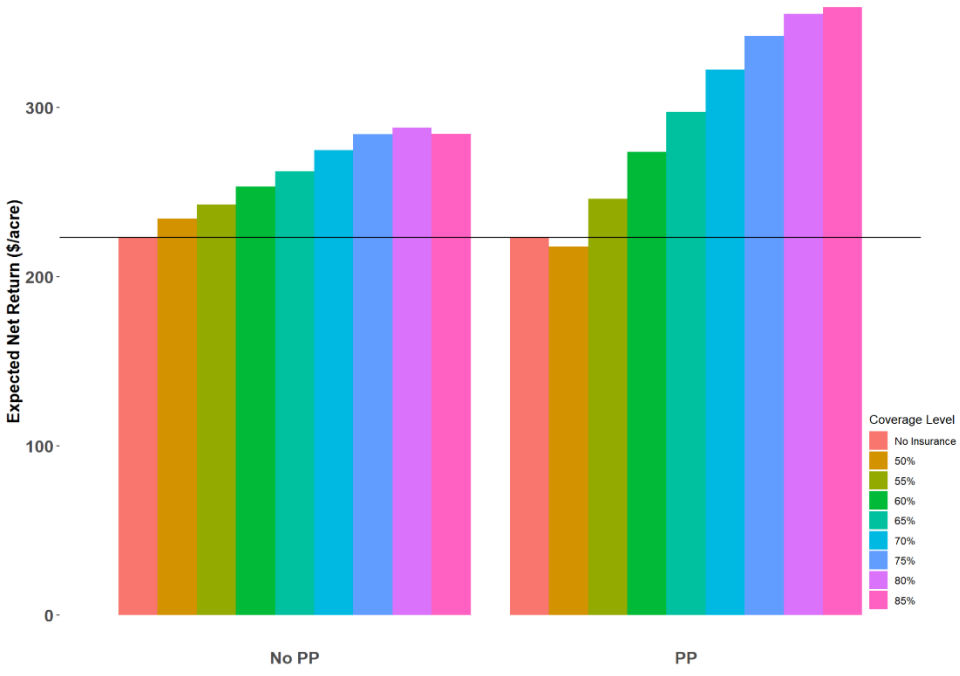
Note: The black line denotes expected net returns under no insurance scenario.

Figure 3. Expected Net Returns of Producing a Rice Crop Versus Receiving a Prevented Planting Payment (Yield Protection, Optional Units) - 15% of Total Input Cost Incurred at Planting



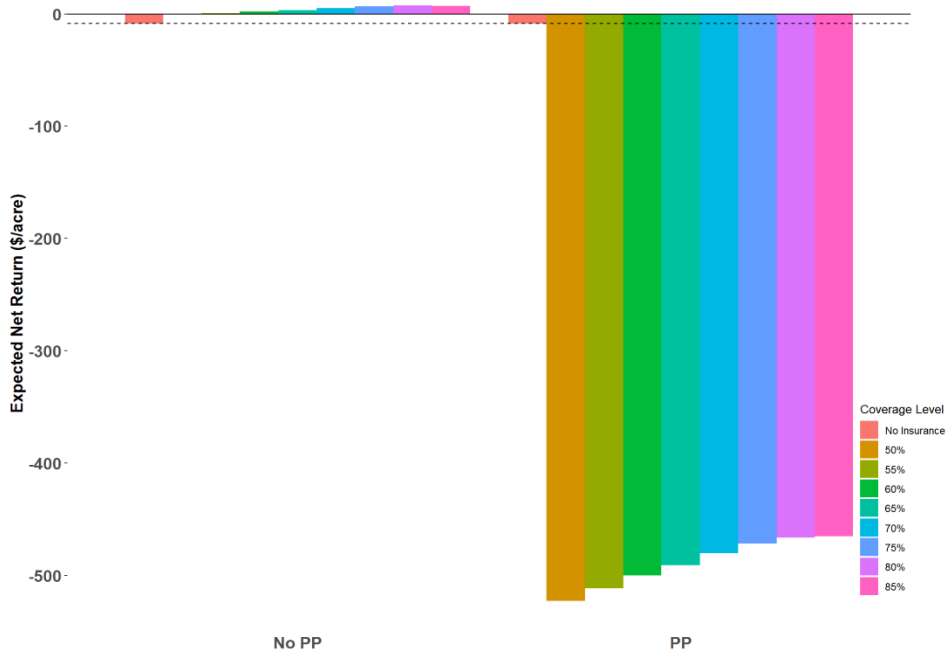
Note: The black line denotes expected net returns under no insurance scenario.

Figure 4. Expected Net Returns of Producing a Rice Crop Versus Receiving a Prevented Planting Payment (Yield Protection, Optional Units) - 10% of Total Input Cost Incurred at Planting



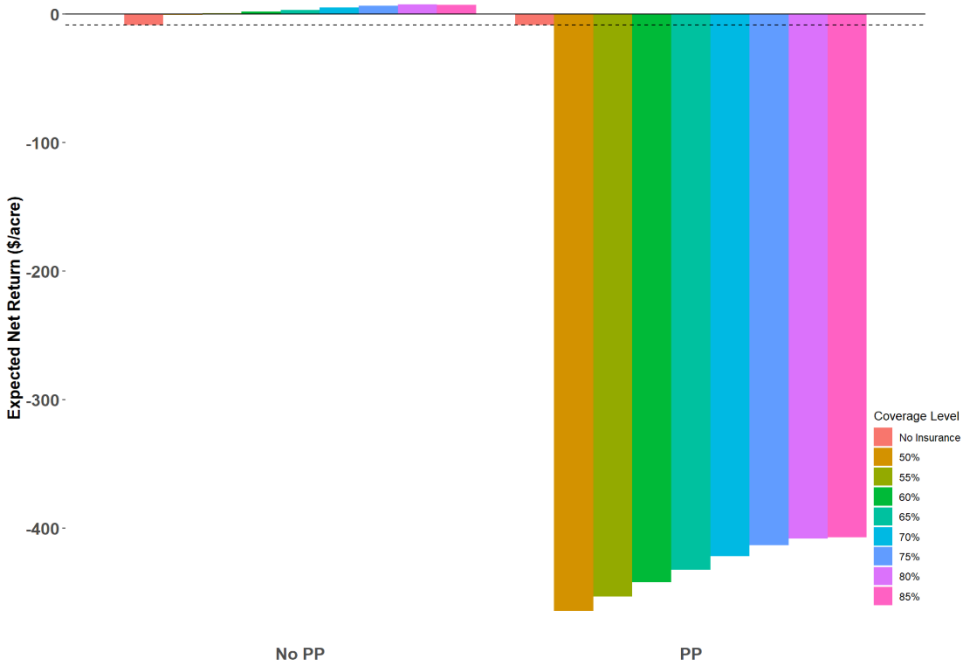
Note: The black line denotes expected net returns under no insurance scenario.

Figure 5. Expected Net Returns of Planting Second Crop Soybeans and Receiving a Reduced Prevented Planting Payment for Rice (Yield Protection, Optional Units) - 55% of Total Input Cost Incurred with Planting First Crop Rice



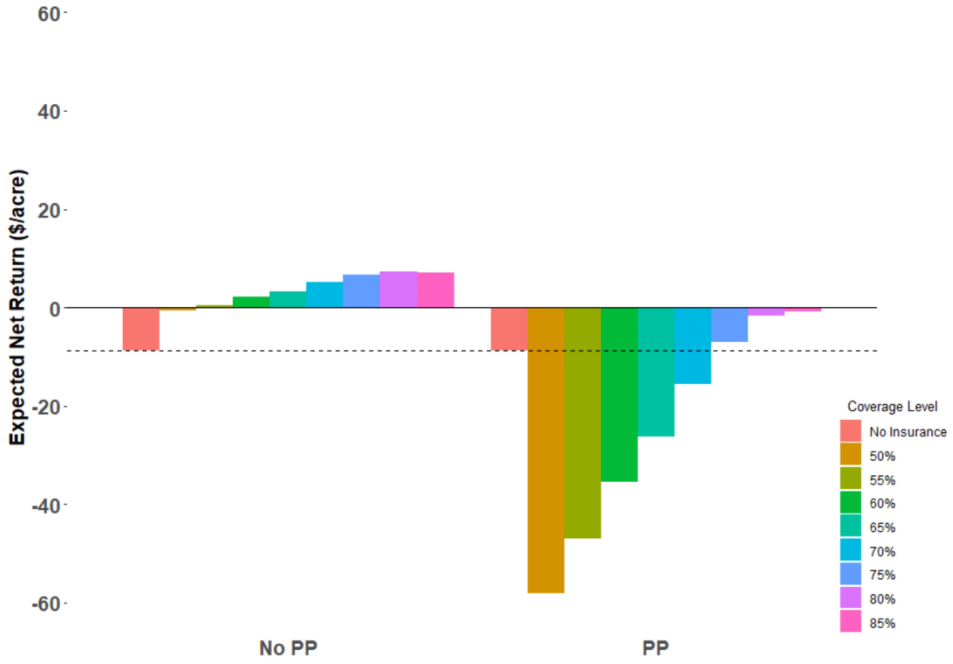
Note: The black dashed line denotes expected net returns under no insurance scenario.

Figure 6. Expected Net Returns of Planting Second Crop Soybeans and Receiving a Reduced Prevented Planting Payment for Rice (Yield Protection, Optional Units) - 50% of Total Input Cost Incurred with Planting First Crop Rice



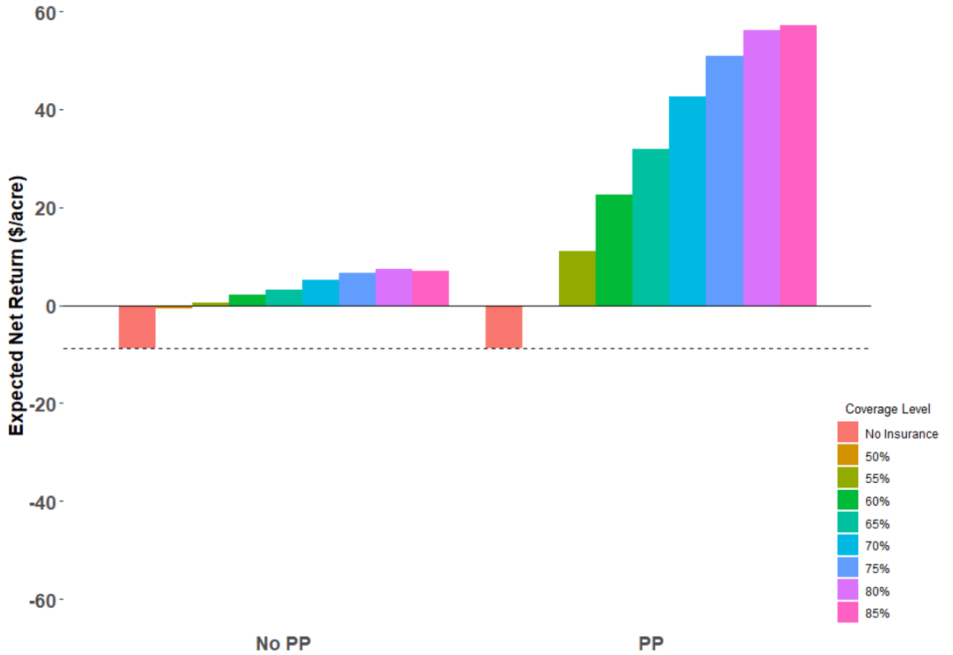
Note: The black dashed line denotes expected net returns under no insurance scenario.

Figure 7. Expected Net Returns of Planting Second Crop Soybeans and Receiving a Reduced Prevented Planting Payment for Rice (Yield Protection, Optional Units) - 15% of Total Input Cost Incurred with Planting First Crop Rice



Note: The black dashed line denotes expected net returns under no insurance scenario.

Figure 8. Expected Net Returns of Planting Second Crop Soybeans and Receiving a Reduced Prevented Planting Payment for Rice (Yield Protection, Optional Units) - 10% of Total Input Cost Incurred with Planting First Crop Rice



Note: The black dashed line denotes expected net returns under no insurance scenario.

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