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A Comparison of Risk Management Strategies for Indiana Grain Producers

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Abstract

Crop insurance and pre-harvest pricing strategies were analyzed for all years and "years following a normal crop year" from 1986 to 2001 in three counties. Although pre-harvest marketing strategies had the highest certainty equivalents, net farm revenues were lower and crop insurances were more common strategies following normal crop years.

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A Comparison of Risk Management Strategies for Indiana Grain Producers

Agriculture is inherently risky. A broad variety of risk management strategies exist which may reduce the risks associated with farming. However, in gaining protection from an unfavorable event, part of the potential gain is generally given up. Producers' responses to risk are commonly grouped into production, marketing, and financial responses. Production responses reduce the variability of production. Marketing responses reduce the variability of prices or transfer price risk to other individuals or institutions. In contrast, financial responses generally emphasize the firm's capacity to bear risk (Patrick). The responses to risk may have different effects on the farm, but none of the responses can protect a producer from all types of risk. As a result, most producers use a combination of production, marketing and financial responses in their individual risk management strategy. Effectiveness of risk management strategies may be influenced by price and yield risks, the risk-return tradeoffs and risk preferences of an individual producer.

Over the past 50 years, a number of changes in the U.S. agricultural sector have increased risks faced by producers and increased the importance of risk management. The fundamental shifts in the risk environment include the termination of fixed price commodity programs, globalization of markets, increased managerial complexity, increased neighbor conflicts, and increased governmental regulations (Musser and Patrick). Additionally, the types of forward pricing contracts and crop insurance alternatives available have expanded, crop insurance premium subsidies have increased, and the 2002 Farm Bill may have affected the risk management environment.

The broad variety of risk mitigating tools and the changes in the agricultural sector have given rise to many studies seeking to understand how specific risk management strategies affect the level and variability of farm income (e.g., Clow and Flaskerud; Coble and Knight; Collins; Nydene; Philpot and Stokes). Despite these efforts, it is not fully understood how risk management strategies may affect the level and variability of net farm revenue for producers. Furthermore, there may be differences in the effectiveness of risk management strategies for different areas and market conditions.

Using methodology similar to Pritchett et al., this study initially extended the evaluation of some risk management alternatives to three areas of Indiana (Rios and Patrick). In this paper, the strategies are analyzed under two different scenarios: all years, and "years following a normal crop year" in the period analyzed. Years following a short crop year, a year in which production fell below the previous year's total utilization and the U.S. average yield was at least 5% below the long run trend yield (Wisner, Blue and Baldwin), typically have high early spring prices. These years were excluded from consideration in the second scenario. Thus, this study seeks to understand how specific risk management strategies affect the level and variability of net farm revenue under different market conditions which can be observed by producers.

Methodology

A non-parametric simulation model (Richardson) using @Risk software (Palisade Corporation) evaluated the effects of risk management strategies on net farm revenue for corn and soybean producers in Indiana. An overview of the model is presented in Figure 1. The analysis considered a 1,500 acre farm with a 50/50 corn and soybean rotation in three geographical areas. Three counties were chosen to represent areas with differing

levels of yields, yield variability, yield/price correlation or natural hedge, and proximity to demand centers. Carroll County, in Central Indiana, was chosen to represent the typical high yield region with average variability and access to processing centers. Elkhart County, in Northern Indiana, represented an area with relatively low corn yields with low variability, average soybean yields with low variability, and limited local markets. Posey County, near the Ohio River in Southwest Indiana, is an area with average corn yields with high variability, low soybean yields with high variability, and greater access to international markets.

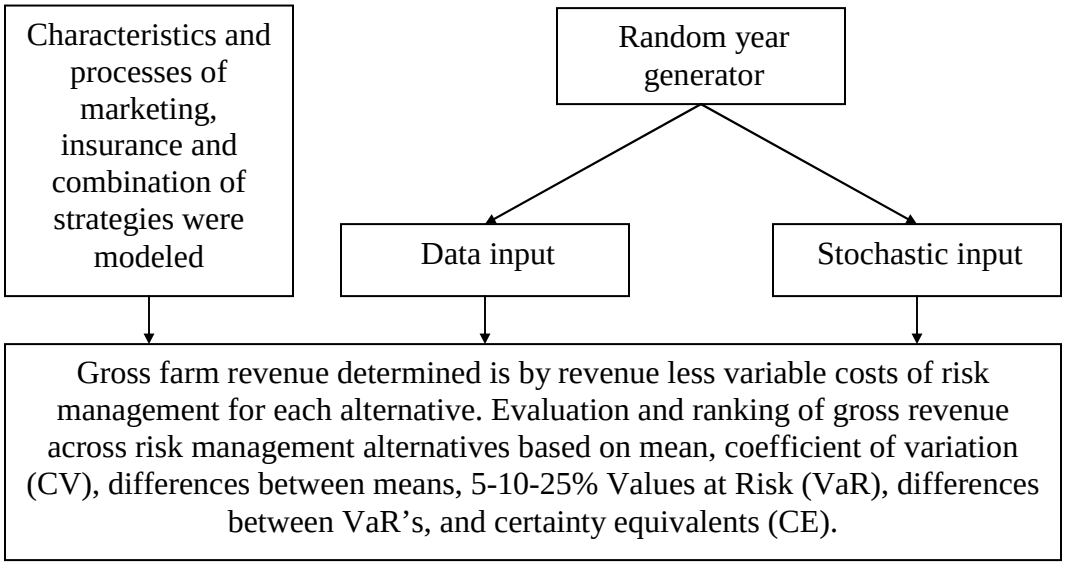

Figure 1. Model Flowchart

Mechanical marketing strategies, crop yield and crop revenue insurance, and combinations of marketing strategies and crop insurance were the risk management strategies considered. Mechanical marketing strategies involving cash sale at harvest, cash forward contracts, hedging with futures contracts, and hedging with option contracts were evaluated in this study. Marketing contracts were implemented at 33%, 66%, and 100% of the estimated ten year moving average Actual Production History (APH) yields.

Alternative crop and revenue insurances were analyzed at different coverage levels and price elections. Combinations of marketing strategies and crop insurance coverage were analyzed to determine whether it would be less expensive and/or more effective to combine strategies rather than using the available crop revenue insurance packages.

Due to data availability, the years considered in the analysis were from 1986 to 2001 for Carroll and Elkhart Counties and from 1987 to 2001 for Posey County. Cash prices for Posey County soybeans in 1987 were unavailable and were estimated using the average relationship of Carroll County soybean cash prices to Posey County soybean cash prices from 1988 to 2001. Wednesday corn and soybean cash prices were gathered from central, northern, and southern Indiana elevators (Hurt, Cabrini de Colonna).

Chicago Board of Trade (CBOT) December corn and November soybean futures and options prices for Wednesdays were also used in the analysis. The study considered prices for futures contracts at three points in time: early spring (March 15), late spring (June 1), and harvest time (November 1 for corn, and October 1 for soybeans). Additionally, early spring (March 15) and harvest time (November 1 for corn, and October 1 for soybeans) option premiums were incorporated. A complete turn futures transaction cost was $100, which represents $50 per half turn. Transactions costs for options were equal to futures transaction costs, with the difference that the entire commission was paid upfront. Commissions were assumed to be paid regardless the option contract was exercised or not. For trading purposes, a non-interest bearing margin account deposit of 7.5% was required. In order to capture the opportunity cost associated with entering into the transaction, a 7% interest cost was assumed in the model for the period the futures or options contracts were held.

The springtime forward prices for harvest delivery for both corn and soybean were assumed to be $0.20 under the December corn and November soybean CBOT futures contracts, respectively, at the time the cash forward contract was implemented (Collins; Pritchett et al.).

Marketing average prices and county level yields were gathered from the National Agricultural Statistics Service (NASS). Farm level corn yields were collected from an APH database from the Risk Management Agency (RMA).

The historical year generator and farm level yields for corn and soybeans were generated by a boot strapping procedure (Gray) to simulate farm revenue (Figures 2 and 3). First, a historical year was chosen at random in this model. Then, deviations in prices and yields from this year are used to calculate the farm revenue under each of the risk management alternatives. However, because the prices and yields are historical data, the variability in the results generated by using these raw data may be misestimated due to trends in yields and prices, and to cyclical patterns of prices that may exist.

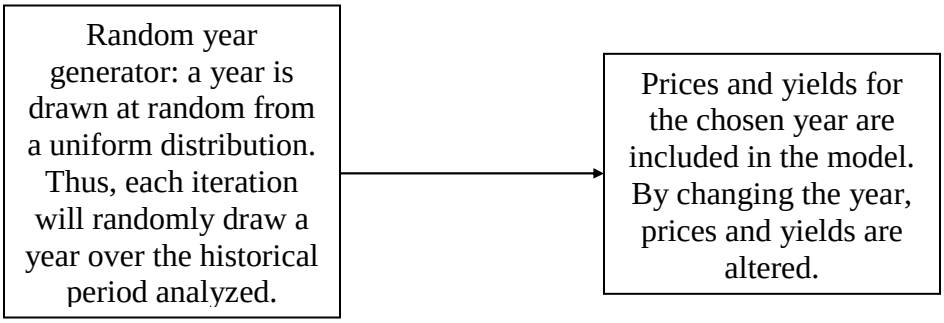

Figure 2. Random Process Flowchart

Detrending the data or employing an Autoregressive Moving-Average (ARMA) process are procedures that can be used to remove trends and cycles from historical prices and yields. These methods allow for prices to be measured in current dollars and yields

to be measured in terms of today's technology. By using the transformed prices and yields, the variability of the distribution of net farm revenue used to determine the effectiveness of alternative risk management strategies will be approximated. Because prices are positive dollar amounts, the natural logarithm of historical prices was incorporated in an ARMA procedure where the expected prices were estimated while maintaining the cycles and behaviors of prices. Expected yields were calculated by a trend equation of the historical data. In order to eliminate the systematic pattern of prices and yields, time series were adjusted by an index using 2001 as the base period. Although specific conditions of 2001 are not simulated, the 1,000 iterations used reflect prices measured in real dollars and yields assuming 2001 technology levels (Figure 3).

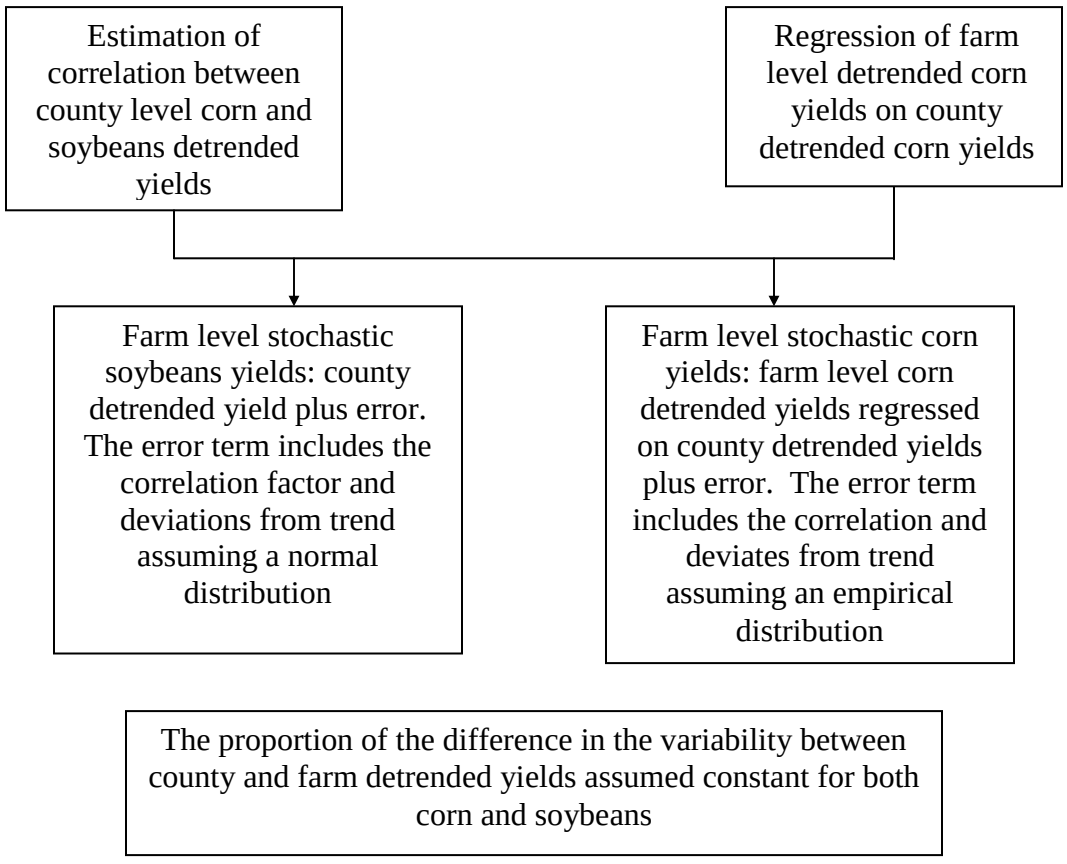

Figure 3. Stochastic Input Flowchart

The flow of data into the model is summarized in Figure 4.

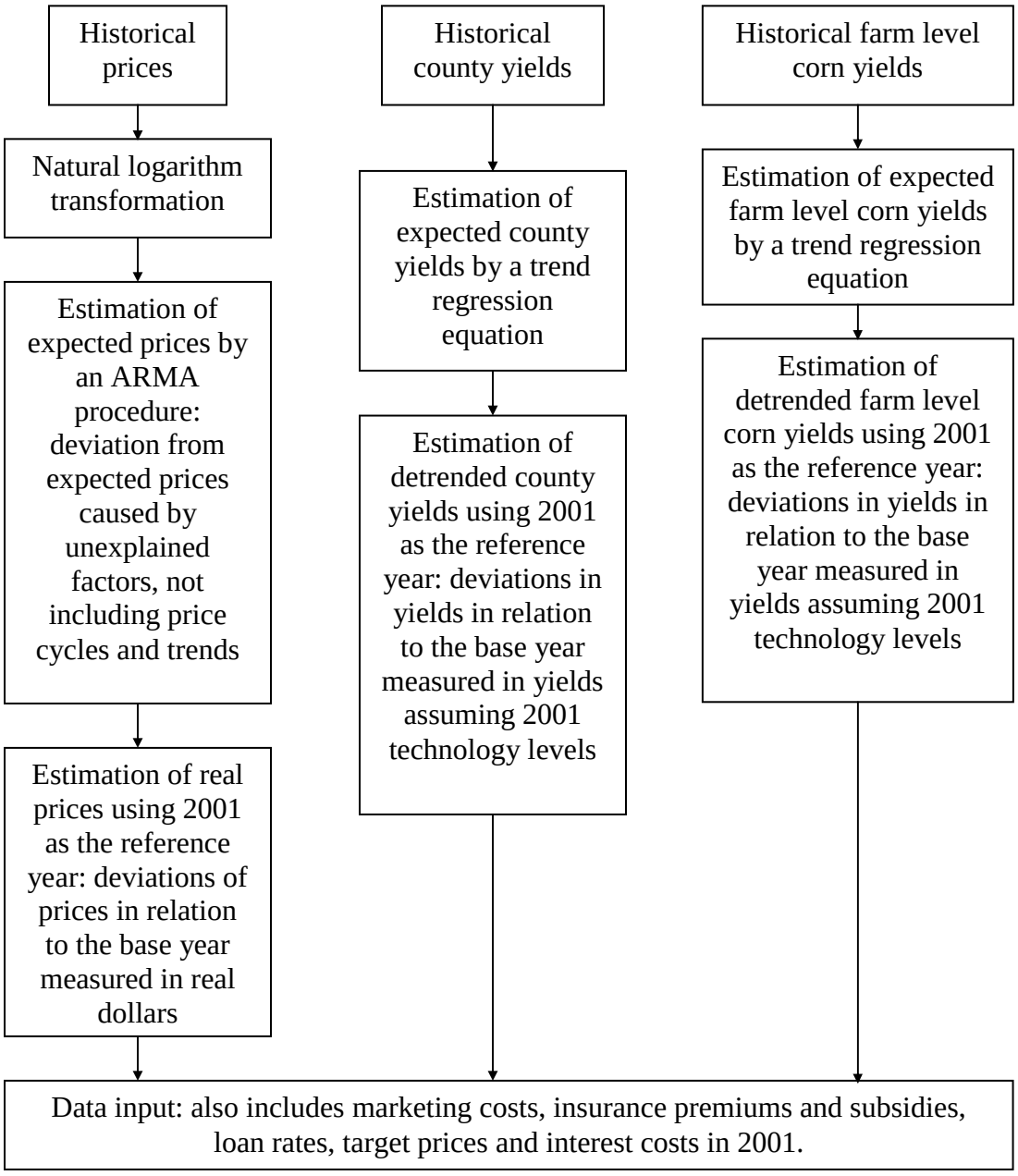

Figure 4: Data Input Flowchart

All of the crop yield and crop revenue insurance products available in Indiana in 2002 were included in the analysis. These included the individual farm-based Actual Production History (AHP) and the county-based Group Risk Plan (GRP) types of yield

insurance. Crop Revenue Coverage (CRC), Income Protection Plan (IP), Revenue Assurance (RA) with both the base and harvest price options, and Group Risk Income Plan (GRIP) were also included. In all cases, the premium rates and coverage levels reflected those available in 2002. It was assumed that all of the corn and soybeans would each be treated as a unit for insurance purposes. For a further discussion of insurance product specifics, see www.farmdoc.uiuc.edu/cropins or Schnitkey, Sherrick and Irwin.

The model did not explicitly consider costs of production and direct government payments in the calculation of net farm revenue under the assumption that these payments were constant across strategies. Therefore, net farm revenue was determined by gross revenue less variable costs of risk management for each strategy. Revenue was based on farm level production and harvest prices, gains or losses from marketing strategies and insurance indemnity payments. In order to reflect the current farm legislation, farm revenue also included any loan deficiency payments (LDP) and countercyclical payments (CCP) for corn and soybeans under the 2002-2003 loan rates and target prices, respectively. The marketing contract commission fees, interest costs on futures and options margin accounts, and insurance administrative fees and premiums were considered as variable costs of risk management.

Two scenarios were analyzed. First, all crop years in the 1986 or 1987 to 2001 were considered. Second, analysis was restricted to only those years following a normal crop year. Years following a short crop year, years when a weather-induced decline caused production to fell below the previous year's total utilization and the U.S. average yield was at least 5% below the long run trend line yield, were excluded (Wisner, Blue, and Baldwin). Producers are not required to predict when a short crop year will occur.

Rather, they can adjust their risk management strategy in response to the generally higher early spring prices following a short crop year which has already occurred.

Results

A total of 74 risk management strategies were considered in this analysis for each of the three counties and for both the "all years" and "years following a normal crop year" scenarios. Comparisons were made to a benchmark strategy of no insurance with cash sale at harvest as well as other management strategies. Net farm revenue across strategies were ranked using mean, coefficient of variation (CV), differences between means, 5-10-25% Values at Risk (VaR), differences between VaR's, and certainty equivalents (CEs). Appropriate statistical tests were performed at the 5% significance level. The CEs were determined using the power utility function that assumes constant relative risk aversion and decreasing absolute risk aversion (Richardson et al.). Initially, the marketing strategies, crop insurance, and crop revenue strategies were analyzed independently and these results are discussed briefly. Discussion in this paper emphasizes the risk management strategies with the highest CEs in each of the counties and differences between the scenarios of all years and only the years following a normal crop year.

Results indicate that mechanical marketing strategies tended to provide significantly higher net farm revenue than the cash sale at harvest in all three counties and for both scenarios. However, in both scenarios, cash forward contracts established on June 1 in Carroll and Posey Counties had lower returns than the benchmark strategy. Higher levels of hedging and forward contracting resulted in higher mean returns for Carroll and Elkhart Counties in the all years scenario. For the years following a normal

crop year scenario, this pattern held in all three counties with the exception of hedging with options in Carroll and Elkhart Counties. Most of the crop yield insurance (APH and GRP) strategies resulted in significantly lower net farm revenue than the benchmark strategy in all three counties under both scenarios. In contrast to yield insurance, crop revenue insurances (CRC, RA, IP and GRIP) often had mean returns that exceeded the benchmark strategy under both scenarios. Furthermore, the higher levels of coverage of CRC and RA-BP typically also provided higher 5% and 10% VaRs than the no insurance, cash sale at harvest strategy. GRP in Carroll and Posey Counties generally had mean returns and 5% and 10% VaR values which exceeded the benchmark strategy, while this was not the case in Elkhart County. For a more in-depth analysis of these strategies, see Rios.

Certainty Equivalents Results - Carroll County

All Years Scenario

The benchmark strategy of no insurance with cash sale at harvest resulted in CEs which ranged between $352 per acre for a risk neutral individual to $316 per acre for a highly risk averse individual. Marketing strategies involving futures contracts alone or futures contracts in combination with APH or GRP insurance provided the highest CEs at all risk aversion levels in Carroll County (Table 1). Hedging using futures contract positions established in March for 100% of expected production resulted in the highest CE for risk neutral to moderately risk averse individuals. This represented an increase in CE of about $40 per acre relative to the benchmark strategy. At the higher risk aversion levels, the highest CE values were associated with futures contracts for 66% of the expected production level were combined with APH insurance at the 85% coverage level.

Table 1. Carroll County Top Risk Management Strategies for All Years Scenario Ranked by Certainty Equivalents ($/acre)[a,b]

Strategy /CE	Relative Risk Aversion Coefficient					
Rank	0	1	2	3	4	5
1	Futures (M15) 100% 392.47	Futures (M15) 100% 385.14	Futures (M15) 100% 377.12	Futures (M15) 100% 368.17	APH (100%PE) 85% Futures (M15) 66% 363.27	APH (100%PE) 85% Futures (M15) 66% 359.71
2	GRP (70%MP) 90% Futures (M15) 66% 382.87	GRP (70%MP) 90% Futures (M15) 66% 377.36	GRP (70%MP) 90% Futures (M15) 66% 371.58	APH (100%PE) 85% Futures (M15) 66% 366.95	APH (100%PE) 75% Futures (M15) 66% 360.46	APH (100%PE) 75% Futures (M15) 66% 355.83
3	GRP (70%MP) 80% Futures (M15) 66% 381.22	GRP (70%MP) 80% Futures (M15) 66% 375.40	APH (100%PE) 85% Futures (M15) 66% 370.77	GRP (70%MP) 90% Futures (M15) 66% 365.48	APH (100%PE) 85%C Futures (M15) 66% 359.10	APH (100%PE) 85%C Futures (M15) 66% 354.34

[a] Rankings and relative risk aversion coefficients presented in rows and columns, respectively. For instance, the CE for a risk neutral producer hedging 100% of the expected production using futures established on March 15 was $392.47 per acre which was the highest CE among all the marketing strategies considered in Carroll County. The CE decreases across the first row as the level of risk aversion increases.

[b] CE under power utility function.

For the risk neutral and slightly risk averse individuals, the second and third highest CEs were associated with GRP and hedging with futures, and the CEs were about $10 per acre below the top-rated strategies. In general, there tended to be a shift away from the county-based GRP insurance toward the individual farm-based APH insurance as the level of risk aversion increased.

Although not shown in Table 1, differences in CEs between the top and fifth ranked crop yield insurance strategies tended to be about $5 per acre with some tendency

toward an increase as the level of risk aversion increased. In contrast, differences in CEs values between crop revenue insurance strategies tended to be larger for the risk neutral individuals than for the more risk averse individuals.

Years Following a Normal Crop Year Scenario

The benchmark strategy of no insurance with cash sale at harvest resulted in CEs which ranged between $345 per acre for a risk neutral individual to $312 per acre for a highly risk averse individual. This represented a decrease in CE of about $7 and $4 per acre for risk neutral and risk averse individuals respectively, or 2% or less, relative to the benchmark strategy under the all years scenario. Similar to the all years scenario, marketing strategies involving futures contracts alone or futures contracts in combination with APH or GRP insurance provided the highest CEs at all risk aversion levels in Carroll County (Table 2). Hedging using futures contract positions established in March for 100% of expected production resulted in the highest CE for risk neutral to somewhat risk averse individuals. For moderately to extremely risk averse decision makers, the highest CE values were associated with futures contracts for 66% of the expected production level were combined with APH insurance at the 85% coverage level.

Compared to the all years scenario, in the years following a normal crop year scenario the CE of the top-rated strategy declined by more than $22 per acre or about 5.7%. This suggests that the returns to aggressive early spring marketing are reduced by excluding the years following a short crop year. There are also reductions in the CEs for the other strategies that tend to be smaller at the higher level of risk aversion. It is striking that all of the strategies for both of the scenarios involve establishment of futures

positions on March 15. Differences in the ranking of strategies between the two scenarios are minimal.

Table 2. Carroll County Top Risk Management Strategies for Crop Years Following Normal Years Scenario Ranked by Certainty Equivalents ($/acre)[a]

Strategy /CE	Relative Risk Aversion Coefficient					
Rank	0	1	2	3	4	5
1	Futures (M15) 100% 369.99	Futures (M15) 100% 363.86	Futures (M15) 100% 357.27	APH (100%PE) 85% Futures (M15) 66% 352.18	APH (100%PE) 85% Futures (M15) 66% 349.05	APH (100%PE) 85% Futures (M15) 66% 346.01
2	GRP (70%MP) 90% Futures (M15) 66% 367.52	GRP (70%MP) 90% Futures (M15) 66% 362.52	GRP (70%MP) 90% Futures (M15) 66% 357.21	GRP (70%MP) 90% Futures (M15) 66% 351.53	GRP (70%MP) 90% Futures (M15) 66% 345.43	APH (100%PE) 75% Futures (M15) 66% 341.36
3	GRP (70%MP) 80% Futures (M15) 66% 364.65	GRP (70%MP) 80% Futures (M15) 66% 359.46	APH (100%PE) 85% Futures (M15) 66% 355.41	Futures (M15) 100% 350.13	APH (100%PE) 75% Futures (M15) 66% 345.40	APH (100%PE) 85%C Futures (M15) 66% 340.84

[a] CE under power utility function.

Certainty Equivalents - Elkhart County

All Years Scenario

CEs for the no insurance, cash sale at harvest strategy ranged from $281 per acre for the risk neutral individual to $233 per acre for the highly risk averse individual in the all years scenarios. The smaller CEs reflect the lower levels of yields and prices in Elkhart County as compared with Carroll County. However, similar to Carroll County, futures contracts alone or in combination with a yield insurance product resulted in the

highest CEs among the risk management strategies evaluated in Elkhart County (Table 3). Hedging 100% of expected production using futures positions established on March 15 had the highest CEs for risk neutral to somewhat risk averse producers. At higher risk aversion levels, combinations of APH insurance with futures contracts at 66% level of expected production established in March provided the highest CEs.

Table 3. Elkhart County Top Risk Management Strategies for All Years Scenario Ranked by Certainty Equivalents ($/acre)[a]

Strategy /CE	Relative Risk Aversion Coefficient					
Rank	0	1	2	3	4	5
1	Futures (M15) 100% 311.70	Futures (M15) 100% 302.74	Futures (M15) 100% 292.52	APH (100%PE) 85% Futures (M15) 66% 285.82	APH (100%PE) 85% Futures (M15) 66% 281.49	APH (100%PE) 85% Futures (M15) 66% 277.36
2	Forward (M15) 100% 304.42	APH (100%PE) 75% Futures (M15) 66% 296.72	APH (100%PE) 75% Futures (M15) 66% 290.96	APH (100%PE) 75% Futures (M15) 66% 285.28	APH (100%PE) 75% Futures (M15) 66% 279.72	APH (100%PE) 75% Futures (M15) 66% 274.35
3	APH (100%PE) 75% Futures (M15) 66% 302.49	APH (100%PE) 75%C Futures (M15) 66% 295.52	APH (100%PE) 85% Futures (M15) 66% 290.33	APH (100%PE) 85%C Futures (M15) 66% 282.21	APH (100%PE) 85%C Futures (M15) 66% 275.77	RA-BP 75% 271.77

[a] CE under power utility function.

Analysis not presented in Table 3 indicated APH at the 75% and 85% coverage levels were the highest ranked crop yield insurance strategies in terms of CEs. In contrast to Carroll County, in Elkhart County the GRP products were not included in the top five revenue insurance strategies in terms of CEs. RA-BP at 75% coverage level produced

the highest CEs among the revenue insurance alternatives considered for the slightly to the extremely risk averse producers and was included in the top rated risk management strategies in Table 3 for the very risk averse.

Years Following a Normal Crop Year Scenario

The benchmark strategy of no insurance with cash sale at harvest resulted in CEs which ranged between $282 per acre for a risk neutral individual to $222 per acre for a highly risk averse individual. This represented an increase in CE of about $1 per acre for risk neutral individuals and a decrease of about $11 per acre for risk averse decision makers respectively, relative to the benchmark strategy under the all years scenario. Similar to Carroll County, the shift away from hedging 100% of expected production using futures positions implemented on March 15 toward APH insurance with futures contracts at 66% level of expected production established in March occurred at lower levels of risk aversion relative to the all years scenario (Table 4).

In Elkhart County, hedging 100% of expected production using futures positions established in March had a CE of about $11 per acre less in the years following a normal crop year. This was only about one-half of the difference in Carroll County. Also, as in Carroll County, the differences in the CEs of risk management strategies between the all years and years following a normal crop year were smaller for decision makers with higher levels of risk aversion.

Table 4. Elkhart County Top Risk Management Strategies for Crop Years Following Normal Crop Year Scenario Ranked by Certainty Equivalents ($/acre)[a]

Strategy /CE	Relative Risk Aversion Coefficient					
Rank	0	1	2	3	4	5
1	Futures (M15) 100%	Futures (M15) 100%	APH (100%PE) 75% Futures (M15) 66%	APH (100%PE) 85% Futures (M15) 66%	APH (100%PE) 85% Futures (M15) 66%	APH (100%PE) 85% Futures (M15) 66%
	301.07	292.40	284.24	279.13	274.75	270.57
2	APH (100%PE) 75% Futures (M15) 66%	APH (100%PE) 75% Futures (M15) 66%	APH (100%PE) 85% Futures (M15) 66%	APH (100%PE) 75% Futures (M15) 66%	APH (100%PE) 75% Futures (M15) 66%	APH (100%PE) 75% Futures (M15) 66%
	295.87	290.07	283.70	278.47	272.82	267.39
3	APH (100%PE) 75%C Futures (M15) 66%	APH (100%PE) 75%C Futures (M15) 66%	Futures (M15) 100%	APH (100%PE) 85%C Futures (M15) 66%	RA-BP 75%	RA-BP 75%
	295.69	288.98	282.61	275.77	271.27	267.27

[a] CE under power utility function.

Certainty Equivalents - Posey County

All Years Scenario

CEs for the benchmark strategy ranged from $274 per acre for a risk neutral individual to $255 per acre for a highly risk averse individual, a narrower range than in the other counties. Futures hedges initiated on March 15 at 100% of the expected production level provided the highest CEs of the risk management alternatives evaluated for most risk aversion levels in Posey County (Table 5). The exception was for a risk neutral individual where a put option strategy for 100% of expected production implemented on March 15 was the top ranked strategy. GRP insurance combined with

futures contracts were among the top three ranked alternatives in terms of CEs, and the rank of this strategy increased at higher risk aversion levels. There was about a $10 per acre difference in the CEs between the top and third ranked alternatives for all levels of risk aversion.

Table 5. Posey County Top Risk Management Strategies for All Years Scenario Ranked by Certainty Equivalents ($/acre)[a]

Strategy /CE	Relative Risk Aversion Coefficient					
Rank	0	1	2	3	4	5
1	Put (M15) 100% 312.16	Futures (M15) 100% 304.32	Futures (M15) 100% 299.34	Futures (M15) 100% 294.45	Futures (M15) 100% 289.69	Futures (M15) 100% 285.05
2	Futures (M15) 100% 309.39	Put (M15) 100% 302.24	GRP (70%MP) 90% Futures (M15) 66% 290.84	GRP (70%MP) 90% Futures (M15) 66% 286.81	GRP (70%MP) 90% Futures (M15) 66% 282.88	GRP (70%MP) 90% Futures (M15) 66% 279.07
3	GRP (70%MP) 90% Put (M15) 66% 302.72	GRP (70%MP) 90% Futures (M15) 66% 294.99	Futures (M15) 66% 288.89	Futures (M15) 66% 284.32	Futures (M15) 66% 279.88	Futures (M15) 66% 275.57

[a] CE under power utility function

In the analysis of crop revenue strategies, Posey County, similar to the results for Carroll County, GRP resulted in the highest CEs . Although not indicated in Table 5, in Posey County, the catastrophic level of insurance (CAT) was one of the highest ranked yield insurance strategies in terms of CEs. CAT coverage did not appear among the strategies with higher CEs in either Carroll or Elkhart County. However, it should be noted that CAT coverage does not have replant coverage of other individual farm-based insurances and those benefits are not considered in this analysis.

Years Following a Normal Crop Year Scenario

CEs for the no insurance, cash sale at harvest strategy ranged from $264 per acre for the risk neutral individual to $245 per acre for the highly risk averse individual. This represented a decrease in CE of about $10 per acre relative to the benchmark strategy in the all years scenario. Futures hedges initiated on March at 100% of the expected production level resulted in the top ranked strategy in terms of CEs for all risk aversion levels (Table 6). In contrast to the all years scenario, put option strategies did not appear in the top three ranked alternatives in terms of CEs under the years following a normal crop year.

Table 6. Posey County Top Risk Management Strategies for Crop Years Following Normal Years Ranked by Certainty Equivalents ($/acre)[a]

Strategy /CE	Relative Risk Aversion Coefficient					
Rank	0	1	2	3	4	5
1	Futures (M15) 100% 290.98	Futures (M15) 100% 287.03	Futures (M15) 100% 283.10	Futures (M15) 100% 279.20	Futures (M15) 100% 289.69	Futures (M15) 100% 285.05
2	GRP (70%MP) 90% Futures (M15) 66% 285.24	GRP (70%MP) 90% Futures (M15) 66% 281.84	GRP (70%MP) 90% Futures (M15) 66% 278.50	GRP (70%MP) 90% Futures (M15) 66% 275.20	GRP (70%MP) 90% Futures (M15) 66% 282.88	GRP (70%MP) 90% Futures (M15) 66% 279.07
3	Futures (M15) 66% 282.63	Futures (M15) 66% 278.74	Futures (M15) 66% 274.88	GRP (70%MP) 80% Futures (M15) 66% 271.14	Futures (M15) 66% 279.88	GRP (70%MP) 80% Futures (M15) 66% 275.59

[a] CE under power utility function.

Comparing the all years scenario to the years following a normal crop year, the reduction in the CE for the hedging with futures strategy was about $11 per acre. This

was almost identical with the reduction in the benchmark strategy. In the all years scenario, the difference in the CEs between the first and third ranked strategies was almost constant at $10 per acre across levels of risk aversion. The difference in CEs between the top and third ranked risk management strategies tended to be about $8 per acre for risk neutral to moderately risk averse individuals, increasing to about $10 per acre for higher levels of risk aversion for the years following a normal crop year scenario. Like the other counties analyzed, there were only limited changes in the top-ranked strategies between scenarios.

Conclusions and Implications

A total of 74 risk management strategies were considered in Carroll, Elkhart and Posey Counties under two different scenarios: all years, and "years following a normal crop year." Marketing, crop yield, crop revenue and combinations of strategies were considered. The years considered in the analysis were from 1986 to 2001 for Carroll and Elkhart Counties and from 1987 to 2001 for Posey County. Analysis considered an all years scenario and a years following a normal crop year to determine if specific risk management strategies affect the level and variability of net farm revenue under different market conditions which can be observed by producers.

For both scenarios and all three counties, futures hedges established in March alone or in combination with a yield insurance product provided the highest CEs among the risk management strategies evaluated. Results also indicated that establishment of positions in March resulted in higher returns and CEs than positions established in June. In addition, higher CEs were obtained when high percentages of the expected production were hedged. These findings are consistent with the Wisner et al. hypothesis of pre-

harvest marketing of grains increasing returns for producers. However, similar to Collins results, restricting analysis to years following a normal crop year substantially reduced the returns associated with early marketing of corn and soybeans. Carroll County presented the highest reduction in returns where CEs decreased by about $13 to $22 per acre for the top ranked strategy, with the highest reduction at lower levels of risk aversion. In contrast, Elkhart County presented the lowest reduction in returns, with a decrease in CEs for the top ranked strategy of about $6 to $10 per acre. Interestingly, futures hedges established in March and GRP insurance in combination with futures hedges did not present a reduction in CEs at higher levels of risk aversion in Posey County. There are differences in the effectiveness of risk management alternatives among geographical areas in Indiana. APH insurance was not included in the highly ranked strategies for Posey County, GRP was not included among the highly ranked strategies in Elkhart County and Carroll County had a mix of APH and GRP insurance.

In Carroll and Elkhart Counties, there tended to be a shift away from futures contracts alone toward APH insurance in combination with futures hedges as risk aversion increased. This shift tended to occur at lower levels of risk aversion when the years following a short crop year were excluded. Therefore, the prior crop year and the risk aversion level of a producer do affect the effectiveness of risk management strategies. Although the CEs were lower when the analysis was restricted to years following a normal crop year, there were only small changes in the rankings of the risk management alternatives.

In summary, there are many risk management strategies that have higher CEs than the benchmark strategy of no insurance with cash sale at harvest in all three counties

under all years and “years following a normal crop year.” Furthermore, differences do exist in the effectiveness of alternatives among geographical areas, risk aversion level of a producer and prior crop year. However, results of the type that would be used for producer educational programs are not especially sensitive to the prior crop year. Further research should include systematic marketing strategies and a broader array of both geographical locations and crops.

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