PURDUE AGRICULTURAL ECONOMICS REPORT

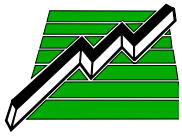
DECEMBER 2001

Outlook for 2002

Economic Recovery For Next Year

Larry DeBoer

Is this a recession? One definition is two straight quarters of decline in real Gross Domestic Product.



In the second quarter, GDP barely grew, at 0.3%. In the third quarter, GDP fell, by 0.4%. That's so close to recession that to call it something else is splitting hairs. The question is not "is this a recession?" The question is "when will the recession end?"

The economy had been skirting the edge of recession for months, due to excess inventories, stock market declines, rises in oil prices and Federal Reserve interest rate hikes in 1999-2000. September 11 tipped us over.

The recession will probably be short. The Federal Reserve has cut interest rates 4.5 percentage points since January. It takes six to nine months for interest rate cuts to be effective, so we should see the added consumer and business spending between now and mid-summer next year.

A second reason the recession will be short is tax cuts and spending increases. Congress is still debating a second stimulus package. Probably, they'll reach agreement, and more tax cuts will be in place by the first half of next year. Added military and reconstruction spending will help, too.

The third reason is prices. Oil prices are down sharply. That reduces our imports, and frees up consumer dollars for domestic spending. Other producer and consumer prices are falling too. Auto prices are down. That should help get rid of excess inventories. Prices for iron, steel, lumber and many other commodities are down in the past three months. That reduces business costs, and should encourage firms to think about expanding production.

"By the second quarter of 2002 the economy should start to expand."

So, expect another quarter or two of zero or small growth. By the second quarter of 2002 the economy should start to expand. Over the next year, expect real GDP to grow by one percent. Slower growth should bring inflation down from its already modest levels. The next twelve months should see inflation of about 2%. Unfortunately, GDP won't grow fast enough to keep unemployment from rising. The unemployment rate should be about 6.5% by October 2002. The Fed may cut interest rates again, once or twice. Expect the 3-month Treasury rate to be a bit lower in twelve months than it is now, at 1.5%. The 10-year rate should remain near where it is now, around 4.5%.

Improved U.S. Agricultural Trade Outlook

Phillip Paarlberg

Agricultural exports by the United States in fiscal year 2001/02 are expected to be $57 billion compared to $53.5 billion in 2000/01. Agricultural imports are forecast to remain around $39 billion, thus the agricultural trade surplus is expected to rise from $14.5 billion to $18 billion.

There are three negative forces affecting U.S. agricultural trade in 2001/02. One force is the continued strong U.S. dollar which remains high against the currencies of several major importers and rival exporters. Second, most major economies are experiencing poor economic growth. The third force is the perception that the U.S. commitment to the multilateral trading system is weakening. President Bush does not have Trade Promotion Authority.

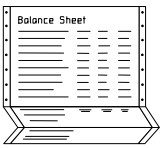
In This Issue

On the positive side, recent hurricane damage in Cuba is increasing the likelihood of some food sales there. China and Taiwan have recently joined the WTO which will be positive for trade in the longer run. Finally member countries of WTO have agreed to negotiate new agricultural provisions on world trade in the 2002 to 2005 period.

Farm Income Driven Upward by Livestock

Chris Hurt

National net farm income is estimated to rise 9% to $49.4 billion, the second highest on record. Income prospects for the nation's farmers have improved in 2001 due to increases in livestock returns. Milk prices will be near record highs for the year, and cattle and hog returns were also very strong in the first three quarters. On the other hand, income from crops nationally will be down as increased receipts of $2.9 billion are exactly offset by about $2.9 billion in lower direct government payments, plus production costs were higher.



Income prospects for Indiana farmers will be much stronger than for the nation as a whole due to record corn and soybean yields. The revenue generated from Indiana's favorable yields will more than offset some reduction in direct government payments and higher production costs related to fuel and fertilizer prices.

Is an Agricultural Bill Coming Soon?

Otto Doering and Allan Gray

In September, the House passed "The Agricultural Act of 2001" that keeps much of the 1996 Act, including:

1. Planting flexibility is maintained while providing counter cyclical protection against adverse market conditions

2. Fixed-decoupled payments are retained as well as the marketing loan program.

3. Producers are allowed to update base acreage, but current base yields are maintained. Both the fixed-decoupled payments and the counter cyclical payments are made on 85% of the producer's base.

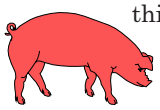
4. The loan rate for corn is set at $1.89/bu. and $4.92/bu for soybeans. The fixed payment (similar to the current AMTA payment) is $.30/bu. for corn and $.42 for soybeans. The target price is $2.78/bu. for corn and $5.86 for soybeans).

The Senate bill has passed out of committee as of this writing and is scheduled to be debated on the floor the week after Thanksgiving. It also maintains planting flexibility, contains direct payments, as well as a counter cyclical component. It allows for updating of both acreage and yield bases. The bills "safety net" price for corn is $2.35 per bushel, $5.75 per bushel for soybeans, and $3.45 per bushel for wheat. These are different than the house bill since payments are based on updated yields and are made at a 100% rate rather than the 85% rate in the house bill. There are many similarities between the two making passage of a "compromise" House/Senate agreement more likely to get done by the end of the year.

Hogs Struggle With Another Tough Fall

Chris Hurt

Hog prices weren't supposed to drop this low! That statement is too reminiscent of the fall of 1998 when everyone was shocked by the depression in hog prices. Most of us thought the fall lows would be in the higher $30s, not the higher $20s. The source of this depression appears to be in the weak tone of the general economy in combination with higher supplies than anticipated. Prices of live hogs are expected to average in the $36 to $38 per hundredweight range for the last quarter of 2001, compared to an expectation of $43 at the beginning of the quarter. About $2 of the lower price is a result of larger than anticipated supplies with the rest being other factors including a more cautious economy.



Farrowings are expected to be up 1% this fall and 3% in the winter. For 2002, expect to see production rise by about 3%. Exports will likely drop as Europe returns to more normal export patterns.

Prices of live animals this winter are expected to return to the higher $30 or low $40s after recovering from a much weaker fall than had been anticipated. Spring should bring a return to prices in the mid-$40s, with summer prices averaging in the low-to-mid $40s.

It is expected that some additional expansion will occur by late 2002 and into 2003, thus prices will be pressured. With this thought in mind it is suggested that producers keep expansion plans moderate.

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Cattle Prices Get Caught in 9-11 Crash

Chris Hurt

The cattle market collapse was a victim of the terrorist attacks of September 11th. Prospects for weaker economic growth as well as reductions in beef consumption in restaurants that cater to vacation, business, and convention travel reduced prices by an estimated $6 per live hundredweight on finished cattle this fall. In addition, the discovery of mad cow disease in Japan also cut into U.S. exports.

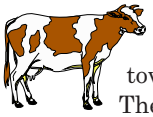
In 2002, production is expected to drop again by 2% to 3%. This should give rise to stronger finished cattle prices with the big question being how much recovery in demand? Expect first quarter prices for finished steers to be in the $68 to $72 range, with second quarter prices averaging in the $72 to $77 range. Seasonal highs in late March and early April could reach into the higher $70s and even stronger if demand returns.

Calf prices are expected to be modestly lower than last winter. As an example, Oklahoma City 500-550 pound steers average $108/cwt. last fall and are expected to average about $105/cwt. this fall. Weaker calf prices are resulting from the weakness and uncertainty in the finished cattle market. However interest rates are lower, feed costs remain moderate, thus further recovery could come in calf prices if confidence is restored in beef demand. Calf prices are expected to strengthen a few dollars into the spring. Calf prices tend to run $3 to $5 lower in southern Indiana as compared to Oklahoma City.

Milk Prices Near Record As Indiana Grows

Mike Schutz, Animal Sciences Professor

Indiana is the fastest growing dairy state in the nation at the current time. In 2000, the number of dairy cows increased by 13,000 to 151,000.



And what a great time to be expanding with milk prices pushing back toward record high levels. The all U.S. milk price reached an annual high of $15.42/cwt. in 1998, and the current USDA estimate is for an average of $15.10 this year. Unfortunately, however, the high milk prices are behind us, as lower prices are in prospect for 2002.

Milk production was down by 1.3% with consumption up 1% in 2001. Indiana producers have benefitted from having high milk prices but have not been as exposed to sharp restrictions on forage and feed supplies. The greater stress was on dairies in the southwest and western states where a second year of drought limited forage and feed supplies.

Recovery in milk production per cow will increase supplies into 2002. For 2002, total milk production is expected to increase by about 2.7% with milk consumption growing only 1.8%. Thus, milk stocks will build and prices move lower. All milk prices this winter are expected to average about $13.15, and about $12.40 in the spring. USDA is currently estimating that all milk prices will average $13.20 in 2002.

Major Reduction In 2002 Input Cost

Howard Doster

Lower fertilizer prices will be an important feature for input prices in the coming year. Phosphorous prices are expected to be very low. As an example, 18-34-0 prices this winter could be $35 to $50 per ton lower than last year. If so, this could be an ideal year to apply potash for the next several years. Potash prices are expected to be 2% lower than last year with adequate supplies. Nitrogen prices will also be sharply lower.

Fuel prices and propane for drying in 2002 are likely to have sharply lower price. For other inputs, seed and chemical prices are expected to average unchanged in the next 12 months, and machinery prices are expected to rise by 3% to 4%. Anticipation of higher machinery prices is based upon increased labor and transportation costs, and due to low inventories with some increase in demand due to higher farm incomes.

What do crop budgets suggest for crop mix for 2002? Preliminary budgets suggest that Indiana producers will have about equal incentive to plant corn and soybeans in 2002. Wheat returns for 2002, while improving, remain a far distant contender compared to corn and soybeans.

Corn acreage may need to be larger next year. These budgets suggest little shifting. Thus new crop corn prices will likely need to be higher at some point to move added acres into corn. Again at this early point, some shifting of acreage to corn from soybeans seems likely for next year, especially if December 2002 corn futures can reach the $2.60 level.

Farmland Values and Cash Rent

Craig L. Dobbins

In spite of continued low commodity prices, Indiana land values and cash rents continue to increase. In June 2001, the estimated value of average agricultural land was $2,264 per acre for the state. The cash rent was estimated to be $113 per acre. One factor that helps explain this strength is increased government payments.

Demand for farm land continues to be strong. The growing non-farm economy has resulted in a strong demand for development land close to towns and cities. It has also resulted in a strong demand for country home-sites and recreational land. There has also been a strong demand from farmers seeking to expand. While expansion may be a bigger factor in the rental market, it is also a source of demand supporting farmland values. The strong demand combined with the limited supply of land for sale and rent has

served to maintain land values and cash rent.

There are several important items to watch with regard to farm land values:

1. Government payments: Will a new farm bill be passed for 2002, and will it have as much, or more support than "Freedom to Farm?"

2. Demand from operators interested in increasing the size of their business, developers, and people desiring a place in the country,

3. Income from off-farm jobs and the slow down in the non-farm economy.

For next year, cash rents are expected to remain at about current levels. Land values are expected to increase, but because of the softening non-farm economy the increase is expected to be less than the 3% to 6% increase this year.

Corn Surplus Shrinking Sending Prices Higher

Chris Hurt

In the U.S., acreage was down 3.5 million acres. National yields are estimated at 138 bushels per acre, about 1 bushel above trend. Indiana was the "garden spot" and had a tremendous crop. Indiana set a yield record of 160 bushels per acre compared with the previous record of 147 bu. per acre. New record high yields were made in each of the state's nine crop reporting districts. Yields were10 to 15 bushels above normal for northern Indiana, and 20 to 30 bushels above normal in the central and southern portions of the state.

Usage is expected to reach 9.9 billion bushels with a crop that is about 9.55 billion. Thus carryover stocks from this year's crop will drop from 1.9 billion down to 1.57 billion.

USDA is estimating the season average corn prices will be $2.00 compared to $1.85 for the 2000 crop. Cash prices are expected to move up by as much as 35 cents per bushel during the winter. This would put prices in northern Indiana near $2.15, central Indiana near $2.20, and the Ohio River market at $2.35 per bushel.

Producers should consider taking the LDP's on corn, as it is anticipated that they will not be working this winter. Some of the best pricing opportunities could come in late November and December, so this is a time frame to watch closely.

There are excellent price incentives to earn returns for storage this year. Once the decision to price has been made consider pricing for a later delivery period that will earn the most return above costs for storage. This may be as far out as next June. New crop December 2002 futures will likely reach or exceed the $2.60 price sometime this winter, and will provide an excellent place to start pricing the 2002 crop.

Soybeans Making Little Progress

Chris Hurt

In contrast to corn, soybean prices are expected to struggle at below loan levels in the coming marketing year. Record high acreage of 75.2 million and yields somewhat above trend at 39.4, in combination with record large Southern Hemisphere crops are increasing world and U.S. carryover stocks.

U.S. ending stocks are expected to rise from 248 million bushels to 355 million bushels by August 31, 2002. Soybean meal prices (48%) are expected to average $160 per ton at Decatur, Illinois compared to $170 last year.

The USDA estimates that the average U.S. farm price for soybeans will be $4.30 (in a range from $3.90 to $4.70). This is down $.25 per bushel from the average of $4.55 for the 2000 crop.

Cash prices are expected to show a strong upward tendency in late November and early December. The direction of prices after that will depend upon crop progress in South America, and on world income conditions.

Most producers will want to take their LDP's as soon as possible, especially if they plan to price beans in late 2001. Cash soybean prices are expected to rally 25 to 35 cents per bushel into mid-December. If so, this would put central Indiana cash prices in the $4.60 to $4.70 range. Prices on the Ohio River could reach $4.75 to $4.85. These should be strongly considered, as historically, prices tend to reach their winter highs by about mid-December. The market is providing no price incentives to store beans into 2002.

Could bean prices surge to the upside? World surpluses are greater for soybeans than for corn, and would thus seem to limit major upside potential, unless Southern Hemisphere crop yields drop next spring.

Wheat Stocks Tighten, and Prices Should Rise

Chris Hurt

Just like corn, world wheat stocks in 2001/02 are expected to be tighter than in 1995/96 when world prices were very high. World production is expected to drop by 1% led by a 12% decline in the U.S., 13% in Europe, 6% in China, and 23% in Canada.

World wheat stocks are tight, U.S. carryover's have been reduced, and thus U.S. farm prices are expected to increase to an average of $2.85 per bushel compared to $2.62 for the 2000 crop. The higher wheat prices will cut into wheat feeding however, as this volume shifts back to corn and sorghum. Exports may get support from less competition due to smaller crops in Canada, China, and the EU.

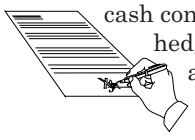
Indiana cash prices may recover back to near $3.00 at Ohio River elevators and $2.80 for central and northern regions. Wheat prices tend to peak in December or January. Indiana's wheat acreage reached a record low in 2001 at 400,000 planted acres.

Protecting Farm Revenues with Pre-Harvest Pricing and Insurance

Kurt J. Collins,[*] research analyst with Sparks Companies, Inc.; James G. Pritchett, Assistant Professor, Department of Agricultural and Resource Economics, Colorado State University; and George F. Patrick, Professor

Suppose you have a growing crop but are months away from harvest - what's the value of the crop today? Will the crop have the same value tomorrow? In truth, the value of a growing crop changes from planting to harvest, and there is no reason to believe that its harvest value will be greater than on any other day during the growing season. To be more specific, the value of the crop – defined as its total revenue – depends both on the yield and the price received. Crop prices may fluctuate widely during the growing season. Weather conditions can positively affect yields one day and negatively another. Changing yields and prices both alter the value of the growing crop. No one likes selling a crop for less value than they could have had in the spring if only they had used pre-harvest pricing. Can you protect the crop's value throughout the growing season?

Pre-harvest pricing in the guise of cash contracts or futures hedges, as well as crop and revenue insurance, offer alternative strategies for protecting a crop's value. No one strategy will best protect a crop's value every year because each growing season is different. Furthermore, even good decisions don't always have favorable outcomes. But careful use of marketing and insurance tools will reduce the variability of revenues and help to prevent a "bad" revenue outcome – an outcome that places your farm business in financial peril.



To take advantage of marketing and insurance tools, it's important to first understand how each tool functions and under what conditions a specific tool will work well or poorly. For instance, a futures contract hedge limits losses in markets with declining prices, but will also limit gains in markets with increasing prices. One of your goals as a farm manager may be to provide the business with a minimum level of protection, but also to avoid paying too much for this protection. The cost of protection may come directly out-of-pocket, like an insurance premium, or be a cost associated with a missed opportunity.

An example farm will assist in understanding how marketing and insurance tools function by comparing revenue from cash sales at harvest to revenues from other strategies. The general advantages and disadvantages of crop insurance and marketing tools will be discussed in terms of the revenues generated from each strategy for the example farm. The procedures used in this study are discussed in the first section of this article. The second and third sections look at the effects of marketing and crop insurance tools independently. In the fourth section, combination strategies that both increase average returns and decrease downside risk are identified. The article concludes with some general observations about risk management.

Example Farm and Procedures

The example farm is a "typical" farm in Central Indiana. The farm has 1,500 acres in a 50/50 corn-soybean rotation. The farm's net revenue[**] is derived from the harvest-time sale of crops. Yield and price information are based on the prices observed in "normal" crop years between 1986 and 2000. A normal crop year is defined as a year that does not follow a short crop year.[***] To represent how the farm's revenues may change under various growing and price conditions, a normal crop year between 1986 and 2000 is chosen at random. Once the year is selected, the farm's revenues are calculated using the corresponding prices and a farm level yield from the respective randomly chosen year. If applicable, the county loan rates and loan deficiency payments are calculated. The process is repeated 1,000 times[****] leading to many potential revenue outcomes, some of which occur more frequently than others. The revenue outcomes are grouped with the likelihood of their

** Research was completed while Collins was a graduate research assistant at Purdue University.*

*** In our example, net revenue is the proceeds from selling the crop minus marketing and insurance costs. It is assumed that production costs, such as seed, fertilizer, herbicide, etc. stay the same regardless of the marketing or insurance strategy used.*

**** A short crop year occurs when production falls below the previous year's total utilization and when the U.S. average yield is 5% or more below the long run trend line yield (Wisner, 2001). Short crop years occurred four times between 1986 and 2000, in 1988, 1991, 1993, and 1995. In these years, high harvest prices exist relative to pre-harvest prices. Conversely, years after short crop years tend to have high pre-harvest prices and lower relative harvest prices as the "normal" harvest relieves the tight supply conditions. The four after short crop years (1989, 1992, 1994, and 1996) were excluded from this study because price trends don't reflect normal crop conditions, i.e., if producers know that pre-harvest prices are abnormally high due to the prior year's shortage they may opt for different marketing strategies. In a normal year, it is not known if pre-harvest prices will exceed harvest prices.*

***** Specifically, simulations are conducted using an historical nonparametric procedure. The chosen year's prices are used in revenue calculations along with a crop yield that is based on the average farm yield for that year plus or minus a randomly chosen error. In this way, farm level yields are linked to each year's growing conditions and prices. The simulation is performed using an Excel spreadsheet and the @Risk analysis software (Collins, 2001).*

Table 1. Top 10 Marketing Strategies Ranked By Average Revenue and Average Revenue under Normal Crop Year Conditions

Strategy	Coverage Level	Rank Among Marketing Alternatives	Average Revenue in $1,000	Rank Among All 74 Alternatives
Put Option Hedge (March 15th)	100% of Expected Prod.	1	$431.2	7
Put Option Hedge (March 15th)	66% of Expected Prod.	2	$430.7	9
Put Option Hedge (March 15th)	33% of Expected Prod.	3	$429.7	12
Futures Hedge (March 15th)	100% of Expected Prod.	4	$428.1	16
Futures Hedge (March 15th)	66% of Expected Prod.	5	$426.3	24
Forward Contract (March 15th)	100% of Expected Prod.	6	$425.4	28
Forward Contract (March 15th)	66% of Expected Prod.	7	$424.2	35
Futures Hedge (March 15th)	33% of Expected Prod.	8	$423.5	36
Forward Contract (March 15th)	33% of Expected Prod.	9	$423.0	38
Futures Hedge (June 1)	66% of Expected Prod.	10	$422.1	47
Benchmark: Harvest Sale	**100% of Actual Prod.**	**NA**	**$421.8**	**50**

occurrence. In this way, the net revenues from a harvest cash sale (our benchmark strategy) can be compared to net revenues with marketing tools, insurance tools, or a combination of market and insurance tools.

The simulation process generates a number of net revenue outcomes, and a systematic method is needed to compare the strategies. One straightforward way to compare strategies is based on average revenues. Perhaps more importantly though, we'll also compare strategies based on how many times a "bad" outcome occurs and the farm has truly low revenues. This downside risk comparison will be made based on the dollar amount of revenue that the farm fails to achieve 5% of the time. Comparisons based on this dollar amount are called "Value-at-Risk" comparisons.

It might be worthwhile to explain the idea of Value-at-Risk (VaR) further. Suppose that the net revenue outcomes for one alternative, say a simple cash sale at harvest, are generated. After collecting these randomly generated revenues, it turns out that the harvest cash sale strategy fails to reach the $260,000 revenue level five percent of the time. Thus, the harvest cash sale's 5% VaR is $260,000. Now compare this to another marketing strategy that fails to meet the $300,000 revenue level five percent of the time. Other things being equal, which strategy is preferred? Because the second marketing strategy has the higher 5% VaR revenue ($300,000 vs. $260,000), it provides more downside protection than the harvest cash sale, so the second marketing strategy would be preferred. Intuitively, a farm manager prefers this strategy because it provides a 95% chance that we can achieve revenue of $300,000 or higher (only 5% of the time we will have less than $300,000). In contrast, the cash sale at harvest strategy provides a 5% chance of reaching only $260,000 or less and a 95% chance that revenue will exceed $260,000.

All told, seventy-four (74) different strategies are compared for the example farm, and the results are discussed below. Initially, an overview of marketing strategies is presented. This is followed by a discussion of insurance strategies. Finally, combination strategies utilizing both marketing and insurance tools are presented.

Marketing Tools

Marketing strategies in this study

are essentially pricing strategies that allow the farm manager to establish the price for corn or soybeans prior to harvest. In most locations, pre-harvest prices can be established using cash forward contracts, basis contracts, hedge-to-arrive contracts, deferred price contracts and delayed payment contracts. In addition, pre-harvest prices may be established using futures hedges, while minimum prices can be set using options hedges. To narrow the possible marketing alternatives in our discussion, we'll focus on cash sales at harvest, forward contracts, futures hedges and options hedges***** as pre-harvest pricing alternatives. Pre-harvest marketing occurs for 33%, 66% and 100% of the expected harvest production level. Expected harvest production is the

***** *Options hedges are set at the nearest out-of-the-money strike price on the Wednesday nearest March 15th for early spring hedges and June 1st for hedges initiated later in the spring. Forward contract prices are based on historical data from Central Indiana.*

actual production history yield (APH)****** times the crop's acreage. If there is a production shortfall, the revenue is reduced by the cost of covering that shortfall.

A potential advantage of pre-harvest pricing is the ability to lock-in a favorable price – whether this price meets a marketing goal by earning a percentage over variable costs or achieving better than average returns against a benchmark. Pre-harvest pricing allows the farm manager to take advantage of seasonality in corn and soybean prices – a seasonality that usually means spring prices are higher than prices at harvest. Table 1 lists the top ten pre-harvest marketing strategies ranked by average revenue as well as their overall rank against all 74 strategies.

The put option hedge ranked highest among marketing alternatives in terms of average revenue, about $431,200. Indeed, the top three marketing strategies were all put option hedges that were initiated on March 15th and hedged 100%, 66% and 33% of the expected level of production. The advantages of this strategy are pretty straightforward; the put option hedge offers a minimum price guarantee with an opportunity to benefit from price increases. These strategies ranked 7th, 9th and 12th among all possible risk management strategies in terms of average revenue. Thus, they compare favorably to the insurance strategies and combination strategies that will be discussed later. In addition, each of these top ten ranked strategies performed better in terms of average revenue than the simple cash sale at harvest, which at $421,800, is ranked 50th among all strategies. The gains from pre-harvest pricing were modest however; the highest-ranking marketing strategy had average revenues 2% higher than the cash sale at harvest strategy. This nearly $9,600 difference is less than $6.50 per acre.

Examining Table 1 more closely, it becomes apparent that early pre-harvest pricing (March 15th) ranks higher in terms of average revenues than late spring pricing (June 1st). In part, pricing early takes advantage of early season high prices for corn and soybeans. Better pricing opportunities often existed on March 15th relative to June 1st in the years following normal crop years during the 1986-2000 period, which is why these strategies tend to perform well.

Pricing a higher percentage of expected crop production had higher average revenue rankings than pricing a lower proportion of the crop. For instance, put options that hedged 100% of expected production ranked higher than hedges of 66% or 33% of expected production.

While these marketing strategies tend to rank high in terms of average revenues, they may not reduce the variability of the revenues. In fact, these strategies do have considerable downside risk. Table 2 illustrates this concept as it lists the same ten strategies from Table 1, but also includes their 5% VaR rankings and 5% VaR level of revenue. Figure 1 shows the average revenue and 5% VaR revenue of these strategies as a percentage of the benchmark harvest cash sale.

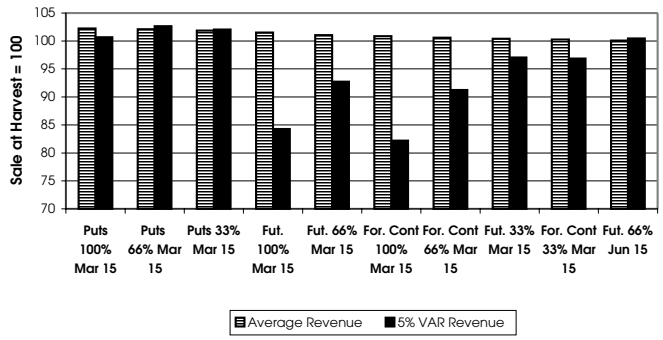
Table 2. Top 10 Marketing Strategies with 5% VaR Rankings under Normal Crop Year Conditions[1]

Strategy	Coverage Level	Average Revenue Ranking Among 74 Alternatives	Avg. Revenue in $1,000	5% VaR Ranking Among 74 Alternatives	5% VaR in $1,000
Put Option Hedge (March 15th)	100% of Expected Prod.	7	$431.2	45	$261.5
Put Option Hedge (March 15th)	66% of Expected Prod.	9	$430.7	35	$266.7
Put Option Hedge (March 15th)	33% of Expected Prod.	12	$429.7	39	$265.2
Futures Hedge (March 15th)	100% of Expected Prod.	16	$428.1	73	$218.9
Futures Hedge (March 15th)	66% of Expected Prod.	24	$426.3	65	$240.9
Forward Contract (March 15th)	100% of Expected Prod.	28	$425.4	74	$213.5
Forward Contract (March 15th)	66% of Expected Prod.	35	$424.2	66	$237.1
Futures Hedge (March 15th)	33% of Expected Prod.	36	$423.5	58	$252.1
Forward Contract (March 15th)	33% of Expected Prod.	38	$423.0	59	$251.7
Futures Hedge (June 1)	66% of Expected Prod.	47	$422.1	47	$261.0
Benchmark: Harvest Sale	**100% of Actual Prod.**	**50**	**$421.8**	**50**	**$259.8**

1 The strategies with the highest 5% VAR rankings are not all shown in Table 2, because this table only contains the 5% VAR rankings for strategies in Table 1. The top five marketing strategies in terms of 5% VAR are March 15th Put Option Hedges with 66%, 33%, and 100% coverage levels respectively and June 1st futures hedges at the 66% and 33% coverage level.

****** *The APH yield is the moving average yield for a particular parcel of land. For a further discussion on the APH yield, see "Crop and Revenue Insurance Alternatives" published in the September 2001* ***Purdue Agricultural Economics Report****.*

Figure 1. Average and 5% VaR Revenues of Top 10 Marketing Strategies as % of Cash Sale at Harvest



As indicated in Table 2 and Figure 1, marketing strategies that rank high according to average revenue do not perform well when ranked by 5% VaR. For instance, a March 15th put option hedge on 100% of expected production (Table 2, top row) ranked 7th among all possible risk management strategies based on the average revenue of $431,200. However, this strategy ranked only 45th, only slightly above the benchmark strategy, based on the 5% VaR risk criteria value of $261,500. In fact, none of the top ten average revenue strategies ranked higher than 35th in terms of 5% VaR. Even worse, six of the top ten strategies ranked lower than harvest cash sales, which was ranked 50th, at $259,800, in terms of 5% VaR. This can be seen clearly in Figure 1 where these strategies fall well short of the 100% of the benchmark strategy. Thus, selling at harvest would be a preferred strategy for protecting against very low revenues for the example Central Indiana farm when compared to these six strategies.

The top two rows of Table 2 illustrate the tradeoffs between increasing average revenues and maximizing downside risk protection. In Table 2, the greatest downside protection was provided by hedging 66% of expected production – but the greatest average revenue was generated by hedging 100% of expected production. This might be expected; generating high returns requires accepting risk rather than shifting it away. Is a producer willing to give up about $500 in average revenue to have a $5,200 higher 5% VaR?

Hedging and forward contracting 100% of expected production takes greatest advantage of seasonal highs in prices, increasing average revenues but also increasing downside risk. Increasing downside risk is tied to uncertain yields – if 100% of expected production is contracted and the harvested grain doesn't fulfill the contractual obligation, then producers must buy out the contract at likely higher prices and suffer a net loss. Likewise, if 100% of expected production is hedged and yields are low, then a portion of the futures contract becomes a losing speculative position. The sharp reductions in the 5% VaR revenue associated with the futures and forward contracting strategies show clearly in the middle of Figure 1.

The risk and return principle also applies to the timing of the pre-harvest pricing. The best time to establish price and receive the highest average revenues was in the early spring (March 15th) according to the results in Table 1. However, as suggested by Figure 1, the best time to establish futures hedges to protect against downside risk was on June 1st. Similar results (not presented) were obtained for forward contracting. Typically, less price and yield uncertainty exists in late spring relative to early spring. This is why there are higher 5% VaR rankings for June 1st, but lower average revenue rankings. Again, reducing the amount of risk in an operation tends to lower overall returns. Choosing the right strategy for your farm operation will depend, at least partially, on your tolerance for risk.

Insurance Tools*******

A number of crop insurance products have evolved over time including yield insurance, revenue insurance

Table 3. Top 10 Insurance Strategies Ranked by 5% VaR (Normal Crop Years)

Strategy	Coverage Level	5% VaR Ranking Among 74 Alternatives	5% VaR Revenue in $1,000	Avg. Revenue Rank Among 74 Alternatives	Average Revenue in $1,000
APH	85%	2	$308.8	60	$420.4
CRC	85%	3	$307.4	39	$422.8
RA-BP	75%	4	$306.8	34	$424.2
CRC	75%	5	$306.3	33	$424.2
RA-HP	85%	6	$306.3	67	$419.1
RA-BP	85%	7	$305.9	64	$419.6
RA-HP	75%	8	$304.7	55	$421.5
RA-HP	65%	9	$294.9	53	$421.6
IP	75%	10	$294.9	26	$425.7
CRC	65%	11	$294.9	44	$422.2
Benchmark: Harvest Sale	**100% of Actual Prod.**	**50**	**$259.8**	**50**	**$421.8**

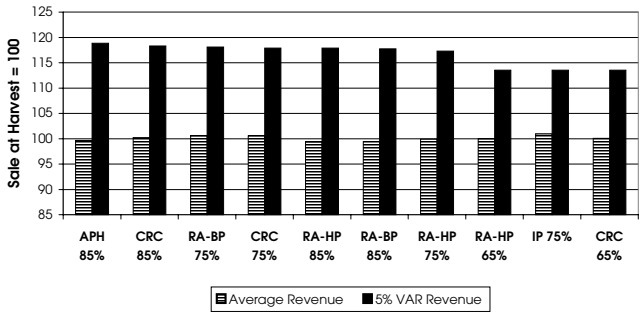
******* *More detailed explanation of yield, revenue and group insurances can be found in "Crop and Revenue Insurance Alternatives," published in September 2001 issue of the* ***Purdue Agricultural Economics Report****.*

and group insurance.******** Insurance products examined in this study include Actual Production History (APH), Crop Revenue Coverage (CRC), Income Protection (IP), Revenue Assurance (RA), Group Risk Plan (GRP) and Group Risk Income Plan (GRIP). Premiums are calculated using the Risk Management Agency's premium calculator, and these premiums are subtracted from the example farm's revenue when appropriate. Care must be taken in interpreting the results of this section because insurance premiums will vary from county to county, but should be fairly consistent across Central Indiana.

An important aspect of insurance alternatives is how indemnity payments are triggered. Various products provide some protection when revenues are low either directly (CRC, IP) or indirectly by protecting against low yields (APH, GRP). Importantly, the minimum revenue guarantee is calculated in many different ways, especially with respect to how the price used for insurance purposes is determined. However, in all cases, the price guarantees and indemnities are not based on a local market price or the price actually received by a farmer. Therefore, insurance will not protect a producer from poor marketing decisions.

Table 3 and Figure 2 rank crop insurance alternatives according to 5% VaR revenue. Clearly, these insurances provide some of the best downside protection of all 74 alternatives, and rank as, 9 of the top 10 strategies in overall 5% VaR rankings. A yield insurance, APH at the 85% coverage level, is ranked highest in Table 3 (top row) and as indicated in Figure 2, provides a 5% VaR revenue that is nearly 20% higher than the benchmark strategy. Interestingly, this is the only yield insurance among the top ten, the remainder of the insurance

Figure 2. Average and 5% VaR Revenues of Top 10 Insurance Strategies as % of Cash Sale at Harvest



strategies (CRC, RA-HP RA-BP, IP) protect farm revenues. For instance, CRC indemnity payments can be triggered when revenue falls below the guarantee level because of low yields and/or low prices. In addition, all 10 of the highest-ranking insurances alternatives are based on individual yield performance; group risk plans such as GRP and GRIP do not rank as highly in terms of 5% VaR revenue. Recall that group insurance indemnities are triggered only when the county suffers a loss, so it is possible that an individual farm may have a loss even when the county does not. In this instance, revenue is more variable, and group risk insurances will tend to have lower 5% VaR rankings than individual coverage based insurances such as APH and CRC.

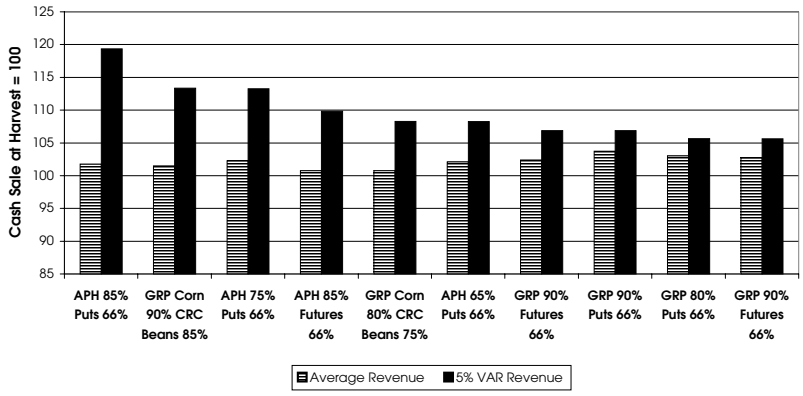
As expected, higher coverage levels tend to provide more protection against downside risk than lower coverage levels. This occurs in

Table 4. Top 10 Combination Strategies Ranked by 5% VaR under Normal Crop Year Conditions

Strategy	Coverage Level	5% VaR Ranking Among 74 Alternatives	5% VaR Revenue in $1,000	Average Revenue Ranking Among 74 Alternatives	Average Revenue in $1,000
APH & Put (March 15th)	66% Hedge 85% Coverage	1	$310.1	13	$429.2
GRP Corn CRC Soybeans	90% GRP 85% CRC	12	$294.5	15	$428.1
APH & Put (March 15th)	66% Hedge 75% Coverage	13	$294.3	6	$431.4
APH & Futures (March 15th)	66% Hedge 85% Coverage	15	$285.4	31	$424.9
GRP Corn CRC Soybeans	80% GRP 75% CRC	17	$281.3	32	$424.6
APH & Put (March 15th)	66% Hedge 65% Coverage	18	$281.2	10	$430.5
GRP and Futures (March 15th)	66% Hedge 90% Coverage (100% Max)	21	$277.6	4	$431.9
GRP and Put (March 15th)	**66% Hedge 90% Insurance (70% Max.)**	**22**	**$277.6**	**1**	**$437.5**
GRP and Put (March 15th)	66% Hedge 80% Insurance (70% Max.)	23	$274.5	2	$434.5
GRP and Futures (March 15th)	66% Hedge 90% Coverage (70% Max)	24	$274.4	3	$433.2
Benchmark: Harvest Sale	**100% of Actual Prod.**	**50**	**$259.8**	**50**	**$421.8**

******** *Discussion of the units that can be insured (e.g. basic, whole farm) is omitted from the text. Some insurance types may not be available for all units, readers are encouraged to contact their risk management professional for details.*

Figure 3. Average and 5% VaR Revenue of Top 10 Combination Strategies as % of Cash Sale at Harvest



spite of the fact that higher coverage levels also have larger insurance premiums. For instance, CRC at the 85% coverage level has a higher 5% VaR revenue, $307,400, than CRC 75%, $306,300, or CRC 65%, $294,600.

As was the case with marketing strategies, there is an opportunity cost to the downside protection that insurance provides; downside protection often comes at the expense of average revenues. In the last column of Table 3 the average revenue and rankings are listed for the top ten insurance strategies. Typically, the insurance strategies perform poorly in terms of average revenue rankings; the APH 85% insurance ranks 60th among all 74 strategies at $420,400. No insurance strategy ranks higher than 26th in terms of average revenue, and half of the top ten insurance strategies have lower average revenues than the harvest cash sale of $421,800 (bottom row of Table 3). However, as indicated in Figure 2, the differences in average revenues, in percentage terms, are relatively small. The insurance strategies with the highest revenues were the group risk strategies, which tend to have the lowest premiums.********* As an example, the 2001 GRP premium for the example farm was $1.01 per acre of corn as compared with $4.60 for APH at the 75% coverage level.

Combinations of Marketing and Insurance Strategies

It's clear from our discussion that marketing strategies tend to have higher average revenue rankings but provide less protection against downside side risk as indicated by the lower 5% VaR rankings. At the same time, crop insurance tools have high 5% VaR rankings but lower average revenue rankings. These results raise the question "What if we used these tools in combination?" In combination, perhaps the best of both worlds is available; that is, price risk is managed with marketing strategies and low yields (or revenues) are managed with insurance. However, using tools in combination can be quite expensive, and we may actually pay for more protection than is needed. Table 4 and Figure 3 include the top ten combination strategies as ranked by 5% VaR.

Table 4 and Figure 3 confirm our intuition; combination strategies tend to have higher 5% VaR rankings relative to marketing strategies used alone, and provide higher average revenue than insurance used alone. The combination strategy with the highest 5% VaR ranking is a combination of APH insurance and a put options hedge (Table 4, top row).

This combined strategy functions in a manner similar to revenue insurance – indemnity payments are triggered with low yields, and low prices are balanced by gains from the put option hedge. This strategy also ranks 13th among all alternatives in terms of average revenues generated, which is higher than APH insurance alone (ranks 60th) and nearly as high as a put option hedge alone (ranks 9th).

The highest-ranking combination strategy in terms of average revenue (GRP with 70% of the maximum protection, 90% coverage, and a put

Table 5. Top 10 Strategies Ranked by 5% VaR under Normal Crop Year Conditions

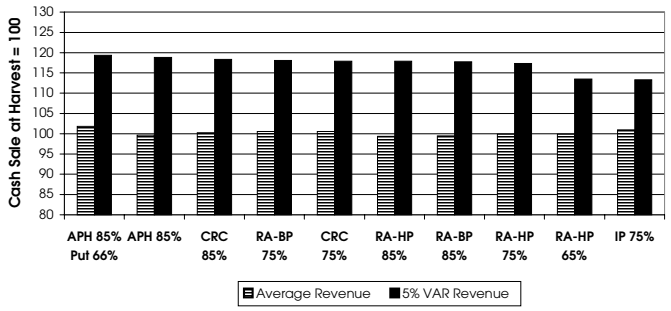
Strategy	Coverage Level	5% VaR Ranking Among 74 Alternatives	5% VaR Revenue in $1,000	Average Revenue Ranking Among 74 Alternatives	Average Revenue in $1,000
APH & Put (March 15th)	66% Hedge 85% Coverage	1	$310.1	13	$429.4
APH	85%	2	$308.8	60	$420.4
CRC	85%	3	$307.4	39	$422.8
RA-BP	75%	4	$306.8	34	$424.2
CRC	75%	5	$306.3	33	$424.2
RA-HP	85%	6	$306.3	67	$419.1
RA-BP	85%	7	$305.9	64	$419.6
RA-HP	75%	8	$304.7	55	$421.5
RA-HP	65%	9	$294.9	53	$421.6
IP	75%	10	$294.9	26	$425.7
Benchmark: Harvest Sale	**100% of Actual Prod.**	**50**	**$259.8**	**50**	**$421.8**

********* *The insurance strategies with the highest average revenue rankings were GRP (100% of maximum protection, 90% coverage level); GRP (70% of maximum protection, 90%coverage level); GRP (100% of maximum protection, 80% coverage level); GRIP (100% of maximum protection, 90% coverage); IP (75% coverage level).*

option hedge) also has the highest average revenue ranking among all strategies (Table 4, row 8). This strategy combines the yield insurance of GRP with the price protection of a put option hedge to create a synthetic revenue insurance. The strategy also ranks 22nd in terms of 5% VaR, ranking nearly as well as the GRP strategy alone and much better than the put strategy alone (ranks 35th).

Figure 3 shows there are several strategies with average revenues that are greater than the benchmark strategy of cash sales at harvest. Furthermore, these strategies also have 5% VaR revenues that are higher than the benchmark strategy. As discussed previously, the higher average returns are generally associated with greater downside risk (lower 5% VaR revenues).

Figure 4. Average and 5% VaR Revenues of Top 10 Strategies for 5% VaR as % of Cash Sale at Harvest



Concluding Remarks

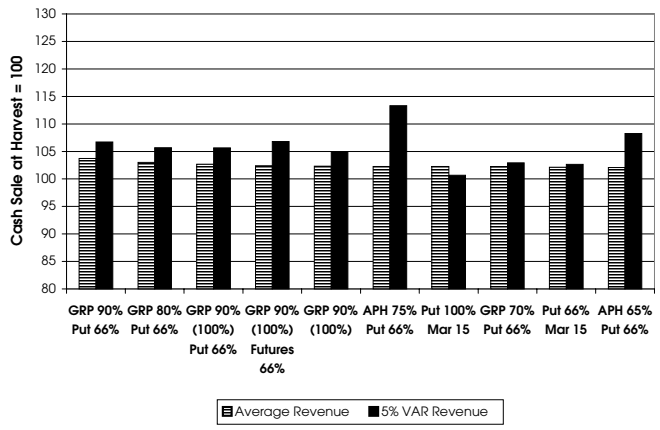
This study examined how well 74 different marketing, insurance and combination strategies protect the value of a growing crop in terms of 5% VaR and average revenue. Only normal crop years, years not following a short crop, in the 1986 to 2000 period were considered. Table 5 and Figure 4 and Table 6 and Figure 5 present the top ten strategies in terms of 5% VaR and average revenue. Using the rankings and values from Tables 1-4 and Figures 1-3, a few general points may be made:

- Using marketing strategies to manage price risk will keep average revenues high relative to other choices. However, yield risk is still very important, and use of marketing strategies alone generally means that producers face more downside risk than a simple cash sale at harvest.
- Marketing strategies which price the growing crop earlier in the season generate higher average revenues than late spring pricing, but also present more downside risk. Pre-harvest pricing does not work well in drought years, which occurred infrequently in the years of our study (1986-2000).
- Crop and revenue insurance strategies can significantly reduce downside risk, as measured by 5% VaR revenue. However, these strategies generally have slightly lower average revenues than strategies not involving insurance due to the cost associated with insurance premiums.
- Individual insurances such as APH and CRC provide better downside risk protection than group risk plans, but will also generate lower average revenues than group risk plans.
- Higher coverage levels of insurance provide greater downside

Table 6. Top 10 Strategies Ranked by Average Revenue under Normal Crop Year Conditions

Strategy	Marketing and Insurance Coverage Level	Average Revenue Ranking Among All Alternatives	Average Revenue in $1,000	5% VAR Ranking Among All Alternatives	5% VaR Revenue in $1,000
GRP and Put (March 15th)	66% Hedge 90% Insurance (70%Max.)	1	$437.5	22	$277.2
GRP and Put (March 15th)	66% Hedge 80% Insurance (70% Max.)	2	$434.5	23	$274.5
GRP and Futures (March 15th)	66% Hedge 90% Coverage (100%Max)	3	$433.2	24	$274.4
GRP and Futures (June 1st)	66% Hedge 90% Coverage (100% Max)	4	$431.9	21	$277.5
GRP	90% Coverage (100% Max)	5	$431.6	25	$272.7
APH & Put (March 15th)	66% Hedge 75% Coverage	6	$431.4	13	$294.3
Put Option Hedge (March 15th)	100% Hedge	7	$431.4	45	$261.5
GRP and Put (March 15th)	66% Hedge 70% Coverage (70% Max.)	8	$431.1	32	$267.4
Put Option Hedge (March 15th)	66% Hedge	9	$430.7	35	$266.7
APH and Put (March 15th)	66% Hedge 65% Coverage	10	$430.5	18	$281.2
Benchmark: Harvest Sale	**100% of Actual Prod.**	**50**	**$421.8**	**50**	**$259.8**

Figure 5. Average and 5% VaR Revenue of Top 10 Strategies for Average Revenue as % of Cash Sale at Harvest



risk protection, but tend to produce lower average revenues.

- Combination strategies, especially synthetic revenue insurance strategies which combine yield insurance and a marketing tool, tend to have relatively high average revenues and relatively high 5% VaR revenues when compared to marketing strategies or insurance strategies alone, respectively.

- A variety of synthetic revenue insurance combinations, formed by combining crop insurance and a marketing strategy, provide increased revenue and reduced downside risk relative to the cash sale at harvest strategy. Thus, there is no one "best" risk management strategy.

- Tradeoffs exist among all of the risk management alternatives. Reducing the chance of excessively low revenues precludes opportunities to generate higher revenues. Chasing higher revenues almost always will increase the potential for low revenues.

Used carefully, marketing, insurance and combination strategies can reduce risk and increase average revenues relative to a simple cash sale at harvest. Before making a risk management decision, farm managers are advised to first understand how each tool functions, and in particular, focus attention on the conditions in which the tool will work well and when it works poorly. Farm managers should strive to achieve a minimum level of risk protection and acknowledge that the necessary protection may differ from farm operation to farm operation. Finally, consult with your local extension educator or risk management professional to determine which tools are available in your area and to evaluate which tool or tools are the best fit for your situation.

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Wisner, Robert. Personal interview via e-mail January 29, 2001.

Estate Planning — 2002
Jan. 22&29—6:30p.m.-9:30 p.m.
Spring Mill State Park Inn,
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Feb. 15 – 8:45 a.m.– 3:00 p.m.
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Social, Legal and Tax Issues
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