B R I E F I N G

Using a MBM Risk Calculator
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Objective

Analysis

for Informed

Decision Making

Risk management strategies for crops fall into three categories: (1) Government programs that provide price protection through loan rates or loan deficiency payments (LDP), (2) Crop insurance products that cover yield risk and may include price protection, (3) Formal price risk management tools that may or may not include standardized futures and options contracts.

Weather and other natural events largely determine local and national yields and ultimately combine with other market forces to determine prices for a given commodity. The spreadsheet "MBM Risk Calculator" is designed to combine different risk management strategies to determine how they affect crop revenue[1]. The calculator is designed for ease of use and one-screen display on a computer or projector.

The Basic Scenario worksheet presented in Figure 1 is the easiest to use and understand. The user begins by completing the Inputs section for a specific crop and location. Then, desired selections are made from the Risk Management Toolbox section. By entering a "1", the product is acquired. Finally, the futures price and yield at harvest-time are entered in the "What if?" Scenario section – which then calculates crop revenues net of risk management costs.

Inputs

The inputs indicated in Figure 1 are generally well known and entered before any simulations are conducted. The inputs consist of the Federal Crop Insurance Corporation (FCIC) price and the new-crop futures price during February (for revenue insurance

products). These nationwide, crop-specific prices are available from USDA-RMA or a crop insurance agent. The FCIC is the level relevant for Catastrophic (CAT) and Multi-Peril Crop Insurance (MPCI) coverage. The spreadsheet can accommodate Crop Revenue Coverage (CRC), Income Protection (IP), and Revenue Assurance (RA) products.

The loan rate is crop and county-specific and obtainable from USDA-FSA. Basis, defined as cash price minus futures price, refers to the expected basis at harvest-time. Generally, the basis will be negative for most crops in the Northern Plains. Basis histories are usually available from Extension economists, or perhaps local elevators, lenders, or brokers. Actual Production History (APH) yield is farm- and crop-specific. The final entry is the "upper limit", which is relevant for revenue insurance products. The "upper limit" should be set to commodity-specific levels for CRC coverage. The "upper limit" is zero for IP and RA. RA's "harvest option" can be accommodated by setting the upper limit to a very high level.

Risk Management Toolbox

The toolbox incorporates both insurance and available marketing products. Insurance choices include yield and revenue products. Adjusting yield election levels to 50 percent and changing the insurance cost to almost zero can mimic CAT coverage. For any given crop, a reasonable approach to estimating CAT coverage costs per acre is to divide $100 by the acres covered by the CAT contract. To use an insurance tool, place a "1" in the first column after the product's name. Enter a "0" for any product that will not be used. Then, enter the yield and price elections for the insurance product and the product's cost on a per-acre basis.

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[1] MBM is the abbreviation for Master Business Manager, an Extension program under development at South Dakota State University.

MBM Risk Calculator-Basic Scenario

Inputs	
FCIC Price	$2.00
Feb. Futures	$2.50
Loan Rate	$1.75
Basis	-$0.50
APH Yield	100
Upper Limit	$1.50

"What if?" Scenario	
Futures:	$2.50
Yield:	100
Cash:	200.00
Yield Ins.	0.00
Rev. Ins.	-10.00
Hedge:	0.00
Puts:	0.00
Calls:	0.00
LDP:	0.00
Revenue:	$190.00

Risk Management Toolbox

	1=use 0=skip	Yield Election (%)		Price Election (%)		Cost
Yield Insurance	0	75		100		**$5.00**
Revenue Insurance	1	75		100		**$10.00**
Sell Futures	0	Price:		$2.50		
		Ratio:		100%		
Buy Puts	0	Strike:		$2.50		
		Premium:		$0.20		
Buy Calls	0	Strike:		$2.50		
		Premium:		$0.20		

The marketing products are activated by entering 1 to indicate use of the product and 0 otherwise. When selling futures, the futures price is entered in the price box. For options, both the strike price and premium are entered. Regardless of the product or products chosen, a hedge ratio (i.e., the percentage of expected crop production to be hedged) must be specified in the ratio box. A single ratio applies to any marketing product(s) activated, and is useful for comparing the interaction of insurance and marketing tools. Revenue insurance is often touted as a tool that facilitates aggressive marketing strategies; that is, high hedge ratios. The calculator lets the user compare acceptable hedge ratios under different insurance strategies.

"What if?" Scenario

Once inputs have been entered and selections made in the Risk Management Toolbox, harvest-time "What if?" scenarios can be conducted. The two critical variables at this stage are the harvest futures price and the harvest yield. Values for both may be selected and the calculator determines gains or losses from the chosen strategies. The spreadsheet determines revenue net of risk management costs. That revenue level can then be compared to the expected returns or expected production costs for the crop. A scenario (or set of scenarios) can then be found that provides revenue levels above production costs or some other minimum level of desired revenue.

The first item in the scenario is "Cash", computed as the sum of harvest futures price and basis multiplied by the harvest yield. Cash represents the price at a local elevator. Next are the gains or losses from insurance tools. For both product types, indemnity payments are computed based on harvest yields. Then, insurance costs are subtracted, resulting in indemnity projections net of insurance premiums.

Net gains from marketing tools are then computed. "Hedge" refers to futures results. Note that basis is constant, so it does not influence gains and losses here. "Puts" and "Calls" refer to the net gains from buying the respective tools. If the harvest futures price results in intrinsic value in the options, the gains are computed and the initial premium is subtracted. Hence, only in-the-money options have value at harvest.

The final adjustment to revenue is any LDP payment computed at harvest. If the sum of the harvest futures price and basis is less than the loan rate, the difference is multiplied by harvest yield to obtain an LDP payment per-acre. Various risk management adjustments are added to the cash price to obtain the "Revenue" estimate.

Additional Scenarios

A base scenario using last year's (or a typical year's) insurance and marketing strategy could be a good starting point for the analysis. Running additional scenarios can show the interactions of the different tools. For example, users can change crop insurance products and observe revenues for different prices and/or yields. Comparing revenue insurance products, such as CRC, to MPCI can be an especially useful exercise. Setting harvest yields equal to APH yields facilitates comparing classical marketing tools, such as selling futures and buying put options. A comparison of buying put options and using the LDP is especially interesting when yields also fluctuate. Note while an LDP may be available, it is only applicable on bushels produced. Other scenarios which can be examined include: creating synthetic options, comparing MPCI and buying put options to purchasing CRC, introducing basis risk, and eliminating the loan rate. The goal is to compare net revenue risk management alternatives. The possibilities are endless.

Once the user is familiar with the Basic Scenario worksheet, the other worksheets (in the Excel version only) can be used for additional analysis. The Strategies Grid worksheet can be used to compare how selected tools work for a variety of yield and price combinations. The Revenue Grid worksheet can also be used to examine a larger variety of yield and price combinations, but only revenues are shown. The revenue observations can then be copied into the Revenue Chart worksheet for easier viewing of revenue patterns.