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USING THE FUTURES MARKET TO LOWER
THE FARM MANAGEMENT RISKS OF PRODUCING
FOR UNKNOWN MARKET PRICES IN THE USA: A
FARM EXAMPLE OF A MAIZE HEDGER

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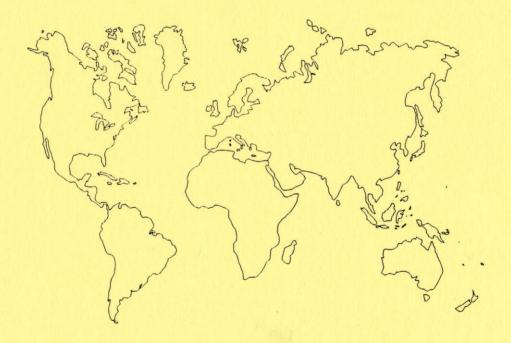**Paper presented at the Tenth International Farm Management Congress, Reading, England, 10-16th July 1995**

"USING THE FUTURES MARKET TO LOWER THE FARM MANAGEMENT RISKS OF PRODUCING FOR UNKNOWN MARKET PRICES IN THE USA: A FARM EXAMPLE OF A MAIZE HEDGER."

P. J. van Blokland[1]
University of Florida, Department of Food and Resource Economics
Gainesville, Florida, USA

ABSTRACT

This paper illustrates a simple hedging procedure for reducing the risk of investing in production costs by locking in a pre-determined price range. The emphasis is on planning and budgeting before committing resources to production. Success is measured as a return to management. The hedging methodology used in the paper is applicable to any agricultural enterprise where basis is known. It is probably impossible to hedge successfully without a good understanding of basis.

The recent thrust of US agricultural policy to return farm products to the market place and to reduce governmental safety net prices for agricultural commodities will probably be accelerated since the November 8th Congressional elections. There is a growing public opinion that farmers are too well looked after by the tax payer, and even the more responsible media occasionally carry pieces illustrating denigrating subsidy situations. For instance, the Wall Street Journal published an article in March showing several million dollars of farm subsidies ending up in the pockets of wealthy absentee landlords living in New York City and Chicago. Consequently, the US farmer will be facing more market price risk than he used to.

His basic risk is investing large sums in production costs and hoping that these costs will be covered by the final market prices. It may seem illogical to spend over $300 per acre

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[1]P. J. van Blokland is Professor of Agricultural Finance in the Department of Food and Resource Economics at the University of Florida.

on a row crop like maize or $500 per steer and do nothing to guarentee that these costs are covered before investing this money, but it is still the norm for most farmers. University and private surveys still find that the majority of farmers spend over 90% of their time producing and what little remains to run their business. This conclusion is particularly ironic because current evidence shows greater rewards today from marketing than from producing.

One of the simplest ways of reducing production risk and learning about market prices is to use the futures market. This market operates for all the major US farm commodities as well as for some minor ones. However fewer than 5% of the nation's farmers use this tool, though the actual proportion that do use it probably account for around 20% of US farm sales.

The general belief about futures markets is that they are highly speculative, totally chaotic and that speculators make the prices. None of these things are true. Futures markets lower the markets risks for hedgers by guarenteeing them a narrow price range for their product well before they invest their production costs, allow easy and cheap entry and exit from the market and aid markedly in smooth price discovery. So how can a farmer use these seemingly difficult markets/ This paper will provide a simple example to illustrate the simplicity of the procedure.

But firstly, let's make clear that a farmer attempting to reduce his risk by using the futures market is a hedger. A hedger is someone who has or plans to have a commodity. For example, a cotton grower may not have planted his cotton yet. Or a feedlot operator plans to fill his feedlots but has yet to purchase feeder cattle Or a soybean producer currently has beans in his elevator. All three examples are potential hedgers. The first two plan to have commodity and the third has commodity.

Secondly, what tools does a farmer need to use the futures market. He needs the commodity which he will convert into futures contracts, a broker to buy or sell for him, a margin account with that broker and a budget to show whether it's worthwhile for him to hedge or not. Let's take these things in order. The futures market uses the futures contract as its trading instrument. Each contract is specific to that commodity in that each

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commodity has its own size, quality and delivery details so that everyone knows exactly just what is being traded and where it will end up. For example, maize is traded as a futures contract of 5000 bushels of Number 2 yellow maize for delivery in specific locations in either March, May, July, September or December. A broker is necessary to place the farmer's contacts in the market and to manage the margin account. All futures contracts trade on a very small margin, which varies depending on the trade size, brokerage house and whether the trader is hedging or speculating. For example a farmer planning to hedge 20 contracts of maize, or 100,000 bu, might pay a margin of $400 per contract. The leverage in futures is enormous. If maize is priced at $2.50 per bu then the farmer is paying $400 to guarentee his delivery of $12,500 value of commodity. (i.e. 5000 x 2.50). The margin account works like any margin. If prices move in his favour the account accumulates funds; if it doesn't , he may need to give the broker more money.

The final thing the farmer requires before he can decide whether to hedge or not, is to make a budget. This essential business tool is unfortunately rarely attempted by most farmers. Consequently, few farmers hedge or even have any idea about the financial results of their business. Most conclude that if there's cash in the bank, they are successful, and if there isn't then they've not been doing so well.

Let's assume that it is January and the farmer thinks that he will plant 600 acres in maize around April. He expects to harvest around October with an average yield of 140 bu per acre, or a total of 84,000 bu. The nearest maize futures contract he can use is December. His newspaper shows that December maize at the Chicago Board of Trade (CBT) closed at $2.50 per bu on January 9th. His task is to calculate whether he can grow maize for less than this price. Let's trace the decision making process in a series of steps.

Step 1. Calculate the costs of producing a bushel of maize

. this step is much the same as producing a maize enterprise budget. He calculates that his cash costs for growing maize work out to $230 per acre. Representative inputs, amounts of each input and typical costs are available in local county extension offices and from his own records. Cash costs are simply the items he

spends cash for. They include seed, fertiliser, chemicals, fuel, repairs, labour, transportation, interest on operating debt etc.

. he thinks his non cash costs, which consist essentially of the depreciation of all the machinery associated with maize growing, come to $45 per acre. He can get these numbers from his F1 schedule in his IRS returns.

. finally he finds that maize's pro rated share of farm overhead is $10 per acre. Overhead consists of office stuff like phone and other utilities, farm publications, membership fees, office expenditures and office depreciation, stationary, entertainment and any other items which are essential to the farm business but cannot be directly charged to the maize enterprise.

. thus his total per acre budget is $230 + $45 + $10 = $285, or with a 140 bu per acre yield, $2.03 per bu. In other words he needs $2.03 per bu to cover all the costs of growing maize. But this sum is not his break even price. He still needs to add something to show he is making a profit.

. it is simple and perhaps not unreasonable to estimate profit, or return to management, which is the same thing, as a certain percentage of investment. In this case, the investment is $2.03 per bu, or $171,000 for the whole crop. If the market can bear a 10% return on this investment, then we need to add about 20c to the per bushel costs of production for a break even price of $2.23 per bu.

Step 2. What is the market offering?

. the farmer wants $2.23 per bu to break even. Is the market offering this or must he reduce his goal of 10% return on investment to meet the market price? Recall that he saw a December price of $2.50 in the futures market. But this price is for number 2 yellow maize delivered at a site near Chicago. . . he will obviously not deliver his

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maize to Chicago. He probably wants to sell his maize where he always sells it, namely to his local elevator. Can he actually obtain $2.50 for his maize? Possibly. Will his elevator now offer him $2.50 for his maize which will be ready in October. Almost certainly not. So what does he do? He has to look at the key to successful hedging. This key is called basis.

. basis is the difference between two prices. For this illustration basis will be the difference between the elevator price that the farmer will get in October for his maize and the December futures price. So we will use the formula

CASH PRICE - FUTURES PRICE = BASIS

> . where the cash price is the price offered by the local elevator when the farmer decides to sell his maize in October. However, he could also contract with the elevator much earlier and lock in his cash price then. For example, he could contract in March to deliver his maize in October for say, $2.25. The point is that he can both contract his cash maize AND still use the futures market to attempt to make extra money on his maize.

> . we are assuming that he will deliver all his maize on October so he must use the December futures contract . But he could stagger his maize deliveries and reap some rewards from storing grain. Consequently he would then use more than the December contract, perhaps going into March, May and July.

> . realise that basis is very specific . In this illustration, the basis depends entirely on four variables. These are:

> 1. the month that maize is delivered to the elevator, (October)
> 2. where the elevator is located, (Mudville USA)

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3. the futures contract used (December)

4. where the futures delivery point is. (Chicago)

. changing any one of these four variables will change the basis.

We are now ready to our definition of a hedger. The new definition is that a hedger is a person who has or plans to have commodity, and retains the right to speculate in basis. This last phrase means that the hedger hopes to add to his return to management from favourable basis movements. We will see how this happens later on. At this stage it is also important to realise that the word" speculate" does not mean that hedging is is a risky procedure. All it means is that there may or may not be additional returns accruing to the trade.

So, to return to the original question, what is the market offering? The farmer knows the December futures price in Chicago is $2.50. His elevator knows the basis because they make their money from basis. They have been keeping basis information since they started business. The local county extension office should also have this information. Consequently we now have two knowns in our equation.

Let's assume that the basis is 10 under. This means that the basis is 10c less than the futures price. But before calculating the cash price it may be worthwhile to emphasise just what this basis of 10 under refers to. It refers to the difference between the December futures price in Chicago and the expected cash price at Mudville USA in October. So

CASH PRICE - $2.50 = (0.10).

Therefore the expected cash price at the local elevator in October is $2.40. This is the price that the market is offering to the farmer on January 19th.

Step 3. Make the hedging decision

The farmer's breakeven price was $2.23 per bu . The market is offering $2.40. This

looks good for him because he has the possibility of getting a further 17c per bu. So he should hedge. He phones his broker and tells him he wants to hedge maize for December. He plans to grow some 84,000 bu. How much should he hedge?

We need to know how likely he is to get the production he wants. Do historical yields very a lot in his area or is he pretty sure that he's already discounted uncertainty in his expected production. Let's assume the latter case but still play safe. Dividing 5000 into 84,000 gives us 16.8 contracts. There are no fractions of a contract, so we'll assume he hedges, or sells 14 contracts, leaving 14,000 bu for speculation in the cash market.

Why worry about the amounts? Firstly because he is now legally obligated to deliver maize to Chicago and he should not be obligated for more than he can reasonably produce. Secondly, speculative margins are considerably higher than hedging margins with a broker and he should not be caught speculating if his expected crop does not arrive.

So his broker will phone his representative at the CBT and ask him to sell 14 contracts of Dec maize "at the market." This phrase means that the farmer will accept the current market price at the time the trade gets to the maize pit, where the trades are made. Most trades are at the market and the hedger will lose little and probably get his trade executed more quickly than if the sell order comes with strings attached. Once the phone call is made the actual trade will usually take a couple of minutes (literally) to be consummated. If the market was trading at $2.48, this is what the farmer will get. He did not get the $2.50 he saw in the newspaper, but it appears that he has covered his breakeven and got 15 cents extra.

Step 4   What's his situation look like now?

The farmer has placed his hedge. His situation now looks like this.

DATE	EVENT	CASH MKT	FUTURES MKT	BASIS

Jan. 20	calculate BEP $2.23			
	expects Oct price	2.38		
	hedges 14 Dec maize		2.48	0.10 under

Because his local basis in mid October for December futures is typically 10 cents less than the futures price, he expects that his local cash price wil be $2.38. As he thinks that his break even price will be $2.23, this transaction looks good.

We need to consider two questions here. Will he get these prices and how has he lowered his risk by using the futures market? The answer to the first question is probably not. But he has locked in a range of likely prices that should guarentee he will do better than his break even. How? This is the answer to the second question.

The root of the answer lies in the fact that cash and futures prices move together over time. Not necessarily equally, but over any but very short periods of time, they move in the same direction. Suppose, for example that there was a rumour of another oil embargo starting in a few months. Garage petrol prices would move up immediately in order to ration out existing supplies before the embargo hit. Or, suppose that we heard that the US maize harvest was being devastated by drought. Current cash prices for feed would rise in response. Cash and futures prices move together. And because they move together, basis is hardly affected at all.

Consider that futures prices for September maize change in response to the drought over time, from $2.40 to $3.40, an increase of 42%. Suppose also that the local market basis in August compared with Sept maize was usually around 12 cents under. We therefore expected the local cash price in August to be $2.28. What will August cash prices do in response to this drastic change in futures prices? They will also rise. Suppose they rise to $3.26, or an increase of 43%.

How has the basis changed? Because basis is the difference between cash and

futures, and cash and futures prices move together, it has only changed from 12 under to 14 under or 16%. It is basis that lowers the risk for farmers using the futures market and that's why futures is a risk reducing tool.

Step 4. Watching the market

The farmer can now go out and do what farmers do best, namely produce the crop. But he still needs to watch the December futures price. This is mainly to avoid margin calls. We will not go into too much margin detail here, except to say that if December futures prices move upwards sufficiently that he has to meet margin calls, then he is probably better to get out of the futures market for a bit and go back in a little later when the market has adjusted.

The point here is not that he needs to follow prices hourly nor is it to forget about his hedge. It is to watch sensibly, every few days or so and act accordingly. These remarks will become clearer in the next step.

Step 5. Lift the hedge

It is now October and he has harvested his maize and delivered it to his local elevator for a price of $2.30, rather lower than he expected but still better than his break even price. Having done this he now faces a problem. He sold 14 contracts of December maize in January and he therefore has a legal obligation to deliver this maize to Chicago. But he has just sold all his maize in the local market. What does he do to avoid legal trouble? He phones his broker and tells him to buy 14 contracts of December maize. This decision cancels out his commitment to deliver. He has offset his original position and is now out of the market.

Note that the cash price fell. Therefore we would expect the futures price to fall as well. Suppose the December futures price was $2.38 when he offset. What do all these numbers mean?

Step 6. How did he do?

Let's set up both the opening and closing transactions together.

DATE	EVENT	CASH	FUTURES	BASIS
Jan. 20	sold 14 Dec maize	2.48		
	expects Oct price	2.38		0.10
Oct 15	sold cash maize	2.30		
	bought 14 Dec maize		2.38	0.08
RESULT		(0.08)	+0.10	0.02

What does all this mean? Mathematically he lost 8 cents in the cash market and gained 10 cents in the futures market for an overall gain of 2 cents per bushel. Looking carefully we see that he lost in one market, the cash and gained in the other, the futures. This is the norm for any hedge. The main purpose of hedging is to lower the risk of losing our investment. So we almost always "lose" in one market and win in the other. But look carefully at the loss. Did we actually lose? The answer can be seen by showing how our farmer ended up.

He got $2.30 in cash for his maize at the elevator and 10 cents in cash from his broker for an overall price of $2.40 per bu. His costs of production were $2.03, so his return to management was 37 cents or a bit over 18%. Recall that he wanted 10%. If he had not hedged he would have received $2.30, which represents a 13% return. Hedging added the remaining 5%.

We have ignored commission in this example. Commission is cheap. Most brokers

will charge between $15 and $50 per contract and this commission is only paid when the trade is offset. So this charge is usually only a fraction of a cent per bushel.

Recall also that he did not hedge all his maize. Assume that he achieved his 84,000 bu target. Without hedging he would have received 84,000 x $2.30 or $193,200. By hedging, he received (14 x 5000 x $2.40) +(14,000 x $2.30) or $200,200, which represents an additional $7,000 for a couple of phone calls and perhaps $300 commission. If we subtract the commission, the increase from hedging was nearly 3.5%, excluding the peace of mind from reducing risk substantially.

In summary, use futures as a managerial tool to lower investment risk not to make a fortune. Hedgers also get better loans because lenders understand that their loans are more secure. The only danger to hedging is to assume that it can lock in a price. It cannot, simply because the expected basis will rarely turn out to be the final basis. But perhaps the most important advantage of hedging is that it encourages farmers to pick up a pencil and do some budgeting. Hedging cannot succeed without sound budgeting. Neither can today's farmers.