



Cooperative Extension Service
Institute of Food and Agricultural Sciences

Reducing Business Risk Through Hedging Valencia Oranges in the Futures Market¹

P.J. van Blokland²

The following paper presents a simple hedging procedure for grove owners in Florida. It covers the basics of hedging and emphasizes the importance of budgeting and knowing basis before the hedge is placed. It also shows how the hedge ended up in terms of cash returns to management. What it does not do is to suggest that this sort of hedge is a reasonable strategy to adopt. So the main purpose of the paper is to present the logical thinking steps necessary for a successful hedge.

Assumptions

- 1) Growing Valencia oranges for processing in an irrigated, mature grove.
- 2) Yield 400 boxes per acre.
- 3) 6.5 pounds solid (p.s.) per box.
- 4) Have always marketed fruit by forward contracting to a fruit processor, who processes the fruit into Frozen Concentrate Orange Juice (FCOJ).

The Nine Logical Steps of Hedging

Step One - Start the Hedging Process

On January 11, 1996, the January 1997 FCOJ contract settled at 123.90. Believing in planning well ahead we ask ourselves, "Can we spend money to produce oranges this season and make a profit from this price?"

Step Two - Calculating the Investment Costs of Growing Valencias

We lay out our calculations as follows:

Item	Cost per acre (\$)
total production costs	800
management costs	50
tax and regulatory costs	90
interest on production costs	40
interest on capital costs	400
TOTAL grower costs	1,380
Harvest Cost	750
TOTAL Cost	2,130

1. This document is Circular 1195, one of a series of the Food and Resource Economics Department, Florida Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida. Publication date: July 1998. Please visit the FAIRS Web site at <http://hammock.ifas.ufl.edu>.
2. P.J. van Blokland, Professor, Food and Resource Economics Department, Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida, Gainesville, 32611.

The Institute of Food and Agricultural Sciences is an equal opportunity/affirmative action employer authorized to provide research, educational information and other services only to individuals and institutions that function without regard to race, color, sex, age, handicap, or national origin. For information on obtaining other extension publications, contact your county Cooperative Extension Service office. Florida Cooperative Extension Service / Institute of Food and Agricultural Sciences / University of Florida / Christine Taylor Waddill, Dean

- This \$2130 per acre is 2130/ 400, or \$5.32 per box;
- or 5.32 / 6.5, or \$0.82 per p.s.

So we now are looking at three sets of costs that we must cover before we invest. Again, these are:

- cost per acre of - \$2130.
- cost per box of - \$5.32.
- cost per p.s. of - \$0.82.

Step Three - Calculating a Break Even Price (BEP)

The concept here is that we want more than a cost of production coverage. If we can cover our costs of production, we don't lose money. But we don't make any either. We need to make a profit. We will call this profit a "return to management," or RTM. For example, if our costs are \$100 and we make \$115, then our profits or "return to management" is \$15, or 15%.

Our calculation of RTM is obviously affected by what the market will bear. At times of low market prices, our RTM must be set lower than at times of higher prices. So how do we calculate what RTM we want? There are several ways to do it. You can pick whichever you feel comfortable with. We'll use a percentage of total costs and then see whether the market price can support it. Let's try 10% as our required RTM and see if the market will bear it:

- | | |
|---------------------------|----------|
| 1) 10% of per acre cost = | \$213. |
| so BEP per acre = | \$2,343. |
| 2) 10% of box cost = | \$0.53. |
| so BEP per box = | \$5.85. |
| 3) 10% of p.s. = | \$0.08. |
| so BEP per p.s. = | \$0.90. |

These are the BEPs we are looking for in the market. Let's for simplicity just use the p.s. BEP from now on and bring the others in only when we need them. So we now need to see if the market is offering us \$0.90.

Step Four - What Is the Market Offering?

This step requires a knowledge of basis. Basis is simply the difference between two prices. Here though, we will use basis only as the difference between the cash and futures price:

Cash price minus futures price = basis;
OR 90 - 123.90 = - 33.90.

This is a negative basis and it means that the cash price is less than the futures price. In futures market language, this is referred to as "basis under." Why is basis under? Suppose that your job was to pick up oranges, process them into juice, match the juice to the requirements of the futures contract and then deliver it to one of the delivery points. Suppose also, that you agree to pay 90 cents for the fruit. How much would you charge for the rest of the tasks? Presumably your costs of pick up, hauling, remixing, packing, grading, loading and hauling again, plus a little RTM. And all this collectively is your BEP, or the basis.

The basis is the cost, including management, of getting stuff in the form that the market wants, from where it is to where it should be. Basis must be time, place and form specific in order to be useful. So basis, as we are using it, is not simply cash minus futures, but the cash commodity price at a particular time, place and form MINUS the futures market price at a particular time, place and form. So our above equation now looks like this:

Cash price at locality in Florida in December 1996
MINUS futures price at the Cotton Exchange (CTN) in
New York City in January 1997 = basis;
OR 90 - 123.90 = - 33.90.

Or our locality in Florida basis in December for oranges against the January futures for FCOJ is typically 33.90 under. Change any one of these six variables and you will change the basis. Basis is that specific.

Basis lowers the risk of investing by linking the cash and futures markets in the equation. This is because cash and futures markets move together. They will rarely move equally together but usually pretty closely. Unfortunately, when there is a freeze, we tend to see cash and futures diverge for a bit. But over a longer period, if prices move up or down, they tend to do so in matching fashion in both markets.

Where do we get basis information from? Sometimes we get this information from the industry, or a brokerage firm or a bank or the extension service. But often this basis information is averaged, old or misleading. The best method is to gather and keep our own basis information.

How do we actually use basis? We learn from one or more of our above sources that basis is typically 30 under for our specific time, place and form. Remember we are in

January 1996 deciding whether to spend money on growing oranges this season, and then matching our price against the January 1997 futures price. Let's go back to our general basis equation:

Cash price in locality in Dec - Jan futures CTN = basis;
OR cash price - 123.90 = 30 under.

Therefore, we expect a cash price for our oranges of 93.90 per p.s. Note that this is an expected cash price. It is what we expect to receive for our fruit per ps if basis stays at (30). This presentation tells us two things. The first is that we have to know the basis before we hedge. The second is that because we can see the futures prices in the media, and we know our basis, our calculations are to find the expected cash price at our local market.

Realize that basis will rarely stay at (30) for our hedging transaction. This is because the basis components change. Recall that basis here is composed of processing costs, the costs of haulage, insurance, handling, etc. As these and their component fuel prices and wages change so does the basis. But the basis will not change as much as prices in either market do, because basis is the price difference between the two markets, so its variation is less. Suppose, for example, that futures prices rose from 109 cents to 135 over a six-month period. This is a 24% price rise. And assume cash fruit per ps was 79 cents and it rose (cash and futures prices move together) to 108 cents, or 37%. Both these price moves are considerable. But basis, which was (30) and changed to (27), has only changed by 9%.

Because the basis changes during the life of nearly all hedges, we probably will not get our expected cash price of 93.90 cents. But if it's a good hedge, it probably doesn't matter. Why is it a good hedge? Because we are practically certain to get a positive RTM which should be our main objective anyway. However, our work so far shows us that the market is offering us 93.90 for our fruit per p.s.

Step Five - Make the Hedging Decision

The question is "should we hedge or not?" We calculated in step 2 that our BEP for our grove is 90 cents. Our step 4 calculations show that the futures market is offering us 93.90 if we hedge. This is 3.9 cents more than our BEP so we should hedge. With costs of production of 82 cents, we can hope for a RTM of 11.9 cents (93.90 - 82).

How much should we hedge? This question can only be answered by grove records showing how much our

yield varies from year to year. The smaller the variation the greater the proportion of our anticipated yield that we can hedge. Assume, for example, we have a fairly steady annual yield pattern. Consequently, we'll hedge 85% of our anticipated yield. The calculation looks like this:

500 acres x 400 boxes x 6.5 p.s. x 0.85 hedging %
divided by
15,000 p.s. per contract
= 74 contracts.

Step Six - Placing the Hedge

We now have to phone the broker to go short 74 January 1997 contracts. The set up looks something like Table 1.

Table 1. Step six - placing the hedge

Date	Item	Markets (\$ per P.S.)		
		Cash	Futures	Basis
Jan 11 '96	short 74 Jan '97		123.90	
	cash Dec '96	93.90		(30)

Step Seven - Watch the Market

We are going to assume that nothing untoward happens during the time that we are in the futures market. On the whole, this is a fair statement, but we need to recall that this is the point in the paper to reiterate that it does not cover strategy recommendations. The strategy presented here is simple, used widely and often works. But it is presented to illustrate the main points of hedging only. It is usually described as a naive hedge in that we have hedged all our contracts in one month and do not do anything between the time we place the hedge and offset it. In today's market, we can probably still put all our contracts in one month, but we would be rather lucky to have prices move our way over the nearly one year's duration of this hedge. This remark refers to margin calls which will be covered in another paper.

Remember that cash and futures prices do move together. So that what is bad news in one market is usually countered by good news in the other. And, because we are using both cash and futures markets, we will win in one and lose in the other. We cannot win in both, nor can we lose in both.

Step Eight - Lifting the Hedge

After our November/December harvest, we sell our fruit locally as we have always done, and receive 89 cents per ps for it. Now we are faced with a problem. We have a legal obligation to deliver 74 contracts of FCOJ to a specified delivery point, but we have just sold all our fruit. How do we get out of this legal obligation? We do it by "offsetting" our futures commitment. This is done by purchasing or going long 74 contracts of January 1997 FCOJ. This transaction offsets or cancels our obligation to deliver.

Note that we expected our local cash price to be 93.90 cents. But our actual local cash price was 89, or less than we expected. The cash price has fallen. Consequently, we would expect the futures price for January FCOJ to fall as well. Assume it has fallen to 116. Our total transaction now looks like what is shown in Table 2.

Table 2. Step eight - lifting the hedge.

Date	Item	Markets (\$ per p.s.)		
		Cash	Futures	Basis
1-11-96	short 74 Jan '97		123.90	
	cash Dec '96	93.90		(30)
12-20-96	cash Dec '96	89		
	long 74 Jan '97		116	(27)
Totals		(4.90)	+ 7.90	3

What do all these numbers mean in terms of our RTM?

Step Nine - How Did we Do?

- 1) We received 89 cents in the cash market and 7.90 cents from our broker, to end up with an overall price of 96.90 for our oranges per p.s.
- 2) Our costs of production were 82 cents.
- 3) Therefore, our RTM was 96.90 - 82 or 14.90 cents per p.s.

How do these numbers convert to our final returns?

- 1) We received 74 contracts x 15,000 p.s per contract x 14.90 cents, or \$165,390 RTM for our whole futures market transaction.
- 2) Our total return was 74 x 15,000 x 96.90 or \$1,075,590 from the futures trade.
- 3) And (500 acres x 400 boxes x 6.5 p.s. x .15 percent non hedged x 89), or \$173,550 from the cash market for our non hedged portion.
- 4) Ending up with a total return of \$1,249,140.

If we had not hedged, we would have made 500 x 400 x 6.5 x 89 = \$1,157,000. Therefore, we made an extra \$92,140 from our total hedging transaction.

Remarks

- 1) We made our extra money because basis moved in our favour. Look at the transaction again. We expected basis to be 30 under. It ended up 27 under, which is good news for us in the futures part of our transaction. This movement of basis is called "narrowing". When we are originally short and basis narrows, we make our extra money on basis movement.
- 2) The commission to do this total transaction is cheap. It is usually not worth worrying about commission costs as a hedger. This trade would probably cost around \$ 20 to \$30 per contract per round turn and it is not paid to the broker until we offset our trade.
- 3) Futures are traded on margin. Margin is the money we give the broker to ensure that we can follow through on our trades. It is margin which provides the large leverage in futures markets. If futures prices move in our favour then our margin account increases. But

leverage is a two edged sword. If futures prices move against us, our margin decreases and we may have to give the broker more margin money (i.e. a margin call). Because fruit prices do not always move consistently with FCOJ prices, margin calls are a distinct possibility.

- 4) We should have peace of mind from knowing that we were going to make a positive RTM or profit from our investment.
- 5) We have just completed a "naive" hedge. It is the simplest hedge possible in that we put all our transaction into one month and never changed our position over the whole time period. Yet we still made money. As we get more sophisticated, we should be able to make more money.
- 6) The rewards from this example are kept rather low. This is on purpose. The primary purpose of futures is to lower our business risk. The secondary objective is to make some extra money as basis moves our way. The above transaction showed that basis narrowed and allowed us to make an extra 3 cents, which boosted our RTM.
- 7) Finally, perhaps the main advantage of futures is that it keeps us aware of prices. Hedgers can profit from price movements. And they should try.

Bibliography

van Blokland, P.J., "Hedging for Beginners", FRE 47, FRED, IFAS, FCES, UF, 1985.

Ibid., "A Simple Method for Hedging Citrus", FRE 55, FRED, IFAS, FCES, UF, 1985.

Muraro, Ronald P., and Thomas W. Oswalt, "Budgeting Costs and Returns for Central Florida Citrus Production, 1994-95", Economic Information Report EI 95-2, FRED, IFAS, FAES, FCES, UF, August 1995.