BUILDING A NET CASH PAYOFF SCHEDULE

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The Net Cash Payoff Schedule is a tool to evaluate alternative cash, futures, and option marketing strategies. It is a graphical representation of the expected return to a marketing strategy, adjusted for basis, premiums, and commissions, for any given futures price that may occur at the delivery date. Once the payoff for a given price is determined marketers can incorporate the probability of a given price range occurring and their attitude toward the risk of that outcome.

While this decision aid compares marketing strategies over given futures prices, it does not explicitly address basis risk. Basis risk does exist and can be significant. The only marketing strategies that eliminate basis risk are a cash forward contract or a basis contract. Strategies involving the cash, futures, and options markets will be effected identically by basis risk, and can be directly compared using the Net Cash Payoff Schedule.

The following examples assume that the cattle feeder holds an underlying long position in the cash market. That is, he or she has fed cattle to sell. Also for the first few examples a perfect hedge is assumed (i.e., 40,000 pounds of fed cattle for each contract). It is a simple extension of the exercise to consider a non-perfect hedge and the final example will do so.

The first step in building a NET CASH PAYOFF is to draw a graph with FUTURES PRICE on the horizontal axis and the NET CASH PAYOFF on the vertical axis. Account for the expected basis by offsetting the axis by the amount of the basis. This example uses an expected basis of -$1.00 (cash price $1.00 less than the futures prices). When futures are $75 the cash price is $74. Thus, a 45° line drawn sloping upward to the right will represent the cash payoff. The 45° line assumes that the basis is the same at all prices, not that the basis is constant. The net price received from a cash market strategy will depend on the futures price at delivery and the actual basis. Reading up from the futures price to the 45° line and across to the vertical axis will be the cash price received. That is, the futures price adjusted for expected basis (Figure 1).

The next point of reference is the return from a hedge. The net price received from hedging will be the futures price at the time the hedge is placed adjusted for the actual basis at delivery and commission and interest on margins (CIM). Because the actual basis is unknown until delivery, the expected basis is used to compare strategies. The hedge price will be received regardless of the futures price at delivery resulting in a horizontal line at the net hedge price.

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Futures price at placement  $75.45
Expected basis -1.00
Commission & interest .30
Net hedge price $74.15

Comparing hedging to staying in the cash market reveals the obvious. If futures prices fall below $75.15 (futures - CIM) hedging provides a higher payoff. At higher prices the cash market pays off better.

COMPARING OPTION STRATEGIES

There are three basic steps to examining option strategies.

1. Compute the NET PREMIUM for the strike price being considered. The net premium includes the option premium paid or collected less commission and interest. Multiple option strategies will have multiple premiums and expenses.

2. Note the STRIKE PRICE of the option being considered on the horizontal axis. Move vertically from this strike price to the corresponding cash price on the 45° line then adjust for the net premium. This point is the inflection point. The owner of the option will choose whether or not to exercise the option at the strike price resulting in an inflection in the payoff line.

3. The net price received will change from the left to the right of the INFLECTION POINT. Calculate the net price received on each side of the inflection point and draw the appropriate payoff lines.
EXAMPLES OF FOUR BASIC OPTION PAYOFFS
ASSUMING AN UNDERLYING LONG CASH POSITION.

BUY A PUT OPTION: This strategy is a common recommendation to cattle feeders because it sets a minimum expected selling price or price floor. At futures prices less than the strike price (left of the inflection point) the buyer of the put will choose to exercise the put. The net payoff is the strike price adjusted for basis and the net premium. At futures prices higher than the strike price (right of the inflection point) the buyer of the put option will not exercise it, but rather receive the cash price less the net premium already paid. The net cash payoff line will parallel the cash line at a distance equal to the net premium (Fig. 2).

SELL A CALL OPTION: This strategy sets a maximum selling price, but the seller collects the premium. It is often recommended as a way to "cheapen up a put" as part of a fence strategy. To the left of the strike price the owner of the call will not choose to exercise the option. The seller of the call (the cattle feeder) will receive the cash price plus the net premium. At prices above the strike price the owner of the call will exercise his or her right to buy a futures contract. The seller (the cattle feeder) will have to honor the call by going short in the futures market, in other words hedge, at the strike price. The net cash payoff to the cattle feeder to the right of the inflection point is a horizontal line equal to the strike price adjusted for basis and the net premium (Figure 3).
SELL A PUT OPTION: This strategy is seldom recommended for someone with a long cash position because they are left with two long positions in a falling market. The seller receives the cash price and collects the net premium to the right of the inflection point because the buyer will not exercise the option. However, at prices below the strike price (left of the inflection point) the buyer of the put will exercise it. The seller must buy a futures contract at the strike price. For each $1 fall below the strike price the seller loses $2, $1 in the cash market and $1 on the long futures position (Figure 4).
BUY A CALL OPTION: This strategy has several uses in a feedlot marketing plan, but has little use in marketing fed cattle used by itself. With an underlying long cash position the buyer of the call pays the net premium and receives the cash price at prices below the strike price. At prices above the strike price the buyer has a "Texas Hedge", two long positions. For each $1 increase the buyer receives $2 (Figure 5). Where this strategy is more commonly used is in conjunction with forward contracting or hedging to build a synthetic put or to put a ceiling on input prices (feeder cattle or corn).

SAMPLE MARKETING STRATEGIES FOR CATTLE FEEDERS

The following examples are strategies that can be used by cattle feeders when marketing fed cattle. These definitions may be helpful:

Net premium = option premium + interest - commission
Interest = 6 months @ 11% on options, $0.15/cwt on hedges
Commission = $0.15/cwt
Payoff at Strike Price = Strike price + basis + net premium
Buy a $74 Put @ $1.47  
Net premium = -1.47 - 0.08 - 0.15 = -$1.70 
Payoff at $74 = 74.00 - 1.00 - 1.70 = $71.30 
Less than strike price = $71.30 
More than strike price = Cash price + net premium

Figure 6

Buy a $76 Put @ $2.40  
Net premium = -2.40 - 0.13 - 0.15 = -$2.68 
Payoff at $76 = 76.00 - 1.00 - 2.68 = $72.32 
Less than strike price = $72.32 
More than strike price = Cash price + net premium

Figure 7
Sell a $78 Call @ $0.92  

Net premium =  

Payoff at $78 =  

Less than strike price =  

More than strike price =  

Figure 8
Fence: Buy $74 Put @ $1.47  
Sell $78 Call @ $0.92  

Figure 9

Net premium =  
Payoff at $74 =  
Between $74 and $78 =  
Payoff at $78 =  
Less than $74 strike price =  
More than $78 strike price =  

+0.92 - 1.47 - 0.03 - 0.30 = -$0.88  
74.00 - 1.00 - 0.88 = $72.12  
Cash price + net premium  
78.00 - 1.00 - 0.88 = $76.12  
$72.12  
$76.12
Trapezoid: Hedge at $75.45

Sell $74 Put @ $1.47
Sell $76 Call @ $1.65

Net premium = +1.47 + 1.65 - 0.17 - 0.30 = +$2.99
Net hedge price = 75.45 - 1.00 - 0.30 = $74.15

Payoff at $74 = 74.15 + 2.99 = $77.14
Payoff at $76 = 74.15 + 2.99 = $77.14

Less than $74 strike price =
Hedge + net premium + (futures price - strike price)
At $70 NCP = $77.14 + (70 - 74) = $73.14

Between $74 and $76 = 74.15 + 2.99 = $77.14

More than $76 strike price =
Hedge + net premium + (strike price - futures price)
At $80 NCP = $77.14 + (76 - 80) = $73.14
Now consider what happens if there is not a perfect hedge, say 180 head of 1200 lb steers (2160 cwt or 5.4 contracts). The same procedure is used for cattle feeders that only want to hedge part of their cattle. In general, the horizontal line now has a slope and the net premium per hundredweight is more (or less) expensive. Consider the fence example used earlier and assume that the cattle feeder uses five contracts.

Fence: Buy 5 $74 Puts @ $1.47 Figure 11
Sell 5 $78 Calls @ $0.92
Net premium =
\[ -1.47 \times 5 \times 400 \text{ cwt} = -2940 \]
\[ +0.92 \times 5 \times 400 \text{ cwt} = +1840 \]
\[ -1100 \]
\[ -1100 - 60.50 - 600 = -1760.50 \]

Net premium / cwt = \(-1760.50 / 2160 = -0.82\)

Payoff at $74 = 74 - 1.00 - 0.82 = $72.18
Payoff at $78 = 78 - 1.00 - 0.82 = $76.18
Less than $74 strike price = $72.12
Between $74 and $78 = Cash price + net premium

Less than $74 strike price = check at one point
At $70: Cash $69 \times 2160 \text{ cwt} $149,040
Option \((74 - 70) \times 2000 \text{ cwt}\) +8,000
Net Premium \(-1,760\)
$155,280

Net cash payoff per cwt at $70 = $71.89

Draw a straight line from the inflection point, $72.18 at $74 futures price, through the point checked, $71.89 at $70 futures price.

More than $78 strike price = check at one point
At $82: Cash $81 \times 2160 \text{ cwt} $174,9600
Option \((78 - 82) \times 2000 \text{ cwt}\) -8,000
Net Premium \(-1,760\)
$165,200

Net cash payoff per cwt = $76.48

Draw a straight line from the inflection point, $76.18 at $78 futures price, through the point checked, $76.48 at $82 futures price.
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