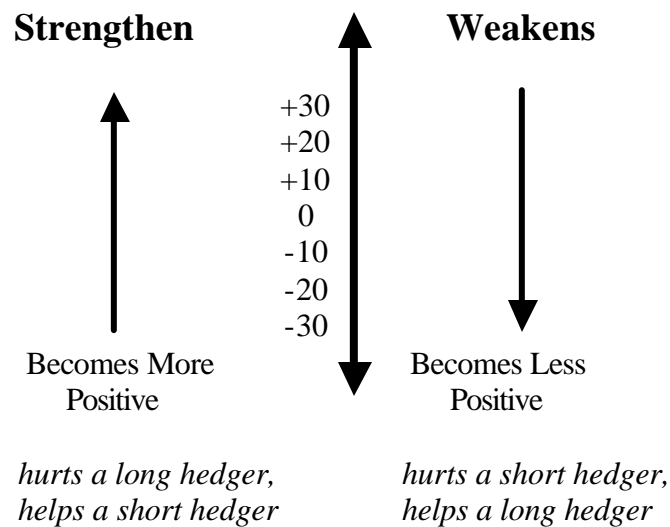


## Using Futures Spreads to Manage Basis Risk:

### Introduction:

In managing the risk of an adverse change in cash prices, there are essentially two risks exposed to this change in price. A cash price consists of both a futures component or benchmark price, as well as a basis differential that relates that futures value or benchmark to a local cash market in which the commodity will be priced. By definition,  $CASH = FUTURES + BASIS$ ; therefore,  $BASIS = CASH - FUTURES$ . Often, futures are used as a hedge against an adverse move in cash prices. If futures are priced as a *substitute* to a cash purchase or sale, then this element of price is covered or hedged; however, the basis differential remains a floating variable to the final determinant price and is itself exposed to adverse variation in its value between the time the futures are hedged and the time the hedge is removed and the cash price is set in the local market.

As a long hedger (someone who is short the physical commodity in the cash market), one is exposed to a stronger basis. As a short hedger (someone who is long the physical commodity in the cash market), one is exposed to a weaker basis. The graph below illustrates the movement of basis and its impact on the long and short hedger.



### Hedging Basis:

Fortunately, basis variation is the smaller portion of overall price variation. By most measures, futures variation accounts for approximately 80% of the overall variation in cash prices. Despite this, unfavorable movements in basis can limit the effectiveness of a futures or options hedge in protecting price. For many markets, including corn, soybean meal and hogs, basis can be set independent of price well ahead of time, thus removing this variable cash price risk from the equation. Unfortunately, because of uncertainties associated with basis movement – particularly in years of extreme price volatility – the

costs associated with establishing basis can be high and the forward basis value offered in the cash market can appear unattractive relative to historical levels.

As an alternative to forward pricing basis, futures spreads can be used to hedge the basis element of a cash price. The reasoning behind this is that basis and spreads tend to move together. As an example, in situations where the cash market is very strong, basis tends to be increasing. This typically is reflected in the spot futures contract gaining relative to deferred contracts. In the opposite case where the cash market is very weak, basis tends to be decreasing and this usually corresponds with spot futures declining relative to deferred contracts.

With respect to futures spreads, the direction of the underlying market is not necessarily indicative of how a spread will perform. In other words, just because a market is moving higher does not necessarily mean that spot contracts are gaining on deferred contracts. Similarly, just because the underlying market is moving lower does not automatically mean that spot contracts are losing on deferred contracts.

One way to think of this is in the case where a declining market discourages cash sales and begins to strengthen basis levels. This often leads to strength in spot contracts relative to deferred contracts. This can occur even as futures continue moving lower – it happens when the spot contract is not going down as much as deferred contracts are in an overall declining market.

To hedge against the risk of a *stronger* basis, a *bull* spread would be used which consists of buying a futures contract with a nearby expiration, and selling a futures contract with a later expiration. To hedge against the risk of a *weaker* basis, a *bear* spread would be used which consists of selling a futures contract with a nearby expiration, and buying a futures contract with a later expiration.

It is important to realize that a futures spread will not necessarily offset basis risk in a local cash market on a one-for-one basis. In other words, if corn basis in my local cash market moves up by 10 cents, spot futures will not necessarily gain 10 cents on deferred futures. This is because there is a bit of a disconnection between any specific local cash market and the futures market. The futures market serves as a benchmark price for the collective cash market across many different locations. In any given locale, supply/demand fundamentals specific to that area can lead to basis fluctuations that are distinct and separate from the rest of the country.

The point is that *basis and spreads tend to move together*. If the overall trend of the cash market is a strengthening basis, this tends to correspond with spot futures contracts gaining on deferred futures contracts while if the overall trend of the cash market is a weakening basis, this tends to correspond with spot futures contracts losing ground to deferred futures contracts. If the basis movement in a local cash market is not reflected in the general trend of basis across the rest of the country, it will not likely be reflected in the movement of futures spreads either.

Another important point to note is that using a futures spread to hedge basis risk is separate and distinct from using futures or options to hedge price risk. As an example, if I am short soybean futures as a hedge against lower cash prices in a forward period, and in addition, I am short nearby futures and long deferred futures, these are two separate positions hedging two separate risks. In fact, these basis hedge positions are typically *segregated* in a separate account to prevent unintentional offsets of price hedges. To illustrate the point, let's consider the following theoretical hedges for exposure on 1Q and 2Q soybeans:

1Q: Short 10 March Soybean Futures

2Q: Short 10 July Soybean Futures

Next, let's consider the following bear spread to hedge against a weaker basis on 1Q soybeans:

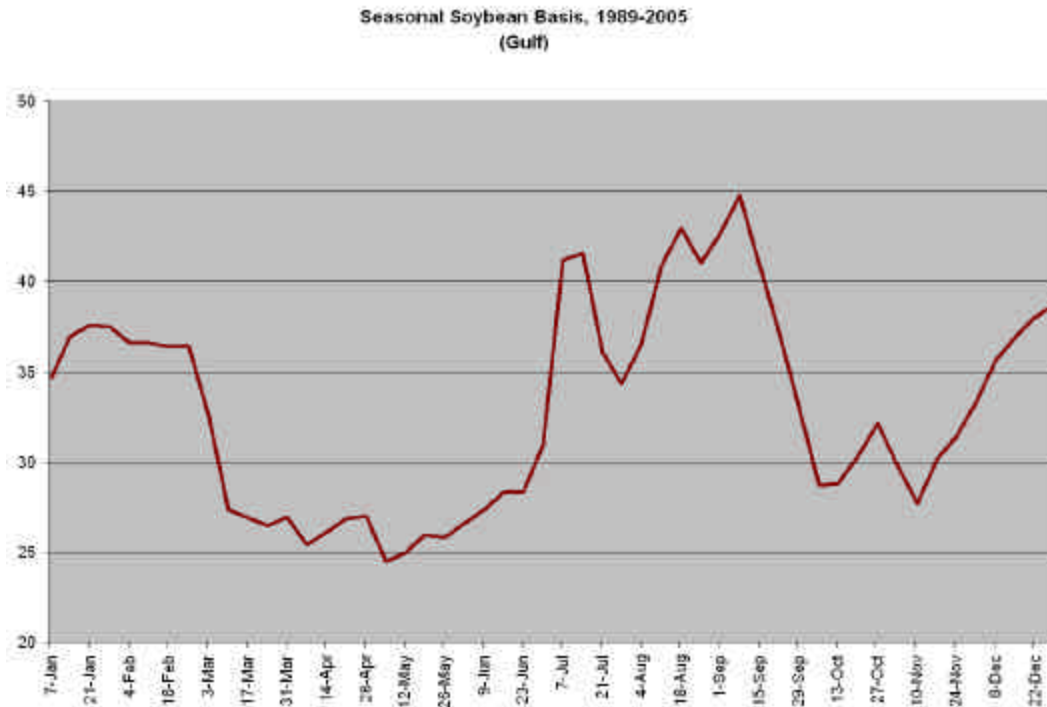
Sell 10 March Futures, Buy 10 July Futures

If I were to place this hedge into my soybeans account, the long July futures position of the 2Q basis hedge would offset the short July futures position of my 2Q price hedge, which I do not want to do. I therefore need to create a separate place to put these positions to prevent this offsetting and to better keep track of the performance of the basis hedge relative to the price hedge.

It is also important to note that the purpose of using futures spreads is to hedge the risk of a stronger or weaker basis, not to make money on the spread. In the aforementioned example, assuming I sell March futures and buy July futures as a 2Q basis hedge, if the March contract gains on the July contract I will lose money on the spread; however, this should be offset by a stronger basis in the cash market. If I am selling my beans to the elevator at a stronger basis, this improves my overall price and is favorable for my 1Q margin, which is what I want for the soybean operation.

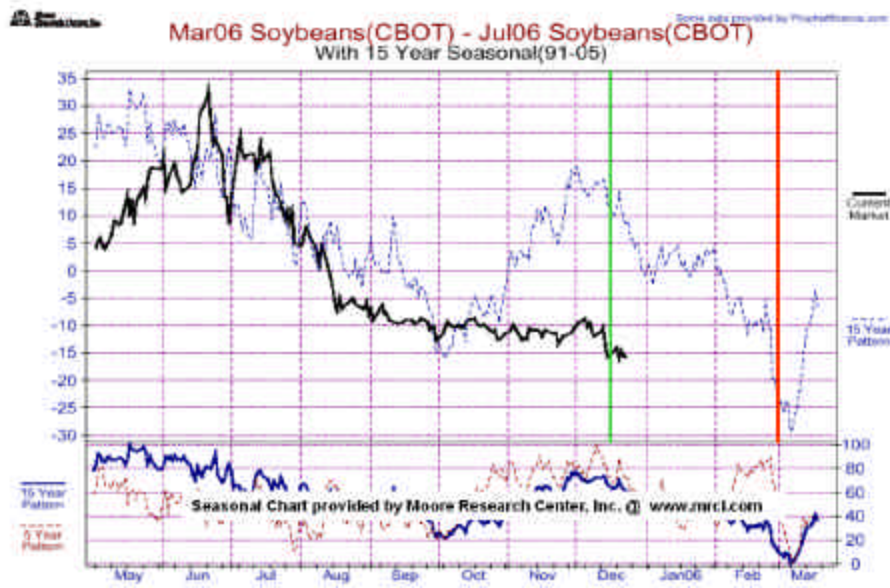
#### Seasonality of Basis:

Just as futures prices display seasonal tendencies, so does basis. As an example, corn basis tends to be the weakest around harvest time when a surge of supply moves into the cash market pipeline. Conversely, corn basis typically strengthens in the spring during planting time as most producers are preoccupied in the field and not delivering any supply to their local elevators. Because basis itself has seasonality, one can reference seasonal basis patterns to help optimize cash purchases and sales. The following chart illustrates soybean basis in the Gulf since 1989:



From the above chart, one can notice that there has been a general tendency for soybean basis to deteriorate during the first 3-4 calendar months of the year. Interestingly, this usually corresponds to a period in which the cash soybean market itself seasonally moves higher. This helps illustrate why it is optimal to separate the two components in managing price, and manage the associated risks of basis and price separately as well.

As you may have already contemplated, because there are seasonal basis patterns, there are also seasonal patterns to futures spreads. This is logical as the two are related to one another. In managing a basis risk using futures spreads, it is helpful to be aware of these seasonal tendencies when it comes to timing both the implementation and removal of these hedges. In a previous example, we looked at using a bear spread to hedge against a decline in basis for 1Q soybeans. This consisted of selling March futures and buying July futures. The following chart illustrates the 15-year seasonal pattern of that futures spread:



One can see from the above chart that there is a very strong seasonal tendency for March futures to begin losing ground relative to July futures through the month of starting in late Dec./Jan. and ending in February.

#### Executing a Futures Spread as a Basis Hedge for Soybeans:

Now let us assume that it is early December and we are considering a forward basis quote from a local elevator for soybeans to be delivered during the middle of February. Let us further assume that the forward offer from the elevator is quite weak compared to the current spot quote, and consequently, we do not want to lock this level in. We remain concerned that basis values in 2 months time could be considerably weaker than where they are presently in the spot market, and we wish to protect ourselves from this basis risk. As an alternative to locking in the forward basis offered by the elevator, we could initiate a *bear spread*, selling March futures and buying July futures simultaneously. Remember, this is independent from any price hedge we may have in place to protect lower 1Q soybean values – we are only addressing the basis risk component of the soybeans to be sold during this time frame.

When executing a spread order, we typically specify the *premium* at which we wish to initiate the position. Continuing with the previous example, let us assume the following futures values for both the March and July soybean futures contracts:

March: \$6.00/bu.

July: \$6.10/bu.

We wish to go ahead with this basis hedge and initiate the bear spread. We could simply enter an order at the market to sell March soybeans and buy July soybeans; however, if

we wish to guarantee no worse than the differential between the two contracts we witness above then the order would be entered as follows:

Sell 10 March Soybeans and Buy 10 July Soybeans at \$.10 premium to the July buy side. Generally speaking, when placing a limit order on a spread, we specify the price by looking at which contract is trading at a premium to the other and stating the differential based on that premium. Assuming the prices were reversed (March trading at \$6.10 and July trading at \$6.00), the order would read as follows: Sell 10 March Soybeans and Buy 10 July Soybeans at \$.10 premium to the March sell side.

The most important thing to keep in mind when executing a spread is which contract to sell versus which to buy. To execute a bear spread, we would be *selling* a contract with a *nearby expiration* and *buying* a contract with a *deferred expiration*. To execute a bull spread, we would be *buying* a contract with a *nearby expiration* and *selling* a contract with a *deferred expiration*.

Continuing with the above example, let us assume that we go ahead with the bear spread and now have the following position in our spread account for basis hedges:

Short 10 March Soybeans @ \$6.00/bu.  
Long 10 July Soybeans @ \$6.10/bu.

Also, let's assume that it is early December and our current spot basis for soybeans is option price (we can sell our beans at parity to January futures). Now let's advance the clock ahead 9 weeks and assume it is mid-February. We observe the following spot basis for soybeans and futures prices in the marketplace:

March Soybean Futures: \$5.55/bu.  
July Soybean Futures: \$5.70/bu.  
Spot Basis for Cash Soybeans: \$.20/bu. under February futures

We sell our soybeans to the elevator at \$.20/bu. under December futures and simultaneously remove our basis hedge. To do this, we need to buy March futures and sell July futures. Again, assuming we want to assure no worse than the differential we see above, the order would be placed as follows:

Buy 10 March Soybeans and Sell 10 July Soybeans @ \$.20 premium to the July sell side. This order is filled and we calculate the following P&L on our basis hedge:

Sold 10 March Soybeans @ \$6.00/bu., bought 10 March Soybeans @ \$5.55/bu. =  
\$.35/bu. gain = \$17,500.

Bought 10 July Soybeans @ \$6.10/bu., sold 10 July Soybeans @ \$5.70/bu. = \$.30/bu.  
loss = (\$15,000).

Net P&L = \$.45/bu. gain - \$.30/bu. loss = \$.15/bu. gain = \$7,500.

Now let us look at the cash market side of the ledger. When we executed our bear spread in early December, spot soybean basis was trading at parity to the board. When we offset our bear spread in mid-February, the spot basis had weakened to \$.20 under the board. The spread thus was effective in protecting \$.15/bu. out of a total \$.20/bu. drop in basis levels. It is important to note that even though the spread made money (\$.15/bu.), we are actually worse off by \$.05/bu. because the basis weakened by more than what the futures spread gained. Again, the objective is not to make money on the spread, but to protect an adverse move in the basis.

It is also important to remember that this \$.15/bu. gain on the bear spread is only protecting any weakness in basis over a given time frame. If we had no price protection on during this period, there would have been another \$.20/bu. opportunity cost in the loss on March futures during this period between early December and mid-February referencing the prices above. A separate hedge would have been needed to address this risk component, either in the form of a hedge-to-arrive contract with the elevator, a short futures position, a long put option or some type of option spread that would protect soybean prices in a declining market.

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One important point to note on all basis hedge examples is the seasonality of the futures spreads. Unlike a price hedge where there is a high degree of correlation between the cash price and the futures price, there is not as high a correlation between local cash basis variation and variation in the associated futures spreads. Because of this, it is often optimal to time the implementation and removal of these futures spreads with the seasonal tendencies, *not necessarily with setting the basis in the local market.*

Please contact us for further explanation and specific applications for your basis exposure.

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