

# Price Risk Management and Hedging in U.S. Grains Markets

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Market participants across the supply chain involved in buying and selling of grains and their related products are quite aware of the risks they face from a potential price change.

Businesses involved in the production of finished products regularly face commodity price risks on input costs and other manufacturing and distribution risks including power, fuel, interest rates, and foreign currency exposures. Grain processors, feed manufacturers, food companies and importers who are concerned about the impact that a price increase could have on their business are constantly seeking ways to mitigate this risk and protect their bottom line.

While inefficient fixed-price supplier contracts can be used to “hedge” some of these risks, business managers are increasingly looking for more flexible financial hedges to manage these risks.

This chapter is designed to introduce the basic methods to utilize futures in basic hedging strategies for grains and oilseeds.

## **HEDGING THE PRICE RISK OF GRAIN**

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Hedging is the management of the price risks naturally inherent in the buying and selling of commodities. In hedging, price risk is transferred from those seeking to reduce it to others willing to assume it in hopes of making a profit.

Grain hedgers include those who need protection again declining prices, such as farmers, merchandisers and grain elevators; as well as those looking for protection against rising prices, such as food processors, feed manufacturers and importers.

*“Hedging reduces risk and increases the certainty of outcome.”*

Hedging does not prevent all negative events from happening. However, if an event with adverse price impacts does happen, and the firm's position is properly hedged, the impact of the event is reduced.

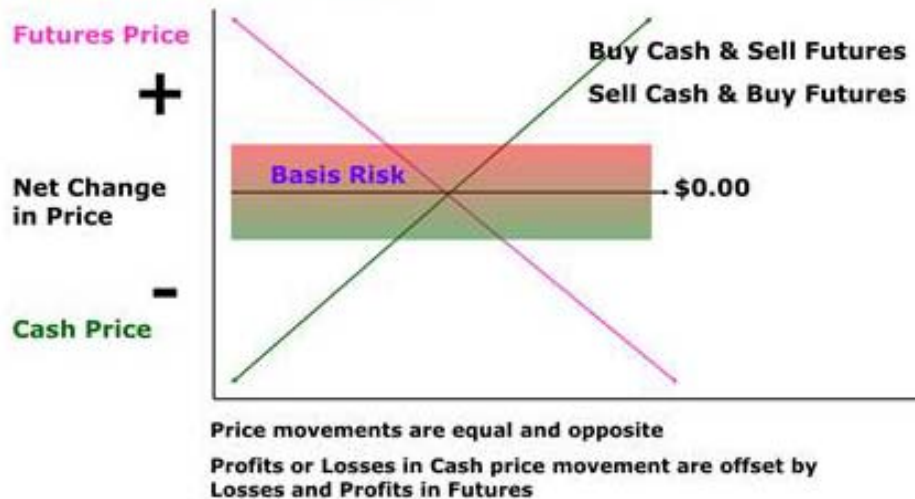
In practice, hedging occurs across a range of businesses activities and is performed by portfolio managers, individual investors, and corporations use techniques to reduce exposure to various risks.

For example, if you buy homeowner's insurance, you are hedging yourself against fires, break-ins, or other unforeseen disasters. Or, if purchase your inputs of corn and soybean meal at the same time you sell finished feed, you are hedging yourself against supplies of feed inputs and changes in prices.

In commodity and financial markets, hedging is not as simple as paying an insurance company a fee every year for coverage. Hedging against adverse movements in prices, "price risk", means strategically using financial instruments and market strategies to offset the risk of any adverse price movements.

*Hedging  
Price Risk*

### Hedging: Removing Price Risk



One of the primary functions of the agricultural derivatives, futures and options markets, is hedging. Hedging is essentially taking a position in the futures or options market that will offset (or is opposite) your current position in the physical cash market. Since the cash and futures prices tend to move up and down together, any gains or losses in the cash market will be counterbalanced with gains or losses in the futures market.

Technically, to hedge requires an offsetting trade with negative, or opposite, correlation. The closer the correlation, the better or more efficient the hedge.

A reduction in risk, results in an increased certainty in outcome. It is designed to protect the anticipated profit margin and reduce a potential loss; and not maximize a potential gain. As such, it will also mean a reduction in “potential” profits.

If the investment that is being hedged makes money, you have also usually reduced further potential profit. However, if the investment loses money, and the hedge was successful, the business will have protected its profit margin, and reduced its loss.

Hedging techniques used for agricultural commodities and currencies generally involve the use of financial instruments known as derivatives. Two of the most commonly used derivatives are futures and options. With derivatives, a range of strategies can be constructed where a loss in one investment is offset by a gain in a derivative. Similarly, as this is a hedge, a gain in the investment will be offset by a loss in the derivative. This achieves the desired result of certainty of outcome.

### *Hedging Price Risk*

It should be kept in mind that every hedging strategy has a cost associated with it. Before it is decided to engage in a particular hedging strategy, it should be asked if the potential benefits outweigh the expense. Remember, the goal of hedging is to reduce risk and increase the certainty of outcome, and to protect the operating margin. The cost of the hedge, whether it is the cost of brokerage, financing a margin, or the cost of an option, cannot be avoided.

While comparison of hedging to insurance is frequently employed, insurance is far more prescriptive and precise. With insurance, the business is completely compensated for the loss (usually less a defined deductible). Hedging commodities, on the other hand, isn't a perfect science, and is some respects considered an art. If the relationship between the physical commodity and the underlying derivative is not fully understood, things can easily go wrong.

Although risk managers are always aiming for the perfect hedge, this situation can be very difficult to achieve in practice. In addition, the removal of all risks, also remove all further profit opportunity. Through the process of strategic risk management certain risks will want to be removed, while other risks may want to be retained. The more in depth and technical discussion on risk management will be left for another time.

### **WHY LEARN ABOUT HEDGING ...?**

As there are a wide variety of derivatives, futures and options contracts available in the market, a market participant can hedge price risk against

nearly anything, including commodities, interest rates, or currencies, etc.

However, a good number of market participants may never directly trade a derivative, futures or options contract. Many grain growers and end users can successfully manage (i.e., hedge) their price risk through the use of a variety of physical cash contracts offered by the buyer or the supplier.

Even if an importer or end users never directly engages in directly trading of derivatives, they should have and understand how these common risk management processes work and can impact the market.

Many suppliers and post-farm gate supply chain participants will hedge in some form. They will use a combination of physical cash contracts, along with derivatives, the offer hybrid cash contracts, including Basis Contracts, Minimum Price Contracts, and Maximum Price Contracts, as well as others. Having a basic understanding of hedging can help you comprehend and analyze these useful marketing and procurement tools.

## **WHO IS A HEDGER?**

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A hedger is an individual who wants to remove or reduce the risk of unforeseen price movements in the future by using a technique that shifts price risk to others.

Hedging is used in agricultural commodity markets by people who want to remove or reduce the risk of unforeseen price movements in the physical commodity in the future. This is done by shifting the price risk to speculators, or other market participants, who are willing to take on a risk in hopes of making a profit.

In this sense a hedger is typically a producer, processor, marketer, supplier, seller or buyer of a physical commodity that also trades in related derivative markets and futures exchanges to offset price risk.

The hedger may be someone who wants to lock in the price they will receive at for growing crop, storing grain in a warehouse, or who wants to lock in a price they will have to pay for a commodity at some time in the future that will be used in the hedger's business.

The classic example of a hedger is a farmer who is seasonally growing corn, and who wants to, at the time of planting, establish the price he will receive at harvest. They can accomplish this selling an appropriate corn futures contract (December) at the time of planting. Later, at some future point in time before the physical corn is harvested and delivered to the local country

elevator, physical corn will be sold, and the offsetting futures sale of corn will be bought back.

Similarly, a cattle feeder who in April wants to establish in the cost of corn needed to feed cattle for 90 days from October through December can do so by hedging, i.e., buying a December futures contract. Later, at some future point in time before the cattle arrive to the feedlot, physical corn will be purchased, and the offsetting futures purchase of corn will be sold.

In these examples the hedger seeks to reduce price risk in his business activities in order to concentrate on creating profits from core business activities, such as growing, producing, transporting, storing, handling, exporting, importing, manufacturing, milling, processing, feeding or merchandising grain.

### WHAT IS A COMMERCIAL HEDGER?

#### *Who is a Hedger?*

A commercial hedger is a company, firm or individual who take positions (long or short) on derivative or futures markets in order to secure the price for the commodities they will need for their business purposes at a later date.

A primary example of a commercial hedger is a country elevator, warehouse operator, export or importer. Most participants throughout the United States post farm gate supply chain operate in the manner.

Commercial hedgers have a position in the physical commodity and uses derivatives markets to reduce, i.e., hedge, their price risk exposure to either the items they produce, or the inputs needed for those commodities.

### WHAT IS LIFTING A HEDGE?

“Lifting a Hedge” is to concurrently close out of an existing hedge position in a related derivative of futures market as the corresponding physical in the physical market is secured.

Simply put, if a “hedged position” is being maintained; **When physical cash grain is bought, corresponding futures are sold, and, when physical cash grain is sold, corresponding futures are bought.**

In the case of a first stage processor who is protecting the processing margin, such as a feed manufacturer, the grain equivalent of the feed sold, would be the physical grain component to be hedged.

One method of accomplishing this process without the risk of “slippage” in

## *Who is a Hedger?*

the transaction is the use of an exchange of futures for physical (EFP). An EFP is a private agreement between two parties to trade a futures position for the basket of underlying actuals. An exchange of futures for physicals can be used to open a futures position, close a futures position, or switch a futures position for the underlying asset. When two parties have agreed to an EFP they must register the transaction with the relevant exchange. Exchange of futures for physical can also be referred to as an exchange of futures for product, or an exchange of futures for cash (as in cash commodity).

The question may arise as to why not just let these transactions go through the market...? The answer is, simply, for the sake of efficiency. Large transactions can impact a market as they are executed. At times large trades may sometimes be broken up into a series of smaller transactions over time to reduce the impact of slippage. By executing the order by an EFP and outside the market pricing mechanism allows large, offsetting transactions to take place at a determined price. An EFP may also be used when the market depth is not sufficient to absorb a large transaction. This is to the advantage of both the buyer and the seller.

## **BASICS OF HEDGING AND BASIS**

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Hedging is based on the principle that physical cash prices and futures market prices are correlated and will tend to move up and down together. This movement may not be identical, but the correlation is close enough that it is possible to reduce the overall price risk by taking an opposite position in the futures market as to that held in the physical cash market.

The gain or loss in one market will be offset by an equal, but opposite position in the other. In this manner, the hedger is able to increase the certainty of outcome for a desired price outcome for a physical cash market transaction that may not actually occur until sometime in the future. The following are some simple illustrations of hedging:

Business A, who wants protection itself against the possibility of being hurt by a rise in prices before purchasing the actual goods in the cash market, will buy a futures contract. Thus, Business A takes what is called a long position in the futures market to counter the risk of what is called short position in the cash market (meaning the business does not yet have the physical goods needed at some time in the future).

Business B, who wants protection against the possibility of being hurt by a drop in prices, will sell a futures contract. Thus, Business B takes a short position in the futures market to counter the risk of a long position (meaning

Business B already owns or is perhaps growing the commodity which will be sold later) in the cash market.

In each of these cases, the business has reduced or largely eliminated risk because the cash and futures markets are usually influenced by the same basic factors.

In the first example, Business A who bought a corn futures contract at \$6.50 when the cash price for delivery in the same month was \$6.60 might find later that cash prices had risen to \$6.85, and the grain would cost 25 cents more than expected. But the future contract price might well have risen from the original \$6.50 to \$6.75, so the business's 25 cent profit on the offsetting sale of the future contract would offset the 25 cent loss in the cash market, and the price change risk would have been fully covered.

In the second example, Business B, who was hurt by a 25 cent drop in the cash market, could offset it by an equal profit if the futures market declined 25 cents after the producer had sold a futures contract.

The simplified hedging examples above are only a first step for effective grain market risk management. Commercial producers and consumers are also dealing with the quality, location, and time value of grain that creates the concept called "basis."

#### **BASIS: THE LINK BETWEEN CASH AND FUTURES PRICES**

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### *Basics of Hedging and Basis*

As a buyer or seller of grain you know the physical cash price for grain in your local area will differ from the price quoted in the reference futures market. Simply explained:

$$\text{Basis} = \text{Cash} - \text{Futures}$$

$$\text{\$0.10} = \text{\$6.60} - \text{\$6.50}$$

$$\text{Basis} = \text{10 Cents Over December Futures}$$

Basis simply is the difference at any given point in time between the cash price for a commodity delivered at a particular place and time and the referenced futures price for any given contract month of the same commodity.

For anyone buying and selling grain there are three factors that ultimately determine the final price of the commodity: 1.) the futures price, 2.) the local basis value, and 3.) the applicable foreign exchange rate.

In simplest terms. the futures price is the current market assessment of world

fundamentals of supply and demand, and a benchmark value from which to value a commodity.

Basis is the relationship between the local physical cash price and the underlying futures price. The price difference between the cash and futures may be small or it may be large, and the two prices will not always vary by exactly the same amount. This price difference represents variables as type, class, quality, location, transportation and freight cost, storage and handling, as well as local supply and demand factors.

Foreign exchange, if applicable, take into account the relationship between differing underlying currencies that may be involved in a transaction.

For example, if a merchant finds on July 1<sup>st</sup> that the merchant can buy corn in the cash market for \$6.60 per bushel for November delivery while the December futures contract is selling at the same time for \$6.50, the basis that July day would be plus 10 cents, or "10 over the December corn futures" for November delivery.

When the cash price is below the futures price, the basis is said to be negative (or "under"); when above the futures price, the basis is said to be positive (or "over"). Again, basis is simply quoting the relationship of the local cash price to the futures price.

### *Basics of Hedging and Basis*

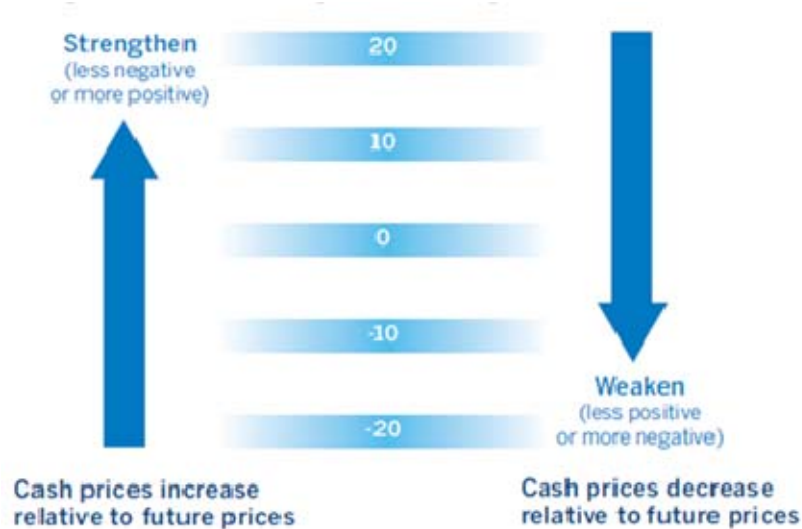
For example; when the basis changes from 40 cents under (a cash price 40 cents less than the futures price) to a basis of 30 cents under (a cash price 30 cents less than the futures price) indicates a strengthening basis, even though the basis is still negative.

On the other hand, a basis change from 30 cents over (a cash price 30 cents more than the futures price) to a basis of 25 cents over (a cash price 25 cents more than the futures price) indicates a weakening basis, even though \*the basis is still positive.

(Within the grain industry a basis of 15 cents over or 15 cents under a given futures contract is usually referred to as "15 over" or "15 under." The word "cents" is dropped. If the basis is 0 cents or equal to the given futures contract it is referred to as "option price".)

Like the futures price, the basis is determined by the market. When evaluating the current basis value, we consider its potential to "strengthen" or "weaken"; i.e., the more positive (or less negative) the basis becomes, the "stronger" it becomes. In contrast, the more negative (or less positive) the basis becomes, the "weaker" it is.





Source: CME Group - Self-Study Guide to Hedging with Grain and Oilseed Futures and Options 2019<sup>1</sup>

### *Basics of Hedging and Basis*

Basis is important to the hedger because the hedger is trying to establish or maintain the cash price by using the futures price. Therefore, the predictability of the difference between the cash and futures markets, the basis, is very important to the hedger.

The basis is also important to the commodity speculator trying to profit by anticipating movements in futures prices which must eventually bear resemblance to cash prices. By knowing the basis, the speculator can relate derivative or futures prices to the underlying physical cash prices.

The price discovery aspect of a derivative market – acting as a clearing place for all market information and providing a real market value for the goods traded – relies on two key elements of the cash and basis equations.

The first element is the need for the cash price at a designated delivery point for a futures market and the price of an expiring futures contract to be reasonably close, differing approximately by the amount of the delivery costs associated with transferring ownership.

The second element is the need for a close correlation between market prices at designated futures market delivery points and prices at other places within the marketplace. Without this correlation, it would be difficult to effectively hedge commodities sold at non-designated delivery points.

### **BASIS – THE WHAT, WHERE AND WHEN OF PRICE**

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Basis represents the “physical” attributes of cash grain; imply put the

physical attributes of **What**, **Where** and **When**. These individual factors that define “Basis” account for the difference between the physical cash price and the futures price of grain at any given point in time.

- **WHAT** – the “*Typical*” or “Type or Class” and/or “Quality” dimension of Price.

Type and Class factors, relate to the relative value of a commodity when comparing it to other types or class which may be suited for a substitutable end use.

In the matter of “type”; corn vs grain sorghum, which may both be used as a feed stuff or in the production of ethanol.

In the matter of “class”; Hard Red Winter (HRW) Wheat vs Soft Red Winter (SRW) Wheat, which may both be used as in milling flour, but with HRW Wheat 12.5% protein, which is preferred for bread, while SRW Wheat 10.0% protein is which is preferred for cakes.

Quality factors, also include differences between the quality grade, bulk density, moisture, foreign material, protein content, etc., of the physical grain and the quality levels specified in a futures contract.

- **WHERE** – the “*Spatial*” or “Location” dimension of Price.

Spatial factors relate to where the commodity is physically located, or the point from which it may be shipped or intended for delivery.

The value of the commodity is influenced by costs of transporting the commodity from its existing location or designated pricing point in the contract or relativity to a futures market.

### *Basics of Hedging and Basis*

- **WHEN** – the “*Temporal*” or “Time” dimension of Price.

Time factors can include the cost of storing grain from one point in time to another.

As grain production is seasonal, with local harvest supplies occurring in a short four-to-six-week period, while consumption by the end users usually occurring 52 weeks throughout the marketing year. As such, inventories accumulated at harvest must be stored and carried forward.

In addition, inter-seasonal differences in the values of grain are noted. Seasonal differences between “old crop” and “new crop” values are driven by seasonal changes in local and macro supply and demand relationships.

An understanding and analysis of the dynamics of “Basis” can be used to provide insight into the correlation, as well as differences, between the physical cash prices and related futures markets.

**Because the production and consumption of grain is characterized by seasonal production and continuous use, the market must perform its economic function of storing grain, limiting production, and increasing demand in times of surplus, while encouraging movement, increasing production and rationing demand in times of shortage.**

While organized futures markets exercise these economic functions within the confines of standardized contracts and the underlying delivery markets applicable to the contract, it is the function of local basis values to exercise these functions in other more removed markets relative to an underlying futures price.

Basis is the key to understanding cash commodities trading and the key element to understanding the link between the actual physical commodities and the futures, options and derivative markets that seek to express the price of the underlying commodities.

## *Basics of Hedging and Basis*

### **HEDGING EXAMPLES**

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#### **EXAMPLE 1: A PRODUCER'S SHORT HEDGE**

A producer plans to sell 50,000 bushels (approximately 1,270 mts) of corn at harvest time in October. On July 1<sup>st</sup>, the cash price is \$6.00 per bushel and the December futures are \$6.25/bu.

*(Note - this is a basis of 25 cents under the December futures contract)*

Strategic Considerations –

- Flat price opinion is “bearish” (likely to move lower);
- Basis is relatively inexpensive or “cheap”;
- The producer may not want to commit to a physical sale of corn due to perceived production risks.

The producer hedges his cash selling price by selling 100 December future contracts, thereby establishing a short hedge.

When harvest arrives, the producer finds the cash price has declined to \$5.50/bu and the December futures price has dropped to \$5.75/bu.

*(Note - the basis of 25 cents under the December futures contract)*

The producer is ready to initiate two final steps of the hedge:

- The producer will sell the producer's physical grain into the cash market at his local cash price; and,
- The producer will close out the producer's hedge by purchasing (buying back) 100 futures contracts to offset the producer's earlier sale of futures.

The net result is the producer has secured the net of \$6.00/bu that was available in July but has not made either a profit or a loss on the hedging operation itself.

Here is how it worked: The producer lost 50 cents per bushel in the cash market when the producer made the producer's actual sale at \$5.50/bu instead of the \$6.00/bu that was available to the producer for October or November delivery back in July. However, that loss was offset by the profit of 50 cents per bushel on the producer's futures transaction as the producer closed out the producer's \$6.25/bu futures sale with an offsetting \$5.75/bu purchase.

The example is summarized in this chart:

<b>Time</b>	<b>Cash</b>	<b>Futures</b>
July 1	Cash price \$6.00/bu for Oct. or Nov.	\$6.25/bu farmer sells 50,000 bushels Dec corn
<b>Time</b>	<b>Delivery</b>	<b>Futures Contracts</b>
Harvest (Oct-Nov)	Cash price \$5.50/bu	\$5.75/bu farmer buys 50,000 bushels Dec corn
	Loss: -\$.50/bu	Gain: + \$.50/bu

The result of the above “short hedge” example can also be evaluated by another method: an analysis of changes in the basis.

The basis on July 1<sup>st</sup> was -25 cents, meaning the cash price of \$6.00/bu was 25 cents below the \$6.25/bu future, which is referred to as 25 under December. When the hedge is completed at harvest, the basis is still 25 under because the cash price of \$5.50/bu is 25 cents below the future price of \$5.75/bu. Since there is no net change in the basis, there is no gain or loss on the hedge.

This process is not completely risk-free. If the basis in the example had changed while the hedge was in effect, there would have been a net gain or loss on the hedge transaction.

In the above example, the producer used a short hedge by selling futures.

Any short hedge will show a trading profit if the basis strengthens. If the basis moves from 25 under to only 15 under, such a change means that it has strengthened by 10 cents and the hedger reaps a 10 cent profit. Similarly, the basis could weaken and cause a loss on the hedge transaction.

## LONG HEDEGER AND BASIS

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### BUY FUTURES / LEAVE CASH “UNPRICED” = SHORT THE BASIS

Hedging with futures can offer the opportunity to establish an approximate price months in advance of the actual sale or purchase and protect the hedger from unfavorable price changes. This is possible because cash and futures prices tend to move in the same direction and by similar amounts, so losses in one market can be offset with gains in the other.

It must be kept in mind that; “**hedging manages risk by increasing the certainty of outcome.**” Although the hedger is unable to benefit from favorable price changes, they are reducing price risk and protected from unfavorable market moves.

### EXAMPLE 2: AN IMPORTER LONG HEDGE

Strategic Considerations –

- Flat price opinion is “bullish” (likely to move higher);
- Basis is relatively expensive.

	<b>Cash Market</b>	<b>Futures Market</b>	<b>Basis</b>
March		Buy July Corn Futures at \$6.50/bu	
June	Purchase physical cash corn at \$9.15/bu for June Shipment	Sell July Corn Futures at \$7.50/bu	The resulting basis value is +\$1.65N
<b>Net</b>	<b>\$9.15/bu</b> - <b>1.00/bu</b> <b>\$8.15/bu</b>	<b>\$7.50/bu</b> - <b>\$6.50</b> <b>\$1.00/bu</b>	<b>+\$1.65N</b>
<b>Net</b>	<b>\$8.15/bu</b>	<b>\$6.50</b>	<b>+\$1.65N</b>

For example, suppose it is March and an importer wants to price corn for June shipment as they believe that prices between March and June are likely

to move higher. At this same point in time, CME July corn futures price are trading at \$6.50 per bushel. However, the importer wants to leave the basis “unpriced” is not concerned about physical “security of supply” and believes the basis will weaken; (and therefore waits to make a cash purchase). To manage the expected price risk, they buy CME July corn futures at \$6.50 per bushel. In doing so the importer has established a futures price for the June corn, but has left the basis component of the final cash value “unpriced”

At some point before July the importer makes the cash purchase at \$9.15/bu. Simultaneously, they sell CME July corn futures at \$7.50 per bushel. In doing so the importer has established a cash basis of +\$1.65N (July futures price).

**Procurement Results** – Initially, CME July corn was purchased at \$6.50/bu. Later, physical cash corn was purchased at \$9.15/bu, while simultaneously CME July corn was sold at \$7.50/bu, lifting the initial “long hedge” and establishing a basis of +\$1.65N. This results in the net costs of corn of \$8.15/bu.

**Accounting Results** – In the accounting ledgers; the cost of corn inventory will be at a cost \$9.15/bu (debit) as per the physical cash purchase for corn, while the futures account will show a \$1.00/bu gain (credit) from the sale and subsequent purchase of CME July corn futures. This results in the net costs of corn of \$8.15/bu.

### **How might a change in basis values affect the performance of a long hedge?**

Basis is important to the hedger because it affects the final outcome of a hedge. Long hedgers benefit from a weakening basis, just the opposite of a short hedger.

Basis risk is considerably less than price risk, but basis behavior can have a significant impact on the performance of a hedge. A stronger-than-expected basis will benefit a short hedger, while a weaker-than-expected basis works to the advantage of a long hedger. It is important to consider when hedging is basis history and market expectations.

As a long hedger, if you like the current futures price and expect the basis to weaken, you should consider hedging a portion of your commodity purchase. On the other hand, if you expect the basis to strengthen and like today’s prices, you might consider buying or pricing your commodity now.

In the above example, if the basis values in March for June shipment of CIF corn was weaker, say at +\$1.50N than the final basis value established in June of +\$1.65N, it would have been advantageous to purchase the cash grain in

March. Had the basis been established in March, the net cash price would have been (\$6.50 futures + \$1.50 basis) \$8.00/bu.

Similarly, if the basis values for June shipment of CIF corn had strengthened to higher levels, say at +\$180N, the net cash price would have been (\$6.50 futures + \$1.80 basis) \$8.30/bu.

It should be kept in mind that basis values are:

1. less volatile than futures and flat price,
2. are more predictable,
3. make up a smaller component portion of the cash price than futures.

### **EXAMPLE 3: AN END USER LONG HEDGE, SHORT THE BASIS**

Strategic Considerations –

- Flat price opinion is “bullish” (likely to move higher), or physical sales of the end product (feed) are being committed to;
- Basis is relatively expensive.

In March, an end user of corn plans to lock in a price for a forward sale of 50,000 bushels (approximately 1,270 mts) chicken feed. In order to protect against a future price increase on corn the end will need later in July and August.

On March 1st, the cash price corn delivered to his mill in July is \$8.00 per bushel and the July futures are \$6.25/bu.  
*(Note - this is a basis of \$1.75 over the December futures contract)*

The end user hedges his cash price by buying 100 July futures contracts, thereby establishing a long hedge.

In June, the end user finds the cash price has increased \$9.25/bu and the July futures price has rallied to \$7.75/bu.  
*(Note - the basis of \$1.50 over the December futures contract)*

The end user is now ready to purchase physical corn and to initiate two final steps of the hedge:

- The end user will buy physical grain into the physical cash market at his local cash price of \$9.25/bu; and,
- The end user will simultaneously close out the producer's hedge by purchasing (buying back) 100 futures contracts at \$7.75/bu to offset the producer's earlier sale of futures.

The net result is the end user has secured physical cash grain at the net value of \$7.75/bu for delivery in July.

Here is how it worked: The end user lost 1.25 cents per bushel in the cash market when the end user made the actual purchase at \$9.25/bu in June, instead of the \$8.00 that was available to the end user back in March. However, that loss was offset by the profit of \$1.50 cents per bushel on the end user's futures transaction as the end user closed out the \$6.25 futures purchase with an offsetting \$7.75 purchase.

The example is summarized in this chart:

	<b>Cash Market</b>	<b>Futures Market</b>	<b>Basis</b>
March	Cash corn at \$8.00/bu for June Shipment	Buy July Corn Futures at \$6.25/bu	+\$1.75N <i>(implied)</i>
June	Purchase physical cash corn at \$9.25/bu for June Shipment	Sell July Corn Futures at \$7.75/bu	The resulting basis value is +\$1.50N
<b>Net</b>	<b>\$9.25/bu</b> - <b>1.50/bu</b> <b>\$7.75/bu</b>	<b>\$7.75/bu</b> - <b>\$6.25</b> <b>\$1.50/bu</b>	+\$0.25N <i>(implied savings)</i>
<b>Net</b>	<b>\$7.75/bu</b>	<b>\$6.25</b>	<b>+\$1.50N</b>

The result of the above “long hedge” example can also be evaluated by another method: an analysis of changes in the basis.

The basis on March 1<sup>st</sup> was \$1.75 over, meaning the cash price of \$8.00/bu was 175 cents above the \$6.25/bu futures which is referred to as \$1.75 over July. When the hedge is completed at the time of securing the physical cash grain in June, the basis had declined to \$1.50 over as the cash price of \$9.25/bu was 150 cents over the future price of \$7.75/bu.

Since there was a decline in the basis value of 25 cents per bushel, there was a resulting basis gain on the hedge.

This process is not completely risk-free. If the basis in the example had increased while the hedge was in effect, there would have been a net basis loss on the hedge transaction.

In the above example, the end user used a long hedge by buying futures. The long hedge strategy showed an additional trading profit as the basis weakened from 175 over, to 150 overs.



However, if the basis moved higher, from 175 over to 185 over, such a change means that it has strengthened by 10 cents, and the hedger would realize a 10 cent basis loss.

**Procurement Results** – Initially, CME July corn was purchased at \$6.25/bu. Later, physical cash corn was purchased at \$9.25/bu, while simultaneously CME July corn was sold at \$7.75/bu, lifting the initial “long hedge” and establishing a basis of +\$1.50N. This results in the net costs of corn of \$7.75/bu.

**Accounting Results** – In the accounting ledgers; the cost of corn inventory will be at a cost \$9.25/bu (debit) as per the physical cash purchase for corn, while the futures account will show a \$1.50/bu gain (credit) from the sale and subsequent purchase of CME July corn futures. This results in the net costs of corn of \$7.75/bu.

**EXAMPLE 4: AN END USER IMPORTER SHORT HEDGE, LONG THE BASIS**

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**BUY CASH / SELL FUTURES = LONG THE BASIS**

Strategic Considerations –

- Flat price opinion is “bearish” (likely to move lower), or there are no commitment to physical sales of the end product.
- Basis is relatively cheap

For example, suppose it is March and an importer purchases corn for June shipment CIF the desired port. At this same point in time, CME July corn futures price are trading at \$7.50 per bushel. While the importer want to establish the physical “security of supply” (and therefore makes the cash purchase at \$9.15/bu) they believe that prices between March and June are likely to move lower. To “unprice” the physical purchase of cash grain, they sell CME July corn futures at \$6.50 per bushel. In doing so the importer has established a cash basis of +\$1.65N (July futures price).

	<b>Cash Market</b>	<b>Futures Market</b>	<b>Basis</b>
March	Purchase physical cash corn at \$9.15/bu for June Shipment	Sell July Corn Futures at \$7.50/bu	The resulting basis value is +\$1.65N
June		Buy July Corn Futures at	

		\$6.50/bu	
Results	Cost of physical cash corn = \$9.15/bu	Net gain / loss from futures position = \$1.00/bu	Basis value = +\$1.65N
Net	\$9.15/bu - 1.00/bu \$8.15/bu	\$6.50/bu	+\$1.65N
Net	\$8.15/bu	\$6.50	+\$1.65N

At some point before July the importer wishes to establish the final net cost of the physical cash corn purchase. The market has moved favorably and CME July corn futures are purchased at \$6.50 per bushel.

**Procurement Results** – Physical cash corn was purchased at \$9.15/bu, while simultaneously CME July corn was sold at \$7.50/bu, “unpricing” the corn and establishing a basis of +\$1.65N. Later, CME July corn was purchased at \$6.50/bu, pricing the cash corn that had an established basis of +\$1.65N. This results in the net costs of corn of \$8.15/bu.

**Accounting Results** – In the accounting ledgers; the cost of corn inventory will be at a cost \$9.15/bu (debit) as per the physical cash purchase for corn, while the futures account will show a \$1.00/bu gain (credit) from the sale and subsequent purchase of CME July corn futures. This results in the net costs of corn of \$8.15/bu.

**How might a change in basis values affect the performance of a short hedge?**

Basis is important to the hedger because it affects the final outcome of a hedge. Short hedgers benefit from a strengthening basis, just the opposite of a long hedger.

In the above example, if the basis values for June shipment of CIF corn had strengthened to weaken to lower levels, say at +\$1.50N, the net cash price would have been (\$6.50 futures + \$1.50 basis) \$8.00/bu.

**EXAMPLE 5: A FOREIGN EXCHANGE HEDGE**

Foreign exchange risk can be as important as the underlying commodity hedge. An importer who has foreign exchange risks may also use the exchange traded futures, the OTC swap market, or foreign exchange contracts with a merchant bank to reduce foreign exchange risks. The related transactions, accounting and reporting follows much the same as the

commodity hedge.

For example, a Japanese grain firm plans to buy one billion Japanese yen worth of grain from the United States in three months, but the firm anticipates that the U.S. dollar will strengthen during the coming three months. The yen is currently selling for .9500 and the three-month futures are priced at .9501. The Japanese grain firm properly hedges against a possible strengthening of the dollar by selling three-month futures and then offsets (closes the hedge) when the yen cash or spot market is at .9360 and the yen futures are selling at .9350.

What is the resulting profit or loss? (A futures quote in yen assumes an extra two zeroes: a quote of .9355 really means .009355 yen per dollar.)

	<b>Cash(spot)</b>	<b>Futures</b>
Firm owns Yen	.9500	.9501
Firm sells Yen	.9360	.9350

The Japanese grain firm loses .0140 on the cash transaction but gains .0151 on the futures. The net gain or basis difference results in a .000011 profit or \$11,000. The use of futures to lock in currency risk avoided a potentially volatile move of .0140 or \$140,000.

## **HISTORICAL BASIS**

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By hedging with futures, buyers and sellers are eliminating a large portion of overall price risk, and more specifically the futures component of price risk. However, they may be left assuming basis risk. While basis risk is relatively less risky than either cash market prices or futures market prices. It still has a component of residual price risk.

As we have seen, exposure to basis risk is connected to the physical purchase or sale of grain. As such, buyers and sellers of commodities can be proactive managing their basis risk. A good place to begin is an evaluation of the local historical basis.

### ***Importance of Historical Basis***

Since agricultural basis tends to follow historical and seasonal patterns, it makes sense to keep good historical basis records of your local markets. A good place to start is to obtain a local history of “flat” price. With a little research, a price history can be constructed for past years. From here it is easy to set the data up in a spreadsheet to do the necessary calculation to determine the basis. From this data set it is an easy process to obtain corresponding historical price history for a related futures contract; (including a historical foreign exchange rate, if applicable).

Exporters, Importers, end users and other merchandisers that purchase ingredients from distant suppliers may find it useful to track and calculate the basis from liquid and transparent secondary markets closer to the source of the supply.

Bushels/Tonne		39.35714						
Date	Cash Price / mt	Fx	Cash in US\$/bu	Futures	Month	Basis		Market Factors
05-Jan-22	AUD 400.00	0.7490	\$7.61	\$7.00	H (March)	0.61	H	
12-Jan-22	AUD 406.00	0.7510	\$7.75	\$7.20	H (March)	0.55	H	Fund Buying
19-Jan-22	AUD 395.00	0.7495	\$7.52	\$6.90	H (March)	0.62	H	Bearish USDA Report
26-Jan-22	AUD 405.00	0.7500	\$7.72	\$7.15	H (March)	0.57	H	Technical Buying
02-Feb-22	AUD 409.00	0.7520	\$7.81	\$7.25	H (March)	0.56	H	
09-Feb-22	AUD 415.00	0.7515	\$7.92	\$7.40	H (March)	0.52	H	Export Sales
16-Feb-22	AUD 412.00	0.7520	\$7.87	\$7.30	H (March)	0.57	H	Farmer Selling
23-Feb-22	AUD 418.00	0.7515	\$7.98	\$7.45	H (March)	0.53	H	
02-Mar-22	AUD 420.00	0.7525	\$8.03	\$7.50	K(May)	0.53	K	Dry U.S. Forecast
-	-	-	-	-	-	-	-	
-	-	-	-	-	-	-	-	
-	-	-	-	-	-	-	-	

**Importance  
of Historical  
Basis**

The table above is a sample of a basis record. Although there are numerous ways to set this up, the content should include: date, cash market price, foreign exchange rate, derived cash price in US Dollars per bushel, futures market price (specify contract month), calculated basis and underlying futures month, and market factors for that date. Once in a spreadsheet, this information can be easily put into a chart format and analyzed further.

The most common type of basis record will track the current cash market price to the nearby futures contract month price. It is a good practice to switch the nearby contract month to the next futures contract month prior to entering the delivery month.

It is common to track basis either daily or weekly. If you choose to keep track of basis on a weekly schedule, be consistent with the day of the week you follow. If weekly, avoid tracking prices and basis on the first or last day of the week, i.e. Mondays or Fridays.

Formatting basis information from multiple years on a chart will identify seasonal and historical patterns. In addition to determining a seasonal period average, data will also help to determine the historical basis range, along with historical highs and lows for any given time period. Notes made on the influencing market factors will help to explain these highs and lows.

Basis tables can help to compare the current basis level with historic values. They can also assist in forecasting expected basis levels in the future, assisting in developing merchandising strategies for purchases and sales. It can help determine which suppliers are historically more competitive, as well as if a supplier’s current offer is historically stronger or weaker than expected.

This historical perspective, used in conjunction with and understanding of Delivery Value Equivalents (DVE's), and current fundamental market information will greatly assist in developing more effective merchandising strategies.

Merchandisers and basis traders make a profit by actively managing their basis positions. They keep a watchful eye out for unusual basis patterns and values that present opportunities to improve their margins or avoid losses, while maintaining their market bids and offers at competitive levels.

## **HEDGING AND THE FORWARD MARKET STRUCTURE**

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The shape of the forward curve is important to both commodity hedgers and speculators. Both care about whether commodity markets are in a “**carry**” or an “**inverse**”. As such, it needs to be kept in mind that certain market environments are more conducive to hedging strategies than others.

Hedging strategies are best incorporated into merchandising decisions when “time” is available. This is when the forward price structure is showing a “carry”; i.e., the forward or future value of a commodity is higher than its spot or nearby price. This reflects, in part, the costs associated with physically holding the underlying assets into sometime in the future. In this type of an environment, time is working for the merchandiser allowing a window of opportunity to improve a position in the market.

**In markets with a “carry” structure, hedging strategies can work very well and offer significant merchandising opportunities and improved returns.**

However, in an “inverted” market environment, where prices in the spot or nearby month are at higher than values in the more distant months; time is working against the merchandiser and does not allow a window of opportunity to improve a position in the market. In these types of environments hedging opportunities become increasingly limited as merchandising decisions move more to a “back-to-back” approach.

## **TRADING OTHER SPREAD RELATIONSHIPS**

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A “**spread**” trade is a strategic approach a trader can use to seek out profit. These strategies can be executed through the use of derivatives or futures, as well as in liquid physical cash markets, or a combination of both.

The goal of “**spread**” strategy is to profit from the change in the price relationship between two differing positions. A trader or merchandiser may seek to execute a spread in the market when they feel there's a potential to gain from a beneficial change in a price relationship. These relationships can be defined as:

- **What** - “kind or type or quality” (Typical),
- **When** - “time” (Temporal)
- **Where** - “location” (Spatial)

A significant benefit of active “spread” trading in a market assures that price relationships across commodity type, quality, time and location are kept in balance.

A spread requires simultaneous establishment of two positions. The two positions are traded simultaneously as a unit, with each side considered to be a leg of the unit trade.

Being aware of these price changes and their causes is a key element to risk management in commodity markets. These same strategic considerations are contemplated when making merchandising decision for physical cash grain, as well as when determining hedge placements of futures and derivatives. In fact, the majority of futures and derivative transactions traded within CME Group markets are a result of spread relationships.

#### **INTER-COMMODITY SPREADS:**

##### ***WHAT “KIND, TYPE, CLASS OR QUALITY” OF COMMODITY (TYPICAL)***

An “inter-commodity” spread is trade that attempts to take advantage of the value differential between two or more related commodities, such as crude oil vs heating oil, or corn vs soybeans. To be successful requires a knowledge of the underlying dynamics between the various commodities or two different classes or quality of the same commodity. They will typically have a definable relationship, i.e. they are economic substitutes, (corn vs wheat) or compete for the same production capacity (corn vs soybeans).

An inter-commodity spread is a strategy established by simultaneously entering a long and short position between two different, but related commodities with the same contract month.

For example, a trader who is more bullish on the corn market than the soybean market would buy corn futures and simultaneously sell soybean futures in corresponding months. The trader profits if the price of corn appreciates over the price of soybean. A strategy such as this is quite

common as corn and soybeans compete for planted acres each spring.

These price relationships are also important in physical cash markets as substitutable commodities compete for demand, such as into the feed ration and feed ingredients. Grain sorghum is often priced below corn values. If the corn-sorghum price gap widens because of an increase in corn prices or a decline in sorghum prices, a trader will anticipate that feeders may increase their usage of the relatively lower valued grain sorghum. This is likely to decrease the usage of the relatively expensive corn as grain sorghum prices in greater demand.

### *Inter-Commodity Spreads*

With this knowledge, a trader can go long on wheat and short on corn when the spread is widening. Alternatively, the trader may go long on corn and short on wheat when the spread is narrowing.

If a trader can correctly predict changing relationship between various commodities, i.e., whether the value relationship will widen or narrow, the trader will realize a profit.

In this instance, the trader is not concerned with the actual price of each commodity. They are interested in the direction and difference in the price.

For the merchandiser and hedger, understanding these relationships can be an import strategic component of hedge placement.

#### **INTRA-COMMODITY OR CALENDAR SPREADS:**

##### ***WHEN “TIME” (TEMPORAL)***

A calendar spread is a strategy established by simultaneously entering into a long and short position on the same underlying commodity, but with different delivery periods.

### *Intra-Commodity Spreads*

A **“Bull Spread”** is when one buys the nearby contract and sells the deferred. For instance, a trader could buy a March wheat futures contract and sell a September wheat futures contract.

A **“Bear Spread”** is when one sells the nearby contract and buys the deferred. For instance, a trader could sell a March wheat futures contract and buy a September wheat futures contract.

Calendar Spreads are used throughout the agribusiness community for a number of reasons, but primarily to manage price risks over time.

#### **INTER-MARKET SPREADS:**

##### ***WHERE - “LOCATION” (SPATIAL)***

## *Inter- Market Spreads*

An Inter-Market spread is a strategy established by simultaneously entering into a long and short position between the same or similar commodities in two differing locations, and generally involve two differing exchanges.

This based on the fact that some commodities are traded on more than one market with differing underlying locations. Prices for a commodity between two market locations will vary due changes in local supply and demand relationships, as well as the differences in transportation costs.

A trader will make an inter-market spread when the trader believes that the price differences between two markets when a change in the relationship is anticipated or looks abnormal. For example, if the price of corn on the U.S. Chicago CBOT is underpriced when compared to the price of corn on the Chinese Dalian DCE, when considering the logistical and quality differences, a trader will buy the CBOT corn and sell DCE corn. The trader will profit if the market moves to the anticipated price relationship.

### **PROCESSING SPREADS**

This type of spread relationship takes into account an implied processing margin in a particular market sector.

**SOYBEANS** - An common example of this is the soybean crushing margin or “**crush**”. Soybean crushers process soybeans into meal and oil products. The value of these three components are reflected in their relative values in CBOT futures contracts.

A trader may establish a “**Board Crush**” by buying a given contract month of soybeans and simultaneous selling a corresponding volume of soybean meal and soybean oil in the same month.

A “**Reverse Board Crush**” can also be establish by selling a given contract month of soybeans and simultaneous buying a corresponding volume of soybean meal and soybean oil in the same month.

The soybean crush spread is often used by soybean crushers to hedge the physical purchase price of corn and the physical sales prices of soybean meal and soybean oil. It also offers many opportunities for speculators, as the spread relationship between soybeans, soybean meal and soybean oil vary over time.

**CORN** - A similar approach can be taken by the ethanol industry. The term “**Corn Crush or Grind**” refers both to a physical process as well as a value



## *Processing Spreads*

calculation. The physical corn grind is the process of converting corn into the byproducts of ethanol and distillers' dried grains (DDGs).

The corn grind spread is a dollar value quoted as the difference between the combined sales values of the products (ethanol and DDGs) versus the cost of corn. This value is traded in the cash or futures market based on expectations of future price movement of corn versus ethanol and DDGs. The relationship between prices in the cash market is commonly referred to as the Gross Production Margin (GPM). The value traded in the futures market is an inter-commodity spread transaction in which corn futures are bought (or sold) and ethanol and DDGs are sold (or bought).

The corn grind spread is often used by ethanol producers to hedge the purchase price of corn and the sales prices of ethanol and DDGs. It also offers many opportunities for speculators, as the spread relationship between the corn, ethanol, and DDGS varies over time.

### **DIRECTIONAL TRADING**

Generally, trading directional price movements is viewed as crossing into the realm of speculation. Trying to predict directional price movement are more difficult and requires a differing approach to market analysis. Directional trading also carries a significantly greater risk profile. These issues need to be considered when developing trading and merchandising strategies.

It is important to understand that when trading spread relationships, direction price movements are of minimal concern, as the offsetting bought vs sold positions should offset this risk.

### **FUTURES MARGINS ON SPREAD TRADING**

A futures spread effectively provides a hedge against systematic risk, allowing exchanges to reduce the margins for spread trading. If an external market event occurs, such as a surprise interest rate movement or terrorist attack, both the long and short positions of a spread, in theory, will offset each other.

Due to a lower risk profile and volatility of spread relationships, margining requirements for spread trading on established futures exchanges are generally lower than margining requirements for hedging or speculative accounts.

For example for comparison:

- Speculative: Initial Margin is \$1,800 Maintenance \$1,600 +/-

- Hedge: Initial Margin is \$1,600 Maintenance \$1,600 +/-
- Spread: Initial Margin is \$ 800 Maintenance \$ 500 +/-

## SUMMARY

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Price Risk is an intrinsic, yet a precarious element of commodity markets. Regardless of what kind of market participant one aims to be, having a basic knowledge and understanding of hedging strategies will lead to greater awareness of market dynamics and how various participants work to protect themselves against adverse price moves.

Whether or not it is decided to commercially expand the more intricate use of derivatives, futures or options; learning about how hedging works will help advance greater understanding of the markets, and related price signals, which will always help securing improved success in procurement and purchasing activities.

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<sup>i</sup> CME Group "Self-Study Guide to Hedging with Grain and Oilseed Futures and Options ". (2019)  
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