BUL 1055

Managing Price Risks Using Grain Contracts

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Contents

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Introduction

GRAIN MARKETS ARE NO LONGER JUST a local concern. Agricultural market discussions today must factor in global perspectives. When analyzing the price of wheat, for instance, producers must not only consider the market in the United States but also those of other key suppliers from overseas, such as Russia, Australia, Ukraine, and the European Union. The conversation becomes more complicated when examining the demand side. What's happening in Asia? Will China's purchasing volume be as high as last year's? How much grain will be consumed in the Middle East? Indeed, US producers must now grapple with increasingly complex uncertainties when marketing their products. Consequently, in the modern global agricultural landscape, developing effective risk management is a crucial skill.

The need to manage price risks in commodity markets has become even more apparent in recent years. The large rally in grain markets in 2021 and 2022, followed by a bear market in 2023, has demonstrated that relying solely on selling at cash prices at harvest without a proper risk management plan is no longer sufficient. Rising volatility in markets, coupled with increasing costs, means that producers must be more diligent in their grain marketing approaches. Luckily, a wide range of tools is available to producers to help ensure the long-term economic sustainability of a farm.

When visiting local grain buyers, producers should always carefully scrutinize the assortment of risk management products available for both old and new crops. Each product offers its own benefits and drawbacks. This publication helps in that endeavor by discussing the common marketing tools that local elevators and co-ops offer for wheat producers. By familiarizing themselves with these tools, producers will enhance their marketing strategies and thus more effectively navigate the ever-evolving dynamics of the wheat market.

Wheat Prices in Idaho

Price volatility is a common characteristic of agricultural commodities, including wheat, due to the influence of various supply and demand factors. In 2022, the price of Chicago soft red wheat futures ranged from a high of almost $13/bushel to a low of less than $8/bushel. A similar magnitude of price variations is observed for cash prices. In Lewiston, Idaho, prices for soft white wheat ranged from a low of around $7.50/bushel to a high of over $11.50/bushel, while hard red winter wheat prices fluctuated between $8.50/bushel and $13.40/bushel. However, the basis (the difference between cash and futures prices) tends to exhibit less volatility and often follows a more predictable range. The main reason is that cash and futures prices tend to move in the same direction, with the difference (basis) reflecting the cost of carrying the commodity and the deviation of local supply and demand conditions from the global factors.

The main hub for grain exports in the Pacific Northwest (PNW) (namely Montana, Idaho, and Washington) is Portland, Oregon. Many resources referencing the basis in the PNW will be for Portland. While this is a good barometer, basis at the Idaho elevators varies from those in Portland. Table 1 provides summary statistics for wheat prices and basis in three Idaho locations: Burley, Soda Springs, and Lewiston, for the marketing years 2020/21 and 2021/22 (June through May). Weekly cash price data is provided by the Idaho Barley Commission. Basis is computed by subtracting nearby futures prices from the cash price.

Table 1 shows that in all but one case (soft white wheat in Lewiston in 2021/22), the standard deviation of basis is significantly smaller compared to that of cash prices. This underscores the importance of using marketing tools to mitigate price risks, in particular through hedging, which helps remove price volatility in exchange for the less volatile basis risk. The table also shows the significant spatial variation of prices and basis. It is interesting to note that in 2020/21, while in Burley and Soda Springs HRW wheat prices were more volatile than SW wheat prices, the pattern was opposite in Lewiston. In 2021/22, SW wheat prices and basis were more volatile than HRW in Soda Springs and Lewiston, but in Burley HRW remained more volatile than SW. Notably, the volatility of SW wheat basis in Lewiston stands out in both years.

Basic Terminology

Cash price: the price quoted by a local grain elevator or merchandiser for a given delivery window (today or a future date).

Futures price: the price of an exchange-traded futures contract, which is the obligation to deliver a specified amount of grain on a future delivery date; futures price typically reflects global demand and supply conditions.

Basis: the difference between cash and futures prices, which reflects the cost of carry, insurance, freight, merchandiser margins, and local supply and demand conditions; basis can be either positive or negative and varies by location and time.

Price risk: the risk posed to a producer that the selling price will decline before delivery.

Basis risk: the risk that basis will move in unfavorable directions; basis risk is in general significantly lower than price risk.

Cash price = futures price + basis: final price received by producers can be decomposed into futures price and basis; most grain contracts deal with at least one of the three quantities.

Cash Market Contracts

Cash market contracts, typically offered by local grain buyers and elevators, are important marketing tools that producers can use to manage price risks. We discuss the following contracts: (1) cash/simple

Table 1. Average wheat prices and standard deviation ($/bushel) for soft white (SW) and hard red winter (HRW) wheat in Burley, Soda Springs, and Lewiston, 2020/21–2021/22.

Year		Burley, Idaho		Soda Springs, Idaho		Lewiston, Idaho	
		SW	HRW	SW	HRW	SW	HRW
2020/21	Futures	6.01	5.50	6.01	5.50	6.01	5.50
		(0.69)	(0.80)	(0.69)	(0.80)	(0.69)	(0.80)
	Cash	5.02	5.18	4.89	5.04	5.92	6.14
		(0.59)	(0.59)	(0.50)	(0.72)	(0.91)	(0.78)
	Basis	-1.02	-0.37	-1.26	-0.48	-0.09	0.64
		(0.18)	(0.21)	(0.17)	(0.17)	(0.44)	(0.29)
2021/22	Futures	8.39	8.48	8.39	8.48	8.39	8.48
		(1.70)	(1.92)	(1.70)	(1.92)	(1.70)	(1.92)
	Cash	7.92	7.80	8.28	8.70	9.85	9.26
		(0.88)	(1.12)	(1.32)	(2.14)	(0.97)	(1.82)
	Basis	0.56	0.47	-0.11	0.23	1.47	0.78
		(0.48)	(0.50)	(1.19)	(0.61)	(1.21)	(0.45)

Notes: Standard deviation in parenthesis. For SW wheat, futures prices refer to prices of nearby Chicago soft red wheat futures contracts. For HRW wheat, futures prices refer to prices of nearby Kansas City hard red winter wheat futures contracts. Data obtained from the Idaho Barley Commission.

forward contract, (2) hedge-to-arrive (HTA) contract, (3) basis contract, (4) minimum price contract, (5) price later or delayed pricing contract, and (6) average pricing contract. For easier demonstration, we use Doug, a wheat farmer, to demonstrate all the examples.

It should be noted that some contracts discussed are useful mostly for grains with active futures and options trading (e.g., HTA), while some contracts are applicable for all types of grains (e.g., cash contracts or forward sales). However, all six types of contracts should be applicable to all major varieties of wheat produced in Idaho. Soft white wheat is priced based on the Chicago soft red wheat futures contract, while HRW and hard red spring wheat is priced based on Kansas City wheat and Minneapolis wheat futures contracts, respectively. Another major type of grain produced in Idaho is barley. Cash contracts may be available for barley through local elevators, although most of the malt barley in Idaho is purchased by major beer companies through direct contracting.

(1) Cash Contract/Simple Forward Contract

This is the most basic type of grain contract. Under this agreement, the producer agrees to sell a specific quantity of grain at a specific price during a specific delivery window to a specified location. The producer may agree to a spot sale, where they deliver the grain at the price currently available at the elevator at the time of the delivery, or to a forward cash sale, where they set the price today for the grain to be delivered during a future delivery window. With a cash contract, the producer locks in a cash price today, effectively eliminating any possible futures price or basis risk. However, they will be unable to benefit from any favorable moves in price or basis in the future.

Best-use case: This contract type may be best in situations where time to sale is limited or the producer anticipates no favorable moves in basis or price. Cash contracts are popular among producers because of their simplicity.

Table 2. Net price using cash contract, in $/bushel.

	Scenario 1			Scenario 2		
	Cash Price	Futures Price	Basis	Cash Price	Futures Price	Basis
T0 (today)	**7.40**	6.70	0.70	**7.40**	6.70	0.70
T1 (harvest)	6.45	5.80	0.65	7.85	7.10	0.75
Net Price Received	7.40			7.40		

Notes: Numbers in bold are the prices/basis used in the net price computation. Cash contract uses the prices when the contract is initiated.

Example: While creating a plan to manage the price risk of new crops, Doug notices the cash price for harvest delivery is $7.40 and the futures price is $6.70 (basis = $0.70). If he agrees to use a forward contract to manage his risk, he will receive a cash price of $7.40 at harvest, regardless of what happens in the market. Table 2 describes the net price Doug receives when prices decline (**scenario 1**) and rise (**scenario 2**) when using cash/forward contracts.

(2) Hedge-to-Arrive (HTA)

With an HTA contract, a producer enters into an agreement to lock in the futures price today but leaves the basis to be set on a future date for a specific quantity of grain to be delivered in the future. Excluding transaction charges, the final cash price the producer receives is the futures price when the HTA contract is signed, plus the basis the producer sets on a future date (but before the delivery window).

When executing an HTA contract, a merchandiser places a hedge on a producer's behalf by selling deferred futures contracts. An HTA contract eliminates the futures price risk, but the producer is still exposed to basis changes. The final selling price using HTA will be higher if the basis strengthens (becomes more positive or less negative).

Best-use case: This is a very common (and popular) type of contract. Initiating an HTA is most favorable when a producer expects the basis to strengthen or the futures price to decline.

Example: Doug notices the cash price for harvest delivery is $7.40 and the futures price is $6.70 (basis = $0.70). He initiates an HTA contract with the local merchandiser at the current futures price. Fast forward to the harvest season to two scenarios. In **scenario 1**, prices have fallen and the futures price is $5.80 and the cash price $6.45 (basis = $0.65). Doug sets the basis and the final price he receives is $6.70 (futures price when HTA is initiated) + $0.65 = $7.35. In **scenario 2**, prices have risen: the futures price is $7.10 and the cash price $7.85 (basis = $0.75). Doug sets the basis and the final price he receives is $6.70 (futures price when HTA is initiated) + $0.75 = $7.45. Table 3 describes the net price Doug receives when prices decline (**scenario 1**) and rise (**scenario 2**) when using HTA contracts.

(3) Basis Contract

With a basis contract, the producer agrees to deliver a specified amount of grain on a future date at a fixed basis, but leaves the futures price open to be set later (but before the delivery window). Excluding transaction charges, the final cash price the producer

Table 3. Net price using HTA contracts, in $/bushel.

	Scenario 1			Scenario 2		
	Cash Price	Futures Price	Basis	Cash Price	Futures Price	Basis
T0 (today)	7.40	**6.70**	0.70	7.40	**6.70**	0.70
T1 (harvest)	6.45	5.80	**0.65**	7.85	7.10	**0.75**
Net Price Received	6.70 + 0.65 = 7.35			6.70 + 0.75 = 7.45		

Notes: Numbers in bold are the prices/basis used in the net price computation. HTA contracts lock in the futures prices when the contract is initiated, with the basis set at a later date.

Table 4. Net price using basis contracts, in $/bushel.

	Scenario 1			Scenario 2		
	Cash Price	Futures Price	Basis	Cash Price	Futures Price	Basis
T0 (today)	7.40	6.70	**0.70**	7.40	6.70	**0.70**
T1 (harvest)	6.45	**5.80**	0.65	7.85	**7.10**	0.75
Net Price Received	5.80 + 0.70 = 6.55			7.10 + 0.70 = 7.80		

Notes: Numbers in bold are the prices/basis used in the net price computation. Basis contracts lock in the basis when the contract is initiated, with the futures price set at a later date.

receives is the futures price set later, plus the fixed basis when the contract is initiated. A basis contract eliminates basis risk, but the producer is still subject to price risks. The final selling price of a basis contract will be higher if the futures price increases.

Best-use case: A basis contract is most suitable when the producer expects the basis to weaken (become more negative or less positive) or the price to increase between the time of the contract initiation and the delivery window.

Example: While marketing new crops during the planting season, Doug notices the cash price for harvest delivery is $7.40 and the futures price is $6.70 (basis = $0.70). He decides to go with a basis contract, locking in the current basis of $0.70. Now consider two scenarios after the contract has been signed. In **scenario 1**, prices have fallen, with futures being $5.80 and cash being $6.45 (basis = $0.65). Doug sets the futures price and the final price he receives is $5.80 + $0.70 (basis when contract is initiated) = $6.55, a price higher than the current cash bid. Doug accepts a lower price since he does not have any other price protections, but he receives a higher cash bid due to the higher basis set earlier. In **scenario 2**, prices have risen, with the futures price at $7.10 and the cash price at $7.85 (basis = $0.75). He sets the futures price and the final price Doug receives is $7.10 + $0.70 (basis when contract is initiated) = $7.80. Table 4 describes the net price Doug receives when prices decline (**scenario 1**) and rise (**scenario 2**) when using basis contracts.

(4) Minimum Price (MP)

With an MP contract, the producer agrees to deliver a specified quantity of grain at a minimum guaranteed price in a future delivery window. An MP contract allows the producer to create a price floor while taking advantage of potentially higher prices before the delivery window. In most cases, the minimum price is determined based on the strike price of an options contract, the premium of the options contract, and the basis set by the merchandiser. Producers need to compare the minimum price with their own production cost to determine whether the minimum price is acceptable.

An MP contract effectively eliminates any basis risk and downside price risk between the time the contract is initiated and the delivery window. The producer can set a higher price later if the opportunity arises, but they will not be able to benefit from any favorable movement on basis. Additionally, they will have to pay merchandiser fees for MP contracts.

Table 5. Net price using minimum price contracts, in $/bushel.

	Premium for MPC with Strike Price = 6.70	Scenario 1			Scenario 2		
		Cash Price	Futures Price	Basis	Cash Price	Futures Price	Basis
T0 (today)	**0.20**	7.40	**6.70**	**0.70**	7.40	6.70	**0.70**
T1 (harvest)		6.45	5.80	0.65	7.85	**7.10**	0.75
Net Price Received		6.70 + 0.70 - 0.20 = 7.20			7.10 + 0.70 - 0.20 = 7.60		

Notes: Numbers in bold are the prices/basis used in the net price computation. MPCs lock in a minimum price based on the strike price, the premium, and the basis. If prices go up, the producer can reprice the contract to achieve a higher price. MPC = minimum price contract.

Best-use case: This contract is best used when the producer believes there will be a meaningful increase in price before delivery, but is still worried the price may decline.

Example: Doug notices the cash price for harvest delivery is $7.40, the futures price is $6.70 (basis = $0.70), and the premium on the options contract with a strike price of $6.70 is $0.20. He believes prices will increase but is also worried about downside risk. He is offered an MP contract for $6.70 strike price, $0.20 premium, and $0.70 basis. Excluding the additional fees charged by the merchandiser, Doug is guaranteed to receive at least $6.70 (strike price of options) - $0.20 (premium of options) + $0.70 (basis) = $7.20 at harvest with the MP contract. He will be able to receive higher prices if the futures price goes above $6.70.

Consider two scenarios. In **scenario 1**, prices have fallen, with futures being $5.80 and cash $6.45 (basis = $0.65). The final price Doug receives is $7.20, the minimum price of the MP contract. In **scenario 2**, prices have risen; now futures price is $7.10 and cash price is $7.85 (basis = $0.75). Doug reprices the grain and the final price he receives with the MP contract is $7.10 (futures price now) - $0.20 (premium of options at the time MC is initiated) + $0.70 (basis set when MC is initiated) = $7.60. Table 5 describes the net price Doug receives when prices decline (**scenario 1**) and rise (**scenario 2**) while using minimum price contracts.

(5) Price Later or Delayed Pricing (DP)

A price later or DP contract allows a producer to establish the price of grain at a later date. After delivering grain to the elevator, the producer prices the grain at a later date within a specified window. During this time, the producer is fully subject to both price and basis risks. They may also be responsible for service and storage fees until the grain is priced. Producers should carefully consider those charges when assessing the risk/reward of waiting to sell.

Best-use case: The main purpose of this contract is to ensure that there is a buyer for the grain. It does not provide any price protection. However, this could be beneficial if the producer wants to delay reporting income from the sale of grain to the next reporting period. Producers may also consider a DP contract if they believe that prices will rise in the short term and the basis will strengthen and they want to wait to speculate on that higher price.

Example: At harvest, the cash price is $7.00 and Doug has 10% of grain that has not been priced. Doug enters a DP contract for the grain with his elevator. The storage cost is $0.05/month. Consider two scenarios. In **scenario 1**, cash prices rally from $7.00 to $7.40 over the next month and Doug prices the grain. After considering carrying costs, the net price of the grain is $7.40 - $0.05 (storage fees) = $7.35. In **scenario 2**, cash prices fall to $6.60 over the next month and Doug prices the grain. The net price he receives is $6.60 - $0.05 (storage fees) = $6.55. Table 6 shows the net price received by Doug using price later contracts in the two scenarios.

(6) Average Price

The term *average price* encompasses a range of products that operates on the same principle. Generally, an average price contract is a variation of the standard HTA, but with a key difference:

Table 6. Net price using price later contracts, in $/bushel.

	Storage Cost	Scenario 1			Scenario 2		
		Cash Price	Futures Price	Basis	Cash Price	Futures Price	Basis
T0 (today)		7.00	6.30	0.70	7.00	6.30	0.70
T1 (harvest)	**0.05**	**7.40**	6.80	0.60	**6.60**	6.00	0.60
Net Price Received		7.40 - 0.05 = 7.35			6.60 - 0.05 = 6.55		

Notes: Numbers in bold are the prices/basis used in the net price computation. Price later contracts allow a producer to lock in the price later after accounting for storage costs.

rather than entering into the entire position at once, the pricing spreads out over a period of time. The producer determines the number of bushels to sell each week during a given window, creating an average crop price. They can set the basis at any time during the given window. Alternatively, they may opt for a series of cash forward sales instead of HTA-type sales. In such a scenario, the producer does not need to set the basis.

This type of contract may also offer a minimum price feature known as the *knock-out level*. When the market price reaches a predetermined minimum level, all the remaining bushels will be automatically sold at the prevailing price. This provision acts as a safeguard for the producer in the event of a sudden market downturn.

Best-use case: Average price contracts help spread out pricing risk over a pricing window, avoiding pricing at a low point. The pricing window can be selected to capture the historical seasonal price premiums when prices tend to be the highest. For HTA types of average price contracts, producers can also benefit from a strengthening basis.

Example: During the planting season, Doug notices the cash price for harvest delivery is $7.40 and the futures price is $6.70 (basis = $0.70). Assume there are thirteen weeks until harvest and Doug decides to initiate an average price contract with cash forward sale on 10% of the crop each week until the entire amount is under contract.

Consider two scenarios. In **scenario 1**, prices steadily rise since initiating the contract. Cash prices over the next ten weeks are $7.30, $7.25, $7.30, $7.40, $7.45, $7.50, $7.60, $7.65, $7.70, and $7.80. Ten percent of the crop will be sold at each of these prices, creating an average selling price of $7.495. In **scenario 2**, prices steadily declined since initiating the contract. Cash prices over the ten weeks are $7.45, $7.35, $7.30, $7.20, $7.10, $7.00, $6.90, $6.75, $6.70, and $6.75. The average price, also the final price Doug receives, is $7.05. Table 7 shows the net price received by Doug using average price contracts in the two scenarios.

Table 7. Net price using average price contracts, in $/bushel.

	Scenario 1			Scenario 2		
	Cash Price	Futures Price	Basis	Cash Price	Futures Price	Basis
Week 0 (today)	7.00	6.30	0.70	7.00	6.30	0.70
Week 1	**7.30**	6.65	0.65	**7.45**	6.75	0.75
Week 2	**7.25**	6.60	0.65	**7.35**	6.70	0.65
Week 3	**7.30**	6.62	0.68	**7.30**	6.65	0.65
Week 4	**7.40**	6.70	0.70	**7.20**	6.60	0.60
Week 5	**7.45**	6.75	0.70	**7.10**	6.55	0.65
Week 6	**7.50**	6.78	0.72	**7.00**	6.45	0.55
Week 7	**7.60**	6.80	0.80	**6.90**	6.35	0.55
Week 8	**7.65**	6.90	0.75	**6.75**	6.15	0.60
Week 9	**7.70**	7.00	0.70	**6.70**	6.05	0.65
Week 10 (harvest)	**7.80**	7.05	0.75	**6.75**	6.10	0.65
Net Price Received	(7.30 + 7.25 + 7.30 + 7.40 + 7.45 + 7.50 + 7.60 + 7.65 + 7.70 + 7.80)/10 = 7.495			(7.45 + 7.35 + 7.30 + 7.20 + 7.10 + 7.00 + 6.90 + 6.75 + 6.70 + 6.75)/10 = 7.05		

Notes: Numbers in bold are the prices/basis used in the net price computation. Average price contract allows producers to sell portions of crops during each time period specified to arrive at a weighted average price.

Using Grain Contracts in Practice

Producers can use this bulletin's overview of various grain contracts as part of their risk management strategy. Table 8 compares their suitability based on different price and basis expectations, as well as their associated risk exposure and level. For instance, if a producer expects the basis to weaken but prices to rise, then a basis or MP contract may work best. In periods of high basis and price volatility, such as the SW wheat market in Lewiston in 2021/22, a producer may benefit from using an MP contract to limit downside risk while still offering the opportunity for price improvement.

In practice, producers may adopt a combination of contracts. For example, a producer who wants to capitalize on a favorable basis movement might enter into a cash forward for 50% of their crop, while using HTA for the remaining 50%. At the end of the season, there may still be a portion of unpriced grain. In such cases, contracts like deferred pricing and cash forwards can be more advantageous.

Most contracts involve fees or commissions, which may be charged separately or factored into the offered price. When price protection is provided, especially in the form of an MP, it is common to include a service margin. It is crucial to carefully review contract details and to understand the commitments involved.

Note: Local elevators and merchandisers may offer similar contracts under different names or with variations specific to their company. More sophisticated contracts not covered by this study may also be offered by local elevators. Additionally, not all grain elevators offer all of the contract types previously mentioned and not all contracts will be offered every time of year. Hence, it's important to build relationships with local grain buyers to discover the available options.

Although these contracts offer several advantages to producers, they share two key drawbacks: delivery location and counterparty risk. In each case, producers are subject to counterparty risk—the chance that a company is unwilling or unable to live up to its obligations under the agreement through corporate decisions, insolvency, or other issues. Another disadvantage of all contracts with an individual grain buyer is that the contracts also include delivery location, which disallows grain sales to another regional buyer. Therefore, it's also worth comparing these options to standard futures and options risk management strategies.

Table 8. Comparison of different marketing contracts.

Marketing Contracts	Market Expectations					Area of Risk Exposure		Risk Rating
	Rising Prices		Declining Prices		Rising Price after Harvest			
	stronger basis	weaker basis	stronger basis	weaker basis		price	basis	
(1) Cash/Forward				X				low
(2) HTA			X				X	moderate
(3) Basis Contract		X				X		moderate
(4) Minimum Price	X	X						low
(5) Delayed Pricing	X				X	X	X	moderate
(6) Average Price	X					X	X	moderate

Notes: minimum price contracts are subjected to option volatility risk.

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BUL 1055 | Published August 2023 |