

August 1973

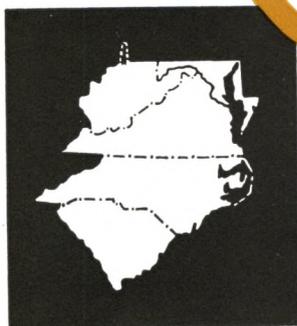
FEDERAL RESERVE BANK OF RICHMOND

# MONTHLY REVIEW

*Using The Futures Markets  
To Hedge*

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Volume 59  
Number 8

AUGUST 1973

# USING THE FUTURES MARKET TO HEDGE

## *Some Basic Concepts*

In the United States organized trading in commodity futures began in Chicago more than 100 years ago. Today there are 20 licensed exchanges in the United States and an even larger number abroad. There has been an increasing awareness of the futures markets on the part of businessmen and the general public in recent years. This interest has been reflected in substantial year-to-year increases in the number and value of transactions on the nation's commodity exchanges. Trading activity in 1972 was more than three times the level 10 years earlier. Agricultural products dominate the long list of commodities traded, but there is also an active market for such commodities as silver, propane gas, and copper. In 1972 soybeans were the most actively traded commodity, followed by frozen pork bellies.

The recent growing interest in the futures markets is likely to accelerate, particularly on the part of agribusiness firms. These firms are relying increasingly on borrowed capital, and by using the futures markets to hedge, both borrowers and lenders can protect themselves against risks of commodity price changes. Moreover, the benefits of hedging are likely to become more obvious to those who deal in agricultural commodities as Government stocks decline. In recent months Government grain stocks have dwindled to almost nothing. As long as Government stocks are low or nonexistent, prices of grains and other commodities likely will be much more volatile as supply-demand conditions change. Consequently, managers will probably turn to the commodity futures markets more frequently as they seek to hedge their crops and inventories against drastic price changes.

A long history and growing importance notwithstanding, knowledge of the institution of futures trading is not widespread, even among businessmen. This article is designed to acquaint businessmen who might use futures markets in their production, ware-

housing, and processing activities, and the lenders who finance them, with the basic principles underlying the operation of the futures market.

**Major Commodity Exchanges** There are five principal commodity exchanges in the United States. The 124-year-old Chicago Board of Trade is by far the largest, accounting for more than one-half of total trading. It lists contracts in corn, wheat, oats, soybeans, soybean oil, soybean meal, plywood, and silver. The Chicago Mercantile Exchange is the second largest exchange. Handling contracts in live cattle, live hogs, frozen pork bellies, lumber, grain sorghum, and Idaho potatoes, this exchange accounts for about 25 percent of total trading.

The New York Cotton Exchange lists contracts in frozen orange juice, liquefied propane gas, cotton, and wool. Futures contracts in platinum, boneless beef, Maine potatoes, and silver coins are traded on the New York Mercantile Exchange. The Commodity Exchange in New York provides a marketplace for copper and silver.

**The Futures Contract** The physical commodity itself is not bought and sold on the futures market. Instead, trading is in contracts for the delivery of a standardized quantity and quality of a commodity at some future date at a designated price. Suppose, for example, that on April 11 an individual decides to buy a contract of December corn that is selling at \$1.52 per bushel. The initial step in implementing the transaction is to open an account with a commodity broker who is represented on the exchange where corn is traded. The individual then instructs the broker to buy a contract of December corn. By purchasing the contract he enters into an agreement that calls for him to accept delivery and make payment of \$1.52 per bushel for corn in December. In this case, where the trader's first transaction is a contract to buy, he is said to be long the futures. The

individual who sells the contract agrees to deliver corn in December for a price of \$1.52 per bushel. Where the trader's first transaction is a contract to sell, he is said to be short the futures. The following items are specified in the contract: the commodity, price per unit, quantity, quality or grade, delivery date, place of delivery, and terms of payment. In the case of grain, a standard contract is 5,000 bushels, and the place of delivery is a public warehouse designated by the commodity exchange. In addition to the contract terms, additional regulations are usually imposed.<sup>1</sup>

The commodity exchanges establish several delivery months for each commodity. Delivery months are generally tailored to the seasonality of production and to the needs of the buyers and sellers of the particular commodity in question. Delivery

months for corn are July, September, December, March, and May. Although some contracts are for periods other than a year, most extend forward up to one year; and when a contract matures it is replaced by a contract for the same month of the following year.

A futures contract may be settled either by delivery or by making an opposite or offsetting transaction in futures. In practice, commodities are actually delivered on only 2 to 3 percent of the futures contracts. Because of the additional costs of making delivery, it is generally more profitable for the seller to offset the futures contract before maturity and deliver his product in the local market. Contracts in the futures market are bought and sold on margin. Margin funds, deposited with a broker by both buyer and seller, usually range from 5 to 10 percent of the value of the contract and serve as performance bond to assure settlement in the event of unfavorable price changes.

<sup>1</sup> For details of these regulations see Thomas A. Hieronymus, *Economics of Futures Trading for Commercial and Personal Profit* (New York: Commodity Research Bureau, Inc., 1971), p. 34.

## A FUTURES GLOSSARY

**Basis** The difference between the price of a futures contract and the price of the same or similar commodity in cash transactions.

**Delivery Month** The calendar month during which a futures contract matures.

**Futures Contract** An agreement set forth in standardized terms under rules of an organized commodity exchange to buy and receive, or to sell and deliver, a commodity at a future date.

**Hedging** Using the futures market to reduce exposure to price risk and to help assure profits on business activities.

**Long Position** One in which an individual's inventory plus forward purchases exceeds his forward sales; also, the buying side of an open futures contract.

**Margin** The amount deposited by a trader

with his broker to insure performance on contract commitments.

**Open Interest** The total of unfilled or unsatisfied futures contracts on either side of the market.

**Regulated Commodities** Those regulated by the Commodity Exchange Authority (CEA) under specific provisions of the Commodity Exchange Act. The CEA is concerned with safeguarding futures trading against price manipulation and abusive trading practices.

**Short Position** One in which an individual's forward sales exceed his inventory plus forward purchases; also, the selling side of an open futures contract.

**Volume of Trading** The total purchases or sales of a commodity future during a specified period.

Source: U. S. Department of Agriculture, *The Farm Index*, July 1973, p. 14.

**Futures Quotations** The financial page of most large newspapers usually includes the opening, high, low, and closing price of contracts traded the previous day. These quotations reflect the prices determined by the actions of buyers and sellers represented on the floor of the commodity exchange. Table I shows that the futures trading on April 11, 1973 for March 1974 soybeans resulted in an opening contract of \$4.11 per bushel, while transactions made at the close of the market ranged from \$4.15 to \$4.16 a bushel. An individual who buys a March contract at \$4.15 agrees to accept delivery of 5,000 bushels of soybeans at this price at expiration of the contract in March 1974. If he decides not to fulfill this contract by accepting delivery of the soybeans, he may sell a March futures contract prior to the maturity date for the contract. Since the terms of the two contracts offset each other, both contracts are cancelled.

**Hedging** Anyone who owns an inventory of a commodity is faced with a speculative risk because the value of the inventory may fall. Businessmen who need to purchase commodities for use in their business are faced with the risk that prices may rise. The futures market provides a means whereby the businessman can transfer the risks to speculators by hedging. Indeed, this is the primary function of the futures market. A hedge is established by taking a position in futures equal to and opposite an existing or anticipated cash position.

For example, if an individual has an inventory of 50,000 bushels of soybeans, he is long cash soybeans. If the price of soybeans goes up he gains, if it goes down he loses. He can offset the risk of a price decline by selling 50,000 bushels of soybeans on the futures market. He is now hedged because he is short futures and long cash soybeans. As long as cash and futures prices move up and down together, what he makes on one position he will lose on the other. Consequently, he is unaffected by price changes. When the cash soybeans are sold, the futures contracts are bought and the transaction is completed. The owner (hedger) shifted the price risk of ownership to the purchaser of the futures contracts. The person who assumes a position opposite a hedge position is generally a speculator who hopes to profit from a price change he has correctly anticipated. Speculators are willing to accept the inherent risks because of the opportunities for quick and substantial profits.

Hedging is possible because of the relationship between cash prices and futures prices. Because they reflect the cost of storage, insurance, and interest for the commodity being carried for future delivery, futures prices are generally higher than cash prices. At any given time, however, local supply-demand conditions may be such as to cause the cash price to be higher than the futures price. Normally, cash and futures prices tend to move up and down together. Although most futures contracts are cancelled by the purchase of an opposite contract, the

Table I  
SOYBEAN FUTURES PRICES, WEDNESDAY, APRIL 11, 1973

<u>Month</u>	<u>Open</u>	<u>High</u>	<u>Low</u>	<u>Close</u>	<u>Change</u>
<b>1973</b>					
May	609	619	599	617-618	+ 6¼-7¼
July	570	581½	564	579¾	+ 6¼
August	538	553	537½	551-551½	+ 5½-6
September	465	447	464¾	475	+ 3⅓
November	409	412⅞	407	412¼	+ 1⅜-1⅝
<b>1974</b>					
January	410	413½	408	413¼-413½	+ 1½-1¾
March	411	416½	410½	415-416	+ 1⅞-2⅞
May	413	416½	413	416½	+ 2

fact that delivery can and does take place in some cases forces the two prices to move up and down together.

**Hedging Arithmetic** The arithmetic of a hedge is illustrated by the following examples. Suppose that on December 1 a grain elevator operator has in storage 5,000 bushels of soybeans valued at \$3.60 per bushel. To protect against a price decline he sells a May futures contract for \$3.80 per bushel. In February he will simultaneously *sell* soybeans and *buy* a May futures contract. Assume that by February when he sells the cash soybeans and buys the futures contract both cash and futures prices have declined 10 cents per bushel. In this example

CASH MARKET	FUTURES MARKET
<b>December 1</b> Cash price @\$3.60 per bu.  <b>February 1</b> Sell 5,000 bu. soybeans @\$3.50 Loss on cash grain = 10¢ per bu.	<b>December 1</b> Sell 5,000 bu. May futures @\$3.80  <b>February 1</b> Buy 5,000 bu. May futures @\$3.70 Gain on futures = 10¢ per bu.
Net gain or loss = 0	

the elevator operator lost 10 cents per bushel when he sold the cash soybeans and gained 10 cents per bushel when he bought back the futures contract. The loss on the cash price was exactly offset by the gain on the futures price.<sup>2</sup> It should be pointed out that while the hedge protects against a loss it also precludes a gain from a price increase. As an illustration assume that in the previous example the price of soybeans had risen. In this example had

CASH MARKET	FUTURES MARKET
<b>December 1</b> Cash price @\$3.60 per bu.  <b>February 1</b> Sell 5,000 bu. corn @\$3.70 Gain on cash grain = 10¢ per bu.	<b>December 1</b> Sell 5,000 bu. May futures @\$3.80  <b>February 1</b> Buy 5,000 bu. May futures @\$3.90 Loss on futures = 10¢ per bu.
Net gain or loss = 0	

he not hedged, the elevator operator would have gained an extra 10 cents per bushel.

In these two examples, the hedge worked perfectly, that is, in the first example the loss in the

cash market was exactly offset by the gain in the futures market, and in the second example the gain in the cash market was exactly offset by the loss in the futures market. This situation rarely occurs in practice, however. While cash and futures prices usually vary together in response to fluctuating market conditions, they generally do not move in lock step fashion.

The difference between the futures price on any exchange and the local cash price is called the *basis*. Basis varies among geographic locations and changes from month to month in each location, normally narrowing as the delivery month approaches. The basis reflects primarily the cost of transportation and storage. At any specific time, for example, the basis in a local area will approximately equal the cost of delivering the grain to the city in which the exchange is located plus the cost of storing it until the delivery month. The basis is normally highest at harvesttime since cash prices are depressed relative to futures. Because the basis reflects storage costs, it usually narrows as the month of delivery approaches.

In the case of grains cash prices at most locations around the country are usually below the Chicago futures price. The exact amount of this difference—the basis—varies from location to location and from month to month. For example, if soybeans in Richmond, Virginia, during November typically sell for 18 cents per bushel below the July futures in Chicago, the basis for November is 18 cents. In April the basis might be 6 cents. Even though basis varies from month to month, it usually follows a fairly consistent and distinct pattern. That is, the basis in April of one year is likely to be about the same as it was in April of other years.

**The Storage Hedge** Because the basis normally narrows from harvesttime to the delivery month of the contract, an elevator operator can store grain and earn a profit on it and protect himself against price level changes by hedging. Assume that at the time of harvest in October a local elevator operator purchases 5,000 bushels of soybeans for \$4.30 per bushel. He could immediately resell the soybeans at a price high enough to cover handling costs, including a profit. But this would leave him with idle storage space on which he would like to earn a return. Given the price he paid for the soybeans and the cost of insurance, taxes, and depreciation, he calculates that he will need to sell in May at a net local price of \$4.40 per bushel. He thus establishes \$4.40 as his price objective.

<sup>2</sup> In these transactions the cost of the hedge is ignored for simplicity of presentation. If it were included the hedger would have lost an amount equal to \$30.00 per contract.

From the historic records of basis he determines that the local price of soybeans is typically 18 cents per bushel below the July futures at harvest and that this basis usually narrows to 8 cents in May. While this basis pattern is not certain, it is considerably more certain than what the actual price of soybeans will be in May.

Checking prices he finds that the usual 18 cents harvesttime differential does in fact exist and that the July futures is selling at \$4.48 per bushel. If basis follows the normal pattern and narrows to 8 cents in May the futures price of \$4.48 should result in a net local price of \$4.40 in May. His price objective met, he hedges by selling one contract (5,000 bu.) of July soybeans. Assume that between October and May the local price of soybeans drops from \$4.30 to \$4.20. An unhedged storage of soybeans would have resulted in a loss of 10 cents per bushel plus the cost of storage. If in actuality the May basis is 8 cents, the Chicago July futures price is \$4.28.

Selling his soybeans for the local price of \$4.20 results in a loss of 10 cents per bushel in the cash market. Offsetting his futures market position by buying a July futures contract for \$4.28 per bushel results in a profit of 20 cents per bushel. The following is a summary of his transactions.

CASH MARKET	FUTURES MARKET
<u>October</u> Buys 5,000 bu. @ \$4.30	<u>October</u> Sells 5,000 bu. @ \$4.48
<u>May</u> Sells 5,000 bu. @ \$4.20 Loss 10¢ per bu.	<u>May</u> Buys 5,000 bu. @ \$4.28 Profit 20¢ per bu.

The May cash price of \$4.20 per bushel plus the 20 cents per bushel profit on the hedge results in a net price of \$4.40—his price objective. Hedging allowed him to establish a storage return and simultaneously protect himself against a price decline.

In this hypothetical example the basis movement was exactly as expected—from 18 cents in October to 8 cents in May. The hedger will seldom be able to predict exact movements in basis, however. In actuality, when a hedging position is to be closed by an offsetting futures transaction, there is a risk that the relationship between cash price and futures price may be different than expected. This uncertainty is referred to as *basis risk*, and its existence makes hedging an imperfect method of price protection. For instance, in the example, if the basis had narrowed to only 10 cents by May, the hedger would have realized an 18 cents rather than a 20 cents profit per bushel. Thus, the cash price of \$4.20

plus the futures profit of 18 cents per bushel would have resulted in a net price of \$4.38—2 cents short of his price objective at the time he hedged. Although there is some risk in estimating the basis, it is less risky than estimating changes in the price level.

**Establishing a Price in Advance** A farmer may establish the price of a growing crop by using the futures market. For example, assume that in July the futures price for November soybeans is \$4.25 per bushel. Knowing that the typical November basis in his area is around 16 cents, the farmer realizes that the futures price of \$4.25 translates into a local price of \$4.09. He decides that he would be satisfied to sell his anticipated production of 5,000 bushels at this price.<sup>3</sup> Accordingly, he sells soybeans for November delivery.

In November, when he is ready to deliver his soybeans, he finds that the local price of soybeans is \$3.89. As anticipated the basis is 16 cents—meaning that the Chicago futures price is \$4.05. He sells his beans locally and simultaneously buys back his futures contract. The cash price of \$3.89, plus the

CASH MARKET	FUTURES MARKET
<u>July</u> Anticipated crop 5,000 bu. (expected price @ \$4.09 per bu.)	<u>July</u> Sells 5,000 bu. November soybeans @ \$4.25
<u>November</u> Sells 5,000 bu. soybeans @ \$3.89	<u>November</u> Buys 5,000 bu. November soybeans @ \$4.05 Futures profit 20¢ per bu.

20 cents per bushel profit on the futures transaction, yields a total price of \$4.09 for his bean crop.

The foregoing example illustrates how a farmer can use the futures market to establish a price for his growing crop. Farmers can also use the futures market: (a) to earn a payment for holding a crop in storage, (b) to establish the cost of feed to be purchased at a future date, and (c) to speculate on a price increase without storing the crop.

**Forward Contracting** Many crops are produced under cash contract. That is, at some time prior to the actual delivery of the commodity a producer enters a contract with a local processor or marketing firm to deliver the commodity at a specified time for a specified price. Contrary to the futures market, in which most contracts are cancelled, in contracting, delivery and acceptance of the actual commodity are expected. For example, a farmer can sell corn in

<sup>3</sup> Actually a farmer would probably not hedge all of his anticipated production. The amount hedged will depend on a number of factors such as the amount of risk he is willing to accept and his speculative skills.

October for delivery in January or March. A knowledge of the futures market and the concept of basis can be valuable to a farmer who intends to sell his crop under forward contract. By checking the futures price for the month in which he plans to deliver his commodity to the forward buyer, and subtracting typical basis for that month, he can tell if he is being offered a reasonable price for his commodity.

Although the specific examples given in this article relate to grain producers and handlers, other businessmen also use the futures markets. Livestock feeders can hedge and lock in an acceptable selling price in advance. Similarly, processors can establish in advance the selling price of finished products or the buying price of raw materials.

**Hedging and Credit** In addition to enabling a businessman to protect himself against price changes, hedging frequently facilitates credit acquisition. In the case of grains, lenders generally will advance credit more readily and in larger amounts against a hedged inventory than against one not hedged. Ordinary bank financing is readily available for the purchase and storage of hedged inventories, and lenders will frequently lend up to 90 percent of the value of a hedged commodity as opposed to 60 to 70 percent of an unhedged one. In a loan against a hedged commodity the warehouse receipts serve as the collateral. It is not hard to understand why lenders will lend more against a hedged commodity since a commodity protected against erratic and sometimes rapid price changes provides a relatively safer collateral.

The growing complexity of the business environment along with the increased size of agribusiness firms has increased the reliance on outside capital,

mostly in the form of debt. Consequently, the stability of returns from commodities has become increasingly important to the borrower and the lender. Because of these factors, transactions in the futures markets are likely to assume a growing importance in the daily operations of many business enterprises.

**Conclusions** A futures market provides a mechanism whereby traders can establish now the price of products they intend to buy or sell in the future and where speculators can attempt to profit from commodity price fluctuations. In addition to providing a method of protection against price level changes, hedging makes credit more accessible. Banks generally will lend more willingly and in relatively larger amounts to a producer or owner who hedges. While the mechanics and the arithmetic of a hedge are fairly easy to understand, successful hedging is not a simple matter. Detailed study of the markets and a broad knowledge of commodities, transportation costs, and general economic conditions are necessary to be a successful hedger. This article was designed to explain only the basic principles of the futures market and hedging. For the reader wanting more detail, several references are listed.

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