# Marketing Tools: Cross-Hedging

**► Cross-hedging is a marketing tool that producers can use to manage price risk for commodities that do not have a futures contract.**

## Hedging versus Cross-Hedging

Hedging is one of the main ways to reduce loss risk associated with fluctuating prices of commodities. In hedging, a person takes a position in one cash or physical commodity market while simultaneously taking the opposite position in the complementing futures market. For example, a farmer who produces and sells corn might in turn purchase a position in the corn futures market.

The perfect hedge is one where the profits from one market equal the losses from the other. This rarely occurs, however, so the quality of a hedge depends on how closely the gains in one market mirror (or offset) the losses in the other market.

The Chicago Mercantile Exchange houses futures markets for several agricultural commodities, such as corn, cotton, soybeans, and wheat. Some commodities, however, do not have a futures market, oftentimes because their markets are thin, meaning there are relatively few buyers or sellers. Peanuts are an example of a commodity important to Alabama agriculture that does not have a futures market. Other examples include cottonseed and most fruits and vegetables.

In situations where there is no futures market for the commodity, cross-hedging is a marketing strategy that can be used to mitigate risk associated with fluctuating prices. Cross-hedging is using futures contracts for one commodity to hedge the loss risk of a different underlying commodity.

When cross-hedging, it is important to hedge with the best futures contract available. This will be the one for which price movements are expected to match the cash commodity most closely. In other words, the best futures contract is that with the highest correlation between its price and the cash price of the commodity in question. This is the same concept as hedging, with the only difference being the use of two different commodities (one cash commodity and a different commodity's futures contract). It is important to keep in mind that there might not always be an appropriate cross-hedge if no other commodity's futures market has prices that closely follow the prices of the cash commodity.

## Basics of Cross-Hedging

The first step in cross-hedging is to evaluate the relationship between the price of the cash commodity and the price of the futures contract for the potential commodity used to cross-hedge. This is important because it indicates the optimal cross-hedge, which is the quantity of the cash commodity that is being hedged by a unit of the futures commodity.

Next is to determine the number of futures contracts you need to purchase. This is important because futures contracts are defined for specific values (e.g., 5,000 bushels of corn or 50,000 pounds of feeder cattle). Since futures contracts are available for whole values only, you may need to round to the nearest value to properly hedge.

The final step is to evaluate whether the futures commodity would be a proper cross-hedge. If you are comparing the futures contracts of more than one commodity, you need to determine which commodity is the best option to use as a cross-hedge. This process involves checking how much of the variation in your cash commodity's price is explained by the price of the other commodity's futures contract. If the price of the futures contract for the second commodity explains relatively little of the cash commodity price, cross-hedging might not reduce price risk and hence not be the appropriate strategy.

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## Cross-Hedging Analysis Details

One can use linear regression to evaluate whether a given cross-hedge might be a good strategy. To evaluate a cross-hedge, you need price data over time for the cash commodity. Prices of the futures contract for the nearest month at the same frequency as the cash commodity (i.e., daily, weekly, monthly) are also needed for any commodities of interest. While there is not a specified length of data required, a longer period consisting of at least thirty observations is preferred.

The steps to perform the analysis are as follows:

1. Use linear regression to determine the relationship between the cash and futures commodities. It is valid to use the change in prices over time (or first differences) as shown in the following equation:

   *Change in Commodity A Cash Price* = $\alpha + \beta \times$ *Change in Commodity B Futures Price* + $\varepsilon$

   Note: α is the intercept of the regression line on the y axis; β is the slope of the regression line; and ε is the residual term. The results necessary for hedging are β and the $r^2$ of the equation. The $r^2$ represents the percentage of variation eliminated by the hedge and is used as a measure of hedging effectiveness. The β coefficient from the linear regression is known as the *optimal hedge ratio* and represents the quantity of cash commodity 'A' that is being hedged by one unit of our futures commodity 'B'. It is important to know what units are being used for the prices (e.g., dollars per bushel or cents per pound) because the quantity units will be the same as those used in the price data (e.g., bushels or pounds).

2. Knowing the *hedge ratio*, you can determine the quantity of futures contracts to hedge. To do this you must know how many commercial quantities of commodity A are equal to the commercial quantities of commodity B. To determine the amount of cash commodity that would be hedged by one futures contract, divide the futures contract size by the hedge ratio: $\frac{\textit{Futures Contract Size}}{\beta}$

   Since there are no fractional futures contracts, you may need to round to the nearest whole number to choose how many futures contracts to purchase.

3. Check whether the cross-hedge would potentially be a good strategy by evaluating the $r^2$. The higher $r^2$, the less risk will be involved in the hedge. Likewise, the lower the $r^2$, the more risk will be involved, as less risk is eliminated from the hedge. An $r^2$ value above 0.64 is generally considered a suitable level.

Extension specialists in farm and agribusiness management can provide guidance on this type of analysis.

## Cross-Hedging Example: Peanuts

This section follows the steps outlined above to evaluate the potential for cross-hedging peanuts with three of our largest crop commodities (wheat, corn, and soybeans) using data from 2017 to 2018. Note that prices for peanuts are measured in dollars per pound, and prices for all other commodities in dollars per bushel.

1. Results from our regressions for the three futures commodities on peanut cash prices are presented in the first two columns of table 1:

   The optimal hedge ratio for peanuts and corn futures is 0.017008. This suggests that each pound of peanuts should be hedged with 0.017008 bushels of corn futures. Thus, purchasing a 5,000-bushel corn futures contract would hedge 293,987 pounds of peanuts.

   For soybeans, the optimal hedge ratio is 0.009248. This means that each pound of peanuts should be hedged with 0.009248 bushels of soybean futures contracts, and a 5,000-bushel soybean futures contract would hedge 540,641 pounds of peanuts.

   For wheat, the optimal hedge ratio is 0.009972. Therefore, each pound of peanuts should be hedged with 0.009972 bushels of wheat futures, and a 5,000-bushel wheat futures contract would hedge 501,405 pounds of peanuts.

   Producers could decide the quantity of peanuts they want to hedge and divide by the above numbers to determine how many futures contracts to purchase. For example, a producer looking to hedge 500,000 pounds of peanuts would want to purchase two corn futures contracts, one soybean futures contract, or one wheat futures contract.

2. Next we check whether the prices of the three commodities follow peanut prices closely enough to be worth using as a cross-hedge. The $r^2$ values for the regressions are 0.008629 (0.87 percent) for corn, 0.020273 (2.03 percent) for soybeans, and 0.014757 (1.48 percent) for wheat. This indicates that soybeans would be the best option of the three to use as a cross-hedge based on the $r^2$ values. However, all three fall well below the 0.64 value that many deem acceptable. We therefore conclude that none of the commodities would be appropriate to use as a cross-hedge for peanuts, as they would not reduce peanut price risk.

| Table 1. Cross-Hedge Estimates for Hedging Peanuts with Corn, Soybeans, or Wheat | | | |
|---|---|---|---|
| **Commodity** | **Hedge Ratio (β)** | **R-squared** | **Pounds of Peanuts Hedged per Futures Contract** |
| Corn | 0.017008 | 0.008629 | 293,987 |
| Soybeans | 0.009248 | 0.020273 | 540,641 |
| Wheat | 0.009972 | 0.014757 | 501,405 |

Note: Futures contract sizes are 5,000 bushels for corn, soybeans, and wheat.

## Conclusions

Cross-hedging is a marketing tool that producers can use to manage price risk for commodities that do not have a futures contract. We evaluated the potential for cross-hedging peanuts with corn, soybeans, or wheat. However, none of the three futures contracts analyzed were deemed acceptable for cross-hedging peanuts.

Peanut farmers may want to consider other futures contracts or other price risk management strategies, such as marketing contracts or participating in the government's marketing assistance loan program and storing peanuts with the goal of selling them at a time when prices are higher than at harvest. Another option would be to participate in a cooperative in which a group of producers jointly sell their peanuts to the sheller.

While cross-hedging using corn, soybean, or wheat futures might not be an appropriate marketing strategy for peanuts, producers might consider cross-hedging other agricultural commodities or by-products of certain commodities. For example, soybean meal may work as a proper cross-hedge for peanut meal and soybeans as a cross-hedge for cottonseed. This could be useful to producers or agribusinesses that are looking to mitigate price risk associated with those products.

## Additional Resources


- Costa, Ecio F., and Steven C. Turner. 2003. "Price Risk Management for Peanut Meal." Journal of International Food & Agribusiness Marketing 13: 2–3, 99–109.
- Peterson, Paul E. 2018. Commodity Derivatives: A Guide for Future Practitioners. New York: Taylor & Francis.
- Regmund, Wes, John Robinson, and David Anderson. 2017. Higher and More Stable Returns from Cottonseed no. 1377-2016-109982. https://ageconsearch.umn.edu/record/252813/.



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