

Research & Product Development

An Introduction to Variable Storage Rates in Wheat Futures (November 30, 2009)

Introduction

After receiving input from customers, regulators and agricultural trade organizations, CME Group proposed that Variable Storage Rates (VSR) be implemented on the Chicago Board of Trade (CBOT®) Wheat futures contracts beginning with the July 2010 contract. The CME Group's VSR proposal was approved by the Commodity Futures Trading Commission on November 27, 2009.

The VSR concept allows the maximum storage charge that an elevator, which is designated as "regular for delivery", can charge someone holding one of their shipping certificates to vary. The amount of variance in the maximum storage charge is dependent on the spread relationships determined in the futures market.

The concept is designed to improve cash-futures convergence at futures contract expiration. Over the past year and a half, cash prices and futures prices have failed to converge at futures contract expirations as expected. A large percentage of commercial market participants believe that the VSR concept will transfer a large portion of the price discovery process, currently occurring in the basis, to the futures spread market, and result in improved cash-futures convergence. This paper explains how the VSR concept works.

VSR Concept

The basic idea behind VSR is to trigger higher storage costs that allow wider spreads when spreads are near financial full carry and trigger lower storage costs when spreads are narrow or inverted. Research conducted by CME Group staff and the University of Illinois indicates that the wheat market often exhibits poor cash-futures convergence when wheat stocks are large and calendar spreads are 80 to 100 percent of financial full carry. However, convergence tends to be excellent when stocks are smaller and calendar spreads are less than 80 percent of financial full carry. The VSR will continually expand financial full carry until calendar spreads fall below 80 percent of financial full carry.

How VSR Works

An important component of VSR is the concept of financial full carry, or the cost to take delivery of a wheat shipping certificate, carry that certificate to the next delivery period and re-deliver that certificate during the next delivery period. The formula for financial full carry is:

$$\# \text{ Days} * \left[\left(\frac{\text{Interest}}{360} * \text{Futures Price} \right) + \text{Daily Storage} \right]$$

Where:

Days = Number of calendar days from first delivery day in the nearby contract to first delivery day in the contract following the nearby contract

Interest = 3-Month LIBOR rate + 200 basis points

Futures Price = Settlement price for the nearby contract

Daily Storage = Current daily premium charge

For example, there are 62 days between the first delivery day of the July 2010 Wheat futures contract and the first delivery day of the September 2010 Wheat futures contract. Daily storage is at the current rate of 16.5/100s of one cent per bushel per day. Suppose the 3-Month LIBOR rate is 0.50 percent and full carry is calculated using LIBOR plus 200 basis points or 2.5 percent interest. Finally, suppose the July 2010 futures contract is priced at \$5.75 per bushel. Financial full carry would be calculated as:

$$62 * \left[\left(\frac{.025}{360} * \$5.75 \right) + .00165 \right] = 12.70 \text{ cents}$$

Now if the July 2010 contract was priced at \$5.75 per bushel and the September 2010 contract was priced at \$5.87 per bushel, the July-September spread of 12 cents would represent $12 \div 12.70 = 94.5$ percent of financial full carry.

Under the VSR concept, on each business day from the 19th calendar day of the previous delivery month until the nearby contract option expiration date, the nearby calendar spread and financial full carry are calculated just as in the example above. Again, using the July 2010 contract as an example, on each business day from May 19 (May is the previous delivery month) until June 25 (June 25 is the July option expiration date) the July – September spread is calculated, financial full carry is calculated and the July – September spread is reported relative to financial full carry. The exchange also will calculate the running average of the spread relative to financial full carry each business day on its Web site.

Should the average carry be 80 percent or greater of financial full carry at the close of trading on option expiration day, the daily storage charge will increase by 10/100's of one cent per bushel (approximately 3 cents per bushel per month) beginning on the 18th calendar day following the delivery period of the nearby contract. For example, continuing with the previous example, if on June 25, 2010, the Jul 10 – Sep 10 spread has averaged 80 percent of full carry or greater, then beginning on July 18, 2010, the daily storage charge for all outstanding wheat shipping certificates will increase by 10/100's of one cent per bushel. Thus, if this was to occur, the daily storage charge would increase from 16.5/100s of one cent per bushel (approximately 5 cents per bushel per month) to 26.5/100s of one cent per bushel (approximately 8 cents per bushel per month).

If the running average carry is between 50 and 80 percent of financial full carry after trading on option expiration day, the daily storage charges will remain the same.

Similarly, should the running average carry be 50 percent or less of financial full carry after trading on option expiration day, the daily storage charges would decrease by 10/100's of one cent per bushel beginning on the 18th calendar day following the delivery period of the nearby contract. However, the daily storage charge is not allowed to fall below 16.5/100s of one cent per bushel, so even if the Jul – Sep spread averaged less than 50 percent of financial full carry, it would not trigger a reduction in the daily storage charge because the daily storage charge would already be at its minimum of 16.5/100s of one cent per bushel.

However, there would not be any upper limit on storage charges should spreads continue to hold above 80 percent of financial full carry. Assume the Jul-Sep spread remains above 80% of financial full carry and the daily storage charge is triggered to increase to 26.5/100s on July 18, 2010. Then, beginning on July 19, the exchange would begin monitoring the Sep 10 – Dec 10 spread relative to full financial carry. Assume the 3-month LIBOR rate plus 200 basis points is 2.25 per cent. There are 91 days between September 1, 2010 and December 1, 2010. Suppose September 2010 Wheat futures are trading at \$4.50 per bushel. Then, financial full carry for the Sep 10 to Dec 10 timeframe would be:

$$91 * \left[\left(\frac{.0225}{360} * \$4.50 \right) + .00265 \right] = 26.67 \text{ cents}$$

The September – December Wheat spread is measured relative to financial full carry each day from July 19 until August 27, the day the September 2010 Wheat options expire. Suppose during this time the September – December Wheat spread averaged 25.5 cents, then the spread would be $25.5 / 26.67 = 95.61$ percent of full carry. This would trigger an increase in the daily storage rate from 26.5/100s of one cent per bushel to 36.5/100s of one cent per bushel (approximately 11 cents per bushel per month) beginning on September 18, 2010.

Then the process begins again, looking at the Dec 2010 – Mar 2011 spread relative to financial full carry beginning on September 20, 2010 (September 19 is not a business day). Should the Dec – Mar spread average over 80 percent of full carry, the daily storage would again be increased, this time to 46.5/100s of one cent per bushel. Should the Dec – Mar spread average 50 percent of full carry or below, it would trigger the daily storage charge to decrease 10/100s or back to 26.5/100s of one cent per bushel beginning on December 18, 2010.

Should the Dec-Mar spread average be greater than 50 percent of full carry but less than 80 percent of full carry, the daily storage charge would remain unchanged at 36.5/100s of one cent per bushel.

Summary

Due to the lack of wheat cash and futures price convergence at futures contract expiration over the past year and a half, the majority of commercial wheat market participants support the implementation of VSR in the CBOT Wheat futures contract to improve convergence. VSR is based on the concept of allowing Wheat futures contract maximum storage charges to **increase** when nearby spreads average 80 percent of financial full carry or more over a defined time period and allowing Wheat futures contract maximum storage charges to **decrease** when nearby spreads average 50 percent of financial full carry or less over a defined time period.

VSR makes calculating financial full carry more difficult to determine because under the VSR concept, financial full carry is a moving target and not a constant. Despite being more difficult to determine, VSR should result in improved cash-futures convergence. The portion of price discovery currently being determined in the basis will return to the futures spread market, resulting in greater liquidity.

For more information on VSR, please contact:

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