Fed Cattle Basis: An Updated Overview of Concepts and Applications

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Forming expectations of price is important to agricultural producers to enable them to make profitable production and managerial decisions. There are many approaches to forecasting prices. Many agricultural economists agree that basis- adjusted information from futures markets provide the best forecasting approach. This fact sheet discusses fed cattle basis, overviews how historical basis data can be used along with futures market data to aid in forming price expectations, and summarizes recent research on the best approach to forecasting fed cattle basis.

Introduction

The futures market bids for fed cattle represent the collective opinion of what the price will be for fed cattle of a particular grade at a given time in a given delivery location. Several studies have shown that it is difficult to systematically produce forecasts of price which are more accurate predictors that the futures markets. Furthermore the most recent futures market bids are available almost instantaneously at very little cost, whereas up-to-date private forecasts of price are comparatively expensive and may be hard to find. This suggests futures market bids can be an invaluable tool for use when forming local cash price forecasts. Given futures markets are prices for fed cattle at the specified delivery locations how do you adjusted your pricing expectations for your particular location and situation appropriately relative to futures market bids?

What is Basis?

Basis for fed cattle is the price differential between the "nearby" futures market bid for live cattle and the cash price for a particular lot of fed cattle at a particular location. Basis is influenced by differences in local supply and demand, transportation costs to delivery points, and quality relative to contract specifications. Basis can be calculated as:

$$\text{Basis} = \text{Local Cash Price} - \text{Futures Price.} \qquad (1)$$

Given the above formula, a negative basis would imply a futures price which is greater than the cash price and a positive basis would imply cash is higher than the futures price. When calculating basis for fed cattle the "nearby" futures contract of the contract closest to expiration is used. The reason for this is that Live Cattle Futures contracts are spaced two months between delivery periods and fed cattle are normally not considered storable across a two month time span. While forecasting basis is not without challenges, it is generally considered much easier to forecast basis than cash or futures prices. One reason for this is that cash prices and futures prices tend to move in sync leading to variation in basis levels that is typically lower in magnitude than the variation of either cash or futures prices.

How to Use Basis

It is common practice amongst buyers of commodities such as fed cattle to offer forward prices based off "the board" plus some price differential. This method is simply taking equation (1) and rearranging it to yield:

$$\text{Local Cash Price} = \text{Local Basis} + \text{Futures Price.} \quad (2)$$

In such cases these parties are using the futures contracts as a forecast of future price. When considering the decision to accept a forward contract one can take the contract price and difference it with the associated futures bid and evaluate whether or not the implicit basis value aligns with their expectations. Using this knowledge they can decide to accept or reject the offered forward price or employ a hedging strategy.

Hedgers use their expectation of basis to lock in an expected cash price much like that of a forward contract. In the case of a short hedge the producer sells the futures contract for the expected delivery date and their expected cash price at delivery is now the price which they sold the futures contract at plus the expected basis.

An example of this is outlined in the following scenario. Suppose it is April and you expect to have fed cattle ready to market in September. The futures contract nearest the expected delivery date is October. Currently the October futures contract is trading at $131.00/cwt. Now suppose the expected basis for Garden City, KS for October is -$1.85/cwt. By engaging in the short hedge the producer in the Garden City, KS area has effectively locked in an expected price of $129.15/cwt.

Now suppose October comes and the Live Cattle futures contract is trading at $127.00/cwt and the producer sells fed cattle for a cash price of $125.15/cwt. This means basis in Garden City is actually the expected $-1.85/cwt. When the producer sells his cattle he in turn buys back his futures contract to offset his position and exit the hedge. This results in a $4.00/cwt gain on the futures contract: [(sold) $131.00/cwt – (bought) $127.00/cwt = $4.00/cwt]. But the producer realized a $4.00/cwt loss on the cash sale: [(sold) $125.15/cwt – (expected) $129.15/cwt = -$4.00/cwt]. The producer has just realized no gain, but more importantly no loss in relation to his original expectations. The loss on the cash market for fed cattle was exactly offset by the gains made on the futures market transaction. Of course this example is simplified in the sense that basis will rarely be exactly equal to the forecasted value but it does serve to demonstrate the theory behind futures market hedging.

Forming Accurate Basis Expectations

Previous studies have analyzed several approaches from the relatively quick and simple use of historic basis tables and averaging, all the way to the compilation of many variables thought to explain basis and using advanced and complex econometric methods to produce forecasts. Recently McElligott (2012) explored the use of these methods and attempted to identify methods which will produce the most accurate fed cattle basis forecasts across different time horizons. McElligott (2012) found historical averaging approaches perform as well as, if not better than econometric methods in terms of minimizing forecast error. In short, viable forecasts of basis are readily available.

Creating Historic Basis Tables

It is recommended to construct basis tables on a weekly frequency. A weekly window gives a small precise window over which producers will make a decision versus monthly averages, and cash live cattle trade typically does not occur on a daily basis in a given region. Also for this reason it is recommended to use an average of the prices reported for a week rather than the given price for one particular day to produce basis tables.

To calculate basis, a rule must be established as to when to deal with switching contracts. The rule recommended here is to continue to use the contract closest to expiration as long as it trades the entire week. For instance the February 2012 Live Cattle contract expired on Wednesday, February 29th, in this case the week beginning 2/27 and ending 3/2 would be the first week paired with the April Live Cattle futures contract when calculating basis.

Remember that any factors which effect cash price such as sex, grade, weight, will have an impact on basis so try to use price data which closely resembles the type of animals to be marketed. While it is recommended to keep records of basis specific to your region and operation, university resources such as Kansas State University's AgManager.info website also provide historic average basis information.

Forecasting with Historic Basis Tables

Basis tends to follow seasonal patterns so the use of historic data can prove to be very affective. The use of historic basis tables is also a very intuitive practice. Let's say you have your table constructed with weekly basis for the past five years recorded. Now suppose someone asks you what you think basis will be the second week of October this year. Most likely you will look at your table and see what basis was the second week of October last year. Although you may and should reference the previous year's basis with some caution because last year may not have been a typical year and/or the current year may not be typical. So the next step is to take an average of the second week of October across the past several years. Mintert et, al. (2002) suggests using a simple average of the past three years basis. McElligott (2012) confirmed that the use of a three-year simple average is still an acceptable method. McElligott (2012) found five-year averages were slightly more accurate than three-year averages in Kansas and Texas, and two-year averages were slightly more accurate in Nebraska. However these findings were

based on out-of-sample test considering only the year of 2011 so one may be well advised to deviate from three-year averages with caution.
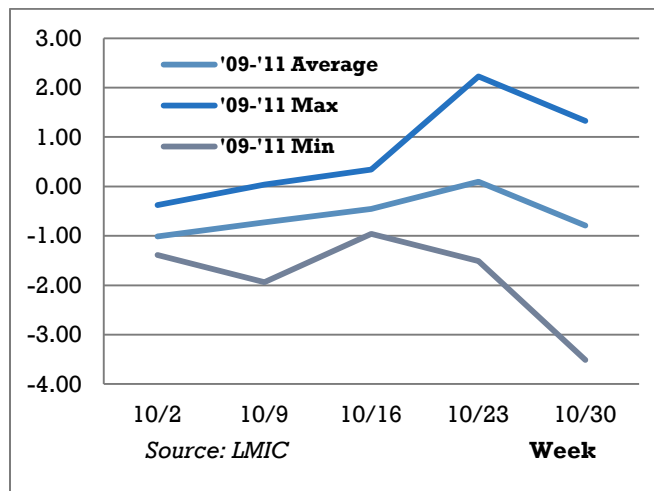
Example

Table 1 provides weekly fed cattle basis for the month of October for years 2009 through 2011 in Kansas. The data is an average of all fed cattle sold in Kansas in the given weeks and is not specific to a given location such as Garden City. Following the procedures discussed above a forecast of 2012 October basis levels can be made by referencing the column with the three-year average of historical basis. While this is a viable forecast, actual basis may be higher or lower than the values given. Figure 1 may help visualize a range basis is likely to fall in as it depicts the average basis as well as the highest and lowest basis values for the years from 2009 to 2011.

Table 1. Kansas Fed Cattle Basis vs. CME October Live Cattle Futures ($/cwt)

Week (2011)	2009	2010 $/cwt	2011	3 Year Average
10/2	-1.39	-0.38	-1.26	-1.01
10/9	-0.29	0.04	-1.94	-0.73
10/16	-0.96	0.34	-0.75	-0.46
10/23	2.23	-0.43	-1.51	0.10
10/30	1.33	-0.18	-3.51	-0.79

Figure 1. Kansas-CME Fed Cattle Basis ($/cwt)

Where to Find Updated Information

While it is recommended use historic basis tables specific to your own operation, Kansas State University Research and Extension provides updated three-year historic average Kansas fed cattle basis charts are available at:

http://www.agmanager.info/livestock/marketing/graphs/cattlebasis.asp .

References

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