Futures

Econ 235

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Fall 2018

Definitions: basis

- The *basis* is the difference in price for a commodity at different times and/or locations.
- In this class, most of the time, we will consider that the basis is the difference between the cash price for a commodity and a futures price:

<p style="text-align:center; color:blue;">Basis = Cash price - Futures price.</p>

- It is the *price spread* between the futures and the cash market.
- For example, you can calculate the basis as the difference between the price for corn in the local cash market and the futures price of corn.
- The value of the basis with this definitions has both *time* and *space* components.

Definitions: basis

- Be careful, sometimes the basis is defined as the difference between the futures price and the cash price.
- Especially true in academic work (textbook).

Definitions: basis

- Another definition of the basis is the difference in the prices at two cash markets.
  - For example, the difference in fed cattle prices in Canada and in the United States.
- With this definition, the basis only has a space component.

Resources to understand the basis

- Many extension services have published documents that explain the basis in agriculture. It is easy to search on the web for those documents.
  - ▶ An example of such document from Iowa State University Extension and Outreach is available at http://www.extension.iastate.edu/agdm/crops/html/a2-40.html.
  - ▶ The Chicago Board of Trade has a document titled *Understanding the basis* that you can find here or on Canvas.

Definitions: law of one price

- The *law of one price* says that there is one price for a commodity once accounting for transaction costs.
- *Arbitrage* is the practice of taking advantage of a price difference between two markets to make profit. For example, if the price of soybeans is higher in China than it is in the United-States, an exporter will organize shipments of soybeans if the price difference is sufficiently large to cover transaction costs (e.g. transportation costs).
- Arbitrage between markets through time and space allows for the law of one price to hold.

Definitions: law of one price

- Examples of transaction costs through time:
  - ▶ Interest rate;
  - ▶ Storage;
  - ▶ Spoilage.

- Examples of transaction costs through space:
  - ▶ Transportation cost;
  - ▶ Spoilage (heat);
  - ▶ Shrinkage (livestock);
  - ▶ Death (chicken).

Explaining the basis

- We will look at explaining the basis between a futures contract and the cash price in two parts:
  1. In this section, we will look at the basis through space (location).
  2. In a section about storage, we will look at how prices evolve through time.

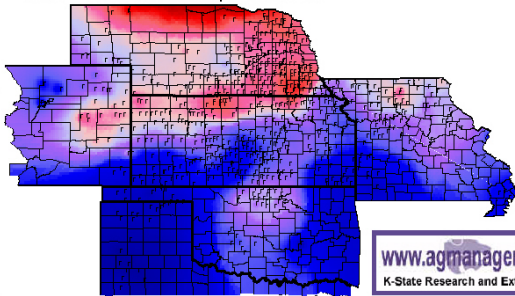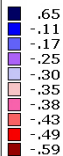# Corn basis

Source: Rabo AgriFinance.

Source: AgManager.info.
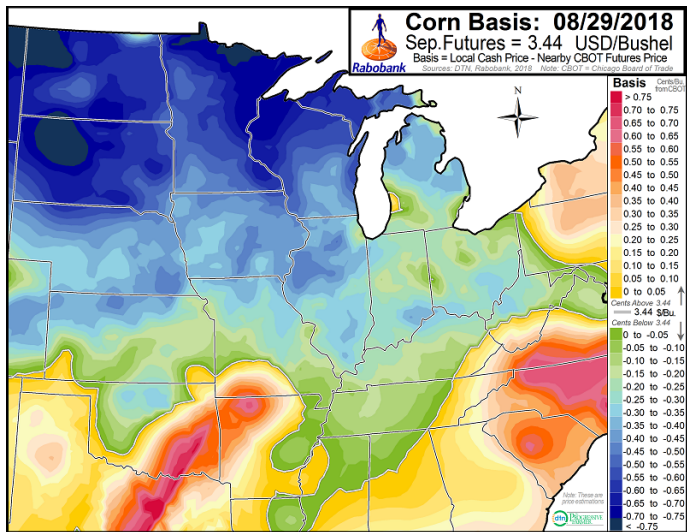
Soybean basis

Source: Rabo AgriFinance.

Soybean Basis, 08-29-2018

Basis = Cash Price - Nearby Futures Price
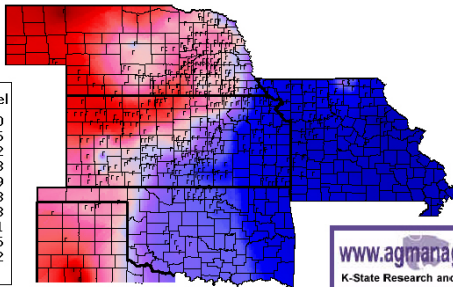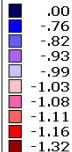
Source: AgManager.info.

The basis through space

- The basis between two locations depends on the transaction costs to move the commodity from one location to another.
- The basis informs about local market conditions and tells traders about opportunities to arbitrage the market and make money.

Trading over the basis

- Traders use the basis to make decisions about where to buy and where to sell.
- Let's look at this with an example (I made up the numbers).
- Consider the basis for corn in Fort Dodge, IA and in Fremont, NE.
- The basis are measured using cash bids for October and the December futures price.
- Suppose that the basis in Fort Dodge is -0.45\$/bu and that the basis in Fremont is -0.51\$/bu.
- Is it possible for a trader to make money by shipping corn between these two locations?

Trading over the basis

- First, given the two values for the basis, where should a trader buy and sell?
- Recall that the basis is

$$\text{Basis} = \text{Cash price - Futures price.}$$

- The futures price used to calculate the basis is the same for the two locations.
- Because of this, without even knowing the futures prices, we can tell that because the basis is lower in Fremont than in Fort Dodge (-0.51\$/bu < -0.45\$/bu) that the price of corn is lower in Fremont.
- Thus, if the trader buys corn, it will be in Fremont, to sell in Fort Dodge.

Trading over the basis

- Is there money to make by buying corn in Fremont and selling that corn in Fort Dodge?
- The difference in the basis values is -0.45\$/bu - -0.51\$/bu = 0.06\$/bu.
- Thus, if the shipping cost between Fremont and Fort Dodge is less than 0.06\$/bu, then the trader can make a profit by buying corn in Fremont and selling it in Fort Dodge.
- This is a competitive market and it is likely that the transportation cost is very close to 0.06\$/bu. Traders typically a fraction of a cent per bushel on these transactions.
- There is going to be corn shipped between Fremont and Fort Dodge until the difference in basis exactly equals shipping cost.
- In such a case, all arbitrage opportunities have been exploited.

Trading over the basis

- Traders are able to make money over small differences in the basis because they can hedge.
- Hedging removes the risk from movement in the futures price.
- We will see how hedging works in the next section.

Market integration

- Markets are integrated if they are determined by the same market conditions and their prices vary together.
- Two markets are integrated when a commodity flows between one location to the other.
- When markets are integrated, the difference in the basis equals shipping cost (no arbitrage condition).
- If the cost of transportation is very large, then there will be no be trade between the two locations.
  - The difference in the basis (or the difference in the local cash prices) then is smaller than the shipping cost.
  - Prices in the two markets are determined separately at the intersections of their respective supply and the demand curves.
  - The two markets are not integrated.

When there is no trade between two locations

- It is possible that there is no trade between two markets but that the markets are still integrated.

  - It might just happen that the difference in price equals the transportation cost.
  - It might also be that the two markets both ship the commodity to a third market, making the three markets integrated.
  - For example, both the US and Brazil ship soybeans to China. (This is true under normal market conditions - i.e. no trade war.)

In summary

- The basis summarizes local market conditions.
- Commodities will flow from a location where the basis is low to a location where the basis is high.
- In competitive integrated markets, the difference in basis between two locations will equal shipping cost.