

Basis

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Lecture notes for Econ 235

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:

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

- 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.

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

- Another definition of the basis is the difference in the prices in the cash market at two locations.
 - 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 Blackboard.

Definitions: law of one price

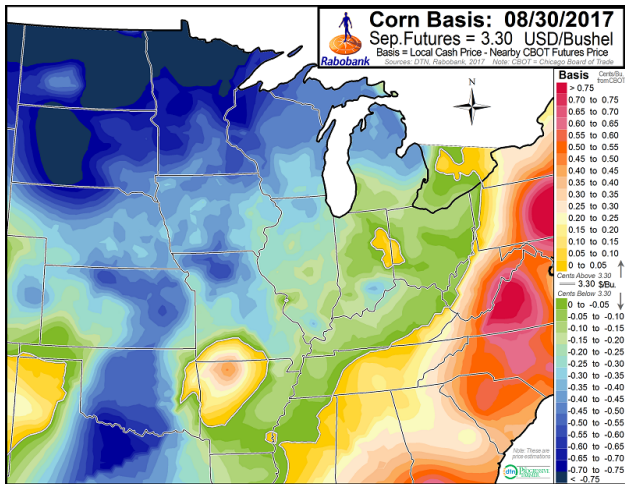
- The *law of one price* says that there is one price for a commodity once accounting for transaction costs.
- *Arbitrage* is the practice of taking advantage of a price difference between two markets to make profit. For example, if the price of soybeans is higher in China than it is in the United-States, 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).

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

Corn basis



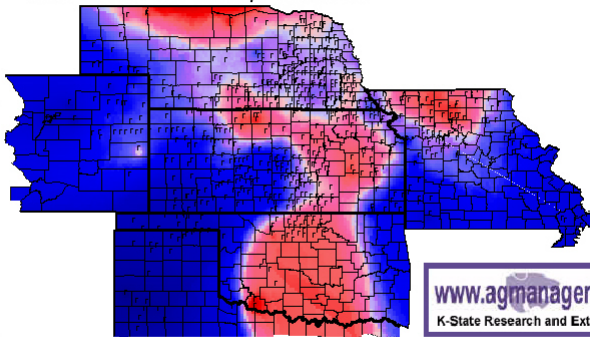
Source: [Rabo AgriFinance](#).

Corn Basis, 08-30-2017

Basis = Cash Price - Nearby Futures Price

CBT Sept
Futures
Price: \$3.36

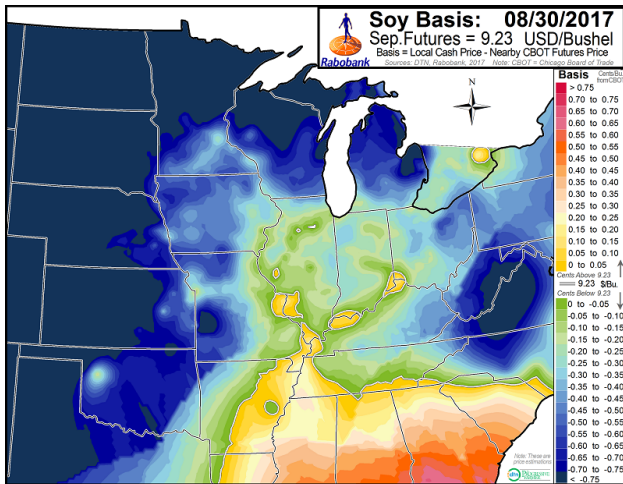
\$/Bushel



www.agmanager.info
K-State Research and Extension

Source: AgManager.info.

Soybean basis

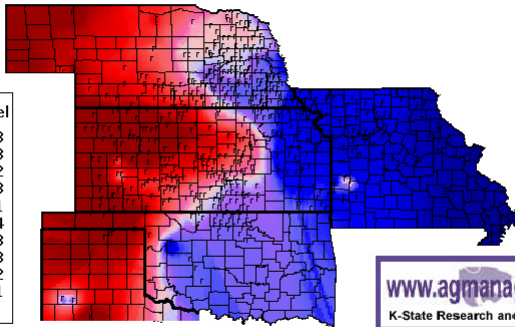
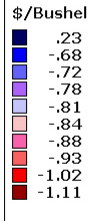


Source: Rabo AgriFinance.

Soybean Basis, 08-30-2017

Basis = Cash Price - Nearby Futures Price

CBT Sept
Futures
Price: \$9.29



www.agmanager.info
K-State Research and Extension

Source: AgManager.info.

Basis for cattle in Canada (Alberta) and the US (Nebraska)



Note: the basis is calculated as the price in Canada minus the price in the United States.

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 as cash bids for October with respect to the December futures.
- Suppose that the basis in Fort Dodge is $-0.45\$/\text{bu}$ and that the basis in Fremont is $-0.51\$/\text{bu}$.
- 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

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

- 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 ($-0.51\$/\text{bu} < -0.45\$/\text{bu}$) 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 are 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.

When there is no trade between two locations

- 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 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.

- 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.