

# Farm and Industry Short Course Grain Marketing

## Basis

### Lecture 2, January 23, 2004

#### Understanding Basis

Understanding the relationship between local cash prices and prices in the futures market is key to making any grain marketing decision. Even producers who never use the futures market directly benefit from understanding the relationship between their local market and the futures market.

The relationship between cash and futures prices is called the basis. Basis is simply the difference between the current cash price at a specific location and the futures price for a specific futures contract. The basis accounts for the difference in the supply and demand relationships in the local market relative to the futures market. It is usually calculated as CASH PRICE minus FUTURES PRICE.

As an example, consider the market for corn. Corn futures contracts trade for delivery in Chicago. Since Chicago is a grain deficit area (i.e., no grain is grown there, but there is demand for grain), Chicago's corn price will generally be above the price in a local market where corn is produced. This is because corn buyers in Chicago must be willing to pay the producer's local price plus transportation costs between Chicago and the local market to encourage corn delivery in Chicago. As a result, basis in grain surplus areas will generally be negative, meaning the cash price is below the futures price. For example, if the futures price for December corn (that is, a futures contract for corn to be delivered in December) is \$2.30 per bushel, and the local cash price is \$2.00 per bushel, the basis is  $-\$0.30$  (cash price minus futures price).

In addition to transportation costs, storage costs influence basis levels. Assume the date is February 1, and corn in your local market is \$2.00 per bushel. Also assume that corn futures contracts for March delivery are trading for \$2.20 per bushel. The local basis would be  $-\$0.20$  relative to the March contract. In most years, the July contract for corn would be trading at a higher price than the March contract; let's say \$2.40 per bushel. The July contract is at a premium over March because it will cost more to store corn from February to July than from February to March. Since there will be no new supply of corn between February and July, the only way to insure corn will be available in July is for market participants to be willing to pay corn suppliers the current market price plus expected storage costs between February and July. If the July price did not compensate for storage costs there would be no incentive to store corn, and thus no assurance of a supply of corn in July.

Notice in the above example the February basis differs depending on which futures contract one considers. Relative to March futures, the basis is  $-\$0.20$ . Relative to July futures the basis is  $-\$0.40$ .

A basis in which the cash price rises *relative* to the futures price is said to be strengthening. In other words, the higher the cash price for any given futures price, the stronger the basis. Thus, a basis of  $-\$0.10$  is stronger than a basis of  $-\$0.20$ . If the cash price begins to fall *relative* to futures, the basis is weakening.

In general, we expect the basis in a grain producing area to strengthen as we move away from harvest. This is because the local market is slowly reducing its overall relative excess supply of grain. Consider a March futures contract for corn that has a price of  $\$2.10$  per bushel in November. As we move from November into December and January, we generally would expect the cash price to start moving up towards the March futures price even if the March futures price stays around  $\$2.10$ . The local basis is strengthening as grain is moved out of the local market. This is an important concept. One way to make money on storage is to realize a strengthening basis over the storage period, i.e. cash prices strengthen even if futures markets do not rally. An important part of deciding whether to store grain is determining if there are opportunities for the local basis to strengthen, and whether the expected improvement in basis will be sufficient to cover storage costs.

Since basis is largely determined by transportation and storage costs, several observations can be made. First, basis is likely to be weaker the further a country elevator is from the Chicago market, or some other terminal market. The further from a terminal market, the lower the cash price will usually be relative to futures prices. In general, Wisconsin basis levels will be weaker in the central part of the state than they are in the southeastern corner or on the Mississippi River. This is because excess grain production in central Wisconsin must be moved to the Milwaukee/Chicago corridor, or to the river in order to enter the commercial marketing channel. This transportation cost results in lower cash prices relative to markets located near larger terminals.

Also, basis will tend to be weaker than normal in local markets when storage facilities are glutted and handling and transportation equipment are strained to capacity during a bumper harvest. Conversely, a short crop locally will result in a stronger than normal basis at harvest since there is less relative excess supply than occurs in most years.

Last, since the largest supply of the year occurs right at harvest, we would expect the weakest basis of the crop year to occur at harvest. As supplies diminish, basis will generally strengthen until the next harvest.

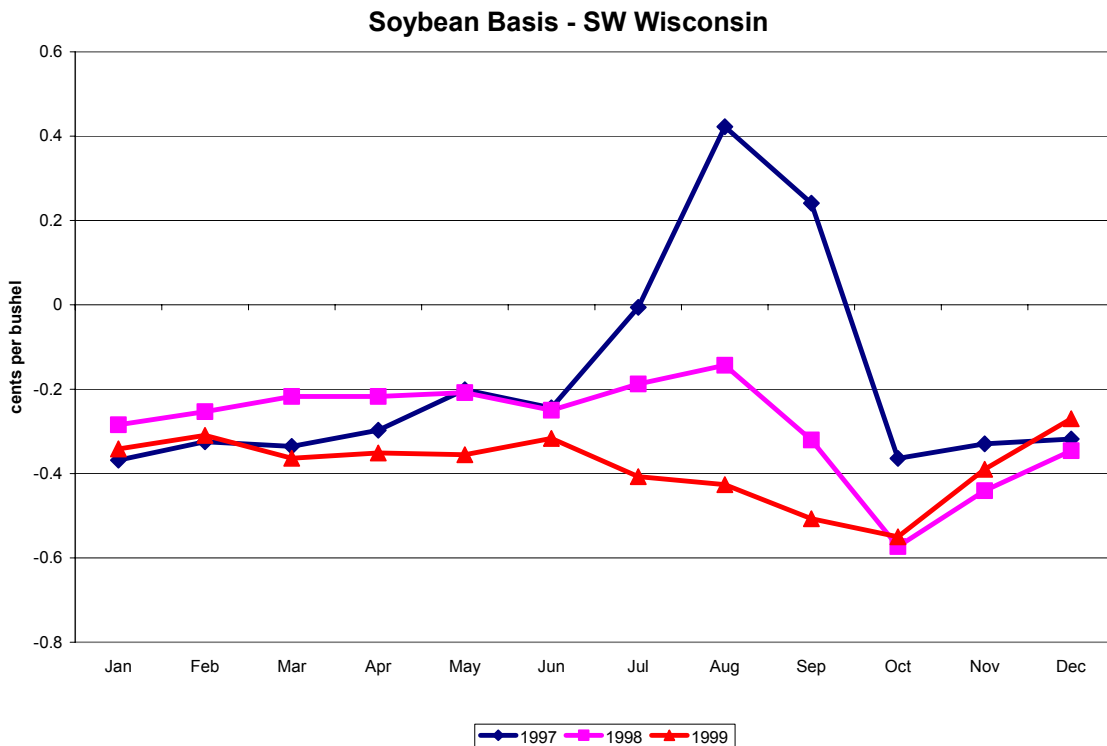
An illustration of soybean basis for Southwest Wisconsin is given in Figure 1. Note that while basis varies across years, it does tend to exhibit a similar pattern of movement each year. Further, while it varies significantly in the summer months from year to year, it does tend to end each year at about the same level. This is important to know. The less the basis varies from year to year, the less basis risk exists. In Figure 1, basis risk is

greatest in August (there are the greatest differences from year to year in the August basis), while basis risk is small in December (the basis only varies a few cents per bushel from year to year).

### Forecasting Basis

In order to use basis information to improve cash marketing decisions, it is important to predict what the basis will likely be in coming months. For grains, this can be done

Figure 1.



relatively simply. The most common forecasting strategy is to simply use the average basis experienced in previous years.

In order to keep basis recording efforts to a minimum, most people simply track the average monthly basis over time. Tracking the basis over the last 3 to 5 years, and averaging each month's basis across years is the simplest method. This average is then used as a forecast of basis in the coming year.

Remember that basis is the cash price minus the futures price. In general, the only basis we care about tracking is the local cash price minus the futures price for the contract closest to maturity. So, for example, the corn basis in January is the average January cash price minus the average price in January for the March futures contract (this is the

contract closest to maturity in January as there is no corn contract for February delivery). In February, the basis is the average February cash price minus the average price in February for the March futures contract.

The March futures contract will expire about the third week of March. Traders who do not want to make or take delivery of corn in Chicago in March will be scrambling to offset their delivery obligations the last couple of weeks the contract trades. As a result, the March contract in March becomes less useful as a pricing reference. Therefore, the basis in March is the average March cash price minus the average price in March for the next futures contract. The next corn contract is for May delivery, so the March basis is the cash price minus the price in March for the May futures contract.

In order to calculate the monthly average basis, it is only necessary to collect prices once a week. The best day is usually Wednesday because it is in the middle of the work week, so futures traders are just trading the current set of information, not trying to make up for information which became available over the weekend (as happens on Monday) and not attempting to adjust their obligations to minimize risk exposure over the next weekend (as often happens on Friday). The relevant futures price is the last price traded each Wednesday. This is the price that represents the market consensus of value at the end of the trading day.

To calculate the basis, collect the closing futures price on Wednesday, and then collect the cash price from the local elevator either late Wednesday afternoon or first thing Thursday morning. Most elevators change their cash price bids about 2:00 PM each day following the close of futures trading (the grain markets close at 1:15 Central Standard Time). Make sure the cash price collected has been adjusted for the most recent closing futures price.

Subtracting the futures price from the cash price each Wednesday gives the basis for a given week. While it may vary a little from day to day, once a week will generally be accurate enough. If there are four Wednesday's in a given month, the basis from each of the four Wednesday's is averaged, and this gives the average basis for that month in that year. If this is collected and calculated for three years in a row, then the average of the three years gives the expectation for the basis in the coming year.

Table 1 provides an illustration. Each month's basis level for each year is the average of every Wednesday's basis each month. The forecast for 2000 is the average of each month's basis from 1997, 1998, and 1999.

Table 1. Southwest Wisconsin Soybean Basis.

	Jan	Feb	Mar	Apr	May	Jun	Jl	Aug	Sep	Oct	Nov	Dec
1997	-0.37	-0.32	-0.34	-0.30	-0.20	-0.24	-0.01	0.42	0.24	-0.36	-0.33	-0.32
1998	-0.28	-0.25	-0.22	-0.22	-0.21	-0.25	-0.19	-0.14	-0.32	-0.57	-0.44	-0.35
1999	-0.34	-0.31	-0.36	-0.35	-0.36	-0.32	-0.41	-0.43	-0.51	-0.55	-0.39	-0.27
2000 Forecast	-0.33	-0.30	-0.31	-0.29	-0.26	-0.27	-0.20	-0.05	-0.20	-0.50	-0.39	-0.31

## Using Basis to Improve Storage Decisions

An important use of local basis information is improving the quality of storage decisions each year. If a producer has a good feel for how basis levels change through the year in his/her local market, this information can be combined with current futures prices to decide whether storage is an attractive strategy in the local area.

The difference between two futures prices for different delivery months represents a measurement of the national average return to storage. For example, if the March corn contract is trading for \$2.50 per bushel, and the May corn contract is \$2.60 per bushel, the national market (as measured by Chicago futures prices) is offering 5 cents per month for storage between March and May. However, this does not mean that the local market is paying the same return to storage. By using basis patterns to localize each futures price, however, the local return to storage currently being offered can be estimated.

Using the basis forecasts from Table 1, note that in February the Southwest Wisconsin cash price for soybeans is expected to be about 30 cents under the March futures price (the contract closest to maturity in February). If March soybean futures are trading today for \$5.20 per bushel, then the current expectation for the February cash price is \$4.90 (the March futures price adjusted for the average basis in February). A producer can compare this price with the price they would get if they sold soybeans locally today. If the difference between today's local price and the expected cash price in February (\$4.90 per bushel) is more than the costs of storage<sup>1</sup>, market conditions indicate that it is currently expected that storage in the local market will be profitable at least until February. By looking at expected basis and current futures prices for other delivery months, the producer can decide how long the market is expected to pay for storage, and thus the optimal month, given current market information, to sell the stored soybeans. Without a good basis forecast, storing soybeans is more risky because the producer can not determine an expected cash price for later sale to compare to today's cash price.

If the combination of basis expectations and current futures prices result in expected cash prices in later months that do not exceed the current price by more than the costs of storage, the market is telling producers that it would rather buy their soybeans today, and will actually charge them to hold them off the market for later sale. Under this scenario, the only way a producer will profit from storage is if there is an unexpected rally in the futures market, and the cash market follows (i.e., the basis does not weaken as futures prices rise). While this is always a possibility, it is much more risky to store cash grain betting just on a futures rally than to store grain when the combination of expected basis and current futures prices are already rewarding storage through higher expected cash prices in later months.

Table 2 illustrates how a producer would analyze a storage decision using all available market information. Assume the current date is January 15, and the cash price offered for

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<sup>1</sup> Producers should assume that the minimum cost of storage is 3.5 cents per bushel per month, even if they own their bins and they are paid for. Producers renting commercial storage space will sometimes pay up to 5 cents per bushel per month.

soybeans today is \$4.75 per bushel. What the producer wants to know is whether he/she should sell soybeans today, or continue storing them.

From Table 2 we can see that the market is paying an excellent reward for storing from mid-January to February. Even if the futures market does not rally, we would expect to make 15 cents per bushel after storage costs have been subtracted. The one risk is falling

Table 2.

Using basis information to evaluate a storage decision.

January 15, 2000

Today's cash price	\$4.75
March futures price	\$5.23
May futures price	\$5.32
July futures price	\$5.41

Expected cash prices for later delivery on January 15:

Store Until:	February	March	April	May	June
Futures Price	\$5.23	\$5.32	\$5.23	\$5.41	\$5.41
Expected Basis	-\$0.30	-\$0.31	-\$0.29	-\$0.26	-\$0.27
Expected Cash Price	\$4.93	\$5.01	\$5.03	\$5.15	\$5.14
Storage Return					
Expected Cash Price	\$4.93	\$5.01	\$5.03	\$5.15	\$5.14
minus Today's Price	\$4.75	\$4.75	\$4.75	\$4.75	\$4.75
minus Storage Costs*	\$0.035	\$0.07	\$0.105	\$0.14	\$0.175
Total Return	\$0.15	\$0.19	\$0.18	\$0.26	\$0.22
Per Month Return	\$0.15	\$0.095	\$ 0.058	\$0.065	\$0.043

\* Storage costs are 3.5 cents per month.

make 15 cents per bushel after storage costs have been subtracted. The one risk is falling futures prices. If futures prices go down by more the 15 cents per bushel between January 15 and February, we could lose money. However, if futures prices either stay the same or go up, we will make money on storage.

If we continue storing from February to March, we make an additional 4 cents per bushel after storage costs are subtracted. Note from March to April, however, we actually expect to lose a penny a bushel. This is worth doing, though, if we can continue to store into May. After May, we start losing money on storage. Using our understanding of basis and the current futures prices, we have discovered that the local market is offering us the greatest reward for storing to May, but after May we will likely lose money on storage. Again, the only thing that will affect the outcome in a negative way is if futures prices fall during the storage period. As long as they don't fall by more than 26 cents per

bushel between January and May, however, we will still make at least enough to offset storage costs<sup>2</sup>.

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<sup>2</sup> This assumes we have made a good basis forecast. If basis turns out different than expected, it will also affect storage returns. From Table 1 we can see how much the basis for each month has varied over the years, so we do have some feel for the basis risk involved in making the storage decision.