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CORNHUSKER ECONOMICS

Farmland Values: The Effects of Commodity Prices, Yields, Profit Margins and Capitalization Rates

Market Report	Yr Ago	4 Wks Ago	9/9/11
<u>Livestock and Products,</u>			
<u>Weekly Average</u>			
Nebraska Slaughter Steers, 35-65% Choice, Live Weight.....	\$96.99	\$116.90	\$117.69
Nebraska Feeder Steers, Med. & Large Frame, 550-600 lb....	124.82	150.48	155.28
Nebraska Feeder Steers, Med. & Large Frame 750-800 lb....	116.36	142.11	140.00
Choice Boxed Beef, 600-750 lb. Carcass.....	160.84	176.65	180.25
Western Corn Belt Base Hog Price Carcass, Negotiated.....	80.77	102.63	83.02
Pork Carcass Cutout, 185 lb. Carcass, 51-52% Lean.....	90.56	109.83	94.52
Slaughter Lambs, Ch. & Pr., Heavy, Wooled, South Dakota, Direct.....	146.25	184.75	179.25
National Carcass Lamb Cutout, FOB.....	321.20	407.98	408.98
<u>Crops,</u>			
<u>Daily Spot Prices</u>			
Wheat, No. 1, H.W. Imperial, bu.....	5.86	7.08	7.19
Corn, No. 2, Yellow Omaha, bu.....	4.24	7.19	7.17
Soybeans, No. 1, Yellow Omaha, bu.....	10.06	13.30	13.77
Grain Sorghum, No. 2, Yellow Dorchester, cwt.....	7.50	12.00	12.00
Oats, No. 2, Heavy Minneapolis, MN, bu.....	3.22	3.61	3.63
<u>Feed</u>			
Alfalfa, Large Square Bales, Good to Premium, RFV 160-185 Northeast Nebraska, ton.....	137.50	185.00	185.00
Alfalfa, Large Rounds, Good Platte Valley, ton.....	72.50	110.00	132.50
Grass Hay, Large Rounds, Good Nebraska, ton.....	*	75.00	85.00
Dried Distillers Grains, 10% Moisture, Nebraska Average.....	115.00	196.50	209.00
Wet Distillers Grains, 65-70% Moisture, Nebraska Average.....	41.75	69.00	74.00
*No Market			

Recent price increases for many of the crops grown in Nebraska have been followed directly by higher input costs. Land cost is one of these escalating factors. Typically, those that invest in real estate or land use a ratio of income relative to opportunity cost to evaluate the value of that purchase. This ratio involves factors related to the lands use and productive capacity, and is known as the “Capitalization rate” or “Cap Rate.”

One source defines this rate as follows: “Capitalization rate defines the percentage number used to determine the current value of a property based on estimated future operating income. In other words, taking the net operating income from an apartment complex and dividing it by the capitalization rate would yield the approximate current value of the complex. The capitalization rate would be determined based on an appraisal and/or the cap rates of similar properties that have sold recently. By taking another apartment project that sold recently, determining its net operating income (NOI), you would divide the income by the sold price to get the cap rate.” http://realestate.about.com/od/ac/g/def_cap_rate.htm Mathematically, the cap rate can be written as Equation 1.

Equation 1:

$$\text{Cap Rate} = \frac{\text{Annual Net Operating Income (NOI)}}{\text{Property Value}}$$

As suggested by the previous paragraph, the usefulness of the cap rate is its application in accessing the value of real property. This form of the relationship is achieved by algebraically manipulating Equation 1 into the form of Equation 2.

Equation 2:

$$\text{Property Value} = \frac{\text{NOI}}{\text{Cap Rate}}$$

In this discussion we are examining how commodity prices, yields, profit margins and the cap rate affect property values. To do this we disaggregate the NOI into its components, which yields commodity price, times expected yield, times profit margin as a measure of gross revenue. This substitution into Equation 2 creates Equation 3.

Equation 3:

$$\text{Property Value} = \frac{\text{Price} \times \text{Yield} \times \text{Profit Margin}}{\text{Cap Rate}}$$

To illustrate the usefulness of this model and to make it operational, several assumptions will be made. The land valued will have a single productive use, growing corn; the expected profit margin is 25 percent of gross revenue; and the appropriate cap rate is five percent. These assumptions are based on observation and expert opinions, and are hoped to be representative of the true factors.

Using two different yield and price expectations the resulting land values are as follows: Farmland that is expected to produce 240 bushels of corn with an expected value of \$9.00/bu is valued at \$10,800/acre. Conversely, farmland with a 200 bu/ac expected yield, and an expected corn price of \$3.00/bu would be valued at \$3,000.

These two examples illustrate how price and yield expectations contribute to differences in farmland value. Varying profit margin and the cap rate also alters property value. The question is, "How does each of these variables contribute to changes in land value?"

To better understand these factors and to answer this question, a series of simulations are created. These simulations vary each of the four factors individually and simultaneously. Due to the size limitations of this article a full explanation of the simulation process and a complete graphing of the results are omitted. However, these items are available from the author. The simulations are much like using dice in selecting a specific outcome or realization. Each of the factors outcome or realization is limited within a range, the cap rate varies between three and seven percent, corn yields between 200 bu/ac and 240 bu/ac, profit margin between 20 and 30 percent of gross revenue and prices between \$2.00/bu and \$8.00/bu. For simplicity, each factors realization is expected to be unrelated to the others.

Results

When all factors are varied simultaneously, the following 500 possible outcomes are mapped in Figure 1 (on next page). This figure shows a variation in land values ranging from about \$2,300 as a low, to a high of just over \$11,600, a range of over \$9,300.

Holding all but one of the factors constant demonstrates the varied factors effect on land values. Through this process the price/bu factor creates the largest variation of all factors, with a range of \$6,381 between the highest and lowest valued property when prices are varied from \$2.00/bu to \$8.00/bu. The other factors have smaller impacts on farmland values. The cap rate has the second largest variation of \$5,680 from highest to lowest land values, as it ranges from three to seven percent. A change in profit margin from 25 to 30 percent follows the cap rate, resulting in a \$2,190 range from high to low. The factor with the least effect is yields/acre, which is varied between 200 bu/ac to 240 bu/ac expected production, and only alters property values about \$1,044, from high to low.

These results are consistent with observed facts, where land values have risen quite rapidly in conjunction with rising corn prices. The cap rate, corn yields and profit margin factors are slower to change, and are likely not to change as drastically in a short period of time.

In addition to noting the variation created by different factors on land values, it is useful to study these relationships as a forecasting tool. Figure 2 (on next page) illustrates the relationship between corn price expectations and land values. The chart can be used as a forecast of expected future corn prices based on current land values.

Implications

Agriculture land values are likely to remain high, and continue to rise as prices remain high and the future expectation of commodity prices remain high. Adjustments in profit margin, cap rates and yield expectation will modify over time, resulting in further refinements in property values. If profit margins shrink as a portion of gross revenue, land values will likely have a small decline. If yield increase expectations begin to fade, values may also fade, but not as strongly as the price effect. If the cap rate increases, values will also decay.

If the prognostication that food production will have difficulty keeping up with the demand and crop prices have reached new trading ranges, which may go even higher, then high land values are here to stay. On the other hand, if the current high prices are temporary, then agriculture property is poised to be the new real estate bubble getting ready to burst. Looking forward, regardless of the current market conditions, the most promising land tenure policy always has been and will always likely be, for buyers to have a solid business plan and use sound financial principals in their purchase and leasing decisions of this valuable resource.

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Figure 1. Forecasted Land Prices With All Four Factors Variable

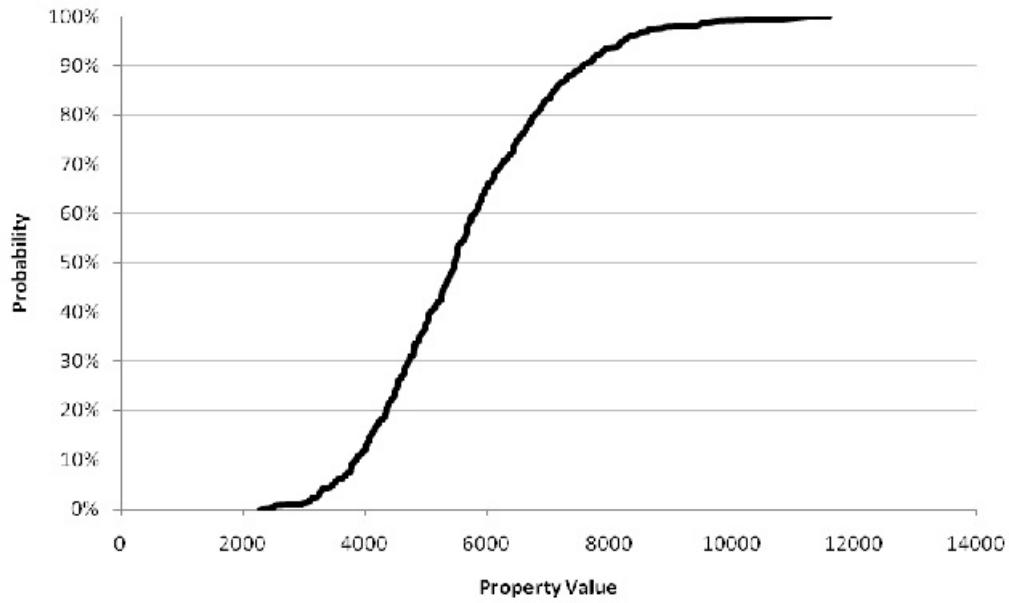


Figure 2. The Corn Price Land Value Relationship

