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THE RISE AND FALL OF CORNBELT FARMLAND VALUE:
SEARCHING FOR THE BOTTOM
by
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# THE RISE AND FALL OF CORNBELT FARMLAND VALUE: <br> SEARCHING FOR THE BOTTOM* 

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THE RISE AND FALL OF CORNBELT FARMLAND VALUE:

SEARCHING FOR THE BOTTOM


#### Abstract

This analysis shows the rise and fall of Cornbelt farmland values in real and nominal terms and predicts future values. Nominal land values could decline another 25 to 35 percent. Forecasts are based on predicted net rents and capitalization rates needed by buyers to finance land.


# The Rise and Fall of Cornbelt Farmland Value: Searching for the Bottom ${ }^{1}$ 

## Introduction

Midwest farmland has gone through a classic boom and bust cycle beginning in 1972 or 1973 (Blase), reaching the top in 1980 or spring of 1981 and then declining since then. Farmland in the United States as a whole has gone through a similar cycle lagged about a year or so behind the midwest. There were various explanations for the rise including anticipation of increasing income (Melichar). The rate of inflation, a period in the 70's of negative real rates of interest, sharply increasing exports, lenders pushing loans based on collateral inflation and not least of all agriculturists in the U.S. Department of Agriculture and Land Grant Universities who almost unanimously wre predicting that demand for food in the world with population growth would soon outpace supply. Many were recommending to farmers in the United States that all out production was the order of the day. Many did not recognize the unusual circumstances and the spill over effect that the increase in price of gold from $\$ 35$ to $\$ 135$ an ounce and the increase in oil prices from under $\$ 10$ to $\$ 30$ a barrel would have on agriculture. Currently, the nominal values of many farm sales are half or less than half what the same farms would have sold for at the peak. In fact several paired sales (sale of the same farm at two different
$1_{\text {Paper }}$ to be presented at the Western Economic Association Meeting in Vancouver, Canada, July 9, 1987.
times) sold first in 1977 to 1981 have sold again a second time in the last two or three years at half or less than half the earlier price. In real terms, since inflation continued through to the present time, albeit less than in 1979 to 1982 , land values in many parts of the United States have declined from 60 to $70 \%$. This is even greater than the real decline in land prices from 1920 to 9133. Land prices unadjusted for changes in the value of the dollar declined about $25 \%$ from 1920 to 1929 and another $40 \%$ from 1929 to 1933. The bottom of the land price decline in the last land cycle was in 1933. The general economy in the United States was very strong from 1920 to 1929 with the stock market reaching a peak in the spring of 1929 and wobbling through the summer on a plateau with some minor sinking spells before going over the brink in October of 1929.

## The Current Land Price Cycle

Land prices in the last six months on the best land have increased slightly. There are instances of sales which appear to be up from 5\% to 10\%. Land rent has been declining the last few years about as fast as land values. The sharp decline in interest rates especially for the investor in bank CD's has made farmland a more attractive investment on a strictly current account basis for cash investors. We have seen more cash buyers in the land market the past six months than the past several years. Poor quality land seems to be only level or still declining slightly. The Conservation Reserve Program seems to be putting a floor under the price of the poor quality land.

Table 1 shows the nominal average prices per acre from 1971 to 1986 for the states in the Cornbelt. In general, prices rose in a range from 275 percent in Missouri to a high of 430 percent in Iowa. Since the peak, nominal prices declined from 46 percent in Ohio to 62 percent in Iowa. The state with the largest increase (Iowa) also had the largest decline.

Table 2 shows the same data deflated by the Consumer Price Index with the average price in 1971 as the beginning base year. The real values increased from a low of 78 percent in Missouri to a high again in Iowa of 153 percent. The peak year of real values was in 1980, a year earlier than for peak nominal values. Current real values of land throughout the Cornbelt are lower today than they were in 1971. Comparisons of the recent land boom have been made with the increase and decline centered on the year 1920. The rate of decline in the 1980's was much faster than in the 1920's and closer to the rates of the period from 1929 to 1933. The total nominal decline occurring from 1981 to 1987 (a period of 6 years) in all Cornbelt states on a percentage basis is now greater than the nominal decline from 1920 to 1933 (a period of 13 years). The real value decline from 1980 to 1987 is greater than the real value decline in all the years from 1920 to 1933, partly because in the early 1930's the CPI declined, while in the early 1980's the CPI has continued to rise, albeit much more slowly in the last three years. The real decline since 1980 in cornbelt farmland ranges from 60 to 69 percent depending on the state. Ohio had the lease decline and Iowa the most.

Prior to 1920 and into the early $1920^{\prime}$ s, there was a flurry of land purchases with borrowed money. Some of these were foreclosed in
the late 1920's and many of those who had incurred debt and were still viable in 1929 lost out in the $1930^{\prime}$ s. A few similarities to that period exist, but there are also many differences. The supply side was finally curtailed in the 1930's by several factors: government land retirement programs, a number of years of very poor weather that limited yields, along with some serious insect problems which helped reduce marketable products.

Weather still plays an important role -- the drought of 1983 was formidable and reduced yields across the Cornbelt. Along with the PIK program it was one of the few years when there was a significant shortfall in production relative to domestic use and exports. It can work the other way also as in 1985 and 1986 in some areas when yields of both corn and soybeans were far above any previous records. Farm machine size and precision improving seed placement, planting rates, and timeliness in planting and harvesting has helped increase yield. Other advanced technologies of crop production, coupled with ever improving genetic material reduces the risk of crop failure or near failure as we had during several years of the $1930^{\prime}$ s, so the relative variance in yield should be getting smaller.

Exports have not totally collapsed as they did in the 1920's, but they have declined very significantly since 1980. Various scenarios explaining export decline have been profered including increased value of the dollar relative to our trading partners on the demand side (making our commodity prices higher to buyers), short run embargoes of exports, import restrictions by other countries, and higher commodity prices in terms of the currencies of grain producing countries causing supply increases in competing producer countries. Reversing the
policies that caused these events of the $1970^{\prime}$ s is not likely to easily recapture exports. Some countries have much higher debt now than a decade earlier and a price decline to increase demand may be lost in that kind of market. The dollar has declined relative to some currencies (about 30 percent against European currencies and more against the Japanese yen). These countries are important purchasers of grain and this makes grain prices cheaper for them. However, the dollar value has increased relative to the currencies of some countries, such as Brazil and Argentina, that are competitive on the supply side. This may well have stimulated grain production and exports from those countries. Reducing world prices of grain as we are now doing may increase the total world grain trade over time, but it may have little effect on increasing our share of the export market at least in the short run.

Our ability to produce will continue to be large. Generally, we do not know what the elasticities of supply and demand are when there are large and drastic permanent changes in price.

It can be assumed that as long as all production costs and real estate taxes are covered that production is likely to continue at a relatively high level.

The variable which affects land value the most, according to Burt (1986), is net rent to land. Many variables have been included in econometric studies of land value such as net rent, the rate of interest, the real rate of interest, the rate of inflation, the size of tract, soil quality, the prices and yields of products produced, the trend, and others (Hammill; Osborn; Reiss and Gordon; Tweeten).

Although Burt's model showed net rent as the only significant variable, economic and capital theory still dictate the use of the rate of return or the rate of interest as an important link to relate land value to net rent. If the rate of return were constant, then net rent might be the only variable needed -- particularly if both land value and net rent were appropriately deflated and the real rate of interest is constant. The nominal rate of return on land is certainly not constant and some argue that neither is the real rate. For a model using deflated values to be used as a predictive tool, one must be able to predict the rate of inflation and the "real" net rent, which is certainly difficult.

## Financial Approach

Much of the traditional economic arguments or established economic theory about capital value and returns to capital ignore or denigrate the financial aspects and the necessary financial capability of buyers and the sources of funds for mortgage payments (Kletke and Plaxico; Herr; Thompson). Financial variables which have proved to be important should be analyzed with respect to returns and land value. These include the cash down payment buyers can make along with the acceptable cash on cash return, the net rent from land, and the mortgage payments required on the mortgage available or the mortgage that must be taken given the cash down payment. This is summarized best by the "Financial Approach" to appraisal (Scott, 1983). Assume thai first mortgage companies are loaning 60 percent of the price of la:d amortized at 10 percent for 30 years. Then a cash to mortgage buyer
must make a cash down payment of 40 percent of the purchase price. At the present time most commercial mortgage companies including insurance companies and the Federal Land Bank will loan 50 percent to 60 percent of the purchase price. (The Federal Land Bank has instituted some special loans which will not be considered as typical for this analysis because they are relevant only to land owned by the bank.) Assume further that the buyer wants to get a current return equal to the real rate of interest (say 3 percent). The buyer then is speculating that equity buildup due to increase in land value will capture the difference between the market nominal interest rate and the real rate. If the loan rate is variable as many mortgage rates are, there would likely be little or no buildup on the mortgaged proportion of the capital resulting from increases in land value if value increase was mainly from inflation; because the mortgage interest rate would increase with inflation using up the extra gain in equity much like a shared appreciation mortgage. Using the band of investment (Table 3), we show three 30 -year mortgage amortization rates based on 11 percent, 10 percent, and 8 percent interest on assumption 1,2 , and 3 . The band of investment table shows the rate of return that the asset must produce in order to return the desired amount on equity capital and pay the mortgage payments on that part of the capital financed with the mortgage. We call this the financial approach in analyzing investments. For example, under assumption $1, \mathrm{p}(3 \%)+\mathrm{q}(11.5 \%)=$ $8.1 \%$ where $p$ is the proportion of equity ( $40 \%$ ) and $q$ is the proportion mortgaged (608). Thus under the Financial Approach the capitalization rate would be 8.1 percent for 11 percent mortgage interest amortized over 30 years, 7.56 percent for mortgage interest of 10 percent, and
6.54 percent for mortgage interest of 8 percent. Then dividing the net rent by the capitalization rate gives the price of land that can be financially supported given the future remains unchanged from the assumptions made.

Figure 1 shows a graph of two variables over time for high quality corn and soybean land. These two variables are the net rent per acre and the amortized payment required on a mortgage on the full price of land. The payment level is at the mortgage rate at the time shown and for the full price of land that existed at the time.

Inspecting Figure 1 shows that during the period from 1959 through about 1972, a relationship of $1 / 3$ to $1 / 2$ cash down with little or no return on cash equity would have produced sufficient net rent to pay the mortgage. During this period most mortgage rates were fixed so capital accumulation to equity was sufficient to offset the near zero return to cash equity bringing about at least a real rate of return on equity.

During the 1970's and early 1980's these two variables became totally distorted until there was no way that the mortgage payments could be supported by income without a cash down payment of as much as 80 percent with no current return on the cash equity. The land boom of the 1970 's so distorted the normal relationship between income and debt payment that a collapse became imminent. As early as 1978 there were warnings that current farmland prices could not be supported by farm income (Scott, 1978). Again, a warning flag hoisted in 1981 predicted a decline of 20 percent in land values (Scott, 1981), and in a paper in at the AAEA Annual Meeting (Scott, 1982) it was predicted that high
quality corn and soybean land would likely decline to $\$ 1,200$ per acre which is near the current market level in many areas.

## Predicting the Future

Using a simple budgeting approach to obtain the net rent that might be expected on high quality corn and soybean land and the "Financial Approach" to estimate the capitalization rate, land values have been estimated under three assumptions.

Table 4 gives the average costs incurred on 1,000 acre cash grain farms of high quality corn and soybean land in central and northern Illinois in 1984, our most recent year of complete data. Future costs are projected under the assumptions that lower energy costs will work their way through to reduce fertilizer, chemical, and fuel costs to the levels shown. As grain prices decline, seed costs also will come down. Machinery repairs which are labor intensive will remain about the same or increase slightly. Machinery depreciation with elimination of the investment credit and stretching out of machine life (both by the IRS and in reality by farmers) will be reduced significantly. Returns to the operator's labor and management (hired labor may be part of the family labor) must be increased because a somewhat higher labor and management return is necessary to hold good operators on the farm. Interest on capital has been reduced because of lower interest rates, lower value of operating capital, and better inventory control. Total projected non-land costs are $\$ 158$ per acre. This is approximately 15 percent below the 1984 level.

On the returns side, 140 bushel corn and 45 bushel beans are assumed with government program compliance for 1986. Assuming 1984 costs in 1986 , which are probably too high, give a net rent of $\$ 83$ per acre. Possible changes in revenue are shown for the 1987 to 1990 period under assumptions 2 and 3 where crop prices and crop percent are the only changes. Assumption 2 is 50 percent corn and 50 percent soybeans, $\$ 2$ per bushe1 corn and $\$ 5.25$ per bushel for soybeans. Assumption 3 is the same proportion in corn and soybeans with $\$ 1.80$ per bushel for corn and $\$ 4.50$ per bushel for soybeans. We use the projected production costs of $\$ 158$ per acre in both assumption 1 and 2 . Under assumption 2 we get a net rent of $\$ 76$ and under assumption 3 , we get a net rent of $\$ 54$. Assumption 2 shows a slight decline in real estate taxes and a somewhat further decline in assumption 3 . The capitalization rates shown are derived from the Financial Approach to appraisal with 3 percent real rate, 40 percent cash down, and under assumption 1 (1986) a mortgage rate of interest of 11 percent, assumption 2 uses a mortgage interest rate of 10 percent and assumption 3 a rate of 8 percent with 30 year amortization.

## Summary

Using these derived capitalization rates shows that under the foregoing assumptions, financial values of high quality land would be in the $\$ 800$ to $\$ 1,000$ range. This obviously is still below current market prices in some areas. The best land in central Illinois had a significant upturn in the winter of 1985-1986 (Scott, 1986). This was due mainly to high yields and lower interest rates. Some new plant
locations also positively impacted prices in the land market. However, land prices are likely to move lower, but at a much slower rate over the next two or three years than has occurred over the past few years. According to the foregoing analysis, land prices would likely decline another 25 to 35 percent to reach their financial equilibrium which is a price level that can be supported in the market.

Any further decline in prices clearly means considerable hardship for all landowners who have mortgages of more than $\$ 600$ to $\$ 700$ per acre. It may mean additional foreclosure or substantial readjustment of land contracts. Reports are that to avoid default and land reversion to the original seller, land contracts are already being adjusted in various ways .- adding unpaid principal to the balance, downward adjustment of both principal and interest, adjusting payments to the land price index and others. Land contracts can frequently be adjusted more easily than mortgages with commercial lenders who have few alternatives. Lenders who foreclose on land will have great difficulty in recouping their losses unless their portfolio is sufficiently varied or they are otherwise financially strong enough to be able to hold land for an extended period of time.

A recent survey of farmers' future expectations on land rents and land values shows that farmers in Eastern Illinois expect the real price of land to decline from 2 to $2.5 \%$ per year on the average over the next 10 years. ${ }^{2}$ This is certainly a significant long run decline and reflects a generally pessimistic outlook. However, a $2.5 \%$ annual
${ }^{2}$ From a survey conducted by Scott Birkey, Natalie Yockie and Simeon Sisay as a class project in a survey sampling statistics course which I teach.
decline would bring current land prices over the next five to ten years close to what is predicted with the budgeting and financial approach.


Figure 1. Net return on land with basic soil productivity rating 85-100, all tillable, and amortization of full land price.

Table 1. Nominal Farmland Values in the Cornbelt (USDA Source).

|  | Ohio |  | Indiana |  | Illinois |  | Iowa |  | Missouri |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Ind | ex \$/acre | Ind | ex/acre | Ind | ( /acre |  | x \$/acre |  | \$/acre |
| 1971 | 36 | 404 | 34 | 394 | 30 | 429 | 29 | 354 | 46 | 242 |
| 1972 | 38 | 426 | 35 | 406 | 33 | 472 | 31 | 378 | 50 | 263 |
| 1973 | 44 | 493 | 41 | 475 | 36 | 515 | 36 | 439 | 56 | 295 |
| 1974 | 56 | 628 | 50 | 580 | 49 | 701 | 48 | 585 | 73 | 384 |
| 1975 | 63 | 706 | 62 | 718 | 59 | 844 | 59 | 719 | 75 | 394 |
| 1976 | 76 | 852 | 76 | 880 | 74 | 1,059 | 74 | 902 | 85 | 498 |
| 1977 | 100 | 1,121 | 100 | 1,159 | 100 | 1,431 | 100 | 1,219 | 100 | 526 |
| 1978 | 113 | 1,263 | 112 | 1,303 | 110 | 1,581 | 104 | 1,268 | 115 | 602 |
| 1979 | 138 | 1,483 | 130 | 1,589 | 125 | 1,858 | 119 | 1,550 | 127 | 726 |
| 1980 | 156 | 1,730 | 150 | 1,863 | 135 | 2,041 | 139 | 1,840 | 154 | 902 |
| 1981 | 160 | 1,831 | 161 | 2,031 | 144 | 2,188 | 150 | 1,999 | 165 | 990 |
| 1982 | 137 | 1,629 | 140 | 1,804 | 131 | 2,023 | 139 | 1,889 | 153 | 945 |
| 1983 | 121 | 1,504 | 122 | 1,610 | 117 | 1,837 | 121 | 1,684 | 133 | 856 |
| 1984 | 116 | 1,444 | 121 | 1,594 | 115 | 1,800 | 108 | 1,499 | 133 | 856 |
| 1985 | 90 | 1,126 | 96 | 1,259 | 84 | 1,314 | 77 | 1,064 | 102 | 659 |
| 1986 | 81 | 1,013 | 81 | 1,013 | 73 | 1,143 | 61 | 841 | 94 | 606 |
| 1987 | 87 | 942 | 71 | 931 | 67 | 1,040 | 54 | 748 | 85 | 552 |

Table 2. Average Land Values in the Cornbelt Deflated by the CPI (Beginning in 1971).

| 1971 | 404 | 394 | 429 | 354 | 242 |
| :--- | :--- | :--- | :--- | :--- | :--- |
| 1972 | 413 | 394 | 458 | 367 | 255 |
| 1973 | 457 | 440 | 481 | 410 | 276 |
| 1974 | 537 | 496 | 599 | 500 | 328 |
| 1975 | 539 | 548 | 644 | 549 | 301 |
| 1976 | 608 | 628 | 756 | 644 | 356 |
| 1977 | 756 | 782 | 967 | 824 | 355 |
| 1978 | 820 | 825 | 1,000 | 803 | 381 |
| 1979 | 855 | 916 | 1,074 | 896 | 420 |
| 1980 | 874 | 941 | 1,031 | 929 | 456 |
| 1981 | 831 | 922 | 995 | 909 | 450 |
| 1982 | 687 | 761 | 854 | 797 | 399 |
| 1983 | 614 | 657 | 750 | 687 | 349 |
| 1984 | 450 | 628 | 709 | 590 | 337 |
| 1985 | 426 | 477 | 498 | 403 | 250 |
| 1986 | 372 | 389 | 420 | 309 | 222 |
| 1987 | 342 | 338 | 382 | 284 | 195 |

Table 3. Percent Decline from the High Nominal and Real Values to the Present in 1987

| Nominal | 48 | 54 | 56 | 63 |
| :--- | :--- | :--- | :--- | :--- |
| Real | 60 | 63 | 64 | 69 |

Table 4. Band of Investment.

| Source of Funds | Proportion | Rate |  | BlendedCapitalization Rate |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Assumption |  | Assumption |  |  |
|  |  | $1 \quad 2$ | 3 | 1 | 2 | 3 |
| Equity | $40 \%$ | 3\% 3\% | 3\% | 1.2\% | 1.2\% | 1.2\% |
| Mortgage | 60\% | 11.510 .6 | 8.9 | 6.9 | 5.34 | 6.36 |
| 100\% |  |  |  | 8.18 | $7.56 \%$ | 6.548 |

Table 5. Budgeted Costs and Returns, 1000 Acre Farm.

| Input | 1984 costs/acre | Projected costs/acre |
| :---: | :---: | :---: |
| Fertilizer. | \$ 33.13 | \$ 28 |
| Pesticides (herbicides and insecticides)....... | 19.98 | 16 |
| Seed and other crop. | 17.98 | 14 |
| Auto and utilities | 2.79 | 3 |
| Machinery repairs | 14.99 | 16 |
| Machine hire. | 4.67 | 4 |
| Fuel and oil. | 11.71 | 7 |
| Drying and storage | 3.83 | 4 |
| Machinery depreciation. | 25.70 | 20 |
| Hired labor | 7.04 | 7 |
| Operator's labor and mgt. | 17.93 | 20 |
| Interest on opr. K. | 18.61 | 12 |
| Insurance and miscellaneous | 6.58 | 7 |
| Total Nonland Costs | \$184.94 | \$158 |


| Returns bus |  | 1986 |  |  | 1987-1990 |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | No. 1 |  |  | No. 2 |  |  | No. 3 |  |
|  | crop | Price Revenue Crop |  |  | Revenue Price Revenue |  |  |  |  |
| Corn | 140 | 40 | \$3.02 | \$169.12 | 50 | \$2.00 | \$140 | \$1.80 | \$126 |
| Soybeans | 45 | 50 | 5.25 | 118.12 | 50 | 5.00 | 112 | 4.50 | 101 |
| Total Revenue |  |  |  | \$287.24 |  |  | \$252 |  | \$227 |
| Less Non-Land |  | Cost |  | 184.94 |  |  | 158 |  | 158 |
| Gross Rent. |  |  |  | 103.30 |  |  | 94 |  | 69 |
| Less Real Est |  | te T |  | 20.00 |  |  | 18 |  | 15 |
| Net Rent |  |  |  | \$ 83.34 |  |  | \$ 76 |  | \$ 54 |
| Cap Rate |  |  |  | $8 \%$ |  |  | $71 / 2 \%$ |  | $61 / 28$ |
| Financial Value |  |  |  | \$1,040 |  |  | \$1,015 |  | \$830 |

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