Rising Farmland Prices and Falling Farm Earnings: Is Agriculture in Trouble?

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U.S. farm real estate values have risen rapidly in recent years.[1] In the five-year period from 1972 to 1977, the average price of an acre of U.S. farmland increased 114 percent, or at an annual rate of 16.5 percent. This rate of gain for farmland is the most rapid for any five-year period in this century and compares with a 6 percent annual rate of increase in the thirty years ending in 1972. At a time when some alternative investments, notably many common stocks, have performed less spectacularly, and when assets which offer a hedge against inflation are highly desired, farm real estate has been very attractive. In fact, ownership of farmland has provided more than simply a hedge against inflation as increases in farmland values have substantially outpaced the rate of general price inflation.

These increases in farmland values have brought about substantial gains in the wealth of landowners who made land purchases prior to, or in the early stages of, the present farmland price boom. Yet, while most landowners have become wealthier, lower farm commodity prices and sharply higher costs of production in recent years have substantially depressed farm earnings from the level of three to four years ago. These conditions, in turn, have led to substantial cash flow problems for those farmers who financed purchases of land at the elevated prices of recent years and who must continue to meet periodic large interest payments as well as other fixed costs. Such a financial "squeeze" apparently underlies the recent farmers' strike movement.

Determination of Land Values

Land is an asset which is relatively fixed in supply. Since the quantity of land is not very responsive to changes in its price, especially in the near term, changes in the price of land reflect primarily changes in the demand for the services it provides. In addition to agricultural uses, land is demanded for many other uses including residential, industrial, commercial, and recreational.

The price of most agricultural land, however, reflects primarily the value of the agricultural products that it can produce. That is, the demand for farmland is derived primarily from its role as an input into the production process for food and fiber. Thus, the earnings accruing to farmland are affected by numerous supply and demand factors affecting agricultural products. Among these factors are aggregate incomes in the economy, population, export demand, prices of nonagricultural goods, prices of non-land inputs into agricultural production, agricultural technology, and government farm programs.[2]

Farmland is a durable asset, yielding a stream of services, or earnings, over time. Consequently, the price of farmland, although influenced by current earnings, reflects the stream of earnings which are *expected* over its life.[3] Investors must, therefore, ana-

[1]Farm real estate values and farmland values are used interchangeably. Farm real estate values is the more appropriate term for the U.S. Department of Agriculture data used in this paper since it includes the value of buildings and other permanent structures on the land.

[2]For a summary discussion of the outlook for agriculture in 1978, see Clifton B. Luttrell and Neil A. Stevens, "Outlook for Food and Agriculture," this *Review* (January 1978), pp. 15-22. For a discussion of the problems and effects of Government price supports on agriculture, see Clifton B. Luttrell, "Farm Price Supports at Cost of Production," this *Review* (December 1977), pp. 2-7.

[3]In investment theory terminology, the stream of earnings is discounted or capitalized in order to determine its present value. The present value (P) of a constant stream of earnings can be written as $P = \frac{E_o}{1+i} + \frac{E_o}{(1+i)^2} + \ldots + \frac{E_o}{(1+i)^n}$, where E_o is net earnings, i is the opportunity cost of credit, and n is the number of periods over which the earnings are expected. This formula can be written in shorthand form as $\sum_{n=1}^{t} \frac{E_o}{(1+i)^n}$. For example, earnings of $100 per year for the next ten years discounted at a 5 percent interest rate is worth approximately $772 today. When n becomes very large, the formula reduces to the simple formula $P = \frac{E_o}{i}$. When a

lyze the demand and supply factors which can influence the future income stream of the asset and form some judgment as to the probable pattern of that income stream. If, for example, population growth is expected to increase from 2 percent a year to 3 percent a year, investors would probably raise their expectations of future earnings from farmland, other things equal, and the price of farmland would be bid up immediately to incorporate this change.[4]

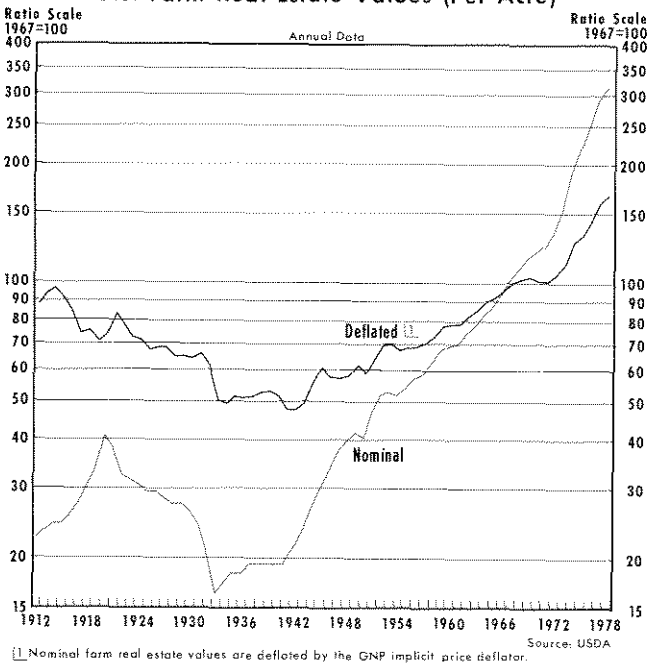
Farmland Values and Earnings — The Historical Record

Farmland has been a "good" investment over the past thirty-five years in the sense that the average value of an acre of U.S. agricultural land has increased more rapidly than the rate of inflation. Farmland values, deflated by the GNP implicit price deflator, rose at an average rate of 2.6 percent per year from 1942 to 1972. Beginning in 1972 farmland values accelerated sharply, rising almost 9 percent per year faster than the general inflation rate from 1972 to 1977 (Chart I).

Farmland investments have also performed well when compared with most common stock investments. In the past ten years, farm real estate values in nominal terms have advanced at an 11 percent annual rate while common stock prices, as measured by the Standard and Poor's 500 Index, have remained about unchanged.[5] In the previous twenty years common stock prices rose at a 9.4 percent rate, compared with a 5.2 percent rate for farmland prices. Such a divergent pattern for these two types of investments is symbolic of a substantial shift in investors' expectations about the future earnings of these two investments.

Chart I

U.S. Farm Real Estate Values (Per Acre)



Source: USDA

1/ Nominal farm real estate values are deflated by the GNP implicit price deflator.

Historical data on earnings from farmland as a separate factor of production are not readily available. However, a measure of earnings on total farm assets is computed by the U.S. Department of Agriculture and can be used here as a proxy measure for farmland earnings.[6] As shown in Chart II, these earnings on farm production assets (in nominal terms) have trended upward since 1950. Especially noticeable is the sharp rise in earnings in the early 1970s when earnings from farm assets rose 200 percent from 1971 to 1973, then subsequently fell. Earnings adjusted for changes in the general price level also increased sharply in the 1971-73 period, but by 1977 real earnings were only 15 percent above the 1971 level.

An Analysis of Price and Earnings

The ratio of the value of farm production assets to earnings on these assets is a useful tool for analyzing the behavior of farm earnings and farm real estate values. This ratio, similar to the price-earnings ratio used in stock market analysis, is a measure of

stream of returns is expected to increase g percent per year, the formula can be rewritten as $\sum_{n=1}^{t} \frac{E_o(1+g)^n}{(1+i)^n}$. When n becomes very large and i is greater than g, the formula becomes $P_o = \frac{E_o}{i-g}$.

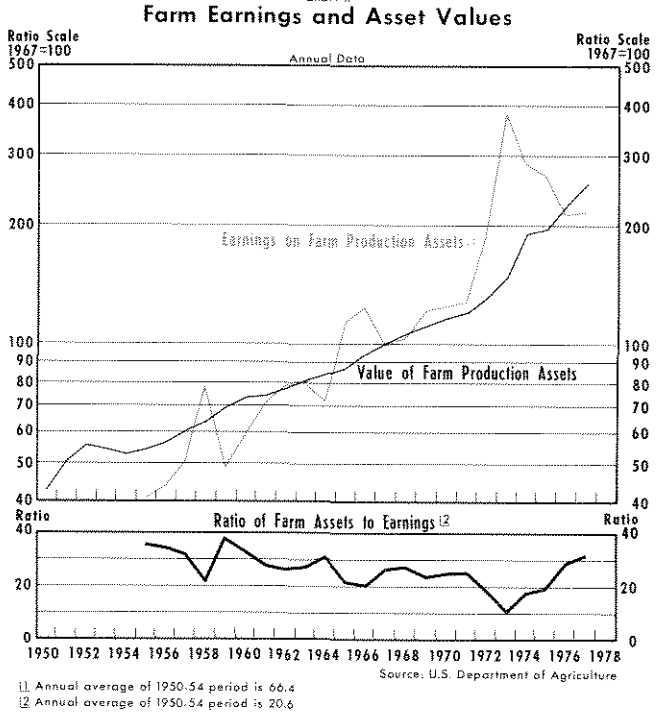
[4]For studies which have attempted to determine which factors underlie real estate movements, see Marvin Duncan, "Farm Real Estate Values — Some Important Determinants," Federal Reserve Bank of Kansas City *Monthly Review* (March 1977), pp. 3-12; Luther G. Tweeten and Ted R. Nelson, "Sources and Repercussions of Changing U.S. Farm Real Estate Values," *Technical Bulletin* T-120, Oklahoma State University (April 1966); Robert W. Herdt and Willard W. Cochrane, "Farmland Prices and Farm Technological Advance," *Journal of Farm Economics* (May 1966), pp. 243-63.

[5]While different growth rates were observed for the two assets, the rates of return on investments are not necessarily different. In fact, over the longer term, rates of return for assets tend to equalize when differences in risks are taken into account. If, for example, the rate of return of a particular asset is substantially above that of other investments, investors will tend to switch into the higher-yielding assets, thereby bidding up the price of the asset relative to that of other assets.

[6]Farm real estate comprised approximately 80 percent of all farm production assets in 1977. Earnings on farm assets are total net income of farm operators from farming plus net rent to nonfarm landlords and interest on farm debt, less adjustments for farm operators' labor and management.

Chart II

Farm Earnings and Asset Values



[1] Annual average of 1950-54 period is 66.4
[2] Annual average of 1950-54 period is 20.6

the confidence that investors have in the future earnings of one investment relative to another. For example, the higher the price-earnings ratio (P/E), the greater is the expected growth rate of earnings from the current level and the more certain investors are that a given stream of earnings will be realized.[7]

As shown in Chart II, earnings on farm production assets and the value of these assets generally trended upward together in the 1950s and 1960s. Fluctuations in the P/E ratio occurred, but the price of farm assets averaged 26 times earnings from 1950 to 1971. The P/E ratio fell sharply in 1972 and 1973, but has risen significantly since then.

These recent movements in the P/E ratio reflect the unusual pattern of earnings in this period. The sharp rise in earnings in 1972 and 1973 was not immediately and completely incorporated into future expectations. Thus the P/E ratio fell to an abnormally low level when compared with historical values. Earnings subsequently began falling and the P/E ratio began rising. Instead of reestablishing a value at around the average ratio of the 1950s and 1960s, however, the ratio has continued to rise and by 1977 the value of farm assets was estimated to be 31 times current earnings, well above the average ratio of the 1950s and 1960s.

One interpretation of this most recent rise in the P/E ratio is that investors revised upward their expectations concerning long-run prospects for future earnings on farm assets following the surge in earnings in 1972 and 1973. An acceleration in real estate prices would accompany such an upward revision in earnings as these expectations are capitalized into current land prices. In this case, the recent shortfall in farm earnings would appear to reflect an investor view that such low earnings were a temporary phenomena.

The fact that farmland prices relative to other prices have grown at an accelerated rate beginning in 1972 strongly suggests that investors' expectations of earnings, indeed, have increased in real terms. Because of higher earnings expectations, investors have bid up the price of farmland. This has meant substantial wealth gains to landowners, but the rate of return to new farmland owners depends upon the correctness of these expectations of higher earnings which have been incorporated into land values. Should these expectations be revised downward in the market, thus leading to a general decline in farmland values, new owners will either have to sell their land at a loss or continue to farm the land at a lower rate of return than was anticipated when they made their original investment.

Cash flow problems can develop when asset values are bid up considerably above that level which is consistent with *current* earnings. When purchases are heavily financed, as is usually the case for most farmland purchases, large interest payments, as well as other fixed costs, must be covered by current earnings, unless other sources of income are available. Farmers who borrowed heavily to purchase land or who have borrowed on the increased market value of their land and who do not have other sources of income will experience financial trouble when realized earnings are considerably below the level anticipated at the time of purchase.

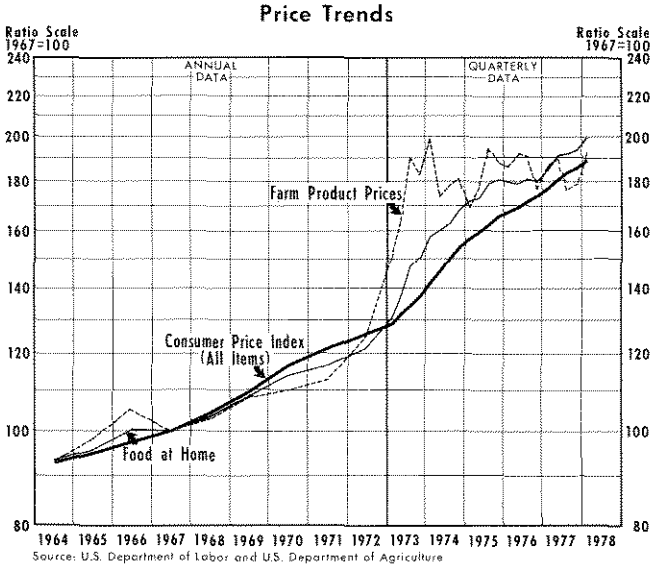
The higher expectations for farm earnings reflected in the recent upsurge in land prices may be traced back to the 1972-73 period when farm commodity prices and farm asset earnings rose dramatically. The sharp rise in earnings in this period reflected changed supply and demand conditions for agricultural products. Unexpected sales of wheat and feed grains to the Soviet Union in mid-1972 served to reduce domes-

[7] The greater the degree of certainty the less is the return required to compensate for risk. The investors' perception of risk may be based, for example, on the variability of earnings.

To compare P/E ratios among alternative investments, the useful life of the investment must be similar since assets with a longer life span will have higher P/E ratios than shorter-lived investments.

tic stocks and increase prices. A sharp decline in the production of Peruvian fish meal led to a shortfall in world protein supplies and an unanticipated increase in export demand for soybean meal. The unexpected decline in world crop production in 1972 and a realignment of world currencies led to large increases in export demand for U.S. crops. U.S. farm exports rose from about 15 percent of farm commodity sales in 1971 to 25 percent in 1975. In addition to sharply increasing export demand, domestic demand for food in the early 1970s was boosted by increases in government food assistance programs such as the food stamp program. Also, a number of factors adversely affected U.S. agricultural production in the early 1970s, such as wage-price controls, environmental regulations, sharp increases in energy prices, and a drought-induced shortfall in U.S. crop production in 1974.

Chart III
Price Trends



Source: U.S. Department of Labor and U.S. Department of Agriculture

All of these factors contributed to a sudden, large increase in agricultural earnings. Most of the factors behind this bulge in earnings were temporary as is indicated by the decline in earnings and farm commodity prices in recent years. As shown in Chart III, farm commodity prices rose much faster than consumer prices from 1971 to 1973, but have since come back in line with the general price level in the economy. World grain production, aided by more favorable weather, has increased 14 percent since 1972-73, and oilseed and meal production across the world has risen 38 percent. U.S. crop production also snapped back from the 1974 disaster as weather conditions normalized. In addition, funding for domestic food assistance programs has levelled off and many of the factors, such as mandatory wage-price controls, which had disruptive effects on agricultural production in the early 1970s have disappeared in recent years.

If the bulge in earnings in the early 1970s was mostly temporary, then current earnings may not be too far out of line with longer-run supply and demand forces. To the extent this bulge was the basis for the upward revision in investors' expectations about farmland earnings, then farm assets, and farmland in particular, have become overvalued on the basis of fundamental supply and demand conditions in the market for agricultural products.[8]

Implications

The farmers' strike movement has brought considerable attention to the current "low" earnings in agriculture. One might infer from this movement that U.S. agriculture is in trouble and is near widespread bankruptcy. However, the fundamental factors affecting U.S. agriculture appear relatively sound. The health of U.S. agriculture is heavily dependent on its ability to compete effectively in world markets. U.S. agriculture is very efficient and enjoys a comparative advantage in trade with most countries of the world.

While the long-run prospects appear sound for U.S. agriculture, "hard times" may be experienced by some farmers who possibly made incorrect decisions based, perhaps, on misinterpretation of the bulge in earnings in the early 1970s. Cash flow problems have already developed for some farmers. Should earnings not rise in accordance with the expected earnings now built into land values, then agricultural land values will decline. Continued "low" earnings, if maintained, would eventually prompt a change in expectations by investors since farmland must compete with other investments. If farmers and other investors in farmland begin to doubt the future prospects for earnings growth, they will lower their bid prices for farmland coming into the market or attempt to sell land in order to take advantage of higher-yielding investment opportunities elsewhere. Farmland values would then decline until the return on farmland has risen to a comparable level with returns on alternative investments.[9]

[8]Based on 1977 data, either a 20 percent rise in earnings or a 17 percent fall in the value of farm assets, or some combination, would be necessary to reestablish the average ratio between farm assets and earnings which prevailed in the period from 1950 to 1971.

[9]The rate of increase for nominal farm real estate values has shown a tendency to slow in the past year. From February

If land values do decline, owners of farmland will experience losses in wealth. For most, this would simply reduce some of the gains experienced as prices rose. But those farmers who bought at the higher prices of the past few years will realize a lower rate of return on their initial investment than they expected, and some who are highly leveraged may be forced to leave agriculture, and the rate of bankruptcy might increase for a time.

Yet, equity in agriculture is large. In fact, the ratio of farm real estate debt to the value of farm real estate has actually fallen in recent years, from about 14 percent in 1971 to about 11 percent in 1977. It would appear that most farmers would be able to weather some decline in land values without incurring bankruptcy. In recent years over one-half of all farmland transfers have been to existing owner-operators of farms, where equity is often substantial in existing acreages, so cash flow problems are not as severe for these farmers.

In the final analysis, the health of the agricultural industry reflects its efficiency in producing food and fiber products and the level of demand for these products. While investors' expectations determine the value of farm real estate as well as other investments, these expectations cannot stay out of line with the fundamental supply and demand conditions for these investments for very long.

1977 to February 1978, the average price of farmland rose about 9 percent compared with a 16.5 percent increase per year in the previous five years.