Farm Real Estate Values

By Marvin Duncan

INTRODUCTION

While the combined ravages of inflation and recession cut heavily into the real and dollar values of most investment portfolios, farm real estate investments have performed particularly well in recent years. The rate of return on farm real estate (measured as combined income earnings and capital appreciation) has exceeded, by a substantial margin, the rates of return on common stock.[1] Since 1971, farm real estate values across the United States have doubled, while the prices of U.S. goods and services as measured by the GNP deflator—the broadest measure of U.S. price changes—have increased only 39.1 per cent (first quarter 1971—first quarter 1976). During this time, the Standard and Poor's Index of 500 stocks increased only 3.6 per cent (January 1971—January 1976).

Not since the mid-1960's has there been as much interest in changes in the value of farm real estate. Nonfarm and farm investors alike are actively interested in farm and ranch investment opportunities. The index of farm real estate value per acre has not declined, on an annual basis, since 1954 (Chart 1) and holders of farm real estate recently have seen their net worth position soar. This has enabled farm families to enlarge their farms and make capital purchases, but it has also created substantial estate planning problems for those owners. Additionally, higher land values present a serious barrier to those attempting to begin farming or ranching.

A better understanding of how farmland price values are derived can aid present owners and potential investors in making sound investment and business management decisions. Credit institutions face increased risk as both the total real estate loan size and loan per acre reach unprecedented levels. Information about the basis and duration of the current trend in farm real estate values and the probable future directions of factors affecting these values are of great importance to agricultural procedures, investors, and lending institutions.

A SOCIOECONOMIC PERSPECTIVE

Widespread ownership of farm and ranchland has been a U.S. Government policy since the founding of the Republic.[2] By 1800, land in the Ohio country was being distributed under a system of federal land credit and sold in tracts as small as 320 acres. Subsequent

[1] Based upon the Standard and Poor's Composite Index.

[2] Philip M. Raup, "Societal Goals in Farm Size," *Size, Structure, and Future of Farms* (Ames, Iowa: CARD, Iowa State University, 1972), pp. 1-8.

legislation provided for smaller minimum tract size and preferential treatment for squatters in the sale of public land. The Homestead Act of 1862, and its later modifications, made vast areas of the U.S. heartland available for settlement to those who otherwise would have been unable to own land.[3]

This policy proved attractive to U.S. citizens and to immigrants. Thus, while personal freedom motivated immigrants, the availability of inexpensive land was a strong attraction for both. Out of this background, then, it should not be surprising that American farmers and ranchers have clung tenaciously to their property during periods when the returns to their labor and management, as well as income returns attributable to land, ranged substantially below those offered by other investment opportunities.

Consumption Outputs of Land

The farm or ranch is a multi-product firm—producing not only products to be sold, but also a stream of tangible and intangible benefits. In an implicit—and usually subconscious–discounting process, the discounted value of the stream of these benefits is equated with the discounted value of the stream of income foregone as a result of continuing in farming or ranching.

Smith and Martin have suggested that cattle ranchers may not be profit maximizers.[4] Once a certain level of monetary income has been achieved, the rancher is satisfied to forego additional income, preferring to continue his ranch enterprise as a home and way of life. These researchers were able—with 73 per cent accuracy—to categorize ranchers into those who would consider selling their ranches and those who would not, based only on attitudes toward landownership and ranch life. The strength of ranchers' attitudes toward land was the key to understanding why most ranchers did not act as "economic men."

How does one account for attitudes toward the land and rural values in predictive and explanatory models of farm real estate values? The answer is that they are implicitly taken into account by generally assuming that such values explain part of farm real estate demand. The extremely difficult empirical questions related to quantifying such values are usually not confronted; instead they are usually assumed to explain a constant proportion of demand.

Short-Term Resource Fixity – Long-Term Returns

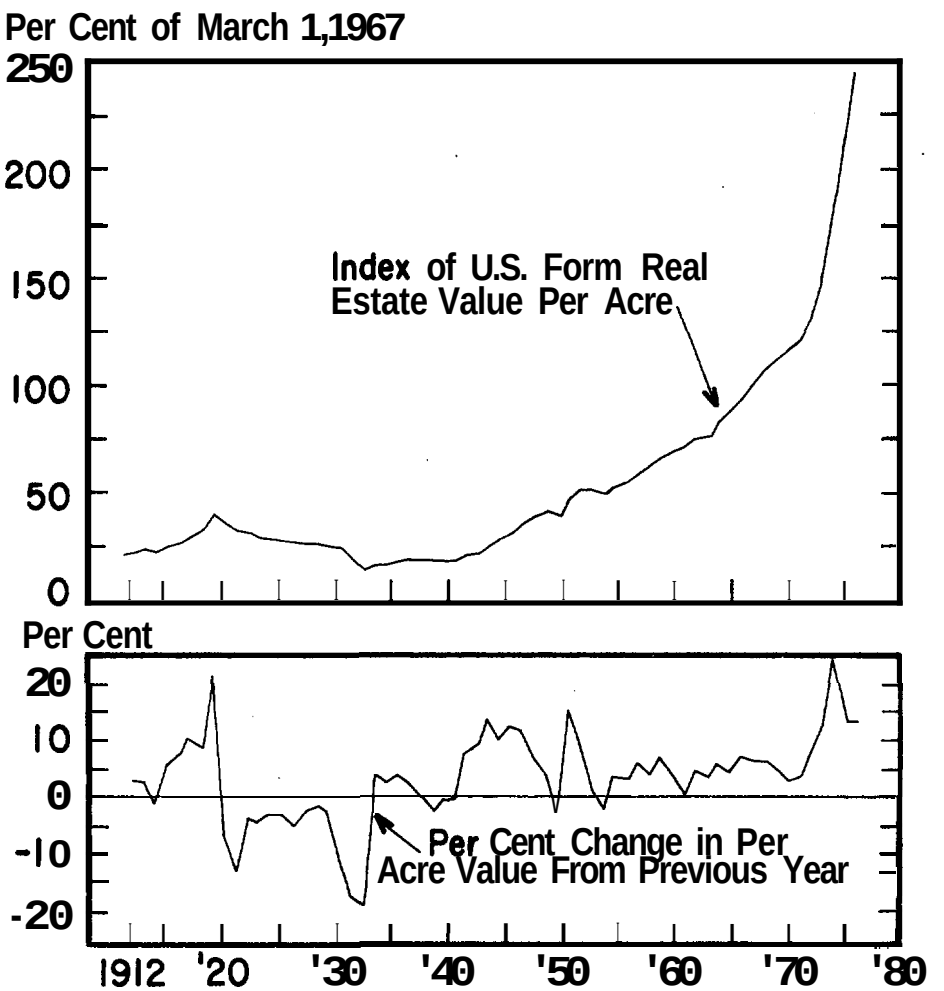
Farmers and ranchers may continue to accept below-normal returns to labor and management for reasons other than their attitudes toward the land and rural values. Resource fixity may be an answer in the short term. Capital investment and equipment and livestock needed to operate a farm or ranch is specialized and thus has a low use value in an alternative business. Despite what may be inadequate returns in agriculture, disinvesting and entering another occupation may result in even lower net returns—when capital losses from disinvestment are considered. Thus, until the salvage or resale value of the equipment and livestock equals or exceeds its use value in agriculture, the resources are effectively locked into that use.

A long-term answer can be found in the calculation of net returns in agriculture. Characteristically, the total net return to the farm operator represents what is left after deducting farm operating expenses and adjusting for net changes in farm inventories. This net return frequently is too low to justify continuing the operation. However, farmers and ranchers typically build substantial net worths over time. When these wealth benefits are taken into account, an entirely different

3 Murray R. Benedict, *Farm Policies in the United States. 1790-1950* (New York: Twentieth Century Fund, 1953).

4 Arthur H. Smith and William E. Martin, "Socioeconomic Behavior of Cattle Ranchers, with Implications for Rural Community Development in the West," *American Journal of Agricultural Economics,* Vol. 54, No. 2 (May 1972), pp. 217-25.

Chart 1
U.S. FARM WEAL ESTATE VALUES



SOURCE: U.S. Department of Agriculture.
NOTE: Excludes Alaska and Hawaii. Data unavailable prior to 1912.

income picture emerges. If these net worths were used to purchase annuities with annual payments over the family units' expected lifetimes, and the annual annuity payments were added to net income, the sum would be large enough to result in a rational choice to continue farming or ranching. A study of wheat farmers' net returns during 1967-71 calculated — for full owner-operators in the Central Plains — an annual income of $5,385.[5] But, when a $22,200 annual annuity payment (or wealth component) was added, the $27,585 annual income probably equaled or exceeded that available in other occupations.

[5] P. Weisgerber, "The Impact of Wealth Benefits on Farm Returns in the Wheat Area," *Agricultural Finance Review*, Vol. 34 (July 1973), pp. 31-34.

LAND MARKET CHARACTERISTICS

Agriculture is often characterized as the best current example of a perfectly competitive industry. But it does not follow that all submarkets within that industry are competitive. The land market, though embodying some characteristics of a perfectly competitive market, lacks others. Although two tracts of Mississippi River bottomland may be physically indistinguishable, they are both far different in physical characteristics and productive capacity from grassland in the Kansas Flint Hills. Even within a community, tracts of similar soil type and productive capacity may be viewed as different because of location—proximity to a market road or town, for example. Thus, the competitive market requirement of homogeneous good may not hold true even within a small area.

The competitive market requirements of many producers (sellers) and an inability of the individual producer (seller) to affect product supply—and thus market prices—are valid for land only at a broad, national market level. Within a community, however, there are typically few sellers and presently many potential buyers. Although the quantity of land offered for sale at a given time may vary according to market conditions, it typically represents a relatively small proportion of the total land within a defined area. Thus, even one additional tract offered for sale may significantly affect the current supply of saleable land—and possibly the price—in that area.

Finally, the competitive assumption of perfect knowledge by both buyers and sellers in the marketplace is typically not true in the case of land. The typical land buyer does not have full and complete knowledge of the characteristics contributing to the value of all tracts of land nationally, or even within a small market area. Land buyers and sellers typically enter the market only occasionally, and despite the use of real estate brokers, have a limited knowledge of the market. It is still true that most land is sold in small, localized markets where the assumptions of perfect competition are violated. It follows, then, that the price of the land may, or may not, equal its value as determined by the discounted sum of its future earnings. Occasionally, land sells for less, but in the recent past it may more often have sold for more.

FUTURE INCOME DETERMINES LAND VALUE

Over any reasonable planning horizon land must derive its value from its earning capacity. The value—and a reasonable price for land—must equal the sum of the discounted future returns to land (the capitalized value of land). These future returns flow not only from products grown on the land. They also come from mineral or oil extraction, capital appreciation of land resulting from higher expected earnings or inflation, shifts of land to higher uses such as urban development, and the impact of tax legislation on landowners. Differences of opinion exist as to the exact derivation of the returns to be discounted, however. Generally, production and management costs, as well as a reasonable charge for family labor, are deducted from the gross receipts per acre. The remaining, or residual, receipts are attributed to the land and become the value to be discounted. However, the prices of management services and family labor can vary according to basic assumptions about their value. Another measure of the return to land is the prevailing cash rent (net of any production costs) commanded by the type of land in question. The available data indicate that, though cash rents have been increasing in the past few years, the ratio of rent to value has declined in most sections of the country, an indication that land values have risen faster than rents.

The capitalized value of any given tract of farm real estate can vary substantially, based on whether a prospective buyer assumes an

Table 1
DISCOUNTED PRESENT VALUES UNDER THREE ASSUMPTIONS AT THE END OF 20 YEARS

	Constant Return, Constant Land Value 5% Discount Rate	Increasing Return For First 4 Yrs. (20%/Yr.) Constant Return (50.00/Yr.) For Next 16 Yrs., Constant Land Value 5% Discount Rate	Increasing Return (6%/Yr.), Increasing Land Value (6%/Yr.) 5% Discount Rate	Constant Return, Increasing Land Value (6%/Yr.) 5% Discount Rate
Net Return				
First Year	$ 50.00	$ 53.00	$ 53.00	$ 50.00
20th Year	50.00	50.00	160.36	50.00
Cumulative Present Value Of Net Returns	623.11	725.86	1,106.43	623.11
Present Discounted Value Of Land Held 20 Years	376.89	376.89	1,208.74	1,208.74
Combined Discounted Present Values	1,000.00	1,102.75	2,315.17	1,831.85

SOURCE: William D. Crowley, "Actual Versus Apparent Rates of Return on Farmland Investment," **Agricultural Finance Review,** Vol. 35 (October 1974), p. 56.
NOTE: For the formulas used to derive the data in this table, see Technical Appendix at the end of this article.

increased rate of return to land will continue far into the future or whether it will be limited to a few years. An incorrect assumption about the duration of increases in returns to land can cause a buyer to pay more, or less, than actual returns would justify. The capitalization rate used also influences the estimated current value of real estate. Since the capitalization rate is subjective, one buyer might use the current interest rate on Federal Land Bank loans, viewing that as an opportunity cost. Another buyer might assume a lower opportunity cost and thus assign a higher capitalized value to the same price of property.

Simple discounting of future earnings has come into some disrepute as a means for determining market value of farm real estate. However, certain modifications in the discounting process can restore much of the usefulness. The technical appendix at the end of this article discusses a number of these modifications. Table 1 illustrates the impact on present discounted value of various assumptions about future returns to land and sale prices.[6] As a result, prospective buyers and sellers are able to determine ranges within which the actual value of farmland may fall.

STRUCTURAL CHARACTERISTICS OF AGRICULTURE

Different buyers assign substantially different values to the same farm real estate based on the assumptions they are willing to make about future returns to land, price trends, and capitalization rates. Assumptions aside, prospective buyers also can experience different net returns on property they presently operate. Herein lies a real dilemma for agriculture. Not only the residual return to land, but also most of the difference between gross returns and nonland production costs, tend to be

[6] For additional discussion on the use of modified capitalization formulas see William D. Crowley, "Actual Versus Apparent Rates of Return on Farmland Investment," *Agricultural Finance Review,* Vol. 35 (October 1974), pp. 52-58.

capitalized into the price of land. Consequently, land prices tend to adjust over time to a level at which the returns to land will equal the land cost for efficient sized farms and ranches.' But, land cost will likely exceed returns to land on farms and ranches below an efficient size.

The per unit cost of production for a farm operation may be reduced by moving to a size that incorporates both larger equipment and more acres of land. As a farmer increases the size of his operation from 320 acres to 480 acres, for example, a larger share of gross revenue could be available for allocation to land. Thus, in competition with a smaller farm, the farmer with an expanding operation could afford to pay a higher per acre price for the same land. The difference is determined by the net advantage in per unit cost of production the larger farm would hold over the smaller farm at the new scale of operation for each. Technological change in agriculture has made available equipment and techniques with the potential for reducing cost and increasing output. Thus, a farm employing the latest production technology will also, characteristically, enjoy a per unit of production cost advantage over the farmer employing an obsolescent production technology.

Some additional characteristics of competition in the agricultural industry create an upward bias in farm real estate values. Each farmer or rancher produces a homogeneous product, indistinguishable from others' products, and product prices are generally not affected by a single operator's production decision. Consequently, early innovators who adopt cost reducing technology (often increasing output) enjoy a competitive edge over other farm or ranch operators. Thus, there is an incentive for technological innovation, because the primary rewards are captured by the early innovators.

However, as the majority of producers adopt a new technology, total output may increase — resulting in a lower product price that may be only equal to the cost of production at the margin for the most efficient farmers. Thus, lower — rather than higher — land prices would be justified at an aggregate (industry) level. But, researchers have observed that land prices have generally advanced concurrently with technological advances. This theoretically unexpected outcome has generally been attributed to the impact of differential adoption rates of technology, government farm programs, and the interaction of government farm programs and technical advance.[8] The very strong export demand for U.S. farm products in recent years is probably an additional factor supporting land price increases. On balance, then, it is important to remember that the impact of technological innovation on land prices at the individual farm firm level may be quite different than that at the farm industry level.

Technological advances that reduce cost and increase output generally are available in large discrete units — a four-wheel drive tractor or an eight-row corn planter, for example. Purchasers of this technology frequently find they .are then able to substantially increase the size of their present operation without additional equipment purchases. When estimating the projected net returns to additional land purchased — the amount capitalized to determine maximum purchase price — characteristically, no charge for equipment amortization is made. Thus, since net returns to land are then substantially higher, it follows that established operators planning to expand by purchasing land are able to outbid prospective buyers who must spread all appropriate operating costs over the expansion acreage.

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7 For an excellent discussion of the policy implications see Luther Tweeten, *Foundations of Farm Policy* (Lincoln, Nebr.: University of Nebraska Press, 1970), pp. 178-82.

8 Walter E. Chryst, "Land Values and Agricultural Income: A Paradox?" *Journal of Farm Economics.* Vol. *47* (December 1965), pp. 1265-73.

Finally, not all farmers or ranchers produce at the least cost level for a given scale of operation. Differences in management skill, capital availability, weather, animal or plant disease, etc., can all result in higher per unit costs. Thus, among similar operations net returns to land can vary substantially. But, characteristically, land prices are determined by what the most efficient farmers or ranchers can afford to pay. Consequently, land is priced too high for all but the most efficient operator's.

CONCLUSION

Demand for farm real estate is a derived demand, generated by the demand for products produced on the land and future uses of the land. Consequently, farm real estate values differ between regions and over time, based on differences in product demand and land productivity as well as anticipated land use. However, substantial differences in perceived value also result from varying assumptions about the size and distribution of the future stream of annual returns from land, as well as from expected changes in land value. Additionally, attitudes of farmers and ranchers toward landownership provide support for land values, at any given level of net returns to land. Finally, technological innovation and economies of scale that reduce per unit costs of production provide a powerful upward bias—at a farm firm level—to farm real estate values. As a consequence, different prospective purchasers may compute substantially different capitalized values for a given tract of land offered for sale.

TECHNICAL APPENDIX

The formula used to compute the present value of a stream of future income is:

$$(1)\quad V = \frac{A_1}{(1+r)^1} + \frac{A_2}{(1+r)^2} + \ldots + \frac{A_n}{(1+r)^n},$$

where V = present value
A = net return to land
r = interest rate used to discount future earnings
n = number of years over which returns are discounted.

When it can be assumed that the net returns to land remain constant over time, that the discounted rate does not change, and that a very long investment period is considered, the formula reduces to the familiar:

$$(2)\quad V = \frac{A}{r}.$$

Though equation (2) is the more common formula, it is clearly not the appropriate one when net returns and land prices are changing. If a once and for all change occurs and returns are expected to continue at that new level in the future, the value of A can be adjusted to reflect this expectation. If, however, the value of A is expected to increase at a constant arithmetic rate. the formula becomes:

$$(3)\quad V = \frac{A}{r} + \frac{I}{r^2},$$

where I is the average expected annual increment of increased returns to land and A is the present average net return to land. It may, however, be more realistic to expect either an increase or decrease in the returns to land to continue for a specified number of years into the future. In that event, the formula becomes:

$$(4)\quad V = \frac{A}{r} + \frac{I_1}{(1+r)^1} + \frac{I_2}{(1+r)^2} + \ldots + \frac{I_n}{(1+r)^n},$$

Here, I assumes a specific value for each year in question ($I_1, \ldots I_n$).

The capitalization formula could be further modified to account for an increase or decrease in the future value of the property itself, in the event the buyer intended to resell after a

specified time period. The general form of the discounting formula

$$(5) \quad V = \sum_{t=1}^{n} \frac{A_t}{(1+r)^t} + \frac{V_{o+n}}{(1+r)^n}$$

can be modified. If the net rent is expected to change by S per cent each year, the A_t term can be replaced by $A_o\ (1+S)_t$ where A_o is the net rent at the beginning of year 1. Rents are assumed to be received at the end of the year. If the property value is increasing at a constant annual rate U, the term V_o can be replaced by $V_o\ (1+U)^n$, where n is the number of years the property is held.