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August 1959

# **THE FARM REAL ESTATE MARKET**

*---Proceedings of a Seminar  
July 23, 1959, University of Minnesota*

**Sponsored by  
North Central Land Tenure Research Committee  
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## INTRODUCTION

This is a proceedings report of a seminar held at the University of Minnesota, July 23, 1959 by the Subcommittee on Land Prices and Credit of the North Central Land Tenure Research Committee.

The purpose of the seminar was to focus attention on major aspects of farm real estate markets as an aid in determining future activities of the Subcommittee.

Farm real estate markets often appear as incapable of being well organized and pricing may appear haphazard or indeterminable. What is the demand and what is the supply of land? How does price affect the quantity offered or taken? What is land? Is land non-reproducible or indestructible? How well does the farm real estate market function? What affects the price of land? What is the relationship between earnings and value of land? These and other questions were examined in papers and discussions as shown in the table of contents.

Following the seminar the Subcommittee listed several areas of research and agreed to outline two projects: (1) effects of controls over supply of land (Soil Bank) on the farm real estate market, and (2) effects of farm enlargement on the farm real estate market.

Attendance included those presenting papers, their discussants, and Jerome Johnson and Walter Baumgartner, University of Minnesota.

SUPPLY AND DEMAND ASPECTS OF THE  
FARM REAL ESTATE MARKET

William H. Scofield, Head, Farm Real Estate Values Section  
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If the term "market" has the same general meaning when applied to land as when applied to other goods, it also is logical to view prices as resulting from the interaction of supply and demand forces. A supply schedule for land would reflect the quantities that would be offered, and the demand schedule the quantities that would be taken, at each of several prices. Knowledge of the shape, slope, and relevant ranges of such supply and demand curves would then be helpful in explaining and predicting the level and movement of market prices for land. Conversely, if such conventional concepts are not applicable to land, other analytical models will be necessary to explain the pricing process. Thus, the purpose of this paper is to examine the supply and demand aspects of the land market and to evaluate the relevance of such concepts when applied to land.

It is not only conventional, but almost mandatory in view of the usual difficulties of communication, to dispose of a few definitions before proceeding.

- (1) The term "land" will mean farm real estate, or the bundle of property that is normally conveyed as a unit in a market transaction. One could make the distinction between bare land and land with improvements, but this does not appear to be necessary for the current discussion.
- (2) The terms "supply" and "demand" will be used in an aggregate sense, rather than with respect to an individual seller or buyer.

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<sup>1/</sup> The opinions expressed in this paper are those of the author and do not necessarily represent those of the Farm Economics Division, ARS, or the United States Department of Agriculture.

(3) "Supply" will mean market supply, or the total amount of land offered for sale within a given time period. Although there are time lags between first offerings and actual sale that result in a "stock" of land on the market at any given time, supply will be considered as synonymous with demand for the time periods under consideration. One could, of course, explore the differences between total supply and market supply, and potential or latent demand and effective demand, but these areas are beyond the scope of the present discussion.

I would first like to raise the general question as to whether the supply of, and demand for, any non-reproducible capital good can be responsive to price. The market price of a stock, or of land, is determined primarily on the basis of expected future earnings. If both present owner and potential buyer hold the same value judgement with respect to earnings and have the same discount rate, a change in either factor will have no effect on the quantities offered or the quantities sought. There could still be transfers of such assets, but the number of transfers would not necessarily be related to price. To illustrate, assume two points in time:

	Time Period A	Time Period B
Net earnings-----	\$ 10	\$ 20
Capitalization rate--	5%	5%
Capital value-----	\$200	\$400

Although prices have doubled, there is no reason to expect more land to be offered, or any change in demand. Land at \$400 is just as attractive, both to owners and to potential buyers, as when it was priced at \$200.

Although admittedly this is an abstract situation, I think it indicates that any semblance of a supply and demand schedule for land must arise from differences between owners and prospective buyers with respect to income expectations and/or their capitalization rates. Also, there are often factors that are unique to, or bear more heavily upon, either the supply or demand side of the market. If

prices offered by potential buyers appear to be "high" to potential sellers in relation to their expectation of earnings, then more land may be offered. But if buyers' expectations are later accepted by sellers, then the number of offerings would again decline.

If supply and demand for land depend primarily upon future earnings (broadly defined) and not price, then we need to extend our thinking into the whole area of alternative investments. Even though there are a number of rigidities in the capital market that inhibit the free flow of funds, and several features of land that make it a unique form of capital, common stock appears to be the most nearly comparable investment to land. A surprisingly close agreement can be observed in the trend of the apparent capitalization rate of expected earnings from both stocks and land. At least one type of prospective buyer - the investor - undoubtedly does make comparisons of the rates of return from alternative investments. There also are other economic forces which prevent earnings-price ratios for land and for stocks from becoming greatly dissimilar.

#### Two Components of the Supply Stream

Because most of our land market research in this country has been concerned with bona fide transfers, we know relatively little about the sizeable volume of transfers that occur as a result of inheritance, gifts, and intrafamily sales. Yet this submarket represents a part of the total market supply of land, and interactions occur between the submarket and the open-market supply of land. Prices established in the open-market are often taken as the basis for "fair market value" for transfers in the submarket. Conversely, the supply of land subject to competitive pricing will be reduced if the volume of submarket transactions becomes large.

Present tax and inheritance laws and increasing capital requirements in agriculture appear to favor an increasing volume of submarket transactions and

a shrinking volume of those in the open-market. Although the land market in this country still does not approach that found in Italy and described by Medici in his book, Principles of Appraisal, I think the following passage is of considerable interest.<sup>2/</sup>

"Land for sale does not appear on the market until one or more of (the following) events occurs: economic convulsions, as in the post-war years, the ruin of a peasant family due to idleness, or in the case of gentry, gambling, bad behaviour or slow exhaustion and financial difficulties long disguised by the creation of debt. Apart from such circumstances, the axiom governing the normal economic conduct of a landowner is that land is not for sale. This is not an economic axiom; it is born of instinct and is incomprehensible to the townsman. Those in whom that instinct works buy, but do not sell. To sell is an illicit, immoral act, which their moral code forbids."

#### Factors Affecting Market Supply

What is the nature of metering mechanism and the factors that regulate the amount of land entering the market? If these appear to be price-responsive, then a supply schedule may exist for land. If they are not, then the concept of a supply schedule will be meaningless. I can see possible four jets in the supply flow, each of which discharges a small amount of land on the market each year.

- (1) Death of owners, and the propensity, or necessity, of heirs to convert the estate into cash. Currently, a fifth to a fourth of all land coming on the open-market is from this source. There is a little evidence, but not much, that the rate of estate settlements may be delayed by low prices for land and speeded up when land can be sold readily at a favorable price. More important, however, is that this source of

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<sup>2/</sup> Principles of Appraisal, Medici Giuseppe, page 183. See also the description of the land market, beginning on page 175.



market supply of land remains fairly constant, and in certain periods provides a substantial proportion of all parcels of land offered for sale.

- (2) Locational and occupational mobility of land owners. Liquidation of farm businesses has occurred at an unprecedented rate in the last 10 years because of job opportunities off the farm. The fact that land prices were rising and capital could be withdrawn from land, seldom at a loss and usually at a profit, certainly did not dampen this disinvestment process. But it seems unlikely that many owners sold simply because they could realize a substantial profit, and then sought other employment and reinvested their capital. The sequence of events indicates that higher land prices are not the primary cause of this land's coming on the market.
- (3) Financial pressures arising from family or personal circumstances of land owners, such as sickness, physical disability, poor management or weather and disease disasters. Decisions to sell under such pressures are seldom related to price except as low returns to agriculture accentuate such personal factors.

Generalizing from the above four components of market supply, the evidence seems to indicate a generally inelastic supply of land. Although higher prices may, under certain conditions, bring forth some increase in offerings, the effects are likely to be so transitory as to contribute little to the long-term trends in the land market.

#### Supply Aspects of Land for Nonfarm Uses

If we shift our attention to factors that regulate the movement of land into nonagricultural uses, the hypothesis that some sort of metering mechanism is operating seems to have even greater validity. At any point in time, the

potential supply of land that could be used for nonagricultural purposes is very large in relation to the rate at which it is needed. Yet wide spreads in market prices for the two major uses are maintained, and they usually widen with the passage of time. Why does not the amount of land offered for nonfarm uses increase sufficiently to narrow or close the gap? If land were a good that had the usual supply-response characteristics, it should be apparent in this kind of a market. Yet we are all familiar with the leap-frog development of subdivisions and of new commercial and industrial locations beyond the growing edge of the city. It is often a common complaint of builders that they cannot obtain the amount and kind of land they need for large-scale projects.

One possible explanation of this seeming paradox is that the supply of land with the particular attributes desired for each of several nonfarm uses is so limited that choice land can command the premium, and that gradually, less and less desirable land will be used. The price ratios between land for agricultural purposes, and for each higher nonfarm use become established by the intersection of conventional supply and demand curves. Although this may be a plausible explanation, it does not seem wholly adequate to explain the rate and direction of growth of most suburban areas.

I believe a more valid explanation can be found in the general area of expectations of land owners, and their capital positions and liquidity preferences. Because use determines price of nonagricultural lands, present owners tend to formulate expectations as to the highest possible use, and to estimate the length of time necessary to realize each use. Their decision as to when to offer land depends upon a subjective judgement with respect to these points, as well as their ability to wait. The level of real estate taxes, their dependence upon the land for current income, and their position with respect to capital gains taxes are relevant in determining the rate at which land passes to nonfarm uses.

Although technology has increased the effective supply of land for production purposes, there are few, if any, similar developments that reduce our needs for land as space. In fact, the growth of suburbia and the efficient design of factories and commercial developments seem to increase the amount of land needed per capita. Gaffney in his Yearbook article points up the paradox of the rapid rate of speculative purchase and holding of land for nonfarm uses at the same time that much land in urban and fringe areas remain unused.<sup>3/</sup> It seems possible that market forces may have over-estimated the amount of land that will be needed for future growth -- we may already have enough set aside to serve the needs likely to arise for an extended period in the future.

The wide acceptance of the expectation of continued economic growth, supported by the experience of the past decade and further strengthened as national policy, has implications on both the supply and the demand side of the land market. People became aware of, and made decisions with respect to pricing and purchase of land in the World War I land boom on the basis of this strategic importance of a fixed land area in an expanding economy. The events of the succeeding decades seemed to disprove the principle that had been observed for centuries. The expectation of a secular rise in land prices again emerged in the 1940's and seems now to help explain what otherwise may be considered as "uneconomic" behavior in the current land market.

The popular concept of the effects of a growing population on land prices is primarily based on considerations of land area, rather than of land as a productive factor. People who have never heard of Malthus still act as if a land shortage is inevitable; they have not made the necessary allowances for

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<sup>3/</sup> Mason Gaffney, "Urban Expansion - Will It Ever Stop?" Land-The 1958 Yearbook of Agriculture, (Washington: U.S. Government Printing Office, 1958), pp. 503-522.

technological advances, both on the farm and in industry. Gains in farm output have been well documented, and projected food and fiber needs to 1975 and even later offer scant support for the belief in a coming land shortage.<sup>4/</sup> But even more important to the long-run supply and demand situation for land could be one or more major technological break-throughs in the industrial production of food or animal feeds. Industry is already "nibbling at the edges" with growth stimulants and synthetic fibers, antibiotics and a host of other developments. Could we reach a point where choice Corn Belt land had to compete with an industrial process that produced livestock feed at lower cost? Our present concern that agriculture already has some of the characteristics of a declining industry would be further strengthened.

#### Elements in the Demand for Land

Because both the supply of, and the demand for land have the common origin of capital value of a productive resource, the differences between the two are mainly a matter of the weights given to the various components of value in the subjective judgements of people. We could classify the types of people who make up the aggregate demand for land, and then impute to each a set of motives and value judgements. Or we could list the various elements of demand that become expressed as value and delineate the particular market sectors where each factor appears to be dominate. I prefer the latter approach.

If we defined income from land broadly enough, and could quantify each element, the conventional capitalization formula would serve its intended purpose. But the values people attach to the amenities of owning land, such as prestige,

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<sup>4/</sup> Carl P. Heisig, "Long-term Adjustments in Composition of Farm Production and in Production Inputs;" also, Glen T. Barton, "Trends in Agricultural Productivity." Statements appearing in Hearings Before the Subcommittee on Agricultural Policy of the Joint Economic Committee, Congress of the United States, December 16-20, 1957.

recreation, and the satisfaction of possessing a tangible good, are wholly subjective. Although they are a part of the income flow, they cannot be measured. We even have difficulty determining the income contributed by land in the production process, and have little more than past earnings as a guide to future earnings.

The demand for land as an investment, although primarily based on the income to be derived from production, is also based on several intangible elements such as durability, tax advantages, speculative gain, and opportunities for diversification. Income to be expected from alternative investments, after allowing for the special characteristics of land, is also a relevant part of this demand sector.

The demand for land by established farmers seeking to expand their operations also is strongly income-based, but several special problems of estimating net returns are involved. In general, this type of demand rests upon marginal pricing, which can be even more subjective than the valuation of a complete farm unit. Questions as to the particular expenses for labor, machinery, and depreciation to be charged to the added parcel are involved. With two-fifths of all transfers in the nation now being made for farm enlargement, this sector of the market must be recognized as an important part of total demand. Further research is needed to determine the valuation procedures followed by such buyers and the manner in which the general level of land prices in an area is affected.

The desire to possess or acquire land as a means of protecting capital against loss of purchasing power during inflation has become so firmly entrenched that it deserves special attention in any evaluation of the supply and demand facets of the farm real estate market. Although there is ample historical evidence to support the belief that land has such qualities, the belief rests upon the expectation that all sectors of the economy, including agriculture, will share in the inflationary trend. The fact that the opposite has been true in

most years since 1951 seems to have been largely discounted or ignored. Yet for the longer term, prices of agricultural products must advance more than production costs (excluding the land input) if net returns to land are to support the inflationary increase in land prices. Although such price behavior is a reasonable expectation in wartime, there is little basis for expecting such price relationships during a period of creeping inflation and rapid advances in agricultural technology.

#### Summary

To a greater extent than for other capital goods, the supply of and demand for land are responsive to the same set of economic forces, which are evaluated and interpreted by individuals who have the same motives for ownership. Those who own land and make decisions to retain or sell have the same interests as do those who constitute the demand for land. Both groups seek constantly to estimate the total of benefits to be derived from ownership, and to convert these benefits to a capital value.

Decisions to sell arise primarily from necessity (death, inability to maximize returns, etc.), knowledge of our preference for other goods that promise equal or greater returns, or expectations of lower future returns and benefits than are expected by potential buyers. Decisions to buy reflect estimates of future returns greater than those estimated by sellers, a lower capitalization rate, or the necessity to acquire land in order to maximize returns from other capital they already possess or control.

The several unique characteristics of land, particularly the fact that it is not reproducible, appear largely to negate conventional supply and demand concepts for explaining the level or trend in market prices. Rather, we should continue to focus attention on defining and measuring the total benefits to be derived from ownership of land, and the process by which people convert such

returns to capital value. More attention needs to be given to the components of total returns other than those derived from agricultural production and the complex subjective value judgements, beliefs, and preferences of the individuals who collectively constitute the farm real estate market.

DISCUSSION:

SUPPLY AND DEMAND ASPECTS OF THE  
FARM REAL ESTATE MARKET

William Wayt  
Ohio State University

I would first like to commend the author for a stimulating and thought provoking paper. Although I am in general agreement with many of the ideas expressed, I would like to differ and enlarge on a few points.

Insofar as he has chosen to define "land" as being synonymous with "farm real estate," then it does not follow that this is a non-reproducible item--since additions of capital can change the "economic" supply of real estate, although the physical supply of the natural element remains constant. Drainage, terracing, irrigation, highway development, etc., all can add to the economic supply of land in response to higher prices. The length of time period involved becomes extremely important.

Following this thought, I particularly liked the analogy he had drawn with the common stock market as being comparable to real estate market price behavior. The total supply of common stocks also changes over time according to the relative attractiveness of equity financing of business ventures as compared with bonds, internal financing, or other alternatives.

The author's analysis serves to emphasize differences in the productive abilities and expectations of owners and prospective owners, or differences in their time discount rates as being important elements in the exchanges in the real estate market. These are, I believe, sufficient to give some slope to both supply and demand curves in response to prices. I am in agreement with his analysis of the composition of the seller group being such as to imply a highly inelastic supply curve.

With reference to the conversion of farm real estate to nonfarm uses, I would certainly welcome research studies in behavior of fringe area markets.



The expectations of rural residents, part-time farmers, and full-time farmers are probably different for the same piece of real estate--especially if the latter already has a home and buildings to service his expanded area of land, while the other potential buyers view the farm real estate as a desirable substitute for an urban-residence. I am sure you are all aware that the "fringe" subject to farm-urban competition has been extending rapidly but in irregular shape for considerable distances into rural land areas.

I am in agreement with Mr. Scofield's thinking of the apparent increased interest in land and effects of a growing population being oriented more towards area than to a productive factor concept. I would not entirely discount the latter, however. To the extent productive agricultural land supply versus population needs is viewed in a world rather than a national setting, the increased awareness of the world land-food picture may serve to strengthen the U.S. land market.

Perhaps studies of buyers' expectations, rates of time discounts, and procedures by which they ultimately place a value on a piece of farm real estate would be a fruitful research area.



THE FUNCTIONING OF THE MARKET FOR FARM LAND

Loyd K. Fischer  
University of Nebraska

The objectives of this paper are (1) to define the term "market" in general and in reference to land, (2) to present the criterion by which the operations of a market might be appraised and (3) to survey briefly some aspects of the land market in terms of the manner in which it functions.

Why are we as land economists concerning ourselves with the market for farm land. If, as often suggested or implied, the land market conforms, or can at least be adapted to a general theoretical market model, then why are not the marketing people handling this problem? Economists have devised models for markets varying all the way from the perfectly competitive to the completely monopolized. Does not then the market for farm land fall somewhere in between these extremes? And, if the land market does fall between the perfect market and the monopoly-monopsony market, can it not be appraised by conventional market analysis?

We assume for the perfect market many transactions, involving many buyers and many sellers, mobility and homogeneity of the good and perfect knowledge on the part of buyers and sellers. Certainly the land market does not conform to these assumptions, but neither does the market for any other good. The perfect market is a theoretical concept, not attainable in the real world. But the failure of markets to achieve the perfection of the model has not prevented economists from making use of models to appraise the functioning of markets. Oftentimes the models have been modified to more nearly approximate the real world. For instance, as few, not many, buyers and/or sellers became the dominant characteristic of markets, a new model was constructed based on restricted competition.

The concept "market" has been variously defined. The broader definition of a market encompasses those productive activities which add space, time and form utility to economic goods. However, the term "market" when referring to land is much narrower. The land market is merely the mechanism by which individuals exchange property rights; land is not transformed nor is utility added during the process of marketing. This difference in the functions performed by the market is indicative of basic differences in appropriate analyses. The land market cannot be adequately described or analyzed on the basis of the purely competitive model, the pure monopoly model, or the restricted competitive model. The market for land is different, not in "degree" but in "kind", from the market for other goods.

Often mentioned as characteristics which differentiate land from other goods are its immobility and heterogeneity. However, urban residences are also immobile and used cars are hardly more homogeneous. Differences here are ones of degree only and could be accommodated. But a much more crucial difference is that land is neither produced nor consumed. In fact, land is not even possessed by the owners in the same sense that products are. Instead the owner of land possesses limited rights of use, occupancy and transferral of the resource which is basic. Land is basic in the sense that, with few exceptions non-land resources are productive only when combined with land. At the present time this limitation is particularly true in agriculture.

When an individual is denied access to some of the existing supply of land he is out of farming. When economists write about increasing the supply of land, they are referring, not to a change in land supply, but to land development and improvement activities. In other words, they are referring to the application of additional non-land inputs to land. Land which has not previously been used can be brought into use and land which is being used extensively can be used more intensively. The crucial point is that in general one must

control the rights to land, the basic resource, before he has a place to invest or employ non-land resources.

That land is fixed in physical supply has quite different connotations from the controlled supply of the product of the monopolistic or oligopolistic industry. We have in the United States a great many owners of land, i.e. prospective suppliers. Furthermore, a great many individuals are at any given time in the market for land at some price. Certainly, no one controls the supply of land. That the market flow of land is slow in any local market may detract from the knowledge of the market possessed by prospective buyers and sellers but does not indicate a controlled market or administered pricing. We have better knowledge of the "appropriate" price for automobiles only because bargaining is permitted within relatively narrow limits. If the demand for automobiles falls so low that they cannot be sold at a price which will recover costs, no more cars are built.

As contrasted with the market for automobiles the demand for, and price of, land can fall to any level and the physical quantity remains undisturbed. And because of this relative fixity of supply and the nature of land as the basic productive resource, the reaction of present owners and prospective buyers to changes in demand is quite different from the reaction of those in the market for goods which are produced and consumed. Of course, no two buyers or sellers approach the land market with quite the same motivation or resources. But one generalization can be stated with some certainty; most people who own or attempt to buy land do so because of the expectation of deriving benefits in the future. Such benefits can accrue from two sources (a) returns which accrue during ownership of the land in terms of income or services and (b) appreciation in value which is received when the property is sold.

After a transaction has occurred in the land market the new proprietor may or may not derive more satisfaction from the ownership of the land than would

the previous owner or some other prospective purchaser. Furthermore, the tract of land as a factor of production may or may not contribute more to social welfare under the new ownership. But the market for land cannot be appraised in these terms.

The primary function of a market is to facilitate the movement of scarce goods into the hands of the individuals with the strongest effective demand. The effective demand of any individual is determined by (1) his financial position, (2) his ability to acquire satisfaction from ownership and (3) the opportunity cost of resources which he would have to commit. If the goods being transferred is a factor of production in a freely competitive economy in which resources are optimally allocated the individual with the greatest effective demand will be the one whose ownership will result in the greatest net social gain. The optimum use is not necessarily the most intensive; in other words, it is not necessarily the use in which the quantity of non-land inputs would be greatest. The optimum intensity of use of land will be dependent upon the opportunity costs and the physical and monetary input-output relationships of the non-land inputs. But we have in our society a great many institutional arrangements, such as our inheritance laws, which make it somewhat coincidental if ability to efficiently utilize a resource and strong financial position reside in the same individual. Nor, in the United States, does a landowner have any legal obligation to produce efficiently or at all. The market for land must be appraised within the framework of the economy in which it operates, not in terms of some ideal framework which does not exist.

We have five types of buyers competing for agricultural land. In Nebraska the market appears to be dominated by active owner-operator farmers buying land to expand existing units. Secondly, some tenants are in the market for farms in the hopes of attaining owner-operatorship. A third group of buyers are the non-farm investors who normally intend to rent out the land either as parcels

or as entire farms. A fourth group of buyers are those who buy as sites for part-time farming or for rural residences. The final group is composed of public agencies and private individuals who intend to convert the land to non-farm use. The last two groups of buyers are likely to dominate the market near urban, and particularly industrial, centers.

Given these five classes of buyers of farm land, what conclusions can be drawn concerning the operation of the land market? Are the prospective buyers with the highest effective demand acquiring the land? A superficial examination of the land market in Nebraska would indicate that such was the case. One of the principal determinants of the level of effective demand for land is the intended intensity of use. As would be expected non-farm uses tend to prevail over farm uses wherever the two compete for land. And intensive farming generally prevails over a less intensive use where both are adapted.

As mentioned previously, active owner-operator farmers tend to dominate the market for farm land in Nebraska. They tend to have a high effective demand because of (1) their favorable financial position, particularly with reference to credit and (2) their ability to derive income from the land by more fully employing under employed and unemployed resources already under their control. Perhaps the farm land markets in Nebraska retain their local nature, not because of lack of knowledge by non-resident buyers, but instead because few of the non-farmer buyers have as high an effective demand.

In summary, the market for farm land is not amenable to analysis by conventional market models. The prospective buyers and sellers of land act and react in a manner which is basically different from the actions of buyers and sellers of goods which are produced and consumed.

DISCUSSION: THE FUNCTIONING OF THE MARKET FOR FARM LAND

Wilfred H. Pine  
Kansas State University

Fisches emphasizes that the effectiveness of the farm real estate market is determined by the extent to which land gets into the hands of those with the greatest effective demand. He says further that the attainment of the greatest net income from ownership depends on the "workings of the general economy but does not reflect directly on the operation of the land market." He does not make clear what he means by this statement. One might choose to conclude that if the general economy operated in a perfectly competitive manner, net incomes would be maximized. Even though perfectly competitive conditions do not exist, it seems safe to say that net income has some direct affect on the operation of land markets.

Fischer is correct in disagreeing with the view that the perfectly competitive model is too unrealistic for farm real estate. He points out that markets for all products are far from perfectly competitive. He does say that differences exist, but they are in "kind" and not in "degree". I would say differences are in degree and not in kind. Choice of words may be the problem.

An empirical test of resource markets would require the measurement of quantities of goods and services from similar resources transferred by different kinds of markets. This would be near impossible to do for farm real estate markets.

Scitovsky has described different types of markets or forms of trade going from isolated bargaining to various degrees of monopoly and to perfect competition.<sup>1/</sup> He says that resources are apt to be used most productively under

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<sup>1/</sup> Tibor Scitovsky, "The Market," Welfare and Competition, (Chicago, R.D. Irwin, 1951), ch. 2.



perfect competition.<sup>2/</sup> Consequently, an appraisal of farm real estate markets entails the determination of the conditions of perfect competition and the measurement of how far a specific market deviates from those conditions.

One appraisal of farm real estate markets would require (1) the determination of the number of buyers and sellers who are or can be brought into the market, (2) how well buyers and sellers are or can be informed of opportunities and qualities of real estate, and (3) how well real estate is or can be described and graded. Subsidiary functions such as financing would need to be examined.

Any study of a market would be made on the assumption that ways for improvement are being sought. Criteria are necessary for evaluating weaknesses in existing markets. A perfect market under any set of criteria can not be expected in practice. Improvement, however, may be possible.

The old problem of dual or triple definitions of words still plagues us. "Supply" and "demand" are two of the words, "Supply" often is used with reference to a quantity such as "supply of land is fixed." This could be interpreted as a vertical supply function or have reference to the total physical quantity of land. The expression "sloping supply curve" is used also.

Although not a major part of his paper, Fischer suggests that the supply curve for land may be backward sloping. I would raise the question of whether it is a new function and not the same function which may cause one to think of a backward sloping supply curve.

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<sup>2/</sup> Ibid., p. 19.



REFLECTION ON DECISION MAKING IN THE FARM LAND  
MARKET AND THE PROCESSES OF LAND VALUATION

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One of the phenomena distinguishing the land market from other commodity markets lies in the fact that at any one time there exists a wide range of obtainable prices for a given tract of land. This fact is reflected in the customary attitude of sellers, who traditionally set a price and wait for a buyer to accept it. There is relatively little higgling and bargaining about price, with more emphasis placed upon obtaining the "right" prospective buyer. In effect, this is a reflection of the fact that prospective buyers evaluate the land in question by different processes, and arrive at substantially different estimates of a maximum price that they will consider offering for the land.

It has been customary to regard these wide ranges of achievable prices as a reflection of the imperfection of the farm land market. It is taken as evidence, for example, that buyers and sellers have imperfect knowledge regarding the actual productive capacity of the land. It is also taken as evidence of the failure of our present land and soil classification procedures to describe a tract accurately and unambiguously, in terms understandable by all parties to the transaction. In a broader sense, this wide range of prices is also taken as evidence of the lack of economic sophistication on the part of buyers and sellers. If they understood the process of land valuation more adequately, it is argued, they would be capitalizing the "proper" net returns figure at the "correct" rate of interest and should arrive at value estimates falling within a much narrower range.

This traditional view of the farm land market, and of the reasons why price quotations in the market involve a relatively wide range rather than

an explicit price per unit or quantity carries the implication that all parties in the market are valuing the land in terms of a common agreement regarding its function, and within the framework of a generally agreed upon value system. This characterizes individuals who are actively "in" the market, as current buyers or sellers, as well as those whose potential for entering the market is limited by a self-imposed reservation price on their present property. The following comments are the result of an effort to re-examine the implications of our conventional attitudes toward farm land markets and their imperfection.

Mechanization in agriculture, as John Brewster<sup>1/</sup> has emphasized, permitted the continuation and strengthening of proprietary attitudes on the part of the laboring force, while in industry mechanization has forced a social change in attitudes toward one's occupation. Following this line of reasoning it might be argued that in agriculture the value systems of European peasant cultures could be transferred to the new world relatively intact, and with a greatly improved chance of fulfillment. E.g. the hope for land ownership, security, and a farm for one's sons could be fulfilled in the new world.

Thus the technological revolution and industrialization did not force on agriculture a revolution in social actions and goals. On the contrary, it has permitted the co-existence and development of peasant-European attitudes (perpetuated through ethnic groups and communities) with respect to land ownership, parallel with new world, commercial, farming-as-a-business attitudes toward land ownership.

As a consequence, widely differing attitudes and motive forces may govern the approach made by different prospective buyers to the question: What is

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<sup>1/</sup> John M. Brewster, "The Machine Process in Agriculture and Industry", Journal of Farm Economics, February 1950, pp. 69-81.

the value of this piece of land? The income, services, satisfactions or "utility" of the given parcel of land may vary quite widely among different prospective buyers, who may not even evaluate the land according to scales that fall within the same value system. That is to say, value systems pertinent to 18th or 19th century Europe may be reflected in the concept of value on which one buyer bases his bid for a parcel of land. His competitor for the land may be evaluating the land in accord with a value system orientated around the concepts, goals, and social structure of mid-20th century industrial America. In other terms, the utility scales on which two bidders are basing their offers for a tract of land are apt to be widely different, to the point of being non-comparable. This may help explain the comparatively wide and erratic range within which land prices can fluctuate, even assuming competition among informed and willing buyers, and an informed and willing seller.

At this point we might raise a question: Is land particularly different from other commodities in this regard? The tentative answer is: It may be. Conventionally, different valuations placed on a tract of land by alternative prospective buyers possessing equal information have been explained in terms of:

- a) The alternative uses to which they intend to put the land.
- b) The different capital position of the buyers.

Wide ranges in valuation have thus been attributed to the range in alternative uses or to the differences in command over capital on the part of prospective buyers. The reasoning pursued in this discussion would add a third explanatory consideration:

- c) The differences in utility scales underlying the valuations arrived at by competing buyers.

These differences among utility scales as applied to land may be much greater than among those applied to other goods or services because of the perpetuation in agriculture of pre-industrial and pre-commercial value systems

side by side with value systems characteristic of urban-industrial society. In short, the land market provides one of the major occasions for a confrontation between rural-peasant and urban-industrial cultural and value systems. Little wonder that the price range is so great.

These reflections can have relevance to the concept of the land "market", within which land values are presumed to be determined. For this purpose, a market might be defined as an area of communications within which potential buyers and sellers can reasonably be expected to come together for the purpose of exchanging a good or service whose utility is measured by both parties to the transaction in accord with a common scale of measurement. For the market to function properly it would follow that these scales of measurement should meet the following tests:

- a) They are sub-sets of a set of utility scales whose ordering is determined by the same over-all value system,
- b) they are capable of being expressed in money terms that can be related to objectively determinable characteristics of the good in question (length, weight, measure, quality), etc.

With these standards as guides, the degree of perfection of the market might then be measured with regard to:

- a) The extent to which the utility scales of buyers and sellers are based on the same value systems.
- b) The extent to which the good or service lends itself to classification and description by objective standards that are independent of the value system.

The boundaries of the market might be determined with regard to:

- a) The area within which communication is feasible.
- b) The extent to which the goods can be objectively graded, classified, and described.

c) Certain arbitrary limits within which the range of utility scales of buyers and sellers can vary without disturbing the ordering and scaling of market values.

Equipped with this concept of a market, ammended to provide for some tolerable limits to the allowable variation in utility scales and value systems, we would then be in a position to discuss the scope of the market, identify it, and test it for functional efficiency. Unless some adjustments of the nature suggested above are made in our conventional descriptions of land market activity, we are in danger of criticizing levels of prices, or the ranges between bid and offer prices, by standards that are inapplicable to the actual situation.

While we can explain a portion of the variations in prices within the farm land market on the basis of value system conflicts, as outlined above, there remains a substantial basis for price differentials, given the comparability of the value systems within which prospective buyers and sellers operate. One of the major explanations for land prices that appear by rational economic analysis to be out of line with prospective income potentials is provided by the current role played by anticipated capital gains. From the days of our earliest settlement land has played a major role in the potential for financial gain offered by the new world. While it has not accounted for great industrial fortunes, it has been a persistent heavy lure to the investor of speculator seeking maximum security combined with assurances of profit. This expectation of capital value appreciation in land has been a feature of American economic life for two centuries, and has been a prominent feature of our modern era for the past 25 years. In this setting it would seem highly probable that one of the reasons for discrepancies between land earning potentials and current prices may lie in the different valuations placed upon the prospect of capital gain.

It is suggested that one of the underlying reasons featuring prominently in current decisions in the farm land market can be traced to the combination of earning potentials represented by current income, on the one hand, and the prospect of capital value appreciation, over the long run. Bellerby and others have pointed out that the "incentive income" ratio of farm income to non-farm income rarely goes above 50% in the United States while it may go as high as 100% or more in other countries (United Kingdom, New Zealand). International comparisons of this kind may be partially explained by the fact that the American farmers have had some two centuries of experience with capital gains in land values that compensate for low annual incomes. Virtually no other farmers in the world can enter this prospect of value appreciation in their labor income estimates. First because there is no functioning land market in most countries, and second, because there are no realistic alternative job opportunities that would permit them to sell out and realize the capital gain.

This may help explain why in the United States the "incentive income" may not be valid. It is difficult or impossible to separate out the capital-appreciation aspects from the annual-labor-income aspects of the rewards to farming. This argument suggests that if the farm "incentive income" ratio approaches 100% of non-farm incomes in the U.S., farmers can expect increasing pressure on them to forego their opportunity to enjoy capital gains in land. This may well be one of the prices that society will exact for a greater stability of expectations in farm incomes.

One of the ways in which we may arrive at a more accurate basis for comparing farm and non-farm income levels is to include in our income estimates some valuation of income traceable to the role of the farmer as land owner possessing a valuable opportunity to share in capital gains. Farmers in the United States today can now earn or enjoy:

- a.) income for their labor
- b.) returns to their capital
- c.) capital gains on their land.



Many farmers in other countries enjoy little income from (b) and none at all from (c), either because they do not own the land or because they adhere to a peasant tradition that precludes them from regarding land as a suitable item on which to earn a capital gain. They would never consider selling out in order to realize the capital gain. If they did they would have no place to go, in seeking alternative employment.

One reason why farmers may be willing to adopt technological practices that involve risk and waiting costs may be found in an assumption that they will reap the rewards of land-value appreciation as well as the short-term and transient advantages of higher operating profits. If they were to lose the right to enjoy the capital appreciation of their lands they might be much less willing to invest heavily in new technology. In this setting, it would appear that the only way many farmers today can enjoy a share of the fruits of technological progress is to realize on the enhanced capital value of their land, either overtly or subjectively.

If price supports and production controls lead to high returns to producers, and if this leads to a demand from the general public that fortunate few be prevented from enjoying these capitalized values reflected in higher land prices, then this could lead to controls on the freedom of the landowner to realize on his capital gains. This control might come via a capital gains tax on land, or via prohibitions on the resale of land except under stated conditions. If this should be the consequence of price supports and production controls, it might develop that the reduction of price and income uncertainty had not served to stimulate technological advance. To analyze these prospects we need a greater understanding of the extent to which expectations of capital value appreciation have been built into current price levels for farm land.

We may note in passing some of the possible implications of these reflections. If land prices are stable or rising while farm incomes are falling, it may reduce the economic pressure on farmers to get out of agriculture. While their current incomes may not be adequate to keep them in agriculture, their expectations of capital gains in land may be unimpaired, or even improved. It seems probable that land value trends in recent years have worked against the traditional pattern of price adjustments in agriculture.

An additional implication is that tenants should receive labor earnings above those of owner operators in an equilibrium situation, to compensate for their inability to participate in capital gains. There is some evidence that this is occurring, and one possible method of testing the extent of capital gain anticipation would involve a comparison of tenant and owner-operator income expectations, under comparable circumstances.

Two principle lines of argument have been developed in this discussion. On the one hand, it has been urged that attention be paid in our land market analysis to the different cultural patterns and value systems characterizing active participants in the current market. To the extent that cultural lag exists in rural America, it may be most prominently exhibited in attitudes toward land.

Regardless of conflict among cultural standards, it has been suggested that the justification of buyers' and sellers' decisions in the current farm land market is complicated by widely differing attitudes toward current income and the time discount applicable toward future income. The implication of this line of reasoning points to the farmer as a capitalist interested in growth rather than in current receipts. It suggests that he places a substantial value on this prospect of growth, and that this enters heavily into his instinctive calculation of tolerable levels of incentive income. If this situation prevails, it constitutes a significant modification in the conventional

analyses of farmers' response to price incentives. It is possible that an explanation on these lines may go far toward a clarification of the seeming irrational refusal of farm people to leave agriculture in the face of falling incomes. The argument also suggests that conventional land pricing and appraising practices may be seriously in error to the extent that they rest upon capitalization of current incomes at conventional long term money rates. This procedure excludes completely an estimate of the significance of anticipated capital gains.

DISCUSSION:

REFLECTIONS ON DECISION MAKING IN THE FARM LAND  
MARKET AND THE PROCESSES OF LAND VALUATION

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A large part of our barley production is used for livestock feed; smaller amounts are used for human food and for production of alcoholic beverages. While I may be in error in doing so, I would infer from Dr. Raup's paper that, in the case of barley, we have at least three different utility scales involved. To me, this is the same as saying that there are three uses to which buyers intend to put barley. Thus, I am of the opinion that differences in utility scales is not a third factor explaining differences in value placed on a tract of land but is an elaboration of the first factor, viz. the alternative uses to which they intend to put the land.

Even if we accept the hypothesis that there exists in present-day American agriculture "peasant-European" attitudes about land ownership, it would seem to me that this would serve only to help explain the general level of land prices, not to explain different values placed on a particular parcel of land. Of course, we might reason that these attitudes resulted in a desire for a particular parcel of land. If so, the culprit then becomes the immobile nature of land.

Unless we can separate markets both on the basis of utility and definite characteristics of land, I see little to be gained by grouping together those who have peasant-European attitudes about land in one market; then identifying farmer-businessmen as another market. What matters the motive in the barley market? On the other hand, examination of the land market would be much more meaningful if, for example, we could identify the rural residence market and were able to determine the attributes of land desired for this purpose.

The first part of this paper is concerned with variations in prices within the farm land market while the latter part discusses anticipated capital gains as an explanation for land prices that appear to be out of line with prospective income potential. This latter part of the paper I found most stimulating and wonder whether the peasant-European attitudes might not have been examined in the same manner. Then, the question could have been explored as to whether or not land of certain unique characteristics might fulfill these desires to own land. Is it not possible that we might as easily identify an "anticipated capital gains" market as a "peasant-European attitudes" market?



## MEASURING THE PRODUCTIVITY OF LAND

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Although the problem of measuring the productivity of land is essentially the same in principle as for any other factor of productivity, a few of the characteristics of land as a factor and some of the customary practices associated with it confound the task of measuring the product. Outstanding among these characteristics, are durability and nonreproducibility; and among practices, the failure to classify and the general tendency to handle land as a component in the real estate bundle. The inputs of units of many factors of production are largely or entirely used up within one production period: there is no difficulty in measuring the unit of input, and the costs are explicit in that they largely accrue at specific prices for the production period. With land, the situation is one of maintenance instead of replacement per unit; the units endure over an infinite number of production periods; some of the other inputs become attached to and inseparable from the land; and the annual costs are implicit, necessitating estimates in terms of opportunity cost.<sup>2/</sup>

In broad perspective, the problem of measuring the productivity of any factor is one of determining that factor's contribution to total product in a given time period, and within a combination of inputs. Aside from the complexities mentioned above, the task of measurement is the same for land as for any other factor.

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<sup>1/</sup> This paper represents the personal views of the author on the questions considered.

<sup>2/</sup> See Leftwich, Richard H., The Price System and Resource Allocation, Rinehart and Company, Inc., New York, 1955, chapter VIII, for an excellent discussion of costs.

The task of measurement of the productivity of any one factor requires measurement of all factors; and this task is one of applying production theory--- performing the steps in measurement specified as necessary and sufficient by the theory. This is the task of empericizing (performed every day by myriads of practioners in the on-going processes of production, and by a lesser number of research personnel who are only indirectly affected by the results of their findings).

The following discussion is confined to the short run--one production period. This will serve to exclude discounting, price levels, changes in practices, and other related phases of the valuation problem. Carryover effect of particular practices, and use of inputs other than land that last for more than one production period can be handled adequately by treatment of the annual effect.

As I interpret my assignment for the discussion here, there are two phases of the problem of measuring the productivity of land within a production period. One is that of measuring the input. This is something more than a matter of definition, though for the purpose a definition of land is needed. The second phase is measuring the output effect of the unit of land input. As the currently popular song has it, you can't have one without the other.

#### Measuring the Input

Definition of land: I shall use the definition found to be useful in previous experience, knowing full well that there are differences of opinion as to its adequacy--part of which difference of opinion hinges on the purpose involved. "For purposes of evaluation, farmland is defined here in terms of unit area. It includes the natural resources (fertility, structure, and topography) and the added physical inputs incorporated with and inseparable from it. It varies through time (between production periods) with use and treatment. Land is a genus, made up of specie classes or grades. Land is distinct from such structural features as buildings and fences, but it is inseparable from such



incorporated improvements as tile drain or absorbed labor. Distinction must be made also between land and water, at least in surface areas of streams and lakes, but not in water content or holding capacity of soil. The essential distinctions are between land, real estate, and other capital goods--not between man-made characteristics and phenomena of nature, because within limits man can change the characteristics of land." <sup>3/</sup>

This is a physical concept. Productivity too may be treated in physical terms. But to give particularized meaning to productivity in economic analysis, and to come to grips with the problem of measuring the units of geographic area must be classified and priced. The detail of the classification depends on the particular problem at hand.

Rough comparisons can be made for land between geographic areas, without attention to the details of variations within them. Likewise, whole farms may be compared within and between areas, on a per-acre or per-square-mile basis. But for production planning within a firm there is need for refinement by grades, separable on the bases of physical characteristics. We need not be concerned here with the detail of classification or graduation. Suffice it for the purpose to say that land is classified, so that unit areas within a class are substitutes for each other. This follows the idea of definition for any factor of production--one unit of a factor is a substitute for another unit of the same factor; if and when the units do not substitute (overlooking the minor detail of unique location, for the moment) the resource must be defined as another factor (input). Parenthetically, an acre of Jersey sand is not a unit that will substitute for an acre of well drained silt loam.

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<sup>3/</sup> Virgil L. Hurlburt, On The Theory of Evaluating Farmland by The Income Approach, ARS, Washington D. C. April 1959.

The problem of defining and measuring the input at one point of time can thus be handled by physical classification. The unit areas of different grades or qualities are constants for the one production period. Although one selected acre of a determined quality may not be exactly the same at the end of a period as it was at the beginning, the change during the period can be counted in physical and cost terms. It is in comparing production periods, and also in dealing with changes in sets of inputs combined with the land, that problems arise in measuring the land input. A portion of the annual input of another factor may become associated inseparably, for an indefinite and long time period (as in tile drain) or for the shortrun (as with the case of carryover from fertilizer application). These problems require reclassification at the beginning of each production period. Measurement of the land input is an annual proposition, particularly if there are significant and measurable changes in depletion or accretion of characteristics affecting volume of output.

Land may be measured in units of geographic area for selected analytical purposes. Meaningful results are obtained with production functions (for example, a Cobb-Douglas function) and with linear programming, in dealing with groups of farms, or in dealing with one farm in which for the purpose involved the land is all of the same grade. The problem of measuring the land input is minimized in these types of analyses by sample selection--holding land quality constant enough to exclude the effect of variations in quality. The main problem in making comparison between areas, or between farms within the same area, or between acres within the same farm, is that the several characteristics affecting output may be combined in such variety of combinations that as yet the physical scientists are not agreed upon content of classification or definition of grades. Further, as to measuring the output in economic terms, there still remains the problem of pricing the unit of output.

Annual cost of land is implicit, subject to or determinable by estimate for the individual unit of input, whether by acre or by farm. I need not dwell on the details of imperfection in the market for real estate, which details appear to be greater than for other durable goods and considerably greater than for those inputs that are used up in one production period. A price estimate for the land input is needed, with some reference to its quality (including locational) attributes. And it is commonplace that only part of the total ownership units are transferred in any one year, which further complicates the problem of estimating the market-determined cost of those units that are transferred only once within the lifetime of the operator. The need, in a problematic sense, is for a cost estimate for the land input that begins to approach the accuracy of the cost estimates or measures for other inputs. (The same type of problem is present for other inputs such as labor of operator, management, and other inputs that go into the production process largely in physical form.)

There are a number of interesting side details involved in determining the annual cost of the land input. Among them is the question of what to do with property taxes on land. Should these taxes be handled as part of the factor cost, or be charged to the firm? My own preference is to handle the tax cost as a firm overhead (for reasons explained in a journal article now in process). But let us not get lost in the detail of this argument. Rather, for the time available here, and also in terms of consequences, it is more important to concentrate on the annual investment cost.

Annual investment cost of land is quite straightforward for the operator who pays a cash rent. The price is specific. The main detail of measurement is to separate the payment for land from that for buildings. Land cost for the tenant operator who pays a share rent is less definite, for in practice there is no separation of land rental from the rent paid for other inputs furnished by the landlord, including the variables such as fertilizer. We may

wish to go into further detail of the cost of land to the operator, or to the landlord, in the tenant-operated firm. But it may suffice to start with the cost-estimating problem in the owner-operated firm.

What is the cost of the land input to the owner operator who has owned his farm for 25 years? Whether the farm is debt free or heavily mortgaged is beside the point in measuring the cost of the annual input (but not so in terms of personal net income). The general solution--acceptable as a premise of operation--is an opportunity cost concept.

In short, price the annual input of land at opportunity cost. This means taking the best available estimate of market value of the land (complicated as is by the fact of any buildings associated with it) and applying to it a percentage figure that represents the likely or probable earnings if the given quantity of capital funds were invested in the "next best" form. Quite realistically this earning rate can become the interest rate on farm mortgages.

An interest rate applied to the current market value of the selected unit gives an opportunity cost. This is a cost figure, not an earning. The total land cost per year for a given farm would best be arrived at by separate estimates of the different grades of land within it--at least to the extent of distinguishing between cropland and land suited only to permanent pasture or forestry.

This procedure requires the making of estimates. It is subject to all the errors of judgement. But it is a rational basis for getting at the "actual" cost of the land input. Charging the land to the firm at current annual opportunity cost treats the input at actual rather than at "book," dollar outlay, or historical cost. Thus, all inputs are treated the same in the cost accounting for factor earning calculations.

Measuring the Output From the Annual Land Input

Measuring the productivity of land would be no difficult problem if one had the information on the land input and on input--output relations along a range of combinations of input. Taking the specified unit of land, say an acre, one could construct a total product curve, and calculate marginal products. With known fixed costs, variable costs, prices of products, and incremental yields, one could calculate the contributions of any one factor in a combination. The absence of these pertinent details of information necessitates use of approximating devices.

There may be a significant distinction between the return that the factor owner gets through the allocative processes of the market (and from the allocation procedures he uses) and what the factor contributes to gross product. The problem under discussion is that of measuring the actual contribution to firm earnings--measuring the productivity of the factor. What is the best that can be done with the information available in a well organized, average commercial farm firm?

With the information available for an individual farm, and remembering the nature of the basic problem involved, I can see no more feasible method of calculating the productivity of land in a farm than that presented in my article, "How Much For More Land," which appeared in Iowa Farm Science in August 1958. Were I revising that statement today I would add a sentence or two, dealing with the family residence, separating it from the production inputs. The rest of the content would remain. The essential steps are:

- (1) Total the value of all crops produced during the year on the existing unit.
- (2) Divide the total value of crop production as determined in step 1 by number of rotation acres plus pasture, to get average value of production

per acre. This serves as an estimate of production per acre on the added land.

- (3) Total the operating costs for crop production. Include all costs that would change if 1 acre of land were added and operated at the same level of inputs per acre as are present acres. Include the cost of labor.
- (4) Find the average operating costs per acre by dividing total in step 3 by rotation plus pasture acres used in step 2.
- (5) Estimate the annual cost per acre for the added land. The procedure of opportunity cost, discussed under the section above on measuring the input, applies for this purpose; namely, take estimated market value multiplied by a percentage.
- (6) Find the estimated return on each additional dollar of outlay. Add the cost of land per acre from step 5 to the operating cost in step 4, and divide the sum into estimated production per acre from step 2.
- (7) Convert the return per dollar into an earning per acre. Multiply the earning per dollar, step 6, by the cost per acre in step 5. This is an estimate of the earnings of the added acre.

Use of additional land may result in a change in enterprise structure. If so, the steps above would be adjusted accordingly. The additional income and additional costs in crop enterprises would be estimated on the basis of the best available information. Obviously, the present cost-product value ratio would not serve as a basis for estimates in a new combination of enterprises.

One may quarrel with one or more of the assumptions, argue one or more of the separate points, criticize the necessity of judgement at the area and firm level--and still have nothing better to offer as alternative. The model as such comes closer to the orthodox theory in application than any of the alternatives with which I am familiar. This assertion should serve the purpose of

prompting discussion. But to assure discussion, I add that the calculation procedure applies as well to the operator who is estimating land earnings in an existing whole farm as it does to the operator who is contemplating the purchase of additional land. The same information is needed for both calculations because the income-estimating problem is essentially the same.

Approach through the procedure of adding another acre to the existing operating unit sets up the problem of estimating land productivity as it arises in practice, and in the marginal framework. Were there bases for accurate estimate of the additional output from adding land and holding all other inputs constant, there would be no need also to add other inputs; present total inputs, both fixed and variable, could be spread over the new total acreage figure. My procedure includes estimates of required additional variable inputs at the ratio per acre as used presently, to avoid the problem of estimating the input--output relations in a new combination.

Fixed costs do not influence marginal costs. But, fixed costs of the present organization are spread over the larger output, when the land and the variable inputs are added. The limit in adding land to the existing unit is specified by capacity of machinery (and other fixed inputs). That is, 1 acre or 80 may be added to the present unit for the calculation. Allowance may be made in estimated crop yields to take care of any difference between the land to be added and that in the operating unit.

The income equation in this model specifies that additional returns are a function of the additional inputs. Yields on the existing unit are the basis of estimates of yields on the added land. The answers come out in terms of the existing prices, and are annual estimates (which of course must be adjusted for long-run prices when income flow is translated into fund value). Solution to the equation is based upon the assumption that each additional acre will follow equal returns per dollar of additional cost.

One cannot but admit that the assumption of equal returns per dollar of additional cost is an error. But the pertinent question is the extent of the error as compared with that involved in any other estimating device. Part of the problem is that average operators do not know marginal costs of products (they do know marginal costs of factors) and they do not know average costs through a range of variable inputs. They do have some ideas as to marginal efficiency of additional inputs of different types, for their present combinations are not entirely a function of chance, habit, or accident. Admittedly, many operators have purposely invested in machinery beyond the requirement for operations in a normal year, as a safety factor; and some have excess capacity in machinery for the sake of convenience. Even though there may be excess capacity in machinery, however, the exact earning rates of machinery and other inputs are not known. The assumption of equal returns on the added costs does not involve the overhead costs on machinery; the machinery operating costs are a variable. Also, it might not be difficult to assemble proof that fertilizer earnings exceed those of other inputs on average farms in the community. But the point still is that average operators have little specific information on actual earnings of different factors in their present operations. The assumption of equal rates of earning on dollars of all added inputs may well involve less error than would occur with the use of any other assumption.

One further comment on the added-acre approach. It requires an estimate of land cost for the additional acre. The opportunity cost, discussed under measuring the input, is the basis for the cost estimate. And I emphasize that this is a cost estimate, not an earnings one, in spite of relations between land earnings and market price of land in general.

No attention is devoted to estimates of land productivity by use of residual calculation because of both the theoretical and practical limitations of residual calculation.



Attention can be turned now, and briefly, to the problem of calculating productivity of land in area or regional studies. For this purpose I cite the work being done on linear programming, and call on Laurel Loftsgard to explain the pertinent phrases of the gospel. Several of you are familiar with the idea of application of Cobb-Douglas functions. These two have a place in the kit of tools of the analyst. Some work has been done with models that combine cross section and time series data, and there are other computational procedures about which I profess no knowledge other than the fact that they have been tried. These several models which aggregate at area, regional, or national levels are all subject to limitation for use on any one selected acre or farm unit.

In general summary, measuring the productivity of land leaves much to the fertile imagination. Farmers and other have been doing surprisingly well, in spite of the limitations and errors of current and past practices, in all but a few brief periods in history. Yet, there is plenty of room for improvement for laymen and technicians. There is no fully satisfactory measure of the land input, particularly for inter-temporal comparisons and also for geographic ones. And there is no "accurate" measure of the productivity of any one factor in the multiple-product farm firm, short of replicate experiments. All statistical measurement procedures are estimates of the actual. Through time the problems of measurement should decrease, with improvement in measurement of relations between input and output, under both experimental and actual farm conditions, and with greater understanding of the basic economic relations involved.

DISCUSSION:

MEASURING THE PRODUCTIVITY OF LAND

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Dr. Hurlburt presents a practical technique for estimating the maximum amount that a farm operator can afford to pay for more land. Orthodox theorists might challenge some of his assumptions, but practitioners certainly will support his conviction that a rough method of approximation is better than no method at all.

What the method actually determines is the use-value of land in production--not its exchange-value. The end product of the eight-step calculation is a reservation price that a potential buyer might keep in mind when he engages in exchange negotiations with a potential seller. If the two parties have divergent value systems--that is, if the buyer's reservation price is higher than the seller's minimum acceptance price--there is a good chance that an exchange will take place. Normally the exchange-price is somewhat less than the maximum amount that the buyer will pay and somewhat more than the minimum amount that the seller will accept.

As was pointed out in earlier papers, the use-value of land is not the sole determinant of eagerness to buy and sell. Certainly the quantity of assets people hold, their liquidity positions and liquidity preferences (a reflection of asset structure in individual balance sheets), returns expected from opportunity investments, returns expected from alternative land uses, and a host of intangible values associated with ownership have some influence on prices and quantities sold. In the short-run these determinants might result in sale prices that are quite different from use-values based on earned rents in production.

With the above principles of exchange in mind, one might ask if Dr. Hurlburt has a logical method of estimating the amount that a buyer could bid for

cropland to add to his farm. He has it would seem, if: (1) the land to be purchased is equal in quality with that in the base unit; (2) other factor inputs can be increased with no change in grade or quality; (3) the elasticity of production is equal to 1.0--a condition whereby the marginal physical product and the average physical product of a resource input are the same; and (4) optimum scale of operations is achieved after land acquisition--that is, the ratio of the marginal value productivity of each factor to its market price (or in this case the buyer reservation price) is equal to the ratio of the marginal value productivity of each other factor to its market price, and is equal to 1.0. This means that the distribution of rewards among factors will completely exhaust the total product (return). If this condition does not hold there will be either a residual or a deficit with no basis for its allocation.

It would seem then in the final analysis that the theoretical limitations of the approach are: (1) the special case assumption that factor prices are equal to marginal value productivities, and (2) the special case assumption that production functions are linear and homogeneous. In practice, however, it might prove to be a much better technique than any residual imputation scheme. To its credit are its simplicity and the fact that each individual farm operator uses his own performance record to make a value determination. On the other hand it might be somewhat difficult, if not a bit subjective, for each individual farm operator to place a bona fide sale price on his entire farm before he makes an estimate of the value of an additional acre.

The discussion thus far has been directed toward the last part of Dr. Hurlburt's paper, namely, the section on "A Method of Measuring the Output From Annual Land Input." Included in the introductory sections are a definition of land, a commentary on unique characteristics of land, and a detailed

treatment of problems and methods of measuring land input. These parts are well developed and pin-point many of the problems that are encountered in coordinating exchange and production theory. Suffice to say, they pioneer an area of inquiry in land economics that researchers should be giving much more attention.

## SOME FACTORS AFFECTING THE MARKET VALUE OF FARM LAND

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In the few minutes allotted to this paper an attempt will be made to call attention to recent trends in land values and to enumerate some of the causes of these trends.

Land prices have risen materially in all parts of the United States since World War II. The advance has been rapid enough at times to call forth warnings that a speculative boom is underway. Noteworthy among these warnings is a bulletin of the North Central Land Tenure Research Committee issued in March, 1945.

Nearly every land boom has three fairly definite characteristics. (1) Land prices rise rapidly, to a level not justified by long-time average rental returns. (2) Speculative buying increases as evidenced by the purchase of options, and by resale of many tracts shortly after they are purchased. (3) Credit is used freely. Many people buy land with a very small initial payment, leaving themselves extremely vulnerable to large financial losses in a period of low farm commodity prices or crop failure. The market since 1940 has not displayed these boom characteristics.

Let us review briefly some of the changes that have taken place in the land market. The index of estimated price per acre in the United States declined from an index of 170 in 1920 to 73 in 1933 (1912-14=100). In the west north central states, the decline was from 184 to 64. From 1933 to 1940 the index remained below 100.<sup>1/</sup> After 1940, recovery was underway; and since

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<sup>1/</sup> The Farm Real Estate Situation, 1943-44, Circular No. 721, U.S. Department of Agriculture, for years 1912-1944. Data for later years are taken from Current Developments in the Farm Real Estate Market, Agricultural Research Service, U.S. Department of Agriculture.

the Japanese surrender in 1945, land prices in the United States have risen from an index of 126 to 282. In the west north central states the advance has been from 96 to 218. In other words, land prices in the United States in 1933 were little more than  $2/5$  of the 1920 level, and little more than  $1/3$  in the west north central states. In contrast, prices in both the United States and in the west north central states in March 1959 were more than twice the 1945 level, and materially higher than in 1920.

Why do farm land prices fluctuate through such a wide range? Let us turn our attention to this question.

Under normal conditions, most economists hold that the price of farm land depends upon the income that can be derived from it. However, there are two types of income; (a) money and (b) amenity. The relationship between money income and land values is determined by two factors. (1) The net rent that the land returns or that it is expected to return, and (2) the rate (percent) at which this rent is capitalized. To capitalize rent or any other income, is to compute the value of the property which will produce a known or anticipated return at some specified rate of interest. If a land owner can rent a farm for \$21 an acre, cash or for shares of crops that will sell for this amount through the years, and the taxes, depreciation, upkeep of improvements, and other maintenance costs are \$6 an acre, the net return is \$15 per acre. If the owner assumes that the net return will not change materially for many years, and considers 5 percent to be a satisfactory return on his capital, he will value the land at \$300 an acre ( $\$15 \div .05 = \$300$ ). If he believes that he can get 8 percent for his capital in some other investment which he considers fully as safe, he will value the land at only \$187.50 per acre ( $\$15 \div .08 = \$187.50$ ). On the other hand, if he considers 3 percent to be a satisfactory return, he will value the land at \$500 per acre ( $\$15 \div .03 = \$500$ ).

This procedure of capitalizing net rent to get the value of a durable asset is not new. Likewise, it has long been recognized that individuals who are interested in land, do not use the same capitalization rate. One man wants 8 percent on his investment and bids a low price. Another is willing to take 2 percent and offers a high price. A third bids a high price for a particular tract of agricultural land because it has possibilities of development for another use. He is more interested in profits from change in use than in the rent a farmer can pay. Another party wants title to the land so he can reduce his taxes by adding to improvements, by treating the soils with lime, rock phosphate and other amendments, or by building water control structures and subtracting the cost from non-farm income. Still another party is willing to forego immediate uniform annual returns, for income at a later date. A few men have purchased forest land that promises a good income in the future, but nothing at the present.

Land also has amenity value which is not associated with its capitalized net earnings. A high percentage of rural people, think a farmer cannot get ahead except through ownership.<sup>2/</sup> They look upon land as a safe investment. They know that the market value changes, sometimes quite rapidly, but the farm which is fully paid for seldom loses its value within a few months or years.

Another factor in the amenity value of land is the fact that the owner can see it and know it is his. He feels that he is in possession of an indispensable factor of production. It differs from intangible property such as a bond or a stock, which merely represents a property interest in productive factors.

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<sup>2/</sup> George W. Coffman, Jr., Factors Affecting Farm People's Attitudes and Use of Credit. Unpublished Masters Thesis, Dept. of Ag. Econ. University of Missouri, 1959; Gordon E. Bivens, Firm-Household Interdependence and Other Factors in Relation to Use of Credit by Farm Families in Green County, Iowa. Unpublished Ph.D. Thesis, Iowa State University, Ames, Iowa, 1957.

The ownership of farm land gives an appearance of financial stability and security. It is an asset that can be seen. The corn-belt banker who owns good farm land which his depositors know is not mortgaged has an asset that begets confidence even though it is not a liquid security.

Many factors other than net income, and amenity considerations influence the value of land. The following items will be discussed briefly. (1) The lag in land prices up to 1947 as compared to farm income. (2) Technological changes such as widespread use of labor-saving machinery, improvements in varieties of crops, use of chemical fertilizer, and use of chemicals to control weeds. These items are closely related to net income, since they reduce cost per unit of product when used properly and increases the net return. (3) The feeling among land buyers that farm subsidies will be continued for a long time. (4) The desire to own land as a hedge against inflation. (5) Expansion of population centers. (6) Location of industry in the open country. (7) The tendency to use recent sales as a basis for asking price, when land is offered for sale. (8) The change in attitude toward low equity financing in transferring farm land.

Let us turn to a more detailed discussion of these factors. The realized net income from agriculture rose from \$4.3 billion in 1940 to \$17.3 billion in 1947 - a four-fold increase. Per capita income of farm people from agricultural sources went up from \$174 to \$644 - a three and seven tenths times advance. Farm population declined from 30.3 to 27.6 million. Thus an increased farm income was divided among fewer people. Land prices per acre did not double, and the value of real estate per farm was up only 2.26 times the 1940 level. Returns to land owners were excellent. In some cases, investments paid as high as 20 percent. Under these conditions, further advances in land prices after net farm incomes turned downward logically could be expected.



The changes that have taken place in agriculture during the past 25 years logically can be described as an industrial revolution. From 1940 to 1947, the number of tractors increased 69 percent. The number on farms now is more than three times the number in 1940. The number of grain combines went up 2.4 times from 1940 to 1947, and now stands at 5.5 times as many as in 1940. Pick-up balers were not listed among machines on farms in 1940. Now more than a half million are in use. In 1940, 1.7 million tons of plant nutrients were used in the United States. In 1947 the quantity stood at 3.4 million tons, and now at 6.2 million - almost 3.7 times the 1940 level.<sup>3/</sup>

These changes have increased the output of agricultural commodities about 36 percent, reduced the labor requirements for farm work at least 1/3, more than doubled the output per man hour, and made widespread reorganization of farm units an absolute necessity. The influence on land prices becomes obvious when the relationship between the cost per acre of using a farm machine is compared with the acres of annual use. Data for a two-row corn picker will illustrate the principle. If the machine is used to harvest 40 acres of corn a year, the cost is \$3.57 per acre. If 250 acres are harvested, the cost is reduced to \$1.02 an acre.<sup>4/</sup> The \$2.55 reduction capitalized at 5 percent would justify an increase of \$51 an acre in the bid price for the additional land and a corn-picker is only one of several machines used on a farm where corn for grain is a principal crop. Use of fertilizer within marginal limits, improved varieties of crops and many other factors reduce production costs per unit of product.

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<sup>3/</sup> USDA Statistical Bulletin 233, Changes in Farm Production and Efficiency, August, 1958.

<sup>4/</sup> James E. Dillion, Use and Cost of Farm Machinery. Unpublished Masters Thesis, Dept. of Ag. Econ., University of Missouri, 1951, p. 58.

It can be argued that reductions in cost resulting from technological change and improved management practices should not raise land values. The facts are, however, that increases in net income are capitalized into the value of the factors that make the returns possible. The scarcest of these factors is likely to go up most; and farm land is a scarce factor in American Agriculture.

Evidence is appearing in many places that high support prices for Agricultural commodities and payments on land that is placed in the conservation reserve have been and are being capitalized into land values. North Carolina data indicate that each acre of tobacco allotment adds approximately \$1,000 to the value of a farm. In Kansas, income from land placed in the conservation reserve is emphasized strongly in advertising farms for sale.

The inflationary trend is another important factor in the advance of land prices. The all commodity price index has risen almost continuously since 1940. In that year it stood at 51.1, in 1958 it was 119.2 (1947-49 =100).<sup>5/</sup> The federal debt grew from 43 billion dollars in 1940 to more than 286 billion in July 1959. The purchasing power of the consumer's dollar has declined from an index of 166.9 in 1940 to 83.2 (1947-49 = 100).<sup>6/</sup> Common stocks and real estate including farm land have long been regarded as safeguards against inflation. As the price level rises, the market value of these items tends to go up too. Land is a tangible asset. The area of an acre does not change. People want to own it as a hedge. More buyers entering the market to gain title certainly influence the price.

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<sup>5/</sup> Federal Reserve Bulletin, Board of Governors of the Federal Reserve System, Washington, D. C.

<sup>6/</sup> Statistical Abstract of the United States, 1958, U.S. Department of Commerce, Bureau of the Census, Washington, D. C., p. 331.

Another important factor in the upward trend in land values has been the expansion of population centers into agricultural areas, and the movement of industry into the open country. Along with the population increase has come changes in technology, such as widespread use of airplanes, need for landing fields, and improvements in roads, to accommodate the increased flow of traffic. These encroachments on the area of farm land have reduced the supply for agricultural uses and strengthened the price.

The land price determining process is extremely complex. It does not follow the exact mathematical formula usually used by economists in capitalizing net income. Buyers and sellers in Audrain County, Missouri reported that no formal appraisals were made to determine the earnings value of farms that were offered for sale. However, more than 40 percent of the buyers considered the relationship between probable net income and price, when the land was purchased. The asking price was based on recent sales in the community; and in a sellers' market, such as we have had in recent years, the asking price has tended to become the price at which land has been transferred. Sometimes an Audrain County buyer made an offer below the asking price, and the two parties agreed upon a figure that was between what was asked and what was offered. In a few instances, there were other bidders. But the price making process was not at all like an auction. The procedure that was used in arriving at the price easily could get a buyer who borrowed a considerable part of the cost into financial difficulty.<sup>7/</sup>

In recent years, many farms have been sold to men who were willing to accept low income or even to sustain losses for tax reasons. Other farms have been sold for residential and business developments. The price has

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<sup>7/</sup> W.D. Davis, Jr., and Frank Miller, Land Price Trends in Missouri, Missouri Agricultural Experiment Sta. Research Bul. 686, January 1959, pp. 48-50.

not been related to the agricultural earnings value. Basing the price that is paid for land to be used for agricultural purposes, on the transfer price of similar farms, sometimes purchased for non-agricultural uses, can get a credit buyer into serious financial difficulty. He may not pay too much for the farm, but the price may be too high for agricultural purposes, and he may not be able to retain title until the land can be sold for another use. Often the waiting cost in transferring land to other uses is substantial.

The use of sales contracts to transfer land declined in 1958 for the first time since estimates were started in 1946. This type of conveyance is most common in the Mountain states and in the Lake states. In the Mountain states 40 percent of the transfers were made by sales contracts. In the Lake states 39 percent used this type of conveyance. In the Corn-belt states, about 18 percent of the 1948 transfers were by sales contracts.<sup>8/</sup>

As we gather additional information about the land market, it becomes clear that the price determining forces are extremely complex. Market price cannot be determined by capitalizing money income at the mortgage rate of interest. Oftentimes other forces are more influential in determining the price than the money income or the capitalization rate. This brief enumeration of some of the factors may serve only to add to the confusion. As research people, we need to develop procedures that will help us to explain the forces that influence land prices and to describe them in ways that will help people who buy and sell land to understand how these forces operate. This is a big task, perhaps some of the members of this group can make a substantial contribution toward accomplishing it.

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<sup>8/</sup> "Current Developments in the Farm Real Estate Market", Agricultural Research Service, U.S. Department of Agriculture, May 1959, p. 11.

DISCUSSION:            SOME FACTORS AFFECTING THE MARKET VALUE OF LAND

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To explain the market price for land is to identify and quantitatively measure the motivating forces of buyers and sellers of land. Dr. Miller has given an excellent account of identifying historical and current considerations that affect the market value of land. His paper includes an evaluation of capitalizing net rent, amenity values, technology changes, national farm programs, population shifts, industrialization and credit devices.

Miller's criticism of the orthodox capitalization formula seems well justified. Capitalizing net income has repeatedly proven inadequate for arriving at market price. The standard procedure for using this method is varying either net income or the capitalization rate so that the resulting value can be justified by its nearness to actual sales data for comparable land tracts.

Although Miller illustrates the effects of using various interest rates, land values determined by capitalization are dependent also on the validity of the rent figure. A change in rent of \$1 per acre capitalized at 5 percent will change value by \$20 (\$1 divided by 5/100 equals \$20) per acre. (In some areas the current market value of land used for farming is even less than \$20 per acre.)

The capitalization example Miller uses in his paper is based on a cash rent figure of \$21 per acre minus costs. In most cases, cash rent is determined by custom or a bargaining process between tenant and landlord. This rent value may or may not represent long run aspects of earning capacity. More specifically, it is extremely difficult to determine the intensity of land use and corresponding return that conforms with maintenance of a given

level of fertility.<sup>1/</sup> Too, one not only has to reckon with long run physical returns but also long run prices and costs must be determined to give an acceptable value for rent.

Even if rent figures and capitalization rates could be realistically determined, the capitalization method is not likely to always coincide with market sales data. As indicated by Miller, the complexity of land price determining forces involves more than interest rates and rent. Certainly, all the factors mentioned in Miller's paper are determinants of land values. The challenge "to understand how these forces operate" is worthy of concentrated research effort.

Perhaps the most difficult force to understand and describe is individual personalities and the decision-making process they use. However, the assumptions of rationality and identification of people's goals should not make the task impossible.

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<sup>1/</sup> For detailed reasoning on this point, see Bunce, A.C., The Economics of Soil Conservation, Ames: Iowa State College Press, 1941.