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FACTORS DETERMINING THE VALUE OF FARM REAL ESTATE IN THE UNITED STATES

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THE SUBJECT assigned for discussion may for convenience, at least, be approached from two points of view: (1) that which takes the prevailing "level" of farm real estate values as its starting point and proceeds to an analysis of the variations about that "level," trying to isolate and measure factors with which these variations may be associated; (2) that which is concerned with the analysis of changes in the "level" of values, that is, the movement of values in time. It is, of course, clear that these two aspects are by no means independent of each other, but are merely different viewpoints with respect to essentially the same phenomena.

The term value, I should perhaps make clear, is used to mean probable market price, in conformity with common American usage. In most studies that have been made, it is based on estimates, rather than on prices actually paid.

The first point of view is that with which the American appraiser typically approaches his problem, at least until recently. His basis for appraisal was the prices of farms recently sold in the neighborhood at voluntary sale. His method of appraisal was comparison of the farm in question with those which had been sold. The factors he considered in his comparison and the weights he gave each were matters of judgment, experience, and personal opinion. As a result, wide differences of opinion and practice were found, both as to the factors to be taken into account and the importance to be assigned to each. Income, in contrast with practice in some other countries, was rarely taken into account, and if so it was merely a rough estimate, usually for a single year, used as a rough check on whether returns would be sufficient to cover interest requirements on the mortgage. As is characteristic of a new country, a free and active land market generally prevailed, and enough voluntary sales were usually at hand to serve as a basis for "purchase price appraising," as our practice has been called. The valuation of land for taxation in the United States also is typically defined by statute and court decision as the price which

would be paid at private treaty by a buyer willing but not compelled to buy, to a seller willing but not compelled to sell. Only very recently have proposals to tax real property on some sort of an "income" or "productivity" basis been broached in our state legislatures.

In contrast with the attention given the whole subject in other countries represented in this Conference, the subject of farm realty values occasioned little concern in the United States until very recently. As a result this brief paper will offer little else but fragmentary data and general, highly inferential observations which are admittedly not very satisfactory.

A few studies have been made in the United States, and others are under way in the United States Department of Agriculture, which attack the problem from the first point of view and attempt to verify these matters of appraisers' judgments and to give more precise expression to them. Among these studies may be mentioned those of Haas, Ezekiel, Wallace, and Tennant. Each of these was concerned with the relationship between some physical factor or group of physical factors and farm real estate values. Tennant was concerned primarily only with the influence of roads on values, which he obtained by asking farmers to estimate directly how much given road types added to the values of their farms.[1] Wallace, using multiple linear correlation, took as his data county averages for the 99 counties of Iowa, in which data, of course, variations in important factors affecting the value of individual farms may be obscured or obliterated.[2] Haas and Ezekiel used individual farms, the former in a county in southern Minnesota, the latter in a county in southeastern Pennsylvania.[3,4] Haas used cross tabulation and multiple linear correlation. Ezekiel used the multiple plane and solid curvilinear correlation methods which he had developed—an important contribution. Because of the possible presence of intercorrelation and since so many of the relationships appear to be non-linear, use of the

[1] Tennant, J. L., Reported in "Roads in New York State," by G. F. Warren and F. A. Pearson, Farm Economics, New York State College of Agriculture, February, 1929, p. 1053.

[2] Wallace, H. A. What is Iowa Farm Land Worth?

[3] Haas, G. C. Sale Prices As a Basis for Farm Land Appraisal. Technical Bulletin No. 9, Minnesota Agricultural Experiment Station.

[4] Ezekiel, Mordecai. Factors Affecting Farmers' Earnings in Southeastern Pennsylvania, U. S. Department of Agriculture Bulletin No. 1400.

methods developed by Ezekiel seems necessary in studies of this kind. The factors with which Haas found values to be measurably associated were: depreciated value of buildings, per cent of the land in cultivation, soil quality as measured by crop yield, distance from market town, size of market town, and road type. The factors which Ezekiel used, and their coefficients of net determination, were:

	Per cent
Dwelling value	11.95
Value of dairy buildings	12.45
Value of other buildings	19.21
An index of crop yields	4.55
Percentage of the farm area tillable	2.81
Percentage of the farm area level	6.16
Type of road	.47
Distance from town	2.08

Figure 1 will serve as an illustration of the curvilinear nature of the relationships frequently found when multiple curvilinear correlation is applied.[5] These curves were obtained in an unpublished land appraisal study of individual farms made by the United States Department of Agriculture in Indiana. In building value, for example, a point is reached, in this case at about $50 worth of buildings per acre, where further additions of building value add nothing to the value of the farm. A similar relationship appears between the percentage of the farm area which is improved land and the value of the entire farm. After about 80 per cent of the farm area is improved, further additions apparently do not increase the value. Distance to market likewise is a curve. In this case at about 10 miles from town, additional distance does not greatly affect the value.

The available studies suggest these general shapes of the build-

[5] This chart is not especially readable in its present form. However, for present purposes the curves may be interpreted as follows, using "distance to market" as an example: A farm a half mile from market town, averaged about $215 an acre in the area studied. A farm 3 miles from town, after the influence of the other factors affecting value has been eliminated or "held constant" by statistical means so that only the influence of distance alone was left, averaged about $198 per acre or $17 an acre less. A farm 9 miles from market averaged about $185 an acre. This was about $30 an acre less than a substantially similar farm a half mile from town, and about $13 an acre less than the same kind of a farm was worth 3 miles from town. The other curves of figure 1 may be read in the same way.

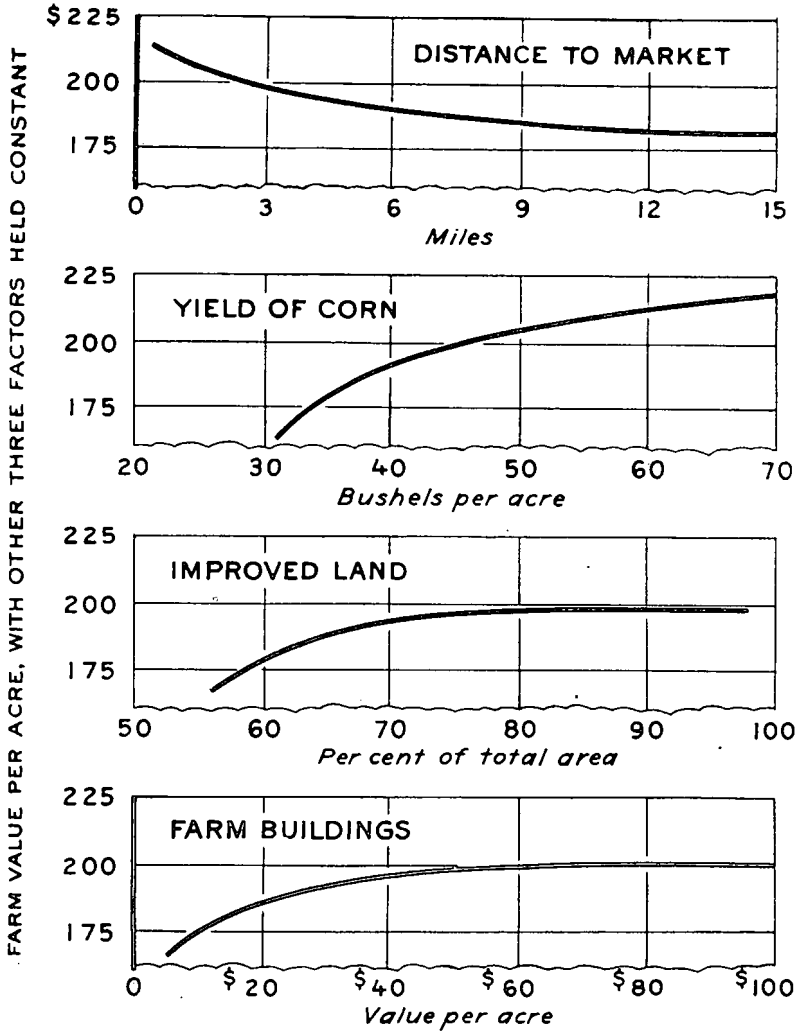

FIGURE 1. NET RELATIONS OF FOUR FACTORS TO THE VALUE OF INDIANA FARMS, 1922

An illustration of relationships obtained in the "cross section" type of study. Many of them are curvilinear. More research is needed to determine the usefulness of such studies in developing "experience tables" for appraisal use.

ing and distance curves to be more or less characteristic but in the other two factors rather marked differences have appeared. For these differences, variation in type of farming and farm practices appear responsible in part, at least. In a cash corn area in Iowa, for example, where all the land possible is desired for cultivation, the per cent of improved or tillable land curve did not flatten off at the upper end, nor did the yield curves, which may have been owing to differences in fertilization practice, in part at least.

The opinion may be ventured that studies which attempt to go beyond opinion and judgment and by statistical analysis, determine and measure factors by which farm to farm variations in value may be explained are yet too few in number, too widely scattered as to location, still too dissimilar in methodology, and each has still too much variation remaining unexplained, for any very definite conclusions to be drawn.[6] Satisfactory data, both in accuracy and scope, are difficult to secure at best. The demoralization of the land market, furthermore, has disturbed the regularity, and the normality, of relationships. The factors that have been used are not always free from criticism: For example, a more objective, more rigid, and more fully representative measure of soil quality than estimated crop yields should be tried. Perhaps soil type can be handled directly. Other factors than those used need to be tried. Presumably, for example, a farm of the optimum size is worth more per acre as a going concern than one not an economic unit. Then also, more attention may be worth giving to possible joint effects. If distance now is measured in hours and not miles, then the distance curves of figure 1 may show rather significant differences when broken down, so to speak, on road type by the use of correlation surface.

The differences in the apparent association with values of the same factor in the studies which have been made caution against generalization until further research has been made. Haas in his Minnesota county, for example, in 1919 found farms on graveled roads, other factors held constant, to be worth about $22 per acre more than those on dirt roads. Ezekiel, in Chester County, Pennsylvania, in 1922 found gravel or broken stone roads to give a

[6] Not more than two-thirds of the squared variability has been accounted for in any of the studies that have been made.

$15 per acre superiority over dirt roads, and hard-surfaced roads a superiority of $31 per acre over dirt roads. In a similar study made in southern Wisconsin by the United States Department of Agriculture in 1924, as yet unpublished, the differentials were much lower, being less than $3 per acre as between gravel and dirt roads and less than $8 per acre as between hard-surfaced and dirt roads.

However, despite all the difficulties perhaps some day there may be developed for the guidance of the appraiser "experience tables" of typical relationships similar to the tables of "depth influence," "corner influence," "alley influence," and so forth, now in every day use among the appraisers of city property.

With regard to the second aspect of the problem, perhaps brief consideration of the behavior of farm real estate values in the United States during the war period, but more particularly since 1920, will be of greater interest than for earlier periods, and will be sufficient to suggest several factors which appear to be important in determining the movement of values. A glance at figure 2 shows how widely average farm real estate values have varied in different sections of the country since the pre-war period, both in the extent of rise during the period up to 1920 and in the character and extent of movement since. These figures are the average estimated values of all farm lands with their improvements, of the United States Department of Agriculture converted to relatives with 1912-1914 as 100 per cent.[7] They are given here for the 9 geographic divisions in which the various states are customarily combined, which will serve roughly as an indication of the regional diversities.

Changes in farm real estate values, of course, presumably should be in some relation to changes in income. Lack of data, however, permits only presumptive relationships to be inferred. In the Northeastern States, which include both the New England and

[7] The sources of these data and the methods of their compilation are described in United States Department of Agriculture Circular No. 15, "The Farm Real Estate Situation, 1926-27," p. 33. A more detailed discussion of recent changes in farm real estate values and of the factors apparently involved therein than it was possible to give in this paper will be found in Circular No. 15; in succeeding issues of "The Farm Real Estate Situation" published as U. S. Department of Agriculture Circulars No. 60 and 101; and in the mimeographed report of the Department, "The Economic Basis of Farm Land Values."

Middle Atlantic divisions, average values rose comparatively little during the war period and fell comparatively little afterward, in relation to other sections of the country. One of the reasons for this may be that the prices of dairy products, an important source of income in the Northeast, rose least and were the last among

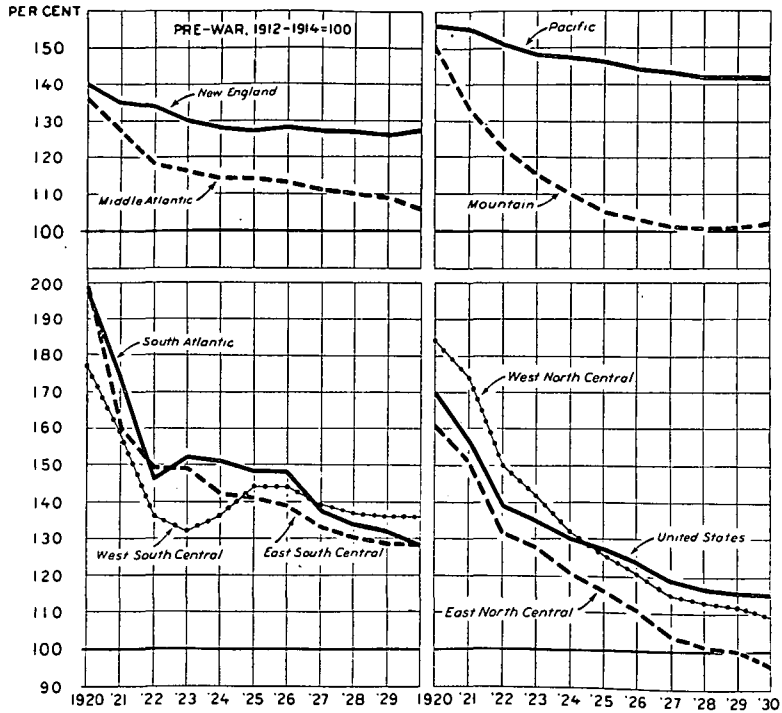

FIGURE 2. FARM REAL ESTATE: INDEX NUMBERS OF AVERAGE VALUE PER ACRE, CENSUS DIVISIONS, 1920-1930

The movement of average farm real estate values, both in the extent of the rise during the "boom" and in the character of their behavior thereafter, varied considerably as between the different sections of the country. Declines still continued to occur during the year ended March 1, 1930.

the major product groups to rise during the war period. In contrast, we find that average land values in the Cotton Belt showed the highest rise during the inflation period of all regions relative to pre-war. This appeared to follow in some degree, at least, the price of cotton, for of all the staple products, cotton rose fastest, and highest in price during the war-time period and was among

the earliest to rise. Values in the Middle West, on the other hand, during the war period rose to levels, in relation to their pre-war levels, higher than in New England, but not so high as in the South. In somewhat similar fashion the prices of meat animals and grains during the war rose more rapidly and to a higher average level than did dairy products, but not so high as did cotton. After 1920, the comparatively stable and reasonably high prices of dairy products no doubt contributed to the comparatively slight decline shown in Northeastern values. In the Southern States, the sharp recovery in cotton prices in 1922 and the subsequent 3 years of prices nearly double pre-war, no doubt were, in part at least, responsible for the abrupt flattening in the curve of average values there until the drastic cotton price-break of 1926. Prices of the principal products of the Middle West enjoyed no such recoveries as cotton, but fell to and maintained levels but little over pre-war for a number of years. No doubt the continuously sharp decline in Middle West land values throughout the early depression period was in part at least a reflection of this fact.

Other considerations may be mentioned at this point. Prices of the same product, as Dr. Warren has pointed out, rose more in the Middle West during the war period than in the Northeast, and after the war, fell more in the Middle West than in the Northeast.[8] Furthermore, as Mr. Hill pointed out, farmers in a large "deficit" area in the Northeast were able to share the higher post-war retail prices because of favorable location near markets, to a greater degree than in other sections of the country.[9] Another factor more important in the Northeast than elsewhere is the movement of city workers to the country and the conversion of farms to other uses, essentially residential, which apparently gathered momentum subsequent to 1920 and tended to bring into values in many areas an upward influence.

Inadequate though these observations are, they indicate a rough relationship between the behavior of farm realty values and the behavior of the prices of the principal products to which these lands are devoted. But the movement of products prices obviously falls far short of adequate explanation. Over against these, of course, must be placed the continued high levels of prices of

[8] Warren, G. F. and Pearson, F. A. The Agricultural Situation.
[9] Mr. Hill's paper appears elsewhere in this volume.

cost goods, of farm wages, and of taxes, which require little comment. The extent to which these have been offset by greater efficiencies is difficult to estimate. The apparent inability of farm taxes to recede in particular is a growing discouragement to land ownership. During 1929 the national farm tax index of the Bureau of Agricultural Economics rose again, to 267 per cent of pre-war from a 1928 position of 263 per cent. The rise was pretty generally distributed throughout the country. The corresponding 1920 figure was 155. The immediate tax outlook gives scant hope of recession, continued increase rather than decrease being expected.

But it is difficult, for lack of data, to infer what the net earnings of farm real estate have been, as compared with pre-war. We have no farm real estate income indexes. Were adequate data available, however, and assuming that the many other factors were known and measurable, it might still be difficult to know how changes in realized income would affect market judgments and action, particularly year to year fluctuations. Land yields its services year after year. A single year's increase or decrease in value possibly may or may not be reflected in a change in value, at least not immediately. How great that year's increase or decrease is, for example; what its relationship is to the course of realized incomes over preceding years; how it accords or differs with what is looked upon as the normal or usual or expected income experience as regards trend and variability about that trend; the extent to which it is considered more or less temporary or as an indication of the future trend—these and other considerations as regards realized incomes affect those market judgments which are necessarily prerequisite to the bids and offers out of which market prices are made. Realized incomes may serve as a point of departure, at least, for estimating what buyers and sellers are willing to pay or accept, *i.e.*, what they think "land is worth." But to the extent that farms are bought largely by farmers, realized incomes serve also as a basis for what farmers are able to pay. Farm real estate dealers now, for example, not infrequently remark that on an earnings basis, farm prices now seem attractive: but prospective purchasers have insufficient funds with which to negotiate purchase.

However, the statement just made regarding realized incomes affording a basis for estimating what land is "worth" probably is, strictly speaking, correct only to the extent that realized incomes

are used as a guide to estimates of the future. Strictly and logically speaking, values can be based only on future earnings or rather, ideas about them, for realized earnings are a thing of the past. Entering into this estimate of the future, rough or subconscious as it may be, is also, of course, the element of comparison of rewards in agriculture with probable returns in other lines of endeavor which may be considered to offer alternative employment of one's capital, management and labor. Since 1920, the question of alternatives has been presented with a force not equalled in recent years. Such a readjustment affecting as it does the desirability of farm ownership may show itself in falling values even though no great change in earnings had been apparent.

In any case average farm real estate values have continued to decline to levels below what the comparative post-war levels of products-prices, relative to pre-war, and the post-war recovery in incomes from the low points of 1921 and 1922, had led some observers to expect. Other factors apparently are involved, although their importance is difficult to estimate. One such factor, at least in certain states of the Middle West, where data on that subject are available, is suggested by the fact that farm real estate values since 1920 have fallen faster than have farm real estate incomes as measured by cash rents, whereas prior to 1920, values rose faster than rents. In Iowa, for example, where our data on this subject are most adequate, the ratios of gross cash rent to value since 1900 averaged as follows: 1900, 7.7 per cent; 1910, 4.3 per cent; 1920, 3.6 per cent; 1925, 4.9 per cent; 1929, 5.6 per cent; 1930, 5.9 per cent.

The available net cash rent data, after the deduction of taxes and building depreciation, showed an average ratio of 2.6 per cent net in 1920, and 3.4 per cent in 1925, also an increase.

The current rate of return, in other words, has been widening or one may say that values are being written down, in the direction of giving a current ratio of income to value more in line with that obtainable on alternative employments of capital. If the conclusions of Chambers were correct, namely, that the tendency of land values to rise faster than rents prior to 1920 was owing primarily to a progressively increasing capitalization of anticipated future increases in income, then basically this process would seem to be largely a matter of counting less generously than formerly upon

future increases in income.[10] In an area which included Iowa, the northern half of Illinois, southern Minnesota, southeastern South Dakota and eastern Nebraska, Chambers estimated that in 1920, 56 per cent of the average current valuations of farm real estate was based on anticipated future increases in income, or, to state it another way, 56 per cent of the current value was not paying interest at the current average first mortgage rate of 5.5 per cent. The process may in some degree involve the oft-heard comment that farmers of today, especially the "younger generation" are insisting on a better living than used to be acceptable. Perhaps they are not as content as they once were to dig into the share of their income which should go to living in order to get money to pay off 6 per cent mortages on land priced to yield only half that much. The tendency to take "earning power" into greater account than formerly in appraisal for mortgage purposes may also have been a contributing influence.

Yet another factor apparently still exerting pressure upon values in some sections, more especially in the Middle West and South, is a large amount of foreclosed and other distress land thrown on the market or hanging over it—how large is not known. The wave of forced sales apparently has not yet run its course as is indicated by figure 3. In some sections, as in the Middle West and Southeast, more forced than voluntary transactions are taking place. In general, forced sale rates as yet seem little disposed to turn downward very rapidly. We also know, of course, that mortgages may and do postpone foreclosure. Undoubtedly an appreciable amount of excessive indebtedness remains to be adjusted. In some sections complaint has been made of price cutting by competing mortgagees seeking to get involuntarily acquired real estate off their books.

Another influence, of which real estate dealers seem to have been considerably more apprehensive during the last year than in preceding years, is that the principal sources of mortgage credit are placing their money much more conservatively than formerly. All phases of the extension of mortgage credit, generally speaking, have been revised toward greater strictness; applications are subjected to greater scrutiny, loan limits have been reduced, efforts to scale down renewals have been reported, loan territory has been

[10] Chambers, C. R. Relation of Land Income to Land Value. U. S. Dept. of Agr. Bulletin No. 1224.

contracted, and, in addition, interest rates recently have risen. Although the long time result of this more conservative attitude no doubt is for the better, the short time result during the transition from higher to lower value levels brings its problems. In any case, the change can hardly react otherwise at this time than to retard buying, temporarily at least.

Although perhaps a minor factor so far as the country as a whole is concerned, yet in some areas the element of physical deteriora-

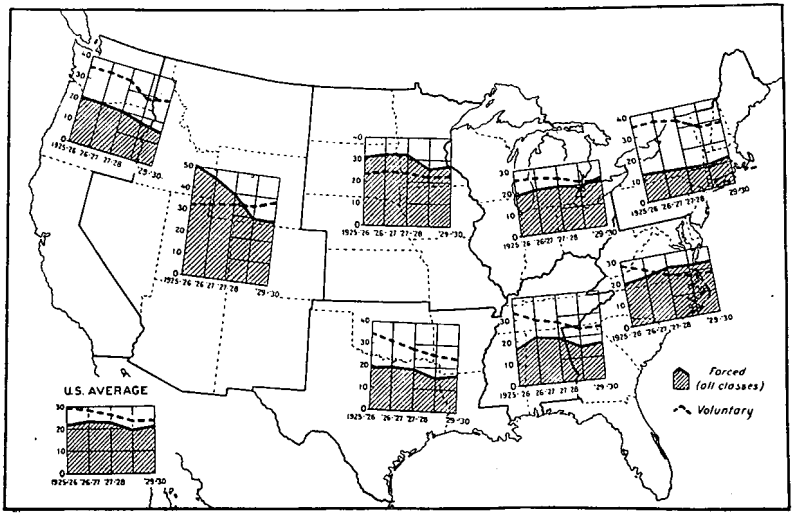

FIGURE 3. NUMBER OF FORCED AND VOLUNTARY SALES PER 1,000 FARMS, YEARS ENDING MARCH 15, 1926-1930

In some parts of the United States, the volume of mortgage foreclosures and other "forced" sales of farms has equalled or exceeded the number of voluntary sales in recent years. The large number of forced sales has exerted heavy pressure on farm real estate values.

tion of the land, the buildings and fences, and of other facilities is reported to be exerting an appreciable downward influence on values. In times of depression adequate farm maintenance becomes difficult.

In closing, mention at least should be accorded to changes in the utilization of land to higher uses, even under depression conditions, as has been shown for example in the transition from grazing to cotton and wheat growing in areas of the Great Plains. The rise of values there since 1920 has been a conspicuous contrast to the

declines which took place elsewhere. Recognition should also be made of especially adverse production conditions, as for example, the unparalleled boll weevil damage in Georgia and South Carolina in 1921 and following, which, directly and indirectly through other adverse conditions it helped to engender, was an important factor in the very severe declines shown in average farm real estate values since 1920 in those states.