

Research in Farm Real Estate Values

--Scope and Method--

Prepared under the direction of
**The Advisory Committee on Social
and Economic Research in
Agriculture**

JOHN D. BLACK, Editor

**E. H. WIECKING, Executive Secretary
of Special Advisory Committee on
Farm Real Estate Values**

SOCIAL SCIENCE RESEARCH COUNCIL

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ACKNOWLEDGMENTS

This report represents the joint effort of experienced research workers in its field in the United States. A Special Advisory Group designated by the Advisory Committee on Social and Economic Research in Agriculture, met and drew up the general outline for the report, made suggestions as to persons to help with various parts of it, and read and criticized the manuscript. The Executive Secretaries of the Special Advisory Committee, assisted the Chairman in revising the manuscripts submitted, fitting them together and filling in the gaps. The name of the principal contributor will be indicated in parenthesis at the beginning of each section of the report.

Advisory Committee on Social and Economic Research in Agriculture.

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EDWIN G. NOURSE, Brookings Institution.

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H. R. TOLLEY, University of California.

M. L. WILSON, Montana State College.

Special Advisory Group for this Report.

J. D. BLACK, Harvard University, Director of Scope and Method Project.

A. G. BLACK, Iowa State College.

C. H. HAMMAR, University of Missouri.

F. F. HILL, Cornell University.

C. L. STEWART, University of Illinois.

G. S. WEHRWEIN, University of Wisconsin.

E. H. WIECKING, Bureau of Agricultural Economics.

USES OF THIS REPORT

This report is No. 19 in a series on "Scope and Method" of research in the various sub-fields of agricultural economics and rural sociology. This series of reports is part of a program of assistance to research in these fields, upon which the Advisory Committee on Social and Economic Research in Agriculture set forth in 1925 under instruction from the Social Science Research Council. Each report undertakes to outline the research of some sub-field of agricultural economics or rural sociology and then discusses the problems in methodology that are peculiar to it. The outline of any sub-field is in large part in terms of a listing and discussion of specific research projects that have been undertaken or might be undertaken. Hence the discussion of methodology is largely in terms of specific projects.

It is expected that these reports will be useful in the following ways: First, directors of experiment stations and chiefs of divisions of agricultural economics and of rural sociology in land-grant institutions in the United States, and persons similarly responsible for direction of the research in agricultural economics and rural sociology of other types of institutions, will find the outlines of the various sub-fields of much help in laying out continuing programs of research for their institutions. Second, individual research workers, graduate students looking for thesis subjects, and teachers conducting research seminars, as well as the agencies above named, will find the listing and discussions of projects helpful in choosing suitable research projects. Third, the descriptions of research already done will save research workers from duplicating other work and help them to find a way of building upon it successfully. Fourth, the discussion of the nature of a project and the qualitative background will reveal the body of the subject-matter which needs to be mastered for its intelligent prosecution, and the difficulties involved, and thus save many research workers from launching forth upon projects for which they have not yet qualified themselves, or which may be too difficult for all but the chosen few. Fifth, the analysis of methodology will furnish a basis for a more intelligent decision as to the procedures and methods which will lead to valid and usable results. Sixth, the discussion of methodology will also suggest helpful devices in technique and details of procedure that might not otherwise be brought to the attention of the research workers. Seventh, the discussions of both scope and methods will make clear to those organizing research in any field the contributions which workers on different subjects have to offer to it, and point the way to the form of collaboration needed.

LIST OF CONTRIBUTORS TO THIS REPORT

The parts of this report contributed by each of the following are indicated at the beginning of each section. Those interested are urged to correspond directly with the contributor with respect to any phase or detail of his discussion.

JOHN D. BLACK, Professor, Department of Economics, Harvard University, Cambridge, Mass. Director for the Social Science Research Council of the Project on Scope and Method of Research in Agricultural Economics and Rural Sociology.

G. T. BLANCH, Cornell University, Ithaca, New York.

R. C. ENGBERG, Statistician-Economist, Federal Farm Loan Board, Washington, D. C.

F. T. HADY, Assistant Professor of Agricultural Economics, South Dakota State College of Agriculture, Brookings, S. Dakota.

C. H. HAMMAR, Assistant Professor of Agricultural Economics, College of Agriculture, University of Missouri, Columbia, Missouri.

W. A. HARTMAN, Senior Agricultural Economist, U. S. Bureau of Agricultural Economics, Washington, D. C.

F. F. HILL, Professor of Land Economics, Cornell University, Ithaca, New York.

R. R. HUDELSON, Associate Professor of Agricultural Economics, University of Illinois, Urbana, Ill.

W. A. JAMES, Research Assistant to the Director of the Project on Scope and Method.

O. M. JOHNSON, Senior Agricultural Economist, U. S. Bureau of Agricultural Economics, Washington, D. C.

M. SLADE KENDRICK, Assistant Professor of Rural Economics, Cornell University, Ithaca, N. Y.

W. G. MURRAY, Associate Professor of Agricultural Economics, Iowa State College, Ames, Iowa.

H. I. RICHARDS, Brookings Institution, Washington, D. C.

B. R. STAUBER, Assistant Agricultural Economist, U. S. Bureau of Agricultural Economics, Washington, D. C.

DAVID E. WICKENS, Agricultural Economist, U. S. Bureau of Agricultural Economics, Washington, D. C.

E. H. WIECKING, Agricultural Economist, U. S. Bureau of Agricultural Economics, Washington, D. C.

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Research in Farm Real Estate Values —Scope and Method—

Relative to 1912-14 taken as 100 per cent, the average value per acre of farm real estate for the United States as a whole, as estimated by the United States Bureau of Agricultural Economics, stood at 73 on March 1, 1933, as compared with 115, 127 and 170 respectively, on the corresponding dates in 1930, 1925 and 1920. According to the Census, the average value per acre of all land in farms in the United States, including the buildings, was in round numbers as follows: 1930, \$49; 1920, \$69; 1910, \$40; 1900, \$20; 1880, \$19; and in 1850, the first year for which the Census obtained these data, \$11. The marked differences which took place in the movement of values as between the different states and regions, and also within states, demonstrate the importance of studying values regionally.

The great fluctuation in values during the last twenty years has raised very practical problems for the individuals and agencies concerned with farm realty values—problems largely foreign to the experience of important agricultural sections of the country, in a number of which farm real estate values even during the '70's '80's and early '90's remained steady or rose, despite falling prices of products. Various new considerations in the outlook, furthermore, suggest that the valuation of farm real estate needs to be viewed more carefully and critically than it has been in the past, and emphasize the need for useful research in the field.

The specific ends in view in this report on Scope and Method of Research in Farm Real Estate Values are to define this field of agricultural economics, indicate its interrelations with other field of research, describe the research projects already undertaken in this field, classify and evaluate the methodology used, and suggest methods and procedures that may be used to advantage in different types of project. It is hoped that the discussions will be of assistance to those engaged in or responsible for the conduct of research in this field, that the various agencies engaged in agricultural research will be enabled to undertake a larger and more carefully considered body of research in land tenure as it affects agriculture, and that the methods employed and procedures followed will be such as to lead to more worth while conclusions and recommendations.

THE FIELD OF RESEARCH

(By E. H. Wiecking)

The field of research in farm real estate values may be considered under two broad divisions: (1) the theory and explanation of the movements and composition of values, both (a) geographically, i. e., as between farms, districts, areas, regions, countries; and (b) chronologically, i. e., from time to time for the same farm, area or region; (2) the methods and procedures for placing values on given pieces of farm realty for various purposes, e. g., purchase or sale, taxation, mortgage loans, benefits and damages, condemnation for public purposes, possibly in some instances for rate-making. The emphasis in the first is on "theory"; in the second, on "practice". The second is of course the familiar phase of appraisal or valuation: it is, or should be, essentially an application of principles developed in the first. The term *farm real estate values* may be used to designate the first division of the field; the term *farm real estate valuation*, the second. Valuation denotes the act of evaluating. Some persons prefer to circumscribe the term appraisal even more narrowly, limiting it to the function which the American farm appraiser has typically fulfilled, in the past, at least; i. e., the estimation of probable present market price of particular farms, taking the going price level for granted and as the basis of departure. Whether or not we accept this more restricted meaning, the division of functions suggested thereby may nevertheless be significant: best results will probably be secured if the field men continue to perform this traditional function together with that of obtaining needed data about the farm and farmer, leaving to the head office other aspects of policy and procedure which research may develop.

The pragmatic ultimate aims of research are, of course, through the development of principles, data and improved technique, to assist those more or less directly concerned with farm real estate values to direct their actions more intelligently. But in addition, research in the field may envisage broader social considerations: for example, where the value structure is such that current rates of return are very low, undue pressure is put upon the farmer's standard of living, and tenancy is stimulated at the expense of ownership? Without wishing to raise any questions as to the relationship between the two, or the relative importance of each, we may note in passing that the field offers ample scope for "pure science" research as well as "applied science." Nor need we dwell long on the practical importance of developing for farm real estate a consistent body of theory. Only when "facts" and year-to-year "running analyses" are cast against the background of sound principle and theory will they reach their rightful degree of validity and usefulness. Furthermore, forecasting is impossible otherwise.

Research, at least of a formal and systematic character, in either of the two broad divisions of the field, has on the whole been relatively limited in this country, partly, no doubt because valuation was so long regarded as presenting no pressing problems; partly, perhaps, because few adequate data are available, and to procure them usually involves considerable time and expense; partly, also, perhaps, because the complex nature of farm real estate value and the multiplicity of factors that affect it makes certain analyses difficult to handle statistically. In the United States much more work has been done in the urban field than in the rural. A considerable body of literature involving the valuation of farm real estate exists in certain other countries, notably in England, Germany, Switzerland and Italy, where problems of valuation for taxation, inheritance or other purposes are important, and where a free and active market for land such as makes valuation by the "comparative sales method" so easy in the United States, does not exist. Of the foreign literature, much appears to be concerned with appraisal practice; the studies using refined statistical methods are relatively few.

The relationship of the field to other fields described below suggests some of the basic principles, concepts and technical equipment with which the research worker may need to be familiar, depending, of course, upon the particular projects in question. In general, the principles and concepts of value and distribution theory are drawn upon at so many points that enumeration or discussion in detail are neither necessary nor feasible in this report; the subjects of rent, quasi-rents, interest and capitalization are of course of central significance. Familiarity with multiple curvilinear correlation, time-series analysis and other advanced statistical methods is also essential for many projects. The two volumes on *Research Method and Procedure in Agricultural Economics*, published under the auspices of the Social Science Research Council, will be found a valuable reference on statistical as well as other research methods. Legal concepts play so large a part in certain phases of the farm realty field that familiarity therewith will also be found advantageous.

Relation to other fields of research

Of all the fields of economic research, investigation in farm real estate values appears to be most closely related to research in commodity prices. Since farm real estate values are obviously types of prices, the research must be a type of price analysis. Differences between the two types of prices and the two fields of research, however, are readily apparent. Commodity prices, for example, are made in continuous, highly organized, highly centralized and inter-connecting markets into which the competitive forces of a wide, perhaps world-wide, scope are concentrated; and concentrated upon individualized products carefully and minutely separated by grade and quality. Farm real estate, on the other hand, is at the other

extreme of unstandardization; the requirements for a perfect market are largely absent; it is sold in a series of highly dispersed, little organized, local markets, loosely interconnected if at all; its markets are irregular and at times may practically cease altogether. In commodity-price analysis, prices actually paid are dealt with; in the farm realty field, "values" or estimates of "probable" market price play a large part.¹ Estimates and lack of grades together complicate the problem. The commodity-price analyst, again, has little to do with "values for a purpose"—to say "prices for a purpose" is to state an anomaly; in farm real estate, valuation for various "purposes", whether or not warranted in theory, must be reckoned with as a dictate of law or custom.

The most significant distinction, however, is that farm real estate is in the category of a factor of production; as such it occupies a different position in the theory of value.² A durable use-bearer, its value is derived from the future net value of its services; usually a composite of both land, strictly speaking, and embodies capital, it yields both rents and quasi-rents. In so far as it is naturally fixed in quantity, it has no supply price. In addition to all the factors which bear upon future net returns, a rate of discount and the phenomenon of capitalization are involved.

Inasmuch as all the influences which make the possession or use of a farm more or less desired are reflected in the value of farm real estate there are few other fields which research in values does not directly or indirectly touch. It must draw upon certain phases, at least, of the work of all of the commodity-price analysts, it must even go beyond the relatively short-time movements to which much of the work in that field has so far been confined into the phase of the longer-time trends; it must, perhaps, also be more concerned with *local* variations than price analysts on the whole have been so far. Cost elements, and also the element of the production organization and the combination of the factors of production, must likewise be evaluated. This analysis of inputs and outputs, highest-profit and least-cost combinations draws heavily upon the fields of production economics and farm management; and of course upon all those aspects of the engineering and technical fields which in any way have a bearing upon farm returns and values—soils, drainage, irrigation, clearing, roads, buildings and other "permanent" improvements, agricultural machinery, agronomy and plant breeding.

(1) The term farm real estate "value" is believed to be preferable to "price" as the general term for the field, since so frequently the data worked with are not prices in the sense of representing the results of actual bargain and sale, but are estimated or "probable" market prices. Furthermore, value is the term more commonly used in real estate affairs, and is more convenient than "estimated price" or "probable price". It would seem best to use "price" as synonymous with the customary legal term "consideration", i.e., the sum of money *actually paid* in the market.

(2) It is, of course, also to a degree a consumer's good; typically, however, this characteristic is distinctly secondary.

The value analyst's concern with taxation, and his close connection with the field of agricultural finance, both because much of his own work will be used in valuation for loan purposes, and because credit conditions and alternative investment opportunities of themselves have a reflex influence upon the farm real estate market, are of course apparent; nor can he escape an interest in tariffs and freight rates. Land classification and land utilization both affect values and in turn may be affected by them. Inasmuch as social considerations affect the desirability of farms for use or possession—often to a substantial degree—factors usually embraced within the field of rural sociology, broadly defined, are also involved. The fact that the boundaries of the province of law and legal institutions are also crossed has already been indicated.

Research in farm real estate values must necessarily consider also the theory of money and of business cycles, to the extent to which farm real estate values are affected and in turn may themselves affect price level movements.

Research in farm real estate values and valuation thus draws from a wide sphere; it must be defined broadly to include anything which influences the value of a farm; and in opening up a field in which research is relatively so new, to give it full range is perhaps best. The wide scope suggests also the opportunities for coöperation of workers in other fields.

Still another direction in which a sharp line cannot be drawn is between farm real estate and that affected in part by more or less non-agricultural uses, or land not now agricultural but potentially affected by agricultural uses. Woodland, for example, as a part of a farm, cut-over land as potential farm land, and so on, to farms affected by residential or recreational uses, and to the "part-time" farms operated in connection with city occupations—all are properly within the scope of this report. "Farm" or "agricultural" will be interpreted broadly, in this respect following in general the Census; i. e., vineyards, market gardens, poultry plants, etc., and in the West, ranching and range lands will be included.

Finally, research in farm realty values and methods of valuation may find helpful suggestions in the work that has been and is being done in the urban field, in which much more attention has been given to the valuation problem than in the farm realty field.

Among the sub-fields of agricultural economics which are connected with the field of farm real estate values and which will be given separate treatment in other bulletins of this series are the following: index numbers, farm incomes, farm family living, rural organizations, agricultural credit, population and food supply, public finance in relation to agriculture, transportation, land utilization, farm management, land tenure, and agrarian policy (including tariff duties).

SUMMARY OF RESEARCH

(By E. H. Wiecking)

An informal (and not fully complete) compilation of federal and state research projects finished or in progress in the field, whether or not published, including theses, indicates the following:

- (1) Primarily description and analysis of current changes in farm real estate values, and/or rents, volume and character of sales, or other related phenomena: *3 projects*. All are continuing projects. Sources of data are primarily county records, or questionnaires to farmers or real estate dealers.
- (2) Primarily description and analysis of time series of farm real estate values, and/or related phenomena, of considerable length: *13 projects*. Most of these pertain to only a few counties within a state. Problems of the data, their presentation and description have in most instances received more emphasis than detailed or refined analysis. Most of them use sales data obtained from county records.
- (3) Special studies of land "booms" and associated phenomena: *2 projects*. Data from field inquiries and county records largely.
- (4) Studies primarily of rents or "income" and their relation to farm real estate values: *6 projects*. Most of these rely heavily on the cash rent data obtained in recent Censuses, but considerable use of questionnaire data is also made. Geographic variation is ordinarily the primary interest, but movements in time are also covered.
- (5) Studies of the relation of different factors to the variation in values between individual farms: *8 projects*. The data are mostly obtained by farm-to-farm surveys, although questionnaires are also used. Approach varies from concern with only a single factor, whose "effect" on value is ascertained by directly questioning a farmer as to how many dollars a hard-surfaced highway, for example, adds to the value of his farm, to consideration of numerous variables simultaneously and determination of their relation to value by multiple curvilinear correlation methods. All studies pertain to the relations obtaining in a single year only.
- (6) Studies of the relation of different factors to variations in average values for townships, counties or similar aggregates of farms: *5 projects*. Census data are usually the principal source of material. Analytical methods vary from simple cross tabulation to multiple correlation.
- (7) Studies primarily of valuation for loans, taxation or benefits and damages: *6 projects*.

- (8) Other studies not classified under any of the above: 3 projects.

Bibliography No. 29 of the United States Bureau of Agricultural Economics, *Valuation of Real Estate, with Special Reference to Farm Real Estate*, will indicate the available American literature in the field published prior to about the middle of 1929. Only a few references to foreign literature are given, since it was not possible to undertake a systematic survey of the foreign field.

SOURCES OF DATA

A principal source of data in farm real estate values and related items continues to be the decennial, and in 1925, the quinquennial, reports of the Census. Beginning in 1850, each Census has presented the combined value of land and buildings by counties; beginning in 1900, the value of all farm buildings combined was presented as a separate item by counties; in the 1930 Census, the value of dwellings was presented separately for the first time as a third item, by counties. The 1930 Census for the first time presented the value of the following items by minor civil divisions: land and buildings combined, all farm buildings, and dwellings alone. All these value data are estimates as reported by farm operators. In 1920 and 1925 cash rents paid were obtained but not published; in 1930, cash rents paid were published by counties, separated according to whether the tenant was related to the landlord. The value of land and buildings for all cash-rented farms taken together was published by counties. For available Census data on farm real estate values in relation to various tenure items, and mortgage debt, consult the summary of "Federal Census Data on Land Tenure" in Bulletin No. 20 in the Scope and Method series. Average mortgage interest rates are published in the special Census of mortgage debt, for each year from 1880 to 1889, by states; and again for 1920, by counties. Data on farm real estate taxes were published for the first time in 1930, although they were obtained also in 1925.

Since the Census data are taken only decennially or, more recently, quinquennially, they have a limited usefulness for time-series studies of the behavior of farm real estate values. The only available original sources of annual data on sale prices actually paid, and on volume and character of sales or other transfers of farm real estate, covering any considerable period, are the county conveyance and other records. They are also usually the only available source for historical series on taxes, mortgages, interest rates, and similar items. In a few states, state tax commissions or other state agencies, and also some non-governmental agencies have been compiling these items more or less systematically for a number of years. Occasionally newspapers will be found to have more or less systematically published statistical

information on land sales and related items. Abstractors sometimes publish regular digests of realty transactions. No known sources for records of cash rents have yet been discovered in this country.

For current analyses of changes in the farm real estate situation, mail reports from crop reporters and farm real estate dealers and other regular reporting lists have proved reasonably successful. This source is frequently considerably cheaper and quicker and otherwise more satisfactory for current use than reliance upon county or other records. On the other hand, the possibilities of organizing a reporting service for prompt reporting of official recordings have by no means been fully explored.

For studies of the type of (5) above, farm-to-farm field surveys will usually be necessary. However, the federal and joint stock land banks, life insurance companies and other mortgage lending agencies have accumulated a mine of valuable data on their loan applications and appraisers' reports which has been very little utilized. The annual reports of the life insurance companies to the state commissioners of insurance will yield valuable information on such items as the amount and location of farm real estate involuntarily acquired and disposed of, and the price at which sold.

ANALYSIS BY PROJECTS

We now come to the main purpose of the report: to outline the field under discussion in terms of a suggested list of possible research projects, and to discuss methodology for each. This list is not intended to be inclusive of all possible projects, but instead to be representative of their topics and methodology. The projects were selected with the thought of the agencies likely to engage in research in farm real estate values constantly in mind—an agricultural experiment station, the United States Department of Agriculture, or certain others. The choice of a project by such agencies depends upon what projects have preceded it, the resources of men and funds available, and a host of other considerations. Accordingly, the projects are not mutually exclusive. Some are comprehensive, calling for macroscopic analysis of a large subject; others are confined to narrow subjects or to limited areas. Under such circumstances, the broad projects may cover the same field as narrow ones, but in far less detail. Several of the narrow projects might be combined into a detailed study of a rather large subject. This is most likely to be done when a limited area is to be covered, as in some of the case studies outlined below. In some instances projects overlap, but approach the subject from different directions. In the actual discussion an effort has been made to avoid duplication by cross-referencing to other projects, but a certain amount is inevitable. Moreover, some projects have been listed that are not likely to yield

tangible results, at least for the present, since neither adequate data nor satisfactory methods of attack are available. It seems likely, however, that progress will be furthered by calling attention to these problems, and by stimulating deductive and qualitative analyses which may lead to the collection of more adequate data and the development of more effective methods of attack. The limitations to present attack on such problems are, however, indicated in the discussion.

The Committee responsible for this report prefers to have it regarded more as an outline of the field and the problems involved than as an analysis of methods and procedures to be used. The relatively limited scope of research in the field of farm real estate values makes specific discussion of methods difficult for a number of projects; nor does the fact of publication necessarily mean that the Committee is in entire agreement with the views expressed, or regards any given project outline as complete or conclusive.

Throughout the discussion will be found references to *Research Method and Procedure*. This is a general discussion on method published in mimeographed form as an introduction to the present series of reports on particular fields. It is available in the libraries of most research agencies of the country, since nearly a thousand copies were distributed before the stencils wore out.

GROUP A

Projects Relating Primarily to the Character and Mechanism of the Farm Real Estate Market

PROJECT 1. Description and Analysis of the Organization and Mechanism of the Farm Real Estate Market of an Area, Including the Rental Market

OBJECTIVE: To analyze and describe the mechanism and forces which function in the sale and rental of farm real estate.

(By W. A. Hartman)

The turnover in ownership and operation of farms is rather large in many sections of the country. Where this is the case we need to know how and to what extent the existing machinery and forces which tend to bring together sellers, landlords and prospective purchasers and tenants are undesirable, and to explore the possibilities for the development of more satisfactory machinery and relationships. Any program for the coördination of the mechanism and forces that

function in a land market would need to appraise and classify all of the ways in which the ownership of farm realty is transferred (voluntary or forced), and leased. In some sections the control exercised by land-selling agencies and landlords through sale and lease contracts or agreements may have an important bearing on the kinds and methods of production, family living conditions, school, highway and other institutional development and character, social standards, etc. It is important, therefore, that desirable and undesirable features of sale and lease contracts be carefully analyzed and described.

The rental market phase of this study might be localized in areas where the practices with respect to leasing land are similar. These areas may be small or large communities depending upon the crops grown and the extent to which it has become customary to lease land along certain specified lines. Entire crop regions or the entire state may need to be examined as a basis for determining the areas in which different kinds of lease terms prevail. Each dissimilar area may then be sampled and studied intensively. It is not likely that many results of this phase of the study will be applicable to many different sections of the United States, because the rental market is, with few exceptions, extremely local in character.

The sale of farm real estate, however, is also national in scope. Almost half (46.7 per cent) of 1,258 land-selling companies included in a survey made by the writer in 1929-30 were engaged in interstate business, and slightly more than half of those engaged in interstate business were conducting so-called home-seeker's tours from various parts of the country to their respective projects. State and semi-state agencies, chambers of commerce and other types of agency advertise on a national scale the attractions and opportunities for the purchase of farm real estate in their respective states. The character of the appeal made, and the motivating forces underlying the activities of various sellers of land differ materially when the land held for sale is located in:

- (a) a relatively stable and established farming area; e.g., an Iowa county or group of counties.
- (b) a developing area which is "coming in" to a higher use; e. g.,
 - 1. The new cotton area of western Texas; or new "combine" territory of western Kansas;
 - 2. The cut-over area in the northern Great Lakes states;
 - 3. The citrus area in the Lower Rio Grande valley.
- (c) an apparently receding area; e. g.,
 - 1. Parts of New England and New York;
 - 2. Parts of the southeastern cotton states.
- (d) an "in-and-out" area, e. g., sections of Montana
[(b) (2) may belong in this class].

The examinations might be localized in an area of one of the above types, which may comprise less than one county, one or several counties in one state, or an entire region constituting parts of several states.

The principal contacts between this project and others in this report will be Projects 2, 3, 4, 7 and 14. The studies in land utilization will have to be drawn upon particularly when studying conditions in the types of areas referred to above under (b), (c) and (d). Likewise, the findings in farm management studies will need to be drawn upon to determine the type-of-farming and farm organization best suited to the land and local conditions in question. The project is also closely connected with studies in agricultural credit. Without adequate and sound credit facilities and institutions prospective purchasers and tenants are seriously handicapped, especially in the types of area referred to under (b) and (d) above.

Qualitative analysis is highly important in this project because of the intangible personal factors which influence and are influenced by the terms on which land is purchased or rented. The "hunger" for life in the country, the high psychic value which many people attach to farm ownership, together with the relative ease of purchasing land, particularly undeveloped land; the ignorance of many prospective farm purchasers and tenants with respect to managing a farming enterprise profitably; and the misjudgments or misstatements of various types of land-selling and promotional agencies concerning the physical and economic limitations of land for profitable farming are motivating forces in the farm real estate market which require careful consideration. They operate whether prices for farm products are relatively high or low. Relatively high prices for farm crops make the farm real estate market even more active. The economic history of agriculture has been characterized by recurring cycles in which temporary price stimulus led to increased expansion of farm acreage. A qualitative analysis of the many reasons why people buy and rent farms is essential to describe fully the mechanism and forces operating in the market as they affect sale prices and rentals. Nationality, age, previous farming experience, family composition, available resources and similar factors influence the terms of purchase or rental which may prove satisfactory to one person and unsatisfactory to another interested in the purchase or rental of farms in any specific locality. In the determination of farm prices, these factors or forces are likely in all areas, but particularly in newly developing areas, to be far more important than the estimated productive capacity of the farm. They will possibly be less important in relatively stable and established farming areas.

A classification of land-selling and leasing agencies according to the nature of their business is essential to describe fully the farm real estate market in any particular area. Many owners of un-

developed land held for sale for farming purposes, and unwilling owners of farms, are compelled, on account of the pressure of carrying charges, either to allow such lands to revert to public ownership through tax delinquency or to push the sale or rental of their land on any terms regardless of its suitability for farming. From the point of view of the owner, to sell or lease farms and undeveloped land under almost any conditions is better than to lose title to it through delinquency. Liberal credit terms, and promises of various types of grubstakes (lumber, part-time employment, livestock) offered to prospective purchasers and renters of farms and undeveloped farm land by land-selling agencies may have a tendency to attract unqualified farm operators to lands unsuited for farming purposes. This tendency is more likely to prevail in areas referred to under (b) and (c) above than in those under (a) and (d).

A mail questionnaire might be sent to county agricultural agents, bankers or others who are familiar with rural activities to obtain information on

- (a) prevailing terms of lease contracts
- (b) localities in which farms are usually rented
- (c) names and addresses of landlords and land-selling agencies
- (d) general practices in the sale and rental of farms and farm land.

A second mail questionnaire might be sent to all land-selling agencies requesting information on the nature of the organizational "set-up" and business activities; farms and land held for sale; terms of sale, etc.

However, direct contact with tenants and purchasers of farms and with representative landlords and land-selling agencies in typical communities or localities will be needed to obtain detailed information and as a means of checking the questionnaire information.

Possibly the nearest approach to a representative sample of the land-selling and the farm-lease aspects of the real estate market will be to obtain general information concerning each by mail questionnaire (as suggested above) and detailed information by field survey in several representative localities selected on the basis of the extensive survey. If the state is selected as the unit for study, an effort should be made to cover it as completely as possible by the use of a mailed questionnaire. Detailed information should be obtained from a carefully selected sample in each representative locality.

Comments (by E. H. Wiecking)

Dr. Hartman has outlined this project primarily from the viewpoint of ascertaining the desirable and undesirable features of market practices. It could also be handled from the point of view of how prices, in the case of the farm ownership market, and rents, in the case of the rental market, are in practice arrived at; how the market methods, mechanism and operating forces function in making sale

prices and rentals; the relations between the rental and ownership markets; the extent to which the requirements of a perfect market are met, etc.

Project 4 in the report on Land Tenure will be helpful for the analysis of the rental market from the price-making point of view.

PROJECT 2. Organization and Mechanism of the Market, Using the Institutional Approach

(By E. H. Wiecking)

This project is in general similar to No. 1, but the institutional approach will be found most useful, i.e., the methods on certain types of institution operating in the market require intensive study. As in Project 1, the aim may be to ascertain (a) the desirable and undesirable features of their practices and policies; or (b) their place in the market and in the price-making process, and their influence on farm real estate prices, sales activity and rents.

Among such important institutions are, for example, companies of the active settlement, colonization and development type, including the combined sales and "operating" company. For the type last named, tobacco "plantation" and citrus-land sales companies, which also operate for a period of years the properties sold, are examples. Another type of agency requiring study is the broker-dealer organization which does an interstate business over a wide territory.

This project will be largely a series of case studies of the selected agencies. Some of the information needed may be obtained by questionnaires, from the organizations concerned, their clients, banks, or from other qualified persons or agencies, but only personal inquiries will yield the information really essential. Probably few agencies will be willing to open their records. A schedule should be prepared for interviews with clients, but should not be in evidence during the conversation; skillful questioning and memory will have to be relied upon. County conveyance and mortgage records may be helpful.

Comments (by J. D. Black)

This type of project is very necessary as a follow-up for Project 1. The writer found that data obtained by mailed questionnaires in Minnesota were useful only in providing a basis for a rough classification of types of agency, in laying plans for systematic field study, and in providing a few superficial facts for the gaps between districts not covered in the field work. The field work should be planned with a view to making case analyses of a small group of carefully selected representatives of each type of land-selling agency and each type of area included in the study. The principles involved in the selection of cases are discussed fully in other reports in this series (see especially *Farm Family Living*), and in *Research Method and Procedure*.

PROJECT 3. Attitudes toward Land Ownership and Land Values (Joint with Rural Social Psychology and Agricultural Land Tenure)

OBJECTIVE: To determine, measure and explain the attitudes of the public, especially the farm public, toward farm purchase, ownership and values.

No attitude studies with these particular objectives are known to have been made, although some of the existing studies on values or tenancy have included relevant questions. Attitude studies in the farm realty field appear likely to yield sufficiently illuminating results to well justify a few experimental ventures.

No detailed treatment will be made, since the technique and problems of attitude study have been discussed quite fully in other bulletins in this series (See especially the report on Rural Social Psychology, Project 12 in the report on Land Tenure (No. 20), and Project 43 in the report on Public Finance (No. 1).

PROJECT 4. Farm Real Estate Dealers' Licensing Laws

OBJECTIVE: To determine the nature of these laws and their effectiveness in operation.

GROUP B

Projects Pertaining Primarily to the Collection of Data on Farm Real Estate Prices and Related Items

PROJECT 5. Historical Data of Changes in Price and Volume of Sales of Farm Real Estate

OBJECTIVES: To collect and organize into series historical data of prices of farm real estate, or estimates of value,¹ and of other data needed to supplement and explain the changes therein; same for character and volume of all types of transfer.

(By W. G. Murray)

Through a study of this type, a picture of the land market over a period of years will be obtained. Three types of information are requisite: average sale price of land in representative areas, volume of sales and acreage transferred, nature of the transactions. The interpretation of these changes is more important than the collection of the information.

(1) Where sale prices are not available, estimates of values by farm-owners or others may at times be substituted.

This project is needed as a background for Project 6, whose object is to determine current changes. Once series of prices and acreage of land sold over a long period is secured, they can be kept up to date by a continuation of Project 6. For example, a study of land prices in Story County, Iowa, from 1852 to 1921 was made in 1922. At intervals since 1922, the series of prices and acreages of land transferred in this county have been extended with small expense in time and labor. At each extension it has been possible to interpret the recent changes, and forecast the future, against a background of this long period, taking account of trends and reversals of trends and their reasons, and any possible evidences of cyclical movements.

This project may properly be limited to data on land transfers for a period of years in a restricted area. On the other hand, information on farm mortgages, foreclosures, and interest rates as provided by Project 30 in Research in Agricultural Credit (Bulletin No. 3 of this series) will be useful in accomplishing the fourth objective, namely, the interpretation of the changes in the land market. For the same purpose, data on rents and on prices of farm products would be desirable. These data might, however, be furnished by other studies rather than as a part of the present study.

County records are the best source for historical information on land transfers. They are accurate copies of the original deed of transfer. Fortunately, these records are open to inspection, and generally are readily accessible. However, they are not complete, since some deeds are never made a matter of record at the court house. Nevertheless, the necessity of showing a clear title in order to obtain mortgage loans makes the recording of deeds the usual procedure.

The main difficulty with county records is the omission in the deed of the consideration involved in the transaction. Custom plays a part in this practice, so that the amount of trouble encountered on this point will vary from area to area and period to period. During periods when revenue taxes are collected on real estate transfers, the consideration may be estimated from the tax paid, which usually appears on the record of the deed. Preliminary investigation should be made, therefore, to ascertain the number of transactions where no consideration is recorded. If a majority of the transactions are recorded as for "one dollar and other valuable considerations", the setting up of a good land price index will be seriously handicapped.

Another problem presented by the county records is to separate the *bona fide* land sales from assignments of trades in which there is no cash consideration. In these assignments, the consideration given may be the amount of mortgage encumbrance on the land instead of the transfer price. Another problem is to separate the farms sold between relatives at prices usually below the prevailing market. Similarity of the names of grantor and grantee will sometimes in-

dicating transactions between relatives, and for records of the past is almost the only possible check.

The deed of course gives no data on the quality of the land transferred, but the location of the land is usually described in detail, and the sale price can be related to known facts concerning the soil and quality of land in the locality in general, worked out through a land classification study such as outlined in Project 4 in Research in Agricultural Land Utilization (Bulletin No. 2 in this series) or Project 7 in this report.

Kansas is an example of a state having the data needed for this project in very usable form in the records of the State Tax Commission (see Kansas Bulletin 235, *The Trend of Real Estate Taxation in Kansas from 1910 to 1923*). On pages 74 and 75 of the Bulletin, this statement appears:

“ . . . County assessors are required to make a detailed report each year of the items of real estate sold for a *bona fide* consideration in their respective counties. Each item is reported separately, showing the date of transfer, description of the land, number of acres, selling value, assessed valuation at the time of transfer, and assessed valuation in per cent of selling value. County assessors are specifically instructed to report *bona fide* sales only, and to reject all transfers for ‘one dollar and other considerations’ and those showing inflated values such as might be involved in trading real estate”.²

Regular statistical tests should be applied to determine the adequacy of the sample. One township is likely to present wide variation from the average of the county in which it is located. On the other hand, several townships in a county will often give a sample representative of conditions in a district of several counties. Of importance, therefore, is an indication of the variation that exists in the area in which the sample is to be selected. If Poisson conditions can be established by a classification of the land according to the Census reports or to other material, a much smaller sample will serve than would otherwise be necessary. This preliminary stratification of the universe is obviously of inestimable value in the choice of a sample in areas with widely divergent conditions.

Two methods of collecting the data are usually available: to copy the material direct from the county records, and to take the information from the books of an abstractor. The original records in the county offices are preferable because the description is generally more complete, and other information that does not appear in the books

(2) “Such instructions may or may not have been followed and experience with similar arrangements in certain other states has clearly demonstrated the need for careful scrutiny before accepting ‘the word of the record’. Nor are the county records in many states as satisfactory or as accurate as they are in Iowa. In certain parts of the country the county records are practically useless for purposes of this project.”—E. H. Wiecking.

of the abstractor may be thereby secured. If any individual parcel of land is studied by itself, however, abstract books are much better.

Schedules and forms will depend on the information to be gathered and on the availability of tabulation equipment. Where possible a study of this kind should be carried out with punch cards which can be run through tabulating machines. These may even be used as the original cards on which the data are copied direct from the transfer books in the court house.

The first problem in the analysis is to determine the acreage where it is given in metes and bounds or in fractional terms. In instances of this kind the use of a plat book, if available, is helpful. The next question is to separate the land transfers according as they are or are not *bona fide* transactions. Separate divisions should be set up for sales within the family, sheriffs' sales, assignments and tax sales.

A variety of questions, of which space does not admit consideration here, arise in the calculation of the statistical series of land prices. An interesting treatment of the subject is contained in a study by F. M. Thrun, *A Local Farm Real Estate Price Index*, published in 1929 as Technical Bulletin 96 of the Michigan Agricultural Experiment Station. Another discussion is in the Kansas bulletin referred to above. The South Carolina bulletin by Jensen and Russel, *Studies of Farm Land Prices and Ownership*, includes information from 10,051 deeds made over a period of 100 years, supplemented by material on mortgages and on farm management practices in the area studied. The individual township surveys by A. H. Lindsay for the Institute of Land and Public Utility Economics (in an unpublished doctoral thesis on land values in Iowa), the studies conducted by the Division of Land Economics of the United States Bureau of Agricultural Economics, Missouri Research Bulletin 154, *The Missouri Farm Real Estate Situation*, and H. R. Moore's *Semi-annual Index of Real Estate Values in Ohio*, should all be considered carefully in preparation for this project.

PROJECT 6. Current Data of Changes in the Farm Real Estate Situation (Joint with Agricultural Credit)

OBJECTIVES: To collect and organize into series the current data essential to: (a) describe the course of farm realty prices;¹ (b) describe the other changes in the farm real estate situation; and (c) explain both.

(By E. H. Wiecking)

A project of this kind may have for its objective the collection of data for *private* use only, e. g., for a mortgage lending institution

(1) Estimates of values may sometimes be substituted for sale prices.

or group of institutions, or for *public* use. Full recognition should be given to the possibilities of a coöperative "service bureau", an information clearing house, jointly maintained on the first basis. However, it is believed that a public project at present offers the greatest possibilities.

The more immediate objective of the project is to determine the best ways and means to that end: scope, content, sources, organization and current operation, analysis and presentation of data, and costs. This project is concerned with problems of assembling current data. Project 9 is concerned with the *use and interpretation* of these data.

A program of current information and analysis should be of direct use to the various mortgage and other financial agencies as a guide to appraisal and investment policies and procedure, and to farmers as a guide in the purchase of farms. It should also be of material aid in gradually correcting the generally uncritical attitude toward land purchase. In times of boom or depression, such a current analysis may serve to correct undue optimism or undue pessimism, both with respect to land purchase and to the extension of credit. In the course of time the project should develop a set of hypotheses concerning movements of farm realty values and related phenomena, and a body of significant data of known quality, which will serve as a basis for more careful verification of these hypotheses than is possible in a year-by-year running analysis.

Three types of program may be considered, giving (1) broad general trends, e. g., for a whole state; (2) main trends for areas within states; (3) still further detail, e. g., actual sales of farm real estate, verified for representativeness and accuracy, available as individual items so they can be "spotted" on the township plats, etc. The first two serve questions of general policy—the last gives specific operating detail, especially useful for appraisers. Great variation in conditions are found within many states, and in general it may be said that the more specifically applicable information is to local areas the more useful is it likely to be. The greater the detail the greater are the cost, administrative attention and statistical problems likely to be.

Such a program obviously is not complete unless it includes all types of information which have a significant bearing upon the course of farm realty prices and incomes, such as that on prices of farm products, trends in production and consumption, population movements, the general price level, taxes. Broadly speaking, the body of information and analysis covered by the term the "agricultural outlook", especially the long-run aspects, is essential for such a program. For the most part it will be provided by other projects.

With respect to specific realty items with which this outline is primarily concerned the following information is needed:

1. Farm real estate prices: estimated "values", actual sale prices, or both. Prices realized at forced sale, where the purchase was made by an independent third party "in good faith", if obtained, will be useful.
2. Realty earnings: the components of earnings, gross and net earnings, ratios of value.
3. Mortgage rates of interest: for comparison with the ratios in No. 2. If the changes in mortgage rates also indicate changes in the rate of capitalization, values may be expected to change. The general difficulty of financing prospective purchases presumably affects sales activity and prices. Hence data on credit conditions, rates of interest and *willingness* to lend at these rates, and conditions attached to grants of loans must be taken into account.
4. Activity in the principal types of land transfer, but especially in voluntary and "forced sales", including land deeded back to avoid foreclosure.
5. Ratios of loans to sale prices on both old and new loans. These may be useful indications of whether loans are running too "strong", as well as of possible later defaults with their possible repercussion on land prices.
6. The "stock" of "distressed" land, that is, land in process of acquisition or actually held by loan agencies, which is hanging over the market; details of total disposals during the year, with prices and terms of sale; total annual acquisitions, and the net increase or decrease in the total held and on the way to being taken over, etc.; similar data for tax-delinquent land.
7. Comment, current opinion, attitudes. Much highly useful information cannot be expressed numerically. Qualified comment is frequently invaluable to proper interpretation of statistical returns.
8. Changes in appraisal and loan policies and practices; e. g., in some sections and by some agencies loans are now refused on farms that are not located on hard roads. If this is made a general policy, it may affect seriously the salability and price of such farms.

Sources and agencies of information which may need to be considered include the following:

1. The crop reporting system of the Department of Agriculture and coöperating states.
2. The establishment of special reporting lists, e. g., real estate dealers and loan correspondents.
3. An annual census of selected areas.

4. Newspapers, abstractors' blotters, and similar commercial reports of land and mortgage transactions.
5. The county conveyance and mortgage records. Possibly a "sample-county" system would be feasible, with all transfers and mortgage details reported promptly by a county official, abstractor or other individual.
6. State tax commissions and other state agencies.
7. The lending agencies may not only give access to data in their own files but also possibly cooperate by having their field men collect certain additional data.
8. Other agencies. One of the railway companies, for example, collects sales and other data for use in connection with tax assessments of its right-of-way in certain states.
9. The periodic enumerations of the Census.

Each of the types of information suggested has its difficulties. For example, nothing appears simpler than the use of sale prices of farm real estate. However, a mid-western state which perhaps has worked more than any other agency with sale prices (as a basis of equalization) will not accept the official conveyance records for sales, but carefully investigates every transaction. Considerations may be falsified despite laws forbidding the practice. "Wash sales", sales between relatives for less than the going market price, all varieties of conditional sales, sales for non-agricultural uses, etc., must be eliminated. The problem of *grades* or *qualities* of farms must be considered. Finally, it is pertinent to note that the state referred to has in recent years made little use of sale prices. Too few *bona fide* farm sales are being made at present to give a reliable basis. *Estimates* by competent appraisers are being relied upon instead. This raises the question of estimated values *vs.* actual sale prices. The writer believes that much is to be said for obtaining both, since (1) they may serve as checks on each other; (2) when sales are few and the character of those few in doubt, estimates will at least give a rough index of the trend in people's *ideas* of values; (3) when the market is very active, a comparison of an average of estimates with an average of current sale prices, say for a county, may show a significant divergence.² Obtaining estimates through crop reporters raises all the problems of sampling and of preparation of mail schedules.

It is believed that the best results will be obtained if the project is carried out under the leadership of a public agency, either the state agricultural college or the Department of Agriculture. There is much to be said for a cooperative federal-state organization of the project.³

(2) See U. S. Department of Agriculture Bulletin 1224.

(3) See *Journal of Farm Economics*, Vol. XI, No. 3, pp. 445 ff.

Problems of organization into series will include editing the returns, sampling, weighting, kind of average to use, type of index number, and shifts in grade or character of the farm real estate from time to time, to which detailed discussion need not be given at this point. It is important, especially for data obtained by sampling, that check data be used wherever available.

There is much to be said for the practice of not publishing a new series of data until it has been collected for three years and opportunity given for careful testing and checking. Regular publication of preliminary results, although serving the interests of promptness, may only cause needless confusion and criticism if subject to great revision.

Absolute figures *vs.* relatives enters as a problem of presentation as well as of analysis. Some series of sample data may be so affected by apparently inherent biases that they would misrepresent the situation if published as absolutes, yet for all practical purposes may indicate relative change very well. Also, certain agencies furnishing important data may wish not to have the absolute figures disclosed, but will have no objection to the publication of *relative* changes.

The interests of students in agricultural credit, public finance in relation to agriculture, and land economics join or are closely parallel at several points in a project of this kind. Excellent opportunity is thus provided for coöperative effort (see especially Scope and Method Bulletin No. 1, Projects 5 and 6, and No. 3, Projects 24 and 30).

Similar research in progress

As complete a program as that herein outlined has not yet been carried out. The Department of Rural Economics of Ohio State University publishes a periodic survey for Ohio. The Department of Agricultural Economics at the University of Missouri has recently undertaken an annual survey for that state. The Division of Land Economics of the Department of Agriculture has made a beginning along this line in its annual *Farm Real Estate Situation*.⁴

PROJECT 7. Classification of Farm Realty as a Basis for Price Quoting

OBJECTIVE: To develop a system and method for the classification of farm realty by grade, type and quality, for use with actual farm prices and with estimates of value.

(By C. H. Hammar)

Movements in prices of farm real estate are usually measured in averages. Thus, we investigate the movements of sale prices of farm

(4) For further information on various problems raised in this outline, see the appendix to U. S. Department of Agriculture Circular 15; the *Journal of Farm Economics*, Vol. XI, No. 3, pp. 445 ff; and Illinois Bulletin 356, p. 81. On the general topic of values and valuation, see U. S. Bureau of Agricultural Economics Bibliography No. 29, *Valuation of Real Estate*. ✓

real estate without regard to variations in kinds or types of real estate that go to make up the general category. This involves the assumption that by and large the changes in price or value of specific types of farm follow the changes of the composite that is being studied. But we know that ranges in prices by grades of land may vary considerably over a period of years. Moreover, the dealer in farm real estate faces in every transaction the necessity to adapt averages to a specific piece of property. Historical study of prices therefore should if possible distinguish types of land, and be supplemented by a horizontal analysis of prices of specific grades of real estate.

Criteria that might be employed to establish a system of grades for the classification of farm real estate are diverse and numerous. A division into the physical and economic helps little, since the two are so closely related. The better method is to approach the criteria by a series of approximations. The extreme departure from grades in reporting real estate values is represented in the national index of the Department of Agriculture. Indexes for geographical divisions are a step away from this. State indexes have still more specific application. In some respects the county averages are still better, but genuine homogeneity can never be attained if we insist on respecting civil boundaries.

A more effective approach is by type-of-farming areas within the state, but even here only a very gross approximation to a desirable homogeneity is attained. As has been said, the type-of-farming area analysis is an attempt to take numerous and often quite unrelated criteria, not only of farming practices, but also of physical factors that induce variations in them, for the purpose of synthesizing a composite regional picture of the farming of a state. Only by chance do the individual farms in the areas conform closely to the implications of any one of the many criteria employed. Nevertheless, this approach does focus attention on the diversity of farm real estate in a peculiarly forceful way and is a proper initial step.

For estimated values emanating from crop reporters and others this is probably as much differentiation as will prove advisable, since they cannot safely be considered capable of distinguishing fine differences in farm real estate. We have, furthermore, no assurance that the central offices compiling the reports have the technical knowledge to supervise effectively the work of reporters where fine distinctions are involved.

For sale prices the circumstances are quite different. The original data are actual transactions in specific tracts of real estate for which in most instances a legal description can be secured.¹ Real estate

(1) The problem is greatly complicated for metes and bounds descriptions. To grade land in such area, field work is apparently the only solution.

can thus be graded relative to one very important characteristic,² namely, soil. The soil is a universal and permanent feature of every farm, except as affected by erosion and other changes in land conditions. Soils are of course closely correlated with topography. Information on soils and topography has the advantage that it can be furnished by an outside agency whose attitude toward problems arising in the field of economics is unquestionably objective and unbiased. Soils are commonly the most valuable single agency that farmers utilize in their efforts to produce farm commodities. Significantly the same data make possible the zoning of tracts with respect to roads and markets.

For accurate quotations, the foregoing information needs to be supplemented by data concerning building equipment and other improvements, land reconstruction, and depletion of soil fertility and related factors. These cannot ordinarily be secured without visiting the farms.

Furthermore, in occasional counties the soils pattern may be so complex that an adequate sample of sales of tracts with a single soil type cannot be obtained. Field work will make it possible to relate the sale prices to the proportions of soil types in individual farms. In some instances, the average prices of reported sales may be related to average proportions of soil types in different parts of the country.

Grading on the basis of soil type does not promise perfection. It does afford a workable method making real estate value data understandable and usable to researchers, dealers and farmers.

GROUP C

Projects Primarily Concerned with Describing and Explaining the Movements of Farm Real Estate Prices and Related Items in the Past

PROJECT 8. Time-series Analysis—Historical Data

OBJECTIVE: To define and explain time-series movements in (a) farm real estate prices, and (b) the volume and character of transfers of ownership.

(By B. R. Stauber)

The problems of analyzing time series of farm real estate prices are similar in many respects to those encountered in the study of

(2) Sufficient soil survey work has not been completed in all states to make possible grading such as is here suggested. For the United States as a whole approximately 26 per cent of the total area has been mapped in detail. In 17 states about 370,000,000 acres have been mapped under the reconnaissance method which is less exact but probably sufficiently accurate for real estate grading purposes.

other economic time series. The presence of trends, cycles, perhaps even seasonal variations, episodic movements and residual fluctuations are to be expected, and the importance, regularity and changing nature of the various components will influence the order of their elimination and the method of their treatment. The choice of analytical devices, with which the qualified research worker is familiar, depends to a large extent upon the nature of the data at hand.

In the ideal study, the collection of data (treated at length in Projects 5 and 6) will be subsidiary to the problem of analysis, discussed herein, and the objectives of the subsidiary study are presumed to have been attained when satisfactory data have been provided for the analysis. In many studies, however, these two aspects of the larger problem will not be so closely articulated and such data as has already become available will provide at least part of the material for analysis. In either event, attention must be given to the precise nature of the basic data, and to securing a suitable degree of refinement.

The real estate market is so constituted that quotations upon parcels of land of exactly the same quality are, in practice, almost out of the question. Classification upon the basis of soil type may under some conditions be helpful, but the lack of sufficient cases in certain years limits the applicability of this procedure. Where the basic data have been derived from county deed records, sales between relatives, sale of divided interests, tracts of land near or in cities or villages, registration of "confirmation" sales at a time much later than the original sale, and the difficulty of ascertaining whether the stated consideration does or does not include the reported mortgage are among the factors which may, and often do, result in per acre values distinctly out of line with the majority of sales. The location, rectification or elimination of errors due to these and similar causes requires a careful preliminary inspection of data. Failure or inability to accomplish such correction may create difficulties throughout the analysis.

It is, of course, essential that not only the data of one year be fairly comparable with those for another, but also that this hold for any index or combined series which is built up for analysis and comparison. It sometimes happens, for example, that in early years, data for one or two counties within a given area comprise the sample, whereas in later years, data for additional counties are available. In adding counties to the series, comparability must be maintained. If a third county is added to a two-county average, the three-county series will not in general be comparable with that for two-county series unless the method of combination is such as to eliminate the effect of differences in the levels of values in the several counties. Similarly, a straight arithmetic average of a county in which values are relatively high, with one in which they are low, serves to obscure

the *relative* changes in the low-value county. From the standpoint of reflecting economic factors, a change in the low-value county is probably just as important as a similar change in a high-value county. The method of combination, in so far as possible, must be such as to accomplish the objectives of a broad sample, and at the same time to retain such characteristics of the component series as are significant from the point of view of the economic relationships involved. These problems, though familiar enough in the construction of index numbers, need to be recognized in this connection.

When the data have been cast into one or more series acceptable for analyses, the probabilities are that several types of movement will be evident. In most instances no one simple curve will satisfactorily represent the secular trend for more than a relatively short period. This fact has a bearing upon the statistical devices used to represent trend and in some instances may suggest the use of some of the more flexible devices such as proposed by Ragnar Frisch.¹

Qualitative analysis will play a large part both in seeking to explain the observed movements and in judging the reasonableness of the results of the statistical manipulations. This phase of the problem is especially important if the analysis is to be of use in judging future trends. Economic history will thus play an important part in this project. For example, changes in the direction or slope of trends will usually reflect the occurrence of special events or combinations of events. The upturn in values about 1900 is one example, and the peak of 1920 is another. Other less striking features of local history will undoubtedly be found exceedingly helpful in the understanding of other fluctuations.

From another viewpoint, additional "critical points" may be mentioned. The turn of the twentieth century coincided quite closely with a change in trend of the price level. It was also approximately the end of an era of agricultural land expansion, and fear arose in some quarters of an impending land "scarcity". The combination of circumstances resulted in a marked acceleration of the upward trend of land values in many sections.

The effects of still other factors of a more or less continuing nature need to be considered also. The present restricted immigration policy, for example, as contrasted to the policy maintained in earlier years to encourage the influx of "land hungry" immigrants is probably of importance as it affects not only the direct demand for land, but also broader questions of growth and composition of population, which indirectly and over longer periods, affect the demand for the products of land. Development of transportation facilities is of importance from a local point of view. In addition, however, attention needs to be given to the broader aspects, such as the continuing extension of railroads, canals, waterways and highways, the development of a

(1) *Statistical Analysis of Time Series*, mimeographed by the Laura Spellman Rockefeller Memorial.

rather inflexible freight rate structure, and in more recent years the increasing degree to which the motor truck has become a factor in transportation.

Isolation of the cyclical element makes possible an examination of the response of land values to the more transitory and changing economic factors. Determination of the effect of produce-price cycles on land values, both as to extent and timing, is a problem requiring further study. The cycle of land values may not be so simple in its origin, however, for in addition to commodity price changes, such factors as changes in policies of mortgage financing have varied greatly from time to time. Frequency of distress sales, holdings of involuntary farmer-owners, and the rapidity with which such holdings are sold, are highly important. Examination of the effects of such factors on a comprehensive scale will provide much essential information.

In the analysis of cyclical change, the effects of continuing developmental factors need examination. For example, are land values more responsive to price changes of farm products now than in earlier years, owing, among other things, to the increasing tendency of agriculture to produce for a commercial market rather than for a self-sufficing economy?

Application of rent and income theory to the historical records of land values provides a particularly intriguing field for investigation. In certain respects it would be highly desirable if series of net rents were available with which to correlate land values. As a practical matter, however, the net-rent attack is of very limited application because of the narrowly restricted compass within which such data are available historically. Rents, however, are themselves the resultants of other factors such as prices, yields, expenses of production, their interrelations, and their relations to competing factors and areas; and these can be studied directly. Thus the effects of changes in prices of commodities and services can be studied in their relation to land values.

But it is also desirable that the effects of even more fundamental factors be explored. For example, the rapid growth of population in the United States has been an important factor in the rise of land values. Also there is need for a critical examination of the effects of improved techniques on land values, standards of living, and the movement of population between city and country. The validity of the conclusions reached in this project, especially in so far as future trends are concerned, will depend in no small measure upon the adequacy of the analysis of the parts played by such fundamental factors.

It may be that the foregoing analysis will reveal aspects of the real estate situation to which adequate correlation technique may make a contribution. For example, the relation between earnings, trends of prices and of land values lends itself to the correlation

approach when the supporting data are available. Such a study may include the nation as a whole, or it may profitably be by homogeneous regions exposing significant differences in the "constants" applicable to the different areas. It may be worth while to include separate studies for marginal, super-marginal and sub-marginal areas.²

In the light of the theoretical and practical difficulties involved in distinguishing income attributable to land from that attributable to the farmer's labor and to his capital, there is a very distinct need for a study showing the relation between a measure of income attributable to land, such as, for example, net rent, and other measures of income, such as prices of products sold, their quantities, and prices of commodities purchased. The place of the interest rate may well be considered in this connection. All such relations may change through time. A particularly important problem which may be elucidated by means of the correlation approach concerns the fundamental basis of valuation, namely, the present value of future but unknown incomes. The course of such a theoretical value could be traced through past time. A comparison of such a course with that actually followed by land prices should serve as a critical commentary on past and present methods of appraisal, and stimulate attention to the relation of this subject to the long-time outlook for price levels and price relationships between different groups of commodities. Particularly important at present would be quantitative knowledge of the effect of the large quantities of foreclosed land which are hanging over the market and also their effect in producing a cycle or an episodic movement in the relation of realized land prices to a computed "true value" as indicated above. The discussion must necessarily be in general terms. Many of the suggestions cannot be carried out until more adequate data are available, and the exact turn which a given project may take will depend to some extent upon the development of basic data.

PROJECT 9. Time-series Analysis—Current Changes

OBJECTIVE: To describe and interpret the changes in the farm real estate situation.

(By B. R. Stauber)

An attempt to accomplish the objective will require as a background an historical analysis, such as outlined in Project 8, of the following items: (a) value per acre, (b) acreage, (c) types of sale and frequency of each type, (d) types of buyer, (e) the trend of population from city to farm or vice versa, (f) earnings as measured

(2) This aspect verges on the sphere of Project 14, but it is directly related to the interpretative aspects of the problem, and should therefore be mentioned at this point.

by gross income, net income, cash rent and other significant figures, (g) the supply of compared with the demand for farms and the factors contributing to or affecting each, (h) conditions external to agriculture but influencing it, such as industrial prosperity or depression and financial conditions which affect the availability of agricultural credit, (i) credit, and (j) distribution of taxes. Explanation of current developments must be derived from the relation of past experience with reference to these items, to whatever is new in the present.

The fields served by such a study are very broad, and aside from the addition to scientific knowledge, it may be of practical use as:

- (a) A guide to farmers and other prospective investors, providing information on farm lands somewhat comparable with that available for other investments.
- (b) A guide to financing agriculture. There is a very close relation between valuation, appraisal and loans. Removal or diminution of the unknown element of risk in so far as possible should have a definite beneficial effect on agriculture by reducing the cost of long-time financing.
- (c) A factor in national and state policies in devising an adequate taxation structure. Adequate interpretation of current data concerning land values likewise bears a direct relation to policies to be pursued with respect to a land utilization program.
- (d) A reflection of the state of agricultural prosperity, such as is afforded, probably, by no other single measure.
- (e) A very definite influence toward control of land booms and their subsequent collapse.

An investigator engaged upon this project should be able to assume that data from at least Projects 5, 6 and 8 are available and that adequate measures of their dependability or reliability have been provided. These measures are necessary for the rather obvious reason that all such data are subject to fluctuations of sampling; consequently part of the current problem will consist in reconciling apparent inconsistencies, in seeking reasons for them, in weighing the merits of the individual elements in the situation, and in arriving at a final judgment concerning the actual situation. Such a procedure will include a comparison and contrast of neighboring areas both at a point of time and as changing through time. Similarities and differences will need to be examined, considered and fitted into the picture. The problem is fundamentally one for the exercise of judgment. Many factors which affect the real estate situation at any given time may, on account of their complexity and their sporadic or non-recurring nature, never become susceptible to measurement in statistical series. For these factors qualitative data are requisite. Cases in point are the policies adopted by various types of lending

agency with respect not only to making new loans, but also to the rigidity of collection or renewal of delinquent loans. To procure such data machinery for making contacts with the market must be set up. Provisions of such machinery may be desirable as a part of this project, although in actual practice its incorporation with Projects 5, 6 or 8 may be desirable. The latter is the procedure followed in the Bureau of Agricultural Economics, where by necessity the subject matter of this project is carried out in combination with the collection of data. It maintains a list of real estate dealers from whom exceedingly valuable information on many factors not subject to satisfactory quantitative measurement is obtained. The development of personal contacts with key men in various parts of the country is another method of handling this phase of the problem. In all such work of course it is necessary to guard against the introduction of the bias of personal opinion or interest.

In conclusion, in drawing inferences, adequate knowledge of the basic data must be supplemented by observation, together with a keen sense of discrimination in weighing intangibles, for intangibles are always present.

The ideal organization for handling such a project would doubtless involve the cooperation of both federal and state agencies. Certain parts of the machinery may perhaps be maintained by the federal agency more conveniently than by the state, for example, the federal crop reporting service. State cooperation, however, may provide more detail and a more intensive picture of local conditions. It may also serve to remedy certain weaknesses inherent in the crop reporting system of data collection. For example, the state may maintain a list of reporters reasonably constant from year to year, or it may set up sample townships in representative locations. Similarly, the provision of sales data from the various county records would be of great assistance. Further, the state organization might be in a position to secure somewhat closer contact with dealers.

The studies described in Project 6 are the best available examples of this type of project.¹ Future development will doubtless be a matter of growth, of increased experience and of the gradual addition of essential information looking toward a complete current picture of the farm real estate situation.

PROJECT 10. The Interrelations between Credit and Farm Real Estate Activity and Prices

(By David L. Wickens)

Credit constitutes a part of the consideration in most real estate transfers and its movements affect the supply of and demand for the

(1) For a further discussion of this subject, see E. H. Wiecking, "Elements of a Cooperative Program for Determining Annual Changes in the Farm Real Estate Situation," *Journal of Farm Economics* (July 1929), XI, 3.

farm property on which it is based. The extension of credit constitutes a partial purchase of the property by the borrower, and repayment completes the transaction. The net difference between these two streams of payment, the direction of its flow and the functions performed make up the significance of the credit factor. Outstanding credit, new credit extended, credit repayments, and funded credit must be distinguished.

Outstanding credit is of consequence, first, because of the cumulative effects of credit receipts, and second, because of the amount of payments required to keep the loans in good condition and of the payments required on principal. Data on outstanding loans may often be the chief credit items available for research purposes, but they may be of little value as an indication of the relation of credit to land unless the income from or the price of land changes, thus creating a new relationship between credit and land.

New credit extended is the most immediately significant for real estate activity and price since its effect is exerted directly on the land market. New credit may be classified as purchase money mortgages representing retained claims on property formerly owned, and outright loans representing the advance of liquid funds in exchange for claims on the property. These direct advances have greater effect on the real estate values of the community when they are received from outside the community, for then they supplement the income of the area and constitute an addition to the total available liquid funds.

New credit is not to be confused with funded credit representing previously existing local debt which has been consolidated or shifted to a land-secured loan. Since the same agencies commonly extend both classes of credit, a problem is presented in the separation of the two. Funded credit, where separable in series, is of value in indicating, with a lag, the volume of capital loans previously made.

Credit repayments have the reverse effect of new advances. If made on account of debt service they reduce the expendable income and available purchasing power of the borrower and, if payable elsewhere, of the community and if payment is on principal account income may be supplemented by sale of assets. The extreme phase of credit payment occurs in mortgage mortality, with foreclosure of the property, wherein the value is brought down to the amount of the credit or below, and the supply of land on the market is increased.

Foreclosures are among the most readily available material and may be used as absolute data or indexes, preferably in connection with voluntary sales. It is important to include with legal foreclosures the instances of surrender of title in satisfaction of debt. To obtain this measure requires special effort.

All credit factors are affected by appraisal and collection policies of the lending agencies, and by applicable laws. They are measured by the extent of the field to which they apply, and have prime im-

portance in the comparison of areas or agencies. Appraisal as the immediate judgment of value, and loan policy as the long-term estimate, influence real estate value and activity by giving direction to immediate advances of credit and by their promise of future credit action. Methods of studying the isolated effects of appraisal policy include comparison of land sales and estimated values under two policies operating in adjoining territory on land of the same character.

The influence of rates of credit cost on real estate is registered first through the amount of current payments. In appraising the influence of rate changes it is necessary to determine the extent of the credit market to which the change applies, whether to new loans or to loans already in effect, and how long the rate remains in effect. Changes in credit cost which influence land values through changes in the capitalization rate are likewise to be measured by the extent of the market to which the rate applies and the time required to put the rate into effect as limited by the maturity periods of existing loans, the length of the interval the rate remains in effect, the accompanying conditions of the loan policy under which credit is extended, and the degree to which these may offset the influence of the change in rate. These effects of credit cost tend to apply whether or not the capitalization rate for the community is the same as the mortgage rate, for it is to be noted that the rate of credit cost on a particular property may have but little relation to the prevailing capitalization rate. (The capitalization rate is the subject of special consideration in Project 34.)

The investigator's search for credit cost data encounters a range of rates on loans in effect and another range of rates on current loans. The most available series of rates is likely to be that of a particular loan agency or class of loan agencies whose representativeness must be tested by the character of loans made as indicated by their size, the tenure of the farm, and legal restrictions. The ideal series, whether for outstanding or current loans, is one with each rate weighted by volume. Tests indicate that composite rates provide effective indicators of relationships in which credit is an item.

A special instance of the effect of credit cost rates arises in the case of lending agencies operating at fixed rather than market rates. During periods when the fixed rate is below the market it tends to inflate farm real estate values by providing a lower than average rate of capitalization. Such values become dependent upon the continuance of a supply of funds at the relatively low rates. The reverse effect follows during periods of high money rates when the agency is forced out of the market. If the resulting loan burden for the community is greater than the remaining lenders are able to meet, mortgage rates rise, a higher capitalization rate results, and land values are forced still lower. Because of the importance of volume in con-

nection with such rate changes, weighted rates are especially desirable for measurement of effects.

Real estate factors exert far more influence upon credit than does credit on real estate. Credit represents action with reference to values, actual or believed to exist, and is always circumscribed by such estimated values, whereas within certain time limitations land income, land sales activity and price are not similarly circumscribed.

Land sales activity is influenced by the same general forces that affect land prices, being another evidence of demand; hence the same problems of measurement apply. The study of the relation of credit to land activity can probably be aided by an effort to determine a normal or average rate of turnover for land in the community. Such a figure would allow for the proportion of farms usually changing title by inheritance, the retirement rate of active farmers, the demand for farms for homes and production purposes, including allowance for the population trend in the area. Such a rate of absorption or schedule of demand for farms for production purposes, even if only an average, may serve as a helpful reference point in judging the significance of forces resulting in increased demand for farms, or of increased supply incident to foreclosure and sale.

The receipt of income from land affects credit first by reducing the need for it through increasing the supply of funds, but principally because it enhances land values and thereby increases both the amount of the consideration requisite to buy the same farms and the amount of capital attracted to land purchase as the source of future income. It has therefore happened that periods of rising income were periods of rising volume of credit.

Since income is the most potent of the real estate factors in relation to both credit and prices, series of data used in studying relationships should be net figures even though gross income should also be used.

Data series are more likely to be available by lending agencies than by areas. Institutional sources of credit, however, are more likely to represent the course of total credit of the area in normal times than in periods of exceptional activity when the credit extended by former owners attains large proportions. Indications are that individuals, local institutions and outside institutions occupy successive positions of importance as sources of credit according to the stage of the mortgage movement. This tendency should be considered in using the data from one class of lenders as representative of the area. If a secular trend appears in the data of one series, such as that due to the growth of an institution or to the enactment of a law, comparison with indexes of land value may be made effectively by means of indexes based on the average size of loans.

Initial approach to the study of the interrelationships may be made by comparison of gross totals, rates and available indexes. Division and refinement of the data on the basis of function should

follow. Where suitable time series can be developed correlation analysis may be applicable within limits. The study raises many problems similar to those confronting business cycle analysts, and their methods may be found useful in this project. At every point an understanding of the nature and limitations of the factors involved may be more essential than possession of actual data.

PROJECT 11. The Influence of City Growth upon Changes in Land Values of the Surrounding Territory

(By H. I. Richards and W. A. James)

When a city grows in population the value of the surrounding territory increases if other economic conditions remain unchanged. More land is needed for building lots and for the production of truck crops. Dairying is substituted for less intensive systems of farming.

The problem is to determine how much of an increase normally occurs for each change in the population of a city, and what changes, if any, occur in the structure of land values about such a city, assuming that other conditions remain the same.

Three methods of analysis suggest themselves: (1) Evaluate the change in economic advantage of land in the surrounding territory at any particular distance from the city that would accompany each change in the population of the city. This must at least for the present be considered impracticable. (2) Study the changes in value that have occurred over a series of years. The advantage of this method is that the natural productivity of the soil, the topography and many other physical factors would remain relatively constant. The method is not applicable, however, because of insufficient data and because of the influence of changes in factors other than population. (3) Analyze the relation of the level and structure of land values around cities of different size in an area at the same time, and attempt to eliminate the effect of differences in productivity of soil, topography and other factors, by statistical means. This is the only feasible and practical method of procedure.

The essential data for such an analysis of agricultural land values are readily available in the form of average values per acre of farm land alone, and of farm land and buildings, by townships, as reported in the United States Census for 1930, and in some parts of the country for 1925. The Census reports also give the percentage of farm land that is tillable and the acreage and yield of important crops by townships.

Selection of the most descriptive data and analysis of the relationships involved are difficult. The value of land surrounding a city is influenced not by one city alone but by several. If the net

relations of land values to size of city and distance are to be determined, the influence of all of those cities affecting the value of a particular area of land must be determined simultaneously.

A rather definite structure of population centers or cities exists. For New England, for example, there are two pivotal cities, New York and Boston. Then there are a group of cities of approximately 125,000 inhabitants, such as Worcester, Springfield, Hartford, New Haven and Providence. Around these cities is another cluster of smaller ones, with populations of approximately 35,000, and so on. The limits of these groups although not exact are still fairly distinct. As the distance to Boston and New York increases the same general structure continues but the size of the central or pivotal cities is smaller. Under these conditions the problem is to select a given number of distance measurements that will most accurately and completely describe the location of townships in any part of the area to the cities or centers of population.

It is necessary to include in each series of measurements the distance to cities of approximately the same size. Suppose now that the distances from the center of each township in the area to New York and Boston, and to four cities of 100,000 to 250,000, two cities of 50,000 to 100,000, two cities of 20,000 to 50,000, and four cities or towns of 5000 to 20,000 have been obtained. Would not series of this kind give a fairly complete numerical picture of the location of each township? More series, of course, might be added or some of those mentioned omitted. A satisfactory analysis of this problem has never been made and therefore many factors and many possible methods of procedure must be tested.

Even in obtaining the above measurements, a number of difficult problems must be decided. The shape of the townships may vary greatly, and when located near large cities the distance from the geographical center of the township to the city will not be associated with the same influence of that city upon the land values of the township, because land values decline very rapidly for the first few miles as the distance to a large city increases. Consequently, the high land values of a small portion of the township very near the center of the city would raise the average value for the township above the true figure indicated by the influence of the city at the geographical *center* of the township. Such differences in the influence of a city on land values may be taken into account by first working out rough approximations to the true curves and then refining them by determining the proportion of the township within relatively small intervals of distance from the city, obtaining the readings from the curves for the mid-point of these intervals and weighting the readings by the respective proportion of the land area of the township within each interval to obtain a weighted average estimate of the influence of the city upon that particular township.

Another problem is the location of the point in the city to which the measurements should be taken. This will be particularly important in making measurements to large cities. Two points might be considered. One is the center of the population living in the city and the other is the center of the business district. The latter is the one to use, because it is the center to which and about which the population of the surrounding territory moves.

Still another question concerns the boundaries of cities or their population. The boundaries of extremely large cities are very difficult to define. The entire population of the metropolitan area is the one that should be used because this population group is definitely bound together by the same natural advantages of location, such as the harbor facilities of New York and Boston and their location with respect to the remainder of the United States and to Europe.

The influence of a city of a given size on the value of land at any given distance from it is also affected by the proportion of land surface within that distance. For instance, a city of 100,000 population on the sea coast would naturally cause a higher level of land values five miles from its center than one entirely surrounded by land. This difference in effect, however, should closely approximate the proportion of the area about a city occupied by land, and may therefore be satisfactorily taken into account by dividing the population of each city by this percentage.

Naturally the distance from the center of a township to a city within its own boundaries cannot be satisfactorily determined, yet it may be very important. The most reasonable way to obtain a measure of this factor is to calculate the urban population per acre of all land in the township. Only the urban population should be included because the rural population may be thought of as a result of the concentration of urban population and not as a major cause of it. In any event, this index will be only a rough measure of the influence of the urban population within a township on the agricultural land values of that township, because of differences in the size of townships. The influence of a city of say 50,000 on the value of agricultural land within the township cannot be expected to decline on the average in proportion to the increase in the size of the township. This is due to the fact that land values decline so rapidly for the first few miles as the distance to a city increases.

Two other important series will be included in the analysis: the percentage of farm land that is tillable and an index of the productivity of the soil. The index of productivity will, of course, have to be based largely upon the acreage and yield of important crops as reported by townships in the Census. These data are available for only one or sometimes two years by townships. They should be adjusted so far as possible by the use of county averages for a longer series of years. The usual method of constructing indexes of this kind by weighting percentages of average yields of each crop by its respective

acreage is not very satisfactory, because it does not take into account the difference in productivity represented by the average yield of the different crops. A method of taking such differences into account in constructing indexes of productivity has been worked out by the senior author and will be published in the near future.

The percentage of farm land that is tillable can be taken directly from the Census reports. This series is a good measure of the proportion of farm land represented by the index of productivity. It is also a fair measure of topography.

Before attempting to determine the relationship that actually exists between land values and the above series for any particular area, it is well to obtain a clear understanding of the general relationships that can be expected. Imagine, for example, the course or path that land values in a township would take if the latter were moved towards a city of 100,000 population, with no surrounding cities. The physical characteristics of the land within the township would, of course, be assumed to remain constant. Under these conditions the course or path of land values would probably be smooth and would very likely follow some mathematical law of change or growth. The increase in land values if the township were moved a distance of 50 miles from a particular city to a distance of 40 miles should bear some mathematical relationship to the increase that occurs from 40 to 30 miles and from 30 to 20 miles, etc. Similarly, if the same township were moved towards a city of 90,000 and 110,000 population the path or curve of land values for each city should bear some smooth, regular, and perhaps definite, mathematical relationship to each other and perhaps conform to some mathematical law. In other words, the curve of land values, say ten miles from cities of different size, should be smooth. In fact, the true relationship of land values and distance to cities of any size is in all probability a smooth regression surface.

Some joint relationships, however, no doubt exist. The influence of a city of 25,000 population on land values in the surrounding territory will probably be different if it is near a city of 100,000 or more than if it is in some isolated area far away from other cities. The importance of these joint relationships is not known, and no satisfactory theoretical analysis of the influence that they are likely to exert has to our knowledge been made. In New England, however, and perhaps in other areas, any joint relationships of this kind that exist are probably associated quite closely with distance to New York and Boston and to the larger cities of New England, and would therefore be reflected in the curves for these cities. Joint relationships of this kind, however, should be tested, as should the possibility of joint relationships between land values and percentage of tillable land and the index of productivity; also between these factors in combination with proximity to cities.

The actual work of determining the relationships between the above variables may be carried out along the lines of multiple curvilinear analysis explained by Mordecai Ezekiel in his *Methods of Correlation Analysis*.

No matter how carefully the above analysis is carried out, relatively large residuals between the actual and estimated values of land in many townships may be expected. In the first place it should be noted that the distance measurements used in this analysis are by air-line. They do not take into account the distance that must actually be travelled in going from one township to the various surrounding cities. The relationship of residuals to factors interfering with air-line travel must be studied carefully. In some parts of the area there are also likely to be some special developments, such as summer resorts and large estates, which greatly enhance the average value of farm land in a few townships. In most instances these developments will not be closely associated with the index of productivity or percentage of tillable land used in this analysis. They must be studied separately as must the values of land in townships along the sea coast.

The most important cause of large residuals, however, will be errors and bias in the original data. However, there is little reason to expect any relationship between such bias as exists in these data and area factors. The values of land reported for New England may be too high on the average, but they are just as likely to be too high in the northern part of Vermont as in the southern part of Connecticut. The same is true of the other series that have been taken from the Census; similarly, with any errors that exist. Furthermore, in a region such as New England the relative importance of proximity to centers of population is so great that it seems likely that the relationship of land values to distance from cities of any size could be determined with fair accuracy even though the indexes of physical characteristics and the estimates of the value of the land itself are not perfect.

If definite laws, or rough approximations to them, of the relationship that exists between land values, distance and cities of any size could be established, they would have many uses. Estimates are constantly being made of the probable growth of many cities, and if the normal relationships of population to land values in the surrounding territory were known even under existing economic conditions, they would tend to stabilize the trend of land values in this territory. They should also be of use in appraising the value of land at any particular time and thus tend to cause the prevailing price of this land to reflect its true value. In this way studies of this kind should be of use in planning the utilization of land by private individuals. Most of these uses of the above relationships are similar to those which have been advanced as a reason for determining the supply price relationships for wheat, corn, hogs and other products.

Many economists will probably doubt the possibility of the establishment of laws or relationships between land values and population and distance that will be applicable to areas where the land is very fertile and where it is very poor. There can be no question but that the amount of change in the level of land values per mile, for example, will vary with the fertility of the soil. Still there seems little reason to expect that the relationship of the change in land values from within 51 to 50 miles of a city of a particular size to the change from 50 to 49 should be any different in a fertile than in a poor agricultural area even though the amount of change in the one is much larger than in the other.

PROJECT 12. The Effect of Changes in Freight Rates on Farm Real Estate Values (Joint with Transportation)

(By John D. Black)

The incidence of changes in railway freight rates upon agriculture, the effects upon both prices of farm products and gross and net incomes, is discussed in detail in the report on Transportation in Relation to Agriculture; but no project is outlined in which the effects are carried through to the value of the land itself. If changes in freight rates affect merely the prices of farm products sold, the analysis will be relatively simple. The procedure consists of mapping the prices of these products by areas before and after the rate change, and combining these prices according to the relative importance of the products in each area or district and then relating these combined figures to indexes of land value changes for the same districts. Probably in some areas allowance must be made for changes in freight-rates on supply goods—feeds, fertilizer, etc. In any case, a useful combined measure of the price changes is the net income of an average farm in the area at different sets of prices.

In most instances, however, the changes in freight rates affect the comparative advantage of different farm products and systems of farming, so that net incomes must be reckoned for one combination of products before the freight change and for another combination after it, and these net incomes related to changes in land values. Several projects in the report on Farm Management discuss methodology for dealing with problems of historical shifts in systems of farming, making use of effect on net farm income as a measure as here suggested.

Actual research in this project will be handicapped by lack of adequate data. Prices of farm products and of farm supplies at the farm are now published regularly only by states. They can probably be obtained from the Division of Crops and Livestock Estimates for smaller area units—crop-reporting districts, for example; but

they are not very accurate for smaller units.¹ Changes in farming systems can be deducted from data on acreages of different crops and livestock, but only in rough outline. Data on changes in land value are not published for smaller units than states, but can be obtained from Tax Commissions and other agencies in some states. Nevertheless, such data as are available are well worth analysis. The first step should exhaust the possibilities of analysis using states as units. Doubtless the effects of the extreme rate changes of the 1915-24 period will be revealed clearly in comparisons of states near to and distant from eastern and mid-western markets. The second step should consist of analysis of smaller areas—type-of-farming areas preferably—for which data can be segregated.

GROUP D

Projects Relating Primarily to Geographical Variations in Values

PROJECT 13. Determining Farm Realty Income (Joint with Agricultural Land Tenure)

OBJECTIVES: To determine the “income” of farm real estate, gross and net, actually imputable to its services, and to account for and evaluate the influences acting upon the variations.

(By E. H. Wiecking)

This project has two phases: (1) to determine the “earnings” properly attributable to the services of the farm real estate as such; (2) to account for geographical variations therein. The latter may be either as between individual farms in a restricted area, say a county, or as between averages for counties or other aggregates of farms.

The “income” data sought should be of considerable use in connection with the valuation of farm real estate; with farm management and other studies involving farm income and its allocation among the contributing factors; with proposals to tax farm real estate according to its “net income”; with land utilization studies involving comparative advantage and land classification, etc.

With respect to phase (1), three sources for deriving the earnings of farm realty may be suggested: (a) cash rents; (b) share rents, (or other rents-in-kind); (c) farm accounts for owner-operated farms. Of these, the first two represent some attempt by the worker to effect a division of income between landlord and tenant and therefore presumably are superior as a starting point for present purposes

(1) However, see C. F. Sarle, *Reliability and Adequacy of Farm-price Data*, U. S. D. A. Bulletin 1480 (1927).

to the third, in which no division has been made. Of the first two, cash rents as a rule are presumptively more what is desired for this project because: (1) they are commonly regarded as involving little or no management or supervision or other contributions by the landlord, (2) year-to-year fluctuations in farm earnings due to yields, prices, etc., are smoothed into a figure representing something like "average" performance, (3) risk to the landlord is more largely eliminated.

Cash rent as reported by farmers nevertheless requires scrutiny for the following reasons, among others: (1) it frequently is a purely nominal figure; (2) it may pertain to only a part of a farm or to certain classes of land in a community, or per head of stock and not per acre; (3) remissions from an agreed upon figure may have been made; (4) cash rents between relatives tend to be below competitive market levels; (5) tenants who have occupied the same farm for a period of years tend to be able to rent it for somewhat less than going rates; (6) there may be some perquisites, or other considerations of value (the tenant may, for example, assume the taxes); (7) the assumption that the landlord contributes little is by no means universally true, as e.g., in certain sections of the South.

Cash renting, however, is not sufficiently common in many localities to yield satisfactory results. Therefore resort to share rents or computed rents will need to be considered. With respect to share rents, scrutiny for many of the same points as listed for cash rents will be in order. The problem of valuation of the element, in the rent, of management, working capital or other contributions of the landlord, including risks assumed, will be especially important; year-to-year fluctuations in the landlord's share will need to be smoothed out.

Ascertainment of the income share attributable to the real estate through bookkeeping methods on owner-operated farms offers so many difficulties as usually to be regarded as impracticable. Particularly troublesome are the questions of valuation of such items as management, unpaid family labor, contribution of the farm to family living. These and other problems have been discussed in the report on Agricultural Income and therefore will be given no further attention here.

After the gross income share to real estate has been determined, there will of course be the further question of deductions for taxes on the real estate, depreciation and repairs of buildings, etc., to obtain net income. Depreciation in turn raises some interesting problems.

Comparison on both a gross and net basis of cash rents, share rents and "bookkeeping" rents with one another and with total farm income will be suggestive as to the relations existing between them.

For this purpose, the data should be obtained if possible in an area where cash renting, share renting, and owner operation all are practiced in sufficient amount to be really on a competitive basis. To be comparable the results should also obviously pertain to farms which are essentially alike with respect to factors affecting rent. This suggests the second phase of this project.

Other problems of analysis are involved, such as contract rent *vs.* economic rent, character and extent of market competition, lag and economic friction, influence of "quality" of tenant, rent of land *vs.* rent of real estate. Discussion of these problems and suggestions on other points raised herein will be found in the reports of this series on Agricultural Land Tenure (especially Project 4), Public Finance in Relation to Agriculture (especially Projects 9 and 42), Agricultural Income, and Farm Management. Ways and means of obtaining the various data have also been sufficiently discussed therein.

With respect to the second phase of this project, i.e., accounting for and evaluating the geographical variations in income, cross tabulation and multiple correlation technique applied to realty income data, especially cash rentals, as developed in this project would appear to be a worth while approach. So far as is known, no studies of this character have been made. Use of this approach for realty values is discussed in Project 15; the general problem as applied to rents is similar, and hence will not be discussed here. It may be added, however, that the selection and handling of variables, and the nature of the results secured, will be somewhat different, depending upon whether the project is based upon data for individual farms, or on averages for aggregates of farms. When data for aggregates of farms are used, the effects of some factors (often of much importance so far as variations in individual farms are concerned) are likely to be cancelled or be otherwise obscured. This statement applies to other data as well as to rentals, such as farm real estate values, when a project like No. 15 is applied to county averages, for example.

PROJECT 14. Relation of Farm Realty Income to Values

OBJECTIVES: To account for the variation in the level of farm realty prices existing at a given time, measure the influences and determine the nature of the relationships involved, using the income attack.

(By E. H. Wiccking)

In Project 13, the problem is to determine the income share attributable to real estate; in this, it is to relate income to value.

The requisite income data are assumed to have been provided by Project 13.

Two aspects of this problem may be considered: (1) given prevailing values and, say, cash rents, what are the existing ratios of income to value, and why do these ratios prevail? (2) given realty income only, what is the value of the real estate?

The service and uses of the first of these two types of analysis may be (a) to throw light on the structure of prevailing values in an area as a guide to lending policy, to the outlook for values, to possible trends in tenancy, and similar considerations suggested when values get out of line with prevailing rates of return on alternative investments; or (b) actually to place values on realty.

The first type of analysis has been made familiar by C. R. Chambers in his Department of Agriculture Bulletin 1224, *Relation of Land Income to Land Value*. Wide geographic variations were shown in ratios of current cash rents, both gross and net (after deducting depreciation of buildings, upkeep and taxes), to the current values reported for the same farms. In 1920, these ratios varied from 2.2 per cent net in north central Minnesota to 6.5 net in the Yazoo-Mississippi Delta, as compared with prevailing first mortgage interest rates of 5.8 and 6.9 per cent respectively.

Regardless of further interpretations that such data suggest, current ratios in relation to prevailing mortgage interest rates throw much light on the "earning power" of farm real estate in relation to ability to pay out on mortgage, and raise important questions concerning the policy of a uniform percentage of loan to value.

Such current ratios may be used without any further analysis to place values on individual farms merely by applying observed ratios to ascertained rentals. This practice is followed somewhat in Europe in appraisal for loan purposes. Sales of farms there are normally infrequent compared with sales in the United States, and although they are said to be too infrequent to admit of valuation by the "comparative sales method", nevertheless sufficient occur to provide a basis for ascertaining these ratios. Since the object apparently is to estimate probable sales prices, such a procedure for this purpose would have little utility in the United States.

These current ratios of rent to value may be used as a basis for further analysis. They suggest that geographic differences in value at any given time may be due in part to *differences* in other factors than *current* net realty income, such as in: (a) lag—values lagging behind incomes; (b) current capitalization rates; (c) anticipated capitalization rates; (d) anticipated incomes; (e) extent of failure of contract rents to equal economic rents because of supply and demand conditions, economic friction, etc., discussed in Agricultural Tenure, Project No. 4; (f) failure of *values* to reflect income fully

because of absence of one or more of the conditions of a perfect *ownership* market, or due to local supply-demand conditions, etc.; (g) extent of bias in the data used, especially if reported values are used. Each one of these in turn raises problems, both qualitatively and with respect to statistical measurement. For some, measurement appears impossible; qualitative ascertainment of their existence is difficult enough.

Only certain questions with respect to (b), (c) and (d), pertaining to the theory of capitalization, which is central in the analysis of observed geographic differences in the rent-value ratios at this point, will be considered here. The theory itself, and the conventional formula

$$V = \frac{a}{r} + \frac{i}{r^2},$$

have been sufficiently treated elsewhere and therefore require little further discussion here.¹ The extent to which geographic variations in values are ascribed to any one of these three considerations—(b), (c) or (d)—will depend in part upon what the numerical values of the constants in this formula are assumed to be, and also upon the choice of the formula itself.

With respect to (b), it is hardly likely that the capitalization rates actually in the minds of those who “make” values in the market can be objectively and independently arrived at in any conclusive way. While there are good grounds for believing that the prevailing interest rate on first mortgages is the capitalization rate, as Chambers cogently argued, this is not subject to “proof” and Chambers’ argument is not necessarily conclusive.

With respect to (c) the conventional formula does not take future changes in “r” into account at all. The fall in farm first mortgage interest rates since the last quarter of the last century has been marked. If the argument be valid that capitalization rates closely approximate first mortgage interest rates, then anticipated changes therein need to be taken into account.

With respect to (d), the constant “i” represents a forecast, as does “a”; the formula assumes that *current* income will continue indefinitely in the future as at present. And finally, the choice of the formula itself obviously affects the results obtained. The conventional formula assumes that “i” is a straight-line annual increase in income that will continue indefinitely. This assumption may not accord with the ideas about the anticipated behavior of future incomes

(1) See especially Project 34 below; Public Finance Projects 9 and 42 in Bulletin No. 1; also Chambers, *op.cit.*, and A. G. and J. D. Black, “The Principles Involved in Farm Land Appraisal for Loan Purposes,” in *Journal of Land and Public Utility Economics* (October 1926), Vol. 2, No. 4.

generally held "in the market". (Capitalization formulae are discussed in Project 34.)

Despite the limitations of the conventional formula, it does provide a very useful approach to analysis of the value structure via the income attack.

Turning now to the second aspect of the problem, the actual determination of values on farm realty when current income only is given, the above discussion indicates the large number of unknowns—and possibly unknowables—that are involved. Small differences in the figures chosen will make large differences in the value set. Assuming the conventional formula and a capitalization rate of 5 per cent, for example, a variation of \$1 in "a" will make a difference in "V" of \$20; a variation of 5 cents in "i", \$20. Assuming "a" to be \$5.00 per acre and "i" to be 10 cents, a difference of 1/2 per cent in capitalization rate will make a difference of approximately \$20 in "v".

The problems involved—and there are still some not discussed here—have led some investigators to conclude that actual valuation of farm real estate via the income route is impossible. It may however be questioned whether sufficient research has been done to regard that conclusion as final. Nor does such a conclusion at all imply that studies in the relation of income to value have no utility from even a practical point of view. American appraisal practice traditionally has taken income too little into account.

Questionnaires, the appraisers' reports, and farm-to-farm surveys may be used to obtain many of the data needed for this project. For the first broad aspect of the project the realty income data and value data if possible should be paired for the same farm in arriving at the ratios in order to eliminate errors due to variations in quality of farm. The second aspect of the project obviously involves forecasting considerations for which other projects in this and in other reports must be drawn upon.

PROJECT 15. Geographic Variations in Farm Realty Values

OBJECTIVE: To account for geographic variation in farm real estate values, using the method of correlating sale prices or estimated values directly with physical, economic or social factors.

(By C. H. Hammar)

Many factors of varying importance affect the income-producing power of individual farms, and the assumption basic to Project 15

as here outlined is that various constants relating these factors to variations in sale prices may be discovered by correlation methods. The independent variables correlated with value per acre in three different studies are tabulated below:

<i>General Farming Area Southern Minnesota¹</i>	<i>General Farming Area Southeastern Penn- sylvania²</i>	<i>Cut-over Dairy Farming Area Northern Minnesota³</i>
Type of road*	Value of dwelling per acre	Type of soil*
Class of town*	Value of dairy buildings per acre	Number of stones*
Depreciated cost of re- production of buildings	Value of other buildings per acre	Topography*
Land classification index	Crop index	Type of road*
Productivity of soil index	Percentage of farm area tillable	Acres cleared
Distance to market	Percentage of farm area level	Acres brushed but not stumped
	Code for type of road	Acres in brush and stumps
	Distance to town	Acres in timber and wood-lot
		Percentage land too rough to cultivate
		Percentage land too wet to cultivate
		Size of market town
		Distance to town
		Size of farm

- (1) G. C. Haas, *Sales Prices as a Basis for Farm Land Appraisal*, Minnesota Technical Bulletin 9 (1922).
- (2) M. J. B. Ezekiel, *Factors Affecting Farmers' Earnings in Southeastern Pennsylvania*, U. S. Department of Agriculture Bulletin 1400 (1926).
- (3) C. H. Hanmar, *Farm Incomes and Land Values in the Cut-over Region of the Great Lakes States*, Doctoral dissertation, University of Minnesota (1930, unpublished).

* Differentials determined by cross tabulations.

The variables selected for correlation with value per acre in these three studies, while showing some uniformity, also reflect the difference in organization of data necessitated by land conditions and farm organization in the three regions. The variable for size of farm (in reality size of tract purchased) in the third study also reflects a condition of the land market.

An initial difficulty is involved in the selection of the proper independent variables. Only a few of the more pertinent should be used. The inclusion of perfectly or highly intercorrelated dependent variables is likely to prove a pitfall.¹ A particular difficulty is the spurious correlation involved in using percentages of total area which sum up to nearly 100 per cent, as in the third study mentioned. To enter the variable for distance to town, at the same time disregarding that for size of town will, except where no significant

(1) For a discussion of this aspect of the problem see H. I. Richards, "Analysis of the Spurious Effect of High Intercorrelation of Independent Variables on Regression and Correlation Coefficients," *Journal of the American Statistical Association* (March 1931); also the criticism of this article in the succeeding issue.

difference in size of market town occurs, lead to inaccurate and at times contradictory results. Thus, if a large number of the farms being studied are located at a considerable distance from a large town and the remainder at a short distance from small towns, the regression coefficient relating distance to town and value per acre is likely to be positive instead of negative, as a priori reasoning would suggest. Clearly, farms at some distance from large towns may be much more valuable than similar farms close to a small town. Inclusion of the variable for size of town meets this difficulty.

The non-numerical or "quality" factors also present a problem of a somewhat specialized nature. Three likely to require special treatment are soils, number of stones, topography and type of road. At times methods of coding that assign numerical values to certain of these can be devised, as was done by Ezekiel for the type of road in the Pennsylvania study cited above. Topography may be sufficiently well accounted for by entering a factor for the percentage of land level. If a dominant type of soil characterizes all tracts, the soils variable may be assigned a numerical value by using the ratios of acreages of this soil to total acreage. Where numerical values cannot be assigned the method of cross-tabulation is an acceptable substitute for that of direct correlation.²

A further difficulty is that to secure an adequate sample of sales data (the difficulty here involved will normally not be encountered in handling estimated values) the investigator is at times tempted to include records of transactions scattered over several years. Haas, for instance, used data for the years 1916, 1917, 1918 and 1919. It cannot be assumed, however, that the relationships discoverable from the data for one year will be representative of those for succeeding or preceding years. Indeed, changes will constantly be occurring as changes in costs and farming practices lead buyers and sellers to place varying emphasis upon the different elements taken into account in determining values. Clearly, for instance, the universal use of the truck and automobile has done much to destroy the discount for distance to town that prevailed during the horse-and-wagon days. Similarly, a change from grain to livestock farming brings in its train a whole chain of modifications in the emphasis upon factors affecting real estate values. Significant shifts in type of farming may in exceptional circumstances occur during even so short a period as four years. The use of longer periods is dubious, though not necessarily precluded.

For much the same reasons, this type of analysis should be restricted to specific localities in which economic and physical conditions are relatively uniform. Under no circumstances should data to be correlated be drawn from two type-of-farming areas. Often,

(2) For a general discussion of cross-tabulation see Volume II, *Research Methods and Procedure in Agricultural Economics*. For specific application to the present topic see G. C. Haas, *op.cit.*

indeed, the type-of-farming area does not represent a sufficient degree of homogeneity to serve accurately as a medium from which to select. Perhaps in such situations the analysis can be restricted to farms upon a single combination of soil types characteristic of the region under consideration and to farms with much the same economic alternatives. Throwing into the same correlations farms varying in soil type from clay to sand, and in topography from rough to level, and with marketing facilities ranging from those with easy access to a large city to those at some distance from a hamlet, is to court disaster. The resulting coefficients of correlation and regression are likely to be so hybridized as to be quite meaningless.

At least two peculiarities of a statistical nature are worthy of special mention. First, the relationships of independent and dependent variables are likely to be curvilinear rather than linear. Huas in the initial study of this type³ expressed all relationships as linear functions. The later study by Ezekiel,⁴ however, found a certain amount of curvilinearity in all the relationships tested. While in subsequent studies linear constants may be quite accurate to express the relationships between certain variables, it is apparently unwise to assume linearity until tests have been made.

Second, the investigator must interpret his constants in the light of the setting from which they have been drawn. In certain areas and regions real estate values are stable, the real estate value pattern highly consistent, and variations largely explicable by methods such as the above. For new and developing regions or those with highly diverse physical and economic characteristics, the percentage of explicable variation will decrease. Even in farming communities of considerable maturity, such as in Atchison county in northwestern Missouri,⁵ a considerable haphazardness in values may be encountered.

In this study a concentration of values in the \$100, \$125 and \$150 per acre classes indicated that guessing had played a significant rôle in value determination. During highly dynamic price periods, such as the present and immediate past, coefficients of alienation are likely to be larger than in a more stable price period. Similarly, the statistics and constants derived for one year or period may not apply to succeeding years or periods, and the analysis to be useful must be performed over and over again.

Securing the data for this type of study by questionnaire has proved unsatisfactory and gathering the information by field work is expensive. Furthermore, when secured, the results are limited in application with respect to both time and place, and are somewhat difficult to present in an easily understandable manner to that portion of the public immediately concerned. Hence this type of project is likely to be restricted rather narrowly.

(3) *Op.cit.*, p. 2.

(4) *Op.cit.*

(5) See *The Missouri Farm Real Estate Situation for 1927-1930*, Missouri Technical Bulletin 154, p. 60.

GROUP E

Projects Relating to Forecasting Farm Real Estate Prices

PROJECT 16. Short-time Forecasting of Farm Real Estate Prices

(By Frank T. Hady)

This project and the one following undertake to forecast the movement of prices of farm real estate, first, in the few years in the immediate future, and second, over several decades. The only difference is that the second requires much more consideration of long-time fundamental factors such as population growth, rise in the plane of living, changes in the state of the arts, long-time changes in general price levels.

Forecasting analysis of land prices differs from similar analysis for other prices in that land is a producer's good more than it is a consumer's good, and has a number of characteristics more or less peculiar to it, such as its manner of depreciating and appreciating, which offset its future value.

Most of the factors affecting the future of land values have been discussed in preceding projects, and in certain projects in the field of credit, prices, public finance and land tenure discussed in other reports in this series.

As a basis for analysis, data or information will need to be assembled upon the following points:

- (a) Present price of land and prices for a period in the past
- (b) Land sales and transfers at present and in the immediate past
- (c) Present and recent prices of farm products, of cost factors used on farming in the area, and farm incomes
- (d) Credit conditions at present and for a period in the past
- (e) Character of present land ownership and "forced sales"
- (f) The tendency or rental situation
- (g) Taxes—present, past, expected in the future
- (h) Prevailing attitudes toward land prices—the "psychology" of the situation.

Obviously some of these elements cannot be handled quantitatively. However, those which lend themselves to plotting in time-series curves and simple cross-tabulation and graphic correlation should be so handled. Other factors can be handled in terms of judgments of their relative weight or importance. The final result will combine the two types of result according to the judgment of the researcher. It will be readily seen that the factors mentioned above overlap somewhat. They have cause and effect relationships among themselves. For example, present land sales and credit conditions affect the

“psychology” of the land market.¹ Likewise, “psychology” affects present land sales. But each of these has its own independent reactions which must be taken into account.

The immediate future of land transfers and land prices will in many instances simply continue the recent trend in transfers and prices. If present forces and the forces of the immediate past continue to work as they have been working, then land transfers and land prices will continue into the near future in somewhat the same direction as they have in the past, account being taken of the inter-effects of changed transfer and price position and the related forces.

Obviously, however, present tendencies will be upset if reverse movements appear in agricultural prices and costs. Accordingly, the outlook for the products of the area must be carefully analyzed.

Any factor as potent as forced sales in the present situation must receive unusual attention. Unwilling land-owners, such as insurance companies, mortgage companies, government units and state rural credit departments, present an unusual and unstable factor in the land market. Any change in the policies of these concerns may vitally affect land values and land transfers.

The demand of tenants for farms will be an important element in the situation. Is it cheaper to rent than to buy? Will this situation change during the coming five years?

It should be clear from the foregoing that forecasting land value movements is hazardous, depending as much upon the soundness of the judgment and objectivity of the researcher as upon any collection and analysis of facts and information. Ability to call the turn of the land market, as in the stock market, is not a special prerogative of sound scholarship.

PROJECT 17. Long-time Forecasting of Farm Real Estate Prices

(By Frank T. Hady)

The past movements of land values in the United States may roughly be divided into three periods: (1) to 1890, (2) 1890-1920, (3) 1920-1933. The problem concerns itself with the period after 1933. When will a new period begin, and what will be its trend? We can assemble the data for the three past periods, and analyze them to the limit, but we will not have a sufficiently broad background to treat the coming period safely by means of a statistical approach alone. The problem must of necessity be handled qualitatively rather than quantitatively.

(1) See Project 30 in the report on Prices of Farm Products for a discussion of the so-called “psychological” factors in market price. These influences are there defined as the irrational and emotional reaction to the situation.

The method of analysis suggested is as follows: (1) The past and present status of each of the factors affecting land values should be determined in a project of its own, statistically if possible, otherwise in terms of judgments as to significance. Each of these factors must then be projected into the future. (2) Obtain the resultant of combining the effects of the various factors as projected into the future—giving each such weight as judgment would seem to indicate. There are no other weights available. That this procedure is unsatisfactory must be conceded. However, with a possible new period in land value movements always confronting us, there can be no alternative.

The factors receiving especial attention in such analysis were named in the opening paragraph in Project 16. Of these, general price levels will be the most difficult to handle. Most students of monetary theory now agree that price levels in the future will move to a large extent independently of gold supply, as they have since 1915. The world seems to be passing into an era of managed price levels. As to population growth, the prevailing thought is in the direction of an approach to a stationary population in the western world at least. But a few students expect a cycle of population growth to appear in due time.

GROUP F

Projects Relating Primarily to Appraisal Policies and Practice

PROJECT 18. Appraisal Methods of Loan Agencies

OBJECTIVES: To describe the various appraisal methods employed in order that information will be available for research and teaching purposes; to compare the methods followed, especially the results of various methods with respect to mortality and loss experience of lending agencies; and to consider what particular practices have resulted in losses to lenders or unnecessary hardships on borrowers and changes that may be made to avoid such losses or hardships.

(By R. C. Engberg)

The first step in such a project is to determine the character of information and data assembled by each lending institution regarding the farm offered as security and the signer of the mortgage note. Much of this information can be obtained from the various forms used by the lending agencies, such as the report of the appraiser; the appraiser's work sheet, if any; the application blank

of the borrower; instructions to appraisers; any statements issued by the lending institutions regarding loan policy; and other similar material. After this material has been studied, the additional information that must be obtained through correspondence and interviews with the appraisers or officials of the lending institutions can be determined. Information and data should be made available to the lending agency on the following points: description and location of farm; topography; soils (to what extent is use made of soil augers or chemical analysis); underlying oil, gas, coal or other minerals; general condition of the farm; rainfall, irrigation, drainage, and other aspects of water supply; productivity (how much of the farm is tillable, in pasture, etc.); buildings; history of farm (how often has it changed hands, what types of individual have owned it in the past, etc.); earning power; character and economic status of community, including taxes, schools, churches, etc; market value of farm lands in community; net worth and moral evaluation of the applicant.

The procedure for the analysis of the data collected and a final appraisal may be indicated in either the appraiser's report or other material issued by the loaning institution. If not, it should be determined either through consultation with responsible officers and employees, or by actual riding with appraisers in the field. Even if this information may be obtained in other ways, it is recommended that some time be spent watching appraisers at their work, since this will throw much light on the appraisal technique.

The following points are suggested for especial consideration:

In arriving at the appraised value, what uses are made of—

- (a) Farm income? How is it determined? In case the income is capitalized, what rate of capitalization is used and how is this rate selected?
- (b) Records of sales of other farms in the vicinity? If such data are used, how are they obtained?
- (c) Weights or formulae? If weights or formulae are used, how are they derived? Are they ever checked, tested or changed, and in detail, how are they used?
- (d) Economic factors in contrast to physical characteristics? For example, to what extent is consideration given to the tax burden and other aspects of the financial condition of the county or other taxing bodies? Shifts in type of farming? Prospective changes in price level and other economic factors?
- (e) Returns for some particular crop or enterprise?¹ Are

(1) H. A. Wallace, "Comparative Farm Land Values in Iowa", *Journal of Land and Public Utility Economics* (October 1926), Vol. II, No. 4, pp. 385-392; also article in same number by J. D. and A. G. Black.

buildings valued separately from land and, if so, what method of valuation is followed? How are special problems such as orchard lands, underlying minerals, non-agricultural values handled? Is the value arrived at a market value, a loan value, a "normal" value, or exactly what is it intended to signify? Are there geographical variations in the procedure or policy?

Statistical analysis of appraisal experience will be desirable, but it may be impracticable to obtain the necessary data. If they can be obtained, however, the efficacy or accuracy of appraisals can be checked by comparisons with prices at which farms appraised are sold subsequent to their appraisal. In making such comparisons, allowance should be made, of course, for changes in the general level of land values between the dates of appraisal and sale. This type of analysis may be carried further by collecting data on loan mortality and studying losses sustained, or the liquidating value of farms acquired in relation to the original appraised values. In view of the difficulty and expense in obtaining the necessary data, if they can be obtained at all, it will undoubtedly be desirable to use only sample areas.

The nature of the analysis and the criticisms or suggestions, will of course depend upon the facts developed. Such facts may point to obvious weaknesses in the appraisal procedure, and in any event, the conclusions reached, out of fairness to the agencies, should be discussed with the latter before publication or release. Among the questions which might properly be considered in this analysis are: In the appraisal procedure, should more emphasis be given to economic factors and less to physical factors, or vice versa? Should more dependence be made upon formulae and less upon judgment, or vice versa? Should more or less attention be devoted to farm income as a basis of valuation? Are appraisals ultra-conservative, needlessly limiting the amount of credit obtainable at first mortgage costs; or have the loans been too generous, resulting in losses which, in turn, have injured the credit standing of the community?

Were research funds available, an experiment in appraisal of farms by various methods would be worth conducting, set up somewhat as follows: In a county, obtain data on sales of farms in the previous four years, conduct field studies and make analyses after the manner of G. C. Haas in his study of Blue Earth County in Minnesota.² In the same county, make a similar analysis using farmers' estimates of the values of their farms instead of actual sale prices. Apply the results from these two studies to fifty other farms in the county of the same general type as covered in these two analyses. Then have two or three appraisers of different loaning

√ (2) *Sales Prices as a Basis of Farm Land Appraisal*, Minnesota Technical Bulletin 9 (1922).

agencies place values on the same fifty farms. Compare the results and classify the differences. Compare the results with estimates made by the farmers themselves and by five farmers living in the same neighborhood. Also compare results with any later sale prices of these farms.

PROJECT 19. Appraisal of Farm Real Estate for Public Purposes

(By M. Slade Kendrick)

Methods of appraisal of land for taxation purposes are discussed in Project 28 in the report on Public Finance in Relation to Agriculture. Other public purposes which such valuations may serve are the following:

- (a) Determining specific benefits or damages to adjoining real estate by a public improvement, as for example, a highway, a drainage system, or a dam.
- (b) Valuing real estate for purposes of condemnation under eminent domain proceedings.
- (c) Valuing railroad or public utility real estate for rate-making purposes.

The value of this type of project is to give appraisal bodies, courts and legislative assemblies some guidance toward the proper solution of a group of the most complicated and baffling problems with which they have to deal.

This project is concerned with the economic phases of appraisal and assessment methods as they appear in the legal framework for assessment and appraisal, and a constructive evaluation of the entire system of appraisal in its legal as well as economic aspects.

The first step in attacking a problem in this field is to determine precisely the valuation goal set up in the law for the assessment or appraisal body. In the case of valuation for purposes of taxation or for ascertaining damages done by a public improvement or benefits conferred, is this goal the value for sale, or the value for use, or some other value? In the case of valuation of a public utility property for rate-making, is the legal objective original cost, or one of the variations of reproduction cost? This determination of legal ends is necessary, for only by knowing the goal can the degree of attainment be measured, or can the achievement be appraised.

The second step is to determine the extent to which the legal objective is attained. Thus if the legal end of measuring damage to real property is full compensation for the sale value loss, does the actual administration of appraisal bodies accomplish this objective?

With the completion of the first and second steps, the ground-

work is laid for the third and fundamental step, evaluation of the existing system of appraisal and assessment in terms both of its goal and of its measure of attainment of that goal and constructive suggestions for the improvement of the system.

The legal aspects of this problem appear in constitutional and statute law, in the decisions of courts and in the executive rulings of bodies charged with the administration of the functions of assessment and appraisal.

The economic aspects of the problem of assessment and that of the damages compensated or the benefits reckoned because of a public improvement will be revealed in the effect of the assessment, the damage or the benefits on the net income and on the sale value of the real estate in question. Such an examination will necessitate a study of the net income and the sale value of adjoining real estate as well. The trends of income and sale value in the past will need to be calculated and some estimate made of their future. No rigid delimitation of informational material can be made. Farm management records, reports of sales of real estate, soil surveys, forecasts of the general price level and of the prices of the principal commodities produced in the affected area, all contribute to this part of the study.

The economic aspects of the problem of valuation for rate-making purposes will be disclosed in the reports of those public service commissions that have actually made such valuations and in the considerable body of economic literature which has appeared on the valuation of public utility property.

No precise method of analysis can be indicated for a problem of this nature. Unforeseen and unforeseeable complications due to the nature and the number of the issues involved and the character of the data assembled make impossible the charting of a plain path toward a solution. The analysis must be both qualitative and quantitative, that is, some of the elements in the problem will lend themselves to numerical statement and some not. The analysis will reflect the depth and breadth of the foundation which the investigator has in legal, economic and governmental studies, especially with respect to the constructive evaluation division of the study. What is wrong with the existing system, and what should be done about it, are questions deeper and broader than the material included in any one field of study.

PROJECT 20. Foreign Appraisal Methods and Policies

This study will include the methods outlined in Projects 18 and 19 as they are applied in foreign countries, with particular reference to their applicability to American conditions.

**PROJECT 21. Legal Concepts of Value as
Applied to Farm Real Estate**

OBJECTIVE: To ascertain the legal interpretations of value in relation to farm real estate, the criteria and methods of procedure prescribed, and to evaluate these critically.

This project will include the legal definition of "value", and how it is determined, for all "purposes"; an inclusive legal-economic study, with emphasis in the critical evaluation on economics. Court decisions and administrative regulations as well as the statutes themselves will need to be covered.

**PROJECT 22. Appraisal Personnel: Selection,
Training, Organization, Control**

A study of European experience will be suggestive.

**PROJECT 23. Area Analysis for Loan Purposes (Joint with
Agricultural Finance Project 23)**

OBJECTIVE: To classify and map an area to afford a basis for making real estate loans in it.

(By G. T. Blanch and F. F. Hill)

The project involves an analysis of the factors that determine the capacity of farms in an area to repay loans in addition to maintaining the farm and farm family, and of those that give value to land for residential purposes. Earning capacity and residential value are primary security behind loans on farm real estate. The objective of the project is to classify and map the area on the basis of debt-paying capacity.

The factors that determine the capacity of farms to repay loans may be roughly divided into four groups as follows:

1. Production factors such as soil, rainfall, length of growing season, average temperature, elevation and topography.
2. Farm organization and management factors under which would be included size of business, combination of enterprises and farm layout.
3. Marketing factors, which include the produce to be marketed, distance to consuming centers, transportation and marketing facilities.
4. Changes in the general price level and public economy factors such as tax rates, public indebtedness and special district taxes.

In addition to the above, factors that may influence the future trend of development in the area must also be considered in making long-term loans on farm-mortgage security. These would include the present economic age of the area, trends and shifts in types of farming to date and possible future changes, the likelihood of retrogression because of outside competition, erosion, or water-logging.

The most common use of a study of this kind would no doubt be as a guide to those who contemplate making loans in the area. Though each application for a loan would still have to be considered on its merits by locating the farm on the classification map the general characteristics or rating of the immediate area would be known.

The classification would also be useful as a guide to prospective settlers. The factors that determine the capacity of a farm to support the farm family and to repay loans also influence the amount of return to tenants, owner-operators and landlords for their labor and capital.

Such a classification might be used as a guide to equalize assessed property values for taxation purposes; to locate public improvements such as roads, electric lines, and telephone lines. Indirectly it might hasten the abandonment of submarginal lands by curtailing credit. It might assist in bringing about an adjustment of interest rates to the risk involved.

The scope of this project is limited only by the information and funds available. The larger the area included the more valuable the study will be. However, it would seem advisable to limit the initial project to a county or other relatively small political unit which lends itself to rather detailed study. If at all possible, the initial study should be confined to an area for which data are available on:

1. Soils, including an up-to-date soil map.
2. Climate covering a period of years.
3. Farm business such as are ordinarily obtained in farm management surveys.

A second consideration in the selection of an area is its homogeneity. There are certain advantages in selecting an area in which there is considerable variation. Results of studies that show sharp contrasts in the debt-paying capacity of farmers on different classes of land are most likely to bring out the factors that should be considered in making loans on farm real estate and their relative importance.

Many of the requisite data may be drawn from studies that have already been made and from existing records and reports of various agencies. The principal sources are soil maps, United States Geological Survey Maps, type-of-farming maps, land classification

maps,¹ climatological reports, Census publications, market reports of shipments of produce, reports of marketing agencies, reports and records of political units such as the town, county or state, and reports and records of federal land banks, joint stock land banks, life insurance companies, or other lending agencies that have had experience with loans in the area. Data on farm incomes and factors affecting farm incomes would be furnished by farm business records. If the farm business data available are limited, it may be necessary to supplement them with records of crop yields on different soil types obtained as a part of this project. It may even be desirable to obtain data for a considerable number of farms concerning the area of crops grown, crop yields, crop sales, livestock kept, sales of livestock and livestock products, and incomes from outside sources. These data related to objective, physical factors and to the available income data will aid in making the classification.

Under certain conditions it might be advisable to prepare a map indicating the uses of the various soil types.¹

The first step in the analysis would be to determine the debt-paying capacity of the average farm in the area, using all available farm business data. If there is more than one major type of farming carried on in the area, the average debt-paying capacity should be determined for each type. In most instances, farm business data will be available for only a limited period so that it will be impossible to estimate the frequency of wide variations from the average. Such variations might be roughly estimated by an analysis of crop yields and prices over a period of years. If crop yield data are not available, an analysis of climatological data might be of value. It will be particularly important in areas where the length of the growing season or rainfall are limiting factors.

The second step in the analysis is to measure variations in debt-paying capacity within the area studied. An analysis would be made of the debt-paying capacity of farms on different soil types for each of the major types of farming. The effect of location in relation to roads and markets would also be analyzed. If data on farm organization and farm incomes on certain soil types or for farms in certain locations are limited, it may be necessary to obtain additional farm survey records. An abbreviated form of farm survey or even crop yield data might suffice. The problem is to outline areas to which the conclusions drawn from the available farm business data apply. This is to be done by relating debt-paying capacity to objective factors such as soils, topography and location. These factors can be used in classifying areas of considerable size.

If the area studied is in an old agricultural area, such as the northeastern section of the United States, a classification of the

(1) A. B. Lewis, *An Economic Study of Land Utilization in Tompkins County, New York*, mimeographed publication of the New York State College of Agriculture, Cornell University (1933).

farm buildings on the basis of occupancy, size and condition might be of considerable aid in drawing in the area boundaries.¹

The residential value of farms in areas adjacent to large centers of population has an important influence on farm real estate values. In many regions of the northeastern section of the United States it would be necessary to collect and analyze sales data to determine the effect of this factor. An analysis of sales data should constitute a part of this study in any event, since the price at which a farm may ordinarily be expected to sell gives some indication of its salvage value even though the probable sales price is high or low on the basis of its earning power.

Areas in which the debt-paying capacity of farms is estimated to be within certain limits would be indicated on a map. For example, an area might be outlined in which it is estimated that from \$20 to \$30 per acre would be a safe loan, or it might be stated that a loan of \$4000 to \$5000 would appear to be safe on a good fifteen-cow dairy farm.

Admittedly, the judgment of the person making the study will be involved to some extent in classifying the area. It is impracticable to collect sufficient data to make such a classification solely on a statistical basis. If a large territory is classified, it would probably not be feasible to make as detailed a study as is suggested here. However, if a fairly detailed study is made in a limited area, and debt-paying capacity is related as closely as possible to objective factors which can be used in making a classification of a larger area, it would seem that the person making the study would acquire sufficient experience to enable him to do useful work. It must also be recognized that any classification of this sort is arbitrary to the extent that area boundaries are not so sharply drawn in actual fact as they appear on the map, and that the tendency is for one area to merge into another.

PROJECT 24. The Time Factor in Appraisals for Loan Purposes

(By David L. Wickens)

In general, the technique of American farm appraisal practice as applied to the physical and technical facts has been fairly well developed. Such factors as the character of the soil, general topography, rainfall, the principal lines of production, the average yield of crops, the prevailing quality of improvements, the general make-up and moral risk of the population have been considered in most appraisal work and their significance has influenced lending activities on individual farms and within the area generally. Despite this

careful attention to area characteristics, farm-mortgage loan distress became widespread during the fourteen years following 1920. In numerous areas where appraisal procedure had become well standardized, large proportions of the loans resulted in loss of principal by the lenders and loss of farms by the borrowers. Method and procedure for the study of appraisal practices therefore must be considered in the light of the changes from the traditional approach to the problem which experience has suggested are needed. Since the changes which seem to be called for on the whole represent a departure from traditional practice, qualitative analysis is of primary importance, and since the lines of inquiry and the research methodology to be followed will largely be suggested by this analysis, the methodology phases are not given detailed attention here.

The causes of trouble in most areas have been due to the inadequate attention given to certain factors. The principal cause has been insufficient allowance for the consequences of the time element. Judgment at the time of appraisal was based on too small a segment of the experience of the area. The production and returns taken typically covered a relatively brief period of years which were not representative of the experience to be encountered.

The appraisal and loan practice prevailing in most areas erred in not making allowance for three fundamental facts. First, advances on mortgage security were capital loans and ordinarily could be paid or reduced only from earnings of the property; second, the length of time required to pay off the average mortgage covered many years and repeated renewals were common; third, these periods of debt term of twenty-five to fifty years had in the past included wide price fluctuations and other changes which gave at times only a fraction of the debt-paying power as compared with that current when the loan was made.

These appraisal faults have not been confined to inexperienced appraisers. They have been almost equally characteristic of the most seasoned and experienced in the field. Nor has the fault been that of the individual appraiser; lending agencies old and new have been more fundamentally responsible for the practice of using too short periods as a basis for judgment in lending operations, and state laws and the regulations imposed upon financial agencies have also tended to perpetuate arbitrary lending practices by specifying fixed proportions of loan to value regardless of whether the value was based on high or low prices.

The practice of appraising land on the basis of preceding experience was fostered by the widespread practice of making the loans for short periods. But since most loans were renewed, and usually carried little or no payment requirements, the original short-term advance resulted in a long-term debt. By not requiring payment when this was possible debt reduction was delayed until the borrower

could not make sufficient payment to keep the loan in good condition.

Appraisal policies during a period of credit expansion develop an over-emphasis on the loan process. Since collection is not then a cause for concern, insufficient attention is given to repayment. Experience has shown that payment must be considered fully at the time the loan is made.

Several general principles must apparently be observed in connection with remedial plans for these past shortcomings. The appraisal must consider the complete cycle of loan experience of the area. Payment must be made when the borrower has the means of payment. The loan must be based on the commodity-production experience of the area.

The following steps are suggested for consideration in the conduct of such a project:

- (1) Determine the average production from leading crops per acre and proportional returns from other land use for the area as indicated by a period representing the average debt-term experience for the area, and the length of time represented by one major period representing all stages of high and of low prices. For example, the preceding period of forty years might be taken.
- (2) Multiply the average yield of crops per acre by the average price for the corresponding period. Compute the average landlord's share of this return and deduct taxes and upkeep.
- (3) Capitalize this net landlord's share of production at a rate equal to the average interest rate on farm mortgages for a period sufficiently long to represent the probable average rate to be expected during the period of debt. The loan ratio may be placed at any safe proportion of the value as thus determined and may be influenced by the current price level, the plan of payment, the term of the loan or by other considerations, but must always be within the current value of the property.
- (4) Require payments to vary with the price level of the principal farm crops. The use or non-use of livestock will not interfere with this primary measure of income. The borrower's payments, as expressed in commodities, would therefore be high or low as their prices vary, but on the average would extinguish the debt or such part of it as was indicated in the contract during a period representing both high and low price conditions.

The problems both of appraisal and of repayment would seem to be better approached from this long-term view, since the two cannot be successfully dealt with separately. Interest would accrue at the

contract rate, of which a minimum could be required annually, regardless of the year's prices. Amounts above the minimum remaining unpaid would add to the principal with compound interest. In years of higher than average prices, payments would reduce the total. Total interest payable during the loan term would have a fixed amount equal to payments plus compound interest. Regardless of the amount of payment made in a given year the total would be the same after allowance for all amounts due and paid. This flexibility could apply to amortization payments as well as to interest.

. In practice, no two periods would work alike. The years of high prices might occur early or late within a period equal to the experience base. If they occurred early, payments would run ahead of accruals; if late, actual payments would be less than accruals, with the result that the principal of the debt would increase. Any incidental rise in the ratio of loan to value of the property would have only the same significance as that due to changes in land value under previous loan arrangements, and lenders would have the same protection. When the total amount of principal and interest accrued threatened to exceed the recoverable value of the property, possession could take place.

This project is thus directly related to Project 29. Flexibility in the loan would replace the present fixed ratios which apply through all price levels, and flexibility of payments would serve to equalize the flow of capital. This would contribute to the control of land booms in the area by requiring larger payments in periods of high prices. The increase in payments to accord with the rise in prices would reduce the local expendable income *pari passu* and affect a corresponding improvement in the position of the loan at the time when the general credit position was becoming precarious.

The Census provides the best source of data for close analysis of land utilization, livestock and crops, and the Department of Agriculture for annual production and price data. Data by counties make possible the consideration of any area not conforming to state lines. The 1930 Census has provided further material for analysis by type of farm. It may be necessary to develop long-time series of local products-prices where existing data do not sufficiently represent the local price history of the area. Local average mortgage rates of interest may be obtained from data taken from county records or possibly from the records of representative lending agencies. Tax data may have to be obtained from local records also. Several projects in this and in other reports of this series (especially Prices, Income, Farm Management and Agricultural Credit) are related to this project and will provide data for it.

The ultimate objective of all study of appraisal questions for an area is to gauge accurately the amount of money that can safely be loaned on the individual farm. This will always vary from the av-

erage and may require special loan adjustments. The factor of judgment will always be primary. There are limits to definite instructions. At this stage of appraisal experience, however, it seems that progress in this direction will be promoted if in addition to the careful technical work of the skilled appraiser used in the past, more emphasis is placed upon the long-term contingencies of the area as a whole and the conditions under which experience has indicated that payments are feasible.

PROJECT 25. Development of Improved Methods of Appraisal

OBJECTIVE: To develop improved systems and methods of farm real estate appraisal suited to conditions in the United States.

(By R. R. Hudelson)

The every-day need for valuing farm land has led to the development of an art of land valuation based on generations of experience in all countries where private ownership of land prevails. This method has yielded fairly satisfactory results during periods of relative stability in land values where it is applied by men of good judgment thoroughly acquainted with all the local and general conditions affecting the demand for and supply of land, including the factors affecting farm incomes. Since the World War, however, it has become more and more evident that the art of land valuation is not adequate to the task during periods of instability. It is evident also that the art as practiced depends too much on the subjective personal element in the judgment of the individual appraiser. A process depending so much on the personal element lacks not only uniformity in application at any given time, but also continuity from period to period, since the accumulated personal experience cannot adequately be transmitted from one generation of appraisers to the next.

Like many arts, land valuation has had to wait on the development of the fundamental underlying sciences before it could be given a scientific basis. As in other arts, those who practice it have been slow to accept the possibility of a scientific foundation. It seems probable, however, that such scientific bases as the theory of value, statistics, soil classification and farm management have now developed to the point of furnishing a scientific foundation for farm land appraisal.

Much light should be thrown on this project by the findings of Projects 18, 19 and 20 which deal with existing methods.

Research on the development of improved systems and methods of appraisal seem most likely to yield results of value if the approach

is made through the application of correlation analysis to the factors affecting land value. Studies by G. C. Haas,¹ M. Ezekiel² and H. A. Wallace³ furnish a promising starting point for this investigation. These studies indicate that the variables to be correlated with land value will be different in different type-of-farming areas. This suggests a need for a separate analysis in each type-of-farming area. Care will be necessary to set up the analysis so as to make possible the measurement of factors affecting individual farm values. Some use of Census data can be made in the determination of average values for areas that are approximately uniform with respect to soils, topography and type of farming. The correlation analysis suggested above, however, has for its purpose the measurement of deviation from these averages due to the various factors, such as distance from market, which cause variations in value between individual farms. A promising method of attack is to build up tables of average farm values for uniform areas, the unit being a typical farm of given size, soil type, percentage of tillable land, kind of road, distance from market, tax burden, community type, etc. The correlation analysis should then yield tables showing the amount of variation in value associated with each unit change in one of these factors. The tables will correspond to existing experience tables of corner influence, depth of lot, etc., used by city real estate appraisers.

The final criterion of value is actual price realized at voluntary sale. It is recognized, however, that records of voluntary sale prices will be found inadequate in many instances. The growing custom of not entering the actual price on the county recorder's books is making it more and more difficult to get an adequate record of land market prices. Such sale prices as are available from county records, state tax commissions, and real estate dealers may be supplemented by local investigations. The sale prices can then be checked against Census reports and appraisal records of farm mortgage agencies.

A good starting point in this project is therefore to collect sale prices for the type-of-farming area chosen for study. County records, state tax commission files, data supplied by reliable real estate dealers may have to be supplemented by a special inquiry to secure additional sale prices in the area to be covered. It will be difficult to secure adequate data of this type and it may be necessary to supplement them with recent farm value appraisals made by lending agencies. For each sale it will be desirable to secure the legal description of the land, size of farm, soil type, distance from market, percentage of tillable land, tax burden, type of farm, value and kind

(1) *Sale Prices as a Basis for Farm Land Appraisal*, Minnesota Technical Bulletin 9 (1922).

(2) *Factors Affecting Farmers' Earnings in Southeastern Pennsylvania*, U. S. Department of Agriculture Bulletin 1400 (1926).

(3) "Comparative Farm Values in Iowa," *Journal of Land and Public Utility Economics* (1926), pp. 385-92.

of buildings, type of community, size of nearest town, kind of road and yield of the more important crops over a five-year period. Once the legal description is known many of these facts can be secured in tentative form from such sources as soil survey maps giving roads, towns, soil type, etc. A preliminary examination will give some idea whether the sale prices included represent the normal distribution with respect to the factors to be studied. The normal distribution on some of the factors can be taken from Census reports and soil maps. This examination of data should be made before visiting the individual farms in order that additional sale prices may be looked for to bring the sample more nearly to a normal distribution with respect to the important factors.

Finally, it will probably be necessary to visit each individual farm in order to check the sample for completeness, accuracy and representativeness. In particular areas other factors related to value may be added to those listed above.

It will be an advantage if a study of this character can be undertaken in a type-of-farming area where financial records have been kept for several years. It is unlikely that sale prices can be secured on many farms which have several years of income records, but the records from similar farms in the same area will give an opportunity to check income data against sale prices. This gives an opportunity to estimate what part of prevailing values is based on present earnings and what part on anticipated increase in earnings.

Data on cash rentals for the farms with sale records or for similar farms should also be collected as a basis for checking capitalized income values against sale prices. Where little cash renting is done it will be possible in many instances to compute from records of amounts of crop delivered to landlords and the price received, the value of share rentals paid. Under these circumstances, the landlord shares in risk-bearing, but on the average for several years this computed value of rentals should be useful in arriving at a capitalized income value to be checked against actual sale price.

Correlation analysis as applied by Haas and Ezekiel offers the best approach to this problem. A study designed to build up tables for extensive practical use should probably introduce factors not included in the studies of Haas and Ezekiel, neither of which has included tax burden or a measure of the home or community value. Of course no accurate measure of the rank of communities is available but it seems possible to work out a code by ranking communities according to such factors as proximity to school, church and neighbors, adequacy of school and church facilities, the presence of other community centers and activities, percentage of owner-occupied farms, and availability of electric power. This code may then be introduced as a variable in the correlation analysis.

The results of this study should be set up in tables showing the amount of variation in value per acre due to a unit variation in each

factor found to have an important influence on value in the particular type-of-farming area in which the tables are to be used. As an example the following table from Ezekiel's study is quoted: "The relation between different factors and the farm value per acre was as follows:

<i>On the average for each increase of:</i>	<i>Farm value per acre showed an increase of:</i>
10 dollars in dwelling value per acre	\$9.75
10 dollars in dairy buildings value per acre.....	—10
10 dollars in other buildings value per acre	9.29
10 units in crop index	5.60
10 per cent in portion of farm tillable	3.96
10 per cent in portion of farm level	2.47
One in road type index	—6.73
One mile in distance to town	—5.47"

The study should also provide a standard or average value per acre for a definitely described farm typical of the area, tables such as the above being used to compute the deviation. It is probable that the deviation due to a particular factor would not change much from year to year so long as the type of farming remained constant.⁵ Some means of keeping the standard figure up to date would of course be necessary; in each particular area Projects 8 and 9 should furnish a method.

The factors to be introduced into the correlation analysis should be selected with great care. There is likely to be considerable variation in the particular factors to be measured in different type-of-farming areas as well as in their relative importance. In some areas, for example, weather hazard or risk of overflow may be highly important.

The unit for measuring the various factors, and the method, also introduce problems. For example, soil productivity may be measured in terms of a crop index, but with the present highly developed state of soil classification in soil survey work it should be worth while to test the possibility of substituting soil type index for crop yield index. This would avoid the difficulty of collecting reliable data on yields and also would eliminate the difficulty arising from the fact that the yield reflects the efficiency of the individual farmer as a crop grower.

Under numerous specialized conditions separate analysis would be necessary if the proposed research is to yield practical methods of land appraisal.

(1) A ranching unit might require the introduction of such factors as the ratio of hay to grazing land, the availability and cost of water, carrying capacity of grazing land instead of crop index, and a different scale for measuring tax burden than that used for crop land.

(2) Irrigated lands are likely to have as important factors the cost and availability of water, the ease with which water can be dis-

(4) *Op.cit.*

(5) "It is doubtful if this assumption will always hold."—E. H. Wiecking.

tributed, the adaptibility to crops capable of carrying a high tax burden.

(3) For lands in drainage districts particular factors must be weighed, including the frequency and extent of water damage, the special influence of tax burden due to drainage costs, and a different scale or code of community values.

(4) Permanent crop properties such as orchards and vineyards introduce a double problem in valuation. It is probable that the land and crop should be valued separately, although the adaptability of the land for orchard or vineyard is a factor in the value of the land itself wherever land for the particular use is scarce. Where there is a large surplus of the particular land beyond what is needed for orchard or vineyard the land can be valued with little reference to this adaptability.

On account of the many opportunities for, and the responsibility resting on practical application of the findings of this study, the tables of standard values and of deviations should be checked and tested thoroughly. One promising method of checking is to apply the tables to a large number of farms recently appraised by farm loan agencies. Any failure to arrive at approximately equal values by the methods now in use and the proposed method would not be conclusive evidence, but it is likely that there would be a general tendency toward agreement, and wide divergence might be explained in an examination which would tend to indicate the relative reliability of the two methods.

The tables should also be tested from time to time by checking the values yielded by them on specific properties against sale prices as they become available. This study, if continued, should yield results useful in modifying the original tables.

An effort should always be made to check results against values yielded by capitalizing net income from land. As experience accumulates in computing land income from farm records it should be possible to analyze standard values with a view to determining what part of prevailing values is based on current income. The method of capitalizing net rent is simpler and can be used in the same way.

In setting up this project the writer has assumed that the object of a farm appraisal is to arrive at market value for a purpose such as that of purchase and sale. Upon this assumption there is relatively little need to weigh future trends in value or to vary value according to productiveness due solely to the skill and efficiency of the farmer.

Much larger numbers of farm appraisals, however, are made in connection with mortgage loans and assessments for taxation. In the case of mortgage lending the mortgagee is interested not only in the present sale value of the farm but even more in knowing whether the borrower, by means of the farm, will be able to meet annual or

more frequent payments for interest and amortization, and whether at the maturity or default of the loan the farm will be worth enough to insure the repayment of the principal and any accumulated charges. The appraiser for mortgage credit agencies is therefore asked to do more than compute the current market value of the farm. He must predict the earning capacity of the farm at the hands of the particular borrower, or if the loan is for several years, at the hands of other possible owners. He must also pass judgment on the borrower as a moral risk. Finally he must predict values to the extent of judging whether at some later date the farm will be of sufficient value to guarantee payment of the loan. It is beyond the scope of this project to treat the judgment of personal efficiency and moral hazard which it seems should be regarded as a separate element in the job of the farm mortgage appraiser. The forecasting of land values is treated in Projects 16 and 17.

GROUP G

Projects Relating Primarily to Farm Buildings

PROJECT 26. Standard Tables of Building Costs (Joint with Agricultural Engineering)

OBJECTIVE: To set up standard tables of farm building costs with provision for the needed adjustments for changing conditions.

No satisfactory standard tables of farm building costs are at present available.

PROJECT 27. Depreciation Rates (Joint with Agricultural Engineering)

OBJECTIVE: To determine for the various classes and types of structure the rates of depreciation and obsolescence.

PROJECT 28. Valuation of Farm Buildings

OBJECTIVE: To determine the value of various classes and types of farm structure for various purposes.

(By E. H. Wicking)

The purpose for which farm structures may be valued include:

- (a) insurance (Joint with Agricultural Insurance)
- (b) mortgage loans (Joint with Agricultural Credit)

- (c) as a guide to rural building policy from an economic point of view (Joint with Farm Management)
- (d) taxation (Joint with Public Finance)
- (e) as a guide in purchase and sale of farms

A central problem in the analysis of this project involves valuation on the basis of cost of reproduction new less depreciation *vs.* valuation according to the economic service actually rendered, as reflected in what the structures actually add to the going value of the farm as an economic unit. The latter needs to be more thoroughly explored. Multiple curvilinear correlation analysis promises to provide a useful methodology. For further suggestions see the references listed in Project 15; also *The Relationship of Farm Buildings and Improved Roads to Land Values*, a mimeographed publication of the United States Bureau of Agricultural Economics.

GROUP H

Projects Relating Primarily to Social Considerations or Public Policy

PROJECT 29. Control of Land Booms (Joint with Agricultural Policy)

The dependence of this project on earlier projects (especially Groups A, C, and D) is clear. However, enough is known about the results of "booms" to discuss the desirability of control; and perhaps the available data on the characteristics of the boom itself are sufficient as a basis for venturing suggestions concerning the feasibility of control. Control of farm real estate booms has actually been advocated, specifically and apart from control of business cycles or of the general price level, to which specific control of land prices may obviously be very closely related.

PROJECT 30. The Relation of Farm Real Estate Values and Earnings to Tenancy (Joint with Agricultural Land Tenure)

OBJECTIVES: To determine the relationship between (1) the amount of tenancy and the income received from land; (2) the amount of tenancy and the ratio of land income to land values; (3) the amount of tenancy and the rate of change in land income and in land values; and (4) the kind of tenancy and the changes in land income and land values.

(By O. M. Johnson)

There are two general uses for a project of this kind. (1) If there is to be any action either in an educational way or by legislation

the facts are needed as a guide; (2) the individual tenant will be interested to know whether it is possible or desirable for him to become an owner under any given set of relationships among land income, land values and standard of living.

If we start with a pioneer area and free land, there is of course no tenancy. In well-settled areas we find great differences depending on laws, customs and the prices of agricultural products and of farm land. In the United States there are areas of high tenancy, low productivity of land and consequent low prices of land per acre, e.g., the cotton producing counties populated by whites in the hill sections of the South. Other areas of low productivity and low price of land per acre are low in tenancy, e.g., the northeastern part of the United States. Frequently areas of high productivity and high value of land per acre are high in tenancy, but there are exceptions.

Under the varying conditions, satisfactorily to account for and measure the factors which influence the amount or kind of tenancy offer many difficult problems both qualitatively and quantitatively. A central problem in the analysis for purposes of this project concerns the relationship of land values to the observed percentages of tenancy. One theory has been that high land values are *per se* a cause of high tenancy. But Chambers¹ suggested that a low ratio of land income to land value was the fundamental cause. High land values and high tenancy percentages, it was true, were often associated, but the relation was not causal. High land values appeared to be the cause because high values often were highly correlated with low income-value ratios, and the latter was the fundamental reason. A problem in the analysis will be to ascertain the effects of other factors so that the effects of the land income-land value factors may be measured and isolated. This obviously will offer insurmountable difficulties, for certain factors can be appraised only qualitatively.

The approach to the problem may be either (a) geographic, i.e., attempting to account for regional variations in the percentages of tenancy observed at a given time, or (b) chronological, i.e., attempting to ascertain and measure relationships by the observation of time-sequence. Studies involving the first approach include (1) E. A. Goldenweiser and Leon E. Truesdell, "Farm Tenancy in the United States," *Census Monograph IV* (1924), Chapter VI; (2) Charles L. Stewart, *Tenancy in Relation to Valuations of Farm Land, Size of Farms and Color of Farmer* (1920), Mimeographed report of the United States Bureau of Agricultural Economics (1924).

Dr. Stewart used correlation methods. Cross-tabulation or multiple correlation methods appear to be useful, within limits, in attacking the problem in its geographic aspects.

(1) U. S. Department of Agriculture Bulletin 1224, *Relation of Land Income to Land Value*.

During a period of rapidly rising prices of farm products, the price of land lags, and in many areas tenancy may decline; during a period of falling prices many who have bought with a small down payment relinquish their farms, and tenancy increases. This suggests the second, or time-sequence approach, to the problem. No research studies specifically of this character have come to the writer's attention, although relevant points have been discussed by several authors.

The material gathered in Projects 13 and 14 will be basic, and all three projects may be carried on for the same area at the same time. For the general relationships and designation of problem areas, data must be gathered in the field. Records of prices of land and turnover can be obtained at many county court houses, and some farm-to-farm survey data will be needed.

This project should be viewed from two standpoints: (a) local studies; (b) a nation-wide project designed to bring together all available data from local studies and from the country as a whole.

For the United States, samples will be needed for the following situations: (a) declining agriculture, industrial competition and low tenancy, such as New England and the Middle Atlantic States; (b) agriculture maintaining quantity production, a change in type of farming to intensive, a customary system of renting, industrial demand for labor, limited competition for land, relatively high tenancy, such as the Eastern Shore of Maryland and Delaware; (c) low productivity of farms, low standards of living, low land prices, high tenancy, as in the southeastern cotton states; (d) the tobacco section of Kentucky, with high value of crop per acre, great variation in prices, high land prices generally; (e) high land prices, low standards of living, cotton crop, high tenancy, such as the Mississippi Delta; (f) high land prices, relatively high standards of living, grain area, high tenancy Corn Belt, such as Iowa or Illinois; (g) relatively high land prices, dairying, low tenancy, such as Wisconsin and parts of Minnesota; (h) high land prices, livestock farming, high tenancy, such as parts of the Corn Belt; (i) irrigated areas; (j) small grain area of the Dakotas, Nebraska and Kansas; (k) fruit areas of the Pacific, low tenancy, high land prices; (l) ranching and livestock product areas.

For the time-sequence approach, the period covered should extend through a major cycle in which land prices and prices of farm products have changed materially. While desirable, data for every year are not essential; probably one year in three will show the important relationships.

PROJECT 31. The Relation of Farm Real Estate Values and Earnings to Scale of Living (Joint with Farm Family Living)

The prices paid for real estate in relation to its earning capacity may seriously press upon the amount of farm income available for

expenditure for family living, especially, but not solely, when farms are purchased subject to mortgage. A 6 per cent mortgage on "2.5 per cent land", e.g., may result in incursion upon the share of farm income which otherwise would be available for living, in order to meet interest payments. This phase of the project would obviously be related significantly to Projects 13 and 14. A second phase of the project would of course be concerned with the pressures exerted by violent changes in farm real estate values such as have occurred in recent years, and the associated phenomena.

**PROJECT 32. Land Values in Relation to Land Utilization
(Joint with Land Utilization)**

This project is covered by Land Utilization Project 15 (Bulletin No. 2).

**PROJECT 33. The Effect of Taxes upon Farm Real Estate
Values (Joint with Public Finance)**

This project has been covered in Public Finance Projects 18, 19 and 20 (Bulletin No. 1).

GROUP I

Miscellaneous Projects

**PROJECT 34. Capitalization of Farm Realty Income
as a Basis of Valuation**

OBJECTIVES: To determine the rate of capitalization of farm realty income, how far the capitalization formulae ordinarily used are applicable in fact.

(By B. R. Stauber)

The subject matter of the present discussion concerns the examination of the capitalization formulae relating farm land income and farm land value, including the problem of the "proper" rate, or rates, of interest, and an examination of each of the other items entering into the formula.

The fundamental basis for the valuation of farm land is similar to the basis of the valuation of the right to the income from any other sort of property, and consists essentially in determining the present worth of the future incomes to be received. In algebraic form the relationship may be set forth as follows:

$$V = \frac{a_1}{1+r} + \frac{a_2}{(1+r)^2} + \frac{a_3}{(1+r)^3} + \dots \quad (1)$$

The a 's represent the income at the end of the years designated by the subscripts; the r 's represent the interest rates at which the various incomes are discounted, and V is equal to the value of the land. In the most general formulation each a and each r may be regarded as independent. The possibility of evaluating V numerically depends on (a) knowing the value of each a indefinitely in the future; (b) knowing each r indefinitely in the future. At the outset, therefore, strict application of such a formula is faced with insurmountable difficulties, for obviously the values of neither the a 's nor the r 's for an indefinite period in the future are within the range of human knowledge. This situation does not, however, necessarily preclude a modification of, or the limitation of, the number of terms in the formula in such a manner as to render the expression of the logical relationship involved distinctly useful in a practical as well as theoretical consideration of farm land values.

In the above formula if each of the a 's and each of the r 's is completely independent, no simplified form is possible, and the evaluation of V even assuming the a 's and r 's to be known, remains a cumbersome arithmetical procedure. If, however, the a 's or the r 's, or better, both, can be expressed as a function of time, then some simplification may be possible. For example, under certain conditions the following formula is an accurate abbreviation of (1):

$$V = \frac{a}{r} + \frac{i}{r^2} \quad (2)$$

The conditions are that every a_k for values of k equal to, or greater than 2, may be expressed as a linear function of time where $a_k = a_1 + (k-1)i$.

A second formula representing a simplification under certain other conditions is

$$V = \frac{a}{r} + \frac{i}{r^2} \left(1 - \frac{i}{(1+r)^n} \right) \quad (3)$$

The assumptions involved in this formula² are similar to those in the

(1) This formula is discussed by C. R. Chambers in United States Department Bulletin 1224, *The Relation of Land Income to Land Value*.

(2) This formula has been applied to stock prices by Dr. Karl Scholz, "The Determination of Reasonable Market Prices of Speculation Investments", in *The Annalist* (January 3, 1930), p. 5.

preceding one except that values of a_k for values of k greater than $n-1$ are constant and equal to a_{n-1} .

The above formulae are a satisfactory representation of V to the extent that the assumptions involved are realized in actual life. In the application, three problems are involved: (a) The determination of a and of r , that is, just what is capitalized and at what rate is it capitalized; (b) Adequate expression in algebraic form; (c) Forecasting the likely trend in a and r for a sufficiently long period.

The usefulness of such a procedure is twofold: first, as a contribution to pure science, as a rigorous scientific statement of relationship; second as a distinct aid to prospective owners of real estate and to those contemplating making long-time loans on the basis of real estate, in that it should enable them to determine a valuation which will be in line with conditions five, ten, fifteen or more years in the future, when loans mature.

The usefulness of a formula depends upon the adequacy with which it expresses real relationships, and in the present instance, depends upon a careful analysis of the market mechanism of how price-making forces react.

Taking up first the matter of the a 's, it remains to determine just what should be included. A decision rests upon the question of imputation of income to land as a factor in production. Possibly a net cash rent figure will provide a point of departure. However, a cash rent is apt to respond rather slowly to changing conditions, whereas it may be argued that an imputed share of income would vary from year to year, depending upon yields, prices, the price level, wage rates and related factors. If the share of income attributable to land is not measurable directly, may it not be possible to set up related series of income or prices which may be expected to vary concomitantly with it?

With respect to the r 's also, several questions may be raised. Should the same value of r be used throughout or should different values be used on the basis that interest rates in the past have fluctuated with more or less regularity within rather elastic limits, and may be expected to continue to do so? If a variable rate is not appropriate, then a choice must be made between past, present or expected future rate, or some sort of "normal" rate. Is the rate of interest current on mortgages the rate that should be used in capitalization? If so, the rate on first or second mortgages? However, a first mortgage is a senior security and certainly is subject to less risk than is the owner's equity, just as a bond is usually regarded as a somewhat safer investment than common stock of the same company. On the other hand, there may be some who will argue that a farm-owner can, if necessary, cut into the share of earnings which properly should contribute to his living and thereby maintain his loan in good standing at the expense of his own share. For this

additional security the farmer might be held willing to accept a rate of return lower than that on first mortgages. If the mortgage rate of interest is not theoretically correct, then the problem remains of ascertaining the correct rate and determining whether the fluctuations in it tend to be greater or less than those in the mortgage rate of interest. Perhaps an examination of the ratio of value to net rent may provide a key to the situation, but this is no simple solution, for market prices at any time may reflect an allowance for anticipated increases or decreases in income. When sufficient data are available, it may be possible to trace a relation between the variation in mortgage rates and in trend in value and by considering other factors to arrive at a satisfactory conclusion concerning "r." If it may be ventured that the "proper" rate of interest for capitalization purposes is one that will, over a period of years, allowing for the mobility of farm population, maintain sufficient land in cultivation to maintain a sufficient food supply under existing conditions of competition and national policy, then it may be that long-time series in land values, rents, prices and incomes may provide another mode of attack on the problem. Another approach to the problem is found in the efforts of the Bureau of Agricultural Economics to arrive at a rate of return on all capital, and on operators' capital, used in agricultural production.

Another problem is the number of years that should be utilized or considered in the formula, i.e., "How far in the future are investors able or inclined to look?" Brief consideration will indicate that the years in the immediate future are the most important from a valuation standpoint while years in the very distant future are relatively unimportant. The following table illustrates this point.

Proportion of $V = \frac{a}{r}$ — represented by the first n annuities of amount a :

n	r=5 Per Cent	r=6 Per Cent
	Per Cent	Per Cent
1	4.76	5.66
5	21.64	25.27
10	38.61	44.16
15	51.90	58.27
20	62.31	68.82
30	76.86	82.59
40	85.80	90.28
50	91.28	94.57
75	97.42	98.74
100	99.24	99.76

Considering a perpetual, constant annuity of amount a and present worth or value $V = \frac{a}{r}$ (r being the constant rate of interest) as

having a value of 100 per cent, the table gives the proportion of such value represented by the present worth of the first five, ten, twenty, fifty and seventy-five years at 5 and 6 per cent. It is clear that an error in judging income in the first five years is more serious than a similar error for any other five-year period, although the first five-year period is less important than the period from the sixth to the fifteenth year inclusive.

A table of somewhat similar character might easily be worked out showing the effect of considering only the first n years of an increasing, decreasing or alternating series of incomes. A similar table contrasting the effects of fluctuating interest rates and of a constant rate representing some sort of an average of the number of the fluctuating series must also be calculated. Such comparisons would afford a means of weighting the relative importance of errors in estimating the future relations between the various factors involved.

It might be desirable to attempt to relate farm value for past years to the discounted incomes actually realized, provided satisfactory series for both become available. The calculation of such incomes for various years in the past would be difficult but it might be possible to make a reasonably close approximation to annual changes in such incomes by the use of index numbers of prices, ratio of prices received to prices paid, and other factors, and comparing the course of values secured on the basis of earnings (a) for the future twenty years, (b) for the future ten years (c) for the future five years (d) the current year (e) the past five years (f) the past ten years. One study³ indicates that the tendency appears to be to judge value on the assumption that the preceding seven to ten years afford an indication of the succeeding ten.

Another aspect of the problem involves the question of how far ahead can one look. What are the bases for estimates concerning the future? Certainty is impossible. Is it possible to devise and arrange the reasonable variation in income into frequency classes, and ascribe various probabilities or likelihoods of occurrence to subclasses within the range and so arrive at an estimate, together with an indication of its precision? In any event there must be some error and some risk of error, and the problem consists in part of minimizing the degree of error to be expected. This involves, of course, a careful study of the factors affecting earnings and a consideration of the course of the general price level. The question will be raised as to how far one can forecast earnings while the price level in general is subject to uncontrolled ups and downs which affect different parts of the economic structure in different ways and directions, and at different times.

Study of the factors indicated above may result in additional formulae that involve assumption approximating those of the practical appraiser and farmer. Such new formulae may involve relations

(3) C. R. Chambers, *ibid.*, p. 36.

~~103-00~~ various factors which have not thus far been worked out. For example, the formula might involve a fluctuating or periodic variation in either a or r or both. In any event, having devised a formula from theoretical considerations, it should be tested on the basis of experience, and applied to the practical problem of forecasting the future. Again it should be emphasized that the formula has no particular merit *per se*; its value lies solely in the simple and concise expression of logical relations between various economic and physical factors as they operate in actual life.

The organization of a project such as that outlined is subject to considerable latitude. The collection of many of the data required is covered in the early projects in this report. Owing to the nature of the problem, it may be some time before the necessary factual material is available for long-time historical study. That circumstance, however, need be no deterrent to attacking the theoretical problem involved, which, when solved, may facilitate progress in the collection of test data.

Certain phases of this project presuppose some familiarity with compound interest, annuities and series. The mathematical principles involved are discussed in standard text books on college algebra and mathematics of finance.⁴

PROJECT 35. Land Titles and Conveyancing (Joint with Agricultural Land Tenure Project 31)

This project will undertake to analyze the problems of land titles, conveyancing, and the legal aspects of land transfer; types, costs, reports and legal status; title insurance, Torrens System, etc., and the relation to real estate prices, appraisal and the like. It will consist of a critical legal-economic analysis with suggestions for improvement.

PROJECT 36. Distressed Land Holding in Relation to Prices (Joint with Agricultural Credit)

This project will consist of a special study of "distressed land" (including defaulted irrigation, drainage and other improvement districts) and its effects upon farm real estate prices, including the effects of the foreclosure laws and the foreclosure practices of the various classes of mortgages, and also of the management and disposal policies of the major holders of involuntarily acquired farm real estate.

(4) See for example:

W. L. Hart, *Mathematics of Investment* (D. C. Heath).

H. L. Rietz, A. R. Crathorne and J. C. Rietz, *Mathematics of Finance* (Holt and Company).

Institute of Actuaries Text Book.