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AGRICULTURAL ECONOMICS

By

Vernon W. Ruttan

Department of Agricultural Economics

University of Minnesota
Institute of Agriculture
St. Paul, Minnesota 55108

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Agricultural economics is a field of applied economics. Its scope and its relationship to other social and natural science disciplines has changed over time in response to (a) the social, economic and technical changes impinging on the agricultural sector and (b) progress in economic theory and in other related social and natural science disciplines. The substance of agricultural economics in the United States at the present time can best be understood by reviewing the historical origins of the field and its recent evolution in relation to developments in economic theory, statistics and econometrics. ^{1/}

1.0 Organization of Agricultural Economics as an Academic Field

Prior to 1900 agricultural economics did not exist as a field of specialized study either within general economics departments or in colleges of agriculture although courses in "Agricultural Economy" and "Economics of Agriculture" appeared in college catalogs at the University of Illinois and

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at Cornell University before 1870. The rapid growth of agricultural economics as an academic field between 1900 and the early 1920's reflected the emerging interests of a number of men who had been trained in the several agricultural disciplines such as agronomy, horticulture, animal husbandry, and soil science in factors affecting the costs of production and in the economics of farm management - particularly in problems such as the economics of enterprise selection, choice of production methods, and the financing and growth of the firm. It also reflected the growing interest of a number of economists in problems of agricultural policy, the behavior of agricultural commodity markets, and the economics of land use.

These developments culminated in the organization of the American Farm Management Association in 1910; the organization of the Association of Agricultural Economists in 1916; and the consolidation of the two associations under the title of American Farm Economic Association in 1919. The organization of the two separate associations reflected a difference in perspective between those who entered the field of agricultural economics from the agricultural disciplines of agronomy, horticulture, animal husbandry, and soils and those who entered the field with prior training in economics. The former were interested primarily in problems of microeconomics while the latter were interested primarily in problems of macro and institutional economics. After the merger of the two associations this difference in perspective continued to manifest itself in terms of (a) discussions regarding the appropriate scope of the field of agricultural economics - was it a separate discipline or an applied field of economics - and (b) the emphasis that should be given to the biological sciences and applied agriculture relative to economic theory and other fields of applied economics in the education of agricultural economists. This dialogue was apparently finally resolved when the association changed its name to the American Agricultural Economics Association in 1967.

A second major event in the development of agricultural economics was the organization of the Bureau of Agricultural Economics in the U.S. Department of Agriculture in 1921 under the direction of Henry C. Taylor. Establishment of the Bureau before the Department initiated the major action programs of the 1930's enabled the Bureau to develop a tradition and a commitment to research that has been difficult to duplicate in other economics research units within the Federal Government. The close professional relationship and the continued mobility of agricultural economists between the Bureau of Agricultural Economics (now the Economic Research Service) and the academic departments has been a major source of strength in the professional development of agricultural economics.

2.0 Development of Agricultural Economics in Relation to General Economics and Related Disciplines

The evolution of agricultural economics since the early 1920's has been closely related to developments in economic theory and statistics. Interest in the use of multiple correlation techniques in the analysis of supply, demand and production relationships following publication of "Forecasting the Yield and Price of Cotton" by Henry Moore represented a particularly fruitful period of collaboration among statisticians and agricultural economists.^{2/} Moore's work on statistical demand relationships was followed closely by the elaboration of simple and multiple correlation methods by H. A. Wallace, George Snedecor, Mordecai Ezekiel and L. H. Bean and by further investigations of statistical demand relationships by Holbrook Working, Fred Waugh, Mordecai Ezekiel, Henry Schultz, and others. Elmer Working's classic article on the identification problem, "What Do Statistical Demand Curves Show",^{3/} was a major theoretical contribution from this same collaboration. During the postwar period (a) new analytical tools - including the structural equations

systems pioneered by the Cowles Commission, the Leontief interindustry analysis, and the closely related methods of linear and non-linear programming - and (b) the availability of better economic time series and survey data have combined to produce a renewal of interest and activity in this area. The work by Karl Fox, Richard Foote, Marc Nerlove, and others^{4/} at the U.S. Department of Agriculture was particularly important in providing new analytical insights, in testing the utility of alternative analytical approaches, and in providing a quantitative basis for evaluating the economic effects of agricultural policy decisions.

Early work in production economics typically emphasized accounting and budgeting techniques of analysis.^{5/} The application of statistical methods in the 1920's led to major innovations in the exploration of agricultural production relationships. Spillman's studies represented the first major attempt to use statistical techniques in the economic analysis of data from agricultural experiments.^{6/} Tolley, Black and Ezekiel pioneered in the use of statistical analysis of production relationships based on survey data collected from individual farms. The first systematic treatment of these several developments within the framework of the neo-classical economic theory of the firm appeared with the publication by Black of Introduction to Production Economics in 1926.^{7/} Further progress in the analysis of agricultural production relationships was delayed until after the advances in the theory of the firm by Hicks and others in the late 1930's.^{8/} These theoretical developments, when combined with the advances in econometrics and mathematical economics during the 1940's, lead to an explosive growth of empirical investigations of agricultural production functions during the 1950's by the "Iowa-Chicago" school of agricultural economics.^{9/}

A more recent area of intensive interaction between agricultural and general economists has been in the field of agricultural and economic development. As a result of both an intellectual and a policy commitment to the problem of economic growth in low-income, predominantly agricultural, countries general economists have found themselves increasingly concerned with the role of agriculture in national economic growth. And agricultural economists, working in similar circumstances, have found themselves giving more careful attention to the implications of firm and sector level analysis for national economic growth than when their analysis was being conducted primarily in western economies where agriculture typically represents a relatively minor share of both national income and the total labor force. While the interest in the economic problems of developing countries has widened the dialogue between agricultural and general economists it is too early to argue that this dialogue has been as fruitful, either of theoretical and methodological developments or empirical results, as the two earlier examples which contributed to the evolution of modern econometric analysis of agricultural demand, supply and production relationships.^{10/}

Several other areas of collaboration between general economics and agricultural economics might be mentioned. Agricultural commodity trade has traditionally occupied an important role in trade theory. Interest in the economic policies of the EEC and in the stabilization of commodity trade between the developed and less developed countries continues to make international trade a fruitful area for the joint efforts of general economists and agricultural economists.

Another area of mutual interest has been in the area of market structure and organization. Much of this work is related to the theoretical developments by Robinson and Chamberlin. More recent work has

stressed the utilization of Bain's structure-conduct-performance framework.^{11/}

During the last decade agricultural economists have also become increasingly involved in the economics of natural resource development and use. Two factors have been involved in this development. Interest in the economics of land use, rural taxation, rural land use planning, and related areas was a factor in attracting the interests of general economists into agricultural economics in the 1890's and early 1900's.^{12/} With the increased concern in the adequacy of the natural resources base to sustain national economic growth in the late 1940's and early 1950's reflected by the President's Water Resources and Materials Policy Commission reports the field of land economics expanded to include other natural resource areas and problems including investment in water resource development, the economics of environmental control and others. This development was also characterized by fruitful collaboration between agricultural economists and general economists in the interrelated fields of public finance and location and regional economics.

In addition to its close relationship with the fields of applied biology and with general economics and statistics, agricultural economics was closely linked to rural sociology during the formative years of the two fields. Many departments were organized as departments of agricultural economics and rural sociology. In spite of close administrative links between the two fields their contribution to each other has been quite limited. However, interest by economists and sociologists in problems of urban and rural poverty and in the diffusion of technical change is leading to renewed collaboration between the two fields.

During the last decade agricultural economics has become much more closely related to work in schools of business. The field of farm management

has never satisfactorily resolved the question of whether it should confine itself to the economics of farm management (i.e. production economics) or whether economics is simply one of the social, biological and physical science disciplines upon which the field of farm management is based. This same dichotomy appeared in the marketing area as agricultural economics became concerned with the economics of the marketing firm. As quantitative tools for the analysis of firm management problems — operations research, systems analysis and others — have become increasingly sophisticated a distinct sub-field of agricultural business has emerged that is more closely related to the type of work typically conducted under the rubric of business or industrial management than in traditional economics departments.

3.0 The Future of Agricultural Economics

In his 1960 presidential address to the American Farm Economic Association William H. Nicholls drew attention to what seemed at the time to be an excessive growth of agricultural economics in relation to economics generally and in relation to future trends in the role of the agricultural sector in the national economy.^{13/} In the intervening years agricultural economics has continued its rapid expansion. At the undergraduate level majors in agricultural economics (and agricultural business) are increasing both absolutely and as a percentage of graduates from the colleges of agriculture. At the graduate level the demand for students completing their Ph.D.'s in agricultural economics is continuing to expand rapidly.^{14/} In spite of these apparent measures of success the field of agricultural economics will face some difficult problems during the next decade.

In recognition of the difficulties facing the field of agricultural economics, the joint Social Science Research Council Committee on Agricultural

Economics - American Farm Economic Association Committee on New Orientations in Research commissioned a series of papers to review the progress and problems being faced by the field.^{15/} The initial paper in the series identified excessive fragmentation along geographic and subdisciplinary lines as the major factor limiting the effectiveness of agricultural economics.^{16/}

These criticisms remain valid. Yet this very parochialism and fragmentation of agricultural economics has also represented a source of strength and a basis for many of its contributions. Its parochialism has contributed to the interest of agricultural economists in focusing their attention on the economic problems of individual farm production and marketing firms. Its fragmentation has contributed to the interest of agricultural economists in examining specific commodity demand, supply and production relationships. Close association with the experimental and statistical methodology employed in applied biology made agricultural economists particularly receptive to methodological developments leading to greater precision in (a) the quantification of economic and technical relationships, (b) in the empirical testing of hypotheses and generalizations, and (c) in providing quantitative guides to the effect of alternative private and public sector decisions.

The fragmentation of agricultural economics along subdisciplinary lines may have also accounted for the ease with which it has expanded from its initial emphasis on problems of production economics and farm management to encompass (a) the marketing of agricultural commodities and factors inputs, (b) commodity, supply demand and trade relationships and policy, (c) land, natural resource and regional economics, and (d) problems of agricultural development and economic growth.

In spite of these strengths agricultural economics is facing a number of serious challenges to its future as a field of applied economics. A substantial share of the increase in the demand for agricultural economists in recent years is a result of the U.S. commitment to economic development abroad. The opportunities for productive application of the skills employed by agricultural economists on problems of agricultural development are substantial. Yet there are serious constraints on the ability of agricultural economics to respond to this need. Financial support for teaching and research on problems of agricultural development abroad has not been forthcoming from traditional sources at the state and federal levels. The national and international agencies responsible for the support of agricultural development assistance have not been as eager to support graduate education and research programs as to employ agricultural economists in the fields of agricultural planning and program administration.

Another substantial share of the increase in demand for advanced degree holders in agricultural economics in recent years has been from the research departments of firms in the agri-business sectors - farm chemicals, food processing and others. Although the demand from this source is expected to continue to be strong the men who enter the agribusiness field have not, and probably cannot be expected, to make major contributions to intellectual growth and vigor of the field. It does seem likely that a significant share of the public sector economics research, development and adult education (extension) that has been performed by economists employed at the U.S. Department of Agriculture and in the State Universities will shift to the private sector as agricultural production becomes increasingly integrated with firms in the agri-business sector. Furthermore, agricultural economists

would seem to have little advantage relative to graduates of schools of business or industrial management for many of the functions which they perform in these organizations. Agricultural economists like general economists, continue to be more successful in working with price behavior and other market phenomena - with what Boulding refers to as the exchange system ^{17/} than with resource allocation and control within integrated or conglomerate private and public sector enterprises.

The most immediate challenge to the field of agricultural economics during the next decade stems from the transformation that is occurring in rural life and in the agricultural sector of the economy. Agricultural economics emerged as a response to the distinct problems of rural society during a period when the characteristics of rural society and rural economy appeared to call for specialized analysis, institutions and policies. These conditions have essentially disappeared. The urbanization of rural life has become pervasive. The agricultural sector is becoming more fully integrated with an agricultural business sector. The distinct problems of agricultural production and of agricultural product markets are less critical than at the time agricultural economics was coming to age.

The transformation of the agricultural sector in the U.S. is characterized by rapid technical change, an increase in the share of farm output produced by the larger farms and closer integration of agricultural production with the supply and processing sectors. In the process agriculture has become a technology based rather than a resource based industry. The interactions between the farm and the non-farm sectors that have led to fundamental changes in the relationship between agriculture and other sectors of the national economy, have operated primarily through five sets of market relationships: (a) the product market, (b) the markets for

purchased inputs, (c) the labor market, (d) the land market, and (e) the market for consumer goods. In the past agricultural economists have focused their attention primarily on product and land market relationships and on problems of agricultural production. Agricultural policy discussion has focused primarily on the modification of institutional relationships in the product and land markets. Other market relationships have been largely ignored. The new structure of society, in which agriculture is fully integrated into a pervasive urban pattern of economy and society, clearly means that the concentration on product and land markets alone is no longer sufficient. Increased attention is now being devoted to the markets for purchased inputs, the labor market and the markets for public and private sector consumer goods and services. The close interdependence between agriculture and the rest of the economy, through the market linkages outlined above and through non-market institutions, means that solutions to the resource allocation and income distribution problems of the agricultural sector and of the rural community must be sought primarily within the framework of general economic policy rather than through a unique set of agricultural commodity and rural community development policies.

Agricultural economists have not yet fully responded to the challenges of the urbanization of rural life. Too little effort has been devoted to the economics of the rural community relative to the economics of farm and agribusiness enterprises. The economic problems of the production and distribution of public and private services in low density population areas have been largely neglected. It seems likely that in the future agricultural economists will be called upon to devote more attention to the analysis of programs and policies designed to affect the levels of

all segments of society than policies and programs designed to give special treatment to farm people. It is important for agricultural economics to become more responsive to such issues because few other social scientists are concerned, at the present time, with the problems that are emerging in the non-metropolitan areas of the United States.

It seems that almost every agricultural economics department in the United States will, during the next decade, be confronted with a decision of how to organize itself to respond to the transformation of the rural society and the agricultural economy. One alternative is the development of regional agricultural economics research and graduate education centers. A second is to combine existing agricultural and general economics departments into single units in which agricultural economics, and its subdisciplines, represent additional fields of applied economics. A third alternative is to broaden the existing departments of agricultural economics into departments of applied economics with broader responsibility for service to the public and private sector at the state and local level. Steps to implement either the second or the third alternative have been taken in a number of institutions, typically those with relatively small agricultural economics departments. In other schools there is increasing integration of agricultural and general economics graduate programs, particularly at the Ph.D. level.

Regardless of the answer that emerges at the level of organization it will be necessary to continuously re-define the significance of the interdisciplinary linkages which have given agricultural economics its unique relationship to both the natural and the social sciences. It will also be necessary to reinforce the tradition of response to social and economic change by redirecting a significant share of the academic professional resources now devoted to problems of the agricultural and agribusiness

sectors to the more pressing issues of the economics of public enterprise in the fields of health, education, government services and to the fields of resource, urban and regional economics.

FOOTNOTES

- 1/ For a more adequate review of the historical development of agricultural economics see H. C. and A. D. Taylor, The Story of Agricultural Economics, Iowa State College Press, Ames, 1952; H. C. Taylor, "Development of the American Farm Economic Association," Journal of Farm Economics, Vol. 4, pp. 96-98 (April 1922).
- 2/ The best review of these developments is George J. Stigler, "Henry L. Moore and Statistical Economics," Econometrica, Vol. XXX, January 1962. Reprinted in George J. Stigler, Essays in the History of Economics, University of Chicago Press, pp. 343-374, 1965.
- 3/ E. J. Working, "What Do Statistical Demand Curves Show," Quarterly Journal of Economics, Vol. 41, February 1927, pp. 218-223.
- 4/ For an early discussion of these developments see K. A. Fox, "Relations Between Price, Consumption and Production," Journal of the American Statistical Association, Vol. 46, September 1951, pp. 323-333. For a later review see Marc Nerlove and K. L. Bachman, "The Analysis of Changes in Agricultural Supply: Problems and Approaches," Journal of Farm Economics, Vol. 42, August 1960, pp. 515-553. The most complete synthesis of work on this area was achieved by George Brandow, Interrelations Among Demands for Farm Products and Implications for Control of Market Supply, Pennsylvania State University Agricultural Experiment Station Bulletin 680, August 1961.
- 5/ For a review of this early development in production economics see S. E. Johnson and K. L. Bachman, "Development of Production Economics in Agriculture," in J. P. Cavin (ed.). Economics for Agriculture: Selected Writings of John D. Black (with Introducing Essays), Harvard University Press, Cambridge, 1959, pp. 21-47. For comment on more recent developments see G. L. Johnson, "Stress on Production Economics," The Australian

- Journal of Agricultural Economics, Vol. 7, No. 1, June 1963, pp. 12-27.
- 6/ W. J. Spillman and Emil Lang, The Law of Diminishing Returns, World Book Company, New York, 1924.
- 7/ J. D. Black, Introduction to Production Economics, Henry Holt, New York, 1926.
- 8/ See J. R. Hicks, Value and Capital, London, Clarendon Press, 1939; Sune Carlson, A Study of the Pure Theory of Production, Chicago, 1939, (reprinted by Kelley and Millman, New York, 1956); T. W. Schultz, "The Theory of the Firm and Farm Management Research," Journal of Farm Economics, Vol. 21, No. 3, August 1939, pp. 570-586.
- 9/ Earl O. Heady, Economics of Agricultural Production and Resource Use, Prentice Hall, New Jersey, 1952, represented on initial synthesis of (a) the theoretical implications of the neo-classical theory of the firm and (b) the use of modern statistical experimental design and survey methods, and (c) the use of statistical methods in the analysis of farm management and production economics problems. See also E. O. Heady and J. L. Dillon, Agricultural Production Functions, Iowa State University Press, Ames, 1961, and E. O. Heady and J. L. Dillon, Agricultural Supply Functions, Iowa State University Press, 1961.
- 10/ The most complete synthesis of work in agricultural and economic development at the present time is J. C. H. Fei and Gustav Ranis, Development of the Labor Surplus Economy, Homewood, Illinois, 1964.
- 11/ R. L. Clodius and W. F. Mueller, "Market Structure Analysis as an Orientation for Research in Agricultural Economics," Journal of Farm Economics, Vol. 43, No. 3, August 1961, pp. 515-553.

- 12/ For a review of the early development of land economics in the United States see L. A. Salter, Jr., A Critical Review of Research in Land Economics, University of Minnesota Press, Minneapolis, 1948.
- 13/ W. H. Nicholls, "Higher Education and Agricultural Economics: A Critical Appraisal," Journal of Farm Economics, Vol. 42, December 1960, pp. 969-990.
- 14/ Ph.D. degrees granted in agricultural economics rose by approximately one-third between 1960 and 1967 while those in other fields of economics almost doubled. In 1967 agricultural economics accounted for just over 15 percent of the approximately 800 Ph.D. degrees granted in economics and agricultural economics by U.S. Universities. During this period initial salaries for students completing their Ph.D.'s in economics and in agricultural economics departments remained essentially identical according to data from surveys conducted by the University of Minnesota Graduate School. Salaries of all agricultural economists fall slightly above the median among the several economics fields. See N. A. Tolles and Emanuel Melichar, "Studies of the Structure of Economists' Salaries and Income", American Economic Review, Vol. 58, No. 5, December, Part 2, December 1968, p. XVIII.
- 15/ These papers were:
- G. K. Brinegar, K. L. Bachman and H. M. Southworth, "Reorientations in Research in Agricultural Economics," Journal of Farm Economics, Vol. 41, August 1959, pp. 600-619.
- V. W. Ruttan, "Research in the Economics of Technological Change in American Agriculture," Journal of Farm Economics, Vol. 42, No. 4.
- Marc Nerlove and K. L. Bachman, "The Analysis of Changes in Agricultural Supply: Problems and Approaches," Journal of Farm Economics, Vol. 42, August 1960, pp. 531-554.

R. L. Clodius and W. F. Mueller, "Market Structure Analysis as an Orientation for Research in Agricultural Economics," Journal of Farm Economics, Vol. 43, August 1961, pp. 515-553.

Karl A. Fox, "The Study of Interactions Between Agriculture and the Nonfarm Economy: Local, Regional and National," Journal of Farm Economics, Vol. 44, February 1967, pp. 1-34.

A 6th paper on the economics of agricultural development was also discussed by the Committee. The scope of the problem appeared too broad for treatment in a single article and a new set of papers were commissioned. The papers were under the title of Agricultural Development and Economic Growth, Cornell University Press, 1967.

16/ "The institutionalization along state lines... tends to force formulations of problems into geographic boundaries that fail to encompass the main economic problems of today's agriculture. The Regional Research Program was intended as a vehicle for broader attack but there seems to be general agreement that we have failed to realize its potentials for research. The more basic compartmentalizations of thought, however, are disciplinary ones, originating out of the formulations of the past: farm management; the financing of farming enterprises; the use of agriculture's resource, the land; the analysis and forecasting of market forces in terms of their expression as prices; marketing, first as an operation whose costs impinge on farmers' returns, more recently as a positive instrument for the enlargement of markets; cooperation as a vehicle for the group solution of the foregoing problems. In each of these problem areas a subdiscipline grew-up, with specialized concepts and methodology. The crystallization of these subdisciplines bounds the structure of problem areas formulated in agricultural economics today. ...Yesterday's formulations do not appear to provide keys, either individually or

collectively, for unlocking the dominant problems of today... Changing times call for reformulation of problems into new categories... Restricting our efforts to traditional thought compartments can generate only fragmentary research results", (pp. 601, 602).

17/ Kenneth E. Boulding, "Economics as a Moral Science", The American Economic Review, Vol. 59, No. 1, March 1969, pp. 1-12.