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PRIORITIES IN AGRICULTURAL ECONOMICS RESEARCH:  
AN INTERNATIONAL PERSPECTIVE 1)

by

Vernon W. Ruttan, New York

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1	The Demand for Knowledge in Economics	13
2	The Supply of Knowledge in Economics	15
3	Managing the World Food Economy	15
4	Expanding Agriculture's Capacity to Produce	17
5	Partitioning Growth Dividends	18
6	Implications for Economic Education	19

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In this paper I identify some of the forces which bear on the demand for and the supply of knowledge in economics. I then outline three issues facing the world economy which are resulting in a shift to the right in the demand for knowledge in agricultural economics. These three issues include: (a) managing the world food economy; (b) expanding agriculture's capacity to produce; and (c) achieving equitable participation by rural people in the dividends from economic growth. No attempt is made to survey the entire field of agricultural economics research (1).

1 The Demand for Knowledge in Economics

Over the last several decades management scientists and economists have provided research managers with the capacity to bring an increasingly powerful set of tools to bear on the allocation of resources to applied research in the biological and physical sciences (2). We have all become familiar with the calculations showing rates of return in the range of 25 - 50 percent per year to investments in agricultural research in the aggregate in countries like the United States and Japan, and to even higher rates of return on individual commodities such as hybrid corn in the United States and wheat in Mexico. More recently a good deal of effort has been devoted to adapting the models used to estimate historical performance for use as decision tools in allocating research resources for future productivity growth (3).

The basic conceptual advance on which essentially all research resource allocation methodology

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1) The author is indebted to Abraham WEISBLAT and Hans BINSWANGER for helpful comments on an earlier draft of this paper.

rests is that the demand for knowledge is derived from the demand for technical change in commodity production. Once the output of the research process was clearly conceptualized as an input into the process of technical change in commodity production, the link was established which made it possible to model and measure the ex post returns to research. It was then possible to begin to model, ex ante, the relative value of alternative uses of research resources and to specify rules which research managers might follow in the allocation of research resources.

The same effort has not yet been devoted to the development of formal methodologies for the allocation of resources to economic (and social science) research. In my judgment, the failure of social scientists to establish a firmer claim on research resources is due, at least in part, to a failure to adequately conceptualize the nature of the contribution of knowledge in the social sciences to institutional change.

The first step in any attempt to value new knowledge in economics is to specify the source of the derived demand for knowledge in economics. Clearly the demand for knowledge in economics is not derived from either private or public demand for technical change. The demand for knowledge in economics and in the other social sciences (and professions) is, in my judgment, derived primarily from demand for institutional change -- for (a) improvements in efficiency in institutional performance, and (b) for institutional innovation. Stated another way, changes in the demand for knowledge in economics are primarily a function of changes in demand for institutional innovation and for efficiency in institutional performance (4).

The hypothesis that the demand for new knowledge in economics, and in the social sciences generally, is derived primarily from a demand for more effective institutional performance is not easy to test. Douglass C. NORTH and Robert Paul THOMAS have attempted to explain the economic growth of Western Europe between 900 and 1700 primarily in terms of changes in the institutions which govern property rights (5). A major source of institutional change was, in their view, the rising pressure of population against increasingly scarce resource endowments. Theodore W. SCHULTZ, focusing on more recent economic history, has identified the rising economic value of man during the process of economic development as a primary source of institutional change (6). NORTH and THOMAS would apparently agree with SCHULTZ that, -- "It is hard to imagine any secular economic movement that would have more profound influence in altering institutions than would the movement of wages relative to that of rents." (7)

The NORTH-THOMAS and SCHULTZ models of the demand for institutional change open up the possibility of a theory of induced institutional change that is capable of generating testable hypotheses regarding alternative paths of institutional change in particular societies over time and cross-sectionally among countries. It also raises the possibility of a more precise identification of the link between the demand for institutional change and the demand for knowledge in economics and in the social sciences generally. Advances in knowledge in the social sciences, in response to the demand for institutional change, would have the effect of reducing the cost of institutional change just as advances in knowledge in the biological sciences and in agricultural technology have reduced the cost of technical changes in agriculture.

This is not to argue that institutional change is dependent on formal research leading to new knowledge in the social sciences. Technical change did not wait until research in the natural sciences and technology became institutionalized. Similarly, institutional change may occur as a pragmatic response to external contact or internal stress. The objective of the institutionalization of social science research capacity is to allocate social science research resources to speed up the production of new knowledge that is designed to become an input into those areas of institutional change on which society places a relatively high priority and to apply the new knowledge to bring about a more precise linkage between the institutional changes that are implemented and the objectives of institutional change.

## 2 The Supply of Knowledge in Economics

How elastic is the supply of knowledge in economics? It is tempting, without serious investigation, to infer that the advances in knowledge in economics identified with the Keynesian revolution represented a supply response to the demand by society for full employment of human and capital resources during the Great Depression of the 1930's. Similarly, it seems apparent that the advances in knowledge of agricultural and industrial development processes, and of the complex interactions among households, firms and sectors during the development process that has occurred since World War II have been a direct response to the demand for economic development in the Third World.

We are assured, however, by such eminent historians of economic thought as George J. STIGLER and Joseph J. SPENGLER, that the development of economic thought has, since at least 1870, been relatively impervious to the impact of events (8, 9).

The issue of the elasticity of supply of knowledge in economics, or in the other social sciences, does not lend itself to an easy resolution. In my view, the supply of knowledge about the economy, within the framework of a particular paradigm, is more elastic than the supply of disciplinary knowledge itself (10). This view of the impact of exogenous influences or advances in economic knowledge is similar to that described by Robert K. MERTON in his discussion of "theories of the middle range" (11). MERTON defines theories of the middle range as "theories that lie between the minor but necessary working hypotheses that evolve in abundance during day-to-day research and the all-inclusive systematic efforts to develop a unified (i.e. general) theory that will explain all the observed uniformities in social behavior, social organization, and social change" (12).

In sociology "theories of the middle range" have been induced by attempts to guide empirical inquiry into delimited aspects of social phenomena such as deviant behavior, the diffusion of technology and social mobility. In economics attempts to provide greater precision in the analysis of the economics of production, the behavior of prices, the process of technical change, and the behavior of households in both market and nonmarket economies have induced the development of partial or middle range methodological and theoretical innovations. The development of knowledge in such fields is characterized by a continuous dialectic between progress in theory development and progress in empirical knowledge (13). Empirical research has helped to shape the development of theory and the refinement or development of theory has contributed to precision in the specification and measurement of economic relationships.

The effect of the above perspective leads me to a conclusion that the STIGLER and SPENGLER perspectives derive from an elitist rather than an empirical view of what economists actually do. The supply of economic knowledge appears to be more elastic than implied by a theory of autonomous development of economics, or of economic knowledge. Much of the knowledge about the behavior of particular economies or economic sectors, and of international and intersectoral relationships, is induced by a demand for economic knowledge that is in turn derived from the social demand for institutional change.

Let me now turn to a discussion of three issues which are, in my judgement, causing a shift to the right in the demand for knowledge in the field of agricultural economics.

## 3 Managing the World Food Economy

The events of the last two years have demonstrated with some force the inadequacy of the institutional arrangements that have been developed to manage the world's food economy. A combination of political, economic and natural events have induced a degree of instability in world commodity markets comparable to that of the post World War I and the post World War II periods. On the political-economic side, (a) the decision by the USSR to permit expansion of livestock

consumption even during periods of poor grain harvests, and (b) the decision of the U.S.-Canadian grain export cartel to discontinue the role of residual suppliers (and of the role they had assumed in stabilizing world grain prices) have been particularly important. Among the natural events were the adverse weather in the USSR in 1972, the poor grain harvests in Southeast Asia due to both drought and flooding since 1972, and the continuing drought in the Sahelian region in Africa (14).

The community of nations has moved reluctantly toward acceptance of international responsibility for management of the world food economy. The establishment of the FAO was a response to the disorganization of the world food economy resulting from the drive toward autonomy in food production during the interwar period and the stress on world food production systems during and immediately after World War II. The Post World War II attempts to formulate and implement international commodity agreements, first under individual commodity protocols and later under the umbrella of the General Agreement in Trade and Tariffs (GATT), reflected another set of concerns arising out of the same experience.

As yet, however, effective institutional arrangements for the management of the world food economy have not emerged (15). The political environment within which FAO decision making and resource allocation takes place has deprived it of the administrative autonomy and professional capacity necessary to carry out its technical functions. And the system of commodity agreements that appeared so promising in the early Post World War II period gradually broke down after the mid-1960's. During the years of food surpluses in the 1950's and early 1960's the importers saw little gain from such arrangements. The shift from a secular pattern of chronic food surpluses which had persisted since the early 1920's till the mid-1960's (excepting WW II) to an environment characterized by alternating shortage and surpluses has eliminated whatever limited interest exporters had in participating in the already weakened arrangements.

Perhaps even more important, by the early 1970's world grain surpluses -- grain available for export on either a commercial or concessional basis -- had become increasingly concentrated in North America. And within North America the Canadian contribution has declined relative to the U.S. contribution. In 1974/75 the U.S. is expected to account for approximately 45 % of the world's total grain exports (16). There is no counterpart to the Organization of Petroleum Exporting Countries (OPEC) in grains because the U.S. is even more dominant in grain exports than Saudi Arabia is in petroleum exports. The capacity to exercise this monopoly power is, however, somewhat weaker in the case of grains than in the case of petroleum because in most countries the shortrun elasticity of demand may be more elastic for grain than for petroleum.

There is some prospect that the community of nations may again be moving toward acceptance of the idea of greater international responsibility for the management of the world food economy. There are signs of revitalization in FAO. A World Food Congress will be meeting in Rome in November (1974). The Congress will clearly focus the world's attention on the dangers inherent in the disarray in which we currently find both the international markets for agricultural commodities and the markets for critical industrial inputs such as fertilizer and pesticides. It may help create an environment in which more effective institutional arrangements for the management of the world food economy in the period of instability which we face in the next several decades can emerge.

I see little evidence, however, that either the analytical capacity, the empirical knowledge of trade and price relationships, or the institutional innovations necessary to translate this favorable environment into effective action are at hand. It is not clear, for example, how much of the instability of grain prices is due to the "balkanization" of international grain markets or other institutional factors and how much is due to the underlying physical factors such as weather (17). There is no question, however, that the demand for economic knowledge regarding the effects of the behavior of agricultural commodity markets, particularly the implications of national policies and the policies of regional groupings such as the EEC, on commodity market

behavior and trade relationships, has shifted strongly to the right. There is an even stronger demand for the entrepreneurial capacity to utilize such knowledge in the design of a more effective institutions to manage the world food economy.

#### 4 Expanding Agriculture's Capacity to Produce

More effective institutional capacity to manage the world food economy is clearly of immediate significance. The development of a more effective set of national and international institutions capable of expanding agricultural capacity to produce is even more important.

Investment in the physical infrastructure needed to expand agriculture's capacity to produce has represented a major component of both international aid efforts and national development efforts. Approximately half of IBRD lending for agricultural development has been for irrigation (18). Expansion of fertilizer capacity and of highway and transportation systems have also received attention. The returns to investments in physical infrastructure have been, however, relatively modest under conditions of static agricultural technology (19). The effect of new technology embodied in rice and wheat varieties has been to shift the demand curves for industrial inputs such as fertilizer, pesticides and for irrigation and transportation to the right. The effect of advances in biological technology has been to raise the rates of returns to investment in the capacity to produce industrial inputs and in physical infrastructure for agricultural development.

Recognition of the potential productivity of investment in agricultural research, and of the location specific nature of biological technology, has led to a shift in the emphasis in both national and international development efforts toward greater investment in the development of professional capacity in the agricultural sciences and technology and in agricultural research. The Consultative Group on International Agricultural Research is now in the process of completing the development of a series of international agricultural research institutes, such as the institutes that generated the new wheat and rice technology, that is intended to link the emerging national research institutions in the developing world and the research capacity of the developed countries into an effective international effort to secure the potential gains in agricultural productivity for the developing countries of the Tropics (20).

What are the implications of these developments for economics research? Clearly the problem of efficient allocation of resources to physical infrastructure, industrial capacity, research effort and human resource development to achieve growth in the agricultural sector must be placed near the top of the public policy agenda in almost every developing country. The economics of resource allocation, which appeared to have so little to offer in the area of development strategy under conditions of static technology becomes of critical importance once the allocation of resources to the production of technical change and human resource development are considered in economic terms (21).

The demand for knowledge in economics (and in the social sciences in general) enters at two levels. There is the problem of the initial investment decision and the problem of operational efficiency. The steps that need to be taken to create the capacity needed to meet long term growth in demand must typically be set in motion a decade or two decades in advance. Even the initial steps necessary for the establishment of new industrial capacity to produce fertilizer and pesticides must be taken 3 - 5 years in advance. A decade may elapse between initiating the planning for a new irrigation system and a significant impact of the system on production. It takes 15 - 20 years to develop and staff an effective agricultural research system and to create the training capacity needed to keep such a system viable. (And it may take as many as two generations to significantly dampen the rate of growth in demand by modifying the population growth rate of a relatively young population.) Efficiency in the allocation of resources to such areas are not effectively made by intuition. There is a demand for the skills of the economist -- welded by skillful economists.

Realization of the new income flows from investment in agricultural development is not easy to achieve. It has been estimated that the fertilizer industry in most developing countries has been operating at less than 60 % of rated capacity. The discrepancies between ex ante and ex post estimations of cost benefit ratios for a water resource development project have consistently been large. And many national research and extension programs have had no measurable impact on production. As the public sector has assumed an increasingly heavy burden of responsibility for economic growth and development, in both the high and the low income countries, the demand for new knowledge regarding the economics of "collective action" and bureaucratic behavior has risen (22).

## 5 Partitioning Growth Dividends

The demand for institutional changes designed to alter traditional patterns of income distribution appears to have risen sharply since the mid-1960's in both developing and developed countries. One source of the rising demand for institutional change is the new income streams that have been generated by technical and institutional change. Dissent over the appropriate partitioning of the new income streams resulting from the efficiency gains associated with technical change and improvements in institutional performance represent a major incentive for institutional change.

In a neo-classical world of perfect competition, undisturbed by technical and industrial change, income streams generated by economic growth would be distributed to factors along the lines of the Ricardian theory of rent and the neo-classical theory of distribution. There would be no scope for the use of political resources to achieve economic objectives (23). The gains would flow to the owners of factors characterized by relatively inelastic or "landesque" supply functions. The development of institutional innovations to modify this "natural" or "technically" defined elasticity of supply of factors and products is pervasive in both developed and developing economies. The effect of these institutional devices is to redirect income flows among factors and classes (24).

It is readily perceived by an increasingly sophisticated citizenry in both developed and developing countries that the capture of the new income streams by the suppliers of technically or institutionally defined inelastic factors -- factors which act as a constraint on growth rather than as a source of growth -- serves no necessary or even socially useful function. As a result, the availability of new growth dividends resulting from technical change often sets in motion attempts to redefine property rights designed to modify the way in which the new income streams are partitioned.

The new income streams resulting from technical change in agriculture have historically led to social and political stress among the several social and economic classes as they have attempted to gain control over the new income streams (25). There has been stress within the agricultural sector -- among landlords, tenants and landless laborers. There has been stress between the agricultural and non-agricultural sectors -- among farmers, middlemen and landowners. There has been stress among regions within national economies -- between lagging and favored regions for development investments. There has been stress between the public and private sectors over the level of resources which each could command out of the growth dividends. And within the public sector there has been stress between the "development" and the "control" or "defense" bureaucracies over access to the resources available to the public sector.

HIRSCHMAN has discussed the rising stress among economic and social classes in terms of society's declining tolerance for disparity: "In the early stages of economic development, when inequities in the distribution of income among classes, sectors and regions are apt to increase sharply, it can happen that society's tolerance for such disparities will be substantial. To the extent that such tolerance comes into being, it accomodates, as it were, the increasing inequalities in almost providential fashion. But this tolerance is like a credit that falls due at a

certain date. It is extended in the expectation that eventually the disparities will narrow again. If this does not occur, there is bound to be trouble and, perhaps, disaster (26)".

A major implication of the capacity of (a) technical and institutional change to lower the cost of generating new income streams and (b) the declining tolerance for income inequality is that the scope for trade-offs between the achievement of equity and productivity objectives is narrowing. There is a rising demand for policies that achieve greater consistency between equity and productivity objectives. And there is a demand for knowledge concerning the income distribution effect of alternative economic policies and for the entrepreneurial capacity to design projects, programs and policies to achieve greater consistency between equity and productivity objectives.

A good deal of recent discussion of the problem of achieving consistency between equity and productivity objectives has focused on the potential for programs of integrated rural development. However, an intensive review of the literature on rural development program accomplishments, in both rich and poor countries, suggests that rural development does not yet represent a viable program or plan objective (27). Rural development, particularly integrated rural development, can be described, not too inaccurately, as an ideology in search of a methodology, or a technology. The above assertion does require some qualification. It clearly has been possible in a number of situations where high levels of professional inputs directed by dedicated or inspired leadership has had access to external resources, the Comilla project in Bangladesh for example, to mobilize village level resources to produce differential rates of development in specific rural communities.

There remains, however, a major unresolved puzzle. Why is it relatively easy to identify a number of relatively successful small scale or pilot rural development projects but so difficult to find examples of successful rural development programs? Neither the economics nor other social science literature which I have reviewed appear to provide either definitive insight into the relative success and failure of rural development projects and programs or effective guides to the design of more effective rural development programs. Returns to investment in rural development programs promise to remain low until social scientists can provide more definitive knowledge about rural development processes.

## 6 Implications for Economic Education

The implications of the rising demand for knowledge in economics are particularly significant for the several fields of micro-economics. In my judgement, the next decade will witness sharp change in the content of what we teach our students in micro-economics. The recent advances in the theory of collective action, the implications of theory of technical and institutional change, and of the theory of human capital have hardly penetrated the textbook expositions of the theory of consumer, firm, and market behavior. The author who successfully achieves a new micro-economic synthesis will replace SAMUELSON in general economics and HEADY in agricultural economics as the source of knowledge for the next generation of economists and agricultural economists.

## Literature

- 1 For an earlier perspective, see Vernon W. RUTTAN, "Agricultural Economics", in: Nancy D. RUGGLES (ed.), *Economics* (Englewood Cliffs: Prentice-Hall, 1970). Reprinted as "Zukünftige Aufgaben der Agrarökonomischen Forschung", *Agrarwirtschaft*, Jg. 20 (1971), S. 362 - 367.
- 2 David SCHUMWAY, "Allocation of Scarce Resources to Agricultural Research: Review of Methodology", *American Journal of Agricultural Economics*, 55 (Nov. 1973), 557 - 566.
- 3 The most complete review of the literature on the returns to investment in agricultural research and the management of agricultural research is in Walter L. FISHEL, *Resource Allocation in Agricultural Research* (Minneapolis: University of Minnesota Press, 1971).
- 4 A distinction is often made in the institutional literature between institutions and organizations. Institutions are often defined as the behavioral rules that govern patterns of action and relationships. In this paper the concept of institution is defined broadly to include organization. Institutional innovation includes changes in the performance of organizations; the relationship between an organization and its environment; and the behavioral rules that govern patterns of action and relationship in the environment. This broader definition would seem to be consistent with that employed by John R. COMMONS, *The Economics of Collective Action* (New York: MacMillan, 1950), p. 26. It encompasses the classification employed by Lance E. DAVIS and Douglas C. NORTH, *Institutional Change and American Economic Growth* (New York: Cambridge University Press, 1971), pp. 6 - 9.
- 5 Douglas C. NORTH and Robert Paul THOMAS, "An Economic Theory of the Growth of the Western World", *The Economic History Review*, 22 (1970): 1 - 17. Also Douglas C. NORTH and Robert Paul THOMAS, *The Rise of the Western World* (London: Cambridge University Press, 1973).
- 6 Theodore W. SCHULTZ, "Institutions and the Rising Economic Value of Man", *American Journal of Agricultural Economics*, 50 (December, 1968): 1113 - 22.
- 7 SCHULTZ, *Ibid*, p. 1120.
- 8 George J. STIGLER, "The Influence of Events and Policies in Economic Theory", in: *Essays in the History of Economics* (Chicago: University of Chicago Press, 1965), pp. 16 - 30. According to STIGLER, "the dominant influence upon the working range of economic theorists is the set of internal values and the pressure of the discipline" (p. 22).
- 9 Joseph J. SPENGLER, "Exogenous and Endogenous Influences in the Formation of Post-1870 Economic Thought: A Sociology of Knowledge Approach", in: Robert V. EAGLY (ed.), *Events, Ideology and Economic Theory* (Detroit: Wayne State University Press, 1968), pp. 159 - 205. SPENGLER admits that advances in economics may be somewhat more responsive to external influences than advances in the natural sciences and that the Keynesian revolution may have been at least partially influenced by events. But he insists that if "one conceives of economics as a kit of tools -- and this is really the core of economics as practiced by all economists -- one reaches the conclusion that exogenous influences exert little influence upon the development of economic science" (p. 187).
- 10 Thomas S. KUHN, *The Structure of Scientific Revolutions* (Chicago: University of Chicago Press, 1962), uses the term paradigm to refer to the basic set of assumptions adopted by a scientific discipline in a particular historical phase or by a particular school.
- 11 See Chapter II, "On Sociological Theories of the Middle Range", in: Robert K. MERTON, *On Theoretical Sociology* (New York: The Free Press, 1967).

- 12 MERTON, *op. cit.*, p. 39.
- 13 "...the only things the theoretical economist knows about economic life are those things the empirical economist tells him". STIGLER, *op. cit.*, p. 24.
- 14 Dale E. HATHAWAY, "Food Prices and Inflation", New York, Ford Foundation, 1974, mimeo; Willard W. COCHRANE, *Famine: The Uncertain World of Food and Agriculture and It's Policy Implications for the United States*, (Washington: National Planning Association, February 1974).
- 15 D. Gale JOHNSON, *World Agriculture in Disarray* (London: MacMillan - St.Martin's Press, 1973).
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- 17 The paper by James R. HOUCK, "Some Economic Aspects of Agricultural Regulation and Stabilization", *American Journal of Agricultural Economics* (December, 1974) - forthcoming - points up some of the sources of conflict between national and international stabilization objectives.
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- 21 Yujiro HAYAMI and Vernon W. RUTTAN, *op. cit.*, p. 59.
- 22 See for example, Mancor OLSON, Jr., *The Logic of Collective Action: Public Goods and the Theory of Groups* (New York: Schocken Books, 1968); William A. NISKANEN, Jr., *Bureaucracy and Representative Government* (Chicago: Aldine-Atherton, 1971); Edwin T. HAEFFELE, *Representative Government and Environmental Management* (Baltimore: The Johns Hopkins University Press, 1973).
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- 24 Anne O. KRUEGER, "The Political Economy of the Rent-Seeking Society", *The American Economic Review*, 64 (June, 1974), 291 - 303.
- 25 See for example, Francine R. FRANKEL, *India's Green Revolution: Economic Gains and Political Costs* (Princeton: Princeton University Press, 1971).
- 26 Albert O. HIRSCHMAN, "The Changing Tolerance for Income Inequality in the Course of Economic Development", *Quarterly Journal of Economics*, 87 (November, 1973), 544.
- 27 Vernon W. RUTTAN, "Rural Development Programs: A Skeptical Perspective" (New York: Agricultural Development Council, 1974, mimeo).