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A SURVEY OF AGRICULTURAL ECONOMICS LITERATURE

VOLUME 2

Quantitative Methods in Agricultural Economics, 1940s to 1970s

George G. Judge, Richard H. Day, S. R. Johnson, Gordon C. Rausser, and Lee R. Martin, editors

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Rural Economic and Social Statistics

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Elsewhere in this volume Upchurch [1977] deals with post-World War II developments in the data systems for the food and fiber sector of the economy, and Bonnen [1977] makes an assessment of the data base of the food and fiber sector from the standpoint of its status as a modern information system. In this chapter the state of the economic and social data for rural people and areas is discussed and the causes of the state of the data are pursued somewhat further. Some modest suggestions for improvement arise from the analysis. The bulk of the material used in the preparation of this chapter has been drawn from work done by members of the AAEA Task Force on Social and Economic Statistics.[1] The Task Force was the creation of the AAEA Committee on Economic Statistics under the chairmanship of J. T. Bonnen.

In reporting on the work of the Task Force, Gardner [1975] used an economic framework to analyze the state and long-run future of rural social and economic statistics. He identified the demand for such statistics as deriving from the prior demand for knowledge. The demand for knowledge stems from its consumption value, as an end in itself, and from its value as a tool in public and private planning and in program development, implementation, and evaluation, all of which takes place under conditions of uncertainty. It is the latter segment of the demand that is the driving force behind the total de-

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mand for statistics. Moreover, he stressed the nature of the demand as a public good and on that ground justified the dominating presence of the federal government on the supply side of the market. The supply side, he noted, is characterized by a centralized system, composed of the federal agencies which gather statistics, and a decentralized system (almost a nonsystem) in which individuals and agencies, typically funded by grants from the federal government, collect small amounts of data for very specific purposes.

Such a framework is useful for making a further analysis of the state of the economic and social statistics for rural areas and people. But what is its state? One indicator is the attention Bonnen and Upchurch gave to social statistics. Bonnen [1977] devoted one paragraph to the subject. In it he identifies the reasons for the lack of such statistics as a lack of demand and "the absence of a satisfactory conceptual or theoretical base for either data collection or analysis." Upchurch [1977] devoted 4 manuscript pages out of a total of 122 pages to statistical developments in the areas of rural poverty, housing, health, and local government. Over one-half of the citations of the literature in this section of his manuscript had to do with local government.

Another indication of the state of the data is the fact that the Census of Population and Housing, the Current Population Survey, the Bureau of Labor Statistics, the Center for Health Statistics, and the Bureau of Economic Analysis all produce a flood of statistics pertaining to the economic and social conditions of people and areas. If the state of such data is poor, it must be because the data produced do not sufficiently refer to rural people and areas, are conceptually irrelevant, or appear too infrequently or because the problems on which the data are used are not well specified.

Each of these indictments is true in some respect, as has been pointed out by others. Vlasin [1973] and Edwards [1973] discussed the lack of agreement over the conceptual base underlying area and regional growth and development. The lack of measurements on program inputs, costs, and intended and unintended outputs are discussed by Daft [1973] and Madden [1973]. Hathaway, Beegle, and Bryant [1968] questioned the continued usefulness of the rural farm, rural nonfarm, and urban classifications used by the Census of Population. Bryant [1973] summarized the implications of new developments in labor supply theory and in the economics of the households and found rural labor market data systems as well as other data on rural people lagging behind the theory. Hathaway [1972] analyzed the characteristics of rural areas and drew conclusions about needed labor market information in rural areas. Gardner [1973] examined the implications of human capital theory for data on rural human resources. Bawden and Kershaw [1973] analyzed available data on the low income population and found little such data for rural areas. In addition, the criticisms of planning and evaluation of rural

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human and regional programs in the middle and latter parts of intercensal periods are legion.

Statistics are used in the production of knowledge which in turn is used in planning, program implementation, and evaluation. All of these processes take place under uncertainty, and it is the uncertainty that is the sine qua non of the demand for knowledge. The demand for statistics, therefore, is an input demand and as such is influenced by the underlying demand for knowledge, the "price" of statistics, the prices of other inputs, and the underlying technical processes. The price of statistics calls up the supply side of the statistics market. It is instructive to consider each in turn.

The Demand for Economic and Social Statistics

The size and structure of the demand for knowledge about social and economic conditions of rural areas and people stands in marked contrast to the demand for knowledge about commercial agriculture. The national importance of commercial agriculture, the fact that many agricultural markets were national or international rather than local, and its status as an industry made political lobbying easy, and its original overwhelming presence in rural areas combined by the turn of the century to create a great demand for agricultural statistics primarily by the private sector, to have that demand focused at the federal level, and to have one federal agency primarily responsible for data collection, use, and dissemination. The assumption of responsibility for national agricultural price policy in the late 1920s and 1930s by the federal government and the escalating importance of farm price policy in the 1940s and 1950s created an explosive public demand for data on commercial agriculture. These forces coming from the public sector helped to focus the demand at the federal level. The encroachment of public agencies on private agricultural markets resulted in further private demand for information.

Not so with respect to the demand for social and economic statistics about rural people and areas. Such a demand is simply part of the larger demand with respect to all areas and all people, urban and rural. As such it crosses all industries, areas, and people, each with different demands. Hence, no lobby as potent as an industry group could form and focus the demand. Since health, education, and welfare policy are still viewed as individual, local, and at most state concerns by many people and groups, the focusing of the demand for knowledge of social conditions at the federal level has been slow.[2] To the extent that there is any federal focus of the demand for social statistics today, it is within the Department of Health, Education, and Welfare, a department deeply fragmented by its three subject areas, and within the Department of Housing and Urban Development. Most programs of the latter

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department have to do with housing, both rural and urban. But its focus is upon the major cities, which provide its political support. Since knowledge of economic conditions is demanded by state and local governments, business, and labor (the last two acquiring their own federal departments at an early stage), the demands for economic statistics—although focused at the national level—are fragmented among several federal agencies. The demand for statistics about social and economic conditions of rural people is further fragmented by the sporadic and declining demand from the USDA.

Just as the demand for commercial agricultural statistics derives in part from national agricultural policy, so too the demand for economic and social statistics derives from national policies with respect to health, education, welfare, and regional policies. But the differences between national agricultural policy and the other policies breed great differences in the kind of statistics demanded. Commercial agricultural policy generates a demand for statistics about one industry at either the local or national market level. At the local level the information in demand about agriculture is chiefly information about production whereas at the national level statistics about both sides of farm product markets are in demand. The national policies generating demands for social and economic statistics on rural people and areas can be exemplified by regional economic policy. Take, for instance, the Area Redevelopment Act of 1961, the Appalachian Regional Development Act of 1965, the Public Works and Economic Development Act of 1965, and the more recent Rural Development Act of 1972. These acts essentially disburse federal monies, loans, and loan guarantees to regions, states, and local areas on the presentation and approval of plans for improvement of either economic or social overhead capital. The statistics demanded by such plans as well as the statistics necessary to evaluate the programs all refer to local and regional economic and social conditions. The data required pertain to many industries as well as to the public sector and must refer to local market conditions rather than simply to local production considerations. And the plans and hence the logic of the demand for the data are written by local, state, or multistate regional bodies.

The demand for statistics implied by national social policy, more than either agricultural or regional policy, refers to the activities of public agencies and to their actual and potential clientele. Since national health, education, and welfare policies all are pursued by the federal government in cooperation with state and local governments, these statistics—like those useful for regional programs—need locational cross-references.

Thus, in contrast to the demand for statistics on commercial agriculture, the demand for social and economic statistics about rural people and areas is fragmented among many federal agencies to the extent that it is focused at

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the federal level at all, and a large segment of the demand originates at state and local levels. In addition, it is much more comprehensive, spanning many industries and both sides of the markets in which they deal, and is location specific. Finally, it is characterized by observation units composed of public agencies and their clientele as well as private firms.

Another element of the demand for knowledge that has influenced the kind of statistics in demand has been the emphasis on program planning, accountability, and evaluation. These are emphases of the past fifteen to twenty years. Statistics suitable for program justification and planning are those which identify problems and establish need. In the social and regional policy domains, rather rough area summary statistics available from the various censuses plus local unemployment rates have sufficed in the past and remain sufficient for program planning and justification purposes. Statistics useful for program accountability and evaluation are of a totally different sort: information on inputs, input cost, outputs, and the value of outputs are required. The demand may yet be a parent of such statistics and the underlying concepts, but the gestation period is not over and the birth pains may be severe. The demand in the areas of social and regional policy, then, is for new kinds of statistics and has run well ahead of the technical capacity to produce them.

The term "technology" refers to the scientific processes underlying the production of knowledge. In economics this includes theories of behavioral relations, theories of measuring and estimating such relations, data processing technology, and data collection technology. Economic theory, quantitative theory, and data processing and collection technologies are all intertwined.

Any development in one of the four areas of technology raises the marginal products of the others, inducing research and development on them. The rapid growth of neoclassical theory during the first forty years of the twentieth century spawned the work during the 1930s, 1940s, and 1950s which resulted in the quantitative theory by which economic relations might be identified and estimated. These advances, given second- and third-generation computers, allowed the development during the 1960s and early 1970s of algorithms programmed for the computer by which high-quality estimates of economic relations could be obtained at reasonable cost. These three elements—economic theory, quantitative theory, and low-cost estimation programs—have placed great pressure on economic data systems and on data collection technology during the 1970s. And it can be argued that, along with the rapid changes in society and in public policy, they have contributed to the concerns of Leontief [1971], Dunn [1974], Rivlin [1975], Bonnen [1977], and others over the adequacy of our data systems.

Of course, the several parts of economic and quantitative theories have not developed at the same pace, a fact partly related to the kind and nature of the

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policy problems with which economists have been asked to wrestle. Human capital theory, for instance, developed during the 1950s, in time to help guide the multitude of social programs enacted during the 1960s. It merged with new cost-benefit analysis techniques in evaluations of the programs. The new economic theory of the household has flowered partly as a result of attempts to bring neoclassical household theory to bear on problems revealed by evaluations of the War on Poverty programs and also on recent trends in labor force activity, fertility, marriage, and divorce.

Less progress appears to have been made in regional economics. Vlasin, Libby, and Shelton [1975] noted the confusion of concepts with respect to area growth and development and the disagreements over definitions of the problem, the explanation of it, and appropriate policies to deal with it. Similar statements were made by Leven [1965] more than a decade ago.

The demand for social and economic statistics has grown rapidly since 1960 as the regional growth and development programs of the early 1960s and the subsequent social programs stimulated the demand. The demand has been further stimulated as advances in economic and quantitative theory along with the drastic reduction in computation costs place additional pressure on the nation's data system. Even though national social and economic policies have been major contributors to the demand, they are still less focused at the federal level than is the case for commercial agriculture. Furthermore, the demand at the federal level is spread across many agencies in many departments. With the demand less concentrated than it is for commercial agriculture statistics, demanders have had less control over the quality and quantity of data produced.

The Supply of Economic and Social Statistics

Several features of the supply of economic and social statistics seem to be pertinent in the present context. One is that unit costs of basic statistics have risen rapidly over the past twenty years, the major driving force being labor costs. In response, massive doses of capital have been substituted for labor, especially on the data processing side of statistics production. The last labor intensive place in the system is in data collection itself; enumerative methods of data collection use large amounts of labor. Increasingly, sampling methods have replaced enumeration. The switch to sampling techniques was hastened as systematic under-counts of certain groups in the population came to light during the 1960s (particularly in the categories of central city, nonwhite, and unrelated individuals).[3] A major implication of the switch to sampling methods, combined with strict disclosure laws, has been a reduction in the statistics on social and economic conditions of people in sparsely populated areas

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with specific location cross-references. Efficient sampling for the purpose of producing national estimates with small errors prohibits the collection of enough sample points in most small rural areas to permit the resulting data to be reported at less than national or census region levels. This, of course, has been the case for years with respect to the Current Population Survey.

Another force has likewise reduced the supply of data for specific segments of the rural population. The repeated redefinitions of "farm" by the USDA and the Bureau of the Census have through time first raised and then eliminated the acreage requirements and raised the minimum gross sales of farm products requirement. These have assuredly improved the quality of agricultural statistics from the standpoint of measuring conditions in commercial agriculture. The same redefinitions, however, by eliminating operations and people no longer considered "commercial farms" and "commercial farm operators," have meant that much less data are now collected by the Census of Agriculture on people on noncommercial farms.[4] Improvement of the concepts underlying the statistics on commercial agriculture, therefore, has come at the expense of data on some rural people.

A more subtle but nonetheless substantial force has to do with the fact that the supply of economic and social statistics is concentrated at the federal level in a very few agencies. The Bureau of the Census, the Bureau of Labor Statistics, the Social Security Administration, and the Treasury Department produce almost all of the statistics about the economic and social conditions of Americans. And, of course, the Office of Management and Budget has ultimate control over what questions may be asked in any survey by a federal agency. The retreat of the USDA from its position as the federal agency for rural people to a federal agency for commercial agriculture has abetted the concentration on the supply side and has resulted in a decline in the demand for statistics about rural people as opposed to farm people. In brief, the supply side of the statistics market is much more concentrated than the demand side and is coordinated at the federal level to a degree unknown in all but the most monopolistic of private markets.

To point out the relative power of the few federal agencies which produce and fund statistics collection is not to ascribe to them any sinister motives. A natural consequence of such power on the supply side, it is argued, is that the statistics collected better serve the goals of federal and national policy than the goals of other areas of demand. It is also the case that no large users of state and local data are represented on statistics advisory committees.[5] Since much of the demand for statistics on rural people and areas emanates from state and local sources, such sources have been less well served than those at the federal level.

The decentralized component of the supply of social and economic statis-

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tics is also influenced by federal initiatives and goals. The decentralized system, as Gardner points out [1975], is composed of individual researchers and policy analysts who collect data related to particular issues. Much of the funding of such projects is federal, and the proposals are reviewed by people in relevant federal agencies and congressional committees as well as by others outside the federal establishment. Of course, the judgments of these people about project viability and priorities are influenced by the goals of the agencies in which the reviewers are employed.

A final feature of the supply of economic and social statistics is the fact that the public sector is the primary supplier of social overhead capital via education, health, welfare, and manpower programs. Consequently, a good statistical information system focusing upon the economic and social conditions of people and areas must provide the statistics needed to manage, monitor, and evaluate such programs and their effects on both people and areas. Such programs are, by and large, cooperative ventures among federal, state, and local governments. The statistics collected by each federal agency are those required for the preparation and justification of appropriations requests, and in consequence tend to emphasize the statistics required for program monitoring more than program management and evaluation.

The available statistics are very much better in tracing federal program inputs than state and local program inputs, but in neither case are the statistics suitable for any but the most general kind of program management and evaluation. A part of the problem is the lack of a conceptual base on which to build the production of program output statistics. Another part of the problem is the fact that public agencies are no more willing than private firms to provide the statistics necessary to gauge their performance (Niskanen [1971]).

It is also the case that although program statistics may catalog a few of the characteristics of program participants (typically those on which eligibility is based) statistics to measure the number and characteristics of the eligible population do not exist. Nor do statistics exist to track the extent of program overlap with respect to either participation or eligibility (Daft [1973]). Program managers and policy analysts have only the crudest of notions, therefore, of the extent of the market for the program, and they have little idea of the extent to which the programs they manage and evaluate compete with or complement other programs.

Thus, the rising costs of statistics production and the structure of the statistics producing and using system emphasize the production of statistics to meet narrow federal and national policies at the expense of more diffuse and less organized demands. The demand for statistics on the social and economic conditions of rural people and areas happens to fall in the latter category.

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Suggestions for Improvement of the Statistical System

The AAEA Task Force on Social and Economic Statistics produced no specific recommendations for the improvement of the statistical system. Nevertheless, certain common themes connected the papers and the discussion on them. Gardner [1973, 1975] was impressed with the decentralized component of the system. Stinson [1975], who discussed Gardner's 1975 paper at the annual AAEA meeting, agreed and argued that ". . . the strategy with the highest payoff for the future is a relatively more rapid expansion of the decentralized approach coupled with a better system disseminating information about existing data files." Vlasin [1973], C. Edwards [1973], and Daft [1973] all expressed concern with respect to area and regional statistics. In addition, Daft [1973] and Madden [1973] were interested in the development of statistics which could be used to measure public program inputs and outputs and which could also be used by policy analysts and program administrators to evaluate and manage public programs. Edwards [1973] and Vlasin, Libby, and Shelton [1975] were concerned about obsolete area and growth concepts and with continued disagreements over problem specification, concepts, and statistical measures of them.

It is clear that additional emphasis on the decentralized component of the economic and social statistics system is warranted. This could be achieved in a number of ways: (1) increased funding by the National Science Foundation for the purpose of new statistical measurement and data collection efforts on a variety of economic and social topics; (2) increased emphasis within the Economic Research Service, the Statistical Reporting Service, and the Agricultural Research Service of the USDA on relatively small experimental statistical measurement and data collection efforts closely tied with theoretical and applied research work on social and economic problems; (3) the earmarking by the USDA Cooperative State Research Service of Hatch Act funds for experimental statistics gathering by land-grant college researchers engaged in work on particular economic and social problems.

Such emphases are justified on several grounds. Since the individual efforts would be small and would be executed by many different researchers around the country, the chances for innovative research and accompanying data collection would be higher than if the same amount of money were allocated to the federal statistics gathering agencies. The statistics system may become more dynamic, as Bonnen urges. Since each effort would be small, mistakes could be discovered early when they are small and could be eliminated. And an increased emphasis on the decentralized component of the system would tend to right the current imbalance of power in the system in which the supply side is dominant over the demand side.

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If there is no agreement on regional and area problems or on area and regional growth concepts, then there should be no coordinated, system-wide effort to collect and systematize statistics in the area and regional domain. Rather, the emphasis should be on diverse small experimental and pilot projects which would simultaneously develop theoretical concepts for area and regional planning and analysis, their empirical statistical analogues, and methods of data collection.[6] Such a strategy fits well with the preceding emphasis on the decentralized component of the system. Indeed, the very fact that area and regional analysis and policy are about areas and regions implies that they are part of the decentralized component and that the problems faced vary from region to region. The strategy invites the innovative solution of theoretical and statistical problems, allows local adaptation to location problems, and enables the inevitable failures to be cut short at least cost.

The allocation of funds for the development of the decentralized system is not enough, however. If the decentralized system is to be an engine of innovation nationally, we need to devise institutional channels through which the work of the system can be communicated, criticized, and made available for incorporation into the national information system. The first and last of these functions can be funded and operated federally. The criticism function is a proper and historical function of professional associations.

In addition to the bibliographies of literature and research work in progress developed by the USDA, the Library of Congress, and others, there is a need for a dynamic computerized bibliography of regional and local data collection efforts. In such a bibliographic system the observation units, content, and accessibility of the data collections would be referenced. Analysts and planners could thus obtain from the system information about the existence of data collections relevant to their purposes and about the method and possible cost of gaining access to the data collections. Similarly, researchers and other groups engaged in primary data collection activities would be encouraged to supply information to the bibliography. Federally funded projects might be required to cooperate in the bibliographic enterprise.

Professional associations, through the offices of their respective journals, have provided means by which books and monographs are subjected to critical review. The reviews serve both to advertise and to evaluate the books. Such scientific scrutiny of the data collection efforts of both the decentralized and centralized data collection systems is needed. A statistics review editor could work in tandem with the book review editor to make sure that the data collection efforts relevant to the profession are given adequate coverage.

At the federal level a review and evaluation of a different sort should be undertaken on a continuing basis. Although professional associations have a responsibility to review critically the data systems on scientific grounds, a

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federal competence needs to be created in which the data generated by the decentralized system is judged for possible incorporation into the national information system. Such a federal agency or committee would periodically scan the data collection efforts of the decentralized system for the purpose of evaluating any new sampling techniques, new ways of defining and measuring concepts, and possible measurements on new concepts. The criteria used would be related to the possible national demand for such data and to possible improvements in the existing federal statistical system.

Recent proposals by David [1976] appear to meet some of the defects in the statistical system identified by Daft [1973] and Madden [1973]. David correctly argues that statistics on the eligible populations for the various poverty programs do not exist. Furthermore, no means are available by which general population statistics and statistics about federal programs from administrative files may be connected. David's concerns are mainly with respect to the low-income population, but his ideas have wider application. He concentrates on the Current Population Survey and shows how the survey could be changed so that it would possess aspects of a longitudinal panel so that questions about changes through time might be addressed and how common sampling frames and cross-references could be developed between the survey data and samples of administrative records of people and households participating in various governmental programs. If achieved, public program management and evaluative analyses would be easier to make and would bear more fruit. David's proposals are based on deep knowledge of the survey and data collection techniques and appear quite feasible. Such developments require close coordination between the survey and the various federal agencies. Coordination appears possible because the problem David identifies is clear-cut and seems to have no basic conceptual aspects.

A final suggestion is that heavy users of local and regional information should be represented on federal statistical advisory committees. Such an action would give a voice to a now neglected group of users and would decrease the myopia of the federal statistics establishment.

Conclusion

Statistics for rural people and areas are produced and used in a marketlike system in the United States. The demand and supply sides of the system have been analyzed. The demand is a derived one, emanating principally from public and private decision makers who are forced to make policy and manage programs in an area of uncertainty and yet must bear the responsibility of errors caused by that uncertainty. This demand is characterized as being fragmented among many federal agencies and some state and local agencies. It is

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comprehensive in origin, spanning many sectors, levels and regions of the economy, public and private. It is also comprehensive in focus in that public and private agencies as well as individuals, all with specific geographic references, are the observation units. It is uncertain in that many of the concepts on which data demands are based are ill-founded and subject to frequent change and also in that many of the public programs which create the demand for such data come and go frequently. The supply is concentrated at the federal level in a few agencies and is focused upon national concerns of federal agencies. Moreover, the supply is subject to rapid escalations in costs which, given the dispersed nature of the demand and the consequent lack of market power, lead to reductions in the supply of the very detail on rural people and areas that is demanded.

The suggestions offered in the preceding section for the improvement of the system recognize these characteristics by advocating increased federal funding of decentralized data-gathering enterprises. A decentralized system encourages innovation, local adaptation, and the early elimination of failures and of data collection efforts serving short-lived demands. Such a system, along with increased representation on federal statistics advisory committees, would serve to buttress the power of the dispersed demand side of the system. Another set of suggestions would provide institutional means by which decentralized data development exercises could be communicated to others, reviewed against scientific criteria, and evaluated for possible inclusion in the centralized part of the system. Finally, work at the federal level is recommended by which data files on federal programs could be merged with data on individuals eligible for the programs, the better to manage and evaluate the programs.

By the late 1960s students graduating from doctoral programs in economics and agricultural economics were expected to have firm control of neoclassical economics and to have quantitative skills which twenty years earlier only a handful of economists possessed. In addition, most have comfortable if not entirely amicable relations with computers. Consequently, the marginal product of sophistication in statistical measurement and data collection techniques is currently high, and interest in such matters is increasing. Since 1968 four large-scale social experiments dealing with cash welfare programs have been mounted along with performance contracting and housing allowance experiments.[7] The resources allocated in these studies to experimental design, to basic data collection, to the training of economists in statistical measurement and data collection techniques, and to training in work with experimental longitudinal panel data are impressive. The 1970s and the 1980s may yet be the "data decades."

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Notes

1. The members of the Task Force on Social and Economic Statistics were W. Keith Bryant, D. L. Bawden, L. M. Daft, E. S. Dunn, Jr., C. Edwards, B. Gardner, J. P. Madden, M. Olson, G. S. Tolley (chairman), and R. D. Vlasin.

2. Federal responsibility for welfare policy did not occur until the Great Depression. Federal responsibility for health and education policy with minor exceptions was a development of the 1960s and 1970s.

3. Bonnen [1977] has documented the problems encountered in this switch with respect to the Census of Agriculture.

4. J. T. Bonnen helped to clarify the implications of the changes in definition. See also Hildreth and Worden [1976].

5. This information was supplied by J. T. Bonnen.

6. It should be emphasized that this suggestion is contrary to the spirit of the discussions by Edwards [1973] and Vlasin, Libby, and Shelton [1975]. It is the author's view, however, that until there is agreement on the problem and the conceptual base there can be no coordinated "system" approaches. Where there is no conceptual agreement, there will be no agreement to submit to coordination.

7. See Bawden [1971], U.S. Department of Health, Education, and Welfare [1976], and Pechman and Timpane [1975] for descriptions of the first two cash welfare social experiments. The other two, the Gary Income Maintenance Experiment and the Denver-Seattle Income Maintenance Experiment, are in progress.