



**AgEcon** SEARCH  
RESEARCH IN AGRICULTURAL & APPLIED ECONOMICS

*The World's Largest Open Access Agricultural & Applied Economics Digital Library*

**This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.**

**Help ensure our sustainability.**

Give to AgEcon Search

AgEcon Search  
<http://ageconsearch.umn.edu>  
[aesearch@umn.edu](mailto:aesearch@umn.edu)

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*

## A SURVEY OF AGRICULTURAL ECONOMICS LITERATURE: VOLUME I, TRADITIONAL FIELDS OF AGRICULTURAL ECONOMICS, 1940's TO 1970's.

Edited by Lee R. Martin, Professor of Agricultural and Applied Economics, University of Minnesota. University of Minnesota Press, 2037 University Avenue, Minneapolis, MN; in Canada, by Burns and MacEachern, Ltd., Donn Mills, Ontario. 540 pages. 1977. \$25.

In descending order of interest, there are books about people, books about events, books about ideas, and books about books. This is a book about books—a review of more than 2,300 books, bulletins, and papers in the traditional fields of agricultural economics. It covers virtually all prominent professional writing in agricultural economics from World War II to the early seventies. It is a prodigious piece of work.

The idea that gave birth to this undertaking came from C. E. Bishop, who, in 1968, as president of the Agricultural Economics Association, appointed a committee to investigate the need for a major survey of agricultural economics literature. On that committee were these prominent persons: Glenn L. Johnson, M. M. Kelso, James E. Martin, M. L. Upchurch, Lee R. Martin, John P. Doll, Peter Helmberger, J. Patrick Madden, and Edward W. Tyrczniewicz.

This committee delineated the field into three general areas, each to appear in a volume: Volume I, *Traditional Fields of Agricultural Economics*; Volume II, *Quantitative Methods in Agricultural Economics*; Volume III, *Economics of Welfare, Development, and Natural Resources*.

The current volume, first of the series, has seven parts, organized as follows:

*Part I. Farm Management and Production Economics, 1946-70*, written by Harald R. Jensen. Preparation of outlines: John P. Doll, Albert R. Hagan, Charles F. Harshbarger, and Joseph C. Headley. Review of papers: John P. Doll, Earl O. Heady, Glenn L. Johnson, and Max R. Langham.

*Part II. The Analysis of Productive Efficiency in Agricultural Marketing: Models, Methods, and Progress*, written by Ben C. French. Preparation of outlines: Peter G. Helmberger and Frank J. Smith. Review of papers: Emerson M. Babb, Peter G. Helmberger, Harold M. Riley, and James D. Shaffer.

*Part III. Policy for Commercial Agriculture, 1945-71*, written by G. E. Brandow. Preparation of outlines: James T. Bonnen, John A. Schnittker, Vernon L. Sorenson, and Arley D. Waldo. Review of papers: Willard W. Cochran, David MacFarlane, Lauren K. Soth, and Luther G. Twesten.

*Part IV. Postwar Policies Relating to Trade in Agricultural Products*, written by D. Gale Johnson. Preparation of outlines: Martin E. Abel and James P. Houck. Review of papers: T. K. Warley, Larry J. Wipf, and Lawrence W. Witt.

*Part V. Agricultural Price Analysis and Outlook*, written by William G. Tomek and Kenneth L. Robinson. Preparation of outlines: James P. Houck, Lester V. Manderscheid, and Edward W. Tyrczniewicz. Review of papers: James P. Houck, Richard A. Kling, and Edward W. Tyrczniewicz.

*Part VI. Agricultural Finance and Capital Markets*, written by John R. Brake and Emanuel Melichar. Preparation of outlines: Chester B. Baker, William H. Heneberry, John A. Hopkin, and George D. Irwin. Review of papers: Peter J. Barry, Fred Garlock, George D. Irwin, Lawrence A. Jones, Warren F. Lee, and John B. Penson.

*Part VII. Technical Change in Agriculture*, written by Willis Peterson and Yujiro Hayami. Preparation of outlines: Vernon W. Ruttan. Review of papers: Zvi Griliches and Vernon W. Ruttan.

The audience to which this volume is addressed is specified in the foreword:

Research workers, teachers, extension workers and graduate students in agricultural economics; teachers, research workers and graduate students in economics and economic statistics, sociology, geography, political science, and anthropology; and teachers, research workers and graduate students in technical agriculture.

Professional rather than popular literature is reviewed.

Style and format are remarkably consistent throughout, evidence of what must have been the exercise of strong organizational efforts by editor Lee Martin. Typically, a chapter begins with a brief resumé of work preceding the post World War II period. The work then follows a topical pattern, topics one after the other more or less in chronological order. The works addressed to a particular topic are reviewed briefly as to their major thrust, with reference to the bibliography that follows each section. The chapter typically closes with a section on further research needs. These reviews can, perhaps, be described as being more interpretive than evaluative. Bibliographies, which are superb, are sometimes topically grouped and sometimes simply arranged alphabetically.

Seminal works are identified. Among the seminal authors mentioned, this reviewer notes the following:

- Earl Heady, for his many publications on production economics
- Mighell and Jones, for their work on vertical coordination
- T. W. Schultz, for his book *Agriculture in an Unstable Economy*
- Waugh, Nerlove, and Brandow, for their work on price analysis and
- Vernon Ruttan, for his writings on technical change.

The book is well written, but rather tedious when read in its entirety, as would be any annotated bibliography. But few people, other than the editor and the reviewer, are likely to read it cover to cover. The average reader will probably come to it in pursuit of some special interest. He will be helped by an excellent table of contents, with good headings and subheadings.

What impressions emerge for this reviewer after working through 540 pages bearing 2,308 references? These are not comments on the book, which is excellent, but on the research which is reported. After reading summaries of more than 2,000 pieces of work,

one would be dull indeed if he did not form some notions about it all.

First of all, the question arises, What difference does all this make? How has the development of agriculture been changed by all this research? The question was not addressed in this work, and it would indeed have been very difficult to address it. But it is a question being raised by State legislatures and members of the Congress who are asked to appropriate money for publicly supported research in agricultural economics.

The impression is clear that these researchers were writing chiefly for their peers. How their findings get injected into the decisionmaking forum is not really faced. Obviously, the feedback engendered by a given piece of work comes mostly from fellow researchers rather than from farmers, marketers, elected public officials, administrators, and financiers. The systems approach to research, so common in applied research in private industry, is not evident in the work reported in this book. Problem identification, the research undertaking, injection of the results into the decisionmaking forum, feedback from users, re-identification of the problem and a new loop of the cycle—this fruitful five-stage sequence appears, typically, to be pursued in only the first two stages and then repeated.

Another impression is that the researchers in the traditional fields of agricultural economics have generally operated within the existing power structure, whether this was political, economic, or professional. Acceptance of, and indeed defense of, the status quo has been a prominent feature of the work. Agricultural policies have been accepted pretty much as given, and much of the work is within that context. Agricultural economists, even though on the public payroll, appear to be agricultural advocates, much as labor economists are advocates of labor and industrial economists are advocates of business.

Should we expect it to be different? Challenges to the conventional wisdom have been fairly few, and when issued have been dramatically successful (as with Heady) or professionally damaging (as with those who didn't make it into the bibliography. Bibliographies, as with histories, are written by the winners.) True, this volume is the one on traditional areas of agricultural

economics; perhaps the third volume, on the new research agenda, may reveal a more venturesome attitude on the part of researchers.

About half the money spent on agricultural research is spent by private firms. Few publications come from this work, and so the volume can contain little on such efforts. But considerable research on agricultural economics has been published by such privately supported sources as the Stanford Food Research Institute, Brookings Foundation, the American Enterprise Institute, the Committee on Economic Development, and others. These receive what seems to me less than their deserved attention.

This book is so comprehensive, so convenient, and so reputable that almost anyone who does research in agricultural economics should own a copy or have access to one. The time involved in researching the literature will be reduced to a fraction of what it would otherwise be. The weight of authority carried by this book in interpretations of past work will be persuasive.

This reviewer awaits with keen interest the volume on quantitative methods, scheduled to be published in late 1977, and the final volume on welfare, development, and natural resources, the publication date for which has not yet been set. This series, when added to earlier and quite different works by Benedict, Stine, and Taylor, will provide a good outline of the work of our profession.

Don Paarlberg  
Professor Emeritus  
Purdue University

---

## RESOURCE ALLOCATION AND PRODUCTIVITY IN NATIONAL AND INTER- NATIONAL AGRICULTURAL RESEARCH

Edited by Thomas M. Arndt, Dana G. Dalrymple, and Vernon W. Ruttan.  
University of Minnesota Press, Minneapolis, MN, 55455, 617 pages. 1977.  
\$25.

Possibly one of the more puzzling aspects of the great growth in agricul-

tural production, to which we have given the name "green revolution," is *how did it happen?* Belief is widespread that research and related activities had a significant role. Certainly, there have been extensive efforts to prove that research is the basis of growth, and developed and developing countries alike have invested great sums to increase agricultural productivity based on this belief.

Now, as the international agricultural research community reaches an advanced stage of adolescence, the desire and, indeed, need to know just exactly how it happened becomes more than an academic question. What might be termed "the easy stuff" has now been done for the most part. What follows will come harder and will cost more.

A conference held at Airlie House, Virginia, in 1975, from which the papers in *Resource Allocation* are derived, addressed this issue of how it happened. Participants discussed recent evidence of the impact of research on agricultural productivity, as well as the factors dictating the demand for and supply of new technology, and the complex infrastructure necessary for the infusion.

*Resource Allocation* contains six sections plus an introductory chapter. The first section presents papers on the productivity of national research systems, providing evidence from several countries. The second section contains papers on the productivity in the international research system, giving evidence of its success. In the third section, authors address the history and problems in the organization and development of the international agricultural research institute system. The fourth section evaluates both the macro and micro considerations in the organization and management of agricultural systems. In the fifth section, authors address the role of economic and social factors in research resource allocation, especially as they affect determination of priorities and optimal systems. In the final section, authors consider research strategies and administrative issues that will influence the future of the international research system.

The conference was especially eventful in two respects. First, it occurred at a time when the international agricultural research community was at a significant juncture. The



basic nature of research undertaken is changing, and national research capabilities are beginning to assert a greater role in both the conduct of research and its determination. The latter is particularly significant. Those concerned with the international agricultural research system, while pleased with its past accomplishments, are now questioning the direction and rate of future thrusts.

Second, the cast of participants at the conference were the "Who's Who" of the international agricultural research community. They included: the leading students of and most prolific writers on technological change; the leading organizers and administrators in the agricultural research system; and, a number of the current practitioners. To my knowledge, this is the first and only time such an assemblage of talent has been brought together on this topic, certainly exceeding the more narrow and less complex examination at the predecessor conference in Minnesota in 1969.\* The individual papers reflect well the level of competence and depth of experience of their authors. Unfortunately, space did not permit the editors to also include fully the range of issues, variety of perspectives, depth of implications, and vehemence of persuasion contained in the interchanges among conference participants.

There is much in this book for serious consideration and discussion, and much for disagreement. One may raise questions about the efficiency criterion in resource substitution as the singular guide to technological change, or the role of economic growth as the singular goal of such change. Both are considered the heart of research allocation in these papers, as in technology literature generally. Problems in measures of returns to, and/or impacts of, research are generally attributed to problems of methodology resulting from uncertainty and bad data, rather than shortcomings in our theory. Are there alternatives to this relatively simplistic criterion and goal? Within the context of current, market-oriented firm theory, probably not.

Even at the firm and project level, the criterion and goal never have

been acceptable in practice as singular guides to allocating resources. Now ample evidence is arising from the "small is beautiful" and "appropriate technology" trends and even from the conference papers to indicate a growing need to integrate these trends with other social criteria in determination of optimality. While in a number of the papers' authors stress these and other difficulties with the infrastructure of technological change, most seem to recommend only a need for change in the infrastructure, rather than a reexamination of our fundamental theories, decision criteria, and models.

An interesting conflict tends to lie just below the surface of many of the papers on organization and management of research, or on models of these, a conflict which may have far-reaching consequences. Western thought holds that research, to be most effective, must be organized, managed, and planned essentially within the context of entrepreneurship. Signals from the marketplace are believed to provide entirely adequate control over the allocation of resources among lines of research, and central direction in research is legitimate only where social opportunity costs of research investment would otherwise be too high. Participants from the developing countries believe a great deal of centralization in research planning is necessary. They would say that Western thought assumes the existence of too many factors (quality of marketplace signals, level of education, existence of technology delivery systems, and many other infrastructure characteristics) which simply do not pertain to developing countries.

Considering that Western thought has substantially dominated the international agricultural research system as to how it is organized, managed, and planned, one might speculate whether this dominance, in view of such philosophical differences, can continue. What role will Western research advisors be permitted in the further development of national research systems? Western advisors tend to be not well adapted to central planning.

Even in this country, the marketplace is visibly becoming a less efficient communicator of relevant choice values. As Schultz points out, these infrastructure problems require

us to look beyond the realm of social scientists and research administrators for a resolution. Problems of infrastructure have not received the full attention that they rightly and necessarily deserve.

The overall conclusions of the volume are provided by Arndt and Rutan who state:

There is solid evidence that investment in national and international research has been highly productive. The social returns to agriculture research have been high relative to the alternative investments available to most poor countries.

There have been great strides forward in our understanding of how technical change is induced, in the modeling of the discovery process, and in mapping worldwide diffusion of technology and scientific knowledge (p. 25).

Yet, they conclude we need to know more—about the origin and nature of demand for new technologies, research cost functions and production processes, the technology diffusion process, and the infrastructure for technological change, especially that relating technology and economic policies. To this should be added the problem of reflecting nonmarket goal criteria.

If this book has a failing, it is probably in the size of the effort, in trying to cover too much material. There are at least three major topics included, each of which could fill a book itself: (1) the measurement of returns to investment in research, (2) the organization and administration of a research system, and (3) the purely micro-concerns of project selection and program management. While the principal aim of the conference was to provide an interchange among participants with expertise in each of these three areas, one might question the necessary sacrifice of alternative perspectives presented during discussions. It might have been better to sacrifice one of the three topics, concentrating on a fuller development of the remaining two.

This volume will be useful to a wide range of readers, because it does contain a vast amount of information. It provides an excellent primer for anyone entering the field of the international agricultural research system or to students of the technological process, whether from the standpoint of program organization and

\*Walter L. Fishel, ed. *Resource Allocation in Agricultural Research*. Univ. Minn. Press, Minneapolis, 1971.

management or the measurement of returns to investment in research. There is much of worth to those who formulate research or development policy. It is an excellent general reference, and provides fine lists of materials for extensive reading in specific topics.

Walter L. Fishel  
Agricultural Research Service

---

## CONSERVATION AND ECONOMIC EFFICIENCY: AN APPROACH TO MATERIALS POLICY

By Talbot Page. Resources for the Future. Baltimore: The Johns Hopkins Univ. Press, 1977. 265 + xvii pp. \$15 (hardcover), \$4.95 (paper).

For many years there have been two approaches to the formulation of materials policy, one associated with the traditional thinking of resource economists and the other with that of conservationists. A national "policy" often emerges as the result of numerous individual decisions, subject to different pressures, and made over a long time, rather than from plans and goals formulated by a governing body. Policy formed after the fact takes on some of the contradictions accumulated over separate and disparate decisions. Our current materials policy falls into this second category.

This book offers a way to look at material flows that can be used in the formulation of materials policy. We can think of this formulation on three levels. At the most elementary level, there is a "large" quantity of waste, a "low" amount of recycling, and direct concern for resource availability in the future. The remedies are in the piecemeal tradition of our existing "policy"—subsidies on recycling, product specification, and so forth. At this level the focus is too narrow, like setting a particular sail of a ship without taking into account the balances among the sails. There is no relationship of one sail to another, no way of telling whether copper should be recycled at one rate and iron at another. Direct intervention may be self-defeating.

At the second level, correction of a single market failure leads to the

improvement of several specific conditions concurrently. A market standard, such as the efficiency criterion, can determine in principle the best balance in material flows. For any particular course upon which the ship sails, we can define the proper or efficient balance among the sails. According to this criterion, the standard perceptions seen at the elementary level are all correct: the quantity of waste is too large, the rate of recycling is too low, there is too much depletion. At this level, particular policy directives can be readily formulated.

Consider the pricing structure for freight, electricity, and other forms of energy. The current structure favors users most sensitive to price, the largest users. The justification has been that volume discounts to the larger users built up capacity to take advantage of possible economies of scale. For freight transportation, bulk materials such as scrap and virgin materials were the intended beneficiaries of the pricing structure, but virgin materials benefited more. For energy pricing, the result has been to move extra materials around in the economy. However, the efficiency criterion tells us that there is an associated cost. A wedge is driven between the price of a material and its marginal cost, a wedge that distorts the price signal to downstream users. This distortion has been neglected. The issue is a complicated one involving trade-offs of competing goals. Nevertheless, the policy direction inherent in the efficiency criterion is clear: move away from demand pricing and toward marginal cost pricing. This move would tend to conserve materials.

At this second level, the efficiency criterion guides us on the taxation of materials industries. Having noted low recycling rates, high rates of waste generation, and the relatively light tax burden on virgin material industries, one may find it easy to recommend equal tax treatment of secondary material industries. And in fact there have been many legislative proposals to extend the tax preferences on virgin materials to scrap materials as well. The efficiency criterion tells us that such a move would compound the materials problem. The result would be more material flowing through the economy, with increased costs of energy and capital to move the material around.

There would likely be some saving in virgin material extraction and waste discharged to the environment, but this saving would come at unnecessarily high cost. The appropriate move, according to the efficiency criterion, would be to eliminate the tax preferences for virgin material. This has been done, in part, for major oil companies, but not for other materials industries.

While the efficiency criterion has long been a staple of the economic literature on depletable resources, it is probably safe to say that this criterion has not been an important concept in the legislative process.

For the third level, we step back to see where the economy as a whole is heading, and focus on the rudder. One view is that no attention need be paid to the rudder at all. The ship is on automatic pilot. The economy sails safely into the future much as Joshua Slocum sailed a thousand miles across the Pacific without adjusting his steering mechanism. Market forces provide a satisfactory balance between new technology and depletion, and the generation of long-lived wastes is not cause for concern. To adjust the rudder of the entire economy in its use of materials, it is necessary to look ahead 50 or 75 years. Different principles apply to the adjustment of the rudder than to the setting of the sails. The resource base is shared intergenerationally, and the questions are: Will it be shared fairly? In its use of materials how can the economy be kept from drifting into unlivable futures? To set and balance the sails requires considerations of economic efficiency; to adjust the rudder requires considerations of fairness. Some headway can be made in defining a fair resolution by imagining an agreement among representatives of different generations deciding on the management of the commonly owned resource base. Consideration of a fair use of the resource base is a legitimate and important concern in the formulation of materials policy.

A materials policy based in part on the conservation criterion is simple but probably counterintuitive. It suggests that when virgin materials threaten to become increasingly costly, they should be made more expensive nominally, perhaps by severance taxes, now. Often, people think just the opposite: when virgin materials



threaten to become more costly, they should be subsidized to keep prices constant to the consumer. The latter approach encourages the expenditure of more resources than may be returned from the effort in the short term; in the long term, it leads to a mismatching between the rate of depletion and technological renewal.

Of the three levels of consideration for the formulation of materials policy, the first, direct level is perhaps the most relied upon at present. It is the least suitable, because its focus is too close. There should be a mixture of the second and third levels. We need to know how to set the sails and how to adjust the rudder. In the past both skills have been neglected.

[Condensed from the book by Clark Edwards with permission from Johns Hopkins University Press.]

## PROCEEDINGS, THE WORLD FOOD CONFERENCE OF 1976

Ames: The Iowa State University Press, 1977. 685 + xiv pp. \$8.50.

When God created the world, He allocated His blessings in many ways incomprehensible to us so that it is impossible to detect what decision-making model He applied in determining who gets what, where, how much and why. To some He assigned the desert; to others He gave mountains, lowlands, and swamps; some received snow and others the monsoons; some too much water and others, no water at all. He also made us of different shades from white to brown to black with no indication as to why some would have fair skin, tall nose, and blond hair while there are those of us who are tanned, pugged-nosed, and short. However, we can have a pretty good guess as to why some were made women and others, men. In the allocation process, one occasionally suspects that He might have played favorites for a few more generously anointed with oil while some managed to inherit all the natural calamities—drought, flood, earthquake, cyclone, etc. . . .

It is just as well that we do not comprehend God's motives, other-

wise there would be no end to the negotiations and to the bargaining for more concessions. Given this Master Creation called Earth and its inexplicable inequalities, we in the 1970's are superciliously trying to fashion an equal world, hopefully with enough food for all . . .

Food is one of the most complex economic, political and moral problems of our times. Despite a great deal of discussion and debate, particularly in the past four years, the underlying issues are still very confused and different groups of people in different parts of the world continue to look at the food problem from their own particular angle. The food situation itself and forecasts about its future are clouded by so many imponderables that predictions swing from deep pessimism to cautious optimism. International discussions about environment, population, food, habitat and water are all part of a sudden realization that without a major restructuring of relationships and concepts, the world simply cannot continue the patterns of production and distribution of the past 25 years for the rest of this century.

Similarly, the search for solutions to the food problem quickly runs into deep moral and political dilemmas which go far beyond the problem of food. Will the rich nations of the world continue to treat the world as a vast market or is there any hope of its evolution into a genuine international community? Is there any common ground between self-interest and the moral imperatives of feeding the whole of mankind? Is it possible for developing countries to achieve, within a system based on freedom of ownership, mobility and consumption, a minimum of equality to secure everyone's basic needs of food, clothing, shelter, medicine and education? . . .

The general objective of The World Food Conference of 1976 was to broaden and intensify the involvement of scientists and educators in solving world food needs through concerted efforts among universities, research organizations, extension service and their many disciplines. The World Food Conference [sponsored by Iowa State University's World Food Institute] attempted to meet that objective by bringing face to face hundreds of specialists . . . [including] internationally renowned

nutritionists, economists, sociologists, animal scientists, food technologists, plant scientists, soil scientists, agricultural engineers, veterinarians and others . . . Publication of these Proceedings provides a record of the conference.

[Excerpted from the book.]

## WORKSHOP ON AGRICULTURAL AND RURAL DATA: IMPROVEMENT IN CONCEPT AND OPERATION

The data systems used by agricultural economists have been, at times, the envy of the economics profession. But a recent workshop sponsored by the American Agricultural Economics Association and USDA's Agricultural Marketing Service, Statistical Reporting Service, and Economic Research Service was dedicated to the proposition that there is room for, and need of, considerable improvement. The following comments on the workshop, held May 4-6 in Rosslyn, Va., are excerpted from the remarks of the four rapporteurs.

### Price Reporting

Concern about price reporting, according to rapporteur Milt Hallberg, was directed exclusively to AMS market news and SRS price reporting systems. The conceptual base of these price series was reviewed. The intent was to identify weak links in the price reporting systems and to establish priorities.

Market prices serve three major functions: allocation of scarce resources in the production and distribution of goods and services; distribution of economic rewards among people, places, functions, and time; and equilibration of supply and demand. Prices aid the understanding of the marketing system, and the judgment of how well it performs. AMS market news prices were found most useful as a guide to the short-run allocative decisions of firms. SRS prices were seen as helping firms make longrun allocative decisions and, perhaps more importantly, aiding in the analysis of a market's performance.

Economic agents must discover the equilibrium prices formed from

interaction of supply and demand before these prices can be used in the allocative process. Buyer and seller interaction, often subtle and complex, reflects uncertainty and randomness, which makes the process of price discovery imperfect and subject to rigidities. It can and does take many forms depending on the structural characteristics of the market or firm behavioral patterns. This in turn affects the quality and usefulness of data available for collection by USDA as well as the need for data of the two different types considered.

Session participants considered the emerging market structure of, and the alternative price discovery processes in use by, the agricultural industries and the resultant impact on the AMS and SRS price series. They also considered several technical problems associated with collecting and disseminating these data.

### Capacity of Food and Fiber System

What is capacity? How is the concept being used? What are some of the methods by which it is derived? How can it be applied to the agricultural sector and of what use (if any) is it there? These are the four questions addressed, according to rapporteur Heinz Spielmann, by the three papers on agricultural capacity.

Existing capacity concepts in the agricultural sector relate mainly to market equilibrium. In the nonagricultural sector, the concept is differentiated into engineering capacity and economic capacity. No time series of capacity measurement exists in the agricultural sector, but several exist in the nonagricultural sector. The most important nonagricultural ones are provided by: The Federal Reserve Board, the Bureau of Economic Analysis of the Commerce Department, McGraw-Hill, and the Wharton School of the University of Pennsylvania. Capacity data are widely used by economists, industry analysts, banks, management, and by government decisionmakers.

Authors directed their attention to agricultural capacity measurement. Penn argued that capacity is a shortrun measure which, over the long run, indicates the efficiency with which fixed factors are used. Weeks saw capacity utilization measures as indicators of bottlenecks. Investment and output plans, and pre-

ferred operating rates expressed by farmers, may be established through capacity utilization measurements. Penson and Kibler recognized the whole food and fiber system, going beyond the narrower concept of the farm sector alone.

Some factors were discussed which affect capacity measurement differently in the agricultural than in the non-agricultural sector. Because of these factors, a useful agricultural capacity measure may be more difficult to conceptualize than those currently in use for the nonagricultural sector.

Discussants' remarks and audience responses were almost without exception rather pessimistic about the concept of capacity measurement and capacity utilization in the agricultural sector. The objections dealt mainly with the efficiency and applicability of capacity measurement, and the degree to which it could improve, or fail to improve, our existing behavioral knowledge of the agricultural sector.

### Data for Indicators of Well-Being for People Engaged in Farming

"Personal income" and "wealth" were proposed, according to rapporteur Norman Whittlesey, as a measure of well-being for "people engaged in farming" by the committee assigned to the working paper for this session. The farm family household was deemed the primary unit of observation. The use of this unit would be a distinct departure from current methods which use the farm as a unit of observation.

Personal income was defined as operator's surplus accruing to the farm operator household from farm and nonfarm businesses; wages and salaries, rents, interest, and dividends; and public and private transfers less contributions to social insurance. In the proposed household wealth account, the major contribution of the new data series would involve data availability, particularly non-farm assets. The wealth account would allow, and advocate, the use of capital gains as part of the well-being measurement. No index was suggested as a means of using the income and wealth accounts to consistently measure well-being in agriculture. The committee recommended that the responsibility for collecting information be assigned to the Bureau

of Census or the Statistical Reporting Service.

During the discussion, the consensus seemed to be that improved income and wealth information was needed to make better policy decisions. Such new information should be added to rather than replacing current data series.

It may be wrong, some suggested, to focus on the farm operator household for creating a new survey population. Problem households in agriculture might be more easily identified through other means than those suggested in the working paper. Other questions arose: How would income problems related to corporate agriculture, partnerships, hired workers, and so on, be identified and dealt with? Could such data collection be justified for only the farm sector or should similar data be collected for all sectors of our economy?

In view of its potential costs, people questioned the value of added information about well being in agriculture, asking for what kinds of policy decisions this information would be applicable. These questions were not answered; it seemed to be implicitly understood by most people that the answers would evolve naturally following collection of the necessary information, a dubious belief indeed.

Greater effort should be given to the justification of such information before it is collected. How will it be used? Who will benefit? Will benefits to persons providing the information at least equal their cost in providing it? Could the costs involved be justified to the Office of Management and Budget or to the Congress?

### Farm and Rural Employment Data

Farm employment has three aspects, according to rapporteur Keith Bryant, about which information might be sought: (a) who controls the nonlabor farm resources with which and on which farm laborers work; (b) who makes the managerial decisions; and (c) who performs the labor; what kind of labor; how much; at what wage rate; and with what accompanying fringe benefits. The taskforce on farm employment attempted to improve the definition of the last aspect. Much emphasis was placed on the who, what, and when; some attention was paid to



fringe benefits; and no attention was paid to wage rates.

The task force used two criteria to think through the recommendations: (a) farm employment should be measured in a way that is comparable and compatible with nonagricultural labor data sources; (b) the measurements should retain what is unique and special to agriculture, including presence of seasonal and migratory workers and family labor, and the practice of multiple-job holding. It was recognized that more resources will not be devoted to farm employment data collection.

The Standard Industrial Classification definitions of agricultural industries and the Standard Occupational Classification treatment of farm occupations were recommended. But, for SRS quarterly purposes, a more abbreviated set of categories would be required. "Farm operator" was singled out as a no longer useful category because of technological and entrepreneurial evolution. Nor is there an analogous concept in other industries.

The taskforce recommended the concept "self-employed in farming," which could encompass partnerships as well as joint ownership and/or management arrangements. This recommendation was the most radical. It was criticized as requiring presence on the farm; thus it excludes the absentee self-employed. It does not improve the concept of unpaid family worker. Some session participants believed that a definition should speak to the issue of resource ownership and managerial activity as well as employment status, and that the self-employed concept spoke only to the matter of employment. Distinctions among self-employed workers, unpaid workers, and hired workers were questioned, given that there are tax incentives to paying one's family cash wages.

Other recommendations included: collect monthly employment data on the SRS quarterly survey; collect data on labor turnover; collect data on employment costs and fringe benefits; and publish more of the data that is collected. Session participants also raised issues not treated in the report, including underemployment, migratory workers, and wage rates.

Underemployment did represent a subject in the rural employment data session and it provided a bridge be-

tween that session and the session on farm employment. The concept came up in two contexts: as a hypothesis that rural people are more burdened by underemployment than urban people; and as a guide to the allocation of Federal program funds. Measuring underemployment has not progressed much past the work of Glasgow in the early sixties. Part of the problem may be that the phenomenon is an attribute of people, yet, its policy applications are concerned with place.

Authors of the rural employment paper created a general typology by which data deficiencies for social research and policy needs could be identified and worked on. They presented results of a poll of professionals in the field of rural development as to their employment data needs and their perceptions of data deficiencies. A valuable bibliography of employment data sources was included.

The authors recommended: (a) publication of data at the most detailed geographical level possible, or more rural-oriented aggregation of geographic detail, (b) publication of public use tapes of economic censuses with fine-grain SIC code and geographic detail and (c) expansion of the CPS by oversampling rural people to gain accuracy for the nonmetro part. Finally, the authors pleaded for more communication between users and suppliers.

The people attending the employment session were regional, health, labor, and natural resource economists, persons involved in public finance and in human capital development, community developers, and others. Why did the planning committee expect a single session to serve these diverse interests? Their commonality consists of two aspects: that we grouped them together for the workshop, and that they use data supplied by agencies over which USDA has little or no control. Neither SRS nor persons taking the Census of Agriculture collect the data. The data collection is done in other agencies, who dance to different, typically urban tunes. It is past the time that we can put all of us not centrally concerned with commercial agriculture into an undigestible lump. In future, workshops must have smaller groups of

specialists so that we can discuss directly relevant concepts and data needs.

We are data users, for the most part. Relevant data suppliers are not in, or influenced much by, the AAEA and USDA. We need better representation on the advisory committees to the Bureau of Economic Analysis, the Bureau of Labor Statistics, the population census, and the economic censuses other than agriculture. Here, the AAEA might help by working through the Federal Statistics Users Advisory Conference. It is time for there to be a statistics review editor for the *American Journal of Agricultural Economics*. That persons's task would be to commission timely reviews of new data series, or old data series being revised or in need of revisions.

Milton C. Hallberg, Visiting Professor of Agricultural Economics, Oklahoma State University  
Heinz Spielmann, Professor of Marketing and Agricultural Policy, University of Hawaii  
Norman K. Whittlesey, Visiting Professor of Economics, Colorado State University  
W. Keith Bryant, Professor of Economics, Cornell University

## U.S. AGRICULTURE AND TRADE ADJUSTMENT ASSISTANCE

The Trade Act of 1974 (hereafter cited as TA-74) represents a significant policy change for agriculture, one with which agricultural economists and others working in agriculture should be familiar. Besides giving the President certain negotiating authority over trade matters, as do all trade bills, TA-74 extends and liberalizes the "adjustment assistance" provisions of the Trade Expansion Act of 1962 (2, p. 5).<sup>\*</sup> These provisions were considered a radical innovation in the 1962 Trade Act since no precedent existed either in the United States or abroad for compensatory adjustment payments

<sup>\*</sup>Italicized numbers in parentheses refer to terms in References at the end of this note.



to domestic interests injured by international merchandise movements. Further, for the first time in U.S. tariff history, TA-74 extends adjustment benefits to farm owners/operators, farmworkers, and farming communities (7, p. 145).

## ELIGIBILITY AND BENEFITS

### Workers

Under Section 221 of TA-74, a group of workers files a petition of eligibility with the U.S. Secretary of Labor. The Secretary certifies a group of workers as eligible if he finds that:

- (1) A significant number or proportion of workers in a firm have been or are threatened to be totally or partially laid off,
- (2) Sales or production of the firm have decreased, and
- (3) Increases in imports of articles like or directly competitive with articles produced by the workers' firm contributed importantly to the separation or threat of layoff of the workers, and to the decline in sales or production.

Worker benefits include an allowance equal to 70 percent of weekly earnings prior to layoff, for a period of up to 52 weeks. Other benefits provided are counseling, testing, placement services, training, job search allowances, and relocation allowances.

### Firms

For firms, the injury test is virtually identical to that required of workers. Petitions are filed with the Secretary of Commerce. A firm must then file a proposal for adjustment which:

- (1) Will contribute to the adjustment of the firm,
- (2) Gives consideration to workers of the firm, and
- (3) Demonstrates that the firm will use its own resources, where possible, for its economic development, and that the firm has no reasonable access to private financing (Sec. 251 and 252, P.L. 93-618).

Two types of assistance are available to eligible firms. First, the U.S. Government will pay up to 75 percent of the cost of technical assistance of consultants who develop, prepare, and assist in implementing an "economic adjustment proposal"

for the firm. Second, loans and loan guarantees are available for working capital, modernization, construction, and acquisition of land, plant, buildings, and machinery, for periods up to 25 years.

### Communities

A new program established by TA-74 is that of community adjustment assistance. By creating new industry and job opportunities, this program is intended to help restore the economic viability of areas adversely affected by increased imports. Under the program, local governmental units petition the Secretary of Commerce, and eligible communities may receive development assistance including technical assistance, improvement of public works, and measures designed to attract new investment.

## IMPLICATIONS FOR AGRICULTURE

Many barriers and special problems relating to agriculture are being addressed at the multilateral trade negotiations in Geneva. There are many U.S. commodities which are protected from foreign competition. Among the better known protective measures are the voluntary export restraints on wool, beef, veal, and mutton, and the quotas on certain dairy products, cotton, and sugar. On the other hand, U.S. agricultural exports are inhibited by restrictions imposed against them by our trading partners. Examples include the variable levies of the European Community Common Agricultural Policy on wheat and grain, and the sudden suspension of the quota on beef imports to Japan in February 1975. Accordingly, adjustments in U.S. agricultural production and trade may be expected over the next decade (4). While there will be gains to some sectors of agriculture, other sectors may be injured. There is likely to be a move away from production of protected agricultural products towards those where the United States has a comparative advantage.

Johnson has ranked U.S. agricultural commodities by their level of comparative advantage at prevailing world prices (3). He finds that the United States possesses a comparative advantage in the production of feed grains, soybeans, wheat, tobacco,

and poultry. He sees an uncertain situation for rice, cotton, flaxseed, pork, beef, and oats, and a comparative disadvantage in manufactured dairy products, sugar, wool, sheepmeat, and peanuts. Johnson estimates that complete displacement of sugar and peanut production, and elimination of import restrictions on dairy products and cotton would result in a total loss of about 7 percent of farm labor and 8 percent of farmland (5). However, if United States concessions were accompanied by trade concessions from other countries, he calculates that the resultant increased use of land could easily reach 20 million acres.

Even so, because of resource inflexibility, it is unlikely that resources will flow readily from the injured sectors to those that benefit from freer trade. Such adjustments will not be without considerable impact on many individual farm operators and farmworkers. As Schmitz and Seckler note of past adjustments, "... we tend to forget the painful process that accompanied the transition from a rural to urban society. We have forgotten that for many people the transition was involuntary; that many people have been forced off the farm only into an economic and social limbo ..." (6).

With passage of TA-74, government assistance is promised in the transition either out of agriculture or into another line of agricultural production. This represents a rather remarkable, albeit unintentional, change affecting U.S. agricultural policy. Unlike earlier policies which restrained adjustment by providing price supports, production controls, and import restraints to protect domestic producers, the adjustment assistance provisions of TA-74 assure that at least persons and firms in that sector of agriculture affected by increased import competition will not be inhibited in moving from previously protected production into other agricultural or nonagricultural occupations. However, the adjustment assistance provisions do not compensate farmowners for a decline in the price of some land that would result from tariff removal.

## IMPLICATIONS

Agricultural economics departments are likely to receive many

requests from farmers to assist in the preparation of a farm firm's "economic adjustment proposal." Farm management personnel may find it useful to construct a flexible computer model of a farm which shows its expenditure and receipt streams, capital requirements, and growth path over, for example, a 5-year period. Such a model would be particularly useful if farms affected in the region are fairly homogeneous.

Extension workers should be aware of the law so they may advise farmers of their prospective eligibility, guide them through the adjustment assistance maze, and counsel them as to their options in changing the enterprise mix or seeking urban employment.

Community and human resource development specialists may find their services in demand by some rural regions which want to take advantage of the community adjustment provisions of TA-74.

#### Costs

Researchers have not estimated the costs of the program in the agricultural sector. These will depend on the magnitude of adjustment which, in turn, depends on such variables as the extent and staging of tariff cuts or quota liberalization, relative exchange rate movements, inflation rates in the United States and abroad, relative changes in productivity, and changes in real income here and in countries we trade with. Bale and Mutti have developed a model to make such estimations and have applied it to the U.S. footwear industry (1). Such calculations have yet to be made for agriculture.

#### Conflicts of Interest

Finally, most significant changes considered by Government involve conflicts of interest. Many Pareto-superior moves entail gains and losses which are equivalent to redistributions of income. Welfare economists use the compensation principle to ask simply: "Is it possible for the gainers to compensate losers so that everyone is at least as well off as before the move?" In practice, such compensation is seldom made. The adjustment assistance provisions of TA-74 may be regarded as an example of the gainers (consumers using Government as an intermediary) actually compensating the losers in a

Pareto-superior move toward free trade. Whether the losers are overcompensated or undercompensated is a question for later research. For agriculture a point of further significance is that the policy stimulates rational adjustment rather than inhibiting it.

Malcolm D. Bale  
Assistant Professor  
Montana State University  
(Temporarily assigned to Foreign  
Demand and Competition Division,  
ERS)

#### REFERENCES

- (1) Bale, M. D., and J. H. Mutti. "Predicting Labor Market Adjustments to International Shocks." Paper presented at the Western Econ. Assoc. Conf., June 27, 1976.
- (2) Foreign Agricultural Service. *Foreign Agriculture*. U.S. Dept. Agr., Jan. 29, 1975.
- (3) Johnson, D. G. "The Impact of Freer Trade on North American Agriculture." *Am. J. Agr. Econ.* 55 (May): 294-299, 1973.
- (4) ———. "Government and Agricultural Adjustment." *Am. J. Econ.* 55 (Dec.): 860-867, 1973.
- (5) ———. *Farm Commodity Programs - An Opportunity for Change*. Am. Enterprise Inst., Wash., D.C., 1973.
- (6) Schmitz A., and D. Seckler. "Mechanized Agriculture and Social Welfare: The Case of the Tomato Harvester." *Am. J. Agr. Econ.* 52 (Nov.): 569-577, 1970.
- (7) U.S. Senate. *Trade Reform Act of 1974*. Rpt. 93-1298, 93d Cong., 2d Sess., Nov., 1974.

#### CURRENT CONDITIONS IN AGRICULTURAL TRUCKING

Unmanufactured agricultural commodities trucked interstate are exempt from economic regulation by the Interstate Commerce Commission (ICC); thus, data on this trucking are not usually available from them. During 1976, however, the Commission conducted a year-long study of the "empty backhaul" problem, one that affects agricultural and other

commodities shipped by truck (4).<sup>1</sup> Interstate highway locations were selected for manageability. They tended to concentrate the survey more heavily on interstate trucking. A total of 13,165 randomly selected trucks, 3-axes or larger, were stopped by cooperating State highway officers at 439 check points on 221 segments of the Interstate Highway System. ICC employees interviewed the drivers about their origins, destinations, operating authorities, commodities on board or usually carried, and reasons for driving empty if not loaded. The trucks were classified into three groups: trucks operated for ICC authorized carriers, trucks that are "exempt" (that is, insofar as ICC authorities are concerned but including those with intrastate operating authorities only), and trucks that are private (that is, operated by firms not engaged primarily in transport, to haul their own products).

The intent here is based on the ICC study, to describe current conditions in agricultural and other rural trucking and to analyze implications of the findings for proposed regulatory changes.

#### CURRENT CONDITIONS

Agricultural commodities were the cargoes for 2,851 trucks, 28.1 percent of the 10,133 loaded trucks observed (4, table VIII, p. 25). Exempt agricultural commodities constituted the loads for 1,303 trucks of which 351 were operated by ICC-authorized truckers, 697 by exempt truckers, and 253 by private truckers.<sup>2</sup> Regulated agricultural commodities constituted loads for 1,548 trucks of which 832 operated under ICC authority, 85 were exempt (pre-

<sup>1</sup> Italicized numbers in parentheses refer to items in References at the end of this note.

<sup>2</sup> The ICC report does not provide information about the "private" trucks reported in this category, but it is not likely that many were operated by the shippers of unmanufactured agricultural commodities. "Private" truckers of the regulated commodities (for example, General Mills) often haul exempt commodities on a for-hire basis in competition with regulated and exempt truckers, both as backhaul traffic and in seasons of slack traffic for the primary shipping firms (3).



sumably moving intrastate only), and 622 were privately owned. For all commodities, private trucks accounted for 31.3 percent of all loaded and partly loaded trucks. Thus, relatively more private trucks carried regulated agricultural and other commodities than exempt commodities.

Of 1,041 loaded trucks classified as operated by for-hire truckers without ICC authority, 67 percent contained exempt agricultural commodities. For all exempt trucks, 21.2 percent of their miles were empty, compared with 16.2 percent for ICC authorized and 27.3 percent for privately operated trucks (4, table 1, p. 6). Refrigerated trucks are also important to agriculture. Of 2,164 such trucks of all carrier types, 14.8 percent of the miles were empty.

ICC employees analyzed all empty trucks for type of equipment, time, location, and direction of movement. All pairs of empty trucks with compatible equipment that were moving in opposite directions on given highway segments within 3 hours of each other were labeled as "empty-meeting-empty" pairs. They represent a potential for reducing empty movements. There were fewer pairs of empty ICC-exempt and private-exempt trucks but more pairs of empty exempt-exempt trucks than were to be expected, based on the relevant numbers of empty trucks observed (computed from 4, fig. K, p. 34).

<i>Types of pairs</i>	<i>Actual pairs</i>	<i>Expected pairs</i>
ICC-exempt	14	21.4
Private-exempt	16	23.4
Exempt-exempt	7	4.6

The pairings by types of carriers while not statistically significant, are consistent with the often stated but so far untested hypothesis that the lack of ICC authority for the exempt trucks (which limits them to "thin" markets in their search for backhaul loads) do result in relatively more empty movements by exempt trucks.<sup>3</sup>

<sup>3</sup> The observed number of empty exempt trucks involved in these pairings is small (44 total), but it is unlikely that a larger sampling of truck movements will become available anytime soon. Such surveys are expensive and require intergovernmental cooperation.

An analysis of 652 trucks in a 1-in-20 subsample showed the number of trucks originating at places by population size and the percentage empty.<sup>4</sup> A second distribution was by size of destination places (4, table XI, p. 37). Of the trucks destined for small places, considerably more of them (48 percent) were running empty than were those originating in small places (27 percent). Such a pattern was expected since bulky, low-valued, exempt agricultural, forest, and mine products move heavily from rural areas (smaller communities) toward concentrations of population (larger communities). Also, many of the truckers hauling exempt agricultural commodities as well as private truckers hauling regulated agricultural commodities have no ICC operating authorities for returning regulated commodities to rural areas. However, the difference in the percentages was not statistically significant.

Based on the subsample of 652 trucks, empty trips were only half as long as loaded trips. Many drivers reported that they were driving from unloading points to other points where loads were available for return trips. Thus, the "empty backhaul" problem is, in many instances, an "empty segment" problem.

#### IMPLICATIONS FOR PROPOSED REGULATORY

Some persons claim that deregulation of all trucking would result in more for-hire trucking of the currently regulated commodities with higher qualities and lower costs of the service. The statistically significant lesser role of private trucking in the exempt sector reflected by the ICC data is consistent with what these persons claim would result from a move toward less regulation. However, other factors contribute to that result for agricultural traffic. Perishable crops are shipped from many small shipping points on a highly seasonal basis.<sup>5</sup> Such shipping

<sup>4</sup> ICC employees plan to analyze additional subsamples to develop more details on truck movements and to yield more precision for estimates.

<sup>5</sup> However, livestock for slaughter, live broilers, eggs, milk, and dressed poultry do not have strong seasonal patterns of movement.

patterns may not permit organization of efficient private trucking, and a system of truck brokering has developed in many areas to bring for-hire truckers and exempt commodity shippers together (2).

Nonetheless, these claims are consistent both with logic and evidence of impacts accruing from past changes in regulations. There are costs involved in regulatory processes, and operating authorities for truckers are constrained by commodity, route, and equipment specifications such that flexible services may not be as readily available in a regulated market.

Supreme Court decisions in the fifties removed regulation for fresh and frozen dressed poultry and frozen fruits and vegetables. "Before" and "after" studies found that, following the decisions, average rates decreased 19 percent or more, fewer shippers hauled their own products, and more shippers claimed that the quality of services of for-hire truckers improved than claimed that it declined (7 and 8).

In 1958, the Congress removed the Court-mandated exemption on frozen fruits and vegetables. Another "before" and "after" study found that tendencies this time went contrary to those observed at the earlier period. That is, more rates increased than decreased, more shippers resorted to private trucking, and many shippers found services less satisfactory (9).

The ICC study does not provide any proof as to the impacts that change in regulatory status might generate for empty/loaded truck miles and/or favorable rates to and from rural areas. Some members of the ICC and regulated truckers, among others, have argued that one-time measures of empty/loaded ratios cannot prove or disprove a disadvantage for truckers not holding ICC authorities. They also argue that any change in regulatory status to favor the "disadvantaged" truckers likely would shift empty miles from this group of truckers to the other, with only nominal or no reduction of overall empty/loaded ratios. They attribute this view to basic traffic imbalances in the nation.

The first argument seems valid. The second argument overlooks the possible modifications of existing traffic patterns that might accrue



from reorganizations of truck routes and schedules.<sup>6</sup> It also overlooks a strong theoretical basis for believing that deregulated trucking would generate favorable rates on traffic moving in the directions that more empty trucks are moving (1). If current rate structures are contrary to those expected in an unregulated setting, then deregulation would tend to spur nonagricultural development of rural areas, which would affect traffic balances.

From the limited evidence available on current rate structures, regulated commodities generate both higher revenues and higher costs per vehicle mile than do the exempt commodities (6), which lends some support to the view that current rate structures, are contrary to what one might expect with unregulated trucking.<sup>7</sup> Nearly all traffic moving to rural areas likely is regulated when carried by for-hire trucks.

Some regulated truckers claim that deregulation would deprive rural communities of trucking services on regulated commodities moving to and from these areas. The ICC data do not support this claim. Much of the regulated traffic moving from rural communities is regulated agricultural commodities, and the ICC data show that private trucking is currently important in these movements. Exempt commodities do move from rural areas in heavy volumes. Various studies show that unregulated trucking provides usually adequate quantities and qualities of services at rates roughly in accord with the costs of trucking in the specific corridors (that is, with congestion and backhaul opportunities accounted for).<sup>8</sup>

As to movements of regulated commodities to rural areas, analysis of all of the ICC data may show that the ratios of empty/loading trucks moving to and from smaller communities support the view that incentives

exist for unregulated trucking to provide adequate services at reasonable rates for such movements. Nonetheless, the highly seasonal nature of the movement of some exempt agricultural commodities from rural areas could result in reversals of the directions of majority traffic flows during the year. Such changes would be expected to generate wide swings in applicable rates. Unfortunately, the ICC sample produced too few observations on exempt commodity and unregulated trucker movements to provide reasonably precise estimates of corridor, seasonal, and commodity movements of the nature required to analyze this phenomenon in detail for rural areas.

John O. Gerald  
Agricultural Economist  
National Economic Analysis Division

#### REFERENCES

- (1) De Vany, Arthur and Thomas R. Saving. *Truck Transportation Efficiency*. Final report to Motor Vehicle Manufacturers Assoc., June 30, 1975, pp. 27-53.
- (2) Hunter, John H., Jr. *Role of Truck Brokers in the Movement of Exempt Agricultural Commodities*. Econ. Res. Serv., U.S. Dept. Agr. Mktg. Res. Rpt. 525, Feb. 1962.
- (3) Hutchinson, T. Q. *Private Motor Carriers of Exempt Agricultural Commodities*. Econ. Res. Serv., U.S. Dept. Agr. Mktg. Res. Rpt. 696, Mar. 1965.
- (4) Interstate Commerce Commission. *Empty/Loaded Truck Miles on Interstate Highways During 1976*. Bur. Econ. and Bur. Oper., Apr. 1977.
- (5) Miklius, Walter. *Economic Performance of Motor Carriers Operating Under the Agricultural Exemption in Interstate Trucking*. Econ. Res. Serv., U.S. Dept. Agr. Mktg. Res. Rpt. 838, Jan. 1969.
- (6) Murphy, Elizabeth L. "Comparison of Small Truck Carriers." *The Mktg. and Transp. Sit.* Econ. Res. Serv., U.S. Dept. Agr. MTS-165, May 1967.
- (7) Snitzler, James R., and Robert J. Byrne. *Interstate Trucking of Fresh and Frozen Poultry Under Agricultural Exemption*. Agr. Mktg. Serv., U.S. Dept. Agr.,

Mktg. Res. Rpt. 224, Mar. 1958.

- (8) ———. *Interstate Trucking of Frozen Fruits and Vegetables Under Agricultural Exemption*. Agr. Mktg. Serv., U.S. Dept. Agr. Mktg. Res. Rpt. 316, Mar. 1959.
- (9) Winter, J. C., and Ivon W. Ulrey. *Interstate Trucking of Frozen Fruits and Vegetables Under Agricultural Exemption*. Agr. Mktg. Serv., U.S. Dept. Agr., Suppl. to Mktg. Res. Rpt. 316., July 1961.

#### A NOTE ON "EFFECT OF SIZE OF THE INPUT-OUTPUT MODEL ON THE RESULTS OF AN IMPACT ANALYSIS"

In an article published previously in this journal (1), Doeksen and Little used four empirical models to show that the output multiplier of a specific industry alters very little if the remaining industries of an input-output model are aggregated into a single composite sector.<sup>1</sup> My purpose is to show that the conclusion reached empirically by Doeksen and Little has been proved by others (2, 3) to be true in principle.

Aggregation of an  $n \times n$  matrix of technical coefficients,  $A$ , into an  $m \times m$  matrix of aggregate technical coefficients,  $\bar{A}$ , is given by the following operation (2):

$$\bar{A} = \text{Tax}_O^D T' (T X_O^D T')^{-1} \dots (1)$$

where  $X_O^D$  is a diagonal matrix, the elements of which are the gross outputs of the  $n$  industries in the base period, and  $T$  is an  $m \times n$  aggregation operator, each row of which contains at least one unit and each column of which contains exactly one unit while the remaining elements are zero.

Hence, if an  $n \times n$  matrix of technical coefficients is aggregated into, for example a  $4 \times 4$  matrix of aggregate technical coefficients in which the first three industries remain distinct and the remainder are aggregated into a single sector,  $T$  takes the form:

<sup>1</sup> Italicized numbers in parentheses refer to items in References at the end of this note.

<sup>6</sup> Some reorganizations have already occurred through mergers and acquisitions of regulated truckers. In other instances, traffic patterns are balanced, or more nearly balanced, by hauling exempt commodities on the "backhauls."

<sup>7</sup> These measurements were for "small" carriers of the sizes likely dominant in serving rural communities.

<sup>8</sup> For a concise summary of several studies, see (5).

$$T = \begin{bmatrix} 1 & 0 & 0 & 0 & 0 & \dots & 0 \\ 0 & 1 & 0 & 0 & 0 & \dots & 0 \\ 0 & 0 & 1 & 0 & 0 & \dots & 0 \\ 0 & 0 & 0 & 1 & 1 & \dots & 1 \end{bmatrix} \dots (2)$$

Output multipliers obtained from the original model are given by

$$m' = i'_n (I-A)^{-1} \dots (3)$$

and from the aggregated model by

$$\bar{m}' = i'_m (I-\bar{A})^{-1} \dots (4)$$

where  $i'_n$  is a row vector of  $n$  units and  $i'_m$  is a row vector of  $m$  units.

Since  $i'_n = i'_m T$  and  $(I-\bar{A})^{-1} T$  is  $(I-\bar{A})^{-1}$  with the last column repeated  $n-3$  times, the difference between output multipliers obtained from the original model and those obtained

from the aggregated model form the elements of the row vector:

$$i'_m T(I-A)^{-1} - i'_m (I-\bar{A})^{-1} T \dots (5)$$

but only the first three elements are of interest.

Expression (5) can be expanded as:

$$\begin{aligned} & i'_m T(I + A + A^2 + \dots) \\ & - i'_m (I + \bar{A} + \bar{A}^2 + \dots) T \\ & = i'_m \{ (TA - \bar{A}T) + (TA^2 + \bar{A}^2T) + \dots \} \\ & \dots (6) \end{aligned}$$

Morimoto (3) has pointed out that the columns of  $TA$  and  $\bar{A}T$  which correspond to the industries not aggregated are equal. Hence, the difference between the multipliers of these industries, obtained from the

original and aggregated models, is of the second order only.

## REFERENCES

- (1) Gerald A. Doekson and Charles H. Little, "Effect of Size of the Input-Output Model on the Results of an Impact Analysis", *Agricultural Economics Research*, Vol. 20, No. 4. October 1968 (p. 134-138).
- (2) H. Neudecker, "Aggregation in Input-Output Analysis: An Extension of Fisher's Method", *Econometrica*, Vol. 38, No. 6. November, 1970 (p. 922).
- (3) Y. Morimoto, "On Aggregation Problems in Input-Output Analysis", *Review of Economic Studies*, Vol. 37, No. 109. January, 1970 (p. 122).

J. R. Rodgers  
Department of Agricultural  
Economics and Marketing  
Lincoln College  
New Zealand

---

## In Earlier Issues

Parity prices have been an integral part of agricultural policy of the United States since 1933. Action programs that have had a material effect on the economic situation of agriculture have been based on or related to parity prices. These programs include such things as price supports, price ceilings, and marketing agreements and orders. Parity prices in themselves are merely measuring devices or yardsticks; it is only when action programs based on parity prices are in operation that prices received by farmers are appreciably affected by them . . .

Parity income has not been used as a basis for any agricultural program. . . Parity income . . . is the per capita net income to persons on farms from farming that bears the same relationship to per capita income of persons not on farms as prevailed in 1910-14. This definition was more or less tailored to fit the available statistics. It will be noted that the nonfarm income of farm people is allocated by this definition to the nonfarm population. It seems fair to say that practically no one has been completely satisfied with this definition.

C. Kyle Randall  
Volume 1, Number 1, pp. 11, 14  
January 1949

---