Interim Report on the Multiregional Input-output Research Program

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INTERIM REPORT
ON THE
MULTIREGIONAL INPUT-OUTPUT
RESEARCH PROGRAM

Report No. 6
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Prepared for the
Economic Development Administration
United States Department of Commerce

by
Karen R. Polenske

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The work during the first year of the multiregional input-output research project has involved the implementation and testing of the interregional gravity trade model, an analysis of the economic impact of the federal government expenditures upon regions in the United States, a study of the industrial and regional economic impact of a de-escalation in military expenditures in Vietnam, a report on the methodology of regional and subregional economic analysis, and, finally, the assembly of a consistent set of final demand data by state for the years 1947, 1958, and 1963. The research being undertaken represents a concerted effort to assemble a consistent set of regional data and to implement a multiregional input-output model of the American economy.

The papers containing the multiregional analyses are being submitted separately. A paper describing the multiregional input-output gravity trade model was presented at the Fourth International Input-Output Conference in Geneva, January 1968.¹ Preliminary figures for the federal expenditures impact and the Vietnam de-escalation

studies were submitted to the Economic Development Administration in August 1967. Revisions were incorporated into later calculations, and the final reports on the two studies are being completed at the present time.\footnote{Karen R. Polenske, "The Economic Impact of Federal Government Expenditures on Industries and Regions of the United States: 1947, 1958, 1962," and Wassily Leontief and Karen Polenske, "The Economic Impact--Industrial and Regional--of a Vietnam De-escalation," EDA Reports No. 2 and No. 3, respectively (Harvard Economic Research Project), August 1967, being revised.} Finally, in the paper on the methodology of regional and subregional input-output analysis, a comprehensive review is made of the basic regional input-output models.\footnote{Robert H. Edelstein, "Methodology of Regional and Subregional Input-Output Studies," EDA Report No. 8, June 1968.} A discussion of data availability for small-area studies is incorporated into the reports on the different components of final demand.

The assembly of regional final demand data which will be used in the multiregional input-output model of the United States is progressing fairly close to schedule. A brief summary of the problems in developing a set of final demands by state for the years 1947, 1958, and 1963 is included in this report, while detailed descriptions of specific difficulties in assembling the final demand data are being included in the individual reports. Since no previous assembly of a complete set of regional input-output data is available to use as a guide, many difficulties have been encountered in attempting to develop a consistent set of regional figures.

During the first year of the research, many sources of regional final demand data have been located. The data, however, are
usually not assembled in a form which would be usable within the
input-output framework; consequently, the main effort during the first
year was directed toward developing techniques for assembling the data
to provide consistency with the methods used for the national input-
output tables prepared by the Office of Business Economics.

Choice of a Regional Unit

The final demand data are being assembled on a state basis,
rather than a county or regional basis.

Counties. Since there are more than 3,000 counties in the
United States, the handling of such large quantities of data was well
beyond the scope of the present research endeavor. In addition, some
of the difficulties mentioned later concerning the nonavailability of
data and the inconsistency of available statistics would have been even
more severe if final demands were to be assembled by county. The
possibilities of disaggregating the state final demand data to county
or multicounty units are discussed in the individual reports.

Regions. The decision not to use an already-established set
of regions was based on a desire for flexibility in implementing the
multiregional model. The regional grouping selected to implement the
multiregional model may vary as the economic problems to be analyzed
change: an analysis of the impact of cutbacks in military spending may
require a different conglomeration of areas than an analysis of invest-
ment requirements for transportation.
Different sets of regions have been established by various federal government agencies over the years. Some of the better-known include:

<table>
<thead>
<tr>
<th>Agency</th>
<th>Comments</th>
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<tbody>
<tr>
<td>1) U.S. Bureau of the Census</td>
<td>Nine regions. Each state is included in one and only one of the regions.</td>
</tr>
<tr>
<td>2) U.S. Department of Commerce, Office of Business Economics,</td>
<td>Eight regions. Each state is included in one and only one of the regions.</td>
</tr>
<tr>
<td>Regional Economics Division</td>
<td></td>
</tr>
<tr>
<td>3) U.S. Department of Commerce, Economic Development Administration</td>
<td>Five regions. Most of the regions are formed from groupings of counties in contiguous states, rather than from combinations of entire states. The regions are not exhaustive of the entire United States, and the EDA anticipates adding more regions as time passes.</td>
</tr>
<tr>
<td>4) U.S. Department of Labor, Bureau of Labor Statistics</td>
<td>Three regions. Each state was assigned to one of the regions. In most cases, the regional boundaries do not cross state lines, but Grand Island, Nebraska, was included in the West, while Omaha, Nebraska, was included in the North.</td>
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<tr>
<td>a) 1950 Consumer Expenditure Survey</td>
<td></td>
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<tr>
<td>b) 1960 Consumer Expenditure Survey</td>
<td>Four regions. Each state was assigned to one of the regions. The survey was extended in coverage (from the 1950 survey) to include farms.</td>
</tr>
</tbody>
</table>

States. The decision was made to assemble the final demand data by states. In most cases, these data had to be estimated from various regional groupings of the data. For example, the consumption data were estimated using the 1960 average consumption expenditure
figures specified for the four BLS regions, while the export data were assembled from figures available for the nine census regions, with certain exports specified on a state basis.

States seem to be the most appropriate basic unit to use for assembling statistics for multiregional analysis. In the multiregional input-output research project, all the data assembled on a state basis are consistent with national control figures. For some economic analyses, the state data can be aggregated to a suitable regional aggregation,\(^4\) while for other studies, the state figures can be used as controls for a subregional analysis within a state at a county or multicounty level.\(^5\)

Data Inconsistencies and Scarcity

In the effort to assemble data on a state basis, the most serious deficiency has been the lack of a consistent set of regional accounts data which can be used to develop the state final demand


\(^5\)Some research work uses the Standard Metropolitan Statistical Area (SMSA) as the basic statistical unit. No attempt was made to assemble the final demand data for use in research on SMSA's in the present research project because of time and money constraints. As more statistics are collected by government agencies for SMSA's, the advisability of using the SMSA classification should be reconsidered.
figures for regional input-output studies. Of course, even at the national level, the national income accounts have been integrated with the input-output tables only since 1965.

The 1947, 1958, and 1963 sets of state final demands which are being assembled for this multiregional input-output research project should be considered as the first round of estimates. As the research work continues, revisions to the original estimates undoubtedly will have to be made as more data sources are discovered. The interest of the various government agencies in this project and their willingness to make available some of the data required for the research have been very encouraging; nevertheless, a need exists for a more routine co-ordination of the assembly of regional data, preferably by an agency within the government rather than by an outside private research group.

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7 In the United States, the first national income figures to be based upon a cross-check with the input-output figures were published in an article by the Office of Business Economics: "The National Income and Product Accounts of the United States: Revised Estimates, 1929-64," Survey of Current Business, Vol. 45, No. 8 (August 1965), 6-56.

8 A very thorough discussion of the problems associated with the assembly of regional data and the implementation of models for regional economic analysis is presented in: Edgar S. Dunn, Jr., An Interagency Program for Regional Economic Research, U.S. Department of Commerce, Business and Defense Services Administration, October 1962.
Present indications are that much of the required final demand data for regional research could be assembled by the various agencies with only a small increase in research effort and expenditures. Many federal government agencies already have state figures available from which they determine the national figures. Two problems must be considered. First, the state figures which are already available usually have not been fully reconciled with the national figures. In certain cases, the reconciliation may require a considerable amount of time. And, second, the federal government cannot publish information which would disclose figures for an individual firm. But neither of these problems seems insurmountable.

Documentation

A common complaint among economists using the input-output tables is that no detailed, up-to-date documentation is presently available. Even the user of just the national income accounts is frustrated by the lack of a complete and current description of the composition of the data. At the present time, he must refer to at least three sources to learn about any revisions to the quite detailed 1954 national accounts methodology. Even then, the information may

The documentation which accompanies the published input-output tables is quite variable. The 1947 table exists in several forms, some published, some unpublished. The table was assembled at a 450-order level of aggregation. As the research was undertaken, information from the final worksheets was reproduced in mimeographed form for each of the industries. The mimeographed worksheets not only list the input and output figures, but also include footnotes which explain any special methods of determining the figures, provide sources for the data, and include other helpful explanations. Some of the final worksheets were never thoroughly checked because the input-output study was closed down in the early 1950's. Nevertheless, the individuals working on the 1947 table were able to complete a more concise documentation--published as a Technical Supplement by the National Bureau of Economic Research--of the construction of the table. The Technical Supplement is the only published source that can be used for reference on the methods of handling specific final demand purchases in the input-output tables. These worksheets and the supplement are indispensable sources for any serious economic analysis of the 1947 data.

The 450-order 1947 table was collapsed at the BLS to approximately 200 industries for the so-called Emergency Model (EM) which was

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10 For example, some description of the method of handling certain consumer expenditure figures, say the import of cars, cannot be determined except by referring to the article: Nancy W. Simon, "Personal Consumption Expenditures in the 1958 Input-Output Study," Survey of Current Business, Vol. 45, No. 10 (October 1965), 8-10.

used to analyze the impact of expenditures for industrial mobilization during the Korean War. Mimeographed reports of the 200-industry table also were prepared. 12

The most-referenced 1947 input-output report probably is the excellent article written by W. Duane Evans and Marvin Hoffenberg. 13 At the end of the article, the authors include a 50-sector table for the United States. They lucidly describe the various accounting methods used in the 1947 input-output table. In the assembly of data for the state final demands, this reference was used to answer some of the general methodological questions related to the composition of the national final demands, but the more specific questions were answered by referring to the Technical Supplement or to the mimeographed 450-order worksheets, supplemented by information received from the Office of Business Economics.

Finally, a 1947 table is being prepared under the direction of Mrs. Beatrice N. Vaccara, of the Office of Business Economics. Adjustments are being made to the original set of 1947 data to make the accounting conventions consistent with those used in the 1958 input-output study. The 1947 final demand data used as controls for the state final demand estimates were obtained from the revised table prepared by the Office of Business Economics.


Some of the procedures developed for the 1947 input-output study have changed in the 1958 input-output study and again in the 1963 input-output study. Since no complete documentation of the 1958 and the 1963 tables is available (the 1963 table is not yet published), the changes in procedures were determined for this research project from visits with or telephone calls to individuals at the Office of Business Economics who had established the figures. The procedure was slow and tedious, and, in the end, may have resulted in some misinterpretation of the actual changes made. A complete review will be required of the state final demand figures for 1963 as soon as the 1963 input-output table is published, since much of the information obtained from the Office of Business Economics was preliminary and incomplete.

Future Research Work

During the coming year the multiregional input-output gravity trade model will continue to be tested using the Japanese data.\(^{14}\) Some refinements to the model will be incorporated as the testing proceeds.

The final demand data which were assembled during the first year will be examined to see if additional refinements of the estimates

\(^{14}\) Efforts are being made to get a complete set of consistent American data assembled within the coming year which can be used to test the model for the American economy. The largest data deficiency at the present time is the lack of interregional trade flows.
are necessary or possible. The data will be used to test some of the regional models described by Robert H. Edelstein in EDA Report No. 8 to assist in determining the usefulness of input-output for small-area studies.\textsuperscript{15}

The major research effort during the coming year will be directed toward the problem of establishing regional estimates of technical coefficients for selected industries. The methodology for making these estimates will be discussed in future research reports.

Finally, the development of output, employment, and labor earning measures by state for the years 1947, 1958, and 1963 is proceeding on schedule under a subcontract to Jack Faucett Associates. These measures will be available in current dollars as well as in constant 1947, 1958, or 1963 dollars. A limited number of the 1963 state output measures which were prepared for the Institute for Defense Analyses\textsuperscript{16} are being revised under the subcontract.

The methodology for the measurement of state output in 1947 and 1958 has been developed for a majority of the nonmanufacturing input-output sectors, and Jack Faucett Associates is proceeding to assemble state output figures for the three years. For the manufacturing sectors, the Bureau of the Census is making a set of special


tabulations from the 1947 and 1958 Census of Manufactures. The information received from the tabulations will be used to develop for the manufacturing sectors the state estimates of output, employment, and labor earnings.