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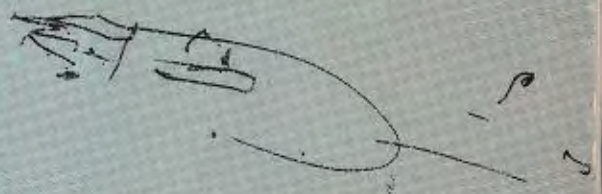

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AN INVENTORY OF REGIONAL INPUT-OUTPUT STUDIES IN THE UNITED STATES

Phillip J. Bourque and Millicent Cox

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OCCASIONAL PAPER NO. 22
(Revision of
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AN INVENTORY OF

REGIONAL INPUT-OUTPUT STUDIES

IN THE UNITED STATES

PHILIP J. BOURQUE and MILLICENT COX

This report was financially aided by the U. S. Department of Commerce, Economic Development Administration, through a grant to the University of Washington pursuant to the provisions of the Public Works and Economic Development Act of 1965.

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UNIVERSITY OF WASHINGTON
SEATTLE, WASHINGTON, U.S.A.

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University of Washington
1970

PREFACE

This monograph reports on the progress of input-output studies for various areas in the United States. It is essentially an updating of a previous inventory by Philip J. Bourque and Gerald Hansen (Occasional Paper 17). Along with the bibliography of empirical studies, some discussion of methodological problems has been included.

While our purpose is simply to provide a bibliography of input-output studies which develop interindustry matrices for regions, we have also included some thoughts on the problems of their design and difficulties in implementing them. The rapid headway made in the application of input-output techniques to regions leaves a wake of unresolved difficulties. Within the fraternity of input-output practitioners there are differences in approach, but a systematic evaluation of the quantitative and conceptual problems in regional applications has not yet been undertaken. We hope this inventory will contribute toward recognition of the meritorious empirical work which has been undertaken and be helpful to others in designing future studies.

Special acknowledgment is due Gerald Hansen for his meticulous care in the preparation of the first edition of this report. Our thanks are also great to Dr. Karen Polenske, Harvard Economic Research Project, and the late Professor Charles Tiebout of the University of Washington. We appreciate the help of so many who responded to our letters and questionnaires and invite readers to let us know of our errors of omission.

Philip J. Bourque
Millicent Cox

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AN INVENTORY OF REGIONAL INPUT-OUTPUT STUDIES IN THE UNITED STATES

Numerous input-output studies have been undertaken for various areas within the United States during the past two decades. Since the substance of these studies is often primarily of regional or local significance their circulation is limited, and convenient references to them are not readily available. This inventory of regional input-output studies has been prepared to provide researchers and consultants a convenient bibliography of empirical studies which have been completed or are in progress for areas in the United States.

References to the important theoretical and conceptual work have been intentionally omitted from the bibliography; our intention is to provide a handy reference to quantitative or applied work undertaken for various areas within the United States. The inventory is arranged in two parts: Part I includes completed or published studies, and Part II, studies currently in progress. We have inevitably missed our goal of a complete census of regional empirical input-output studies; as gaps are brought to our attention, we try to rectify omissions by addenda. The reader's help in this task, by suggesting corrections and additions, is invited.

National Input-Output Studies

The spectacular surge of interest in input-output methods in recent years is witness to the significance of the innovation whose foundations were laid by Wassily Leontief in the 1930's. Interindustry tables developed by Leontief for the United States economy for the years 1919, 1929, and 1939[1], were followed by a massive national input-output table prepared

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[1]Wassily Leontief, *The Structure of the American Economy, 1919-1939* (New York: Oxford University Press, 1941). The second edition (1951) is entitled *The Structure of the American Economy, 1919-1939.*

by the Bureau of Labor Statistics for the year 1947.[2] After a period of quiescence during the 1950's in the United States (but accelerating development abroad), the Office of Business Economics began work on a modest-sized input-output table for the year 1958. Since its publication in 1964, input-output has matured as a significant planning and forecasting tool for government and industry.[3] A national table for 1963 has recently been completed and the statistical apparatus of federal agencies is set to provide another for the year 1967, and at regular intervals thereafter. Input-output tables have become a fundamental block in the social accounting system of the United States and of other countries.

The preparation of a national input-output table for the United States is a complex undertaking, having an average period of gestation -- measured from base year of the table to publication date -- of about six years. Other people interested in national input-output studies update the "official" input-output matrices prepared periodically by the Office of Business Economics. Leontief has made provisional estimated tables for an economy at the $600 billion and $750 billion level. The 1966 CEIR-Fortune tables are also readily available.[4] Projected tables for 1970, 1975, and

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[2]W. Duane Evans and Marvin Hoffenberg, "The Interindustry Relations Study for 1947," *The Review of Economics and Statistics,* Vol. 54, No. 2 (May 1952). See also Wassily Leontief, et al., *Studies in the Structure of the American Economy* (New York: Oxford University Press, 1953); National Bureau of Economic Research, *Input-Output Analysis: An Appraisal,* Studies in Income and Wealth, Vol. 18 (Princeton University Press, 1955); National Bureau of Economic Research, *Input-Output Analysis, Technical Supplement,* Conference on Research in Income and Wealth (1954).

[3]Morris R. Goldman, Martin L. Marimont, and Beatrice H. Vaccara, "The Interindustry Structure of the United States," *Survey of Current Business,* Vol. 44, No. 11 (November 1964); National Economics Division Staff, "The Transactions Table of the 1958 Input-Output Study and Revised Direct and Total Requirements Data," *Survey of Current Business,* Vol. 45, No. 9 (September 1965); Norman Frumkin, "Construction Activity in the 1958 Input-Output Study," *Survey of Current Business,* Vol. 45, No. 5 (May 1965); Nancy W. Simon, "Personal Consumption Expenditures in the 1958 Input-Output Study," *Survey of Current Business,* Vol. 45, No. 10 (October 1965); Office of Business Economics, "Additional Industry Detail for the 1958 Input-Output Study," *Survey of Current Business,* Vol. 46, No. 4 (April 1966).

[4]Wassily W. Leontief, "The Structure of the U. S. Economy," *Scientific American,* Vol. 212, No. 4 (April 1965) contains $600 billion gross flows table; the $750 billion table supplement is available from the publishers. The 1966 table has been published by Fortune Marketing Department, *Fortune's Input-Output Portfolio: A Fortune Marketing Service,* Time, Inc. (1967).

1980 have been prepared in connection with forecasts using the input-output framework.[5] The practical application of input-output in the 1960's is particularly evident in its adoption by research organizations, public and private, and business firms. Input-output has caught the flood of interest in quantitative economic analysis and contributes to that tide as impressive results justify expanded usage.[6]

Regional Input-Output Studies

During the past two decades much of the input-output research in the United States has been along regional lines. Following World War II, as Tiebout observed,[7] regional research became almost completely dominated by applications of input-output models. During the 1950's when ". . . the federal government took a vacation from input-output . . ." (in Leontief's words),[8] much of the expertise and manpower shifted to regional applications and problems. An aroused concern (witness the creation of ARA and EDA, its successor) about lagging regional growth and distressed areas demanded improved methods of regional analysis. The application of input-output analysis to regional problems was a prompt and extensive response to this need. It integrates analysis of regional interdependence with internal

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[5]For published projections using the I-O framework see U. S. Department of Labor, Bureau of Labor Statistics, *Projections 1970, Bulletin No. 1536,* U. S. Government Printing Office (1966); Clopper Almon, Jr., *The American Economy to 1975* (Harper & Row, 1966). Professor Almon, now at the University of Maryland, has prepared unpublished projections to 1980. Some commercial applications are summarized in "Input-Output Searches the Future," *Sales Management* (August 1, 1968).

[6]Excellent bibliographies of input-output literature have been prepared by Charlotte E. Taskier of the Harvard Economic Research Project; see *Input-Output Bibliography,* 1955-1960, United Nations, 1961 (ST/STAT/7), *Input-Output Bibliography,* 1960-1963, United Nations, 1964 (ST/STAT/SER.M/39), *Input-Output Bibliography,* 1963-1966, United Nations, 1967 (ST/STAT/SER.M/46).

[7]Charles M. Tiebout, "Regional and Interregional Input-Output Models: An Appraisal," *The Southern Economic Journal,* Vol. XXIV, No. 2 (October 1957).

[8]Scientific American Film, "Input-Output Structure of the American Economy," produced in 1965. This 46-minute movie is a valuable introduction to the concepts and uses of I-O.

industrial interdependence, providing a descriptive framework and a model for the estimation of regional income multipliers. Further, Cumberland points out that the value of the regional input-output framework is enhanced by its capacity to be functionally related to a number of other techniques.[9]

Among the earliest applications of input-output on a regional basis in the United States were "The Eighth District Balance of Trade," published by the Federal Reserve Bank of St. Louis,[10] followed soon by a New England study by Walter Isard,[11] a Utah study by Frederick Moore and J. W. Petersen,[12] a Maryland study by the Bureau of Business Research, University of Maryland,[13] and a California study prepared by Frederick Moore and J. W. Petersen for the Bureau of Mines.[14] Each of these contributed toward the development of techniques for estimating regional interindustry flows. In the late 1950's several investigations were undertaken which pioneered local data collection for measuring regional coefficients.[15]

These early studies have been followed by others in increasing numbers during the 1960's. The present inventory of regional I-O studies contains

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[9]See especially Walter Isard, *Methods of Regional Analysis,* Chapter 7 (The Technology Press of MIT and John Wiley & Sons, 1960).

[10]Guy Freutel, "The Eighth District Balance of Trade," Federal Reserve Bank of St. Louis, *Monthly Review,* Vol. 34, No. 6 (June 1952).

[11]Walter Isard, "Interregional Analysis and Regional Development," *American Economic Review,* Vol. XLIII, No. 2 (May 1953).

[12]Frederick T. Moore and James M. Petersen, "Regional Analysis: An Interindustry Model of Utah," *The Review of Economics and Statistics,* Vol. XXXVII, No. 4 (November 1955).

[13]*A Regional Interindustry Study of Maryland, Studies in Business and Economics,* Vol. 8, No. 2 (September 1954), Bureau of Business and Economic Research, University of Maryland, College Park, Maryland.

[14]Frederick T. Moore and James W. Petersen, "An Interindustry Model of California," *1963 U. S. Bureau of Mines Interindustry Miscellaneous Paper Number 77.*

[15]Cf. Werner Z. Hirsh, "Interindustry Relations of a Metropolitan Area," *The Review of Economics and Statistics,* Vol. XLI, No. 4 (November 1959); C. D. Kirksey, *An Interindustry Study of the Sabine-Neches Area of Texas,* Bureau of Business Research, University of Texas (1959); Werner Hochwald, Herbert E. Striner, and Sidney Soneblum, *Local Impact of Foreign Trade,* National Planning Association, Washington, D.C. (July 1960).

93 separate references to completed regional tables and 30 to studies in progress. Several attempts are under way to resolve the national tables simultaneously into regional dimensions by various approximating techniques.[16]

Problems of Regional Input-Output Tables

While the transition from national to regional input-output has been prompt and extensive, interindustry applications at the local level have been marked by a diversity of methods and unevenness in quality. The appeal of the format and usefulness of the results are evident in its widespread usage; but there is also a disturbing lack of orderly development or progression in the advancement of regional input-output techniques, both empirically and conceptually, which is only partially attributable to the number of variations in form which such studies may assume or purposes to be served.

Most implementation problems in the construction of the input-output tables can be traced to data difficulties. This is especially true for regional studies conducted as one-shot investigations for which even secondary data must be "discovered." Pertinent data are published in quantity for regions, states, counties, and cities; in fact, the abundance of data, collected by all levels of government, commissions, trade associations, business advisory services, and the like can be overwhelming. One problem is to acquire, evaluate, and assimilate the available information. Perhaps an evaluation, industry by industry, of the data which are fairly universally available for states should be made; this could take the form of an inventory and an appraisal of the appropriateness of area data as control totals or for their value in describing the structure of inputs or outputs. However, because economic journals are not prone, and perhaps not a suitable vehicle, to publish quite narrowly specialized reports, there would be a problem of how to get this distributed. There is no "information central" to assume that distribution role. Moreover, this would presume that there are some agreements in principle on the concepts to be measured. We believe this to be so, although we are not so certain that the rationale behind areas of agreement has yet been articulated.

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[16]Note especially the work of the Harvard Economic Research Project and the CONSAD Corporation.

On the other hand, there is the more literal aspect of data inadequacy: the absence of data relevant to regional input-output studies. While there are some useful data for control totals, and for some industries fragmentary data on inputs or sales distribution, appropriate data on the locational distribution of procurement are virtually nil. To overcome these gaps, major primary data collection efforts may have to be undertaken. Quite a number of studies have used field work, utilizing mail questionnaires and personal interviews, to estimate coefficients and the regional distribution of inputs and outputs. The alternative has been a mechanical formula for reducing national data to regional implications.

These are not new data problems in empirical research. However, there is another data problem of a more conceptual nature in constructing regional input-output tables: the difficulty in defining the properties of the variables to be measured. The concept to be measured must be defined operationally.

As an illustration, consider the definition of the output of a regional industry in which the activities of the resources engaged therein are not confined by the regional geographic borders. Examples which come to mind are the fishing industry of a region in which the fleet operates in local waters and in foreign ports, or the transportation industry which has mobile resources. The definitional difficulties concern: What constitutes a region? What are the resources of a region? What is the location of the region's activities? And finally, what is the meaning of exports and imports?

There is no need to start *de novo*, for the framework of national social accounting, including national input-output accounting, provides an established conceptual design for the measurement of economic activity. Regional studies which lock into these concepts may then be compared to national aggregates, or with other regions, using the same principles. The difficulty in doing so is that the conventions of national social accounting have not been extended to the regional level;[17] furthermore, the national accounting principles themselves are not really well-known beyond a small circle of

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[17]An initial foray into some added complications is made by Richard Ruggles and Nancy D. Ruggles in "Regional Breakdown of National Economic Accounts," Chapter 5 of *Design of Regional Accounts*, Werner Hochwald, Editor (Baltimore: The Johns Hopkins Press, 1961). See also: "Conceptual Issues of Regional Income Estimation" by Werner Hochwald, in *Regional Income*, Conference on Research In Income and Wealth, Vol. 21, National Bureau of Economic Research (1957).

experts most closely involved in national income estimation. Even the principles of input-output accounting underlying the U. S. tables for 1958 have not yet been published in detail.[18]

The difficulties of statistical estimation in input-output studies are quite real, of course, and we do not suggest otherwise. Despite very numerous studies which have already been undertaken and published, there appears even yet very small progress in testing procedures and concepts which could make succeeding studies less arduous. Many regional input-output studies are published with insufficient documentation to provide an adequate basis for detailed evaluation, and few studies attempt to focus upon the details of statistical measurement in their reports.[19] Consequently, there is much less profiting from the mistakes and ingenuity of others, and each new undertaking tends to start from the same initial technical base as the preceding. The Simon Kuznets of regional income accounting has yet to arrive on the scene!

It is little wonder, then, that regional input-output studies which adapt national coefficients and adjust national control totals to a region are rather widely employed. Indeed, these were the techniques of the pioneering regional input-output studies of the early 1950's. This approach requires a minimum of local data. The ratio of local to national employment applied to national industry outputs provides estimates of local control totals if local production statistics are not available. National coefficients are assumed to apply to the region. Internal interindustry transactions are estimated by assuming that the outputs of industries within the region first serve regional input requirements. Regional exports or

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[18]The publications in the *Survey of Current Business* cited in footnote 3 are generally limited to a broad statement of concept and are not documentation or explanation in technical detail. Those engaged in regional input-output studies, attempting to follow the precedence of the national studies, will find some additional guidelines in *Industry Description Appendix to Input-Output Study - 1958*, U. S. Department of Commerce, Office of Business Economics (November 1964). There is not yet any statement in detail describing the current national tables comparable to *Input-Output Analysis, Technical Supplement*, published by the National Bureau of Economic Research, Inc., which details the methods of the 1947 U. S. input-output effort.

[19]The excellent documentation of the Philadelphia study by Professor Isard, et al. is one of several detailed investigations from which others will find guidance.

imports are then the residual of regional production of the ith good and regional demand for that good.

This view of the ~~work~~ world asserts that the only meaningful difference between regions is industry mix. It is a viewpoint which is both theoretically and empirically invalid, but the extent to which that model fails to reflect reality has not yet been tested. The problems of conceptualization and measurement at the regional level are circumvented by this approach, but the trade-off is an uncertain margin of error. There may also be a certain loss of relevance, since the estimated interindustry transactions of the region have no observed counterpart. We have no basis for appraising the worth of regional input-output models so constructed for policy purposes. As a research tool for testing hypotheses about regional behavior and development, the assumptions of the model severely restrict the value of the estimates.[20]

Primary type input-output studies for regions -- those which rely on surveys and published information for their data -- are themselves not altogether without blemish. Reference has already been made to several statistical problems and definitional weaknesses concerning the properties to be measured. In view of these shortcomings, it is impossible to demonstrate that the results of primary-type regional input-output coefficients are more accurate than national coefficients applied to regions.

Several attempts have been made to compare national coefficients with the technical coefficients derived from the Washington Input-Output Study for 1963.[21] The presumption is that if the coefficients (a_{ij}'s) of the two sets of data were similar, at least one of the alleged shortcomings of the use of national coefficients for regions -- namely, the assumption of uniform technical coefficients -- would not be as important.

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[20]The much greater industrial disaggregation of the 1963 national input-output study, when it becomes available, may be expected to lead to more widespread application of national coefficients for regional input-output studies. The assumptions of uniform methods of production, zero cross-hauling, and a fixed proportionality between national control totals and some regional variates still apply.

[21]Stanislaw Czamanski, "Applicability and Limitations in the Use of National Input-Output Tables for Regional Studies," a draft prepared for the Regional Science Association Meetings (November 1968); William A. Schaffer and Kong Chu, "Non-Survey Techniques for Constructing Regional Interindustry Models," *Georgia Institute of Technology Discussion Paper 9* (November 1968).

We think it is a fair interpretation of these investigations to say that the results are indecisive; however, the matrices are conceptually so different that any conclusions would be suspect. In the first place, the Washington study covered 1963; the national study was for 1958. Industrial categories were different and could not be accurately matched. Also, secondary products and central offices were not treated in the same manner. Nationally, foreign imports were separated into competitive and noncompetitive imports; the Washington study did not separate foreign imports by these categories. Certainly there are other differences, but without the detailed definitions and concepts of each study, "real" differences and likenesses in the coefficients cannot be identified. Even in regional studies using primary data, there is some inevitable borrowing of national coefficients!

There are, as we have attempted to suggest, a number of methodological and procedural ambiguities in the quantitative aspects of regional input-output studies. Until these come under microscopic review, applied studies will have a great deal of "messiness" about them, with shadowy empirical foundations. These criticisms notwithstanding, there are still valid applications of regional input-output analysis, and meritorious empirical work predominates in this field. Our concern is that needed developmental work may be side-tracked or that creative solutions may fail to surface through the mass of quantitative analysis.

The Model Structure of Regional Input-Output Studies

Regional I-O studies may be classified according to the type of regional-industrial flow relationships they purport to describe. By model, in this context, we mean the properties of the accounts rather than the theory used to explain their behavior, although we recognize that the latter does (or should) determine the way the accounts are organized. Lack of standard terminology frequently gives rise to communications difficulties since the term "regional input-output" covers a number of variant models with decidedly different structural characteristics.

Regional Technical Flows Tables

Regional studies which must closely correspond in design to the national input-output tables are those which show, for each regional industry, the amounts (or proportions) of inputs used in the production of output by each industry of a region. Tables of this type essentially involve regionalization of the national input-output tables; they have been designated descriptively as intranational input-output tables. We prefer to call them regional technical flows tables. This recognizes their conceptual similarity to the national tables, which are also called technical tables. Without joining the debate concerning the theory of "required" inputs, we note the concept of technically-determined relationships is the same at the national and regional levels.

Notationally, we think it is useful to retain the expression a_{ij} for national technical coefficients and $_{r}a_{ij}$ for their regional counterparts. This will avoid confusion with local input coefficients which are based on rather different behavioral propositions. In the familiar input equation

$$_{r}X_{j} = \sum^{n} {}_{r}a_{ij}\ {}_{r}X_{j} + {}_{r}VA_{j},$$

$$i,j, = 1...n$$

subscripts are added to specify regional dimensions.

Information about regional technical structure has several applications. The dollar flows of the region may be compared with those of other regions or with the nation in order to make comparisons of magnitudes. It can provide answers to questions along the following lines: how much steel, what lumber, shoes, etc. are purchased in this region in comparison with another, or in comparison to national usage? Regional technical coefficients may be compared to assess differences or similarities in production processes. Used in conjunction with an intraregional trade flows matrix (see next section), the regional technical flow and coefficient tables have greatly enhanced value, since imports may be estimated. These in turn provide a basis for estimating interregional dependencies in a multiregional input-output system.

Unlike the national technical coefficients table, the regional technical coefficients matrix does not have an interpretable inverse. It is not quite

true that the inverse would describe the direct and indirect effects upon the output of the nation's industries to support a final demand change for the output of the ith industry in the rth region. To the extent the rth region draws upon other areas for sources of inputs, it is the technical structure of production in other supply regions which dictates the indirect effects upon the national economy. Without an import matrix, the spillover of interindustry demand to other regions cannot be ascertained. For the same reason the inverse cannot tell us anything about the regional consequences of regional demand changes.

Intraregional Interindustry Flows Table

Regional input-output tables which describe the relationships among industries within the area are intraregional interindustry flows tables. These tables are what the literature most frequently refers to as "regional input-output" tables: the flows are transactions among industries within the region, and the coefficients (r_{ij}) derived therefrom show the internal trade relationships in the region among its industries. Occasionally such tables are described as trade flows or trade coefficients, but their essential feature is a characterization of internal input-output dependencies of a defined geographic area.

Intraregional input-output tables are particularly relevant for area impact analysis and forecasting. The coefficient inverse $(I-R)^{-1}$ shows the direct and indirect effects of regional final demand changes upon industries within the region. The major hypothesis, yet to be tested in applying this matrix for forecasting and impact analysis, is that the intraregional trade coefficients are stable, or if not stable, that the pattern of change can be independently projected. The question of stability concerns its usefulness as a behavioral assumption and is not argued as a theoretically-founded proposition.[22]

Regional input-output tables serve to provide a consistent set of estimates of the industrial connections within a region. As an accounting and descriptive framework, the intraregional gross flows tables provide a basis

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[22]L. N. Moses, "The Stability of Interregional Trading Patterns and Input-Output Analysis," *American Economic Review*, Vol. 45 (December 1955), p. 803.

for regional income and product accounts. They provide a perception of the industrial makeup and linkages of a region at a point in time; with tables for different points, these should be especially useful for analyzing the dynamics of regional economic growth.

Other Regional Input-Output Tables

With a given matrix of technical flows and one of regional flows, a matrix of import flows can be derived by subtraction (A - R = M). This import flows table describes the amounts of goods and services each industry in the region purchases from each industry outside the region. Imports by industry may be identified by regional source, industrial source, or both. Import coefficients may be calculated from the interregional flows.

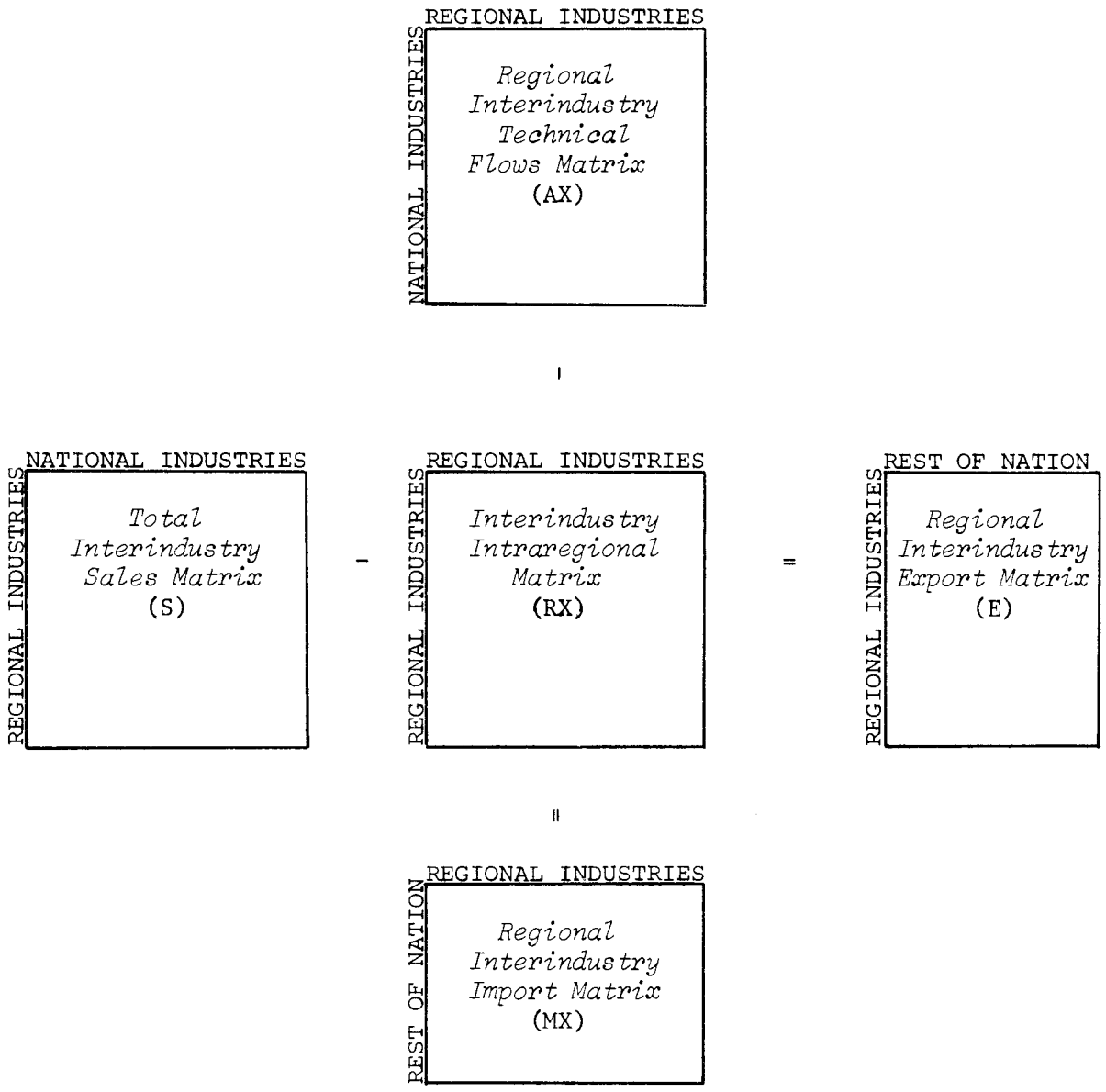
The final demand sectors of regional input-output tables usually identify components of final use to facilitate estimation of gross regional product (GRP). Usually a sizable export sector is found, and it has theoretical significance if an export base-oriented analysis is applied. While regional exports are often represented as a column vector of final demand in a regional table, it can be disaggregated into a matrix identifying the using sectors outside the region. Such a matrix shows the industrial origin of output from the exporting region and the industrial or final user in the receiving region. The receiving industries, in turn, may be regionally identified.

This export matrix describes the industrial/regional markets served by the region's exports. Such exports are also the imports of other regions. These exports, then, can be expressed as import coefficients for the receiving industries. This coefficient matrix is, in effect, a "shares" matrix from the viewpoint of the exporting region: it describes how much of the inputs that region supplies in relation to the outputs in the receiving region(s). These linkages -- exports of one region as imports of another -- are pivotal connective data for the development of multiregional models of economic interdependence and interregional forecasts. The stability of this shares matrix is a premise along with the stability of other regional coefficients.

Figure I shows various input-output flows tables that would be developed in a comprehensive regional study. Corresponding coefficient tables would be

Figure I

INTERINDUSTRY FLOW TABLES IN REGIONAL INPUT-OUTPUT STUDY



calculated for each dollar flows table. An inverse table, which shows direct and induced industrial flows associated with final demand changes, can be computed from the intraregional direct (R) coefficient matrix. Other inverses can be calculated if the system is closed by making certain GRP vectors endogenous. Local consumption expenditures may be included in the inverse computation to capture income multiplier effects generated by the consumer sector. The disaggregated consumption function may be modified to reflect alternative behavior patterns of expenditure implied by alternative theories of consumer behavior.

Most input-output studies concentrate on the intraregional coefficient matrix which, when inverted, provides estimates of the impact effects of changes in final demand. Depending on the anticipated uses of the study, export, technical, or import matrices may be developed. All have certain analytical and predictive values. Development of these additional matrices can provide an alternative estimation and a check of consistency since:

$$RX = AX - MX$$
$$RX = S - E .$$

Additional breakouts are possible to enhance the descriptive value of the framework. For example, imports can be divided into imports from the rest of the nation and imports from foreign sources.[23]

The Final Demand Sectors

The components of final demand are invariably the most difficult portions of empirical input-output studies. If final demands are to represent more than a disaggregation of national final demand by region, then data on the locational source of production of goods purchased by final users are essential. Such data are not ordinarily available, and even surveys of final demand sectors are not ordinarily possible.[24] However, estimates of final demand met by regional industries can be generated by primary data type surveys of the markets serviced by regional producers. This is one of the advantages of the "rows" method of implementing regional input studies.

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[23] *Ibid.*

[24] The Boulder study by Miernyk used intensive household sampling; this is beyond the resources of most studies.

It is important in this approach for sellers to separate capital goods markets from current consumption goods.[25]

Some input-output studies define the categories of final demand to correspond closely with major divisions of the GNP expenditure accounts. There is no fixed sectoring of the final demand elements, just as there is no universal practice in respect to the classification of industries included in the coefficient matrix. Final demand components are basically a separation of exogenous activities from the interindustry transactions in the invertible form of the matrix. For various intended analyses and policy formulation problems, the components of final demand may be further subdivided.

The Inventory of Input-Output Studies

This inventory is a compilation of that portion of the regional input-output literature which contains studies for regions, states, or smaller areas of the United States. The collection is confined to those completed studies or studies in progress which have (or will have) inverted matrices for a region. The inventory is arranged alphabetically by state, with multistate areas appearing at the end of each list. The purpose of this inventory is to make available a reference which would provide a ready index to the increasing number of regional studies being conducted in the United States.

The following bibliographies relevant to regional input-output analysis were most helpful:

Isard, Walter, *Methods of Regional Analysis: An Introduction to Regional Science* (Cambridge, Mass.: The M.I.T. Press, 1960), Chapter 8.

Riley, Vera and Allen, Robert Loring, *Interindustry Economic Studies,* Bibliographic Reference Series No. 4, Operations Research Office (Baltimore, Maryland: Johns Hopkins University Press, 1955).

Taskier, C. E., *Input-Output Bibliography 1955-1960,* New York, N.Y., United Nations, 1961 ST/STAT/7.

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[25]This means that sellers must evaluate the purpose to which buyers will apply their purchases. It is the use, not the form, which dictates whether a transaction is a flow or a capital type. Sales of "engines" may represent current inputs in aircraft production but capital acquisitions on farms.

United Nations Department of Economic and Social Affairs, *Input-Output Bibliography 1960-1963*, New York, N.Y., United Nations, Statistical Papers Series M, No. 39, 1964.

United Nations Department of Economic and Social Affairs, *Input-Output Bibliography 1963-1966*, New York, N.Y., United Nations, Statistical Papers Series M, No. 46, 1967.

American Economic Association, *Index of Economic Journals* (Homewood, Illinois: Richard D. Irwin, Inc.), Vols. 1-7.

In addition to the sources cited above, a canvass of Bureaus of Business and Economic Research, state economic and planning agencies, and regional Federal Reserve Banks was undertaken during 1968-1969 to uncover additional studies, particularly those recently completed or in progress since the first edition of this inventory in 1967. Many studies were brought to our attention informally by other researchers working in the area. We are grateful for the assistance and encouragement we have received from many people, but there are undoubtedly some significant omissions or corrections which we hope our readers will bring to our attention.

Our objective has been to compile an inventory of regional I-O studies within the United States which have substantive empirical content. The "theoretical" literature related to model building or statistical analysis is deliberately excluded. Also excluded from the inventory are interpretive or policy-oriented reports, unless these include previously uncited tables. Even thus restricted, the lengthy list of I-O regional studies attests to the widespread and expanding use of input-output techniques in regional research. Hopefully, this inventory will make easier the communication of ideas and practices which will make future research in this direction more effective.

Regional United States

Input-Output Studies Inventory

PART I: COMPLETED STUDIES

Base Year		*Number of Sectors*
	ALABAMA: MOBILE COUNTY	
1951	Hochwald, Werner, Striner, Herbert E., and Sonenblum, Sidney *Statistical Results of the Kalamazoo and Mobile County Analyses* (Technical Supplement to *Local Impact of Foreign Trade*), National Planning Association, Washington, D.C., July, 1960.	26
	STATE OF ALASKA	
1963, 1964	Haring, Robert C. *The Alaska Interindustry Relations Study, 1963-1964*, forthcoming.	24
	ALASKA: FAIRBANKS	
1965	*Economic Base of the Fairbanks North Star Borough, Alaska*, University of Alaska SEG Report 14, June, 1967.	12
	STATE OF ARIZONA	
1958	Martin, William E., and Bower, Leonard G. "Input-Output Analysis: An Arizona Model," *The Arizona Review*, February, 1967, Vol. 16, No. 2.	10
1958	Tijoriwala, Anilkumar G., Martin, William E., and Bower, Leonard G. *The Structure of the Arizona Economy: Output Interrelationships and Their Effects on Water and Labor Requirements, Part 1*, Arizona Agricultural Experiment Station Technical Bulletin 180, The University of Arizona, November, 1968.	37
	The Structure of the Arizona Economy: Output Interrelationships and Their Effects on Water and Labor Requirements, Part 2, File Report 68-1, Department of Agricultural Economics, The University of Arizona, April, 1968.	

STATE OF CALIFORNIA

1958	Lofting, E. M. *Economic Evaluation of Water, Part IV: An Input-Output and Linear Programming Analysis of California Water Requirements*, U. C. Water Resources Center Contribution No. 116, Berkeley, Sanitary Engineering Research Laboratory, University of California.	82
1947	Lofting, E. M., and McGauhey, P. H. *Economic Evaluation of Water, Part III: An Interindustry Analysis of the California Water Economy*, U. C. Water Resources, Center Contribution No. 67, Berkeley, Sanitary Engineering Research Laboratory, University of California, January, 1963.	
1954	Martin, William E., and Carter, Harold O. *A California Interindustry Analysis Emphasizing Agriculture, Part 1 and 2*, California Agricultural Experiment Station, Giannini Foundation of Agricultural Economics, Giannini Foundation Research Report No. 250, February, 1962.	37
1947	Moore, Fred, and Peterson, James "An Interindustry Model of California," U.S. Bureau of Mines, Interindustry Miscellaneous Paper Number 77, 1953.	63
1960	Tiebout, Charles M., and Hansen, W. Lee *An Intersectoral Flows Analysis of the California Economy*, University of Washington, Seattle, Washington, Reprint No. 2, 1964. Reprinted from the *Review of Economics and Statistics*, Vol. XIV, No. 4, November, 1963.	31
1954	Zusman, Pinhas, and Hoch, Irving *Resource and Capital Requirements Matrices for the California Economy*, California Agricultural Experiment Station, Giannini Foundation of Agricultural Economics, Research Report 284, August, 1965.	37

CALIFORNIA: SAN BENITO COUNTY

1961 — Rao, Ananda S., and Allee, David J. *An Application of Interindustry Analysis to San Benito County, California*, California Agricultural Experiment Station, Giannini Foundation of Agricultural Economics, Giannini Foundation Research Report No. 278, September, 1964. — 7

CALIFORNIA: SAN DIEGO COUNTY

1965 — Tjersland, Tore, and Chu, Kong *Input-Output or Base Economic Model of San Diego County* (Abstract, 1966). — 30

CALIFORNIA: SAN DIEGO COUNTY

1968 — Tjersland, Tore "New Data on San Diego Economy" *The Union Tribune Index*, Vol. XIX, No. 7 (Copley Newspapers, P. O. Box 1530, LaJolla, California 92038). — 22

CALIFORNIA: STOCKTON

1962 — Arthur D. Little, Inc. (Hendricks, Francis) *The Metropolitan Stockton Economy*, The Department of City Planning, Stockton, California (undated, probably 1964). — 18

COLORADO: BOULDER

1963 — Miernyk, William, and others *Impact of the Space Program on a Local Economy*, Morgantown, West Virginia, West Virginia University Library. — 40

COLORADO: COLORADO RIVER BASIN

1960 — Miernyk, William, and Udis, Bernard Input-Output Tables for the *Colorado River Basin Study* (Six subbasins), dated December 20, 1963. — 21

STATE OF CONNECTICUT

1963 — Thompson, John M., Jr. *The Socio-Economic Growth Model*, P-42, Staff Paper #223D (undated) State of Connecticut, Connecticut Interregional Planning Program, State Office Building, Hartford, Conn. Also a memo from C. L. Leven to Carl Veazie (dated August 5, 1965) which includes the tables. — 24

STATE OF HAWAII

1960-1965 — *Patterns of Economic Growth: The State Economic Model*, State of Hawaii General Plan Revision Program, Part 3, Honolulu, Hawaii, 1967. (A two region model.) — 19

HAWAII: OAHU

1960 — McClure, George E. *A Study of the Economy of Oahu*. Manual 4, Oahu Transportation Study, Ft. Ruger, Honolulu, Hawaii, September, 1964. — 57

STATE OF IDAHO

1963 — Peterson, R. D., and Wykstra, R. A. "A Provisional Input-Output Study of Idaho's Economy," *University of Washington Business Review*, Winter, 1968, Vol. XXVII, No. 2. — 20

1963 — Peterson, R. D. *Economic Structure of Idaho: A Provisional Input-Output Study*, Moscow, Idaho: College of Business Administration, University of Idaho, Idaho BBER Research Report No. 12, July, 1968. — 20

ILLINOIS: CHICAGO

1947 — Hoch, Irving *Forecasting Economic Activity in the Chicago Region: A Progress Report*, No. 119, May 10, 1957, Chicago Area Transportation Study, Chicago, Illinois. See also *Forecasting Economic Activity for the Chicago Region: Final Report*, No. 48, May 15, 1959, Chicago Area Transportation Study, Chicago, Illinois. — 50

ILLINOIS: DAVENPORT-ROCK ISLAND-MOLINE

1963 — *The Economic Potential of the Davenport-Rock Island-Moline Metropolitan Area, A First Report*, prepared for Moline Plan Commission by City of Moline. Illinois Planning and Zoning Department Comprehensive Plan Office, January, 1965. — 35

STATE OF IOWA

1954 — Maki, Wilbur R. — 33
Projections of Iowa's Economy and People in 1974, Special Report No. 41, Agricultural and Home Economics Experiment Station, Iowa State University of Science and Technology, Ames, Iowa, January, 1965.

1954 — Maki, Wilbur R., Suttor, Richard E., and Barnard, Jerald — 18
Simulation of Regional Produce and Income With Emphasis on Iowa, 1954-1974. Special Report No. 41, Agricultural and Home Economics Experiment Station, Iowa State University of Science and Technology, Research Bulletin 548, September, 1966.

1960 — Barnard, Jerald R. — 14
Design and Use of Social Accounting Systems in State Development Planning, Bureau of Business and Economic Research, The University of Iowa, Iowa City, 1967.

IOWA: SIOUX CITY

1958 — Leven, Charles L. — 12
"Regional Income and Product Accounts: Construction and Applications," *Design of Regional Accounts*, Werner Hochwald, Editor, The Johns Hopkins Press, Baltimore (1961).

STATE OF KANSAS

1965 — Emerson, Jarvin — 75
Kansas Interindustry Study, Topeka: State of Kansas, 1969.

KENTUCKY: EAST KENTUCKY

1958 — Baird, Robert N. — 39
Interindustry Analysis in Appalachia: A Demonstration for East Kentucky. Western Reserve University, Cleveland, Ohio. (Multilithed)

LOUISIANA: NEW ORLEANS

1963 — Faucett, Jack, and Kelleher, Grace J. — 79
Economic Relationships in the New Orleans Metropolitan Area, Arlington, Virginia, Institute for Defense Analysis, July, 1967.

MAINE: BANGOR

1963 — Clark, David H., and Coupe, John D. *The Bangor Area Economy, Its Present and Future*, College of Business Administration, University of Maine, Orono, March, 1967. — 22

MAINE: PRESQUE ISLE

1963 — Elias, Shirley. *A Microregional Input-Output Model of the Presque Isle Area.* M. A. Thesis, University of Maine, 1967. — 17

STATE OF MARYLAND

1947 — *A Regional Interindustry Study of Maryland.* Studies in Business and Economics, Vol. 8, No. 2, September, 1954. Bureau of Business and Economic Research, University of Maryland, College Park, Maryland. — 32

MASSACHUSETTS: BOSTON SMSA

1958 — Isard, Walter, Romanoff, Eliahu, and Alspach, Lucy
Technical Reports Issued:
No. 1--*Reconciliation of Industrial Classification Used by the Massachusetts Department of Labor and Industries and the Standard Industrial Classification Developed by the Office of Statistical Standards, U.S. Bureau of the Budget.*
No. 2--*Estimates of Key Coefficients for the Manufacturing Industries.*
No. 3--*Derived Input-Output Coefficients: 1958: First Steps Toward Regional Input-Output Standardization.*
Boston Regional Science Project, Regional Science Research Institute, Cambridge, Massachusetts.

MASSACHUSETTS: BOSTON SMSA

1963 — Isard, Walter, Romanoff, Eliahu, and Tschannerl, Gerhard
Technical Reports Issued:
No. 4--*A Method for Estimating Technical Coefficients in Accordance With Their Rank.*

No. 5--*Water Utilization: Input-Output Coefficients.*
No. 6--*Water Use and Water Pollution Coefficients: Preliminary Report.*
No. 7--*The Printing and Publishing Industries of the Boston SMSA: 1963; and Comparison With the Corresponding Philadelphia Industries.*
Boston Regional Science Project, Regional Science Research Institute, Cambridge, Massachusetts.

MICHIGAN: KALAMAZOO

1954 — Smith, Harold T. — 63
The Kalamazoo County Economy. The W. E. Upjohn Institute for Employment Research Kalamazoo, Michigan, April, 1960. (Also Technical Supplement C, "Kalamazoo and Mobile County Survey Questionnaires," National Planning Association, Washington, D.C.)

MICHIGAN: LANSING TRI-COUNTY AREA

1958 — *Economic and Population Base Study of the Lansing Tri-County Area, An Inter-industry Relations Analysis.* Sponsored by the Tri-County Regional Planning Commission, Bureau of Business and Economic Research, College of Business and Public Service, Michigan State University, East Lansing, Michigan, 1960. — 30

MINNESOTA: ITASCA COUNTY

1966 — Hughes, Jay M. — 35
The Itasca County Input-Output Study, paper presented at the Spring Meeting, 1969, Mid-Continent Section, Regional Science Association, Minneapolis. (Mimeographed).

STATE OF MISSISSIPPI

1961 — Carden, John G. D., and Whittington, F. B., Jr. — 58
Studies in the Economic Structure of the State of Mississippi, Vol. 1 and 2. Mississippi Industrial and Technological Research Commission, Jackson State Department of Commerce, 1964.

STATE OF MISSOURI

1958 — Harmston, Floyd K. and Monroe, Claude E. *The Interindustry Structure of Missouri, 1958*, Missouri Economy Study No. 10, Research Center, School of Business and Public Administration, University of Missouri, 1967. — 39

MISSOURI: ST. LOUIS

1955 — Hirsch, Werner Z. "Interindustry Relations of a Metropolitan Area," *The Review of Economics and Statistics*, Vol. 12, No. 4, November, 1959. — 33

1967 — Liu, Ben-chieh *Interindustrial Structure Analysis: An Input-Output Study of the St. Louis Region, 1967*, St. Louis: St. Louis Regional Development Corporation, 1968. — 23

STATE OF MONTANA

1963 — Hoff, Theodore A. *The Structure of the Montana Economy: An Input-Output Study* (Bozeman: Montana State University Press, 1969). — 12

STATE OF NEBRASKA

1963 — Roesler, T. W., Lamphear, F. C., and Beveridge, M. D. *The Economic Impact of Irrigated Agriculture on the Economy of Nebraska*, Lincoln: Bureau of Business Research, University of Nebraska, Nebraska Economic and Business Reports No. 4. — 28

STATE OF NEW MEXICO

1960 — Blumenfeld, Arthur A., and others *A Preview of the Input-Output Study*. A New Mexico Business Reprint. October, 1965. — 50

See also:
Lindberg, Carolyn D.
New Mexico's Imports and Exports, a New Mexico Business Reprint, September, 1966.

Lindberg, Carolyn D.
A Technical Supplement to the Input-Output Study for New Mexico, Bureau of Business Research, The University of New Mexico, September, 1966.

Sandoval, A. David
"An Interindustry Study of the New Mexico Economy," *New Mexico Business*, May, 1968, Vol. 21, No. 5.

NEW YORK: BROOM COUNTY

1966 — Hinman, R. C. — 15
The Economic Impact of Reservoir Recreation on the Whitney Point Micro-region of New York State, M.S. Thesis, Cornell University, 1967.

NEW YORK: FULTON COUNTY

1954 — Goldwasser, Betti — 21
Report on Fulton County, *Local Impact of Foreign Trade*, National Planning Association, Washington, D.C., July, 1960.

NEW YORK: LONG ISLAND

1963 — Morton, David, and Allee, David — 19
Presentation of the I-O Table for the Calendar Year 1963 Portion of the Economic Study for the Southhold Town Planning Board, Village of Greenport Planning Board, Southhold Town, Long Island, New York, Ithaca, Cornell University, 1966.

NEW YORK: NEW YORK METROPOLITAN AREA

1954 — Berman, Barbara R., Chinitz, Benjamin, and Hoover, Edgar M. — 43
Projections of a Metropolis. Technical Supplement to the New York Region Study, Harvard University Press, Cambridge, Massachusetts, 1960.

NEW YORK: UTICA COUNTY

1966 — Kelter, Robert J. — 37
An Interindustry Analysis of the Central New York Region, Agricultural Economics Research 257, Ithaca: Department of Agricultural Economics, Cornell University, 1968.

NORTH CAROLINA: ASHEVILLE

1960 — Economic Research Service, U.S. Department of Agriculture — 34
Evaluating the Economic Structure of a Rural Area, ERS-386, Washington, D.C., (March, 1969).

NORTH CAROLINA: NORTHERN TIDEWATER AREA

1954 — Ram, Peretz — 7
"An Input-Output Analysis of a Small Homogeneous Agricultural Area," *Journal of Farm Economics*, Vol. 40, No. 5, December, 1958.

STATE OF NORTH DAKOTA

1964 — Bartch, Bruce L. — 30
North Dakota Economic Development Commission, *An Analysis of Interindustry and Intercommunity Relationships in South Western North Dakota.* M.A. Thesis, North Dakota State University, 1966.

1964 — Sand, Larry D. — 30
Analysis of Effects of Income Changes of Intersectoral and Intercommunity Economic Structure. M.A. Thesis, North Dakota State University, 1966.

STATE OF OHIO

1958 — Yocum, James C., and others — 25
The Columbus Area Economy: Structure and Growth, 1950-1985, The Ohio State University Bureau of Business Research, Monograph No. 126. (Input-Output is in Volume I.)

STATE OF OKLAHOMA

1959 — Little, Charles H., and Docksen, Gerald A. — 15
An Input-Output Analysis of Oklahoma's Economy, Technical Bulletin T-124, Oklahoma Agricultural Experiment Station, February, 1968.

STATE OF OREGON

1963 — Allen, Robert Loring, and Watson, Donald A. — 33
The Structure of the Oregon Economy: An Input-Output Study, Bureau of Business and Economic Research, University of Oregon, Eugene, Oregon, 1965.

1963 — Watson, Donald A., and Allen, Robert L. — 68
Oregon Economic and Trade Structure, Bureau of Business and Economic Research, University of Oregon, Eugene, Oregon, 1969.

OREGON: GRANT COUNTY

1963 — Bromley, D. W., Blanch, G.E., and Stoevener, H. H. — 14
Effects of Selected Changes in Federal Land Use on a Rural Economy. Oregon State University Agricultural Experiment Station, Bulletin 604 (March, 1968). Corvallis, Oregon.

OREGON: YAQUINA BAY AREA

1963 — Stoevener, H. H., and Sokoloski, A. A. — 18
"Estimation of the Magnitude and Distribution of Benefits from Recreational Resource Management in the Economy of a Small Area," *Proceedings* of the Committee on Range Use and Development of the Western Agricultural Economics Research Council; see also Sokoloski, Adam A., "Externalities and Empiricism in Water Resources," *Journal of Agricultural Economics,* Vol. 49, No. 5 (December, 1967).

PENNSYLVANIA: CAMERON COUNTY

1960 — Gamble, Hays B., and Glass, Janet H. — 29
The Economic Structure of Cameron County, Pennsylvania, Research Publication 53, Institute for Research on Land and Water Resources, The Pennsylvania State University, 1967.

PENNSYLVANIA: CLINTON COUNTY

1963 — Gamble, Hays B., and Raphael, David L. — 15; 58
A Microregional Analysis of Clinton County, Pennsylvania. Vol. 1 and Vol. 2, The Pennsylvania Regional Analysis Group. The Pennsylvania State University, University Park, Pennsylvania, February, 1965.

PENNSYLVANIA: PITTSBURGH

1956-1957 — Longini, Arthur — 450
Region of Opportunity: Industrial Potential Along the Pittsburgh-Youngstown Axis, The Pittsburgh and Lake Erie Railroad Company, 1961.

1960 — Pittsburgh Regional Planning Association, *Economic Study of the Pittsburgh Region,* Volume 3, "Region With a Future," Pittsburgh, University of Pittsburgh Press, 1963. — 21

PENNSYLVANIA: PHILADELPHIA

1959	Isard, Walter, Langford, Thomas W., and Romanoff, Eliahu *Philadelphia Region Input-Output Study*, Regional Science Research Institute, 1966, Vol. 1 and 2 and 3.	510
1958	Weskott, James *Employment Multipliers for the Philadelphia Metropolitan Area.* Federal Reserve Bank of Philadelphia. July, 1966.	79

PENNSYLVANIA: SULLIVAN COUNTY

1962	Gamble, Hays B. *The Economic Structure of Sullivan County, Pennsylvania,* Bulletin 743, College of Agriculture, The Pennsylvania State University, 1967.	29

RHODE ISLAND: PROVIDENCE

1963	Smith, Caleb, and Moody, Dale *Economic Relations in the Providence, Rhode Island, Metropolitan Area,* Arlington, Virginia: Institute for Defence Analysis, Program Analysis Division, January, 1968.	86

STATE OF TENNESSEE

	Lee, Tong Hun, Moore, John R., and Lewis, David P. *A Report on the Tennessee Interindustry Study,* Knoxville, Tennessee: Center for Business and Economic Research, The University of Tennessee, December, 1967.	60
	Moore, John R. "An Input-Output Study for Tennessee," *Tennessee Business,* March, 1965, Vol. IX, No. 1.	60

TENNESSEE: DAVIDSON COUNTY

1960-1964	Pierce, J. Eugene *Structure of the Nashville Economy.* Center for Business and Economic Research, College of Business Administration, The University of Tennessee, Knoxville, Tennessee (September, 1969).	50

STATE OF TEXAS

1947 May, F. B.
An Interindustry Relations Analysis of the Texas Economy for 1947. Texas, 1957.

TEXAS: RIO GRANDE VALLEY

1963 Williamson, Robert B. 13
The Lower Rio Grande Valley of Texas, Economic Resources and Growth Prospects to 1983-1984, Area Economic Survey No. 27, Bureau of Business Research, University of Texas, Austin, 1966.

TEXAS: SABINE-NECHES AREA

1955 Kirksey, C. C. 13
An Interindustry Study of the Sabine-Neches Area of Texas. Bureau of Business Research, University of Texas, Austin, 1959.

STATE OF UTAH

1963 Bradley, Ivar E. 45
"Utah Interindustry Study: An Input-Output Analysis," *Utah Economic and Business Review,* Volume 27, Number 7, July-August, 1967.

1947 Moore, Frederick T., and Peterson, Tamesh 31
"Regional Analysis: An Interindustry Model of Utah," *The Review of Economics and Statistics,* Vol. XXXVII, No. 4, November, 1955.

STATE OF WASHINGTON

1963 Bourque, Philip J., and others 33
The Washington Economy: An Input-Output Study, Business Studies #3, University of Washington Graduate School of Business Administration, 1967.
See also: Bourque, Philip J., and others: "The Washington Interindustry Study for 1963," *University of Washington Business Review,* Vol. XXV, No. 3, February, 1966.

Bourque, Philip J., and Weeks, Eldon 60
Detailed Input-Output Tables for the Washington Study. Washington State University, Pullman, Washington, September, 1969.

WASHINGTON: PUGET SOUND REGION

1958 — Little, Arthur D., Inc. *Economic Growth of the Puget Sound Region,* Cambridge, Massachusetts: Arthur D. Little, Inc., 1964. — 14

1963 — Tiebout, Charles *Projections: 1980, 2000, 2020: An Economic Study of the Puget Sound and Adjacent Waters Area,* Seattle: Consulting Services Corporation, 1968. — 60

STATE OF WEST VIRGINIA

1965 — Chapman, John H., Jr., and Shellhammer, Kenneth L. *The Structure of the West Virginia Economy, 1965,* a preliminary report, Morgantown, West Virginia: Regional Research Institute, West Virginia University, November, 1967. See also: Miernyk, William H., et al. *Simulating Regional Economic Development,* Regional Research Institute, West Virginia University, Morgantown, West Virginia (June, 1969). — 48

WYOMING: CARBON COUNTY

1959 — Harmston, Floyd K. *A Study of the Resources, People and Economy of Carbon County, Wyoming,* Cheyenne, Wyoming: Wyoming Natural Resources Board, 1962. — 20

WYOMING: EAST CENTRAL

1959 — Harmston, Floyd K., and Lund, Richard E. *A Study of the Resources, People, and Economy of East-Central Wyoming: Platte and Goshen Counties,* Cheyenne, Wyoming: The Wyoming Natural Resources Board, 1963. — 18

WYOMING: SOUTHWESTERN

1959 — Lund, Richard E. *A Study of the Resources, People, and Economy of Southwestern Wyoming,* Cheyenne, Wyoming: The Wyoming Natural Resources Board, 1962. — 26

See also: *An Analysis of Local Economy in a Period of Rapid Transition*, prepared by The University of Wyoming for the Small Business Administration, Washington, D.C. (June, 1962).

WYOMING: TETON COUNTY

1964 — Rajender, G. R., Harmston, Floyd K., and Blood, Dwight M. — 20
A Study of the Resources, People, and Economy of Teton County, Laramie, Wyoming: University of Wyoming, Division of Business and Economic Research, College of Commerce and Industry, 1967.

APPALACHIA

1958 — Baird, Robert N. — 39
Interindustry Analysis in Appalachia: A Demonstration for East Kentucky, Western Reserve University, Cleveland, Ohio. (Multilith).

APPALACHIA

1958-1963 — Research and Development Corporation — 120
Report I: Preliminary Analysis: An Analytical System for the Measurement of Economic Impacts in Appalachia, Washington, D.C., October, 1966.

Report II: Technical Notes: Preparation of an Analytical System for the Measurement of Economic Impacts in Appalachia, Washington, D.C., February, 1968.

Report III: Direct Requirements Matrix.

Report IV: Direct and Indirect Requirements Matrix.

NEW ENGLAND

1947 — Isard, Walter — 49
"Interregional Analysis and Regional Development," *American Economic Review*, Vol. XLIII, No. 2. May, 1953.

1965 — Rorholm, Niels, and others — 13
Economic Impact of Marine Oriented Activities -- A Study of the Southern New England Marine Region, University of Rhode Island, Agricultural Experiment Station, Bulletin 396, 1967.

NORTH CENTRAL STATES

1955	Maki, Wilbur R., and Schreiber, Dean F. *Regional Intersectoral Relations and Demand Projections with Emphasis on the North Central States*, Ames, Iowa: Agricultural and Home Economics Experiment Station, Iowa State University of Science and Technology, Research Bulletin 500, December, 1964.	19

NORTHEAST CORRIDOR

1963	CONSAD Research Corporation *Impact Studies: Northeast Corridor Transportation Project*, Vol. 1, 2, and 3, Pittsburgh: CONSAD Research Corporation, 1967, 1968, and 1969.	10

OHIO RIVER BASIN

1957, 1960	Arthur D. Little, Inc. "Appendix B - Productive Economic Survey," *Ohio River Basin Comprehensive Survey*, Washington, D.C.: U.S. Government Printing Office, 1964.	27

UNITED STATES

1947	Moses, Leon N. "The Stability of Interregional Trading Patterns and Input-Output Analysis," *The American Economic Review*, Vol. XLV, No. 5, December, 1955.	
1963	CONSAD Research Corporation *Regional Federal Procurement Study* (May 15, 1967 draft). Refers to development of 35-industry table for 50 states plus District of Columbia for year 1963 based on national coefficients applied to regional gross output estimates. Appendix C of the draft report presents trade coefficient matrix for New York State as illustrative of the computer printout of direct coefficients found by adjusting the national table according to location quotients.	35

PART II: STUDIES IN PROGRESS

STATE OF ARIZONA

An I-O study for the State of Arizona for 1963 (based on Colorado River Basin Study Coefficients for 1960). Arlyn J. Larsen, Arizona State University.

STATE OF ARIZONA: PUMA COUNTY

An I-O study for Puma County (Tucson) Arizona for 1967 will be completed late in 1969. This study has the feature of regroupable sectors. David Bradwell and Associates, 2550 Telegraph Avenue, Berkeley, California.

STATE OF CALIFORNIA

An I-O study for the State of California 1954, 1963, 1968. Dr. Pinhas Zusman, Department of Agricultural Economics, University of California, Berkeley.

STATE OF IDAHO

An I-O study for the State of Idaho. John McKean, University of Idaho.

STATE OF KENTUCKY

An I-O study for the State of Kentucky using 1958 U.S. technical coefficients and base year 1963. 26 sectors, January 1970 publication. H. K. Charlesworth, University of Kentucky.

MASSACHUSETTS: WORCESTER

An I-O study for the Worcester SMSA. Publication expected June 1970, 30 sectors. Albert J. Sargent, Clark University.

STATE OF MINNESOTA

An I-O study for the state of Minnesota is in the planning stage. John S. Hoyt, Jr., and Dale Dahl, Agricultural Extension Service, University of Minnesota.

MINNESOTA: WEST CENTRAL AREA

An I-O study for 14 counties in West Central Minnesota is in progress for 1967. It is hoped that it will be linked with a future study for the Red River Valley and for the Upper Midwest. Dr. Wilbur Maki, University of Minnesota.

MISSOURI: KANSAS CITY REGION

An I-O study for the Kansas City region will be published in the near future. Mrs. Billie J. Schmidt, Metropolitan Planning Commission, Kansas City, Missouri.

STATE OF MONTANA

An I-O study for 1967 for the State of Montana is under way, updating and expanding the 1963 study done by Theodore Hoff. R. J. McConnen, Montana State University.

NEBRASKA: LINCOLN METROPOLITAN AREA

An I-O study for the Lincoln Metropolitan Area for 1963, 40 sectors, under the direction of the Bureau of Business Research, University of Nebraska.

NEVADA: ELKO COUNTY

An I-O study for Elko County is in progress for 1964. John W. Malone, Jr., Division of Agricultural Economics, University of Nevada.

STATE OF NEW YORK

An I-O study for the State of New York for 1963 is being undertaken under the direction of Philip M. Ritz of the National Planning Association.

NORTH CAROLINA: THIRTY-FIVE EASTERN COUNTIES

An employment-plan I-O study for 35 counties in Eastern North Carolina. Paul Stone, North Carolina State University, Raleigh.

STATE OF NORTH DAKOTA

An I-O study for 10 counties in Northeastern North Dakota. Dr. Thor Hertsgaard, North Dakota State University. This will be a continuing study.

STATE OF OKLAHOMA

An I-O study for the State of Oklahoma divided into three districts in 1959. Gerald Doeksen and Charles H. Little, Oklahoma State University.

OKLAHOMA: OZARKS

An I-O study for the Ozarks Region of Oklahoma for 1964 is in planning stages. Gerald Doeksen, Oklahoma State University.

OKLAHOMA: SOUTHEAST OKLAHOMA

An I-O study for 7 counties in Southeast Oklahoma (the Keddo District under EDA) with anticipated completion, September 1, 1969. Larry Sand, Oklahoma State University.

OREGON: KLAMATH LAKE AREA

An I-O study of the recreational and water quality benefits, with approximately 25 sectors and 1969 as base. H. H. Stoevener, Oregon State University, Agricultural Experiment Station.

PENNSYLVANIA: COUNTY STUDIES

Studies for Centre, and Bradford Counties are under way by the Pennsylvania Regional Analysis Group at Pennsylvania State University. (They have already published studies for Cameron, Clinton, and Sullivan Counties).

PENNSYLVANIA: CITY OF BETHLEHEM

An I-O study for the city of Bethlehem is under way. Warren Pillsbury, Lehigh University. The base year is 1964 and there are 20 sectors.

PENNSYLVANIA: PHILADELPHIA

An I-O study of the Philadelphia SMSA by Walter Isard, et al. (See report cited in Part I of this bibliography).

STATE OF TEXAS

An I-O study for the State of Texas with 7-9 regional models, minimum of 120 sectors, is in the planning stages, with 1970 as target date for the tables, Dr. Herb Grubb, Office of the Governor, State of Texas.

STATE OF VERMONT

An I-O study for the State of Vermont. Abbas Ainasrani and Horace H. Squire, University of Vermont.

STATE OF WASHINGTON

The 1963 study (see Part I) is being updated to 1967. Warren Seyfried, University of Washington.

STATE OF WEST VIRGINIA

An I-O study for the State of West Virginia for 1965. William H. Miernyk and John H. Chapman, Regional Research Institute, West Virginia University. (Preliminary report available.)

MAINE-NEW HAMPSHIRE SEACOAST REGION

The I-O study is due for completion in 1969. Sam Rosen, University of New Hampshire.

MIDWEST

I-O studies for 1958 and 1963 for the West North Central States, Donald Beard, Northern Natural Gas, Omaha, Nebraska.

UNITED STATES

Harvard Economic Research International I-O study of all regions in U.S. for 1947, 1958, 1963. Wassily Leontief and Karen R. Polenske, Harvard University.

COMMONWEALTH OF PUERTO RICO

An I-O study for Puerto Rico following the U.S. Department of Commerce sectoring for 1963 should be completed in 1969. Dr. Miguel Echenitue, Puerto Rico Planning Board.