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DEVELOPMENT OF STATE INTERINDUSTRY MODELS FOR ROCKY MOUNTAIN REGION and CALIFORNIA

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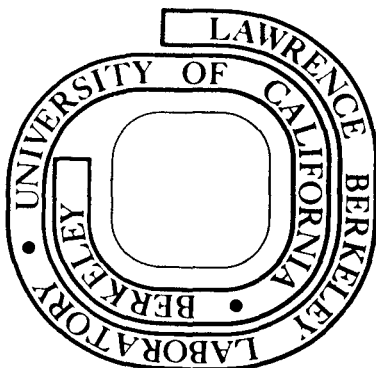# ROCKY MOUNTAIN REGION AND CALIFORNIA

Jayant A. Sathaye and Leonard Kunin

February 1976

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ABSTRACT

Interindustry tables have been developed for the eight Rocky Mountain States and California. These tables are based on the 367-order 1967 national interindustry table. The national matrix was expanded to 404 sectors by disaggregating the seven minerals industries to 44 industries. The state tables can be used for energy and other resource analysis. Regional impacts of alternate development strategies can be evaluated with their use. A general computer program has been developed to facilitate construction of state interindustry tables.

DEVELOPMENT OF STATE INTERINDUSTRY MODELS FOR ROCKY MOUNTAIN REGION AND CALIFORNIA

I. Introduction

Regional interindustry relations studies have tended to fall into two basic categories. These relate specifically to survey and non-survey techniques. Studies based on mail questionnaires or actual canvass of local enterprises are frequently accepted as having greater accuracy or reliability than those founded on secondary data or on certain national averages which are selected to be adequate representations of the technologies of various industries. While these issues remain largely unsettled, there is a growing awareness that detailed national data which can be appropriately regionalized may afford sufficient insight for policy planning purposes.

The interindustry accounts being structured at LBL for the Rocky Mountain Region and for California are based on what might be termed a "scaling down" of national estimates by means of proxies for actual measures. This method permits consistency checks on data and will result in a regional accounting framework that is comparable to, and consistent with, the national income and product accounts.

The cost-effectiveness of this approach has been dealt with in substantial detail in an article by Boster and Martin.[1] An evaluation of the information content and other statistical tests of the proposed method for developing the state interindustry tables has also been conducted.[2] The basic approach being used in the present studies can be classified under the general category of Simple Location Quotient method for developing regional technical coefficients. The method has been tested and ranked as "the best of the purely non-survey approaches."[2]

Review of Interindustry Models. The theoretical principles of inter-industry economics were well-developed by the late 1930's and basic models had been established for the economy of the United States.[3] During World Wat II generalized models of this type were developed to aid in the solution of problems relating to the strategic allocation of manpower and materials.[4]

After World War II, the 1947 Economic Censuses were used to develop the first large-scale interindustry model of the U.S. economy, known as the emergency model (E-M).[5] This work was carried out in the Bureau of Labor Statistics (BLS), U.S. Department of Labor. This model in its most detailed form showed 450 discrete sectors of the national economy and was used for the analysis of potential resource bottlenecks which might arise in connection with various aspects of U.S. international commitments in what was known then as the Cold War.[6]

In 1953, a major review of agency programs was initiated and, in the interest of reduced government spending, further work in interindustry analy-sis at the national level was curtailed.[7] Hence, no U.S. interindustry table was structured from the 1953 Economic Censuses. In 1961 the usefulness of input-output tables was reassessed and based on the 1958 census a modest research undertaking was initiated which resulted in an 82-sector table being published in September 1966.[8] The 1947 table, as noted, was developed by BLS in the U.S. Department of Labor. The research based on 1958 data was sited in the Office of Business Economics, U.S. Department of Commerce and, in contrast to the earlier work, the 1958 tables were made fully consistent with the National Income and Product accounts. In fact the tables were used as a benchmark for modifying components of the entire Income and Product Account series extending back to 1929.[9] For the 1963 census year a more ambitious effort resulted in a further 82-order model published in 1969[10]

along with 367- and 478-sector models[11] which emphasized manufacturing and construction sector details.

The February 1974 issue of the Survey of Current Business[12] contains the 1967 input-output table, and computer tapes of the 367- and 478-sector models are available. The original 1947 BLS table was re-worked to conform with the later OBE table[13] so that for the 20-year period (1947-1967) a detailed analysis of technological change is possible.

In allied research endeavors the Bureau of Labor Statistics has projected the 1958 and 1963 80-order tables to 1970,[14] 1975,[15] and 1980.[16] Similar work is underway for 1985.[17]

The United States Bureau of Mines undertook the disaggregation of the six original ISP[18] mineral sectors of the 1958 table to show the detail of 48 three- and four-digit SIC mineral industries.[19] This research was extended to the 1967 367-sector table in which the original six ISP mining sectors were disaggregated to show 44 three- and four-digit SIC mining industry detail.[20] It is expected that similar detail for mining will be generated for 1967 and 1972 with projections to 1975.[21]

In a major research undertaking based on the 1963 national table, the Economic Development Administration funded the Harvard Economic Research Project (HERP)[22] to develop 80-order state tables that were consistent with (would sum to) the national totals in a multiregional input-output framework.[23] This effort brought the first consistent set of gross outputs, final demands, and state-to-state commodity flow estimates to the field of regional input-output analysis.[24]

Impact Analysis Using Input-Output Tables. In matters of practical application, the uses of interindustry economics generally fall into three broad categories: (1) the analysis of economic structures, (2) the formulation

of economic policy and programs, (3) the projection of industrial activity
levels and resource use to future time frames.

As a part of the analysis of the general interdependence or interlink-
ing of the economy, it is customary to develop output and income multipliers
for each sector under study.[25] The output multipliers show the extent to
which sectors are interlinked. A consideration of the magnitude of the
income multipliers can aid in policy decisions concerning sectoral programs
to stimulate income. An analysis of resource use is aided by the concept
of a "factor content" matrix. This matrix is usually formed by premulti-
plying the matrix of total requirements by a diagonal matrix of coefficients
which show the resource inputs per unit for each sector. The resulting matrix
is (for example) in units of man-years of labor,[26] acre-feet of water,[27] or
BTU's of energy.[28] An analysis can then be carried out sector by sector to
determine the labor (water or energy) intensive activities and the extent to
which industries which use minimal resources as a direct input to their own
productive processes are heavily interlinked to other industries which are
resource intensive.

The problem can be rephrased somewhat in terms of "impact." It might
be asked what impact the expansion of demand for the products of one sector
may have on the output of any other industry. The matter is one of analyzing
demand interdependence for specific resources. More recently with the aware-
ness of environmental problems it was realized that input-output tables could
not only focus on resource inputs but also on residuals output, or wastes,
to the environment per unit of product output.[29] Thus the sale of an auto-
mobile in California has resulted in waste emissions from steel, rubber,
and paint production in Gary, Akron, and Detroit respectively. The problem
is one of accurately quantifying the emission rates of residuals per unit of
production for water, air, and solid wastes.[30] "Residuals" content matrices

can be set up for each type of waste being discharged. A material mass
balance of the economy can be studied and opportunities noted for reclama-
tion and recycling of materials back into the productive processes. The
associated costs in terms of real energy resources and labor can also be
quantified.

The theoretical accounting framework exists for such comprehensive
analyses at the national, regional, and local level. However, it may be
asked what are the real possibilities for successfully implementing this
form of analysis for some specific planning application in the United States?
Let us deal point-by-point with problems of data assembly, model construction,
and analysis.

As noted earlier, at the present time the 1967-national input-output
table is available showing 80-, 367- and 478-sector detail. For discussion
purposes let us say that we are interested in applying the analysis to a
single state or group of states.

Techniques have been developed for allocating outputs to states, Stan-
dard Metropolitan Statistical Areas, and counties.[31,32] These allocations
can be based on county payroll or employment data where a maximum of industry
detail is maintained. Frequently County Business Patterns (CBP) can provide
much of this information. Richardson maintains that the use of national
technical coefficients for local area input-output work is acceptable if
one begins with three- to four-hundred national sector detail.[33] For practi-
cal purposes this assumes that four-digit SIC data are needed at the county/
state level. Final demands can be estimated based on population, income and
Federal, state and local expenditure data.

The final structuring of the transactions table can be accomplished by
following some variant of the basic Moore and Peterson technique.[34]

Income, employment, water use, and energy resource data can now be assembled for each sector of the local table and the multiplier or impact analyses described above can be carried out.

For environmental analyses, Corps of Engineers Permit Application data, Regional Air Quality Control Board information, and other estimates of solid waste generation can be used to make a comprehensive sector analysis of the environmental impacts for certain hypothesized growth patterns.[35]

If it seems desirable the entire analysis can be cast in a linear programming format to maximize regional product subject to certain resource constraints on the supply side and certain environmental constraints on the gross wastes discharged. In sum, it might be stated that for most local areas of the United States, and certainly for states and regions, comprehensive input-output analyses of energy use and environmental impacts are fully realizeable as part of the regional planning process.

II. Development of Regional Interindustry Accounts

The usefulness of an input-output table for many types of analysis is related to the extent of sectoral disaggregation which is feasible. Where interest focuses on particular sectors (minerals, for example), it is important that the production relations in these sectors be defined as precisely as possible. The higher the degree of disaggregation, the smaller the errors stemming from varying "product mix" among regions. For this reason the regional tables being developed are at a level of 400 sectors, 44 of which represent minerals industries. Since the minerals industries comprise a relatively significant group in the Rocky Mountain Region, this level of sectoral detail is important. Table I shows a list of the 400 sectors.

National Matrix. As pointed out earlier the regional accounts are based on the national interindustry accounts for 1967.[12] The published national accounts have 367 sectors. These sectors are grouped in the following categories: agriculture, mining, construction, manufacturing, transportation and utilities, wholesale and retail trade, fincance insurance and real estate, services, government enterprises, imports and miscellaneous industries. The 367-sector table has most sectors classified at the four-digit SIC level of detail. However, the mining industries have been disaggregated into seven sectors which are combinations of 2- and 3-digit SIC industries. In view of the significance of the mining group within the Rocky Mountain Region, it was considered appropriate to disaggregate these seven sectors to forty-four sectors, most of which are at the four-digit SIC level.

The 367 sectors include seven mining sectors, a scrap goods sector, and three miscellaneous (special) industries. Introducing 44 mining sectors expands the table to 400 industrial sectors. The last four sectors are

introduced in the national table essentially for the purpose of balancing the table and hence are removed from the regional table. Their contents are shifted to the final demand columns.

The coefficients for these 44 mining sectors were developed for the 1963 input-output study. These coefficients were then updated to 1967 and inserted into the 367-sector 1967 input-output table to form a 404-sector 1967 table.[21] The RAS technique was used for updating the technical coefficients corresponding to the 44 mining industries.[36]

An expanded 404-sector 1967, national matrix was thus generated. This matrix of technical coefficients formed the basis for developing the 400-sector state matrices.

State Gross Output Vectors. For each state a gross output vector was developed by using appropriate variables to scale down national gross output figures. For the agricultural sectors, the proxy variable used was cash receipts by the farmers in each state for the various agricultural commodities.[37] (See Table 2.)

For the bulk of the other producing sectors state gross output was estimated by applying the following ratio to national gross output for each sector:

$$\frac{\text{State Payroll for sector}}{\text{U.S. Payroll for sector}}$$

State payroll data were taken from 1967 County Business Patterns (State Summaries). Gaps in the state payroll data stemming from disclosure regulations were filled through an estimation procedure based on an applicable probability distribution to data on establishments classed by number of employees.

Data for the mining group in the <u>County Business Patterns</u> is not entirely reliable. Several key sectors are missing from the CBP at the state level. To remedy this an independent set of figures was developed using the 1967 <u>Minerals Yearbook</u>.[38] Production figures in dollars were collected for the following industries, numbered according to Table I, 14, 15, 19, 20, 21, 23, 39, 42, 43, 45, 46, 48, 50 and 51. The national gross output was apportioned to the states for the above sectors using production figures obtained from the <u>Minerals Yearbook</u>.

As Table I indicates in several sectors the four-digit SIC classification is insufficient to represent adequately the contents of an I/O[*] sector. As a result parts of an SIC class have been allocated to different I/O sectors. In all such instances, except in the agriculture group, the SIC class was distributed to the relevant I/O sectors in proportion to the national gross output of those sectors. A similar methodology was adopted for excluding parts of certain classes from their I/O sectors.

<u>State Final Demand Vectors</u>. Four final demand vectors at 367-sector detail are available from the 1967 national input-output study. These vectors represent Personal Consumption Expenditures (PCE), Gross Private Fixed Capital Formation, Federal Government Purchases, and State and Local Government Purchases. The seven mining sectors of the 1967 table were disaggregated to forty-four, using proportions based on 1963 final demand estimates from an earlier study.

In handling construction activity, government purchases were combined with private sector capital formation, yielding a control total which combines Gross (Private and Public) Capital Formation (GCF).

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[*]I/O sector indicates an input-output sector.

For each state, control totals for the four final demand columns were calculated using data on personal income by state and major economic divisions.[39]

State PCE was estimated by apportioning the national PCE for 1967 using personal income at the state and national level as a proxy. Similarly state and national construction income figures were used to estimate the state's share of the national GCF. Federal, state, and local government purchases at the state level were calculated using information on personal income deriving from the respective levels of government.

This procedure yields estimates for the control totals for the four final demand columns for each state. These control totals were then distributed along the column using the proportions in the national input-output table for 1967.

Inventory change and exports which are also a part of final demand are not estimated. In these preliminary tables inventory change is ignored as it forms a very small fraction of total final demand. Exports, however, are estimated as a byproduct of the model itself. These exports include shipments to both foreign countries and other regions within the United States.

III. Input-Output Model

The previous three sections cover the development of the national matrix, the gross output vectors and the final demand vectors. These three, along with the national value added vector, form the input parameters to a mathematical model. This model illustrates the computation of a regional input-output table.

The national flow matrix is converted into a national coefficients matrix $(\overline{A})$. The national value added vector is converted into a coefficients vector (V). A regional flow matrix $(\overline{F})$ is developed using the regional gross output vector (X). Thus

$$\overline{F} - (\overline{X})(\overline{A})$$

where

$\overline{X} =$ Diagonal Matrix

The regional gross output X coupled with the $\overline{A}$ matrix also indicates the portion of the final demand (Y') that can be satisfied.

$$(I-\overline{A})(X) = (Y')$$

where I = Identity Matrix

Four final demand vectors were developed for each state. These four vectors are summed to form a single final demand vector (Y) for each state.

Knowing the actual final demand (Y) and the final demand that can be satisfied (Y'), a Net External Trade Balance (NETB) vector can then be estimated.

$$NETB = Y - Y'$$

This vector indicates whether a particular commodity needs to be imported (I) or exported (E) from each state. A commodity cannot be imported and exported simultaneously, i.e., no cross hauling is permitted. The exported commodities appear as part of the final demand in the output regional matrix.

$$NETB = I + E.$$

To develop a "pure" state input-output table, whose coefficients are devoid of imports, the imported commodities have to be removed from the interindustry flows of the state matrix. The consumption of these imports by individual sectors is not known. To get around this difficulty the Isard[*] assumption is invoked. The assumption is that imported commodities are consumed by the industries in the same proportion as these industries consume their domestic counterparts.

For an n-order matrix the imports vector I has elements $I_1, I_2, \ldots I_n$. Each element I_k is distributed along the kth row. So

$$I_k = i_{k1} + i_{k2} + \ldots + i_{kn}.$$

The kth row of the flow matrix F may be represented as $F_k = f_{k1} + f_{k2} + \ldots f_{kn}$. Then

$$i_{k1} = f_{k1}/F_k \, I_k$$

$$i_{k2} = f_{k2}?F_k \, I_k$$

$$\vdots$$

$$i_{kn} = f_{kn}?F_k I_k$$

[*] Walter Isard. "Interregional and Regional Input-Output Analysis: A Model of a Space-Economy," <u>Review of Economics and Statistics</u>, 33:320, Nov.1951.

The "pure" interindustry flows then are

$$(f_{k1} - i_{k1}), (f_{k2} - i_{k2}) \ldots, (f_{kn} - i_{kn})$$

Similar computations are carried out for all the rows. This results in a "pure" interindustry transactions matrix for each state. The import elements i_{k1}, i_{k2} etc. are summed along the column to develop the sectoral imports vector (SI).

$$SI_1 = \sum_{k=1}^{n} i_{k1}, \; SI_2 = \sum_{k=1}^{n} i_{k2}, \ldots, SI_n = \sum_{k=1}^{n} i_{kn}$$

It should be noted that <u>sectoral</u> import commodities may be manufactured within the state as well. They are distinguished from commodities that have zero regional gross output and are imported entirely from outside the state. A net input-output table for each state is developed in this fashion.

In discussion of the national matrix it was pointed out that the scrap goods sector and the last three sectors of the matrix are ignored. These three sectors have no entries in the main body of the table. The only entries of consequence are in the value added row. As these sectors are mainly introduced for balancing the matrix they are not included in the regional table. However, the value added entries for these sectors are shifted to the final demand columns and appear as final demand value added entries. This procedure balances the regional table.

<u>Interindustry Tables</u>: Construction of gross output vectors and final demand vectors preceded the formation of an input-output table. As outlined earlier these two inputs were prepared using information from CBP[*] and state income data from SCB.[†]

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[*]CBP = <u>County Business Patterns</u>

[†]SCB = <u>Survey of Current Business</u>

A coding dictionary was developed to match the input-output sectors with the SIC[*] codes. SIC codes have gone through a series of transformations since 1958. The 1958 codes were revised in 1963. A new set of codes was published in 1967 and 1972. The 1967 CBP are classified according to the revised 1958 SIC codes whereas the 1967 input-output tables are formulated along the 1967 SIC classification. The input-output (I/O) sectors had to be matched with the 1967 CBP. To accomplish this a coding bridge between 1967 I/O sectors and the revised 1958 SIC codes was developed (Table 1).

A computer program called "ROCKY" was developed to formulate the gross output and the final demand vectors. The coding dictionary was used to pick up the CBP data and develop the apportioning factors. These factors allocate the national gross output to the various states. State income data was key-punched for the nine states to develop the final demand vectors.

Country Business Patterns data for 1967 had numerous gaps ("D's) at both the national and state level. The data was also inconsistent, i.e., row and column sums were far apart, in marked contrast to the 1972 data. A dynamic programming algorithm was used to estimate the D's. This algorithm minimizes the probability of an error in the estimate based on the information on the number and size of establishements at the national and state level. It also forces the row and column sums to balance to the national totals. Due to the severe inconsistencies in the 1967 CBP data some estimates of the D's were found to be unsatisfactory. The problem was acute when the total national employment was very small, such as is the case in several of the minerals industries. In these instances the national employment total exists but the allocation to states is missing. To overcome this difficulty both agricultural and mineral industries were estimated independently as explained earlier.

[**] SIC = Standard Industrial Classification

The input-output model presented in the previous section has been developed in a program called "FLOW." During the course of this project the program is being modified to (1) improve its input-output routines, and (2) to provide for flexible reaggregation of sectors. The program prints the total number of sectors, the number of deleted sectors, and the input vectors, the national gross output, national value added, regional gross output, regional final demand, and final demand value added. The output rows of the FLOW program show all the sectors present in the state economy, the intermediate input, sectoral imports, and deleted sectors, total imports, value added, and gross output. The columns indicate all the sectors present in the state, intermediate output, final demand vectors, exports, gross output, and the commodity imports.

IV. Results

Preliminary input-output tables for the nine states have been developed based on the 400-sector 1967 national input-output matrix. The state tables are, of course, smaller than the national table. Table IV presents a list of the states and the numbers of sectors, out of the total 400 sectors, present in each state matrix. California, with 351 sectors, has the most highly developed and diversified economy among these states, while Wyoming, with 83 sectors present, has a less developed economy.

For some sectors, County Business Patterns do not offer sufficiently detailed classifications for proxy variables to be developed. Where possible, e.g., for the Agricultural and Minerals sectors, alternate sources of data enabled us to develop reasonable proxy variables. In the case of the Construction and Ordnance sectors, apportioning of national output to states was done on the basis of aggregate figures for the major sector (i.e., Construction and Ordnance). Disaggregation to detailed sectors was then accomplished by assuming that national proportions hold for each state.

State Tables

Some general remarks follow concerning the content of the tables presented in the report.

All of the construction sectors appear in the input-output matrix of each state. This stems, as noted above, from the method of apportioning total state construction output to the seven sectors.

There are two trade sectors, wholesale and retail, in the I/O model. As these are very broad categories, comprising SIC code 50 and SIC codes 52 through 59, they invariably appear in each state.

Finance, Insurance, and Real Estate, and Services are also very broad categories which correspond directly to 2-digit SIC codes. The only exception is owner occupied dwellings which does not have an SIC code listing. This sector is collapsed into the real estate sector.

The last three groups in the model (see Table IV), consisting of eleven sectors, do not have any clear SIC codes. The dummy sectors are included for balancing purposes. The outputs of the government enterprises group and the dummy group is at present determined by the model although the model has the capability of accepting exogeneous data on state outputs for these sectors.

There are two foreign imports sectors, one for directly allocated imports and one for transferred imports. The directly allocated imports sector represents noncompetitive imports whereas the transferred imports sector represents competitive imports. Both of these sectors are only crude estimates, based on national coefficients. Each state table has an additional imports row which we refer to as sectoral imports (see pp. 12-13). This row indicates the inflow of finished commodities and is similar to the for-eign transferred imports row.

The sectors discussed thus far are present in each of the state tables— they represent rather broad aggregations of detailed sectors. There remain four major groups of industries which comprise the bulk of the national economy— Agriculture, Mining, Manufacturing and Transportation. These groups constitute 369 of the 400 national sectors. Varying numbers of these sectors appear in each of the state economies. The Mining and Manufacturing groups show the largest variation from state to state. This is due partially to the detailed categorization of sectors within each group, almost all the sec-tors being at the four-digit SIC level.

Table III presents an interstate comparison of some of the salient statistics. Total gross output of each state includes dollar value of products supplied to the final consumers as well as industrial establishments. Gross state product (GSP) reflects the total value added generated by these establishments. Gross state products generated in the input-output tables are based on national value added coefficients in the national input-output table. Bank of California estimates of GSP are independent of the input-output format. Total imports and exports are generated by the model as residuals. Final demand figures as they appear in Table III do not include exports and imports. The final demand figures, which are supplied exogenously and read into the model, include personal consumption expenditures, capital investment, and federal, state, and local government purchases. For most of the states, estimates of GSP by the Bank of California are slightly (5-10%) higher than the estimates which emerge from the input-output model. Although the method of estimation used by the Bank is not known to the authors, one can conjecture that the I/O estimates may be low due to the omission of productive sectors which may actually have existed in the states in 1967. Reliance on County Business Patterns coverage means that sectors overlooked there are also absent from the tables. Our results indicate that the differences in the GSP estimates increase with the number of manufacturing sectors in the state economy, e.g., Wyoming and Nevada show smaller variations than California. Hence differences in the Manufacturing group appear to account for most of the variation in estimates.

It can be seen from Table III that the less developed states, such as Wyoming and Montana, have proportionately more imports and exports per dollar of GSP as compared with California or Colorado. It also appears to be the case that as GSP and the number of sectors increase, the relative importance of imports and exports diminishes. Thus a broader economic base tends to

correlate with an increase in the relative self-sufficiency of state economies.

Table 6 provides an overview of the energy producing sectors for each state. The following seven sectors constitute the energy-producing sectors in each state:

Industry Title	1967 SIC Classification
1. Bituminous Coal	1200
2. Crude Petroleum	1310
3. Natural Gas	1310
4. Natural Gas Liquids	1320
5. Refined Petroleum	2910,2990
6. Electric Companies and Systems	4910,*4930
7. Gas Companies and Systems	4920,*4930

The first four sectors listed are mineral energy resource industries. Note that these sectors do not appear in the Idaho and Nevada economies, nor does the Petroleum Refining industry. These states do produce electricity from hydropower sources. California ranks as the largest producer of energy in every category except coal production. In 1967 Utah and Colorado were comparatively large producers of coal. Output of coal in the other states covered was negligible.

As shown in Table 6, California is by far the largest producer of energy. It should be noted, however, that there is some upward bias in certain sectors stemming from "double counting" in the national table. For example, in the electric utility sector, electricity produced by one utility and whole-sales to another, which then resells it, is counted as having been produced by both utilities. This procedure results in an inflated entry in the electricity row-column cell, which indicates an exaggerated figure for the consumption of electricity by the electric utilities themselves. The gross

output of the electric utility industry therefore contains some upward bias.

As noted earlier, the work reported upon in this report is preliminary in nature. We would like to indicate briefly several lines along which work is being done in our efforts to develop reliable and useful regional interindustry models. First, the tables will be placed on a Gross <u>Domestic</u> Output basis. This will be accomplished by converting the National matrix to a Gross Domestic Output basis. This adjustment will render the scaling of national totals to states more reliable. Second, we expect to improve the regional final demand vectors which are fed exogenously into the model. Currently, final demand patterns are assumed to be the same across all regions. We are working on developing sets of regional final demand vectors which will reflect regional differences in final demand patterns.

Third, we expect to update the tables to 1972, based on both our own updating procedures and on an official national 1972 interindustry table which is forthcoming. Finally, we are working on improved methods of checking and verifying our results. This involves checking our sectoral output estimates against independent data sources, and verifying with regional authorities that our sectoral coverage is complete.

Work in the indicated areas should result in regional tables which can be used confidently for a variety of policy making purposes. We ourselves intend to develop regional energy balances for five major forms of energy resources: natural gas, crude petroleum, coal, electricity, and refined petroleum. The balances will show supply and demand for energy by these give categories. Incremental changes in economic structure will be analyzed in terms of impacts on energy supply and demand. Similar analyses will be carried out for other resources such as water, land,and critical materials.

Acknowledgments

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APPENDIX I

DESCRIPTION OF SALIENT FEATURES
OF EACH STATE ECONOMY

Appendix I

Following is a brief description of the salient characteristics of each state economy in alphabetical order.

Arizona: In 1967 the Arizona state economy had a total output of $8.87 billion with a gross state product of $5.21 billion. Manufacturing was by far the largest group producting a total output of $2.34 billion. Trade and services groups were the next two largest groups. However as the trade and services groups are far more labor intensive, the value added generated by the trade sector exceeds that of the manufacturing sector by $96 million.

Arizona agricultural group had a total output of $867 million with a value added of $338 million. Of this the Meat, Animals and Livestock sector accounted for the maximum output of $275 million. This sector exported more than half its output; the exports being $149 million. Poultry and eggs sector was the smallest sector with a total output of $7 million.

Arizona is a major producer of copper ores. Copper ore accounts for 85% of the major mining activities within the state, the total output being $357 million. The state exports $228 million or 64% of this copper ore. This industry by itself is also a major contributor to the gross state product, contributing about 4% or $170 million.

Combined construction activity accounts for $897 million of total output with a value added of $392 million. This group exports $79 million worth of services and products.

The manufacturing group has 91 sectors in it with a total output of $2342 million. The following major industrial sectors constitute industries with more than $200 million output in this group.

Industrial Sectors	Total Output million dollars	Value Added million dollars
Primary copper	346	20
Steam engines and turbines	201	77
Computing and related machines	215	80
Radio and TV communication eqpt.	245	124

The Primary Copper industry is the least labor-intensive industry with less than 6% of its output being derived from labor activity. In contrast to the Primary Copper Industry, the Radio and TV Communication Equipment sector has a high, 51% value added component. Labor earnings (employee compensation) form only a part of value added. The other part includes profits, business taxes and depreciation.

The Transportation, Communication, Gas and Electric Services output accounts for $744 million of total output. Communications and gas and electric services, each registering over a $100 million output, are the major components in this group.

The Trade sector which is extremely labor intensive accounts for $881 million or 17% of the total value added. It is also the second largest group in the state economy ranking behind the manufacturing group, with an output of $1204 million.

Real estate and services group account for about $1 billion each of total output. Both groups are labor intensive with 62% of their output contributing to value added.

Government enterprise and dummy industries forming the residual groups account for $242 million of output.

Colorado: Colorado is the largest economic entity among the eight Rocky Mountain states. The economy is diverse with the manufacturing group predominating over all others. This group has a total output of $3.4 billion which represents 25% of all Colorado economic activities. However, as it is not a labor intensive group the value added proportion is only 16% of the total Colorado value added (GSP) of $7.4 billion.

Agricultural activities accounted for $1.4 billion of output with 9 of the possible 12 sectors present in the model. Meat Animals and Livestock was the largest sector with an output of $805 billion. Cotton, tobacco and oil bearing crops are the three agricultural sectors not present in the Colorado economy.

Two sectors formed the bulk of the Colorado mining industry. Tungsten and ferroalloy ores output was $121 million while the crude petroleum output was $260 million. These two sectors account for the bulk, 61%, of the mining activity in Colorado.

The construction group accounts for $1.1 billion output in Colorado. Of this output $484 million is contributed to value added.

Manufacturing activity in the state consists of the following major industries having output over $200 million.

Industry	Output million dollars	Value Added million dollars
39 Meat Products	356	45
97 Blast Furnaces, Steel Mills	269	98
142 Aircraft Equipment NEC	281	103

These figures show the wide variation in value added figures among the industries. Meat Products industry has a value added component of 13% whereas the other two industries shown have value added components of 37%. Unfortunately, the tables do not reveal the detailed breakdown by factors of the value added figures. These factors such as labor, profits, etc. would have permitted a more detailed analysis of these industries.

Idaho: The Idaho economy has two comparatively large groups. These two groups, Agriculture and Manufacturing, have outputs of $939 million and $1465 million respectively.

Idaho is a major exporting state for agricultural products. It exported 59% of its produce to other states and foreign countries. The two large sectors within this group are Meat, Animals and Livestock within an output of $203 million and Food, Feed Grains and Grass Seeds with an output of $257 million.

Mining industry in the state is small with an output of $81 million. Production of lead and zinc ores accounted for $45 million of this output. There are eleven other mining sectors in the economy but most of these are comparatively small with an output of $15 million or less.

Manufacture of industrial chemicals is the largest enterprise within the manufacturing group. This industry has an output of $207 million. Other major sectors in this group are related to Idaho's large agriculture group. Dehydrated Food Products and Frozen Fruits and Vegetables account for approximately $150 million each. Idaho forestry products feed directly into the large Logging Camps and Sawmills and Planing Mills sectors. These two sectors

have outputs of $113 million and $156 million respectively.

Railroads form a major portion of the transportation industry contributing an output of $76 million. Privately owned electric utilities supply $88 million worth of electricity. The Trade group has an output of $502 million while Services have an output of $314 million.

Montana: Agriculture and Manufacturing are the two major groups in the state with outputs of $921 million and $1181 million respectively. The Agriculture groups have a higher value added component than the Manufacturing group as might be expected of a more labor intensive group. Also most of the products of the Agriculture group are delivered to intermediate demand and exports whereas Manufactured products are delivered largely to final demand. Final demand excluding imports and exports is only $13 million for Agriculture products whereas it is $821 million for Manufactured products.

As in the neightboring state of Wyoming, Meat, Animals and Livestock Products sectors and Food Feed Grains and Grass Seeds sector bulk large contributing $329 million and $393 million worth of output, respectively. Again substantial portions of this output are exported. These exports amount to $172 million and $277 million respectively. Forestry products, another large sector, amount to $163 million.

Copper ores and crude petroleum industries dominate the mining industry. $82 million worth of copper ores were mined in Montana in 1967. Crude petroleum output was $45 million.

Primary copper industry is the largest sector in the small manufacturing group. This sector had an output of $273 million. It obtains $55 million worth of copper ore from within the state resources. Other major

sectors in the state are sectors 38 and 39 both related to forestry products and sector 46 which is petroleum refining.

Railroads dominate the transportation group accounting for $130 million of the total output of $414 million. Trade sector has an output of $483 million with a high value added component of $354 million. The remaining groups contribute about $585 million to total output.

The state imports large quantities of secondary nonferrous metals; these imports amount to $62 million. These imports feed into the farm nonferrous metal manufacturing industries of Primary Copper, Primary Lead, Primary Zinc, and Primary Aluminum.

Nevada: The Services group dominates the Nevada economy with an output of $1.2 billion dollars. Value added accounts for almost 60% of this output.

Meat, Animals, and Livestock Products and Forestry and Fisheries Products are the major sectors in the Agricultural group. These sectors have an output of $52 million and $46 million respectively. As the demand for these products within Nevada is small, the state exports $26 million of the first product and $45 million of the second product.

The two major sectors in the mining industry are the Iron Ores and Copper Ores sectors. These two sectors account for $13 million and $44 million worth of total output respectively. $12 million worth of iron ore or about 90% of total production is exported to other states. Copper ores exported to $25 million. Lode gold mining accounted for $5 million worth of output.

Construction activity amounted to $437 million worth of output.

The twenty-two manufacturing sectors in Nevada are comparatively small. The three largest industries are listed below.

Industry	Gross Output million dollars	Value Added million dollars
50 Primary Copper	53	3
51 Primary Nonferrous Metals	57	4
52 Nonferrous Rolling & Drawing	59	19

As pointed out earlier the value added component of the first two sectors is fairly small.

The state produced $76 million dollars of electricity. Most of this is exported to other states. These exports amount to $43 million.

Amusement and recreation services which include gambling and casino operations is the largest industry in Nevada. It has an output of $430 million dollars. Ninety-two percent of these services were exported which resulted in a gain of $395 million to the Nevada economy. Value added accounted for 64% of the total output of this sector. Service sectors related to this major industry also show very high output levels. The related sectors, Hotels, Rooming Houses, Camps, etc. and Miscellaneous Business Services, have outputs of $268 million and $250 million respectively. Again most of these services are exported to other states.

Motor vehicles, refined petroleum and aircraft are the major importing sectors in the economy.

New Mexico: The state has 118 sectors in its economic model. Total output of the New Mexico economy is evenly distributed among the ten economic groups. Each group contributes around $500 to $600 million dollars of output. In this sense the economy is well balanced as compared to other economies in the Rocky Mountain Region. The services is the leading sector in both value added and gross output terms.

In the Agriculture group the Meat, Animals sector is by far the largest sector with an output of $238 million. Cotton Growing is unique to this state and its output is $33 million.

Primary industry in the state is fairly large and well developed. The Crude Petroleum sector and the Uranium, Vanadium, Radium sector dominate this group with outputs of $227 million and $106 million. Potash, Soda and Borax Minerals are also manufactured on a large scale. Almost all the output of these minerals is exported, as in the output of crude petroleum and the radioactive minerals.

The manufacturing group is well balanced. The Petroleum Refining sector is the largest sector with an output of $81 million.

Gas and electric utilities dominate the Transportation group with outputs of $154 million and $95 million. Part of these products is exported to other states. Sixty-five million dollars worth of gas is exported to other states.

In the Services Group, Miscellaneous Business Services dominate with an output of $394 million. This amounts to fifty percent of the total services output.

Utah: Utah ranks as the third largest state in the Rocky Mountain Region behind Colorado and Arizona.   It has a total output of $5.9 billion with value added component of $3.4 billion.   Manufacturing is the major activity with an output of $1.9 billion and a value added component of $508 million.

There are nine sectors in the Agricultural group.   These nine sectors have a total output of $346 million.   The three missing sectors are Cotton, Tobbaco and Oil-Bearing Crops.   Meat, Animals,   and Livestock NEC is the major sector with an output of $100 million.   Over 90% of this output is consumed within the state.   Forestry and Fishery Products and Fruits and Tree Nuts are the other major sectors in this group.

Mining industry is almost as large as Agriclture with an output of $330 million.   Production of copper ores accounts for a major portion of this output. Copper Ores industry produces $119 million worth of ores.   Portions of these ores are exported to other states while the rest are fed mainly into the Primary Copper industry.   Coal and Crude Petroleum account for an output of $34 million each.   About half the coal is shipped out of the state.

The Construction sector accounts for $418 million worth of output.

In the manufacturing group the following industries had outputs of around $200 million or more.

Industry	Gross Output million dollars	Valued Added million dollars
74 Petroleum Refining	179	45
84 Blast frunaces, Steel Mills, etc.	178	65
86 Primary Copper	315	18
106 Aircraft engines and parts	156	68

Primary copper is again a major industry with low value added components.

The output of the rest of the groups is fairly evenly divided among their respective sectors. Railroads, Motor Freight Transport and Warehousing and Real Estate are the prominent sectors in these groups.

Wyoming: Manufacturing, Mining and Agricultural Groups are the major groups in the Wyoming economy. These sectors contribute 21%, 16% and 15% of the total output of $2.4 billion in Wyoming. The mining group contributes almost twice the amount of value added as compared to the other two groups: Value added contribution in the Mining Group is $216 million dollars or 56% of its output whereas in the Manufacturing Group and the Agricultural Group it is $119 million and $123 million respectively.

As in other Rocky Mountain States, Meat Animals and Livestock Products is the major agricultural sector with Forestry Products also contributing substantially to the economy. The Livestock sector has an output of $203 million. Sixty-five percent of this output is exported to other regions. Almost 95% of the output of $92 million of the Forestry sector is exported.

The state has an active mining industry which produces $383 million dollars worth of ores and energy resources. Crude Petroleum and Natural Gas sectors together account for $287 million of this output. Crude Petroleum contributes $242 million to this total. Only one third of this production is shipped out of the state. The rest of it goes into petroleum production. Wyoming also produces $37 million worth of rare earth minerals. Seventy-two percent of these ores is shipped out.

Wyoming has only nineteen sectors in the manufacturing group. These sectors produce $517 million worth of products. The group is dominated by the petroleum refining industry. Total production of refined petroleum amounts to $375 million. Exports account for $315 million or 84% of this output.

APPENDIX II

TABLE 1. LIST OF 400 INPUT-OUTPUT SECTORS

Input-Output Sector No.	Title	1958 Revised SIC Classification
1	Dairies	0132,*0140
2	Poultry and Eggs	0133 0134,*0140
3	Meat Animals and Misc. Livestock, NEC	0135 0136 0139,*0140 0193,*0729
4	Cotton	0112,*0140
5	Food Feed Grains and Grass Seeds	*0113,*0119,*0140
6	Tobacco	*0114,*0140
7	Fruits and Tree Nuts	0122,*0140
8	Vegetables, Sugar, and Misc. Crops	0123,*0119,*0140
9	Oil Bearing Crops	*0113,*0119,*0140
10	Greenhouse and Nursery Products	0192,*0140
11	Forestry and Fishery Products	0740 0810 0820 0840 0860 0910
12	Agriculture, Forestry, & Fishery Services	0710 0723 0730,*0729 0850 0980
13	Iron Ores	1010
14	Manganese Ores	1062
15	Tungsten, Ferroalloy Ores excluding Vanadium	1064 1069
16	Copper Ores	1020
17	Lead and Zinc Ores	1030
18	Lode Gold	1042
19	Placer Gold	1043
20	Silver Ores	1044

Table 1 (Continued)

AII-2

Input-Output Sector No.	Title	1958 Revised SIC Classification
21	Bauxite and Other Aluminum Ores	1050
22	Metal Mining Services	1080
23	Mercury Ores	1092
24	Titanium Ores	1093
25	Uranium, Radium, Vanadium Ores	1094
26	Metallic Minerals (Ores), NEC	1099
27	Anthracite	1100
28	Bituminous Coal	1200
29	Crude Petroleum	*1310
30	Natural Gas	*1310
31	Natural Gas Liquids	1320
32	Dimension Stone	1410
33	Crushed and Broken Limestone	1420
34	Construction Sand and Gravel	1440
35	Bentonite	1452
36	Fire Clay	1453
37	Fullers Earth	1454
38	Kaolin and Ball Clay	1455
39	Feldspar	1456
40	Clay, Ceramic, Refractory Minerals, NEC	1459
41	Nonmetallic Minerals Services, excluding Fuels	1480
42	Gypsum	1492
43	Mica	1495

Table 1 (Continued)

Input-Output Sector No.	Title	1956 Revised SIC Classification
44	Native Asphalt and Bitumens	1494
45	Pumice and Pumicite	1495
46	Talc, Soapstone, and Pyrophyllite	1496
47	Natural Abrasives, except Sand	1497
48	Peat	1498
49	Misc. Nonmetallic Minerals, NEC	1499
50	Barite	1472
51	Fluorspar	1473
52	Potash, Soda, and Borate Minerals	1474
53	Phosphate Rock	1475
54	Rock Salt	1476
55	Sulfur	1477
56	Chemical & Fertilizer Mineral Mining, NEC	1479
57	New Construction, Resident (Nonfarm)	*1500,*1600,*1700,*6560
58	New Construction, Nonresident	*1500,*1600,*1700,*6560
59	New Construction, Public Utilities	*1500,*1600,*1700,*6560
60	New Construction, Highways	*1600,*1700
61	New Construction, All Other	*1500,*1600,*1700,*1380
62	Maintenance and Repair Construction, Resident	*1500,*1700
63	Maintenance and Repair Construction, All Other	*1500,*1600,*1700,*1380
64	Complete Guided Missiles	*1900
65	Ammunition except for Small Arms, NEC	*1900

Table 1 (Continued)

AII-4

Input-Output Sector No.	Title	1958 Revised SIC Classification
66	Tanks and Tank Components	*1900
67	Sighting and Fire Control Equipment	*1900
68	Small Arms	*1900
69	Small Arms Ammunition	*1900
70	Ordnance and Accessories, NEC	*1900
71	Meat Products	2010
72	Creamery Butter	2021
73	Cheese, Natural and Processed	2022
74	Condensed and Evaporated Milk	2023
75	Ice-Cream and Frozen Desserts	2024
76	Fluid Milk	2026
77	Canned and Cured Seafoods	2031
78	Canned Specialties	2032
79	Canned Fruits and Vegetables	2033
80	Dehydrated Food Products	2034
81	Pickles, Sauces, and Salad Dressing	2035
82	Fresh or Frozen Packaged Fish	2036
83	Frozen Fruits and Vegetables	2037
84	Flour and Other Grain Mill Products	2041 2043 2045
85	Prepared Feeds for Animals and Fowls	2042
86	Rice Milling	2044
87	Wet Corn Milling	2046

Table 1 (Continued)

AII-5

Input-Output Sector No.	Title	1958 Revised SIC Classification
88	Bakery Products	2050
89	Sugar	2060
90	Confectionary and Related Products	2070
91	Alcoholic Beverages	2082 2083 2084 2085
92	Bottled and Canned Soft Drinks	2086
93	Flavoring Extracts and Syrups, NEC	2087
94	Cottonseed Oil Mills	2091
95	Soybean Oil Mills	2092
96	Vegetable Oil Mills, NEC	2093
97	Animal and Marine Fats and Oils	2094
98	Roasted Coffee	2095
99	Shortening and Cooking Oils	2096
100	Manufactured Ice	2097
101	Macaroni and Spaghetti	2098
102	Food Preparations, NEC	2099
103	Cigarettes, Cigars, Etc.	2110 2120 2130
104	Tobacco Stemming and Redrying	2140
105	Broadwoven Fabric Mills, Finishing Plants	2210 2230 2261 2262
106	Narrow Fabric Mills	2240
107	Finishing Plants, NEC	2269 2281 2282 2283
108	Thread Mills	2284
109	Floor Covering Mills	2270
110	Felt Goods, NEC	2291
111	Lace Goods	2292

Table 1 (Continued)

AII-6

Input-Output Sector No.	Title	1958 Revised SIC Classification
112	Paddings and Upholstery Filling	2293
113	Processed Textile Waste	2294
114	Coated Fabrics, Not Rubberized	2295
115	Tire Cord and Fabric	2296
116	Scouring and Combing Plants	2297
117	Cordage and Twine	2298
118	Textile Goods, NEC	2299
119	Hosiery, NEC	2251 2252
120	Knit Apparel Mills	2253 2254 2259
121	Knit Fabric Mills	2256
122	Apparel Made from Purchased Materials	2300,-2390 39996
123	Curtains and Draperies	2391
124	House Furnishings, NEC	2392
125	Fabricated Textile Products, NEC	2393 2394 2395 2396 2397 2398 2399
126	Logging Camps, Logging Contractors	2410
127	Sawmills and Planing Mills, General	2421
128	Hardwood Dimension and Flooring Mills	2426
129	Special Product Sawmills, NEC	2429
130	Millwork	2431
131	Veneer and Plywood	2432
132	Prefabricated Wood Structures	2433
133	Wood Preserving	2491
134	Wood Products, NEC	2499

Input-Output Sector No.	Title	1958 Revised SIC Classification
135	Wooden Containers	2440
136	Wood Household Furniture	2511 2519
137	Upholstered Household Furniture	2512
138	Metal Household Furniture	2514
139	Mattresses and Bedsprings	2515
140	Wood Office Furniture	2521
141	Metal Office Furniture	2522
142	Public Building Furniture	2530
143	Wood Partitions and Fixtures	2541
144	Metal Partitions and Fixtures	2542
145	Venetian Blinds and Shades	2591
146	Furniture and Fixtures, NEC	2599
147	Pulpmills	2610
148	Papermills, except Building Paper	2620
149	Paperboard Mills	2630
150	Envelopes	2642
151	Sanitary Paper Products	2647
152	Wallpaper, Building Paper, Board Mills	2644 2660
153	Converted Paper Products, NEC	2641 2643 2645 2646 2649
154	Paperboard Containers and Boxes	2650
155	Newspapers	2710
156	Periodicals	2720
157	Books	2730
158	Miscellaneous Publishing	2740

Table 1 (Continued)

AII-7

Table 1 (Continued)

AII-8

Input-Output Sector No.	Title	1958 Revised SIC Classification
159	Commerical Printing	2751 2752
160	Manifold Business Forms	2760 2782
161	Greeting Card Publishing	2770
162	Printing Trade Services	2753 2789 2790
163	Industrial Chemicals	2810,-28195
164	Fertilizers	2871 2872
165	Agricultural Chemicals, NEC	2879
166	Gum and Wood Chemicals	2860 2890
167	Plastics Materials and Resins	2821
168	Synthetic Rubber	2822
169	Cellulosic Manmade Fibers	2823
170	Organic Fibers, Noncellulosic	2824
171	Drugs	2830
172	Cleaning Preparations	2840,-2844
173	Toilet Preparations	2844
174	Paints and Allied Products	2850
175	Petroleum Refining	2910 2990
176	Paving Mixtures and Blocks	2951
177	Asphalt Felts and Coatings	2952
178	Tires and Inner Tubes	3010
179	Rubber Footwear	3020
180	Fabricated Rubber Products, NEC	3030 3060
181	Miscellaneous Plastics Products	3070
182	Leather Tanning, Industrial Leather Products	3110 3120
183	Footwear Cut Stock	3130

Table 1 (Continued)

Input-Output Sector No.	Title	1958 Revised SIC Classification
184	Footwear, except Rubber	3140
185	Leather Goods, NEC	3150 3160 3170 3190
186	Glass, Glass Products excluding containers	3210 3229 3230
187	Glass Containers	3221
188	Cement, Hydraulic	3240
189	Brick and Structural Clay Tile	3251
190	Ceramic Wall and Floor Tile	3253
191	Clay Refractories	3255
192	Structural Clay Products, NEC	3259
193	Vitreous Plumbing Fixtures	3261
194	Food Utensils, Pottery	3262 3263
195	Porcelain Electrical Supplies	3264
196	Pottery Products, NEC	3269
197	Concrete Block and Brick	3271
198	Concrete Products, NEC	3272
199	Ready-Mixed Concrete	3273
200	Lime	3274
201	Gypsum Products	3275
202	Cut Stone and Stone Products	3280
203	Abrasive Products	3291
204	Asbestos Products	3292
205	Gaskets and Insulations	3293
206	Minerals, Ground or Treated	3295
207	Mineral Wool	3296
208	Nonclay Refractories	3297

Table 1 (Continued)

AII-10

Input-Output Sector No.	Title	1958 Revised SIC Classification
209	Nonmetallic Mineral Products, NEC	3299
210	Blast Furnaces, Steel Mills, etc.	3310
211	Iron and Steel Foundries	3320
212	Iron and Steel Forgings	3391
213	Primary Metal Products, NEC	3399
214	Primary Copper	3331
215	Primary Lead	3332
216	Primary Zinc	3333
217	Primary Aluminum	3334 28195
218	Primary Nonferrous Metals, NEC	3339
219	Secondary Nonferrous Metals	3340
220	Copper Rolling and Drawing	3351
221	Aluminum Rolling and Drawing	3352
222	Nonferrous Rolling and Drawing, NEC	3356
223	Nonferrous Wiredrawing, Insulating	3357
224	Aluminum Castings	3361
225	Brass, Bronze, and Copper Castings	3362
226	Nonferrous Castings, NEC	3369
227	Nonferrous Forgings	3392
228	Metal Cans	3410
229	Metal Barrels, Drums, and Pails	3491
230	Metal Sanitary Ware	3431
231	Plumbing Fittings and Brass Goods	3432
232	Heating Equipment, excluding Electric	3433
233	Fabricated Structural Steel	3441

Table 1 (Continued)

Input-Output Sector No.	Title	1958 Revised SIC Classification
234	Metal Doors, Sashes and Trim	3442
235	Fabricated Platework (Boiler Shops)	3443
236	Sheet Metalwork	3444
237	Architectural Metalwork	3446
238	Miscellaneous Metalwork	3449
239	Screw Machine Products, Bolts, etc	3450
240	Metal Stamping	3460
241	Cutlery	3421
242	Hand and Edge Tools, NEC	3423 3425
243	Hardware, NEC	3429
244	Plating and Polishing	3471 3479
245	Miscellaneous Fabricated Wire Products	3480
246	Safes and Vaults	3492
247	Steel Springs	3493
248	Valves and Pipe Fittings	3494 3498
249	Collapsible Tubes	3496
250	Metal Foil and Leaf	3497
251	Fabricated Metal Products, NEC	3499
252	Steam Engines and Turbines	3511
253	Internal Combustion Engines, NEC	3519
254	Farm Machinery	3520
255	Construction Machinery	3531
256	Mining Machinery	3532
257	Oil Field Machinery	3533
258	Elevators and Moving Stairways	3534
259	Conveyors and Conveying Equipment	3835

Table 1 (Continued)

Input-Output Sector No.	Title	1958 Revised SIC Classification
260	Hoist, Cranes, and Monorails	3536
261	Industrial Trucks and Tractors	3537
262	Machine Tools, Metal Cutting Types	3541
263	Machine Tools, Metal Forming Types	3542
264	Special Dies, Tools, Jigs, Fixtures	3544 3545
265	Metalworking Machinery, NEC	3548
266	Food Products Machinery	3551
267	Textile Machinery	3552
268	Woodworking Machinery	3553
269	Paper Industries Machinery	3554
270	Printing Trades Machinery	3555
271	Special Industry Machinery, NEC	3559
272	Pumps and Compressors	3561
273	Ball and Roller Bearings	3562
274	Blowers and Fans	3564
275	Industrial Patterns	3565
276	Power Transmission Equipment	3566
277	Industrial Furnaces and Ovens	3567
278	General Industrial Machinery, NEC	3569
279	Miscellaneous Machinery, except Electrical	3590
280	Computing and Related Machines	3571
281	Typewriters	3572
282	Scales and Balances	3576
283	Office Machines, NEC	3579
284	Automatic Merchandising Machines	3581
285	Commerical Laundry Equipment	3582

Table 1 (Continued)

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Input-Output Sector No.	Title	1958 Revised SIC Classification
286	Refrigeration Machinery	3585
287	Measuring and Dispensing Pumps	3586
288	Service Industry Machines, NEC	3589
289	Electric Measuring Instruments	3611
290	Transformers	3612
291	Switchgear and Switchboard Apparatus	3613
292	Motors and Generators	3621
293	Industrial Controls	3622
294	Welding Apparatus	3623
295	Carbon and Graphite Products	3624
296	Electrical Industrial Apparatus, NEC	3629
297	Household Cooking Equipment	3631
298	Household Refrigerators and Freezers	3632
299	Household Laundry Equipment	3633
300	Electric Housewares and Fans	3634
301	Household Vacuum Cleaners	3635
302	Sewing Machines	3636
303	Household Appliances, NEC	3639
304	Electric Lamps	3641
305	Lighting Fixtures	3642
306	Wiring Devices	3643 3644
307	Radio and TV Receiving Sets	3651
308	Phonograph Records	3652
309	Telephone and Telegraph Apparatus	3661
310	Radio and TV Communication Equipment	3662
311	Electron Tubes	3671 3672 3673

Input-Output Sector No.	Title	1958 Revised SIC Classification
312	Semiconductors	3674
313	Electronic Components, NEC	3679
314	Storage Batteries	3691
315	Primary Batteries, Dry and Wet	3692
316	X-Ray Apparatus and Tubes	3693
317	Engine Electrical Equipment	3694
318	Electrical Equipment, NEC	3699
319	Truck and Bus Bodies	3713
320	Truck Trailers	3715
321	Motor Vehicles and Parts	3717
322	Aircraft	3721
323	Aircraft Engines and Engine Parts	3722
324	Aircraft Propellers and Parts	37295
325	Aircraft Equipment, NEC	3729,-37295
326	Ship Building and Repairing	3731
327	Boat Building and Repairing	3732
328	Locomotives and Parts	3741
329	Railroad and Street Cars	3742
330	Motocycles, Bicycles, and Parts	3750
331	Trailer Coaches	3791
332	Transportation Equipment, NEC	3799
333	Engineering, Scientific Instruments	3810
334	Mechanical Measuring Devices	3821
335	Automatic Temperature Controls	3822
336	Surgical and Medical Instruments	3841

Table 1 (Continued)

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Input-Output Sector No.	Title	1958 Revised SIC Classification
337	Surgical and Medical Instruments	3842
338	Dental Equipment and Supplies	3843
339	Watches, Clocks, and Watchcases	3870
340	Optical Instruments and Lenses	3830
341	Opthalmic Goods	3850
342	Photographic Equipment and Supplies	3860
343	Jewelry, Silverware, Plated Ware	3910 3961
344	Musical Instruments and Parts	3930
345	Games and Toys	3941 3942 3943
346	Sporting and Athletic Goods, NEC	3949
347	Pens, Pencils, Office, Art Goods	3950
348	Artificial Flowers	3962
349	Buttons, Needles, Pins, Fasteners	3963 3964
350	Brooms and Brushes	3981
351	Hard Surface Floor Coverings	3982
352	Morticians Goods	3988
353	Signs and Advertising Displays	3993
354	Manufacturing Industries, NEC	3983 3984 3987 3992 3995 3999
355	Railroads	4000 4740
356	Local, Suburban, Interurban Transportation	4100
357	Motor Freight Transportation & Warehousing	4200 4730
358	Water Transportation	4400
359	Air Transportation	4500

Table 1 (Continued)

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Input-Output Sector No.	Title	1958 Revised SIC Classification
360	Pipe Line Transportation	4600
361	Transportation Services	4700,-4730,-4740
362	Communication except Radio and TV	4800,-4830
363	Radio and Television Broadcasting	4830
364	Electric Companies and Systems	4910,*4930
365	Gas Companies and Systems	4920,*4930
366	Water and Sanitary Services	4940 4950 4960 4970,*4930
367	Wholesale Trade	5010 5020 5030 5040 5050 5060 5070 5080 5090
368	Retail Trade - General Merchandise	5200 5300 5400 5500 5600 5700 5800 5900 7396,*8099
369	Banking	6000
370	Credit Agencies Other than Banks	6100 6700
371	Security + Commodity Brokers	6200
372	Insurance Carriers	6300
373	Insurance Agents, Brokers, + Service	6400
374	Owner Occupied Dwellings	--
375	Real Estate	6500,$6560 6600
376	Hotels, Rooming Houses, Camps, etc	7000
377	Personal Services	7200,-7230,-7240 7600,-7692, -7694,$7699
378	Barber and Beauty Shops	7230 7240
379	Miscellaneous Business Services	7300,-7310,-7396 7692 7694,*7699
380	Advertising	7310

Table 1 (Continued)

Input-Output Sector No.	Title	1958 Revised SIC Classification
381	Miscellaneous Services	8100 8900,-8920
382	Car Repair Services, and Garages	7500
383	Motion Pictures	7800
384	Amusement + Recreation Services, except Motion Pictures	7900
385	Doctors and Dentists	8010 8020 8030 8040
386	Hospitals	8060
387	Health and Allied Services, NEC	0722 8070 8090,$8099
388	Educational Services	8200
389	Nonprofit Organizations	8400 8600 8920
390	Post Office	--
391	Federal Electric Utilities	--
392	Commodity Credit Corporation	--
393	Other Federal Government Enterprises	--
394	Local Government Passenger Transit	--
395	State and Local Electric Utilities	--
396	Other State, Local Government Enterprises	--
397	Directly Allocated Imports	--
398	Transferred Imports	--
399	Business Travel, Entertainment, Gifts	--
400	Office Supplies	--

Notes:

SIC Classification corresponds to the revised 1958 version. This revision was done in 1963.

* indicates part of

\$ indicates excluding part of

- indicates excluding

-- indicates that no comparable SIC Classification exists

Table 1 (Continued)

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Table 2. Cash Receipts in Millions of Dollars for 1967 for the Agricultural Sectors (1 - 12) by State

	Arizona	Colorado	Idaho	Montana	Nevada	New Mexico	Utah	Wyoming	California	USA
1. Dairies	32.323	45.058	58.557	15.152	7.253	18.754	36.735	6.660	443.129	5742.89
2. Poultry & Eggs	6.614	20.418	10.515	5.471	0.163	4.816	25.620	1.137	326.728	3645.344
3. Meat, Animals and Misc. Livestock,NEC	208.013	608.426	154.165	248.545	39.041	180.112	82.924	153.674	783.923	15238.712
4. Cotton	77.916	0	0	0	0.488	27.408	0	0	173.714	1046.435
5. Food, Feed Grains, Grass Seeds	60.825	98.987	113.778	173.724	9.054	37.875	24.970	17.256	426.006	6848.401
6. Tobacco	0	0	0	0	0	0	0	0	0	1392.410
7. Fruits & Tree Nuts	30.117	2.841	9.232	1.146	0.012	1.966	6.110	0.005	719.648	1843.320
8. Vegetables, Sugar and Misc. Crops	106.792	82.263	165.566	20.331	1.800	26.443	13.470	18.168	855.124	3321.841
9. Oil Bearing Crops	0	0	0	0.228	0	2.547	0	0	0.374	2804.382
10. Greenhouse & Nursery Products	105.17	14.181	0.901	2.376	0.562	1.770	2.392	0.525	192.651	1085.900
11. Forestry & Fishery Products*	121.18	15.848	21.614	19.052	5.401	10.196	9.092	10.829	24.299	227.721

*Figures in this row show acreage of forest land instead of cash receipts

Table 3 - Summary Of Results For Each State

	No. of Sectors In The Model	Total State Gross Output 10^6\$	Gross I/O Table	State Product 10^6\$ Bank[*]	Total[+] Imports 10^6\$	Total[+] Exports 10^6\$	Total Final Demand 10^6\$
USA	400	1,449,078	795,388		26,396[1]	31,528[1]	
Arizona	154	9,590	5,212	5,671	3,646	2,623	8,866
Colorado	192	13,532	7,383	8,016	4,454	3,018	11,855
Idaho	112	4,488	2,136	2,190	1,786	1,680	3,929
Montana	99	4,372	2,117	2,382	1,987	1,491	4,111
Nevada	92	3,571	2,064	2,010	1,538	1,461	3,597
New Mexico	116	5,194	3,038	3,329	2,156	1,545	5,212
Utah	151	5,889	2,978	3,622	2,069	1,257	5,096
Wyoming	83	2,426	1,240	1,233	1,036	994	2,280
California	351	154,851	83,300	88,160	29,800	23,791	113,236

[*]Gross state product figures as estimated by Bank of California

[+]Total imports and exports include interstate (domestic) and foreign figures.

[1]Strictly foreign imports and exports.

Table 4. Number of sectors present in each state economy by major economic groups

	Total No. of sectors in the state economy (no imports)	Agriculture Forestry Fisheries	Mining	Construction	Manufacturing	Transportation Communication Gas & Sanitary Services	Trade	Finance Insurance Real Estate	Services	Government Enterprises	Dummy Industries	Foreign Imports
USA	400	12	44	7	291	12	2	7	14	7	2	2
Arizona	154	10	16	7	91	10	2	6	14	6	2	2
Colorado	192	9	14	7	121		2			6	2	2
Idaho	112	9	12	7	44	10	2	6	14	6	2	2
Montana	99	9	15	7	27	11	2	6	14	6	2	2
Nevada	93	8	15	7	22	11	2	6	14	6	2	2
New Mexico	116	11	19	7	39	10	2	6	14	6	2	2
Utah	152	9	17	7	79	10	2			6	2	2
Wyoming	83	9	9	7	19	11	2	6	13	6	2	2
California	351	10	22	7	269	12	2	6	14	6	2	2

Table 5. Value added by state and for each major group in millions of dollars

	Agriculture Forestry Fisheries	Mining	Construction	Manufacturing	Transportation Communication Electric,Gas & Sanitary Services	Trade	Finance Insurance Real Estate	Services	Government Enterprises	Dummy Industries	Total
USA	24,382	13,490	45,575	224,142	66,317	118,265	110,972	88,506	9,858	90,872	795,388
Arizona	338	202	392	785	419	881	594	693	91	817	5,212
Colorado	459	311	484	1,176	645	1,258	658	898	104	1389.0	7,383
Idaho	389	32	130	402	200	366	146	196	29	246	2,136
Montana	337	95	122	280	250	354	140	182	31	326	2,117
Nevada	49	35	192	89	187	277	223	727	36	224	2,039
New Mexico	181	365	258	157	298	436	197	512	42	592	3,038
Utah	123	159	186	508	323	540	226	249	40	624	2,978
Wyoming	123	216	119	138	161	153	61	81	141	47	1,240
California	2,526	1,160	5,173	20,510	7,534	13,764	7,283	12,943	1,293	11,114	83,300

Table 6. State gross output of the seven energy producing sectors in millions of dollars

	Crude petroleum	Natural gas	Coal (bituminous)	Refined petroleum	Electric utilities	Gas utilities	Natural gas liquids
USA	11408	2100	2995	25816	19698	14075	1523
Arizona	8	S	S	0	135	126	0
Colorado	260	48	34	80	199	31	30
Idaho	0	0	0	0	102	68	0
Montana	45	8	1	144	102	44	0
Nevada	0	0	0	0	87	26	0
New Mexico	227	42	9	81	95	154	42
Utah	34	6	34	179	109	70	0
Wyoming	234	45	5	375	58	49	0
California	1255	231	0	3207	1886	1384	79

S - Indicates an output of less than one-half million dollars.

APPENDIX III

GUIDE FOR READING THE INTERINDUSTRY MICROFICHE

APPENDIX III

SUBJECT: Guide for reading the interindustry microfiche

The fiche has both the input and output variables which are included in the FLOW program. Each fiche contains 280 frames. The variables are arranged in the following order.

INPUT:

1. List of 400 labels signifying the 400 sectors of the national economy. These include the first 336 I/O sectors (from the 367 order tables published by BEA) and the additional 44 minerals sectors.

2. The deleted rows indicate the sectors not present in the state economy. The foreign import rows are excluded from the main body of the table but are included in the fiche below the table.

3. The regional gross output vector is a 400 order vector of gross outputs for the state.

4. The national gross output vector is a 400-order vector. This vector is a modified version of the 367-order vector published by BEA for 1967.

5. State final demand is subdivided into four final demand vectors (400-order), personal consumption expenditure, public and private fixed capital formation, federal goverment expenditure, and state and local goverment expenditure.

6. A 400-order national value added vector is read in. This is a modified version of that published in the BEA input-output study for 1967.

OUTPUT:

The remaining frames contain the input-output matrix for the state. The matrix is present column-wise. Each frame has the row sector number, the row labels and eight columns numbered corresponding to the row label. The rows are labelled according to the number of sectors present in the state economy. For example California has 351 sectors in the state economy. The next row (no. 352 for California) is the intermediate output row. This row is the total of the 351 sectors appearing in each column and represents the total input to each column sector, of commodities produced within the state.

The following row is the sectoral imports row. It represents the imports of commodities which are also produced within the state. The next few sectors, up to the directly allocated imports row, are sectors not present in the state economy. Products of these sectors have to be entirely imported from other states. Foreign imports in this table are also based on the national coefficients. However, as imports do not form part of the production function, the foreign imports row is at best a crude estimate of the products actually being imported in each state.

The value added row represents the GNP part of the inputs to each column. This is also based on the national coefficients. Statistical error row indicates gross discrepancies in the data. These could arise due to inconsistent or incorrectly input data. Finally the gross output row indicates the row total for each column.

The first 351 columns for California indicate the flows into each sector (column). The next column is the intermediate outputs column followed by personal consumption expenditure, gross capital formation, federal government purchases, state and local government purchases, total exports, total final demand, gross output and total imports. Total exports are to be distinguished from net exports as they appear in the national I/O table published by BEA. As cross hauling is not accounted for, exports and imports cannot appear in the same row. Total final demand is the sum of the four preceding numbers in each row. Imports have negative signs preceding the number to distinguish them from the exports.