

**Country Input-Output Models  
For the State of Wyoming:  
With Analysis of New Industries And  
New Construction Impacts**

**By John R. McKean  
And  
Agricultural Enterprises, Inc.**

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COUNTY INPUT-OUTPUT MODELS FOR THE STATE OF WYOMING: WITH  
ANALYSIS OF NEW INDUSTRIES, AND NEW CONSTRUCTION IMPACTS

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## CHAPTER 1

## INTRODUCTION

The purpose of this report is to provide a description and analysis of the economies of the counties within the State of Wyoming. The intent of the research is to provide administrators and policy makers with specific information contributing to the decision-making and planning processes and to provide a planning tool having the capability of analyzing a number of alternative development scenarios in the study region.

THE REGION UNDER STUDY

The study area consists of each of the counties in the state of Wyoming (excluding Teton county) and the state in its entirety.<sup>1</sup> In addition to the twenty three separate input-output models presented, the IMS microcomputer program, designed for this study, has the capability to combine any subset of Wyoming counties to form regional models for Wyoming.

Major exports from the state include: oil and gas products, wholesale, households (interest and transfer income), coal mines, other mining, manufacturing, retail, cattle production, other services, and agricultural production. The region imports most finished consumer products, heavy industry products, and non-agricultural ingredient materials. The manufacturing sector is dominated by energy and agricultural processing and other sectors, such as wholesale, include extractive products. Thus, extraction and agribusiness are primary economic sectors of the region.

STATEMENT OF THE PROBLEM

The natural resource base in the region, while relatively abundant in terms of the capability to satisfy local demands, is nonetheless the focal point for regional and extra-regional economic conflict. Ownership of large deposits of exploitable resources, is vested mainly with federal government, or large corporations headquartered out of state. Policies affecting the development of these resources, are the responsibility of these agencies and firms and the State of Wyoming. From this perspective, there is a need to develop a detailed description of the economy as it presently exists and an analytical framework which is capable of assessing the direct and indirect consequences of alternative scenarios for resource exploitation proposed by public and private sectors of the economy. This description and analysis constitutes the major thrust of the

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<sup>1</sup> The counties are: Albany, Big Horn, Campbell, Carbon, Converse, Crook, Fremont, Goshen, Hot Springs, Johnson, Laramie, Lincoln, Natrona, Niobrara, Park, Platte, Sheridan, Sublette, Sweetwater, Uinta, Washakie, and Weston.

research reported here.

#### THE MODEL USED

A tool particularly adapted to these questions is the comprehensive interindustry production model, commonly known as an input-output (I/O) model, developed by W. W. Leontief. The strength of this technique lies in its capability not only to describe the economic interdependence existing among sectors of an economy but also the capacity to measure, sector by sector, the direct and indirect economic consequences of alternative development scenarios. The method is thus both descriptive and analytical. The descriptive phase is accomplished through the collection of extensive primary and secondary data, from firms and agencies in Wyoming, and subsequent tabulation of the data in the form required by the I/O framework. The analytical phase consists of impact analysis, the development of various multipliers, and consistent forecasting under alternative development scenarios.

#### REVIEW OF I/O APPLICATIONS

Input-Output comprises both a well defined system of economic accounts and a tool for economic analysis and forecasting. I/O data are useful both as a consistent descriptor of an economy and all its component parts, and as a tool of economic analysis. The transactions-among-sectors table depicts the economic structure and interdependencies among industries and agencies of a region. The table shows who the major customers are for each industry and what the major input needs are for each industry. Two other tables are simple distributions derived from the transactions-among-sectors table. The direct input requirements table shows purchases distributions representing the technology and trade patterns for each industry. These are the direct or initial input requirements for an industry to expand production. The sales distribution coefficients show the same transactions data in terms of percentages of total output sold to the industries in the economy. Thus the major sources of demand to each industry can be discerned.

The focus of I/O analysis is the cumulative interdependent nature of expansion or contraction of an economy. The Leontief inverse matrix shows the direct plus indirect, i.e. total, input requirements from each industry when a given industry expands. The inverse or total requirements coefficients table also implies that without positive gross sales to final demand, i.e. positive industry exports, investment or government spending, the exchange economy will not exist. This component of I/O analysis examines the backward linkages among sectors, i.e. the increased input requirements when exogenous final demand increases. Forward linked effects may also be studied, where creation of a new supply of inputs allows dependent industries to be created or to expand. Supply driven analysis with the I/O framework depends critically on the assumptions made concerning the strength of the forward links. The model data do not provide this information and

such applications are relatively rare.

Business multipliers are calculated by adding column elements of the total requirements table to show the total spending created in the region when a given industry expands sales to final demand. In a similar fashion, summing the column elements of resource requirements multiplier matrices shows the total resource demands that are created when any given industry expands. Resources analyzed in this fashion may include both physical and monetary variables ... workers, energy, water, imports, savings, or any input which rises proportionately with industry production. For example, an imports requirements multiplier may show that when a particular industry expands sales to exports, the stimulus to the economy may result in total imports rising almost as much as the initial increase of exports. Expanding this industry would not improve the balance of trade. Bottlenecks to expansion for any industry also can be identified from the total requirements table by checking across the rows for each industry to see if large direct, indirect, and induced requirements exist for critical industry inputs, such as energy, skilled labor, or other scarce resources. Constrained optimization of a particular regional economic goal, such as maximum trade surplus to create growth of regional wealth, maximum growth of regional product, payroll, or employment, is possible by combining I/O models and linear programming. The linear program can include both physical resource and monetary technical constraints (shown by the direct input requirements table) which affect the optimal mix of high growth industries.

I/O is most often used to create economic forecasts and impact analyses when growth is caused by changes of industry exports and/or investment and government spending. The I/O forecast generates a new transactions table for the economy showing the interindustry spending that is required to support the new sales to final demand.

A different formulation of the same I/O data can also be used to calculate the inflationary impacts on each intermediate processing sector due to changes in prices on primary inputs. For example, changes in import prices such as are caused by changes in prices on imported goods, falling exchange rates, or the imposition of tariffs, create direct and indirect cost effects throughout the economy.

New technology or entire new industries can be simulated with the I/O model through the use of "phantom sectors." If the new sector sells its output entirely to final demand one can build in a new column showing the purchases distribution with total purchases set to a nominal amount (say \$10,000) with matching sales to final demand. To see the effect of the new industry on other sectors and on the total economy, simply expand the exogenous final demand sales for the phantom sector.

The emergency preparedness planning for a region or nation is facilitated though the use of I/O tables which show the critical inputs directly and indirectly needed to maintain essential services for a society and for an economy. The effects

of a catastrophe can be mitigated if plans based partly on I/O total requirements coefficients are in place. These examples of I/O applications show that the I/O technique is adaptable to a very wide range of economic issues and questions.

#### OUTLINE OF THE REPORT

The remainder of the report consists of a description of the method of study which is presented in Chapter 2; new induced construction sectors described in Chapter 3; the analysis of the state and county regional economies, including sales revenues, payroll, employment, profit, rents and savings, and balance of trade or wealth impacts, which is the concern of Chapter 4; a phantom sector analysis to study the potential impacts of new industries in chapter 5; and an example coal mine construction impact forecast including a two step process to include induced infrastructure construction investment spending in Chapter 6.

In addition to the main text of the report, there are several appendices. These contain detailed sector descriptions, the I/O tables, and the survey form.

## LITERATURE AND SOURCES CITED IN CHAPTER 1

Leontief, Wassily. Input-Output Economics. New York: John Wiley and Sons, 1931.

\_\_\_\_\_. "Quantitative Input-Output Relations in the Economic System of the United States." Review of Economics and Statistics, 18, no. 3 (August 1936):105-25.

\_\_\_\_\_. "Structure of the World Economy." American Economic Review, 64, no. 6, (December 1974):823-34.

Leontief, Wassily, et. al., Studies in the Structure of the American Economy. New York: Oxford University Press, 1953. Reprinted. White Plains International Arts and Sciences Press, 1976.

## CHAPTER 2

## THE METHODOLOGY OF THE STUDY

INTRODUCTION

The national energy situation has focused increasing attention on the energy resources of Wyoming. Agricultural production and processing also constitute an important type of resource development for the region. The economic consequences of exploration, development, and extraction activities associated with petroleum, coal and minerals and the development of the renewable resources of agriculture cannot be understood in isolation from the remainder of the economic environment. A major product of the I/O research is the provision of the analytical capability for assessing the regional impacts of continued resource development.

The interindustry production model (I/O model) popularized by W. W. Leontief is particularly adapted to the study of resource use in a regional economy. This model's strength is its capability to empirically illustrate the interdependent input requirements existing among sectors of an economy. I/O models measure both the direct and indirect requirements created by a change in sales to final demand on a sector-by-sector basis, thus showing the total consequences of any number of development scenarios.

The I/O model provides an account of transactions for each sector of the economy, a calculation of the input requirements of these sectors, and a measurement of the effects of growth in demand for the outputs of each sector. Essentially, the model is a system of double entry bookkeeping in which annual sales and purchases by each sector to and from all other sectors are accounted for and measured. The model consists of two major components: intermediate processing transactions are the purchase and sale of intermediate goods, which are subject to further local processing. Final transactions include all sales and purchases from or to sectors that are external to the model and not identified as intermediate processing sectors. The sectors which are usually included in final transactions include exports, new investment, federal and state government, and under certain circumstances, households.

The I/O model is driven by changes in the sales made to final demand sectors. Any particular sector's sales to exports, state or federal government, or investment creates input requirements from local industry to allow expansion of the sector's output. The I/O model estimates the effects of these changes throughout the entire economy. The impacts, whether measured in terms of income, employment, or value of production, are consistent estimates that mutually and simultaneously satisfy all requirements for intermediate and final production. Once the model's essentials have been identified and the basic empirical description of economic transactions developed, forecasting with

the I/O technique requires only the specification of expected changes in sales to final demand.

The I/O model provides two forecasting tools: multipliers and development scenarios. A multiplier is an aggregate concept which shows how much total business activity in sales dollars, employment, water requirements, etc. is generated by a given industry within the region for each dollar of its sales to final demand. A multiplier will be large for an industry that purchases, directly or indirectly, a large amount of its inputs from within the local economy since the money which the industry earns from its sales will be spent again in the region. The most important "basic" or driving export industries will usually be characterized by large multipliers as local supply sectors develop to serve the exporting industry.

Several types of multipliers may be calculated. The business multiplier shows the total business spending (income) within the region per dollar of additional sales to final demand by a given industry. An employment multiplier shows the total added full time equivalent person years of labor required in the region per dollar of additional sales to final demand by a given industry. Some other variables which may be incorporated into multipliers include; payroll, water withdrawal and consumptive use requirements, energy requirements, taxes, rent and profit or imports.

The multipliers all include direct, and indirect effects. If households are incorporated into the intermediate processing part of the model (as apposed to being included as a final demand sector), then the multipliers will also include an "induced" effect. The induced effects represent the respending of income in the region by households (workers) just as the other intermediate processing sectors spend their earnings partly in the region to buy needed inputs. For example, if a "basic" industry expands its sales to exports by \$1 million, it may spend \$600,000 directly on locally produced goods and local labor. The producers of these goods, and new local hired labor inputs, then are indirectly required to purchase more local goods and services to allow them to expand output to meet this new demand. Thus, the initial expansion of sales to exports by the basic industry results in a cumulative expansion of the local economy as added sales reciprocate throughout the region's economy. The total aggregate effect on spending, employment, or other requirements is reflected by the appropriate I/O multiplier.

The second forecasting tool provides a projection of future business activity by sector. Once again, estimates of expected changes in sales to final demand by each industry are required. The I/O model then projects an entire new transactions table which reflects the new final demand sales and also incorporates the new sales among the intermediate processors in response to the changed input requirements as industries adjust to the new final demands. In addition to the industry transactions table, variables, such as employment or water requirements, which vary with total sales by sector may also be projected.



I/O forecasts of regional economic activity are derived by focusing on the "basic" or driving industries. Examination of the size and expected growth of local exporters along with the size of their multipliers reveals the key sectors. Growth of government sectors such as schools, state or federal offices, military bases and the like may also provide stimulus to a regional economy. Estimates of expected export growth and related new investment spending must be obtained independently to drive the I/O model. Scenarios for growth of these sectors might be obtained from personal interviews with representatives of major firms in each sector. Government growth estimates are often available directly from the appropriate government agencies. The expected export changes for basic industry and government are introduced into the I/O model to generate new, consistent estimates of the value of sales among all industries in the region.

#### PROCEDURES FOLLOWED

The discussion of procedures followed in conducting the research may be conveniently condensed into several categories including: delineation of economic sectors, questionnaire design and use, selection of the base year, the data collection effort, and data processing. Each is discussed as briefly as possible in the following pages.

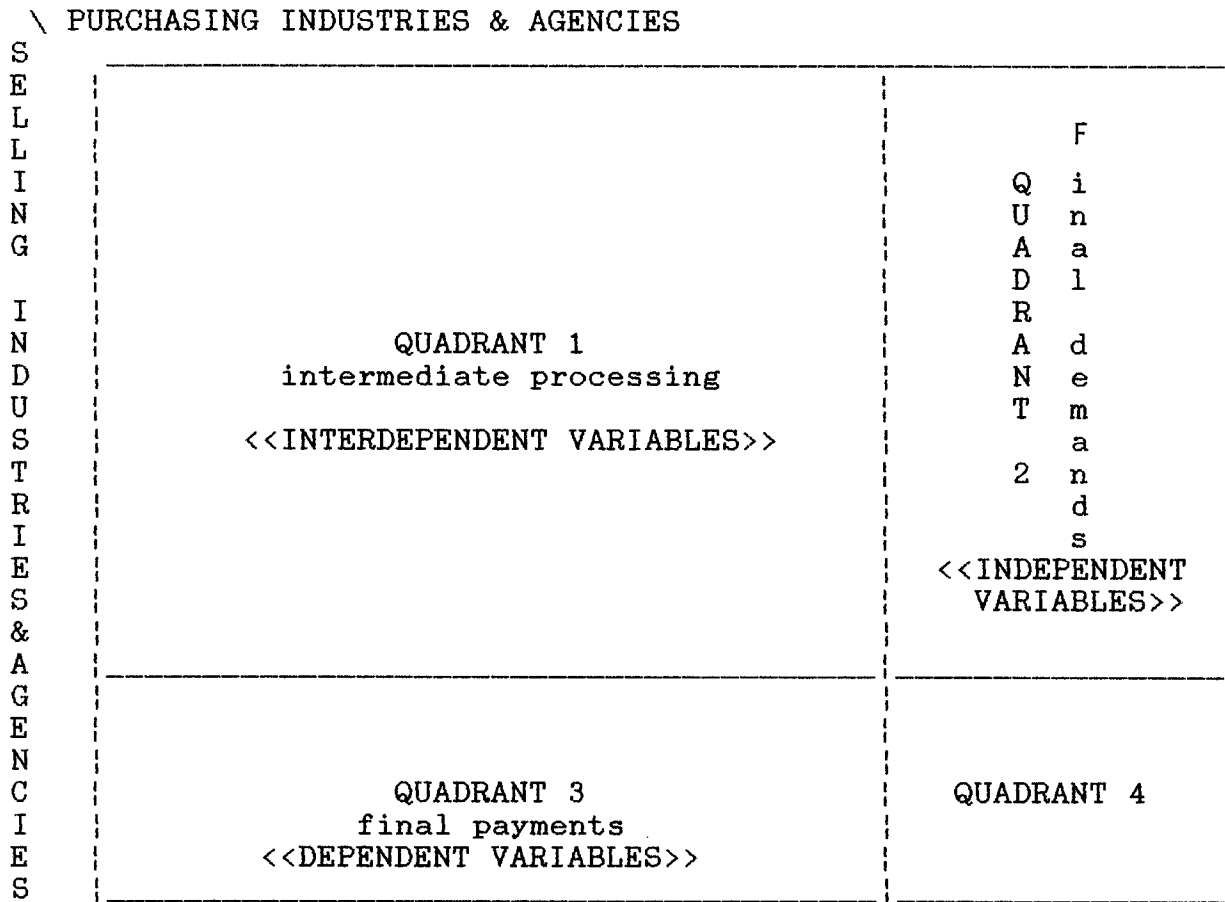
#### SECTOR DELINEATIONS

The I/O model requires the separation of the economy into various economic entities or "sectors." Total output, by industry accounting procedures, is the aggregate value of all sales or purchases that take place, typically the total sales or purchases made during a year. This total output must be divided up into industry sectors in order to assess the interindustry structural dependence that prevails in a region. The model structures economic activity into major components; suppliers (sellers), and purchasers (users). Each of these is further subdivided according to the scheme shown in figure 2-1.

Suppliers include: 1) intermediate processors who are producers who must purchase inputs to be processed into output which they sell to final users or as inputs to other intermediate processors (quadrant 1 of figure 2-1) ; and 2) primary suppliers whose output production is not directly dependent upon locally produced inputs (quadrant 3 of figure 2-1). This latter category includes non-local suppliers, i.e. imports.

Purchasers include: 1) intermediate processing purchasers who buy the outputs of suppliers for use as inputs for further processing; and 2) final purchasers who buy the outputs of suppliers in their final form and for final use. This latter category includes purchases by non-local users (i.e. sales to exports). The level of demand by final purchasers, and its composition, are determined outside the local processing sector. Local production to meet the exogenously determined changes in final demands generates local purchases and sales.

Figure 2-1. SCHEMATIC OF AN I/O TRANSACTIONS TABLE  
SHOWING THE FOUR QUADRANTS OF ACCOUNTS



In summary, the two major divisions of suppliers are the intermediate suppliers, whose transactions are displayed in the intermediate processing quadrant, and the primary suppliers whose transactions are displayed in the final payments quadrant. (see figure 2-1) The suppliers names are conventionally shown along the left border of the transactions-among-sectors table while the purchasers names are shown at the top of the table. Thus industry purchases are shown down columns of the table and sales are shown across rows.

The two major divisions of the purchasers are the intermediate purchasers, which are labeled as the intermediate processing quadrant, (shown in quadrant 1 of figure 2-1 just as with the intermediate suppliers) and the final purchasers which are shown in the final demand quadrant (quadrants 2 and 4 of figure 2-1). It is within this general framework that a further detailed industry and agency disaggregation must be accomplished.

From the model user standpoint, the ideal industry delineation would allow unique recognition of producer groups which provide a homogeneous product or service. However, from the

Table 2-1. Wyoming Models, Standard Industrial Classification Codes by Sector

<u>I-O Sector</u>	1972 S.I.C. <u>codes</u>	<u>Definitions</u>
7-19 Agric.	01	Agricultural Production - Crops <sup>1</sup>
	02	Agricultural Production - Livestock <sup>1</sup>
	07	Agricultural Services <sup>2</sup>
20 Forestry	08	Forestry
21 Coal Mine	12	Bituminous Coal and Lignite Mining
22 Oil/Gas	13	Oil and Gas Extraction <sup>4</sup>
23 Other Mine	10	Metal Mining
	14	Mining and Quarrying of Nonmetallic Minerals, Except Fuels (all of 14 except 144)
24 Const.	15	Building Construction - General Contractors
	16	Construction Other Than Building <sup>5</sup>
	17	Construction - Special Trade Contractors
	144	Sand and Gravel
25 Manuf.	20	Food and Kindred Products
	23	Apparel and Other Finished Products made from cloth and Similar Materials
	24	Lumber and Wood Products, Except Furniture
	25	Furniture and Fixtures
	26	Paper and Allied Products
	27	Printing, Publishing and Allied Industries
	28	Chemicals and Allied Products
	29	Petroleum Refining and Related Industries
	30	Rubber and Miscellaneous Plastics Products
	31	Leather and Leather Products
	32	Stone, Clay, Glass and Concrete Products
	33	Primary Metal Industries

<u>I-O Sector</u>	1972 S.I.C. <u>Codes</u>	<u>Definitions</u>
	34	Fabricated Metal Products, Except Mach. and Transport. Equipment (includes ordnance) <sup>6</sup>
	35	Machinery, Except Electrical
	36	Electrical and Electronic Machinery, Equipment
	37	Transportation Equipment
	38	Measuring, Analyzing, and Controlling Instruments; Photographic, Medical, and Optical Goods; Watches and Clocks <sup>7</sup>
	39	Miscellaneous Manufacturing Industries
26 Trans/Comm	41	Local and Suburban Transit and Interurban Highway Passenger Transportation
	42	Motor Freight Transportation and Warehousing
	43	U.S. Postal Service <sup>8</sup>
	44	Water Transportation
	45	Transportation by Air
	46	Pipe Lines, Except Natural Gas <sup>9</sup>
	47	Transportation Services <sup>10</sup>
	48	Communication
27 Elec./Gas	491	Electric Services
	492	Gas Production and Distribution
	493	Combination Electric and Gas, and other Utility Services
28 Wholesale	50	Wholesale Trade - Durable Goods <sup>11</sup>
	51	Wholesale Trade - Nondurable Goods <sup>11</sup>
29 Retail	52	Building Materials, Hardware, Garden Supply and Mobile Home Dealers <sup>12</sup>
	53	General Merchandise Stores <sup>13</sup>
	54	Food Stores
	55	Automotive Dealers and Gasoline Service Stations
	56	Apparel and Accessory Stores
	57	Furniture, Home Furnishings, and Equipment Stores
	58	Eating and Drinking Places
	59	Miscellaneous Retail Stores <sup>14</sup>
30 F.I.R.E.	60	Banking
	61	Credit Agencies Other Than Banks
	62	Security and Commodity Brokers, Dealers, Exchanges, and Services
	63	Insurance <sup>15</sup>

<u>I-O Sector</u>	1972 S.I.C. <u>Codes</u>	<u>Definitions</u>
	64	Insurance Agents, Brokers, and Service
	65	Real Estate <sup>16</sup>
	66	Combinations of Real Estate, Insurance Loans, and Law Offices
	67	Holding and Other Investment Offices <sup>17</sup>
31 Other Svcs	70	Hotels, Rooming Houses, Camps, and Other Lodging Places
	72	Personal Services
	73	Business Services <sup>18</sup>
	75	Automotive Repair, Services, and Garages <sup>19</sup>
	76	Miscellaneous Repair Services
	78	Motion Pictures
	79	Amusement and Recreation Services, except Motion Pictures
	81	Legal Services
	83	Social Services <sup>21</sup>
	84	Museums, Art Galleries, Botanical and Zoological Gardens
	86	Membership Organizations <sup>22</sup>
	88	Private Households
	89	Miscellaneous Services
32 Education	82	Educational Services
33 Health Svc	80	Health Services <sup>20</sup>
34 Wat\Sew\Tr	494	Water Supply
	495	Sanitary Services
	497	Irrigation Systems
36		Households
35, 37, 38 Local,	91	Executive, Legislative, and General Govt., Except Finances <sup>23</sup>
State,	92	Justice, Public Order, and Safety <sup>23</sup>
Fed. Gvt.	93	Public Finance, Taxation, and Monetary Policy <sup>23</sup>
	94	Administration of Human Resources Programs <sup>23</sup>
	95	Administration of Environmental Quality and Housing Programs <sup>23</sup>
	96	Administration of Economic Programs <sup>23</sup>
	97	National Security and International Affairs <sup>23</sup>
39 Rents		

<u>I-O Sector</u>	1972 S.I.C. <u>Codes</u>	<u>Definitions</u>
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44 Loc Imp

45 World Imp

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Footnotes to table 2-1

1 Listed in 1967 edition as: 01 Agriculture Production (Crops and Livestock).

2 Listed in 1967 edition as: 07 Agriculture Services and Hunting and Trading.

3 Listed in 1967 edition as: 09 Fisheries.

4 Listed in 1967 edition as: 13 Crude Petroleum and Natural Gas.

5 Listed in 1967 edition as: 16 Construction Other than Building Construction - General Contractors.

6 Listed in 1967 edition as: 34 Fabricated Metal products, except Ordnance, Machinery, and Transportation Equipment.

7 Listed in 1967 edition as: 38 Professional, Scientific, and Controlling Instruments; Photographic and Optical Goods; Watches and Clocks.

8 Not listed in 1967 edition.

9 Listed in 1967 edition as: 46 Pipe Line Transportation.

10 Listed in 1967 edition as: 47 Transportation Services (includes stockyards).

11 Listed in 1967 edition as: 50 Wholesale Trade (Durable and Nondurable Goods).

12 Listed in 1967 edition as: 52 Building Materials, Hardware, and Farm Equipment Dealers (includes plumbing, heating, electric supplies).

13 Listed in 1967 edition as: 53 Retail trade - General Merchandise (includes mail order houses, door-to-door selling, and vending machines).

14 In the 1972 edition mail order, direct selling, and vending machines are listed in Group 59.

- 15 Listed in 1967 edition as: 63 Insurance Carriers.
- 16 Listed in 1967 edition as: 65 Real Estate (1972 edition does not include Operative Builders).
- 17 Listed in 1967 edition as: 67 Holding and Other Investment Companies.
- 18 Listed in 1967 edition as: 73 Miscellaneous Business Services.
- 19 Listed in 1967 edition as: 75 Automobile Repair, Automobile Services, and Garages.
- 20 Listed in 1967 edition as: 80 Medical and Other Health Services.
- 21 Not listed in 1967 edition.
- 22 Listed in 1967 edition as: 86 Non-profit Membership Organizations.
- 23 Major Groups 91-94 were listed in the 1967 edition as follows: (91) Federal Government, (92) State Government, (93) Local Government, (94) International Government.

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standpoint of forecasting accuracy it is desirable to group firms together that have similar input requirements. Since these two goals may not be mutually consistent and due to the large amounts of time and resources required for detailed disaggregation, the necessity for confidentiality of individual firm data, and /or lack of data, the actual sector definitions are a compromise. In addition to the above listed factors, sector selection is determined to a large extent by the objectives of the study. Research objectives can often be achieved without detailed disaggregation of all industries. Since the purpose here is largely to determine the impacts of resource development such as extraction and agriculture, other sectors such as trade and services do not require detailed disaggregation. The final delineation of the sectoring plan adopted for this study and the Standard Industrial Codes (SIC) applicable to each sector are shown in Table 2-1. A more detailed description of each sector is shown in Appendix II.

Where enterprise accounting was employed, the profit sector includes after-tax profits, charges to reserves for bad debts, capital loss amortization, and outlays for rents and royalties. Where government fund accounting was employed, the profit sector includes surplus of current revenues over current expenditures, the value of capital expenditures appropriated out of current revenues, net charges out of current revenues to any other

reserve fund (e.g., contingency funds) , and rent payments. The profit sector also includes both depreciation and net inventory depletions. Inventory depletions are relatively speaking, insignificant and are placed with depreciation charges. Similarly, the net inventory accumulation values were incorporated in the investment sector.

With the exception of the intersection of the household row and the agricultural production columns, the household row represents wages and salaries paid subject to withholding. The household cells of the agricultural production sectors also includes estimated self employment earnings. Household incomes are understated in certain industries such as trade and services since data on self employment income are not available at the level of disaggregation required by the I/O model. Incomes which cannot be allocated by industry are included in household exports.

#### QUESTIONNAIRE DESIGN AND USE

Previous experience has shown that a questionnaire, alone, should not be used to obtain primary data. No firm accounts for expenditure and revenue patterns on a Standard Industrial Classification (SIC) basis, the language ultimately employed in an interindustry model. Rather, a firm's books are designed around process or product activities. The use of a questionnaire, either by mail or by personal interview, presupposes adequate translation from a firm's accounting language into SIC codes.

Accordingly, all interviews were conducted in a basic accounting language tailored to the individual firms involved and were translated into SIC classification by the researchers. Not all interviews can be conducted as planned. For example, some firms may want legal advice before participating, while others need more time to collect data. A questionnaire, therefore, was designed for use as an interview focal point and as an item that could be left with the firm.

The questionnaire's cover sheet briefly explained the research in a non-technical manner. Outlay patterns were requested on the second and third sheets along with a geographic distribution of sales, full time equivalent employment, water intake, capital outlay, and future plans. Sales and outlay patterns were also regionalized into the county where the firm is located, the remaining counties of Wyoming (specific counties designated) or rest of the world. A copy of the I/O questionnaire form is included in Appendix II.

#### SELECTION OF THE BASE YEAR

The 1984 base year for the Wyoming survey was selected to match our recent I/O survey efforts in Montana since regional combinations of the south east Montana I/O model with I/O models for various counties in Wyoming were planned. Interviewing for the Wyoming and the south east Montana I-O model began in 1985. Calendar year 1984 was the most recently completed accounting cycle for most firms; it was anticipated that the information



from this cycle would be, qualitatively speaking, foremost in the command of the interviewees. Also, activities of relatively new firms and recent changes by existing firms were automatically incorporated in the primary data base by soliciting what was then the most current information.

#### SCOPE AND CONDUCT OF THE SURVEY

The initial data base for the county by county I/O models was collected over a period of years under several contracts with the Bureau of Land Management. A final contract with the State of Wyoming resulted in the disaggregation of county rather than regional I/O models for Wyoming. The following studies provided the initial data base: The Economy of Albany, Carbon and Sweetwater Counties, Wyoming, Description and Analysis, Bureau of Land Management Contract, Economics Department, Colorado State University with Centaur Management Consultants, Inc., August 1980; The Economy of Albany, Carbon and Fremont Counties, Wyoming: Rawlins BLM District, Bureau of Land Management Contract, Economics Department, Colorado State University, November 1982; The Economy of Big Horn, Hot Springs, Park, and Washakie Counties, Wyoming: Worland BLM District, Bureau of Land Management Contract, Economics Department, Colorado State University, November 1982; The Economy of Lincoln, Sublette, Sweetwater, and Uinta Counties, Wyoming: Rock Springs BLM District, Bureau of Land Management Contract, Economics Department, Colorado State University, November 1982; The Economy of Eastern Wyoming: Casper BLM District, Bureau of Land Management Contract, Economics Department, Colorado State University, November 1982. The latter contract covered the following nine counties: Campbell, Converse, Crook, Goshen, Johnson, Natrona, Platte, Sheridan, and Weston. The above listed studies covered every county in Wyoming except for Teton. The counties are: Albany, Big Horn, Campbell, Carbon, Converse, Crook, Fremont, Goshen, Hot Springs, Johnson, Laramie, Lincoln, Natrona, Niobrara, Park, Platte, Sheridan, Sublette, Sweetwater, Uinta, Washakie, and Weston. These I/O studies are documented in Technical Reports Numbers 21, 36, 40, 41, 42 and 43, by Colorado Water Resources Research Institute, available at the Bulletin Room, Colorado State University, Fort Collins, Colorado 80523.

Each of the studies listed above involved several field interviewers over a period of 3 months or more in addition to other workers compiling secondary data from public documents, tabulating the results and providing computer data processing. Interview schedules were arranged by telephone between three days and a week in advance. Every effort was made to gain an interview with the person who would have the immediate authority to release firm information. The length of time spent on an individual interview varied from firm to firm. A few were conducted in less than an hour; some took place over several days.

The contract with the State of Wyoming required reaggregation of the survey questionnaires collected in these earlier surveys and updating of sectors which either had extreme price changes or

had large changes in the levels of their current activity. In addition, new surveys were conducted to fill in individual county data where a larger sample size appeared desirable to achieve representative data for a county.

#### PROCESSING THE DATA

Information gathered on the outlay and sales patterns for any given enterprise was tabulated to conform to the sector definitions and regional descriptions as defined in table 2-1. Care was exercised at this step to assure a balance between firm outlays and sales. Any anomalies were checked and corrected before proceeding further.

The next step was to aggregate questionnaire forms within a sector and to expand the information to represent total gross flows. An iterative process was used to accomplish this so that the relative composition of a given sector delineated for the Wyoming I/O models would be more truly reflected. The final iteration produced gross flow patterns for the respective sectors delineated in the model. The gross flows identified in this manner provide the border totals for the initial transactions statement.

Reconciling discrepancies in any given transactions cell is to be expected; only if the research yielded perfect knowledge about outlays and sales would this be avoided. A discrepancy can emanate from one of several sources or a combination thereof. The sales or purchases of one industry to or from another can be misrepresented, or the total gross output value for individual sectors can be in error. In the former case other rows and columns are affected by the error. In the latter, there is an aggregate distribution error in both outlays and sales for the sector. Each discrepancy is examined individually and reconciled on a case-by-case basis. Fortunately, the sources of relatively large discrepancies could be isolated and remedied through additional examination. Small discrepancies were reconciled by using imports from and exports to the rest of the world as residual accounts.

### THE COMPUTER DATA PROCESSING SYSTEM

Data processing for the I/O model was accomplished using IMS, a user-friendly software package for microcomputers. This program, copyrighted by Kenneth E. Johnson in 1987, is supplied by Agricultural Enterprises, Inc., Fort Collins, Colorado.

Program IMS is an interactive micro computer program which uses permanent files containing transactions-among-sectors data for as many as 110 industry sectors. These data files are created and stored by the user of the IMS program. The data files can be retrieved at any time for further analysis by user selection from the alphabetized file catalog displayed by the IMS program. The program responds to user commands to retrieve and display numerous descriptive tables showing transactions, and business and income multipliers, input and sales coefficients and resource requirements (such as employment by industry) with the analysis menu selection. The forecast menu selection allows the user to enter changes in final demand in order to make economic projections of transactions, and resource requirements. Up to 30 resource requirement vectors that vary proportionately with industry sales may be projected in this manner. The user must first estimate changes in investment and construction spending, exports and state or federal spending in each sector of the model and enter these final demand data to enable the program to calculate a new transactions-among-sectors table and new employment or other resource requirements. All data entries are in response to user-friendly prompts. It is important to note that complete and accurate changes in final demands must be entered if the IMS program is to provide accurate economic projections. All output from the IMS program can be directed to monitor screen, printer, or permanent file on floppy or hard disk or any combination of these peripheral components.

## LITERATURE AND SOURCES CITED IN CHAPTER 2

- Auld, D.A.L., G. Bannock, R. E. Baxter, and R. Rees. 1983. The American Dictionary of Economics. Facts On File Inc. NY, NY.
- Bureau of Budget. 1987. Economic Report of the President. U.S. Government Printing Office, Wash. DC.
- Bureau of Economic Analysis. 1983. Local Area Personal Income. U.S. Government Printing Office, Wash. D.C.
- City Budgets for 1984 for towns and cities in the study region. Various Cities.
- Community Services Administration. U.S. Government Printing Office. Wash. D. C. Federal Outlays in Wyoming. Annual.
- County Budgets for 1984 for counties in the study region. Six counties.
- Czamanski, Stan. 1973. Regional and Interregional Social Accounting. Lexington Books, Lexington Mass. 204p.
- Federal Deposit Insurance Corporation. Bank Operating Statistics. 1983.
- Federal Savings and Loan Insurance Corporation. Summary of Savings Accounts by Geographic Area. Sept. 1982. Wash. D.C.
- Gomme, F. R., B. R. Weber. 1986. World Wheat Review and the Domestic Outlook. Annual Agricultural Outlook Conference, U.S. Dept. of Agriculture Econ. Research Service. Wash. DC. p1-12.
- Hudson, W. J. 1986. Feedgrains Outlook 1987; An Industry View. Annual Agricultural Outlook Conference, U.S. Dept. of Agriculture Econ. Research Service. Wash. DC. p13-24.
- Interstate Commerce Commission, Bureau of Accounts. U.S. Government Printing Office, Wash. D.C. Transport Statistics of the U.S. Railroads Part 1. 1983.  
Motor Carriers Part 2.
- Leven, C. L. 1961. Regional Income and Product Accounts: Construction and Application. IN W. Hochwald (ed.) Design of Regional Accounts. Johns Hopkins Press, 148-195.
- Levitt, Charles. 1986. Alternative perspective on the meat outlook. Annual Agricultural Outlook Conference, US Dept. of Agriculture Econ. Research Service. Wash. DC. p15-22.

McKean, John R., Interindustry Modeling System (IMS) User Manual. Agricultural Enterprises, Inc. 1987.

Miller, Ronald E. and Peter D. Blair. 1985. Input-Output Analysis: Foundations and Extensions. Prentice-Hall, Englewood Cliffs, New Jersey. 464p.

Wyoming Statistics. 1985, 1984 and earlier years. Wyoming Department of Agriculture.

Paull, Mary K. and E. Pantos. 1986. Annual Outlook for U.S. Coal 1986: With Projections to 1995. Energy Information Administration, Office of Coal, Nuclear, Electric and Alternative Fuels, U.S. Dept. of Energy. Wash. DC 29p.

Richardson, H. W. 1972. Input-Output and Regional Economics. Redwood Press Limited, Trowbridge England. 294p.

Stanhope, Raymond E. 1986. Corn Sweeteners. Annual Agricultural Outlook Conference, U.S. Dept. of Agriculture Econ. Research Service. Wash. DC. p48-52.

Sales and Marketing Management. April 23, 1984. 1984 Survey of U.S. Industrial & Commercial Buying Power. New York. pp. 48-54, 86,111.

Sales and Marketing Management. July 23, 1984. Survey of Buying Power, part 1. New York. pp. a10, c2-c6, c118-c214.

Sheshunoff & Company, Inc. Banks of the Great Plains. Annual.

Taylor, Robert E. 1987. personal communication. Dept. Animal Science Colo. State Univ., Fort Collins, Colorado (303-491-1101).

Wilkins, John. 1978. General Applications of I-O Analysis and its Multipliers. IN Robert McKuscisk et. al. Regional development and plan evaluation: The use of Input-Output analysis. U. S. Dept. of Agriculture, Economics Statistics and Cooperatives Service. Agriculture Handbook No. 530. 65-88. 128p.

U.S. Department of Agriculture, Rural Electrification Administration. U.S. Government Printing Office. Wash. D.C. 1983 Statistical Report, Rural Electric Borrowers. REA Bulletin 1-1.

U.S. Department of Commerce, Bureau of the Census. U.S. Government Printing Office. Wash. D.C. Census of Mineral Industries, Geographic Area Series Mountain States.

U.S. Department of Commerce, Bureau of the Census. U.S. Government Printing Office. Wash. D.C. 1982 Census of Retail Trade, Geographic Area Series, Wyoming.

U.S. Department of Commerce, Bureau of the Census. U.S. Government Printing Office. Wash. D.C. 1982 Census of Service Industries, Geographic Area Series, Wyoming.

U.S. Department of Commerce, Bureau of the Census. U.S. Government Printing Office. Wash. D.C. 1982 Census of Wholesale Trade, Geographic Area Series Wyoming (and Change Sheet).

U.S. Department of Commerce, Bureau of the Census, U.S. Government Printing Office. Wash. D.C. Statistical Abstract of the U.S. 1986. Washington, D.C. 20402: Table 662 Characteristics Of The Civilian Labor Force, By State: 1984, page 393; Table 1308 Housing Units - Summary Of Characteristics 1960 To 1983, page 729; Table 1332 Commercial Buildings - Number And Square Footage Of Floorspace, By Type Of Building and Characteristic: 1983, page 740.

U.S. Department of Interior, Bureau of Land Management. U.S. Government Printing Office. Wash. D.C. Public Land Statistics. Annual.

U.S. Railroad Retirement Board. The RRB Quarterly Review. June 1981. Chicago.

## CHAPTER 3

## NEW CONSTRUCTION SECTORS

INTRODUCTION

This chapter discusses a special set of sectors developed for the Wyoming and southeast Montana I/O models; the new construction sectors. The new construction sectors are final demand sectors, i.e. they provide spending distributions across supplying sectors for exogenous investment for several major types of construction which could take place in Wyoming or southeast Montana.

DISAGGREGATION OF SECTORS FOR NEW CONSTRUCTION

Two types of construction activity are contained in an I/O accounting framework. Construction within the intermediate processing quadrant is for maintenance and repair (sector 24 in table 2-1). These expenditures are part of the operating costs of enterprises and households and are repair and replacement rather than new investment. Final demand quadrant construction spending is only for new investment. It represents spending that is not part of the general operating cost or production function of a sector. Often this type of spending is determined by persons or agencies outside the study region. For example, resource extraction firms may decide to enter a region and, in the process, create new real physical capital in the region. In other cases, new physical investment may arise due to the needs of the regional economy. Expansion of an economy cannot continue indefinitely without an expansion of work space, transport space, living space and the related utilities and other facilities. Long run growth scenarios can be modeled much more accurately if the I/O model has the capability of incorporating these changes in capital facilities.

Six categories of new capital construction spending distributions have been provided in the Wyoming and southeast Montana I/O models. These sectors are; new house construction, new commercial (non-industrial and government) buildings construction, new road construction (which includes sewer, water, and road), new pipeline construction, new coal haul railroad construction, and new surface coal mine construction. The unit costs (cost per unit of capacity), and percentage distribution of costs by sector are provided for these six types of new construction. (M-K Engineers, Inc. 1987). The major assumption in applying these projections is that the ratio of past capital construction to worker holds for the additional workers that may be moving into the region in the future.

House construction pertains to an average wood frame single story residential 1,500 square foot house with exterior wood lap siding with R/19 mineral bat insulation, gable type roof with R/30 insulation, asphalt shingles, drywall partitions over wood plates and studs. The estimated cost for this type of building is

\$78,000 in 1984. (M-K Engineers, Inc. 1987) Requirements for housing are caused by changes in population. However, housing must be related to employment since the I/O model is calibrated to project employment. Two factors affect this relationship; the ratio of population to workers and the persons per house. The first step is to calculate the persons per house of which the inverse is the houses per person. Renters averaged 2.1 persons per house in the west U.S. in 1983 while owners average 2.4 persons per house. (Statistical Abstract of the U.S. 1986, p729) Since 68.6 percent of all houses in Montana are owner occupied, (Statistical Abstract of the U.S. 1986, p729) a weighted average can be calculated,  $(.686)(2.4) + (.314)(2.1) = 2.3$  persons per house. Thus the inverse of 2.3 persons per house yields 0.43365 houses per person. Now that we have houses per person the second step is to find what proportion of these people are the workers in which the I/O model is calibrated. In Montana in 1984, the ratio of population to workers was 1.605. (Statistical Abstract of the U.S. 1986, p393) The product of houses per person times persons per worker yields .696 houses per worker. Thus we have corrected the 0.43365 to 0.696 because some households have dual workers (e.g. husband and wife). Using the cost of an average house results in  $(.696)(\$78,000) = \$54,288$  of new house construction spending for each added worker in the region.

The cost estimate for commercial buildings (which includes public buildings) is based upon a 22,500 square foot 2-story masonry block building with partial basement with 10,000 square feet on the ground floor. Partitions are metal studs with 5/8" drywall, with a fire protection sprinkler system over 100% of the area, a roof decking of 2" T & G with mineral fibre insulation rated R/30. Elevator service is provided from basement to second floor. Total 1984 construction cost is estimated to be \$1,434,948 which is \$63.78 per square foot. (M-K Engineers, Inc. 1987) In the western U.S. in 1984 the ratio of square footage of commercial building space to population was 162.78. (Statistical Abstract of the U.S. 1986, p740) Included in this figure is all non-industrial buildings. Major categories of use for the buildings include: assembly, educational, food sales/service, health care, lodging, mercantile/services/ offices/ residential apartment, warehouse and other. In the U.S., roughly ten percent of the commercial buildings comprising almost one quarter of the total floor space are devoted to government agencies. (Statistical Abstract of the U.S. 1986, p740)

The product of square footage per person times persons per worker yields the square footage of commercial building space per worker or  $(162.78)(1.605) = 261.26$ . The cost per square foot times square footage per workers results in the cost of commercial building space per added worker or  $(261.26)(63.78) = \$16,662$  per worker.

The street and facility cost data are based upon 8" underground sewer line, 8" underground water line, paved street construction, street lighting and curb, gutter and sidewalks. The total cost for two miles is estimated to be \$1,471,101. (M-K Engineers, Inc.



1987) The 1984 cost per mile is then \$735,551. A rough estimate of the added street miles per added population is available for the city of Fort Collins, Colorado. (Michael Ferzog, City Planning Department, Fort Collins, Colorado 1987) Over the period 1980 to 1986 the city added 13,000 in population and built 54 miles of added roads to serve that population increase. This works out to be 0.004154 miles of road per person that moved in to the city. The next step is to place this ratio from a person to a worker basis. The product of miles per person times persons per worker results in  $(.004154)(1.605) = .00666$  miles per worker. Thus, the product of cost per mile times miles per worker results in  $(\$735,551)(.00666) = \$4,904$  in cost to the city for street and facilities for each worker moving into the city.

The construction costs for the pipeline were based upon a ten mile 12 inch line. The total construction cost was \$1,663,051 or \$166,305 per mile. (M-K Engineers 1987)

The coal haul railroad cost was based upon a 15.3 mile line which cost \$9,909,955 to build for a cost per mile of \$647,707. (M-K Engineers Inc. 1987)

The surface coal mine cost was based upon the construction of an 11 million ton per year capacity open pit mine. The construction cost was \$15,267,776 in 1974<sup>2</sup>. Thus the cost per million tons of capacity was \$1,387,978 (M-K Engineers, Inc. 1987). In 1984 dollars the cost is approximately \$3,300,00 per million tons. This coal mine construction includes power lines, water supply and waste water, construction of buildings, mine site preparation, erection of major equipment, and access roads.

Fractional cost distributions by industry source for the six types of new construction are stored on the data base for the Wyoming I/O models. (M-K Engineers, Inc. 1987) Selection of any of the six types of construction when using the IMS I/O program results in a prompt for the total spending change desired for that sector.

The information provided above, or similar data for a study region, allows calibration of the required additional capital investment as employment increases in a region. A technique to project long run growth of a region would require projecting the employment increase based upon a baseline scenario and/or project scenario and then using the resulting employment increase to project new construction spending. Total construction expenses must be divided over the number of years in which construction occurred. The second step is to include both the scenario spending plus the new construction spending to estimate the total

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<sup>2</sup> Updating the construction cost to 1984 dollars, the year of calibration for the Southern Montana I/O model, as estimated by the construction cost index (Statistical Abstract of the U.S. 1986, table 1288) makes the cost approximately \$3,300,000 per million tons. Considerable variation in construction costs will occur depending upon the particular characteristics of the coal deposit.

growth. These steps can be iterated to find the cumulative effects of growth and new investment. An example of the impact measurement process is shown in Chapter 6.

Each of the new construction columns, allocates spending directly to households. Spending which goes to other industries does not create a problem since those industries spend part of their increased income on the hiring of labor and this is measured by the employment coefficient for that industry. Direct payment from final demand construction to households does not result in any added employment in the IMS model since households are not a normal industry which hires workers. One way to overcome this omission of direct employment in the final demand construction sectors is to hand calculate the direct workers by finding the direct payment to households and dividing it by the average wage rate for construction workers.

A second, more efficient way to include direct hiring uses the IMS program and avoids hand calculations once the IMS model data set is properly modified. Each final demand construction column has a split of spending directly to households as shown below in the final demand direct input coefficient calculations. Given an average construction worker annual pay rate, one can find the direct employment per dollar of construction spending in each construction sector. These employment coefficients can be inserted into the employment coefficient data base for each new construction sector. The change in the data set is easily made using the IMS editor mode.

The IMS program will find the number of direct hires if the employment coefficient value is inserted into the IMS data base employment resource requirement coefficient vector for the final demand coal mine construction sector. Coefficients can be calculated and inserted for each of the new construction sectors in a similar manner.

The employment direct input requirement for the new induced construction sectors are found by dividing the fraction of construction spending going to labor by the average annual wages for labor for each new induced construction sector;

1. coal  $.231692/\$22,450 = .000013,$
2. house  $.346846/\$22,450 = .0000155,$
3. commercial  $.361696/\$22,450 = .0000161,$
4. road  $.180989/\$22,450 = .0000081,$
5. pipe  $.195017/\$22,450 = .0000087,$
6. railroad  $.161188/\$22,450 = .0000072.$

## LITERATURE AND SOURCES CITED IN CHAPTER 3

Ferzog, Michael, City Planning Department, Fort Collins, Colorado, (303-221-6750) telephone interview.

M-K Engineers, Inc., 1987, Construction Cost Factors Development, Jack O'Hearn Project Manager, under contract to Agricultural Enterprises, Inc.

Statistical Abstract of the U.S. 1986, U.S. Bureau of the Census, U.S. Government Printing Office, Washington, D.C. 20402: Table 662 Characteristics Of The Civilian Labor Force, By State: 1984, page 393; Table 1308 Housing Units - Summary Of Characteristics 1960 To 1983, page 729; Table 1332 Commercial Buildings - Number And Square Footage Of Floorspace, By Type Of Building and Characteristic: 1983, page 740.

## CHAPTER 4

## ANALYSIS OF WYOMING STATE AND ITS COUNTIES

INTRODUCTION

The results of the descriptive analysis of the Wyoming economy are presented in this chapter. The discussion contained in the chapter includes: the description of the economy; an analysis of the nature and magnitude of economic interdependence among intermediate processing sectors; the various business activity and income multipliers; an analysis of direct and total employment requirements; an analysis of regional wealth effects of exports; and an analysis of direct and total water requirements in the region.

The description and analysis of the economy hinges on three major components of the interindustry model. These are: the transactions-among-sectors table showing gross spending flows among industries and agencies; the table of direct input requirements; and the table of direct plus indirect and induced production requirements, or total requirements. These tables are discussed and interpreted in turn. Because of the size of the tables, they are presented in appendices.

THE TRANSACTIONS-AMONG-SECTORS TABLE

The first essential component of any interindustry study is the collection and tabulation of data which serve to describe the flows of commodities and merchandise from each supplying sector to each purchasing sector. These flows are typically expressed in terms of the dollar value of transactions occurring in a specific period of time, normally one year. The information is arrayed in tabular form with the suppliers (selling sectors) listed at the left of the table and the purchasing sectors listed at the top. The information in this table, termed the transactions-among-sectors table (or simply the transactions table) does two things simultaneously: it identifies the estimated dollar value of sales by sector to each of the other sectors, and it identifies the purchases of factors of production by each sector from each of the other sectors. In essence, the information contained in the transactions-among-sectors table represents a double-entry system of bookkeeping in which every sale is simultaneously described as a purchase. Thus, the system deliberately double counts. The transactions-among-sectors table for Wyoming is found in appendix III. A detailed description of the industry and agency sectors in the model is shown in appendix I.

The rows and columns of the transactions-among-sectors table shown in appendix III which are numbered 1-30 identify the intermediate processing sectors (sector 30, households, may be excluded in some analyses). The subtotals in the table show, in dollar terms, the flow of goods and services (excepting labor inputs) necessary to satisfy the intermediate processing sector demands. These are the demands for goods and services which will be further processed before final consumption. Final demands,

i.e. the demands for goods and services that will not be further processed in the region are identified in columns 31-37. Rows 31 - 35 identify the final payments sectors. These payments include state and federal government (taxes and fees), rents, savings, net inventory depletions, and profits, local imports and world imports.

The distribution of total output of each sector, according to the sectors in which the output is sold, may be readily discerned by reading across the rows of the transactions-among-sectors table (appendix III). The bill of purchases by each sector is found by reading down any column of the table. These column entries show the allocation of purchases among industries.

For example, consider sector 1, cattle producers. Reading across row 1 of the transactions-among-sectors table, the sales by cattle producers were distributed as follows: \$31,555,622 among cattle producers, \$2,375,584 to other mines, \$1,997,848 to manufacturing, \$1,947,080 to trans/comm, \$7,240,025 to wholesale, \$25,244 to retail, \$22,111,810 to households, \$10,089,329 to st/fed govt, and \$303,753,148 to exports. Sales by the cattle production sector to other intermediate processors excluding households in Wyoming (shown by the subtotal) amounted to \$45,557,662 while total livestock industry output was \$381,511,949. The distribution of purchases by the cattle producer sector, by factor input category, is shown in column 1 of the transactions-among-sectors table. Purchases by cattle producers were: \$31,555,622 among cattle producers, \$18,806,948 to grass hay, \$8,336,967 to baled alfalfa, \$3,006,214 to trans/comm, \$12,025,073 to gs/elec ut, \$44,740,753 to wholesale, \$102,764,415 to retail, \$74,088,399 to f i r e, \$11,030,934 to other services, \$13,318,900 to local government, \$26,813,429 to households (labor and entrepreneurial income), \$3,886,045 to state government, \$17,199,098 to federal government and \$13,939,146 to imports. Total spending by the cattle production sector is \$381,511,949 just equal to revenues as required by the I/O accounting format.

Other information can be obtained directly from the transactions table. The household row represents wages paid (and self employment income in the case of agriculture production). The leading contributors to household income are: exports (dividends, interest, pensions and annuities in addition to commuters), state and federal government (wages and transfer payments), oil and gas production, f i r e, education, trans/comm, retail trade, construction, coal mines, and wholesale trade. Similarly, sector contributions to local and county taxes and other useful data may be obtained from the transactions-among-sectors table.

Estimates of gross regional income and gross regional product may be obtained from the final payments and final demands portion of the table. Gross regional product is defined as the sum of deliveries to final demand, net of imports. Traditionally, local and county government activities, including education, are included as part of final demand. Because the I/O model for

Wyoming treats these accounts as part of the intermediate processing sector, an adjustment is required. Thus the sum of education (\$710 million); water, sewer and trash (\$68 million); local government (\$453 million); households (\$6,028 million); state and federal government (\$2,360 million); investment (687 million); and exports (\$12,052 million) less imports (\$7,760); yields an estimate of gross regional product of about \$14,600 million. Since some of the above sectors include private enterprise, and the health sector which is partly public has been excluded, further refinement of the data would be required to accurately measure regional product. An alternative measure is available from the sum of final payments excluding imports which also equals approximately \$14,600 million when all government spending is included as final payments.

While these items, obtained directly from the transactions-among-sectors table, are useful as initial indicators of the relative importance of each sector in the region's economy, the important question of interdependencies is not yet addressed. In order to do so, it is first necessary to isolate the direct production relationships existing in the economy.

#### DIRECT PRODUCTION REQUIREMENTS

The direct production requirements coefficients, or technical coefficients, represent the second major component of the interindustry analysis. The table of direct input requirements is shown in Appendix V. Computation of the direct requirements coefficients requires only that each column entry of the transactions-among-sectors table be divided by the column total. The resulting coefficients describe purchases necessary from each supplier (listed at the left of the table) in order for the purchasing sector (listed at the column head) to produce one added dollar's worth of output. The coefficients, then, are interpreted as the direct input requirements per dollar of output produced by each sector. The direct input requirement coefficients represent a given technology and given trading patterns (local versus imported supplies). The I/O projection technique assumes that these coefficients remain fixed over the period of the projection. For long term projections, the accuracy of the model can be improved by modifying these coefficients over the forecast period to account for changing technology or changing self sufficiency of the study region.

#### I/O MULTIPLIER THEORY

The use of demand driven I/O multipliers to select the sectors of the economy which can provide the great boost to employment is well known. These multipliers are termed resource requirement multipliers since they show the amount of an input that is directly and indirectly required, throughout the economy, for a one unit change in sales to final demand in any given industry. Typically the added sales to final demand are exports although government purchases might also be considered in some instances. A similar construct can be used to analyze taxes, payroll, water

use, profits and imports. These variables also vary in fixed proportion to sales of a given industry and thus their multipliers are very similar in concept to other resource requirement multipliers as will be shown below.

Five I/O input requirements multipliers are of interest. The business multiplier shows for each industry the direct, indirect and induced inputs required from each sector per added dollar of sales to final demand. The employment multipliers show for each industry the direct, indirect and induced change in employment, throughout the economy, per added unit of sales to final demand (exports). The payroll requirement multipliers show for each industry, the direct, indirect and induced effect on payroll throughout the economy per added unit of sales to final demand. The profit and saving multipliers show for each industry the direct, indirect and induced effect on profits throughout the economy per added unit of sales to final demand. The import requirement multipliers show the direct, indirect and induced imports throughout the economy per added unit of sales to final demand. Clearly, the five multipliers may not suggest the same course of a action when , for example, it is desired to both lower the unemployment rate and correct a negative balance of trade. However, the most effective sector to stimulate for increased employment is the one with the highest employment requirement multiplier. If high payroll is a goal, then the industry with the highest payroll multiplier would be favored. The most effective sector to stimulate to reduce a deficit in the balance of payments is the one with the smallest import requirements multiplier. Since an industry with a large employment and/or payroll multiplier is likely to have small leakages to imports it may appear that one multiplier is just the reciprocal of the other. However that approach ignores the other leakages and the indirect and induced effects which are captured by the I/O multipliers. Certain industries may indeed provide high employment boost and low import effects while others do not.

#### Derivation of the Input Requirements Multipliers

The Input/output (I/O) accounting identity and the definition of direct input requirement coefficients provide the information necessary to describe the I/O modeling technique. For the demand side of the I/O accounts (column sums of the transactions table shown as figure 4-1);  $X = (X_1 + X_2 + X_3 \dots X_n) + C + G + I + E + L$ . Where  $X_1 \dots X_n$  are total gross output for each of the intermediate processing sectors and the remaining terms are totals for the final demand sectors of household consumption, government spending, investment, exports and capital losses.

To complete the I/O as a forecasting model, we now focus on the interindustry relations among the accounts. Each sector of the economy is in equilibrium when the sum of the interindustry outputs plus the sum of the final demands for that same sector equals total gross output. For the  $i^{\text{th}}$  industry, in the notation

Figure 4-1. SCHEMATIC OF A REGIONAL I/O TRANSACTIONS MATRIX LABELING THE ACCOUNTS IN THE FOUR QUADRANTS

	\ PURCHASING INDUSTRIES & AGENCIES										
S E L L I N G	z <sub>11</sub> z <sub>12</sub> C <sub>1</sub>			G <sub>1</sub> I <sub>1</sub> E <sub>1</sub> L <sub>1</sub>							
	z <sub>21</sub> z <sub>22</sub> C <sub>2</sub>			G <sub>2</sub> I <sub>2</sub> E <sub>2</sub> L <sub>2</sub>							
	H <sub>1</sub> H <sub>2</sub> H <sub>3</sub>			G <sub>3</sub> I <sub>3</sub> E <sub>3</sub> L <sub>3</sub>							
I N D U S T R I E S	T <sub>1</sub> T <sub>2</sub> T <sub>3</sub>			T <sub>4</sub> T <sub>5</sub> T <sub>6</sub> T <sub>7</sub>							
	D <sub>1</sub> D <sub>2</sub> D <sub>3</sub>			D <sub>4</sub> D <sub>5</sub> D <sub>6</sub> D <sub>7</sub>							
	R <sub>1</sub> R <sub>2</sub> R <sub>3</sub>			R <sub>4</sub> R <sub>5</sub> R <sub>6</sub> R <sub>7</sub>							
	M <sub>1</sub> M <sub>2</sub> M <sub>3</sub>			M <sub>4</sub> M <sub>5</sub> M <sub>6</sub> M <sub>7</sub>							

\* the intermediate processing sector in quadrant one is aggregated to 3 sectors to save space

of figure 4-1, output equilibrium can be expressed as:  $X_i = (z_{i1} + \dots + z_{ij} + \dots + z_{in}) + (C_i + G_i + I_i + E_i + L_i)$ , for industries  $i = 1 \dots n$ . Where the z's are intermediate processing quadrant transactions.

To simplify notation, let Z stand for the intermediate processing quadrant and Y stand for the final demands quadrant. The accounting equation for output can be written as;

$$X = (Z)(U) + (Y)(U);$$

The demand or output equilibrium balance equations

<with households exogenous>

$$\begin{bmatrix} X_1 \\ X_2 \end{bmatrix} = \begin{bmatrix} z_{11} & z_{12} \\ z_{21} & z_{22} \end{bmatrix} \begin{bmatrix} 1 \\ 1 \end{bmatrix} + \begin{bmatrix} C_1 & G_1 & I_1 & E_1 & L_1 \\ C_2 & G_2 & I_2 & E_2 & L_2 \end{bmatrix} \begin{bmatrix} 1 \\ 1 \end{bmatrix}$$

<with households endogenous>



$$\begin{bmatrix} X_1 \\ X_2 \\ X_3 \end{bmatrix} = \begin{bmatrix} z_{11} & z_{12} & C_1 \\ z_{21} & z_{22} & C_2 \\ H_1 & H_2 & H_3 \end{bmatrix} \begin{bmatrix} 1 \\ 1 \\ 1 \end{bmatrix} + \begin{bmatrix} G_1 & I_1 & E_1 & L_1 \\ G_2 & I_2 & E_2 & L_2 \\ G_3 & I_3 & E_3 & L_3 \end{bmatrix} \begin{bmatrix} 1 \\ 1 \\ 1 \end{bmatrix}$$

where U is a column vector of ones whose function is to provide conformation of matrices for addition and which results in summation to column vectors of the matrices which it follows.

This is the statement in matrix form, that total output of the regional economy is composed of intermediate processing transactions and final demands which includes all sectors of the economy.

In order to reduce the number of unknowns to be equal with the number of balance equations, we can substitute the definition of direct input requirement coefficients in place of the  $z_{ij}$ 's. A sector's direct input requirement coefficient is defined as  $a_{ij} = z_{ij}/X_j$ , thus the n by n matrix of direct input requirement coefficients is;

$$A = (Z)(X^{\sim})^{-1},$$

where Z are the intermediate processing flows and  $X^{\sim}$  is a matrix with the total output vector on the main diagonal and zero's elsewhere. (note that an inverse of a diagonal matrix is simply a diagonal matrix of the reciprocals of the original elements)

Post multiplying through by  $X^{\sim}$  and rearranging terms gives us an expression for the intermediate processing quadrant Z, expressed in terms of the direct input requirement coefficients;

$$Z = (A)(X^{\sim}).$$

$$\begin{bmatrix} z_{11} & z_{12} & z_{13} \\ z_{21} & z_{22} & z_{23} \\ z_{31} & z_{32} & z_{33} \end{bmatrix} = \begin{bmatrix} a_{11} & a_{12} & c_{13} \\ a_{21} & a_{22} & c_{23} \\ h_{31} & h_{32} & c_{33} \end{bmatrix} \begin{bmatrix} X_1 & 0 & 0 \\ 0 & X_2 & 0 \\ 0 & 0 & X_3 \end{bmatrix}$$

This term  $(AX^{\sim})$  we will substitute into the accounting equation. Output equilibrium in the regional economy can now be stated as;

$$X = (A)(X^{\sim})(U) + (Y)(U),$$

which reduces to:

$$X = (A)(X) + (Y)(U), \text{ since } (X^{\sim})(U) = X.$$

Further, we can solve the equation for final demands by isolating the final demand vector;

$X - (A)(X) = (Y)(U)$ ,  
 this can be restated as;

$$(I-A)(X) = (Y)(U),$$

where I is the identity matrix with ones on the diagonal and zero's elsewhere.

This output equilibrium shows the amount of output from each of the sectors necessary to supply the exogenously determined final demands.

$$\begin{bmatrix} X_1 \\ X_2 \\ X_3 \end{bmatrix} - \begin{bmatrix} a_{11} & a_{12} & c_1 \\ a_{21} & a_{22} & c_2 \\ h_1 & h_2 & h_3 \end{bmatrix} \begin{bmatrix} X_1 \\ X_2 \\ X_3 \end{bmatrix} = \begin{bmatrix} Y_1 \\ Y_2 \\ Y_3 \end{bmatrix}$$

$$\begin{bmatrix} 1 & 0 & 0 & -a_{11} & -a_{12} & -c_1 \\ 0 & 1 & 0 & -a_{21} & -a_{22} & -c_2 \\ 0 & 0 & 1 & -h_1 & -h_2 & -h_3 \end{bmatrix} \begin{bmatrix} X_1 \\ X_2 \\ X_3 \end{bmatrix} = \begin{bmatrix} Y_1 \\ Y_2 \\ Y_3 \end{bmatrix}$$

$$\begin{bmatrix} (1-a_{11}) & -a_{12} & -c_1 \\ -a_{21} & (1-a_{22}) & -c_2 \\ -h_1 & -h_2 & (1-h_3) \end{bmatrix} \begin{bmatrix} X_1 \\ X_2 \\ X_3 \end{bmatrix} = \begin{bmatrix} Y_1 \\ Y_2 \\ Y_3 \end{bmatrix}$$

The goal is to solve the equilibrium for regional production not final demands. This is accomplished in several steps:

$$(I-A)^{-1}(I-A)(X) = (I-A)^{-1}(Y)(U); \quad ^3$$

$$(I)(X) = (I-A)^{-1}(Y)(U);$$

$$X = (I-A)^{-1}(Y)(U).$$

For ease of notation, the Leontief matrix is relabelled as B = (I-A)<sup>-1</sup>, thus;

$$X = (B)(Y)(U).$$

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<sup>3</sup> The inversion of the Leontief matrix of course assumes that the matrix is nonsingular i.e. that |I-A| N.E. 0.

-1

$$\begin{bmatrix} X_1 \\ X_2 \\ X_3 \end{bmatrix} = \begin{bmatrix} (1-a_{11}) & -a_{12} & -c_1 \\ -a_{21} & (1-a_{22}) & -c_2 \\ -h_1 & -h_2 & (1-h_3) \end{bmatrix} \begin{bmatrix} Y_1 \\ Y_2 \\ Y_3 \end{bmatrix}$$

In this form, the equilibrium shows the "total requirements" in matrix B which are composed of the direct and indirect requirements. When households is included in quadrant one, then the total requirements are said to include "induced" requirements in addition to the direct and indirect requirements. This is the case in our example. Each entry in the inverse matrix,  $b_{ij}$  represents the direct and indirect (and induced) requirements of sector  $i$  per unit of final demand in the output of sector  $j$ .<sup>4</sup> By setting the level of final demands we can obtain the gross regional economic activity (direct, indirect, and induced, thus total) in each sector that goes to supplying that level of demand.

The output or business multiplier, for any sector  $i$ , is the sum of the direct and indirect (and induced) requirements from all sectors of the regional economy needed to sustain one additional dollar of output to final demand by sector  $i$ . The output multiplier is obtained by summing down the column of the inverse matrix for industry  $i$ . Those sectors with larger multipliers draw inputs from local industries which make up the stages of their intermediate production and rely less, directly and/or indirectly, on imports.

At least two definitions of income multipliers exist. One type of income multiplier connects changes in household income to exogenous changes in final demand. We will refer to this multiplier as a "payroll" multiplier. (The other type of income multiplier analyzes the direct and indirect changes in income per unit direct change in income) The first income multiplier is referred to as a final demand driven income multiplier. However it is also a type of input requirements multiplier. The concept of an input requirements multiplier is important for the analysis of imports, profits, taxes and similar variables in an I/O model. The first step in development of the payroll multiplier is the calculation of a vector of household wages per unit of total output sales. This vector ( $1 \times n$ ) of direct household coefficients

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<sup>4</sup> In calculus terms,  $b_{ij} = dX_i / dY_j$ , the change in the  $i^{\text{th}}$  sector of the regional economy when the  $j^{\text{th}}$  final demand changes by an infinitesimal amount.

is calculated exactly as the direct input requirement coefficients of the I/O intermediate processing sector. Payment to households by industry  $j$ ,  $H_j$ , is divided by the respective output of that sector,  $X_j$ . Thus the vector of household coefficients is defined as  $h_j = H_j/X_j$ . This row vector of household coefficients is then multiplied on both sides of the Leontief demand equilibrium;  $(h)(X) = (h)(I-A)^{-1}(Y)(U)$ .

The column sums of the matrix  $(h)(I-A)^{-1}$  are thus defined as the final demand driven payroll multipliers. The payroll multipliers tell us the total increase in household income the economy will undergo with final demand increases in the respective sector.

The above payroll multiplier concept can be modified to yield a multiplier for any vector of endogenous inputs. Thus, for example, a multiplier can be calculated for imports in the above fashion by substituting the row of direct input requirement coefficients of import requirements per unit of output in place of the wage and salary direct input requirement coefficients vectors. If employment requirements multipliers are desired one simply substitutes the vector of full time equivalent workers per unit of sales by industry in place of the wage and salary direct input requirement coefficients in the equation above.

### Findings and Conclusions

Estimates of type II business sales multipliers, employment requirements multipliers, payroll requirements multipliers, and import requirements multipliers for all sectors of the Wyoming economy are shown in this chapter (see tables 4-4 through 4-8). A comparison of the top ten industries in terms of the business sales, payroll, or employment effects created vis a vis industries with the smallest import multiplier effects is shown in table 4-1. Some of the sectors in the top ten can be eliminated as sources of growth since they, by definition, are not export sectors. Local government, and water sewer and trash fall in this category. In terms of both the additional business sales generated per dollar of export and the new employment generated, the agricultural production sectors dominate. When payroll rather than workers is the criterion then education, trans/comm, f i r e and health services predominate. When regional wealth creation is the criterion then the extraction sectors, education, f i r e and the services sectors dominate. The high ranking of the extraction sector assumes that interest and profits from extraction remain in Wyoming. If a large share of the profits and interest in the extraction sector accrue to firms and persons outside Wyoming then the ranking is erroneous.

Reliance on business, employment, or payroll I/O multipliers to select highly expansionary sectors in hopes of improving regional wealth can be highly illusionary if import effects are also high. Furthermore, many sectors provide only local services and cannot

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 Table 4-1. Preferred Industries for Expansion and  
 for Trade Balance Improvement  
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	Business Mult. (largest 10)	Payroll Mult. (largest 10)	Employ. Mult. (largest 10)	Import Mult. (smallest 10)
1	local govt	education	baled alfa	oil/gas
2	sheep	local govt	oats	education
3	baled alfa	trans/comm	sheep	f i r e
4	wat/sew/tr	f i r e	dry beans	coal mines
5	dry beans	health ser	mlt barley	local govt
6	oats	wat/sew/tr	sugar beets	forestry
7	sugar beets	sheep	cattle	wat/sew/tr
8	mlt barley	sugar beets	all what	health ser
9	grass hay	oats	grain corn	trans/comm
10	all what	baled alfa	fd barley	other serv

SOURCE: Estimated I/O Tables

be expected to contribute to exports. In the case of Wyoming, oil and gas production exports create the greatest net increase in regional wealth per dollar of export as shown by the small import multiplier of .146. This multiplier indicates that for every \$1.00 of oil and gas exports some (\$1.00 - \$.15 = \$.85) remains in Wyoming and only \$.15 is directly or indirectly leaked out of the local economy to imports. This is in sharp contrast with the retail sector for which over \$.79 from each dollar of exports is spent directly or indirectly on imports. Other sectors whose added exports would contribute the most to regional wealth include; education, f i r e, coal mines, forestry, health services, gs/elec ut, sheep production and malt barley production. To the extent that the ownership of any of these industries lies mainly outside Wyoming they will be misclassified in this ranking.

The ten worst industries for aiding the regional balance of payments are shown in table 4-2. Their ability to generate net exports per dollar of export varies from 21 cents for retail to 59 cents for manufacturing. Although several agricultural sectors are among the worst ten industries for generating a positive trade balance this is not due to import spending for the production agricultural products. Table 4-3 column 4, reveals that most agricultural producers have small import requirements. Thus all of the imports generated by these sectors are indirect imports by suppliers of the agricultural producers. Thus it is clear that industries which do not rely on imports directly may still do so indirectly. At the other extreme, wholesale directly imports 72 percent of its production inputs and indirectly requires only another 5.6 percent from imports.

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 Table 4-2. Industries with the Largest Dollar Imports,  
 Largest Direct Import Input coefficients,  
 and Largest Import Multipliers  
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	<u>Highest 10 Dollars of Imports</u>	<u>Highest 10 Direct Imports</u>	<u>Highest 10 Import Multiplier</u>
1	retail	wholesale	retail
2	wholesale	retail	wholesale
3	households	manufact	potatoes
4	manufact	other mine	grain crn
5	oil/gas pr	f i r e	fd barley
6	coal mines	other serv	cattle
7	f i r e	gs/elect ut	all wheat
8	other mine	coal mines	grass hay
9	other serv	forestry	dry beans
10	construct	health serv	manufact

SOURCE: Estimated I/O Tables

Table 4-3. Direct Resource Input Requirement Coefficients

		1	2	3	4
		employment	Payroll	Rents	All Import
1	cattle	.23322E-04	.70282E-01	.00000E+00	.36536E-01
2	sheep	.27446E-04	.22624E+00	.00000E+00	.00000E+00
3	oats	.28665E-04	.19067E+00	.00000E+00	.00000E+00
4	grass hay	.23237E-04	.14020E+00	.00000E+00	.00000E+00
5	baled alfa	.26517E-04	.15698E+00	.00000E+00	.00000E+00
6	grain crn	.27020E-04	.74434E-01	.00000E+00	.00000E+00
7	fd barley	.26677E-04	.10710E+00	.00000E+00	.00000E+00
8	mlt barley	.24969E-04	.94665E-01	.35169E-01	.20515E-02
9	all wheat	.26037E-04	.81406E-01	.00000E+00	.00000E+00
10	dry beans	.25911E-04	.17402E+00	.29830E-05	.00000E+00
11	potatoes	.25376E-04	.78019E-01	.00000E+00	.00000E+00
12	sugar beet	.28069E-04	.22941E+00	.42990E-05	.00000E+00
13	other agri	.26611E-04	.28266E+00	.72811E-01	.81776E-01
14	forestry	.18067E-04	.30558E+00	.14645E+00	.19360E+00
15	coal mine	.44363E-05	.17246E+00	.21577E+00	.20127E+00
16	oil/gas pr	.30616E-05	.81910E-01	.38016E+00	.86983E-01
17	other mine	.53882E-05	.18660E+00	.18157E+00	.23638E+00
18	constructi	.10768E-04	.22461E+00	.12585E+00	.13317E+00
19	manufact	.50455E-05	.10954E+00	.51157E-01	.30641E+00
20	trans/comm	.16670E-04	.43599E+00	.51636E-01	.15267E+00
21	gs/elec ut	.54824E-05	.17679E+00	.13514E+00	.22046E+00
22	wholesale	.33429E-05	.71959E-01	.51109E-01	.72006E+00
23	retail	.10937E-04	.10822E+00	.32667E-01	.67793E+00
24	f i r e	.12222E-04	.48142E+00	.15270E+00	.23485E+00
25	other serv	.30064E-04	.35852E+00	.13373E+00	.23368E+00
26	education	.33339E-04	.60034E+00	.84540E-03	.12041E+00
27	health ser	.24288E-04	.42069E+00	.82966E-01	.15771E+00
28	wat/sew/tr	.19490E-04	.30655E+00	.69633E-02	.14579E-02
29	local govt	.70526E-05	.11712E+00	.18915E-01	.41584E-01
30	households	.00000E+00	.29065E-02	.33217E-01	.10306E+00

TABLE 4-4. Type I and Type II Business Multipliers

TYPE I		TYPE II	
NAME(RANK)	MULTIPLIER	NAME(RANK)	MULTIPLIER
cattle(2)	2.1937637	cattle(11)	2.9054071
sheep(12)	2.0852029	sheep(2)	3.2028223
oats(11)	2.0894645	oats(6)	3.1251653
grass hay(8)	2.1295768	grass hay(9)	2.9991502
baled alfa(3)	2.1931773	baled alfa(3)	3.1985170
grain crn(6)	2.1579334	grain crn(13)	2.8418656
fd barley(9)	2.1291578	fd barley(12)	2.8857047
mlt barley(1)	2.2091733	mlt barley(8)	3.0485370
all wheat(4)	2.1627152	all wheat(10)	2.9773744
dry beans(5)	2.1597658	dry beans(5)	3.1264613
potatoes(7)	2.1423654	potatoes(15)	2.7724783
sugar beet(14)	2.0098965	sugar beet(7)	3.0716089
other agri(15)	1.7495472	other agri(16)	2.7001307
forestry(20)	1.4354746	forestry(20)	2.3664120
coal mine(24)	1.3130075	coal mine(27)	1.8520245
oil/gas pr(26)	1.2975343	oil/gas pr(28)	1.5935236
other mine(21)	1.4179203	other mine(26)	1.9994191
constructi(17)	1.6624831	constructi(19)	2.4164736
manufact(16)	1.6718427	manufact(25)	2.1042718
trans/comm(19)	1.4560071	trans/comm(17)	2.6391783
gs/elec ut(18)	1.6278303	gs/elec ut(22)	2.2601801
wholesale(28)	1.1890138	wholesale(30)	1.4298485
retail(27)	1.2106227	retail(29)	1.5150380
f i r e(29)	1.1322149	f i r e(21)	2.2780332
other serv(25)	1.3059137	other serv(23)	2.2525257
education(23)	1.3206980	education(14)	2.7961673
health ser(22)	1.3897003	health ser(18)	2.5259361
wat/sew/tr(13)	2.0108676	wat/sew/tr(4)	3.1364841
local govt(10)	2.1042759	local govt(1)	3.3418918
		households(24)	2.2109007

Table 4-5. Type II Resource  
Input Requirement Multiplier  
for Employment

NAME(RANK)	MULTIPLIER
cattle(7)	.38400400E-04
sheep(3)	.41857217E-04
oats(2)	.42121122E-04
grass hay(13)	.35634553E-04
baled alfa(1)	.42765232E-04
grain crn(9)	.37885425E-04
fd barley(10)	.37411013E-04
alt barley(5)	.41174276E-04
all wheat(8)	.38002631E-04
dry beans(4)	.41488876E-04
potatoes(12)	.35690325E-04
sugar beet(6)	.39741164E-04
other agri(14)	.34243932E-04
forestry(19)	.24014799E-04
coal mine(27)	.80279439E-05
oil/gas pr(28)	.55468695E-05
other mine(25)	.88960200E-05
constructi(21)	.17009931E-04
manufact(26)	.87012728E-05
trans/comm(20)	.21403637E-04
gs/elec ut(24)	.10177848E-04
wholesale(29)	.51322430E-05
retail(23)	.12315562E-04
f i r e(22)	.14128721E-04
other serv(15)	.33593409E-04
education(11)	.36970868E-04
health ser(18)	.28916091E-04
wat/sew/tr(17)	.29514920E-04
local govt(16)	.31128909E-04

Table 4-6. Type II Resource  
Input Requirement Multiplier  
for Payroll

NAME(RANK)	MULTIPLIER
cattle(20)	.32188202E+00
sheep(7)	.50551670E+00
oats(9)	.46845160E+00
grass hay(15)	.39331494E+00
baled alfa(10)	.45472316E+00
grain crn(21)	.30935627E+00
fd barley(18)	.34220751E+00
alt barley(16)	.37964838E+00
all wheat(17)	.36850035E+00
dry beans(11)	.43724004E+00
potatoes(23)	.28499489E+00
sugar beet(8)	.48021381E+00
other agri(12)	.42995264E+00
forestry(14)	.42107214E+00
coal mine(25)	.24380395E+00
oil/gas pr(28)	.13387829E+00
other mine(24)	.26301606E+00
constructi(19)	.34103400E+00
manufact(26)	.19559089E+00
trans/comm(3)	.53515628E+00
gs/elec ut(22)	.28601595E+00
wholesale(29)	.10893071E+00
retail(27)	.13768918E+00
f i r e(4)	.51820612E+00
other serv(13)	.42816041E+00
education(1)	.66736610E+00
health ser(5)	.51392749E+00
wat/sew/tr(6)	.50912231E+00
local govt(2)	.55978575E+00

Table 4-7. Type II Resource  
Input Requirement Multiplier  
for Rents

NAME(RANK)	MULTIPLIER
cattle(25)	.84126157E-01
sheep(24)	.88943282E-01
oats(22)	.92977804E-01
grass hay(18)	.95172122E-01
baled alfa(15)	.10324681E+00
grain crn(16)	.98491978E-01
fd barley(19)	.95013938E-01
alt barley(10)	.14775182E+00
all wheat(14)	.10919633E+00
dry beans(17)	.96078226E-01
potatoes(21)	.93507153E-01
sugar beet(20)	.94449413E-01
other agri(11)	.13566999E+00
forestry(6)	.19898532E+00
coal mine(3)	.24495265E+00
oil/gas pr(1)	.43232369E+00
other mine(5)	.22535876E+00
constructi(7)	.18836869E+00
manufact(4)	.24379177E+00
trans/comm(23)	.90951922E-01
gs/elec ut(2)	.25280015E+00
wholesale(27)	.72328090E-01
retail(28)	.48354419E-01
f i r e(8)	.16660505E+00
other serv(9)	.16395841E+00
education(29)	.29495329E-01
health ser(12)	.11647580E+00
wat/sew/tr(13)	.11571798E+00
local govt(26)	.84031946E-01

Table 4-8. Type II Resource  
Input Requirement Multiplier  
for Imports

NAME(RANK)	MULTIPLIER
cattle(6)	.50058881E+00
sheep(18)	.34887906E+00
oats(15)	.38033867E+00
grass hay(8)	.46931821E+00
baled alfa(11)	.40134251E+00
grain crn(4)	.54781538E+00
fd barley(5)	.51907699E+00
alt barley(17)	.35041721E+00
all wheat(7)	.47716710E+00
dry beans(9)	.42706715E+00
potatoes(3)	.57710474E+00
sugar beet(13)	.38689065E+00
other agri(12)	.38953863E+00
forestry(24)	.30521350E+00
coal mine(26)	.28847013E+00
oil/gas pr(29)	.14637424E+00
other mine(16)	.36703912E+00
constructi(14)	.38583645E+00
manufact(10)	.40574391E+00
trans/comm(21)	.32102968E+00
gs/elec ut(19)	.34162023E+00
wholesale(2)	.77664620E+00
retail(1)	.79189520E+00
f i r e(27)	.27275930E+00
other serv(20)	.33185395E+00
education(28)	.24354604E+00
health ser(22)	.32097558E+00
wat/sew/tr(23)	.31511862E+00
local govt(25)	.30064126E+00



Table 4-9. Total Sales and Final demand Sales for Albany County, Wyoming

Total Sales		Final Demand Sales	
1	cattle 16298775.	Cattle	13984847.
2	sheep 208208.	sheep	188911.
3	oats 36042.	oats	36042.
4	grass hay 6528061.	grass hay	5603191.
5	baled alfa 418980.	baled alfa	83616.
6	grain crn 100.	grain crn	100.
7	fd barley 32000.	fd barley	32000.
8	mlt barley 100.	mlt barley	92.
9	all wheat 101.	all wheat	101.
10	dry beans 101.	dry beans	79.
11	potatoes 101.	potatoes	101.
12	sugar beet 102.	sugar beet	102.
13	other agri 829737.	other agri	420329.
14	forestry 14169822.	forestry	13065966.
15	coal mine 100.	coal mine	94.
16	oil/gas pr 4504775.	oil/gas pr	4504775.
17	other mine 93.	other mine	93.
18	constructi 29219423.	constructi	12016614.
19	manufact 34791506.	manufact	20214072.
20	trans/comm 27082798.	trans/comm	4206242.
21	gs/elec ut 23963509.	gs/elec ut	3094302.
22	wholesale 55902950.	wholesale	5144888.
23	retail 211951000.	retail	64753580.
24	f i r e 54028139.	f i r e	12286505.
25	other serv 58675000.	other serv	31884629.
26	education 183325701.	education	174120416.
27	health ser 26474093.	health ser	11919960.
28	wat/sew/tr 3199938.	wat/sew/tr	391788.
29	local govt 10499371.	local govt	2615435.
30	households 337386268.		
	Final Demands 512756390.		

Table 4-10. Type II Business Multipliers and Type II Employment Requirement Multipliers for Albany County, Wyoming

Business Multiplier		Employment Multiplier	
NAME(RANK)	MULTIPLIER	NAME(RANK)	MULTIPLIER
cattle(14)	2.8052138	cattle(10)	.39827480E-04
sheep( 3)	3.1819675	sheep( 2)	.43661062E-04
oats( 4)	3.1818953	oats( 3)	.43659466E-04
grass hay(11)	2.8966280	grass hay(12)	.38139605E-04
baled alfa( 5)	3.1365922	baled alfa( 4)	.43050995E-04
grain crn(13)	2.8131318	grain crn(15)	.36789693E-04
fd barley(12)	2.8279235	fd barley(14)	.37255342E-04
mlt barley(18)	2.5642874	mlt barley(11)	.39329133E-04
all wheat(10)	2.9367413	all wheat( 9)	.39894174E-04
dry beans( 7)	3.0604624	dry beans( 7)	.40709482E-04
potatoes(16)	2.7040592	potatoes(18)	.34434769E-04
sugar beet( 9)	3.0166292	sugar beet( 8)	.40492750E-04
other agri(17)	2.6004461	other agri(20)	.33218555E-04
forestry(23)	2.2573236	forestry(19)	.33934509E-04
coal mine( 1)	3.2343596	coal mine(23)	.28948186E-04
oil/gas pr(27)	1.5202879	oil/gas pr(28)	.84270745E-05
other mine( 2)	3.2029872	other mine(24)	.27687360E-04
constructi(20)	2.5406596	constructi(21)	.32271052E-04
manufact(26)	1.9560073	manufact(25)	.19137334E-04
trans/comm(19)	2.5502075	trans/comm(16)	.35135364E-04
gs/elec ut(30)	1.2259889	gs/elec ut(30)	.46334880E-05
wholesale(29)	1.3275181	wholesale(29)	.69100138E-05
retail(28)	1.3419367	retail(26)	.13863938E-04
f i r e(22)	2.4166815	f i r e(17)	.34613081E-04
other serv(24)	2.2220373	other serv( 6)	.41150124E-04
education(15)	2.7065243	education( 1)	.44821365E-04
health ser(21)	2.4641918	health ser(22)	.31372053E-04
wat/sew/tr( 6)	3.0641326	wat/sew/tr( 5)	.42899156E-04
local govt( 8)	3.0285994	local govt(13)	.37596706E-04
households(25)	2.1255308	households(27)	.13603625E-04

Table 4-11. Total Sales and Final demand Sales  
for Big Horn County, Wyoming

Total Sales		Final Demand Sales		
1	cattle	11056970.	cattle	9372011.
2	sheep	1916438.	sheep	1715090.
3	oats	630361.	oats	630361.
4	grass hay	1384743.	grass hay	495542.
5	baled alfa	4867150.	baled alfa	4639664.
6	grain crn	2012785.	grain crn	2012780.
7	fd barley	595680.	fd barley	595679.
8	mlt barley	5361121.	mlt barley	5361119.
9	all wheat	412830.	all wheat	165030.
10	dry beans	120400.	dry beans	120393.
11	potatoes	101.	potatoes	101.
12	sugar beet	263531.	sugar beet	100.
13	other agri	3480084.	other agri	1973416.
14	forestry	754711.	forestry	751936.
15	coal mine	85.	coal mine	81.
16	oil/gas pr	152636169.	oil/gas pr	141763837.
17	other mine	21795818.	other mine	21188916.
18	constructi	24393457.	constructi	13944638.
19	manufact	45390730.	manufact	39672587.
20	trans/comm	9687740.	trans/comm	1041126.
21	gs/elec ut	13869810.	gs/elec ut	4097882.
22	wholesale	26030384.	wholesale	3924524.
23	retail	59444225.	retail	4613423.
24	f i r e	13406481.	f i r e	343182.
25	other serv	4682013.	other serv	119312.
26	education	13392500.	education	10018716.
27	health ser	9676566.	health ser	4538891.
28	wat/sew/tr	1294540.	wat/sew/tr	54030.
29	local govt	6907284.	local govt	335963.
30	households	117472938.		
	Final Demands	352430947.		

Table 4-12. Type II Business Multipliers and Type II Employment  
Requirement Multipliers for Big Horn County, Wyoming

Business Multiplier		Employment Multiplier	
NAME(RANK)	MULTIPLIER	NAME(RANK)	MULTIPLIER
cattle(13)	2.4537458	cattle( 6)	.55207414E-04
sheep( 4)	2.7084107	sheep( 3)	.59634771E-04
oats( 5)	2.7082350	oats( 4)	.59623159E-04
grass hay(12)	2.4724198	grass hay( 9)	.53676801E-04
baled alfa( 6)	2.7003017	baled alfa( 2)	.60218069E-04
grain crn(14)	2.4021912	grain crn(10)	.53380977E-04
fd barley(15)	2.3891218	fd barley(11)	.52185084E-04
mlt barley(16)	2.3891100	mlt barley(12)	.52184991E-04
all wheat( 8)	2.6198512	all wheat( 7)	.53989832E-04
dry beans( 7)	2.6724526	dry beans( 1)	.60387406E-04
potatoes(11)	2.5359864	potatoes( 5)	.56004829E-04
sugar beet(10)	2.5460818	sugar beet( 8)	.53907331E-04
other agri(18)	2.3145042	other agri(13)	.50669903E-04
forestry(22)	2.1302748	forestry(14)	.44221144E-04
coal mine( 1)	2.9037462	coal mine(20)	.26513840E-04
oil/gas pr(28)	1.2785694	oil/gas pr(30)	.34094320E-05
other mine(25)	1.7928462	other mine(24)	.12653480E-04
constructi(21)	2.2252475	constructi(22)	.20111289E-04
manufact(27)	1.5193588	manufact(26)	.88329671E-05
trans/comm(17)	2.3370397	trans/comm(21)	.20422589E-04
gs/elec ut(26)	1.5915442	gs/elec ut(29)	.49468704E-05
wholesale(30)	1.1911823	wholesale(23)	.13035862E-04
retail(29)	1.2053936	retail(28)	.75660945E-05
f i r e(19)	2.2425717	f i r e(25)	.12344523E-04
other serv(23)	1.9324124	other serv(16)	.39705119E-04
education( 9)	2.5605688	education(17)	.37431641E-04
health ser(20)	2.2419380	health ser(15)	.40545108E-04
wat/sew/tr( 2)	2.8527171	wat/sew/tr(18)	.32902093E-04
local govt( 3)	2.8082242	local govt(19)	.27456325E-04
households(24)	1.9111097	households(27)	.76169536E-05

Table 4-13. Total Sales and Final demand Sales for Campbell County, Wyoming

Total Sales		Final Demand Sales		
1	cattle	15383695.	cattle	12675176.
2	sheep	1905797.	sheep	1772585.
3	oats	481136.	oats	481136.
4	grass hay	2163688.	grass hay	1184345.
5	baled alfa	2050363.	baled alfa	1745364.
6	grain crn	101.	grain crn	101.
7	fd barley	429408.	fd barley	429403.
8	mlt barley	122.	mlt barley	122.
9	all wheat	3789812.	all wheat	3707212.
10	dry beans	101.	dry beans	101.
11	potatoes	101.	potatoes	96.
12	sugar beet	102.	sugar beet	102.
13	other agri	1690315.	other agri	960877.
14	forestry	226.	forestry	226.
15	coal mine	691919160.	coal mine	689484490.
16	oil/gas pr	832161167.	oil/gas pr	746894790.
17	other mine	119.	other mine	119.
18	constructi	232810180.	constructi	123911627.
19	manufact	11107116.	manufact	17474.
20	trans/comm	75117597.	trans/comm	38593324.
21	gs/elec ut	69898349.	gs/elec ut	8277.
22	wholesale	472704000.	wholesale	328327959.
23	retail	258615000.	retail	28375375.
24	f i r e	52319947.	f i r e	797983.
25	other serv	54312596.	other serv	4291488.
26	education	54730708.	education	6947371.
27	health ser	30182330.	health ser	10717867.
28	wat/sew/tr	5190564.	wat/sew/tr	890804.
29	local govt	75626984.	local govt	317772.
30	households	446731063.		
	Final Demands	2042163038.		

Table 4-14. Type II Business Multipliers and Type II Employment Requirement Multipliers for Campbell County, Wyoming

Business Multiplier		Employment Multiplier	
NAME (RANK)	MULTIPLIER	NAME (RANK)	MULTIPLIER
cattle (9)	2.8540611	cattle (4)	.42096798E-04
sheep (2)	3.1114662	sheep (1)	.43558534E-04
oats (13)	2.6769116	oats (10)	.37558110E-04
grass hay (10)	2.8529142	grass hay (7)	.38845893E-04
baled alfa (3)	3.0755706	baled alfa (3)	.43271910E-04
grain crn (12)	2.7551550	grain crn (8)	.38039473E-04
fd barley (11)	2.7792323	barley (9)	.37722984E-04
mlt barley (23)	2.0528000	barley (13)	.35704865E-04
all wheat (8)	2.8888406	all wheat (6)	.39272802E-04
dry beans (4)	3.0035616	dry beans (2)	.43320524E-04
potatoes (14)	2.6255426	potatoes (11)	.36558317E-04
sugar beet (6)	2.9732112	sugar beet (5)	.41048916E-04
other agri (15)	2.6209272	other agri (12)	.36534057E-04
forestry (29)	1.2301287	forestry (30)	.21424718E-05
coal mine (26)	1.7622904	coal mine (26)	.88933696E-05
oil/gas pr (27)	1.5943689	oil/gas pr (28)	.64984072E-05
other mine (5)	2.9785170	other mine (19)	.24820503E-04
constructi (21)	2.2455840	constructi (23)	.12260962E-04
manufact (25)	1.8523335	manufact (21)	.20663028E-04
trans/comm (16)	2.5812614	trans/comm (17)	.30654832E-04
gs/elec ut (20)	2.3373432	gs/elec ut (27)	.83758272E-05
wholesale (30)	1.2115639	wholesale (29)	.33136722E-05
retail (28)	1.4624047	retail (24)	.11126352E-04
f i r e (18)	2.3958200	f i r e (22)	.18373986E-04
other serv (22)	2.1660259	other serv (14)	.33475489E-04
education (17)	2.4829049	education (16)	.31076404E-04
health ser (19)	2.3856454	health ser (15)	.31476241E-04
wat/sew/tr (7)	2.9397700	wat/sew/tr (20)	.24170192E-04
local govt (1)	3.1867765	local govt (18)	.29498676E-04
households (24)	1.9769031	households (25)	.88974525E-05

Table 4-15. Total Sales and Final demand Sales for Carbon County, Wyoming

Total Sales		Final Demand Sales		
1	cattle	44702311.	cattle	40074042.
2	sheep	1465756.	sheep	1354247.
3	oats	80451.	oats	80451.
4	grass hay	9450658.	grass hay	6953147.
5	baled alfa	1938044.	baled alfa	1045794.
6	grain crn	101.	grain crn	101.
7	fd barley	128355.	fd barley	128355.
8	mlt barley	100.	mlt barley	100.
9	all wheat	177117.	all wheat	7468.
10	dry beans	101.	dry beans	101.
11	potatoes	101.	potatoes	87.
12	sugar beet	102.	sugar beet	102.
13	other agri	957302.	other agri	117346.
14	forestry	6158230.	forestry	5028618.
15	coal mine	175439345.	coal mine	159247872.
16	oil/gas pr	252658913.	oil/gas pr	0.
17	other mine	117555107.	other mine	116981618.
18	constructi	50184432.	constructi	34883924.
19	manufact	596551578.	manufact	557506244.
20	trans/comm	28937860.	trans/comm	16914133.
21	gs/elec ut	37685715.	gs/elec ut	13670118.
22	wholesale	38679000.	wholesale	7844225.
23	retail	122706000.	retail	11038503.
24	f i r e	27707673.	f i r e	2709832.
25	other serv	26836000.	other serv	6320237.
26	education	25987351.	education	6520541.
27	health ser	18779146.	health ser	8484910.
28	wat/sew/tr	2913599.	wat/sew/tr	823035.
29	local govt	29173311.	local govt	500232.
30	households	234632703.		
	Final Demands	1094237461.		

Table 4-16. Type II Business Multipliers and Type II Employment Requirement Multipliers for Carbon County, Wyoming

Business Multiplier		Employment Multiplier	
NAME(RANK)	MULTIPLIER	NAME(RANK)	MULTIPLIER
cattle(12)	2.9499396	cattle(14)	.29999671E-04
sheep( 2)	3.3225499	sheep( 8)	.31541742E-04
oats( 1)	3.3225612	oats( 9)	.31541722E-04
grass hay( 8)	3.1897773	grass hay(15)	.29511754E-04
baled alfa( 4)	3.2851048	baled alfa( 7)	.31907527E-04
grain crn( 9)	3.1861594	grain crn(17)	.29168985E-04
fd barley(10)	3.1718049	fd barley(16)	.29239238E-04
mlt barley(15)	2.7795812	mlt barley(19)	.25750728E-04
all wheat( 6)	3.2115203	all wheat(13)	.30182263E-04
dry beans( 5)	3.2544447	dry beans(10)	.31137532E-04
potatoes(11)	3.1150540	potatoes(18)	.27591462E-04
sugar beet( 7)	3.1975303	sugar beet(12)	.30665121E-04
other agri(18)	2.5657263	other agri(20)	.23009263E-04
forestry(17)	2.5898985	forestry(11)	.30844497E-04
coal mine(26)	1.8135643	coal mine(26)	.98317528E-05
oil/gas pr(29)	1.3782643	oil/gas pr(29)	.39517556E-05
other mine(30)	1.3744664	other mine(28)	.52695546E-05
constructi(24)	1.9659166	constructi(22)	.16265593E-04
manufact(27)	1.5487288	manufact(30)	.21852189E-05
trans/comm(14)	2.7972369	trans/comm( 6)	.34998786E-04
gs/elec ut(25)	1.9222916	gs/elec ut(25)	.10629221E-04
wholesale(22)	2.0354029	wholesale(27)	.92473286E-05
retail(28)	1.4104347	retail(23)	.13528632E-04
f i r e(20)	2.3828114	f i r e(21)	.22579775E-04
other serv(21)	2.0356580	other serv( 3)	.38419369E-04
education(16)	2.6957350	education( 1)	.40900539E-04
health ser(19)	2.5213870	health ser( 2)	.39169354E-04
wat/sew/tr(13)	2.9280137	wat/sew/tr( 4)	.37878639E-04
local govt( 3)	3.3187905	local govt( 5)	.36569132E-04
households(23)	2.0303067	households(24)	.11075325E-04

Table 4-17. Total Sales and Final demand Sales  
for Converse County, Wyoming

Total Sales		Final Demand Sales		
1	cattle	14081538.	cattle	12502287.
2	sheep	3146509.	sheep	2925658.
3	oats	195173.	oats	195173.
4	grass hay	1188329.	grass hay	195720.
5	baled alfa	4012798.	baled alfa	3735602.
6	grain crn	101.	grain crn	101.
7	fd barley	187483.	fd barley	187483.
8	mlt barley	121.	mlt barley	121.
9	all wheat	346670.	all wheat	328970.
10	dry beans	6453.	dry beans	6453.
11	potatoes	101.	potatoes	101.
12	sugar beet	102.	sugar beet	102.
13	other agri	1145000.	other agri	157349.
14	forestry	112.	forestry	111.
15	coal mine	56958249.	coal mine	56958244.
16	oil/gas pr	250140043.	oil/gas pr	199229760.
17	other mine	11514740.	other mine	11514729.
18	constructi	22450405.	constructi	4079594.
19	manufact	2826397.	manufact	35958.
20	trans/comm	12401784.	trans/comm	5257164.
21	gs/elec ut	45665636.	gs/elec ut	28291619.
22	wholesale	21688023.	wholesale	1280241.
23	retail	73671000.	retail	3343771.
24	f i r e	20610235.	f i r e	378109.
25	other serv	11097914.	other serv	133388.
26	education	16036865.	education	9386126.
27	health ser	7147451.	health ser	344557.
28	wat/sew/tr	2116123.	wat/sew/tr	798779.
29	local govt	13729926.	local govt	225128.
30	households	168771989.		
	Final Demands	418786001.		

Table 4-18. Type II Business Multipliers and Type II Employment  
Requirement Multipliers for Converse County, Wyoming

Business Multiplier		Employment Multiplier	
NAME(RANK)	MULTIPLIER	NAME(RANK)	MULTIPLIER
cattle(10)	2.8162408	cattle(10)	.45794443E-04
sheep( 2)	3.1016109	sheep( 3)	.48329706E-04
oats(14)	2.6683754	oats(15)	.41537758E-04
grass hay( 9)	2.8208956	grass hay(13)	.44493545E-04
baled alfa( 4)	3.0481589	baled alfa( 2)	.48350981E-04
grain crn( 7)	2.8814162	grain crn( 9)	.46421779E-04
fd barley(13)	2.7463602	fd barley(14)	.43628530E-04
mlt barley( 1)	3.3609332	mlt barley( 1)	.58666177E-04
all wheat( 8)	2.8571539	all wheat(12)	.44728054E-04
dry beans( 6)	2.9712963	dry beans( 8)	.47016644E-04
potatoes(12)	2.7735749	potatoes(11)	.45309588E-04
sugar beet( 5)	3.0428788	sugar beet( 6)	.47589693E-04
other agri(16)	2.5732323	other agri(16)	.39602513E-04
forestry(17)	2.5482869	forestry(25)	.16762689E-04
coal mine(28)	1.5908263	coal mine(29)	.10284641E-04
oil/gas pr(27)	1.6620974	oil/gas pr(30)	.78756849E-05
other mine(23)	2.1112172	other mine(24)	.17662861E-04
constructi(25)	2.0312073	constructi(20)	.24893457E-04
manufact(26)	1.7585801	manufact(21)	.22777225E-04
trans/comm(18)	2.4600704	trans/comm(19)	.31550775E-04
gs/elec ut(21)	2.3530153	gs/elec ut(23)	.17723378E-04
wholesale(29)	1.4379265	wholesale(26)	.13388270E-04
retail(30)	1.3418222	retail(27)	.12860666E-04
f i r e(19)	2.4189758	f i r e(22)	.21981099E-04
other serv(22)	2.2338122	other serv( 4)	.48303835E-04
education(15)	2.6596063	education( 5)	.48127061E-04
health ser(20)	2.4041324	health ser( 7)	.47052582E-04
wat/sew/tr(11)	2.8146564	wat/sew/tr(18)	.32744305E-04
local govt( 3)	3.0765539	local govt(17)	.38715030E-04
households(24)	2.0317183	households(28)	.11919810E-04

Table 4-19. Total Sales and Final demand Sales  
for Crook County, Wyoming

Total Sales		Final Demand Sales		
1	cattle	13349113.	cattle	11135048.
2	sheep	677402.	sheep	622930.
3	oats	352418.	oats	352418.
4	grass hay	1517999.	grass hay	697289.
5	baled alfa	5811251.	baled alfa	5534055.
6	grain crn	24830.	grain crn	24830.
7	fd barley	294741	fd barley	294741.
8	mlt barley	85.	mlt barley	85.
9	all wheat	1509265.	all wheat	1462685.
10	dry beans	101.	dry beans	101.
11	potatoes	5778.	potatoes	5773.
12	sugar beet	100.	sugar beet	92.
13	other agri	1438251.	other agri	0.
14	forestry	9783668.	forestry	7521408.
15	coal mine	66.	coal mine	66.
16	oil/gas pr	94734424.	oil/gas pr	91679359.
17	other mine	40847349.	other mine	40847292.
18	constructi	13518842.	constructi	9996578.
19	manufact	1158059.	manufact	11816.
20	trans/comm	4549729.	trans/comm	1289984.
21	gs/elec ut	11361569.	gs/elec ut	6768002.
22	wholesale	9475989.	wholesale	786703.
23	retail	17118814.	retail	45396.
24	f i r e	5747642.	f i r e	110102.
25	other serv	1549644.	other serv	27683.
26	education	6617762.	education	4150544.
27	health ser	1885098.	health ser	5646.
28	wat/sew/tr	817753.	wat/sew/tr	21204.
29	local govt	5253578.	local govt	1131846.
30	households	66805399.		
	Final Demands	227403142.		

Table 4-20. Type II Business Multipliers and Type II Employment  
Requirement Multipliers for Crook County, Wyoming

Business Multiplier		Employment Multiplier	
NAME(RANK) MULTIPLIER		NAME(RANK) MULTIPLIER	
cattle(16)	2.1139039	cattle( 7)	.41006944E-04
sheep( 5)	2.4614796	sheep( 6)	.43775042E-04
oats(17)	2.0671248	oats(14)	.36922912E-04
grass hay(10)	2.2438946	grass hay(10)	.38063142E-04
baled alfa( 6)	2.4250494	baled alfa( 5)	.43825455E-04
grain crn(14)	2.1939644	grain crn(13)	.36950278E-04
fd barley(15)	2.1709366	fd barley(17)	.36450101E-04
mlt barley( 8)	2.3336137	mlt barley( 9)	.40400750E-04
all wheat(13)	2.1955870	all wheat(12)	.37358071E-04
dry beans( 1)	2.6496844	dry beans( 2)	.48125106E-04
potatoes( 9)	2.2918232	potatoes( 8)	.40862174E-04
sugar beet( 2)	2.6427825	sugar beet( 3)	.45173405E-04
other agri(20)	2.0307177	other agri(16)	.36508766E-04
forestry(11)	2.2424050	forestry(21)	.27591360E-04
coal mine( 4)	2.5067204	coal mine(22)	.25098500E-04
oil/gas pr(27)	1.1792852	oil/gas pr(30)	.23825382E-05
other mine(29)	1.2236302	other mine(28)	.61486826E-05
constructi(24)	1.6840060	constructi(24)	.15903985E-04
manufact(23)	1.8936440	manufact(18)	.33430245E-04
trans/comm(18)	2.0654939	trans/comm(20)	.31610741E-04
gs/elec ut(26)	1.3023876	gs/elec ut(26)	.74856914E-05
wholesale(30)	1.0924161	wholesale(29)	.34290289E-05
retail(28)	1.1926453	retail(25)	.14969542E-04
f i r e(19)	2.0522713	f i r e(23)	.16009822E-04
other serv(22)	1.9354915	other serv( 1)	.65182308E-04
education(12)	2.2336393	education( 4)	.44995635E-04
health ser(21)	1.9879442	health ser(11)	.37973731E-04
wat/sew/tr( 7)	2.3355254	wat/sew/tr(15)	.36655867E-04
local govt( 3)	2.5298485	local govt(19)	.32160867E-04
households(25)	1.5346714	households(27)	.73708973E-05

Table 4-21. Total Sales and Final Demand Sales for Fremont County, Wyoming

Total Sales		Final Demand Sales		
1	cattle	19943475.	cattle	11730161.
2	sheep	1300443.	sheep	1124165.
3	oats	850702.	oats	850702.
4	grass hay	5611495.	grass hay	4326256.
5	baled alfa	10502429.	baled alfa	10092112.
6	grain crn	531000.	grain crn	530977.
7	fd barley	1478880.	fd barley	1478879.
8	mlt barley	3450720.	mlt barley	3450717.
9	all wheat	246198.	all wheat	0.
10	dry beans	108.	dry beans	67.
11	potatoes	100.	potatoes	59.
12	sugar beet	13700.	sugar beet	13700.
13	other agri	4475290.	other agri	1725114.
14	forestry	4772291.	forestry	4469624.
15	coal mine	100.	coal mine	97.
16	oil/gas pr	388068808.	oil/gas pr	341992146.
17	other mine	64579267.	other mine	62706626.
18	constructi	91261941.	constructi	59666328.
19	manufact	32102088.	manufact	500436.
20	trans/comm	27594183.	trans/comm	4943624.
21	gs/elec ut	37382692.	gs/elec ut	3657961.
22	wholesale	90561802.	wholesale	15309097.
23	retail	215606003.	retail	31284524.
24	f i r e	56241936.	f i r e	4664810.
25	other serv	45366900.	other serv	11588211.
26	education	53985609.	education	34880527.
27	health ser	34093679.	health ser	16266377.
28	wat/sew/tr	3848219.	wat/sew/tr	130162.
29	local govt	27699487.	local govt	809361.
30	households	407588459.		
	Final Demands	854040799.		

Table 4-22. Type II Business Multipliers and Type II Employment Requirement Multipliers for Fremont County, Wyoming

Business Multiplier		Employment Multiplier	
NAME(RANK)	MULTIPLIER	NAME(RANK)	MULTIPLIER
cattle(13)	2.9968937	cattle( 8)	.45231355E-04
sheep( 3)	3.3389531	sheep( 4)	.48193495E-04
oats( 5)	3.2666681	oats( 6)	.46192112E-04
grass hay( 9)	3.1071159	grass hay( 9)	.45041201E-04
baled alfa( 4)	3.3138929	baled alfa( 3)	.49469035E-04
grain crn(12)	3.0211240	grain crn(13)	.43767419E-04
fd barley(11)	3.0412426	fd barley(12)	.43913373E-04
mlt barley(10)	3.0412433	mlt barley(11)	.43913402E-04
all wheat( 8)	3.1267482	all wheat(10)	.44339688E-04
dry beans( 1)	4.0317784	dry beans( 1)	.74994758E-04
potatoes(19)	2.5577891	potatoes(17)	.38355322E-04
sugar beet( 6)	3.1903581	sugar beet( 7)	.45540206E-04
other agri(16)	2.7017189	other agri(16)	.39256499E-04
forestry(22)	2.2837912	forestry(19)	.30823231E-04
coal mine(21)	2.3382220	coal mine(27)	.12331762E-04
oil/gas pr(27)	1.6335871	oil/gas pr(30)	.72444175E-05
other mine(25)	2.0824793	other mine(25)	.15175581E-04
constructi(23)	2.2554905	constructi(21)	.21279677E-04
manufact(26)	1.7147218	manufact(23)	.19197793E-04
trans/comm(17)	2.6117716	trans/comm(20)	.28420572E-04
gs/elec ut(29)	1.5770461	gs/elec ut(29)	.72975563E-05
wholesale(30)	1.5287428	wholesale(28)	.10750621E-04
retail(28)	1.5795581	retail(24)	.15411782E-04
f i r e(20)	2.5440477	f i r e(22)	.19537021E-04
other serv(15)	2.7130972	other serv( 2)	.55867444E-04
education(14)	2.8102204	education( 5)	.47996426E-04
health ser(18)	2.5717268	health ser(18)	.35331320E-04
wat/sew/tr( 7)	3.1576006	wat/sew/tr(14)	.41372695E-04
local govt( 2)	3.4163228	local govt(15)	.40321223E-04
households(24)	2.2322800	households(26)	.13518314E-04

Table 4-23. Total Sales and Final Demand Sales  
for Goshen County, Wyoming

Total Sales		Final Demand Sales		
1	cattle	38560486.	cattle	31880737.
2	sheep	238953.	sheep	201081.
3	oats	240381.	oats	240377.
4	grass hay	2584846.	grass hay	320712.
5	baled alfa	7136634.	baled alfa	6325268.
6	grain crn	10107206.	grain crn	8907200.
7	fd barley	947201.	fd barley	500498.
8	mlt barley	182.	mlt barley	173.
9	all wheat	121.	all wheat	121.
10	dry beans	109201.	dry beans	109197.
11	potatoes	762303.	potatoes	290413.
12	sugar beet	350600.	sugar beet	0.
13	other agri	3850827.	other agri	1625759.
14	forestry	163.	forestry	163.
15	coal mine	184.	coal mine	174.
16	oil/gas pr	159.	oil/gas pr	31.
17	other mine	97.	other mine	26.
18	constructi	14999879.	constructi	10260477.
19	manufact	42772000.	manufact	37502292.
20	trans/comm	28366700.	trans/comm	15974807.
21	gs/elec ut	12542091.	gs/elec ut	4917776.
22	wholesale	92303875.	wholesale	52742755.
23	retail	62067479.	retail	213125.
24	f i r e	20900919.	f i r e	489801.
25	other serv	13135460.	other serv	264195.
26	education	17839711.	education	16176016.
27	health ser	7085040.	health ser	1271090.
28	wat/sew/tr	1440754.	wat/sew/tr	83117.
29	local govt	4729180.	local govt	328077.
30	households	121275878.		
	Final Demands	258819131.		

Table 4-24. Type II Business Multipliers and Type II Employment  
Requirement Multipliers for Goshen County, Wyoming

Business Multiplier		Employment Multiplier	
NAME(RANK)	MULTIPLIER	NAME(RANK)	MULTIPLIER
cattle(11)	2.9112001	cattle(10)	.47766961E-04
sheep( 2)	3.2162499	sheep( 5)	.50920034E-04
oats( 3)	3.2162050	oats( 6)	.50919349E-04
grass hay(10)	2.9436148	grass hay(12)	.46263239E-04
baled alfa( 4)	3.1742462	baled alfa( 3)	.52486381E-04
grain crn(14)	2.8295551	grain crn(14)	.44197513E-04
fd barley(12)	2.8792312	fd barley(13)	.45158919E-04
mlt barley( 1)	3.3593557	mlt barley( 9)	.47878989E-04
all wheat(13)	2.8633428	all wheat(16)	.41840556E-04
dry beans( 6)	3.0951959	dry beans( 7)	.50491497E-04
potatoes(15)	2.7547248	potatoes(15)	.42976706E-04
sugar beet( 7)	3.0533394	sugar beet( 8)	.48052874E-04
other agri(17)	2.6101084	other agri(18)	.39575405E-04
forestry( 5)	3.1446841	forestry(17)	.41535637E-04
coal mine(21)	2.4437679	coal mine(27)	.11534679E-04
oil/gas pr(27)	1.6644615	oil/gas pr(29)	.64889911E-05
other mine(22)	2.3787536	other mine(26)	.11778585E-04
constructi(24)	2.3191150	constructi(21)	.27086233E-04
manufact(28)	1.5231737	manufact(25)	.12514988E-04
trans/comm(18)	2.5436005	trans/comm(22)	.20024228E-04
gs/elec ut(30)	1.2456041	gs/elec ut(30)	.45373636E-05
wholesale(29)	1.3969909	wholesale(28)	.76181697E-05
retail(26)	1.6920345	retail(23)	.16268430E-04
f i r e(20)	2.4594508	f i r e(20)	.27895650E-04
other serv(23)	2.3627480	other serv( 1)	.58894710E-04
education(16)	2.6742638	education( 4)	.51618413E-04
health ser(19)	2.4743922	health ser(11)	.47263657E-04
wat/sew/tr( 8)	3.0503473	wat/sew/tr( 2)	.54440732E-04
local govt( 9)	2.9981651	local govt(19)	.38711524E-04
households(25)	2.0979112	households(24)	.13235963E-04



Table 4-25. Total Sales and Final Demand Sales  
for Hot Springs County, Wyoming

		Total Sales	Final Demand Sales	
1	cattle	7346821.	cattle	6551189.
2	sheep	431605.	sheep	389711.
3	oats	127190.	oats	127190.
4	grass hay	549844.	grass hay	93059.
5	baled alfa	4465859.	baled alfa	4317571.
6	grain crn	25547.	grain crn	25546.
7	fd barley	331655.	fd barley	331655.
8	mlt barley	106.	mlt barley	106.
9	all wheat	20677.	all wheat	20677.
10	dry beans	101.	dry beans	101.
11	potatoes	101.	potatoes	83.
12	sugar beet	9148.	sugar beet	9144.
13	other agri	1043262.	other agri	76882.
14	forestry	132.	forestry	125.
15	coal mine	101.	coal mine	101.
16	oil/gas pr	211631536.	oil/gas pr	204392693.
17	other mine	102.	other mine	102.
18	constructi	6317892.	constructi	1633665.
19	manufact	801340.	manufact	9881.
20	trans/comm	4040646.	trans/comm	786684.
21	gs/elec ut	28133766.	gs/elec ut	17721230.
22	wholesale	13519096.	wholesale	1204376.
23	retail	41084000.	retail	6877002.
24	f i r e	10714670.	f i r e	252170.
25	other serv	7870234.	other serv	1531809.
26	education	7186420.	education	2419471.
27	health ser	9576178.	health ser	6165716.
28	wat/sew/tr	908797.	wat/sew/tr	73111.
29	local govt	8471442.	local govt	185613.
30	households	74336998.		
	Final Demands	298545183.		

Table 4-26. Type II Business Multipliers and Type II Employment  
Requirement Multipliers for Hot Springs County, Wyoming

Business Multiplier		Employment Multiplier	
NAME(RANK)	MULTIPLIER	NAME(RANK)	MULTIPLIER
cattle(16)	2.8123044	cattle(17)	.34452657E-04
sheep( 4)	3.1724326	sheep( 7)	.37646228E-04
oats( 5)	3.1724304	oats( 8)	.37646208E-04
grass hay( 9)	3.0175485	grass hay(11)	.36073177E-04
baled alfa( 2)	3.1903024	baled alfa( 4)	.38872261E-04
grain crn(12)	2.9437587	grain crn(14)	.35122394E-04
fd barley(11)	2.9596257	fd barley(13)	.35517172E-04
mlt barley(15)	2.8889198	mlt barley( 2)	.48616424E-04
all wheat(10)	3.0000792	all wheat(12)	.35999269E-04
dry beans( 3)	3.1833687	dry beans( 5)	.38753876E-04
potatoes(13)	2.9079085	potatoes(16)	.34715319E-04
sugar beet( 8)	3.0561201	sugar beet( 9)	.36210096E-04
other agri(17)	2.6643572	other agri(20)	.30835874E-04
forestry( 1)	3.1970703	forestry(24)	.22083556E-04
coal mine( 6)	3.1412562	coal mine(22)	.27345026E-04
oil/gas pr(29)	1.3161172	oil/gas pr(29)	.39463106E-05
other mine(22)	2.3933773	other mine(28)	.84610539E-05
constructi(24)	2.3397031	constructi(21)	.27784490E-04
manufact(25)	2.1359949	manufact(18)	.33584130E-04
trans/comm(20)	2.4892965	trans/comm(19)	.31360544E-04
gs/elec ut(30)	1.1742445	gs/elec ut(30)	.28166553E-05
wholesale(27)	1.6005296	wholesale(27)	.10878231E-04
retail(28)	1.3635259	retail(26)	.11719182E-04
f i r e(23)	2.3809485	f i r e(23)	.22206950E-04
other serv(18)	2.6185428	other serv( 1)	.53267052E-04
education(19)	2.5579461	education( 6)	.38094332E-04
health ser(21)	2.4741602	health ser( 3)	.40970010E-04
wat/sew/tr(14)	2.8898522	wat/sew/tr(10)	.36078502E-04
local govt( 7)	3.1349871	local govt(15)	.35018209E-04
households(26)	2.0919370	households(25)	.11910863E-04

Table 4-27. Total Sales and Final demand Sales for Johnson County, Wyoming

Total Sales		Final Demand Sales		
1	cattle	12083392.	cattle	8175053.
2	sheep	1664777.	sheep	1559070.
3	oats	206446.	oats	206446.
4	grass hay	597529.	grass hay	96357.
5	baled alfa	4978907.	baled alfa	4752264.
6	grain crn	101.	grain crn	101.
7	fd barley	191862.	fd barley	191862.
8	mlt barley	112.	mlt barley	112.
9	all wheat	143914.	all wheat	143914.
10	dry beans	101.	dry beans	101.
11	potatoes	101.	potatoes	101.
12	sugar beet	102.	sugar beet	102.
13	other agri	1665122.	other agri	666743.
14	forestry	54876.	forestry	54876.
15	coal mine	108.	coal mine	108.
16	oil/gas pr	87448000.	oil/gas pr	86101054.
17	other mine	7486656.	other mine	7486656.
18	constructi	8874345.	constructi	5559744.
19	manufact	6034044.	manufact	2575677.
20	trans/comm	7274037.	trans/comm	1005686.
21	gs/elec ut	5527395.	gs/elec ut	162729.
22	wholesale	13210338.	wholesale	927089.
23	retail	53548000.	retail	14355545.
24	f i r e	13170077.	f i r e	3956975.
25	other serv	7274944.	other serv	243882.
26	education	6756170.	education	5454874.
27	health ser	6048507.	health ser	2289761.
28	wat/sew/tr	910801.	wat/sew/tr	28348.
29	local govt	4064719.	local govt	710054.
30	households	88767998.		
	Final Demands	205178701.		

Table 4-28. Type II Business Multipliers and Type II Employment Requirement Multipliers for Johnson County, Wyoming

Business Multiplier		Employment Multiplier	
NAME(RANK)	MULTIPLIER	NAME(RANK)	MULTIPLIER
cattle(11)	2.6606503	cattle(11)	.40324170E-04
sheep( 3)	2.9302731	sheep( 8)	.41749350E-04
oats(14)	2.6170512	oats(17)	.37263568E-04
grass hay( 9)	2.7091632	grass hay(12)	.39088309E-04
baled alfa( 1)	2.9645098	baled alfa( 5)	.43569555E-04
grain crn(10)	2.6648423	grain crn(14)	.38833185E-04
fd barley(15)	2.6149035	fd barley(15)	.38048877E-04
mlt barley( 4)	2.9015337	mlt barley( 2)	.47360420E-04
all wheat( 8)	2.7156495	all wheat(13)	.39077872E-04
dry beans( 2)	2.9438730	dry beans( 4)	.44404216E-04
potatoes(17)	2.5547882	potatoes(16)	.37423402E-04
sugar beet( 5)	2.8766050	sugar beet( 9)	.41625302E-04
other agri(16)	2.6053750	other agri(18)	.36023900E-04
forestry(21)	2.1757955	forestry( 1)	.80392021E-04
coal mine(13)	2.6301807	coal mine(22)	.24553457E-04
oil/gas pr(28)	1.2569175	oil/gas pr(29)	.55419300E-05
other mine(24)	2.0162658	other mine(25)	.13135237E-04
constructi(22)	2.0799001	constructi(21)	.25262972E-04
manufact(26)	1.6233586	manufact(24)	.15154052E-04
trans/comm(20)	2.1920400	trans/comm(20)	.26369303E-04
gs/elec ut(29)	1.2122025	gs/elec ut(30)	.45760586E-05
wholesale(30)	1.1932659	wholesale(28)	.57955903E-05
retail(27)	1.3658701	retail(26)	.12244401E-04
f i r e(19)	2.2485423	f i r e(23)	.18127014E-04
other serv(25)	1.9159296	other serv( 7)	.42003236E-04
education(12)	2.6519549	education( 3)	.47179714E-04
health ser(18)	2.4708235	health ser( 6)	.43110762E-04
wat/sew/tr( 6)	2.8696771	wat/sew/tr(10)	.41397242E-04
local govt( 7)	2.8404920	local govt(19)	.34828757E-04
households(23)	2.0464048	households(27)	.11979159E-04

Table 4-31. Total Sales and Final demand Sales for Lincoln County, Wyoming

Total Sales		Final Demand Sales		
1	cattle	8344757.	cattle	7180786.
2	sheep	951566.	sheep	864928.
3	oats	91875.	oats	91875.
4	grass hay	3092273.	grass hay	2369203.
5	baled alfa	7833834.	baled alfa	7656058.
6	grain crn	101.	grain crn	101.
7	fd barley	2360923.	fd barley	2360923.
8	mlt barley	217.	mlt barley	217.
9	all wheat	57971.	all wheat	57971.
10	dry beans	101.	dry beans	101.
11	potatoes	133.	potatoes	101.
12	sugar beet	102.	sugar beet	102.
13	other agri	7805434.	other agri	5461130.
14	forestry	4347709.	forestry	3984950.
15	coal mine	77907300.	coal mine	22260330.
16	oil/gas pr	149678139.	oil/gas pr	134373852.
17	other mine	112.	other mine	105.
18	constructi	68551576.	constructi	51923268.
19	manufact	25324146.	manufact	17393829.
20	trans/comm	9996344.	trans/comm	2070849.
21	gs/elec ut	97710196.	gs/elec ut	81853986.
22	wholesale	30178339.	wholesale	1050032.
23	retail	79501781.	retail	11050741.
24	f i r e	26085685.	f i r e	322033.
25	other serv	11243659.	other serv	122831.
26	education	17117117.	education	10309417.
27	health ser	3918684.	health ser	13843.
28	wat/sew/tr	1603345.	wat/sew/tr	34690.
29	local govt	13711113.	local govt	146679.
30	households	146586086.		
	Final Demands	415204811.		

Table 4-32. Type II Business Multipliers and Type II Employment Requirement Multipliers for Lincoln County, Wyoming

Business Multiplier		Employment Multiplier	
NAME(RANK)	MULTIPLIER	NAME(RANK)	MULTIPLIER
cattle(10)	2.7143617	cattle( 8)	.43291083E-04
sheep( 2)	2.9994517	sheep( 3)	.46094123E-04
oats( 3)	2.9994337	oats( 4)	.46093557E-04
grass hay(11)	2.7006920	grass hay(10)	.41369718E-04
baled alfa( 5)	2.9582922	baled alfa( 2)	.47275768E-04
grain crn(12)	2.6437018	grain crn(11)	.41185556E-04
fd barley(13)	2.6081356	fd barley(13)	.40024794E-04
mlt barley( 4)	2.9793430	mlt barley( 6)	.45124277E-04
all wheat( 9)	2.7214310	all wheat(12)	.40709081E-04
dry beans( 6)	2.9490993	dry beans( 1)	.47417785E-04
potatoes(19)	2.2254883	potatoes(17)	.37502573E-04
sugar beet( 7)	2.8935135	sugar beet( 7)	.43568498E-04
other agri(17)	2.5194153	other agri(14)	.38571988E-04
forestry(20)	2.1734493	forestry(16)	.37530672E-04
coal mine(25)	1.9650290	coal mine(26)	.11420498E-04
oil/gas pr(29)	1.3788703	oil/gas pr(30)	.44638919E-05
other mine(27)	1.9074961	other mine(25)	.12095071E-04
constructi(23)	2.0487491	constructi(22)	.18877292E-04
manufact(21)	2.1113176	manufact(21)	.18906573E-04
trans/comm(15)	2.5643449	trans/comm(20)	.20597062E-04
gs/elec ut(16)	2.5353256	gs/elec ut(23)	.12880453E-04
wholesale(30)	1.3016726	wholesale(29)	.70438460E-05
retail(28)	1.4045266	retail(27)	.10792777E-04
f i r e(24)	2.0088095	f i r e(24)	.12283985E-04
other serv(26)	1.9336226	other serv( 5)	.45709779E-04
education(14)	2.5897185	education(15)	.38300243E-04
health ser(18)	2.2908925	health ser( 9)	.41957433E-04
wat/sew/tr( 8)	2.8163291	wat/sew/tr(18)	.37245622E-04
local govt( 1)	3.0237918	local govt(19)	.30896057E-04
households(22)	2.0653734	households(28)	.97128647E-05

Table 4-33. Total Sales and Final demand Sales  
for Natrona County, Wyoming

		Total Sales	Final Demand Sales	
1	cattle	8468171.	cattle	3441889.
2	sheep	3457009.	sheep	3183842.
3	oats	153140.	oats	153140.
4	grass hay	751718.	grass hay	0.
5	baled alfa	2409135.	baled alfa	2158155.
6	grain crn	38349.	grain crn	0.
7	fd barley	40866.	fd barley	40865.
8	mlt barley	94.	mlt barley	94.
9	all wheat	129049.	all wheat	97245.
10	dry beans	101.	dry beans	101.
11	potatoes	101.	potatoes	101.
12	sugar beet	102.	sugar beet	95.
13	other agri	859946.	other agri	111159.
14	forestry	932653.	forestry	932653.
15	coal mine	97.	coal mine	97.
16	oil/gas pr	696475680.	oil/gas pr	359802587.
17	other mine	51421362.	other mine	51282568.
18	constructi	215064967.	constructi	103997538.
19	manufact	754113456.	manufact	639836102.
20	trans/comm	151250177.	trans/comm	80332246.
21	gs/elec ut	119557735.	gs/elec ut	18795995.
22	wholesale	1255448392.	wholesale	1028757288.
23	retail	541036000.	retail	14098451.
24	f i r e	196373212.	f i r e	38748903.
25	other serv	192815261.	other serv	97980782.
26	education	71067194.	education	29868494.
27	health ser	72723282.	health ser	22633913.
28	wat/sew/tr	13569676.	wat/sew/tr	3400746.
29	local govt	62240414.	local govt	1601967.
30	households	1165761492.		
	Final Demands	3059237125.		

Table 4-34. Type II Business Multipliers and Type II Employment  
Requirement Multipliers for Natrona County, Wyoming

Business Multiplier		Employment Multiplier	
NAME(RANK)	MULTIPLIER	NAME(RANK)	MULTIPLIER
cattle(9)	2.9969459	cattle(1)	.63418126E-04
sheep(7)	3.0457542	sheep(4)	.61084085E-04
oats(17)	2.5822418	oats(11)	.53169107E-04
grass hay(11)	2.9413383	grass hay(7)	.55910792E-04
baled alfa(4)	3.1732252	baled alfa(2)	.63306310E-04
grain crn(13)	2.8477196	grain crn(9)	.54321584E-04
fd barley(12)	2.8607252	fd barley(10)	.53848166E-04
mlt barley(6)	3.1090643	mlt barley(6)	.56060383E-04
all wheat(10)	2.9423265	all wheat(8)	.55514424E-04
dry beans(5)	3.1095657	dry beans(3)	.62553177E-04
potatoes(15)	2.7389867	potatoes(13)	.52663941E-04
sugar beet(8)	3.0444592	sugar beet(5)	.57753105E-04
other agri(16)	2.6493173	other agri(12)	.52750546E-04
forestry(23)	2.2690327	forestry(19)	.28473429E-04
coal mine(2)	3.2680500	coal mine(20)	.24475058E-04
oil/gas pr(26)	2.0969245	oil/gas pr(25)	.15126454E-04
other mine(22)	2.2707055	other mine(24)	.17039206E-04
constructi(19)	2.4844204	constructi(22)	.21787937E-04
manufact(27)	1.9212977	manufact(28)	.81131170E-05
trans/comm(20)	2.4449738	trans/comm(21)	.24197615E-04
gs/elec ut(30)	1.2366369	gs/elec ut(30)	.42053805E-05
wholesale(29)	1.3852417	wholesale(29)	.53784092E-05
retail(28)	1.5779947	retail(26)	.14090279E-04
f i r e(21)	2.2927732	f i r e(23)	.20252099E-04
other serv(24)	2.2475132	other serv(16)	.35048933E-04
education(14)	2.7527720	education(14)	.47210853E-04
health ser(18)	2.5215071	health ser(17)	.34691436E-04
wat/sew/tr(3)	3.2539666	wat/sew/tr(18)	.30965081E-04
local govt(1)	3.3564432	local govt(15)	.39460546E-04
households(25)	2.2393557	households(27)	.12146213E-04

Table 4-35. Total Sales and Final demand Sales for Niobrara County, Wyoming

Total Sales		Final Demand Sales		
1	cattle	14833898.	cattle	13576349.
2	sheep	366638.	sheep	338592.
3	oats	306219.	oats	306219.
4	grass hay	1812897.	grass hay	967615.
5	baled alfa	2066405.	baled alfa	1764776.
6	grain crn	178007.	grain crn	2776.
7	fd barley	448080.	fd barley	448080.
8	mlt barley	100.	mlt barley	100.
9	all wheat	930277.	all wheat	420905.
10	dry beans	101.	dry beans	100.
11	potatoes	101.	potatoes	97.
12	sugar beet	101.	sugar beet	86.
13	other agri	881632.	other agri	293576.
14	forestry	116.	forestry	72.
15	coal mine	125.	coal mine	123.
16	oil/gas pr	39424000.	oil/gas pr	36572397.
17	other mine	118.	other mine	109.
18	constructi	5891611.	constructi	4412410.
19	manufact	3193211.	manufact	1211224.
20	trans/comm	3384434.	trans/comm	1384062.
21	gs/elec ut	5321176.	gs/elec ut	2425102.
22	wholesale	10230120.	wholesale	521216.
23	retail	23207000.	retail	3546891.
24	f i r e	8797022.	f i r e	210523.
25	other serv	3427551.	other serv	72511.
26	education	2429350.	education	1046757.
27	health ser	2023291.	health ser	457432.
28	wat/sew/tr	374988.	wat/sew/tr	19472.
29	local govt	3062490.	local govt	86180.
30	households	36749999.		
	Final Demands	94397315.		

Table 4-36. Type II Business Multipliers and Type II Employment Requirement Multipliers for Niobrara County, Wyoming

Business Multiplier		Employment Multiplier	
NAME(RANK)	MULTIPLIER	NAME(RANK)	MULTIPLIER
cattle(16)	2.7419572	cattle(14)	.38470526E-04
sheep( 5)	3.0364814	sheep( 7)	.41062816E-04
oats(19)	2.5659252	oats(18)	.34604677E-04
grass hay(10)	2.8618166	grass hay(10)	.39837553E-04
baled alfa( 3)	3.0437671	baled alfa( 6)	.43142497E-04
grain crn(14)	2.7838338	grain crn(13)	.38620662E-04
fd barley(13)	2.7873028	fd barley(11)	.38759562E-04
mlt barley( 1)	3.2184076	mlt barley( 1)	.62711544E-04
all wheat(12)	2.8139559	all wheat(15)	.38198312E-04
dry beans( 6)	3.0260879	dry beans( 5)	.43425090E-04
potatoes(17)	2.7139743	potatoes(16)	.38070319E-04
sugar beet( 8)	2.9158822	sugar beet( 9)	.39845276E-04
other agri(18)	2.5996332	other agri(17)	.34862756E-04
forestry( 7)	2.9452311	forestry(22)	.21771397E-04
coal mine( 2)	3.0978358	coal mine(23)	.18968383E-04
oil/gas pr(29)	1.3490590	oil/gas pr(30)	.37840718E-05
other mine( 9)	2.9056508	other mine(20)	.24374135E-04
constructi(26)	1.6001257	constructi(24)	.13027833E-04
manufact(25)	1.7412659	manufact(21)	.22757868E-04
trans/comm(20)	2.5287142	trans/comm(19)	.30958465E-04
gs/elec ut(30)	1.3122083	gs/elec ut(29)	.60483952E-05
wholesale(28)	1.4619338	wholesale(27)	.96630815E-05
retail(27)	1.4855009	retail(26)	.12079685E-04
f i r e(24)	1.8256545	f i r e(28)	.95942911E-05
other serv(22)	2.2554986	other serv( 2)	.58528893E-04
education(15)	2.7661734	education( 3)	.55323142E-04
health ser(21)	2.4620305	health ser( 4)	.44472085E-04
wat/sew/tr(11)	2.8259589	wat/sew/tr(12)	.38738444E-04
local govt( 4)	3.0403379	local govt( 8)	.39870523E-04
households(23)	2.1452422	households(25)	.12328079E-04

Table 4-37. Total Sales and Final Demand Sales  
for Park County, Wyoming

Total Sales		Final Demand Sales		
1	cattle	56963809.	cattle	51585812.
2	sheep	577144.	sheep	499053.
3	oats	357000.	oats	0.
4	grass hay	1266047.	grass hay	0.
5	baled alfa	6165995.	baled alfa	4994022.
6	grain crn	678502.	grain crn	0.
7	fd barley	971393.	fd barley	6.
8	mlt barley	8742527.	mlt barley	0.
9	all wheat	267328.	all wheat	0.
10	dry beans	142800.	dry beans	142800.
11	potatoes	6141.	potatoes	6129.
12	sugar beet	101.	sugar beet	68.
13	other agri	2260066.	other agri	690282.
14	forestry	77.	forestry	72.
15	coal mine	101.	coal mine	79.
16	oil/gas pr	613380729.	oil/gas pr	590283844.
17	other mine	110.	other mine	106.
18	constructi	72834605.	constructi	50312253.
19	manufact	45191073.	manufact	26888067.
20	trans/comm	43670102.	trans/comm	17242596.
21	gs/elec ut	23243832.	gs/elec ut	35006.
22	wholesale	87646000.	wholesale	24435428.
23	retail	171361000.	retail	15740038.
24	f i r e	42167021.	f i r e	724205.
25	other serv	60632000.	other serv	32789569.
26	education	27115690.	education	21380879.
27	health ser	22340117.	health ser	9296656.
28	wat/sew/tr	3246767.	wat/sew/tr	543993.
29	local govt	18227557.	local govt	631621.
30	households	302070963.		
	Final Demands	1016203843.		

Table 4-38. Type II Business Multipliers and Type II Employment  
Requirement Multipliers for Park County, Wyoming

Business Multiplier		Employment Multiplier	
NAME(RANK)	MULTIPLIER	NAME(RANK)	MULTIPLIER
cattle(19)	2.6407931	cattle(13)	.33290522E-04
sheep( 8)	2.9735436	sheep( 7)	.35085030E-04
oats(12)	2.8038137	oats(10)	.33616421E-04
grass hay(10)	2.8356539	grass hay( 9)	.33868819E-04
baled alfa( 5)	3.0368844	baled alfa( 3)	.37017885E-04
grain crn(14)	2.7682790	grain crn(16)	.32805212E-04
fd barley(16)	2.7667323	fd barley(15)	.32897696E-04
mlt barley(15)	2.7667418	mlt barley(14)	.32897703E-04
all wheat(11)	2.8065985	all wheat(12)	.33303768E-04
dry beans( 7)	3.0096959	dry beans( 5)	.36340037E-04
potatoes(13)	2.7727837	potatoes(17)	.32352508E-04
sugar beet( 4)	3.0644882	sugar beet( 6)	.35552933E-04
other agri(20)	2.5438831	other agri(19)	.29534849E-04
forestry( 6)	3.0251387	forestry(20)	.28590063E-04
coal mine( 3)	3.0745024	coal mine(24)	.17059259E-04
oil/gas pr(30)	1.2674186	oil/gas pr(30)	.34876576E-05
other mine( 1)	3.3860431	other mine(11)	.33304187E-04
constructi(23)	2.3059184	constructi(22)	.22337755E-04
manufact(25)	1.9159428	manufact(25)	.16969528E-04
trans/comm(18)	2.6568451	trans/comm(21)	.25387286E-04
gs/elec ut(27)	1.7438653	gs/elec ut(29)	.67161452E-05
wholesale(28)	1.4958678	wholesale(28)	.85328333E-05
retail(29)	1.4893469	retail(26)	.13425354E-04
f i r e(22)	2.4336546	f i r e(23)	.19768492E-04
other serv(26)	1.8708024	other serv( 4)	.36894584E-04
education(17)	2.6865634	education( 1)	.50143563E-04
health ser(21)	2.4644358	health ser( 2)	.39335350E-04
wat/sew/tr( 2)	3.1481884	wat/sew/tr(18)	.31812188E-04
local govt( 9)	2.9298321	local govt( 8)	.34282161E-04
households(24)	2.1507312	households(27)	.11835701E-04

Table 4-39. Total Sales and Final demand Sales  
for Platte County, Wyoming

Total Sales		Final Demand Sales		
1	cattle	23915810.	cattle	21307886.
2	sheep	187729.	sheep	152431.
3	oats	244931.	oats	244931.
4	grass hay	2077111.	grass hay	700108.
5	baled alfa	3240112.	baled alfa	2748068.
6	grain crn	1750828.	grain crn	1750808.
7	fd barley	422132.	fd barley	422128.
8	mlt barley	108.	mlt barley	102.
9	all wheat	2917850.	all wheat	1714244.
10	dry beans	43400.	dry beans	43390.
11	potatoes	111.	potatoes	72.
12	sugar beet	107700.	sugar beet	107694.
13	other agri	1848727.	other agri	826184.
14	forestry	268108.	forestry	268108.
15	coal mine	103.	coal mine	100.
16	oil/gas pr	107.	oil/gas pr	50.
17	other mine	10762350.	other mine	10563963.
18	constructi	14188556.	constructi	10202672.
19	manufact	3964355.	manufact	112112.
20	trans/comm	17312960.	trans/comm	10959938.
21	gs/elec ut	203905051.	gs/elec ut	187166312.
22	wholesale	12096421.	wholesale	468685.
23	retail	56196567.	retail	11467722.
24	f i r e	12758807.	f i r e	431221.
25	other serv	5983029.	other serv	159607.
26	education	10666588.	education	2234230.
27	health ser	5460559.	health ser	1558225.
28	wat/sew/tr	913413.	wat/sew/tr	46451.
29	local govt	12332995.	local govt	288840.
30	households	89240034.		
	Final Demands	305268796.		

Table 4-40. Type II Business Multipliers and Type II Employment  
Requirement Multipliers for Platte County, Wyoming

Business Multiplier		Employment Multiplier	
NAME(RANK)	MULTIPLIER	NAME(RANK)	MULTIPLIER
cattle(10)	2.7428170	cattle( 8)	.43973867E-04
sheep( 4)	3.0677882	sheep( 4)	.46326008E-04
oats( 2)	3.0855514	oats( 6)	.45799257E-04
grass hay(11)	2.7377060	grass hay(11)	.41226381E-04
baled alfa( 5)	2.9653407	baled alfa( 5)	.46226459E-04
grain crn(13)	2.5732466	grain crn(18)	.38342893E-04
fd barley(16)	2.4783394	fd barley(17)	.38679154E-04
mlt barley( 3)	3.0766778	mlt barley( 2)	.49252998E-04
all wheat( 9)	2.7849642	all wheat(13)	.40974297E-04
dry beans( 6)	2.8807103	dry beans( 7)	.45032647E-04
potatoes(17)	2.4448833	potatoes(19)	.38308167E-04
sugar beet( 7)	2.8585197	sugar beet( 9)	.42608832E-04
other agri(14)	2.5074850	other agri(20)	.38246409E-04
forestry(25)	1.8789049	forestry(16)	.40151685E-04
coal mine(19)	2.2404979	coal mine(28)	.10757015E-04
oil/gas pr(22)	2.2221502	oil/gas pr(24)	.18966490E-04
other mine(26)	1.7899039	other mine(26)	.14253213E-04
constructi(21)	2.2292259	constructi(21)	.23478797E-04
manufact(27)	1.7342913	manufact(22)	.19695260E-04
trans/comm( 8)	2.8227789	trans/comm(14)	.40892484E-04
gs/elec ut(28)	1.4026656	gs/elec ut(30)	.54363452E-05
wholesale(30)	1.1883192	wholesale(29)	.68429950E-05
retail(29)	1.3498931	retail(25)	.16802670E-04
f i r e(18)	2.3509682	f i r e(23)	.19643855E-04
other serv(23)	2.1162347	other serv( 1)	.53622379E-04
education(15)	2.4877324	education( 3)	.48085325E-04
health ser(20)	2.2380890	health ser(15)	.40582847E-04
wat/sew/tr(12)	2.6853243	wat/sew/tr(12)	.41144869E-04
local govt( 1)	3.1542880	local govt(10)	.41971602E-04
households(24)	1.9796679	households(27)	.13226740E-04

Table 4-41. Total Sales and Final demand Sales for Sheridan County, Wyoming

Total Sales		Final Demand Sales		
1	cattle	17971462.	cattle	14422014.
2	sheep	498304.	sheep	443916.
3	oats	280884.	oats	40744.
4	grass hay	1848549.	grass hay	796315.
5	baled alfa	7357363.	baled alfa	7004339.
6	grain crn	26670.	grain crn	26670.
7	fd barley	748637.	fd barley	748637.
8	mlt barley	109.	mlt barley	109.
9	all wheat	884218.	all wheat	884213.
10	dry beans	51.	dry beans	51.
11	potatoes	6141.	potatoes	6141.
12	sugar beet	93.	sugar beet	93.
13	other agri	3671406.	other agri	2042295.
14	forestry	5321830.	forestry	4519488.
15	coal mine	50694000.	coal mine	50179369.
16	oil/gas pr	11947043.	oil/gas pr	11651172.
17	other mine	95.	other mine	90.
18	constructi	70316158.	constructi	47825911.
19	manufact	23534390.	manufact	6325781.
20	trans/comm	35546210.	trans/comm	18686972.
21	gs/elec ut	22547652.	gs/elec ut	6567773.
22	wholesale	138842000.	wholesale	96079610.
23	retail	171830000.	retail	12561984.
24	f i r e	55871982.	f i r e	5899948.
25	other serv	38059000.	other serv	9873085.
26	education	26924527.	education	12904534.
27	health ser	27319037.	health ser	11373780.
28	wat/sew/tr	4401314.	wat/sew/tr	1211864.
29	local govt	19152919.	local govt	6825231.
30	households	363473717.		
	Final Demands	579855385.		

Table 4-42. Type II Business Multipliers and Type II Employment Requirement Multipliers for Sheridan County, Wyoming

Business Multiplier		Employment Multiplier	
NAME(RANK) MULTIPLIER		NAME(RANK) MULTIPLIER	
cattle(12)	2.8298145	cattle( 7)	.50720744E-04
sheep( 5)	3.1351398	sheep( 5)	.52894796E-04
oats( 6)	3.1351050	oats( 6)	.52893681E-04
grass hay( 9)	2.8753605	grass hay(10)	.47595999E-04
baled alfa( 7)	3.1019611	baled alfa( 4)	.53247746E-04
grain crn(15)	2.7594254	grain crn(13)	.45949504E-04
fd barley(14)	2.7807537	fd barley(12)	.46070755E-04
mlt barley( 1)	3.4539367	mlt barley( 1)	.67919520E-04
all wheat(11)	2.8590060	all wheat(11)	.47448761E-04
dry beans( 4)	3.2542689	dry beans( 2)	.63647059E-04
potatoes(17)	2.6056378	potatoes(15)	.44151140E-04
sugar beet( 3)	3.4193260	sugar beet( 3)	.58838364E-04
other agri(16)	2.7009511	other agri(14)	.44469671E-04
forestry(19)	2.4717709	forestry(20)	.31409527E-04
coal mine(25)	2.1584547	coal mine(25)	.17053266E-04
oil/gas pr(26)	1.8854664	oil/gas pr(24)	.19715703E-04
other mine(20)	2.4054318	other mine(26)	.16797049E-04
constructi(21)	2.3785391	constructi(21)	.25712194E-04
manufact(27)	1.8840692	manufact(22)	.21708034E-04
trans/comm(13)	2.8013259	trans/comm(18)	.37744056E-04
gs/elec ut(29)	1.3037891	gs/elec ut(29)	.61398633E-05
wholesale(30)	1.1909016	wholesale(30)	.38771949E-05
retail(28)	1.4994740	retail(27)	.14847119E-04
f i r e(24)	2.1922377	f i r e(23)	.20853913E-04
other serv(22)	2.2653784	other serv( 8)	.50009612E-04
education(10)	2.8608220	education( 9)	.48513909E-04
health ser(18)	2.4763478	health ser(19)	.33025693E-04
wat/sew/tr( 8)	3.0330574	wat/sew/tr(17)	.40668668E-04
local govt( 2)	3.4347226	local govt(16)	.42487206E-04
households(23)	2.1964031	households(28)	.13707578E-04



Table 4-43. Total Sales and Final demand Sales for Sublette County, Wyoming

Total Sales		Final Demand Sales		
1	cattle	14046430.	cattle	12741879.
2	sheep	1337991.	sheep	1230834.
3	oats	18362.	oats	18362.
4	grass hay	9759120.	grass hay	8864687.
5	baled alfa	691316.	baled alfa	402325.
6	grain crn	101.	grain crn	101.
7	fd barley	98.	fd barley	98.
8	mlt barley	147.	mlt barley	0.
9	all wheat	101.	all wheat	101.
10	dry beans	101.	dry beans	101.
11	potatoes	101.	potatoes	101.
12	sugar beet	102.	sugar beet	102.
13	other agri	972540.	other agri	11901.
14	forestry	612643.	forestry	436680.
15	coal mine	112.	coal mine	0.
16	oil/gas pr	178620219.	oil/gas pr	162167845.
17	other mine	141.	other mine	0.
18	constructi	8901664.	constructi	5016575.
19	manufact	291537.	manufact	4557.
20	trans/comm	6314890.	trans/comm	2586760.
21	gs/elec ut	25061072.	gs/elec ut	17294411.
22	wholesale	8995013.	wholesale	477643.
23	retail	42718635.	retail	12030958.
24	f i r e	7450830.	f i r e	115070.
25	other serv	6587687.	other serv	103022.
26	education	8027822.	education	1667611.
27	health ser	2715671.	health ser	8210.
28	wat/sew/tr	662514.	wat/sew/tr	183420.
29	local govt	9092024.	local govt	127933.
30	households	63447999.		
	Final Demands	262534193.		

Table 4-44. Type II Business Multipliers and Type II Employment Requirement Multipliers for Sublette County, Wyoming

Business Multiplier		Employment Multiplier	
NAME(RANK)	MULTIPLIER	NAME(RANK)	MULTIPLIER
cattle(16)	2.3687303	cattle(19)	.29915181E-04
sheep(11)	2.5656536	sheep(13)	.32326150E-04
oats(10)	2.5749971	oats(11)	.32521610E-04
grass hay(17)	2.3194885	grass hay(20)	.29779650E-04
baled alfa( 9)	2.6306909	baled alfa( 8)	.34737729E-04
grain crn( 6)	2.6585490	grain crn(14)	.32134685E-04
fd barley( 8)	2.6328619	fd barley(17)	.31433824E-04
mlt barley( 3)	2.8193190	mlt barley( 2)	.41732733E-04
all wheat( 5)	2.7363336	all wheat(12)	.32418686E-04
dry beans( 2)	2.9095333	dry beans( 5)	.36417097E-04
potatoes(13)	2.5560648	potatoes(18)	.31212145E-04
sugar beet( 4)	2.8146298	sugar beet( 9)	.33438547E-04
other agri( 7)	2.6482867	other agri( 6)	.35421653E-04
forestry(15)	2.3692911	forestry( 7)	.34811089E-04
coal mine(18)	2.1714520	coal mine(28)	.72274192E-05
oil/gas pr(28)	1.3642554	oil/gas pr(30)	.38774014E-05
other mine(25)	1.8839300	other mine(27)	.73155562E-05
constructi(26)	1.8203620	constructi(22)	.19434791E-04
manufact(21)	2.0798692	manufact( 1)	.43250667E-04
trans/comm(19)	2.1320625	trans/comm(21)	.19625652E-04
gs/elec ut(27)	1.4760505	gs/elec ut(29)	.55095079E-05
wholesale(29)	1.2551814	wholesale(24)	.88782122E-05
retail(30)	1.2513962	retail(26)	.82969127E-05
f i r e(22)	1.9884799	f i r e(23)	.12179255E-04
other serv(24)	1.8842919	other serv(16)	.31737268E-04
education(14)	2.4459677	education( 3)	.37756216E-04
health ser(20)	2.0802536	health ser( 4)	.37749007E-04
wat/sew/tr(12)	2.5605859	wat/sew/tr(10)	.33423172E-04
local govt( 1)	3.0209078	local govt(15)	.31825882E-04
households(23)	1.9182661	households(25)	.82970471E-05

Table 4-45. Total Sales and Final demand Sales for Sweetwater County, Wyoming

Total Sales		Final Demand Sales		
1	cattle	3112331.	cattle	1035394.
2	sheep	1184392.	sheep	1089316.
3	oats	19039.	oats	19039.
4	grass hay	725341.	grass hay	445564.
5	baled alfa	2025070.	baled alfa	1961037.
6	grain crn	101.	grain crn	101.
7	fd barley	80001.	fd barley	80001.
8	mlt barley	103.	mlt barley	103.
9	all wheat	101.	all wheat	101.
10	dry beans	101.	dry beans	96.
11	potatoes	101.	potatoes	91.
12	sugar beet	102.	sugar beet	102.
13	other agri	347235.	other agri	0.
14	forestry	100.	forestry	100.
15	coal mine	192825210.	coal mine	192440099.
16	oil/gas pr	614632092.	oil/gas pr	549590668.
17	other mine	635649313.	other mine	624676218.
18	constructi	157579235.	constructi	70198509.
19	manufact	57871800.	manufact	6033145.
20	trans/comm	98202994.	trans/comm	58644659.
21	gs/elec ut	194740914.	gs/elec ut	48044772.
22	wholesale	305980000.	wholesale	146067557.
23	retail	278180000.	retail	13000987.
24	f i r e	50980983.	f i r e	639085.
25	other serv	97619000.	other serv	42194838.
26	education	50188978.	education	16920268.
27	health ser	40412112.	health ser	14834948.
28	wat/sew/tr	6541424.	wat/sew/tr	1670420.
29	local govt	51984488.	local govt	612803.
30	households	587906057.		
	Final Demands	1962107447.		

Table 4-46. Type II Business Multipliers and Type II Employment Requirement Multipliers for Sweetwater County, Wyoming

Business Multiplier		Employment Multiplier	
NAME(RANK)	MULTIPLIER	NAME(RANK)	MULTIPLIER
cattle(12)	2.6460307	cattle( 4)	.49325774E-04
sheep( 5)	2.8763404	sheep( 3)	.50817592E-04
oats( 6)	2.8762715	oats( 2)	.50817833E-04
grass hay(11)	2.6557311	grass hay(10)	.44349043E-04
baled alfa(10)	2.6642986	baled alfa( 6)	.47740711E-04
grain crn( 9)	2.6926536	grain crn(11)	.43995868E-04
fd barley(15)	2.5626208	fd barley(13)	.42430399E-04
mlt barley(13)	2.6408693	mlt barley( 5)	.48247811E-04
all wheat( 7)	2.8116841	all wheat( 9)	.44954869E-04
dry beans( 3)	2.9524607	dry beans( 1)	.51408992E-04
potatoes(14)	2.5732332	potatoes(14)	.42295641E-04
sugar beet( 4)	2.9211199	sugar beet( 8)	.47397345E-04
other agri(16)	2.5093235	other agri(12)	.43264352E-04
forestry(19)	2.2564550	forestry(24)	.11760826E-04
coal mine(27)	1.7273499	coal mine(28)	.92090247E-05
oil/gas pr(29)	1.4569062	oil/gas pr(29)	.48436612E-05
other mine(25)	1.9269362	other mine(27)	.99087512E-05
constructi(20)	2.2056560	constructi(20)	.16680924E-04
manufact(23)	2.1691810	manufact(23)	.12499693E-04
trans/comm(17)	2.4577565	trans/comm(19)	.17878103E-04
gs/elec ut(22)	2.1826679	gs/elec ut(25)	.11174672E-04
wholesale(30)	1.1977556	wholesale(30)	.32506560E-05
retail(28)	1.5143099	retail(22)	.13380887E-04
f i r e(21)	2.2001065	f i r e(21)	.14649062E-04
other serv(26)	1.8962340	other serv(18)	.22162769E-04
education( 8)	2.7101914	education( 7)	.47675165E-04
health ser(18)	2.4130884	health ser(17)	.24035268E-04
wat/sew/tr( 2)	3.0052611	wat/sew/tr(15)	.40988502E-04
local govt( 1)	3.0554159	local govt(16)	.34016103E-04
households(24)	2.1462209	households(26)	.10058551E-04

Table 4-47. Total Sales and Final demand Sales  
for Uinta County, Wyoming

Total Sales		Final Demand Sales		
1	cattle	6879903.	cattle	5609690.
2	sheep	1337991.	sheep	1231505.
3	oats	9861.	oats	9861.
4	grass hay	5393891.	grass hay	4889709.
5	baled alfa	1117279.	baled alfa	975732.
6	grain crn	101.	grain crn	101.
7	fd barley	105279.	fd barley	105267.
8	mlt barley	100.	mlt barley	100.
9	all wheat	101.	all wheat	101.
10	dry beans	101.	dry beans	78.
11	potatoes	101.	potatoes	101.
12	sugar beet	102.	sugar beet	102.
13	other agri	695843.	other agri	143610.
14	forestry	5552124.	forestry	4290963.
15	coal mine	110.	coal mine	81.
16	oil/gas pr	856809026.	oil/gas pr	762479079.
17	other mine	118.	other mine	95.
18	constructi	96984856.	constructi	62082619.
19	manufact	6529821.	manufact	24496.
20	trans/comm	26149386.	trans/comm	7173196.
21	gs/elec ut	44610808.	gs/elec ut	10601.
22	wholesale	150487000.	wholesale	95844333.
23	retail	225083000.	retail	111016284.
24	f i r e	29749898.	f i r e	339287.
25	other serv	49233815.	other serv	22344929.
26	education	30821781.	education	6972563.
27	health ser	28103768.	health ser	17437498.
28	wat/sew/tr	6142647.	wat/sew/tr	3521900.
29	local govt	40981868.	local govt	275277.
30	households	232958004.		
	Final Demands	1181179382.		

Table 4-48. Type II Business Multipliers and Type II Employment  
Requirement Multipliers for Uinta County, Wyoming

Business Multiplier		Employment Multiplier	
NAME(RANK)	MULTIPLIER	NAME(RANK)	MULTIPLIER
cattle(12)	2.6058164	cattle( 6)	.39341515E-04
sheep( 5)	2.8801352	sheep( 2)	.42033796E-04
oats( 4)	2.8801679	oats( 3)	.42033393E-04
grass hay(10)	2.6662406	grass hay( 9)	.36936386E-04
baled alfa( 6)	2.8663499	baled alfa( 4)	.41458895E-04
grain crn(11)	2.6528763	grain crn(10)	.36456497E-04
fd barley(13)	2.5821289	fd barley(12)	.35506695E-04
mlt barley( 1)	3.1986259	mlt barley( 1)	.51380960E-04
all wheat( 8)	2.7436981	all wheat( 8)	.37600295E-04
dry beans( 3)	2.8923841	dry beans( 5)	.41422639E-04
potatoes(14)	2.5457351	potatoes(13)	.35026042E-04
sugar beet( 7)	2.8345207	sugar beet( 7)	.38807075E-04
other agri(15)	2.4663645	other agri(11)	.35859626E-04
forestry(24)	2.0065306	forestry(18)	.25122340E-04
coal mine(17)	2.4007404	coal mine(23)	.14805186E-04
oil/gas pr(28)	1.5269290	oil/gas pr(28)	.49924632E-05
other mine(20)	2.2258617	other mine(25)	.14159301E-04
constructi(25)	1.9736099	constructi(22)	.14895723E-04
manufact(21)	2.0658935	manufact(17)	.26374216E-04
trans/comm(19)	2.3286523	trans/comm(19)	.23978235E-04
gs/elec ut(27)	1.6105289	gs/elec ut(29)	.43318504E-05
wholesale(30)	1.2128405	wholesale(30)	.37314302E-05
retail(29)	1.3469324	retail(26)	.85943367E-05
f i r e(22)	2.0306987	f i r e(24)	.14599433E-04
other serv(26)	1.9401171	other serv(20)	.23712557E-04
education(16)	2.4212358	education(14)	.32962692E-04
health ser(18)	2.3564610	health ser(15)	.29807449E-04
wat/sew/tr( 9)	2.7106057	wat/sew/tr(21)	.20045832E-04
local govt( 2)	3.0241804	local govt(16)	.29192003E-04
households(23)	2.0285661	households(27)	.81648419E-05

Table 4-49. Total Sales and Final Demand Sales  
for Washakie County, Wyoming

Total Sales		Final Demand Sales		
1	cattle	12442327.	cattle	11049582.
2	sheep	9887756.	sheep	9250545.
3	oats	143708.	oats	143708.
4	grass hay	349508.	grass hay	52778.
5	baled alfa	3811244.	baled alfa	3574490.
6	grain crn	581009.	grain crn	581009.
7	fd barley	1372450.	fd barley	1372449.
8	mlt barley	3202393.	mlt barley	3202380.
9	all wheat	49574.	all wheat	4675.
10	dry beans	8918.	dry beans	8918.
11	potatoes	101.	potatoes	101.
12	sugar beet	457339.	sugar beet	0.
13	other agri	1657491.	other agri	458661.
14	forestry	87.	forestry	73.
15	coal mine	103.	coal mine	62.
16	oil/gas pr	58104948.	oil/gas pr	57077907.
17	other mine	3650968.	other mine	3650968.
18	constructi	21325067.	constructi	13959986.
19	manufact	63128200.	manufact	56419906.
20	trans/comm	11994554.	trans/comm	2826358.
21	gs/elec ut	12766870.	gs/elec ut	5810173.
22	wholesale	54652000.	wholesale	31021088.
23	retail	66027000.	retail	11520239.
24	f i r e	15380565.	f i r e	271922.
25	other serv	14731000.	other serv	3569811.
26	education	10025163.	education	6956685.
27	health ser	6567974.	health ser	1411748.
28	wat/sew/tr	1791684.	wat/sew/tr	657144.
29	local govt	12093277.	local govt	7644331.
30	households	118625002.		
	Final Demands	293243275.		

Table 4-50. Type II Business Multipliers and Type II Employment  
Requirement Multipliers for Washakie County, Wyoming

Business Multiplier		Employment Multiplier	
NAME(RANK)	MULTIPLIER	NAME(RANK)	MULTIPLIER
cattle(14)	2.7004588	cattle( 5)	.38482956E-04
sheep( 7)	2.8370074	sheep( 7)	.37969293E-04
oats(11)	2.7681574	oats(11)	.36321848E-04
grass hay(10)	2.7816188	grass hay(10)	.36992985E-04
baled alfa( 3)	3.0098044	baled alfa( 2)	.41424644E-04
grain crn(15)	2.6934021	grain crn(12)	.36124105E-04
fd barley(13)	2.7070182	fd barley(14)	.36045588E-04
mlt barley(12)	2.7070202	mlt barley(13)	.36045632E-04
all wheat( 9)	2.8091367	all wheat( 9)	.37155124E-04
dry beans( 4)	2.9429936	dry beans( 4)	.39964609E-04
potatoes(18)	2.5473429	potatoes(15)	.35033489E-04
sugar beet( 5)	2.9048919	sugar beet( 8)	.37949964E-04
other agri(16)	2.5867354	other agri(16)	.33865153E-04
forestry( 2)	3.0570308	forestry(20)	.25616341E-04
coal mine( 1)	3.1737317	coal mine(24)	.12478868E-04
oil/gas pr(26)	1.6087047	oil/gas pr(27)	.99235608E-05
other mine(22)	2.0825970	other mine(23)	.14830505E-04
constructi(23)	2.0632762	constructi(21)	.20677851E-04
manufact(27)	1.5519195	manufact(25)	.11258138E-04
trans/comm(20)	2.3581767	trans/comm(19)	.26863005E-04
gs/elec ut(29)	1.4003466	gs/elec ut(29)	.78914510E-05
wholesale(30)	1.1796037	wholesale(30)	.46673412E-05
retail(28)	1.4133266	retail(26)	.11184780E-04
f i r e(21)	2.3538309	f i r e(22)	.16644198E-04
other serv(25)	1.8141451	other serv(17)	.32448425E-04
education(17)	2.5794923	education( 1)	.43843472E-04
health ser(19)	2.3654010	health ser( 6)	.38383458E-04
wat/sew/tr( 6)	2.8836764	wat/sew/tr( 3)	.40306727E-04
local govt( 8)	2.8357360	local govt(18)	.31575906E-04
households(24)	1.9889735	households(28)	.97584495E-05

Table 4-51. Total Sales and Final demand Sales  
for Weston County, Wyoming

Total Sales		Final Demand Sales		
1	cattle	20974606.	cattle	17843967.
2	sheep	1287445.	sheep	1166594.
3	oats	148012.	oats	148011.
4	grass hay	766635.	grass hay	0.
5	baled alfa	1766240.	baled alfa	1008166.
6	grain crn	69911.	grain crn	69911.
7	fd barley	83585.	fd barley	83562.
8	mlt barley	137.	mlt barley	137.
9	all wheat	281660.	all wheat	239260.
10	dry beans	101.	dry beans	78.
11	potatoes	101.	potatoes	94.
12	sugar beet	101.	sugar beet	101.
13	other agri	543805.	other agri	9837.
14	forestry	7652209.	forestry	6962128.
15	coal mine	138.	coal mine	138.
16	oil/gas pr	116762385.	oil/gas pr	55334461.
17	other mine	17355582.	other mine	17355543.
18	constructi	9234960.	constructi	4603123.
19	manufact	64656744.	manufact	55973250.
20	trans/comm	13861665.	trans/comm	7190520.
21	gs/elec ut	19239310.	gs/elec ut	5878080.
22	wholesale	20818961.	wholesale	2393698.
23	retail	51281578.	retail	8434040.
24	f i r e	13526139.	f i r e	464543.
25	other serv	7103764.	other serv	96782.
26	education	8206820.	education	6331883.
27	health ser	3619913.	health ser	87496.
28	wat/sew/tr	823173.	wat/sew/tr	23376.
29	local govt	6511074.	local govt	1835527.
30	households	96560472.		
	Final Demands	241004752.		

Table 4-52. Type II Business Multipliers and Type II Employment  
Requirement Multipliers for Weston County, Wyoming

Business Multiplier		Employment Multiplier	
NAME(RANK)	MULTIPLIER	NAME(RANK)	MULTIPLIER
cattle(14)	2.8597553	cattle( 9)	.31674432E-04
sheep( 1)	3.2736529	sheep( 4)	.34077839E-04
oats( 3)	3.1795527	oats( 6)	.32650421E-04
grass hay( 7)	3.0251335	grass hay(12)	.29523390E-04
baled alfa( 2)	3.2167568	baled alfa( 5)	.33373591E-04
grain crn( 8)	2.9768707	grain crn(14)	.28632084E-04
fd barley( 9)	2.9684116	fd barley(13)	.28760407E-04
mlt barley(16)	2.7299172	mlt barley(16)	.28363426E-04
all wheat( 6)	3.0408982	all wheat(11)	.30518607E-04
dry beans( 4)	3.1742187	dry beans( 7)	.32589139E-04
potatoes(11)	2.9213820	potatoes(17)	.27849932E-04
sugar beet( 5)	3.1251134	sugar beet( 8)	.32400678E-04
other agri(15)	2.7324757	other agri(19)	.25942846E-04
forestry(24)	2.0732877	forestry(29)	.66550609E-05
coal mine(12)	2.9177930	coal mine(21)	.20235126E-04
oil/gas pr(28)	1.5533205	oil/gas pr(27)	.84589257E-05
other mine(27)	1.6360815	other mine(26)	.91189401E-05
constructi(23)	2.0911783	constructi(22)	.19995020E-04
manufact(21)	2.4208936	manufact(25)	.92322673E-05
trans/comm(18)	2.5625343	trans/comm(15)	.28609800E-04
gs/elec ut(30)	1.2248937	gs/elec ut(30)	.39089111E-05
wholesale(26)	1.7428634	wholesale(28)	.68725288E-05
retail(29)	1.4291536	retail(24)	.99235935E-05
f i r e(20)	2.4288657	f i r e(18)	.27403575E-04
other serv(25)	1.7476317	other serv(20)	.25619763E-04
education(17)	2.6630919	education( 2)	.39923829E-04
health ser(19)	2.4625158	health ser( 1)	.46358166E-04
wat/sew/tr(10)	2.9251055	wat/sew/tr( 3)	.37880007E-04
local govt(13)	2.9101545	local govt(10)	.31500165E-04
households(22)	2.1127989	households(23)	.10158965E-04

## LITERATURE AND SOURCES CITED IN CHAPTER 4

Bulmer-Thomas, V. 1982. Input-Output Analysis in Developing Countries: Sources, Methods, and Applications. John Wiley and Sons, Ltd. Chichester, New York, Brisbane, Toronto, Singapore.

Czamanski, Stan. 1973. Regional and Interregional Social Accounting, Lexington Books, Lexington Mass. 204p.

Gray, S. Lee, John R. McKean, and Edward Sparling. 1979. "Measurement of Growth Equalized Employment Multiplier Effects: An Empirical Example," Annals of Regional Science, 13, Number 3, November 1979, 68-75.

Leven, C. L. 1961. Regional Income and Product Accounts: Construction and Application. IN W. Hochwald (ed.) Design of Regional Accounts. Johns Hopkins Press, 148-195.

McKean, J.R., J.C. Weber, and R.K. Ericson April 1981. The Economies of Mesa County and Garfield, Moffat, Rio Blanco, and Routt Counties, Colorado. Colorado Water Resources Research Institute. Technical Report Number 35. 155p

Miller, Ronald E. and Peter D. Blair 1985. Input-Output Analysis: Foundations and Extensions. Prentice-Hall, Englewood Cliffs, New Jersey. 464p.

Richardson, H. W. 1972. Input-Output and Regional Economics. Redwood Press Limited, Trowbridge England. 294p.

Stone, Richard. 1961. Input-Output and National Accounts, Paris: Organization for European Economic Cooperation.

## CHAPTER 5

## PHANTOM SECTOR ANALYSIS

INTRODUCTION

The economies of the mountain states including Wyoming have been severely effected by down turns in energy, minerals, and agriculture and by a federal agricultural program which terminates large blocks of producing farms. Increasing rates of unemployment, bankruptcies, and bank failures and the associated social problems indicate a need for public policies to promote development in the region. The Input-output (I/O) economic modeling technique can provide useful information on the potential economic effects of entry by new industries in a region.

PHANTOM INDUSTRY SECTORS

New technology or entire new industries can be simulated with the I/O model through the use of "phantom sectors." If the new sector sells its output entirely to final demand one can build in a new column in the I/O transactions-among-sectors table showing the purchases distribution with total purchases set to a nominal amount (say 100,000 dollars) with matching sales to final demand. To see the effect of the new industry on other sectors and on the total economy, simply expand the exogenous final demand sales for the phantom sector. It is this application of the I/O model that is used in this analysis of the potential economic effects of new industries.

The impact of new industries in the state of Wyoming are measured for up to twelve phantom sectors, depending upon the county. Because of space considerations, the phantom sectors are applied to the total state I/O model in this report. In some instances, the sectors may not represent viable industries for particular counties due to a lack of market or other considerations. Thus, the phantom sectors are not applicable to all counties in Wyoming.

EXISTING BASIC INDUSTRIES

Table 5-1 shows the relative size of existing industries and the significant "basic" industries in Wyoming. Basic industries sell large amounts to exports or other final demands<sup>5</sup> creating

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<sup>5</sup> Final Demands Excluding Households are the sales for final use by each sector in the I/O model, these are the variables which are determined exogenously and drive the regional economy. Final demands are input by the user in order for the IMS computer program to project a new transactions-among-sectors table that is consistent with the new final demands.

secondary input requirements in the region. Without basic industry, most of the market economy of a region will disappear.

Major exports from the state include: oil and gas products, wholesale, households (interest and transfer income), coal mines, other mining, manufacturing, retail, cattle production, other services, and agricultural production. The manufacturing sector is dominated by energy and agricultural processing and other sectors, such as wholesale, include extractive products. Thus, extraction and agribusiness are primary economic sectors of the region. Without these important export industries the economy of Wyoming would be a small fraction of its current size. The dependence of the region on extraction and energy is even greater than is obvious from these accounts since much of the wholesale and transport final demands are actually due to the export of farm production and extractive or energy products. Weakness in world markets for farm and extractive products thus creates severe economic problems in Wyoming.

#### COMPARISON OF MULTIPLIERS

As discussed in Chapter 4, the total requirements table shows the business multipliers disaggregated for each of the supplying industries. A column sum from the table shows the total cumulative effect on regional sales if the industry described at the column head increases sales to final demand by one dollar. Each element of the column shows the total cumulative effect on sales by the industry listed at the left of the row. If the inverse is calculated "with households", then the household sector is included as part of the interdependent intermediate processors resulting in added spending feedback to the local economy. Thus, the multipliers "with households" results in larger multipliers than the multipliers "without households." The multipliers which are calculated including the induced household spending are known as Type II multipliers. These are the multipliers shown on the following tables.

Business Multipliers are the column sums of the total requirements coefficients table discussed above. Type I business multipliers are from the table "without households" while the Type II multipliers are from the table "with households." Thus, as described above, the Type II multipliers incorporate more sectoral interdependence and are always larger than Type I multipliers. If the business multiplier for an industry is 4.5 and exports by the industry rise by \$1,000,000 this means that total sales among intermediate processing sector industries of the region will rise by \$4,500,000. Counting the export sales then, total sales by industries in the region will have risen by \$5,500,000.

Resource Multipliers are similar to business multipliers except that they are expressed in units of the resource. For example, an employment multiplier shows the total cumulative increase in workers required in the intermediate processing sector of the economy when the sector indicated expands sales to final demand by \$1 million dollars. The multipliers are the columns sums of



the total resource requirements table described above.

#### RELATIVE IMPACTS OF NEW INDUSTRIES

The phantom sector multipliers show the potential effects of the creation of up to 12 different types of industry into the economies described above. The cumulative effects of the new industries on total sales by intermediate processors in the state are shown by the business multipliers and the effects on employment are shown by the employment multipliers. These multipliers are shown in table 5-2. The multipliers for the phantom sectors are always shown in capital letters.

Nine of the top ten business sales multipliers shown in table 5-2 are for the phantom sectors. Lamb processing, feedlots of all sizes, bean processors, dairy, and sugar processing all have larger business multipliers than the existing sectors shown in the Wyoming economy. (This is not to imply that none of the phantom sector industries currently exist in Wyoming...only that they were not shown as separate sectors in the Wyoming I/O model and thus they were probably not a major part of the economy) It is evident that expansion by agricultural production and agricultural processing tends to create larger economic effects than most other industries. The only phantom sectors with small business multipliers were the phosphate fertilizer and machine shop sectors. The beef processing sector multiplier was intermediate in magnitude. With respect to employment effects, feedlots generate more jobs per dollar of exports than any other sector in Wyoming (among those studied). In contrast, the extraction, trade and manufacturing sectors create many fewer jobs per dollar of exports. This is somewhat misleading for the extraction sectors since a major source of export dollars from Wyoming lies with the extraction sectors. The huge volume of extraction exports far outweighs the small multiplier effects for those sectors. Although agricultural processing sectors are high in terms of their impact on increased sales, they rank lower in effective job creation. Overall, the agricultural production sectors rank highest in total job creation while extraction, trade, machine shops and fertilizer manufacturing rank low. These industry data are averages over many types of firms and specific types of manufacturing, extraction, or trade may rank high in their impact on the economy per dollar of exports. This possibility can be investigated easily for specific firms if the purchases distribution of the new firm is inserted as a phantom sector in the manner discussed in this chapter.

Table 5-1. State of Wyoming, Total Sales and Sales to Final Demand, by Industry

	Total Sales (\$)	Final Demand Sales (\$)
1	cattle 381511943.	cattle 313811352.
2	SMALL FDLT 10000.	SMALL FDLT 10000.
3	MED FDLT 10000.	MED FDLT 10000.
4	LARGE FDLT 10000.	LARGE FDLT 10000.
5	sheep 33695743.	sheep 30840514.
6	oats 5045756.	oats 4448445.
7	grass hay 57831047.	grass hay 36318993.
8	baled alfa 85237617.	baled alfa 76750294.
9	grain crn 17024957.	grain crn 14932322.
10	fd barley 31355497.	fd barley 21191242.
11	mlt barley 3412.	mlt barley 3375.
12	all wheat 21535774.	all wheat 18623444.
13	dry beans 1676216.	dry beans 1669116.
14	potatoes 2624809.	potatoes 2147412.
15	sugar beet 1395660.	sugar beet 318734.
16	other agri 47629826.	other agri 20645466.
17	forestry 61971452.	forestry 53877905.
18	coal mine 1233386296.	coal mine 1158213315.
19	oil/gas pr 5503509617.	oil/gas pr 4429207881.
20	other mine 894516446.	other mine 880152821.
21	constructi 1379040086.	constructi 794414801.
22	DAIRY 10000.	DAIRY 10000.
23	BEEF PROC 10000.	BEEF PROC 10000.
24	LAMB PROC 10000.	LAMB PROC 10000.
25	SUGAR PROC 10000.	SUGAR PROC 10000.
26	BEAN PROC 10000.	BEAN PROC 10000.
27	POTAT PROC 10000.	POTAT PROC 10000.
28	PHOS FERTI 10000.	PHOS FERTI 10000.
29	MACH SHOPS 10000.	MACH SHOPS 10000.
30	other mfg 1329549751.	other mfg 872482704.
31	GRN ELEVAT 10000.	GRN ELEVAT 10000.
32	trans/comm 861547822.	trans/comm 471533589.
33	gs/elec ut 684677327.	gs/elec ut 42679005.
34	wholesale 2761071555.	wholesale 1528007425.
35	retail 3221517269.	retail 363837184.
36	f i r e 917171910.	f i r e 132751734.
37	other serv 804929488.	other serv 285794020.
38	education 710089191.	education 436448145.
39	health ser 428186728.	health ser 162391830.
40	wat/sew/tr 68588484.	wat/sew/tr 13577495.
41	local govt 453156131.	local govt 21895045.
42	households 6028521144.	
	FINAL PAYMENTS 15099847322.	

Table 5-2. State of Wyoming, Including Phantom Sectors,  
Type II Business Multipliers and Employment Multipliers

Business Multipliers		Employment Requirement per \$1,000,000	
NAME(RANK)	MULTIPLIER	NAME(RANK)	MULTIPLIER
cattle(21)	2.905	cattle(13)	42.37
SMALL FDLT( 4)	3.706	SMALL FDLT( 3)	50.51
MED FDLT( 2)	3.747	MED FDLT( 1)	50.92
LARGE FDLT( 3)	3.722	LARGE FDLT( 2)	50.60
sheep(11)	3.202	sheep( 5)	48.10
oats(15)	3.125	oats( 6)	47.90
grass hay(18)	2.999	grass hay(17)	40.49
baled alfa(12)	3.198	baled alfa( 4)	48.38
grain crn(23)	2.841	grain crn(14)	41.70
fd barley(22)	2.885	fd barley(15)	41.63
mlt barley(17)	3.048	mlt barley( 9)	45.86
all wheat(19)	2.977	all wheat(12)	42.55
dry beans(14)	3.126	dry beans( 8)	46.89
potatoes(25)	2.772	potatoes(19)	39.21
sugar beet(16)	3.071	sugar beet(10)	45.67
other agri(26)	2.700	other agri(18)	39.55
forestry(30)	2.366	forestry(28)	29.21
coal mine(37)	1.852	coal mine(40)	11.04
oil/gas pr(40)	1.593	oil/gas pr(41)	7.20
other mine(36)	1.999	other mine(38)	12.14
constructi(29)	2.416	constructi(31)	21.22
DAIRY( 6)	3.404	DAIRY(16)	41.40
BEEF PROC(20)	2.929	BEEF PROC(30)	24.90
LAMB PROC( 1)	4.061	LAMB PROC( 7)	47.05
SUGAR PROC( 7)	3.392	SUGAR PROC(22)	38.63
BEAN PROC( 5)	3.439	BEAN PROC(21)	38.74
POTAT PROC(10)	3.311	POTAT PROC(25)	35.57
PHOS FERTI(38)	1.842	PHOS FERTI(33)	14.54
MACH SHOPS(39)	1.609	MACH SHOPS(34)	14.12
other mfg(35)	2.104	other mfg(39)	11.11
GRN ELEVAT( 9)	3.334	GRN ELEVAT(27)	32.89
trans/comm(27)	2.639	trans/comm(29)	28.01
gs/elec ut(32)	2.260	gs/elec ut(36)	13.71
wholesale(42)	1.429	wholesale(42)	6.47
retail(41)	1.515	retail(35)	14.01
f i r e(31)	2.278	f i r e(32)	20.53
other serv(33)	2.252	other serv(20)	38.88
education(24)	2.796	education(11)	45.21
health ser(28)	2.525	health ser(26)	35.26
wat/sew/tr(13)	3.136	wat/sew/tr(24)	35.80
local govt( 8)	3.341	local govt(23)	38.04
households(34)	2.210	households(37)	12.35

## CHAPTER 6

## EXAMPLE OF A CONSTRUCTION IMPACT ANALYSIS

The example test run consists of a condensed scenario which demonstrates the user-application of the IMS I/O program for modeling construction activity impacts. The general approach is to estimate changes in the exogenous final demand variables each year that are caused by the new construction project, insert these values as changes in final demand using the forecast mode of IMS and then observe and evaluate the predicted change in the regional economy made by IMS. Accurate estimates of final demand changes are important since predictions made by an I/O model can be no more accurate than the information that is provided by the user. No attempt is made in this example to project a baseline growth scenario for Wyoming.<sup>6</sup>

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<sup>6</sup> For impact analysis, two types of regional forecast are desired; a baseline growth path, and changes from the baseline due to the proposed project. The baseline for regional growth describes the composition of regional growth prior to the impacts created by the proposed project. The reasons for establishing a baseline are to correctly measure changes in the economy which are due to "with and without project" as opposed to the "before and after project" and to provide a picture of total growth.

Because numerous trends exist among the various components of an economy prior to the impacts created by a new project, it is essential to isolate regional growth that is just due to the project. If the analyst does not project a baseline forecast of regional growth, the entire increase in economic activity could be imputed to the project. The "before and after" criteria would have misstated the changes in regional income or product that were due solely to the project. Without the project, the region would have followed the baseline growth. Thus, the "with and without project" analysis correctly assigns the proper amount of regional growth to the project by subtracting out the baseline growth rate from the total growth rate.

Application of the I/O technique to the problem of forecasting the a baseline composition of economic growth (or decline) of a region requires a new focus on the individual industry outlook. The technique of regional forecasting with I/O is to project changes in the independent variables (final demands) which drive the intermediate processing sectors of the economy. Each component of final demand should be studied. This includes new construction investment, state and federal government spending, and exports by each sector. User-projections of real change in the outputs of each of the important (large) final demand sectors are entered into the IMS program using the forecast mode. This allows IMS to make forecasts which incorporate the cumulative effects of economic growth or decline. These forecasts must then be observed and evaluated by the user.

THE SCENARIO

## DESCRIPTION:

The scenario involves coal mines with a total capacity of 25 million tons per year. In this scenario, it is assumed that population in-migration occurs due to the project with the associated new requirements for housing, and local government infrastructure. In order to show the maximum possible impacts, the economy is assumed to be operating at full capacity and full employment prior to the new mine construction. All new hires are assumed to migrate into the region. Year 1 includes coal mine construction with the extensive in-migration. Year 2 includes coal mine construction, coal mine operation at 50% of capacity and extensive in-migration. Year 3 includes operation at 100% capacity and in-migration still occurring to operate the mine. Year 4 is operation of the mines at full capacity with no further in-migration. With declining employment, no new induced construction is expected in year 4.

All of the runs assume that full employment existed at the start of the project so that each added worker was a net increase to the population requiring housing, streets and facilities. The fact of multiple workers per household was accounted for in the calculation of per worker construction cost. It is further assumed that all workers require conventional housing rather than trailers or simply commuting to the region. To the extent that workers, especially construction workers, use less expensive housing that component of induced investment will be overstated. Spending per added worker on streets and related utilities, housing and commercial building space is \$4,904, \$54,288 and \$16,662 respectively. All induced construction spending columns for the Wyoming data set contain preset spending distributions so that only a single total spending preset figure is entered. The IMS program automatically distributes the spending down each column.

It should be noted that the increased spending due to the induced construction of roads, housing and commercial buildings creates cumulative expansion of the economy and yet further increases of employment. Thus the employment change generated by the inclusion of induced construction could be used to estimate the second round of induced construction. This type of iterative calculation could be continued for as many rounds as desired with each round adding less and less employment and thus less and less induced construction. For the purposes of this demonstration only the first round effect was considered. Unless construction activity continues over a long time period, the lags involved in achieving the spending increases may preclude a full expansion. However, in some instances, it might be more realistic to include a few added rounds. This type of iteration on induced spending is sometimes referred to as the type III multiplier effect. Unfortunately, no criterion for the "correct" number of iterations exists.

## DATA INPUT:

YEAR 1: RUN 1; Coal mine construction of \$41,250,000 ({25 ton mine x \$3,300,000 per ton construction cost in 1984 dollars / 2 years construction period}).

RUN 2; same construction cost as RUN 1 plus 858 employees are in-migrants projected in run 1. The in-migrants costs are:

Street and utility construction  $(\$4,904 \times 858 \text{ workers}) = \$4,207,632,$

Housing  $(\$54,288 \times 858 \text{ workers}) = \$46,579,104,$

Commercial Building Space  $(\$16,662 \times 858 \text{ workers}) = \$14,295,996.$

YEAR 2: RUN 1; Coal construction same as year 1, \$41,250,000. Coal mine operation of \$162,500,000 = (12.5 million tons x \$13 per ton). RUN 2; same as RUN 1 plus (2,652 - 858 = 1,794) additional workers (note: 2,652 workers were projected by run 1 but facilities for the 858 construction induced workers had already been considered in year 1. Construction induced workers were not counted again in Street and Utility Construction, Housing, and Commercial Building Space calculations. The construction induced workers brought into the region for year 1 are assumed to stay for year 2.) The in-migrants for operations costs are:

Street and utility construction  $(\$4,904 \times 1,794 \text{ workers}) = \$8,797,776,$

Housing  $(\$54,288 \times 1,794 \text{ workers}) = \$97,392,672,$

Commercial Building Space  $(\$16,662 \times 1,794 \text{ workers}) = \$29,891,628.$

YEAR 3: RUN 1; Coal Mine operation at 25 million ton x \$13 per ton = \$325,000,000. 3,588 workers are projected for run 1. Since 2,652 new workers have previously been accounted for, the net addition to the work force is 936. RUN 2; Coal mine operation same as RUN 1. The in-migrants for operations costs are:

Street and utility construction  $(\$4,904 \times 936 \text{ workers}) = \$4,590,144,$

Housing  $(\$54,288 \times 936 \text{ workers}) = \$50,813,568,$

Commercial Building Space  $(\$16,662 \times 936 \text{ workers}) = \$15,595,632.$

YEAR 4: Coal mine operation continues at full capacity, as in year 3, (\$325,000,000) and no additional in-migration.

#### DISCUSSION OF THE TEST RUN OUTPUT

The above example test runs provide some valuable insights on the economy of Wyoming. One of the assists that IMS provides the user in impact analysis is presentation of changes in the variables used to measure economic activity as well as totals. The interpretation of changes is often more meaningful, particularly in the examination of yearly progression of construction, operation, and migration. Therefore much of the discussion below will focus on changes and their relationship to

the scenario constructed. Each of the scenario test runs will be discussed in turn.

In year one there is no increase in exports, as shown in forecasted change in matrix totals. This reflects the fact that the coal mine is not yet in production and coal is the only means by which an increase in exports could take place in this scenario. However, notice that the final demands still increased. It is the increase in final demands through mine construction, not exports that drives the economy to greater total production and increased employment in this first year. In the second year both construction and export demands exist as the mine becomes partially operational. In the third year the mine becomes fully operational and construction is completed. As progress is made on the mine toward full capacity production and construction is being completed, the final demand spending becomes more locally oriented. As the mine moves toward full operation, there is more indirect economic activity generated in the region. This is in keeping with the structure of the I/O model. Expansion in construction sectors tends to require more imports than does expansion of the coal mining sector. There is less leakage of spending from economy with coal mine operation as compared to coal mine construction.

The focus of this scenario is the in-migration of workers and the supporting structure needed for those workers in the form of housing, roads, etc. A second computer run in each year of the scenario includes the infrastructure needed for the in-migrants estimated in the first computer run. This provides us with the opportunity to contrast the effect of in-migration on the economy.

In the first year, construction of the coal mines commences. The total increase in workers needed for this is 858. However, when the new infrastructure required by immigrants is estimated in run 2, the total increase in the number of workers almost triples to 2,431. Correspondingly increases in total output of the region also occur. Thus the boom in the regional economy this first year is due more to the provision of infrastructure than to the actual coal mine construction. The relative importance of new infrastructure construction declines rapidly as the coal mine begins operations.

Table 6-1. year 1 run 1

## CHANGES IN FINAL DEMANDS ENTERED IN IMS PROGRAM

	38
	coal const
1	cattle .00000000E+00
2	sheep .00000000E+00
3	oats .00000000E+00
4	grass hay .00000000E+00
5	baled alfa .00000000E+00
6	grain crn .00000000E+00
7	fd barley .00000000E+00
8	mit barley .00000000E+00
9	all wheat .00000000E+00
10	dry beans .00000000E+00
11	potatoes .00000000E+00
12	sugar beet .00000000E+00
13	other agri .00000000E+00
14	forestry .87739121E+05
15	coal mine .00000000E+00
16	oil/gas pr .00000000E+00
17	other mine .20571458E+06
18	constructi .13054316E+08
19	manufact .00000000E+00
20	trans/comm .43226048E+06
21	gs/elec ut .00000000E+00
22	wholesale .32285279E+07
23	retail .00000000E+00
24	f i r e .00000000E+00
25	other serv .00000000E+00
26	education .00000000E+00
27	health ser .00000000E+00
28	wat/sew/tr .00000000E+00
29	local govt .00000000E+00
30	households .95573332E+07
31	state govt .00000000E+00
32	fed govt .00000000E+00
33	rents .21919100E+07
34	impt wyom .00000000E+00
35	impt world .12492200E+08

Table 6-2. year 1 run 1

## \*\* CHANGE \*\* SUMMARY OF RESOURCE REQUIREMENTS

RESOURCE	----DIRECT----	---INDIRECT---	----TOTAL-----
employment	.58614463E+03	.27207205E+03	.85821669E+03



Table 6-3. year 1 run 2

CHANGES IN FINAL DEMANDS ENTERED IN IMS PROGRAM

	33 hous const	34 comm const	36 road const	38 coal const
1 cattle	.00000000E+00	.00000000E+00	.00000000E+00	.00000000E+00
2 sheep	.00000000E+00	.00000000E+00	.00000000E+00	.00000000E+00
3 oats	.00000000E+00	.00000000E+00	.00000000E+00	.00000000E+00
4 grass hay	.00000000E+00	.00000000E+00	.00000000E+00	.00000000E+00
5 baled alfa	.00000000E+00	.00000000E+00	.00000000E+00	.00000000E+00
6 grain crn	.00000000E+00	.00000000E+00	.00000000E+00	.00000000E+00
7 fd barley	.00000000E+00	.00000000E+00	.00000000E+00	.00000000E+00
8 mit barley	.00000000E+00	.00000000E+00	.00000000E+00	.00000000E+00
9 all wheat	.00000000E+00	.00000000E+00	.00000000E+00	.00000000E+00
10 dry beans	.00000000E+00	.00000000E+00	.00000000E+00	.00000000E+00
11 potatoes	.00000000E+00	.00000000E+00	.00000000E+00	.00000000E+00
12 sugar beet	.00000000E+00	.00000000E+00	.00000000E+00	.00000000E+00
13 other agri	.00000000E+00	.00000000E+00	.00000000E+00	.00000000E+00
14 forestry	.00000000E+00	.00000000E+00	.00000000E+00	.87739121E+05
15 coal mine	.00000000E+00	.00000000E+00	.00000000E+00	.00000000E+00
16 oil/gas pr	.00000000E+00	.00000000E+00	.00000000E+00	.00000000E+00
17 other mine	.00000000E+00	.00000000E+00	.00000000E+00	.20571458E+06
18 constructi	.00000000E+00	.00000000E+00	.12044816E+07	.13054316E+08
19 manufact	.63431085E+07	.25246090E+07	.88475494E+06	.00000000E+00
20 trans/comm	.19282390E+07	.61567321E+06	.22229008E+05	.43226048E+06
21 gs/elec ut	.00000000E+00	.00000000E+00	.00000000E+00	.00000000E+00
22 wholesale	.12988423E+08	.34174538E+07	.29702214E+06	.32285279E+07
23 retail	.00000000E+00	.00000000E+00	.00000000E+00	.00000000E+00
24 fire	.00000000E+00	.00000000E+00	.00000000E+00	.00000000E+00
25 other serv	.00000000E+00	.00000000E+00	.00000000E+00	.00000000E+00
26 education	.00000000E+00	.00000000E+00	.00000000E+00	.00000000E+00
27 health ser	.00000000E+00	.00000000E+00	.00000000E+00	.00000000E+00
28 wat/sew/tr	.00000000E+00	.00000000E+00	.00000000E+00	.00000000E+00
29 local govt	.00000000E+00	.00000000E+00	.00000000E+00	.00000000E+00
30 households	.16153808E+08	.51708201E+07	.76153815E+06	.95573332E+07
31 state govt	.00000000E+00	.00000000E+00	.00000000E+00	.00000000E+00
32 fed govt	.00000000E+00	.00000000E+00	.00000000E+00	.00000000E+00
33 rents	.80020732E+07	.19824746E+07	.40156959E+06	.21919100E+07
34 impt wyom	.00000000E+00	.00000000E+00	.00000000E+00	.00000000E+00
35 impt world	.11614523E+07	.58496532E+06	.63603661E+06	.12492200E+08

Table 6-4. year 1 run 2

\*\* CHANGE \*\* FORECASTED  
SALES REVENUES TOTALS

	SALES (\$)
1 cattle	318765.
2 sheep	456.
3 oats	4808.
4 grass hay	15892.
5 baled alfa	7667.
6 grain crn	13125.
7 fd barley	69042.
8 mit barley	-2948.
9 all wheat	23539.
10 dry beans	277.
11 potatoes	3238.
12 sugar beet	10906.
13 other agri	5619.
14 forestry	100192.
15 coal mine	243017.
16 oil/gas pr	6454137.
17 other mine	328655.
18 constructi	17978581.
19 manufact	13561350.
20 trans/comm	5690323.
21 gs/elec ut	2640617.
22 wholesale	26765100.
23 retail	23384492.
24 fire	5097433.
25 other serv	3375832.
26 education	1019968.
27 health ser	2152755.
28 wat/sew/tr	401487.
29 local govt	1419518.
30 households	50897420.
31 st/fed gov	0.
32 investaent	0.
33 hous const	46579104.
34 comm const	14295996.
35 pipe const	0.
36 road const	4207632.
37 rird const	0.
38 coal const	41250001.
39 exports	0.
40 TOTALS	268313997.
41 TOTAL FD	106332727.

Table 6-5. year 1 run 2

## \*\* CHANGE \*\* RESOURCE REQUIREMENTS BY INDUSTRY

	1
	employment
1	cattle .74344301E+01
2	sheep .12506232E-01
3	oats .13783132E+00
4	grass hay .36929507E+00
5	baled alfa .20332080E+00
6	grain crn .35463272E+00
7	fd barley .18418728E+01
8	mt barley -.73599499E-01
9	all wheat .61289271E+00
10	dry beans .71770758E-02
11	potatoes .82179746E-01
12	sugar beet .30612003E+00
13	other agri .14953982E+00
14	forestry .18101720E+01
15	coal mine .10781201E+01
16	oil/gas pr .19760444E+02
17	other mine .17708867E+01
18	constructi .19360497E+03
19	manufact .68425021E+02
20	trans/comm .94859299E+02
21	gs/elec ut .14477083E+02
22	wholesale .89474098E+02
23	retail .25575720E+03
24	f i r e .62303449E+02
25	other serv .10149428E+03
26	education .34005268E+02
27	health ser .52286417E+02
28	wat/sew/tr .78253815E+01
29	local govt .10011331E+02
30	households .00000000E+00

Table 6-6. year 1 run 2

\*\* CHANGE \*\* RESOURCE REQUIREMENTS BY INDUSTRY  
FINAL DEMANDS

employment RESOURCE REQUIREMENT =	.10203816E+04
st/fed gov REQUIREMENT (FINAL DEMAND) =	.00000000E+00
investment REQUIREMENT (FINAL DEMAND) =	.00000000E+00
hous const REQUIREMENT (FINAL DEMAND) =	.72197611E+03
comm const REQUIREMENT (FINAL DEMAND) =	.23016554E+03
pipe const REQUIREMENT (FINAL DEMAND) =	.00000000E+00
road const REQUIREMENT (FINAL DEMAND) =	.34081819E+02
rird const REQUIREMENT (FINAL DEMAND) =	.00000000E+00
coal const REQUIREMENT (FINAL DEMAND) =	.42487501E+03
exports REQUIREMENT (FINAL DEMAND) =	.00000000E+00
TOTAL RESOURCE REQUIREMENT =	.24314801E+04

Table 6-7. year 1 run 2

## \*\* CHANGE \*\* SUMMARY OF RESOURCE REQUIREMENTS

RESOURCE	----DIRECT----	---INDIRECT---	----TOTAL-----
employment	.17331608E+04	.69831931E+03	.24314801E+04

Table 6-8. year 2 run 1

## CHANGES IN FINAL DEMANDS ENTERED IN IMS PROGRAM

	38 coal const	39 exports
1 cattle	.00000000E+00	.00000000E+00
2 sheep	.00000000E+00	.00000000E+00
3 oats	.00000000E+00	.00000000E+00
4 grass hay	.00000000E+00	.00000000E+00
5 baled alfa	.00000000E+00	.00000000E+00
6 grain crn	.00000000E+00	.00000000E+00
7 fd barley	.00000000E+00	.00000000E+00
8 mlt barley	.00000000E+00	.00000000E+00
9 all wheat	.00000000E+00	.00000000E+00
10 dry beans	.00000000E+00	.00000000E+00
11 potatoes	.00000000E+00	.00000000E+00
12 sugar beet	.00000000E+00	.00000000E+00
13 other agri	.00000000E+00	.00000000E+00
14 forestry	.87739121E+05	.00000000E+00
15 coal mine	.00000000E+00	.16250000E+09
16 oil/gas pr	.00000000E+00	.00000000E+00
17 other mine	.20571458E+06	.00000000E+00
18 constructi	.13054316E+08	.00000000E+00
19 manufact	.00000000E+00	.00000000E+00
20 trans/comm	.43226048E+06	.00000000E+00
21 gs/elec ut	.00000000E+00	.00000000E+00
22 wholesale	.32285279E+07	.00000000E+00
23 retail	.00000000E+00	.00000000E+00
24 f i r e	.00000000E+00	.00000000E+00
25 other serv	.00000000E+00	.00000000E+00
26 education	.00000000E+00	.00000000E+00
27 health ser	.00000000E+00	.00000000E+00
28 wat/sew/tr	.00000000E+00	.00000000E+00
29 local govt	.00000000E+00	.00000000E+00
30 households	.95573332E+07	.00000000E+00
31 state govt	.00000000E+00	.00000000E+00
32 fed govt	.00000000E+00	.00000000E+00
33 rents	.21919100E+07	.00000000E+00
34 impt wyom	.00000000E+00	.00000000E+00
35 impt world	.12492200E+08	.00000000E+00

Table 6-9. year 2 run 1

## \*\* CHANGE \*\* SUMMARY OF RESOURCE REQUIREMENTS

RESOURCE	----DIRECT----	---INDIRECT---	----TOTAL-----
employment	.13070590E+04	.13452620E+04	.26523210E+04

Table 6-10. year 2 run 2

## CHANGES IN FINAL DEMANDS ENTERED IN IMS PROGRAM

	33 hous const	34 comm const	36 road const	38 coal const
1 cattle	.00000000E+00	.00000000E+00	.00000000E+00	.00000000E+00
2 sheep	.00000000E+00	.00000000E+00	.00000000E+00	.00000000E+00
3 oats	.00000000E+00	.00000000E+00	.00000000E+00	.00000000E+00
4 grass hay	.00000000E+00	.00000000E+00	.00000000E+00	.00000000E+00
5 baled alfa	.00000000E+00	.00000000E+00	.00000000E+00	.00000000E+00
6 grain crn	.00000000E+00	.00000000E+00	.00000000E+00	.00000000E+00
7 fd barley	.00000000E+00	.00000000E+00	.00000000E+00	.00000000E+00
8 mt barley	.00000000E+00	.00000000E+00	.00000000E+00	.00000000E+00
9 all wheat	.00000000E+00	.00000000E+00	.00000000E+00	.00000000E+00
10 dry beans	.00000000E+00	.00000000E+00	.00000000E+00	.00000000E+00
11 potatoes	.00000000E+00	.00000000E+00	.00000000E+00	.00000000E+00
12 sugar beet	.00000000E+00	.00000000E+00	.00000000E+00	.00000000E+00
13 other agri	.00000000E+00	.00000000E+00	.00000000E+00	.00000000E+00
14 forestry	.00000000E+00	.00000000E+00	.00000000E+00	.87739121E+05
15 coal mine	.00000000E+00	.00000000E+00	.00000000E+00	.00000000E+00
16 oil/gas pr	.00000000E+00	.00000000E+00	.00000000E+00	.00000000E+00
17 other mine	.00000000E+00	.00000000E+00	.00000000E+00	.20571458E+06
18 constructi	.00000000E+00	.00000000E+00	.25184614E+07	.13054316E+08
19 manufact	.13262863E+08	.52787279E+07	.18499422E+07	.00000000E+00
20 trans/comm	.40317725E+07	.12873167E+07	.46478835E+05	.43226048E+06
21 gs/elec ut	.00000000E+00	.00000000E+00	.00000000E+00	.00000000E+00
22 wholesale	.27157611E+08	.71455852E+07	.62104629E+06	.32285279E+07
23 retail	.00000000E+00	.00000000E+00	.00000000E+00	.00000000E+00
24 fire	.00000000E+00	.00000000E+00	.00000000E+00	.00000000E+00
25 other serv	.00000000E+00	.00000000E+00	.00000000E+00	.00000000E+00
26 education	.00000000E+00	.00000000E+00	.00000000E+00	.00000000E+00
27 health ser	.00000000E+00	.00000000E+00	.00000000E+00	.00000000E+00
28 wat/sew/tr	.00000000E+00	.00000000E+00	.00000000E+00	.00000000E+00
29 local govt	.00000000E+00	.00000000E+00	.00000000E+00	.00000000E+00
30 households	.33780326E+08	.10811715E+08	.15923071E+07	.95573332E+07
31 state govt	.00000000E+00	.00000000E+00	.00000000E+00	.00000000E+00
32 fed govt	.00000000E+00	.00000000E+00	.00000000E+00	.00000000E+00
33 rents	.16731608E+08	.41451742E+07	.83964551E+06	.21919100E+07
34 impt wyom	.00000000E+00	.00000000E+00	.00000000E+00	.00000000E+00
35 impt world	.24284911E+07	.12231093E+07	.13298947E+07	.12492200E+08

Table 6-10. (continued) year 2 run 2

## CHANGES IN FINAL DEMANDS ENTERED IN INS PROGRAM

	39
	exports
1	cattle .00000000E+00
2	sheep .00000000E+00
3	oats .00000000E+00
4	grass hay .00000000E+00
5	baled alfa .00000000E+00
6	grain crn .00000000E+00
7	fd barley .00000000E+00
8	alt barley .00000000E+00
9	all wheat .00000000E+00
10	dry beans .00000000E+00
11	potatoes .00000000E+00
12	sugar beet .00000000E+00
13	other agri .00000000E+00
14	forestry .00000000E+00
15	coal mine .16250000E+09
16	oil/gas pr .00000000E+00
17	other mine .00000000E+00
18	constructi .00000000E+00
19	manufact .00000000E+00
20	trans/comm .00000000E+00
21	gs/elec ut .00000000E+00
22	wholesale .00000000E+00
23	retail .00000000E+00
24	f i r e .00000000E+00
25	other serv .00000000E+00
26	education .00000000E+00
27	health ser .00000000E+00
28	wat/sew/tr .00000000E+00
29	local govt .00000000E+00
30	households .00000000E+00
31	state govt .00000000E+00
32	fed govt .00000000E+00
33	rents .00000000E+00
34	impt wyom .00000000E+00
35	impt world .00000000E+00

Table 6-11. year 2 run 2

\*\* CHANGE \*\* FORECASTED  
SALES REVENUES TOTALS

	SALES (\$)
1	cattle 857686.
2	sheep 763.
3	oats 10814.
4	grass hay 42755.
5	baled alfa 19476.
6	grain crn 32044.
7	fd barley 157543.
8	alt barley -3013.
9	all wheat 50812.
10	dry beans 243.
11	potatoes 8926.
12	sugar beet 23811.
13	other agri 13200.
14	forestry 100275.
15	coal mine 165969881.
16	oil/gas pr 14629431.
17	other mine 472753.
18	constructi 31176366.
19	manufact 29610786.
20	trans/comm 13187513.
21	gs/elec ut 9300431.
22	wholesale 60641985.
23	retail 62102618.
24	f i r e 16486385.
25	other serv 11934630.
26	education 6164307.
27	health ser 5833711.
28	wat/sew/tr 1050054.
29	local govt 10510928.
30	households 134827754.
31	st/fed gov 0.
32	investment 0.
33	hous const 97392672.
34	comm const 29891628.
35	pipe const 0.
36	road const 8797776.
37	rird const 0.
38	coal const 41250001.
39	exports 162500000.
40	TOTALS 915046945.
41	TOTAL FD 339832071.

Table 6-12. year 2 run 2

\*\* CHANGE \*\* RESOURCE REQUIREMENTS BY INDUSTRY

	1	employment
1	cattle	.20003468E+02
2	sheep	.20936557E-01
3	oats	.30999348E+00
4	grass hay	.99349905E+00
5	baled alfa	.51645990E+00
6	grain crn	.86584270E+00
7	fd barley	.42028471E+01
8	mt barley	-.75238314E-01
9	all wheat	.13230098E+01
10	dry beans	.62989066E-02
11	potatoes	.22650775E+00
12	sugar beet	.66836215E+00
13	other agri	.35126766E+00
14	forestry	.18116650E+01
15	coal mine	.73630815E+03
16	oil/gas pr	.44790507E+02
17	other mine	.25473232E+01
18	constructi	.33572725E+03
19	manufact	.14940391E+03
20	trans/comm	.21983958E+03
21	gs/elec ut	.50989269E+02
22	wholesale	.20272246E+03
23	retail	.67921903E+03
24	f i r e	.20150510E+03
25	other serv	.35881426E+03
26	education	.20551513E+03
27	health ser	.14168999E+03
28	wat/sew/tr	.20466605E+02
29	local govt	.74129669E+02
30	households	.00000000E+00

Table 6-13. year 2 run 2

\*\* CHANGE \*\* RESOURCE REQUIREMENTS BY INDUSTRY  
FINAL DEMANDS

employment	RESOURCE REQUIREMENT =	.34548931E+04
st/fed gov	REQUIREMENT (FINAL DEMAND) =	.00000000E+00
investment	REQUIREMENT (FINAL DEMAND) =	.00000000E+00
hous const	REQUIREMENT (FINAL DEMAND) =	.15095864E+04
comm const	REQUIREMENT (FINAL DEMAND) =	.48125521E+03
pipe const	REQUIREMENT (FINAL DEMAND) =	.00000000E+00
road const	REQUIREMENT (FINAL DEMAND) =	.71261986E+02
rird const	REQUIREMENT (FINAL DEMAND) =	.00000000E+00
coal const	REQUIREMENT (FINAL DEMAND) =	.42487501E+03
exports	REQUIREMENT (FINAL DEMAND) =	.00000000E+00
TOTAL RESOURCE REQUIREMENT =		.59418718E+04

Table 6-14. year 2 run 2

\*\* CHANGE \*\* SUMMARY OF RESOURCE REQUIREMENTS

RESOURCE	----DIRECT----	---INDIRECT---	----TOTAL-----
employment	.37053655E+04	.22365062E+04	.59418718E+04

Table 6-15. year 3 run 1

## CHANGES IN FINAL DEMANDS ENTERED IN IMS PROGRAM

	39
	exports
1	cattle .00000000E+00
2	sheep .00000000E+00
3	oats .00000000E+00
4	grass hay .00000000E+00
5	baled alfa .00000000E+00
6	grain crn .00000000E+00
7	fd barley .00000000E+00
8	mlt barley .00000000E+00
9	all wheat .00000000E+00
10	dry beans .00000000E+00
11	potatoes .00000000E+00
12	sugar beet .00000000E+00
13	other agri .00000000E+00
14	forestry .00000000E+00
15	coal mine .32500000E+09
16	oil/gas pr .00000000E+00
17	other mine .00000000E+00
18	constructi .00000000E+00
19	manufact .00000000E+00
20	trans/comm .00000000E+00
21	gs/elec ut .00000000E+00
22	wholesale .00000000E+00
23	retail .00000000E+00
24	f i r e .00000000E+00
25	other serv .00000000E+00
26	education .00000000E+00
27	health ser .00000000E+00
28	wat/sew/tr .00000000E+00
29	local govt .00000000E+00
30	households .00000000E+00
31	state govt .00000000E+00
32	fed govt .00000000E+00
33	rents .00000000E+00
34	impt wyom .00000000E+00
35	impt world .00000000E+00

Table 6-16. year 3 run 1

## \*\* CHANGE \*\* SUMMARY OF RESOURCE REQUIREMENTS

RESOURCE	----DIRECT----	---INDIRECT---	----TOTAL-----
employment	.14418288E+04	.21464667E+04	.35882955E+04

Table 6-17. year 3 run 2

## CHANGES IN FINAL DEMANDS ENTERED IN IMS PROGRAM

	33 hous const	34 comm const	36 road const	39 exports
1 cattle	.00000000E+00	.00000000E+00	.00000000E+00	.00000000E+00
2 sheep	.00000000E+00	.00000000E+00	.00000000E+00	.00000000E+00
3 oats	.00000000E+00	.00000000E+00	.00000000E+00	.00000000E+00
4 grass hay	.00000000E+00	.00000000E+00	.00000000E+00	.00000000E+00
5 baled alfa	.00000000E+00	.00000000E+00	.00000000E+00	.00000000E+00
6 grain crn	.00000000E+00	.00000000E+00	.00000000E+00	.00000000E+00
7 fd barley	.00000000E+00	.00000000E+00	.00000000E+00	.00000000E+00
8 mlt barley	.00000000E+00	.00000000E+00	.00000000E+00	.00000000E+00
9 all wheat	.00000000E+00	.00000000E+00	.00000000E+00	.00000000E+00
10 dry beans	.00000000E+00	.00000000E+00	.00000000E+00	.00000000E+00
11 potatoes	.00000000E+00	.00000000E+00	.00000000E+00	.00000000E+00
12 sugar beet	.00000000E+00	.00000000E+00	.00000000E+00	.00000000E+00
13 other agri	.00000000E+00	.00000000E+00	.00000000E+00	.00000000E+00
14 forestry	.00000000E+00	.00000000E+00	.00000000E+00	.00000000E+00
15 coal mine	.00000000E+00	.00000000E+00	.00000000E+00	.32500000E+09
16 oil/gas pr	.00000000E+00	.00000000E+00	.00000000E+00	.00000000E+00
17 other mine	.00000000E+00	.00000000E+00	.00000000E+00	.00000000E+00
18 constructi	.00000000E+00	.00000000E+00	.13139799E+07	.00000000E+00
19 manufact	.69197547E+07	.27541189E+07	.96518721E+06	.00000000E+00
20 trans/comm	.21035335E+07	.67164350E+06	.24249827E+05	.00000000E+00
21 gs/elec ut	.00000000E+00	.00000000E+00	.00000000E+00	.00000000E+00
22 wholesale	.14169189E+08	.37281314E+07	.32402415E+06	.00000000E+00
23 retail	.00000000E+00	.00000000E+00	.00000000E+00	.00000000E+00
24 f i r e	.00000000E+00	.00000000E+00	.00000000E+00	.00000000E+00
25 other serv	.00000000E+00	.00000000E+00	.00000000E+00	.00000000E+00
26 education	.00000000E+00	.00000000E+00	.00000000E+00	.00000000E+00
27 health ser	.00000000E+00	.00000000E+00	.00000000E+00	.00000000E+00
28 wat/sew/tr	.00000000E+00	.00000000E+00	.00000000E+00	.00000000E+00
29 local govt	.00000000E+00	.00000000E+00	.00000000E+00	.00000000E+00
30 households	.17624518E+08	.56408946E+07	.83076890E+06	.00000000E+00
31 state govt	.00000000E+00	.00000000E+00	.00000000E+00	.00000000E+00
32 fed govt	.00000000E+00	.00000000E+00	.00000000E+00	.00000000E+00
33 rents	.87295344E+07	.21626996E+07	.43807592E+06	.00000000E+00
34 impt wyom	.00000000E+00	.00000000E+00	.00000000E+00	.00000000E+00
35 impt world	.12670389E+07	.63814399E+06	.69385812E+06	.00000000E+00

Table 6-18. year 3 run 2

\*\* CHANGE \*\* FORECASTED  
SALES REVENUES TOTALS

	SALES (\$)
1 cattle	836978.
2 sheep	559.
3 oats	7689.
4 grass hay	41582.
5 baled alfa	19038.
6 grain crn	24348.
7 fd barley	122726.
8 mlt barley	-3071.
9 all wheat	39694.
10 dry beans	189.
11 potatoes	5237.
12 sugar beet	15306.
13 other agri	11303.
14 forestry	-657.
15 coal mine	331264695.
16 oil/gas pr	10240520.
17 other mine	172142.
18 constructi	24041308.
19 manufact	19093132.
20 trans/comm	10227843.
21 gs/elec ut	11342446.
22 wholesale	45504148.
23 retail	61881438.
24 f i r e	19294011.
25 other serv	14841459.
26 education	9542561.
27 health ser	5828433.
28 wat/sew/tr	1048358.
29 local govt	17132245.
30 households	131620577.
31 st/fed gov	0.
32 investment	0.
33 hous const	50813568.
34 comm const	15595632.
35 pipe const	0.
36 road const	4590144.
37 rird const	0.
38 coal const	0.
39 exports	325000000.
40 TOTALS	1110195582.
41 TOTAL FD	395999338.



Table 6-19. year 3 run 2

## \*\* CHANGE \*\* RESOURCE REQUIREMENTS BY INDUSTRY

	1
	employment
1	cattle .19520501E+02
2	sheep .15330047E-01
3	oats .22039926E+00
4	grass hay .96625540E+00
5	baled alfa .50485306E+00
6	grain crn .65788800E+00
7	fd barley .32740221E+01
8	mit barley -.76675233E-01
9	all wheat .10335145E+01
10	dry beans .48986950E-02
11	potatoes .13288488E+00
12	sugar beet .42964072E+00
13	other agri .30079543E+00
14	forestry -.11874818E-01
15	coal mine .14696214E+04
16	oil/gas pr .31353106E+02
17	other mine .92755090E+00
18	constructi .25889234E+03
19	manufact .96336133E+02
20	trans/comm .17050104E+03
21	gs/elec ut .62184539E+02
22	wholesale .15211760E+03
23	retail .67679997E+03
24	f i r e .23582134E+03
25	other serv .44620796E+03
26	education .31814459E+03
27	health ser .14156180E+03
28	wat/sew/tr .20433536E+02
29	local govt .12082735E+03
30	households .00000000E+00

Table 6-20. year 3 run 2

\*\* CHANGE \*\* RESOURCE REQUIREMENTS BY INDUSTRY  
FINAL DEMANDS

employment RESOURCE REQUIREMENT =	.42287027E+04
st/fed gov REQUIREMENT (FINAL DEMAND) =	.00000000E+00
investment REQUIREMENT (FINAL DEMAND) =	.00000000E+00
hous const REQUIREMENT (FINAL DEMAND) =	.78761030E+03
comm const REQUIREMENT (FINAL DEMAND) =	.25108968E+03
pipe const REQUIREMENT (FINAL DEMAND) =	.00000000E+00
road const REQUIREMENT (FINAL DEMAND) =	.37180166E+02
rird const REQUIREMENT (FINAL DEMAND) =	.00000000E+00
coal const REQUIREMENT (FINAL DEMAND) =	.00000000E+00
exports REQUIREMENT (FINAL DEMAND) =	.00000000E+00
TOTAL RESOURCE REQUIREMENT =	.53045829E+04

Table 6-21. year 3 run 2

## \*\* CHANGE \*\* SUMMARY OF RESOURCE REQUIREMENTS

RESOURCE	----DIRECT----	---INDIRECT---	----TOTAL-----
employment	.26931191E+04	.26114637E+04	.53045829E+04

Table 6-22. year 4 (single run)

## CHANGES IN FINAL DEMANDS ENTERED IN IMS PROGRAM

	39
	exports
1 cattle	.00000000E+00
2 sheep	.00000000E+00
3 oats	.00000000E+00
4 grass hay	.00000000E+00
5 baled alfa	.00000000E+00
6 grain crn	.00000000E+00
7 fd barley	.00000000E+00
8 mt barley	.00000000E+00
9 all wheat	.00000000E+00
10 dry beans	.00000000E+00
11 potatoes	.00000000E+00
12 sugar beet	.00000000E+00
13 other agri	.00000000E+00
14 forestry	.00000000E+00
15 coal mine	.32500000E+09
16 oil/gas pr	.00000000E+00
17 other mine	.00000000E+00
18 constructi	.00000000E+00
19 manufact	.00000000E+00
20 trans/comm	.00000000E+00
21 gs/elec ut	.00000000E+00
22 wholesale	.00000000E+00
23 retail	.00000000E+00
24 f i r e	.00000000E+00
25 other serv	.00000000E+00
26 education	.00000000E+00
27 health ser	.00000000E+00
28 wat/sew/tr	.00000000E+00
29 local govt	.00000000E+00
30 households	.00000000E+00
31 state govt	.00000000E+00
32 fed govt	.00000000E+00
33 rents	.00000000E+00
34 impt wyom	.00000000E+00
35 impt world	.00000000E+00

Table 6-23. year 4 (single run)

## \*\* CHANGE \*\* FORECASTED SALES REVENUES TOTALS

	SALES (\$)
1	cattle 594855.
2	sheep 315.
3	oats 3364.
4	grass hay 29440.
5	baled alfa 13740.
6	grain crn 12220.
7	fd barley 66519.
8	mlt barley -3070.
9	all wheat 22149.
10	dry beans 177.
11	potatoes 643.
12	sugar beet 4829.
13	other agri 7001.
14	forestry -709.
15	coal mine 331074689.
16	oil/gas pr 4132477.
17	other mine 55800.
18	constructi 21686649.
19	manufact 6086764.
20	trans/comm 5461280.
21	gs/elec ut 9364447.
22	wholesale 23252872.
23	retail 46325604.
24	f i r e 15809451.
25	other serv 12564907.
26	education 8796340.
27	health ser 4294871.
28	wat/sew/tr 799541.
29	local govt 16081477.
30	households 95379018.
31	st/fed gov 0.
32	investment 0.
33	hous const 0.
34	comm const 0.
35	pipe const 0.
36	road const 0.
37	rIRD const 0.
38	coal const 0.
39	exports 325000000.
40	TOTALS 926917659.
41	TOTAL FD 324999994.

Table 6-24. year 4 (single r

## \*\* CHANGE \*\* RESOURCE REQUIRE

	1 employment
1	cattle .13873575E+02
2	sheep .86550968E-02
3	oats .96442229E-01
4	grass hay .68410319E+00
5	baled alfa .36434444E+00
6	grain crn .33019895E+00
7	fd barley .17745573E+01
8	mlt barley -.76660006E-01
9	all wheat .57669776E+00
10	dry beans .45987828E-02
11	potatoes .16316623E-01
12	sugar beet .13553329E+00
13	other agri .18631263E+00
14	forestry -.12807206E-01
15	coal mine .14687785E+04
16	oil/gas pr .12652284E+02
17	other mine .30066380E+00
18	constructi .23353585E+03
19	manufact .30711321E+02
20	trans/comm .91041075E+02
21	gs/elec ut .51340230E+02
22	wholesale .77732934E+02
23	retail .50666513E+03
24	f i r e .19323125E+03
25	other serv .37776351E+03
26	education .29326591E+03
27	health ser .10431444E+03
28	wat/sew/tr .15583856E+02
29	local govt .11341668E+03
30	households .00000000E+00

Table 6-25. year 4 (single run)

\*\* CHANGE \*\* RESOURCE REQUIREMENTS BY INDUSTRY  
FINAL DEMANDS

employment	RESOURCE REQUIREMENT =	.35882955E+04
st/fed gov	REQUIREMENT (FINAL DEMAND) =	.00000000E+00
investment	REQUIREMENT (FINAL DEMAND) =	.00000000E+00
hous const	REQUIREMENT (FINAL DEMAND) =	.00000000E+00
comm const	REQUIREMENT (FINAL DEMAND) =	.00000000E+00
pipe const	REQUIREMENT (FINAL DEMAND) =	.00000000E+00
road const	REQUIREMENT (FINAL DEMAND) =	.00000000E+00
rird const	REQUIREMENT (FINAL DEMAND) =	.00000000E+00
coal const	REQUIREMENT (FINAL DEMAND) =	.00000000E+00
exports	REQUIREMENT (FINAL DEMAND) =	.00000000E+00
	TOTAL RESOURCE REQUIREMENT =	.35882955E+04

Table 6-26. year 4 (single run)

\*\* CHANGE \*\* SUMMARY OF RESOURCE REQUIREMENTS

RESOURCE	----DIRECT----	---INDIRECT---	----TOTAL-----
employment	.14418288E+04	.21464667E+04	.35882955E+04

## APPENDIX I. I/O MODEL SECTOR DEFINITIONS

INTERMEDIATE PROCESSING QUADRANT SECTORS

Livestock, non-reservation spending and income flows for all livestock and dairy product production, except sheep. SIC codes part 02 and part 01.

Sheep, non-reservation spending and income flows for sheep production. SIC code part 01.

Oats, non-reservation spending and income flows for oats production. SIC code part 01.

Grass Hay, non-reservation spending and income flows for grass hay production. SIC code part 01.

Baled Alfalfa, non-reservation spending and income flows for baled alfalfa production. SIC code part 01.

Grain Corn, non-reservation spending and income flows for grain corn production. SIC code part 01.

Feed Barley, non-reservation spending and income flows for feed barley production. SIC code part 01.

Malt Barley, non-reservation spending and income flows for malt barley production. SIC code part 01.

All Wheat, non-reservation spending and income flows for spring and winter wheat production. SIC code part 01.

Dry Beans, non-reservation spending and income flows for dry bean production. SIC code part 01.

Potatoes, non-reservation spending and income flows for potato production. SIC code part 01.

Sugar Beets, non-reservation spending and income flows for sugar beet production. SIC code part 01.

Other Agriculture, non-reservation spending and income flows; minor crops, agricultural seeding, reclamation, and other agricultural production services. SIC codes part 01, part 07.

Logging/Wood Products, non-reservation spending and income flows; logging, lumber and wood products production. SIC code 24.

Coal Mines, coal mining and coal mining services. SIC code 12.

Oil/Gas Extraction, non-reservation spending and income flows; crude petroleum, natural gas, natural gas liquids and extraction services. SIC code 13.

Other Mining, non-reservation spending and income flows;  
Other mining, milling, and related services. SIC 10 and 14 excluding 144.

Construction, non-reservation spending and income flows; repair and maintenance construction services and sand and gravel production. SIC codes 144, 15, 16, and 17.

Manufacturing, non-reservation spending and income flows; all manufacturing. SIC codes 20-23 and 25-39.

Transportation/Communication, non-reservation spending and income flows; all transportation and communication including railroads, motor freight, pipeline except natural gas, passenger transit,

warehousing, other transport services, telephone and other communication services, radio and TV broadcasting SIC codes 40-48.

Electric and Gas Utilities, non-reservation spending and income flows; all electric and gas services including gas production and distribution. SIC codes 491, 492 and 493.

Wholesale, non-reservation spending and income flows; all wholesale trade. SIC codes 50 and 51.

Retail, non-reservation spending and income flows; all retail trade. SIC codes 52-59.

FIRE: Finance, Insurance and Real Estate, non-reservation spending and income flows (commissions, fees and costs of doing business, excludes face value of insurance or other financial instruments, and sales value of real estate handled ); all finance, insurance and real estate. SIC codes 60-67. Profits for this sector are accounted for as rents.

Other Services, non-reservation spending and income flows; all other services including hotels, repair services, laundry cleaning and related services, business services including advertising and computer, legal, engineering and architectural, eating and drinking places, amusements, non-profit, religious, civic, labor and other membership organizations. SIC codes 70-79, 81, and 83-89.

Education, non-reservation spending and income flows; all educational services. SIC 82.

Health Services, non-reservation spending and income flows; all health services. SIC 80.

Water/Sewer/Trash Services, non-reservation spending and income flows; all water, sewer and trash services, steam and irrigation systems. SIC codes 494 and 495.

Local Governments, non-reservation spending and income flows; all city, county or other local governments. SIC codes 91-96.

Households, non-reservation spending, income flows and transfer payments (social security, welfare etc); all households. SIC codes none. This sector can also be a final demand sector.

#### FINAL PAYMENTS QUADRANT SECTORS

State Government, spending and income flows of state government agencies. SIC codes 91-96.

Federal Government, spending and income flows of federal government agencies. SIC codes 91 97.

Rents, business saving and profit, and rents.

Local Imports, purchases outside county region but inside the state of Wyoming.

World Imports, purchases outside the state of Wyoming.

#### FINAL DEMANDS QUADRANT SECTORS

State/Federal Government, see above.

Investment, spending for new construction (not replacement or repair), new inventory or other additions to real capital not specified in other final demand construction columns.

Pipeline Construction, spending for regional pipeline facilities.

Housing Construction, spending for new housing capacity.

Commercial (non-industrial and government) Structures Construction, spending for new commercial structures.

Road, curbs and gutters, water and sewer, sidewalk, and street lighting Construction, spending for new roads and related items.

Coal Mine Construction, spending for surface coal mine construction.

Railroad Construction, spending for a coal haul railroad line.

Exports, sales to households and/or firms and state or local agencies located outside the county study region including sales to travelers and tourists.

APPENDIX II. WYOMING I/O SURVEY FORM

privacy code no. \_\_\_

WYOMING

EXPENDITURES & FLOW OF FUNDS

(\$)<sup>7</sup>                      (\$)<sup>8</sup>

STEP I:	Local County	Wyoming
1. <u>Livestock Ranches:</u>	-----	-----
2. <u>Irrigated Farms:</u>	-----	-----
3. <u>Dry land Farms:</u>	-----	-----
4. <u>Other Ag. &amp; Related Serv.:</u>	-----	-----
5. <u>Forestry, Lumber &amp; Wood Prod.:</u>	-----	-----
6. <u>Coal Mining, Milling &amp; Serv.:</u>	-----	-----
7. <u>Oil &amp; Gas Production &amp; Serv.:</u>	-----	-----
8. <u>Other Mining, Milling &amp; Serv.:</u>	-----	-----
9. <u>Constructions</u> only for maintenance that is expensed; capitalized construction is recorded in item <u>g</u> of step III; include here plumbers, electricians, painters, carpenters, masons, etc.	-----	-----
10. <u>Manufacturing:</u> food process., publishers, refineries, ready-mix, metal fabricators, machine shops, etc.	-----	-----
11. <u>Transport &amp; Communications:</u> trucking & storage, bus lines, airlines, railroads, pipelines, telephone, radio, TV, Post Office, etc.	-----	-----
12. <u>Electric &amp; Gas Utilities:</u>	-----	-----
13. <u>Wholesale:</u> purchases from firms that sell principally to other firms	-----	-----
14. <u>Retail:</u> restaurants, gas stations, auto dealers, office supplies, hardware & lumber, grocery, pharmacy, furniture, department, variety, jewelry, etc.	-----	-----
15. <u>Finance, Insurance &amp; Real Estate:</u> only include interest payments, real estate commissions, insurance premiums, etc. (no principal payments)	-----	-----
16. <u>All Other Services:</u> lodging, legal, ad agencies, computer & data processing, auto repair, recreation services, etc.	-----	-----
17. <u>Educational Services:</u> includes vo-techs	-----	-----

<sup>7</sup> Show spending only in the county where your firm is located.

<sup>8</sup> Show spending in Wyoming but outside the county where your firm is located. Indicate county of purchase for each item.



- 18. Health Services: doctors, clinics, etc. -----|-----
- 19. Water, Sewer, Trash Removal: -----|-----
- 20. Local & County Government: -----|-----
- 21. Salaries & Wages: -----|-----
- 22. Wyoming State Government: -----|-----  
taxes, royalties
- 23. Federal Government: payroll taxes, -----|-----  
royalties, income taxes
- 24. Property Rents, Depreciation, Dividends -----|-----

-----  
Step II. Please show your total business spending outside Wyoming.

\$ -----  
-----

Step III:

a/ Please state your major business or product lines:

b/ What was your full time equivalent employment in 1984?

FTE average number of employees -----.

c/ At what level of capacity did you operate in 1984? \_\_\_%.

d/ What was your firm's water intake per day? \_\_\_\_\_gallons.

e/ What was your firm's capital outlay (not expensed)

in 1984? \$-----.

f/ Describe plans, if any, for future capital outlays and capacity expansion. The purpose of this question is to anticipate future business activity in the region.

-----  
-----  
-----  
-----  
-----  
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## APPENDIX III. TRANSACTIONS AMONG SECTORS

	1	2	3	4
	cattle	sheep	oats	grass hay
1 cattle	31555622.	0.	0.	0.
2 sheep	0.	2592406.	253703.	0.
3 oats	0.	0.	0.	0.
4 grass hay	18806948.	1754672.	150679.	0.
5 baled alfa	8336967.	116790.	0.	0.
6 grain crn	0.	0.	0.	0.
7 fd barley	0.	0.	0.	0.
8 mlt barley	0.	0.	0.	0.
9 all wheat	0.	0.	0.	0.
10 dry beans	0.	0.	4.	0.
11 potatoes	0.	0.	0.	0.
12 sugar beet	0.	0.	0.	0.
13 other agri	0.	1640884.	267700.	3162539.
14 forestry	0.	0.	0.	0.
15 coal mine	0.	0.	0.	0.
16 oil/gas pr	0.	0.	0.	0.
17 other mine	0.	0.	0.	0.
18 constructi	0.	721807.	102096.	0.
19 manufact	0.	147196.	28157.	489841.
20 trans/comm	3006214.	1018856.	152190.	589301.
21 gs/elec ut	12025073.	225257.	38486.	588589.
22 wholesale	44740753.	6801609.	1291143.	24616777.
23 retail	102764415.	779651.	117973.	462978.
24 f i r e	74088399.	7622215.	1209546.	10366641.
25 other serv	11030934.	987117.	183087.	5370723.
26 education	0.	0.	45.	0.
27 health ser	0.	0.	12.	0.
28 wat/sew/tr	0.	0.	3.	0.
29 local govt	13318900.	974685.	185911.	4075209.
30 households	26813429.	7623492.	962117.	8108449.
31 state govt	3886045.	0.	0.	0.
32 fed govt	17199098.	689106.	102904.	0.
33 rents	0.	0.	0.	0.
34 impt wyom	13939146.	0.	0.	0.
35 impt world	0.	0.	0.	0.

	5	6	7	8
	baled alfa	grain crn	fd barley	mlt barley
1 cattle	24.	0.	1.	62.
2 sheep	3.	0.	4.	5.
3 oats	0.	0.	0.	0.
4 grass hay	0.	0.	9.	15.
5 baled alfa	0.	0.	1.	0.
6 grain crn	0.	0.	0.	0.
7 fd barley	0.	0.	0.	21.
8 mlt barley	0.	0.	6.	15.
9 all wheat	0.	0.	6.	26.
10 dry beans	0.	0.	6.	14.
11 potatoes	0.	0.	6.	97.
12 sugar beet	0.	0.	6.	73.
13 other agri	17218666.	619540.	130809.	99.
14 forestry	0.	0.	0.	7.
15 coal mine	0.	3.	0.	84.
16 oil/gas pr	0.	0.	34.	112.
17 other mine	0.	0.	0.	160.
18 constructi	0.	0.	0.	70.
19 manufact	0.	158226.	349815.	58.
20 trans/comm	0.	167756.	328730.	195.
21 gs/elec ut	760631.	175904.	314465.	126.
22 wholesale	23614305.	9557394.	16438195.	557.
23 retail	0.	32.	64927.	33.
24 f i r e	16577029.	3154449.	5663191.	236.
25 other serv	6011087.	1436549.	2921669.	232.
26 education	0.	0.	0.	159.
27 health ser	0.	1.	1385.	73.
28 wat/sew/tr	5423411.	35369.	65216.	125.
29 local govt	2251733.	452491.	1718709.	107.
30 households	13380728.	1267238.	3358307.	323.
31 state govt	0.	0.	0.	146.
32 fed govt	0.	6.	0.	55.
33 rents	0.	0.	0.	120.
34 impt wyom	0.	0.	0.	0.
35 impt world	0.	0.	0.	7.



## APPENDIX III. TRANSACTIONS AMONG SECTORS

	17	18	19	20
	other mine	constructi	manufact	trans/comm
1 cattle	2375584.	0.	1997848.	1947080.
2 sheep	0.	0.	0.	0.
3 oats	0.	0.	240140.	357000.
4 grass hay	0.	0.	7.	0.
5 baled alfa	0.	0.	0.	0.
6 grain crn	1.	0.	0.	1878502.
7 fd barley	17.	0.	0.	10160603.
8 mlt barley	0.	0.	0.	0.
9 all wheat	0.	0.	86172.	2400527.
10 dry beans	0.	0.	0.	0.
11 potatoes	50.	0.	471870.	0.
12 sugar beet	7.	0.	1071338.	0.
13 other agri	24.	0.	0.	0.
14 forestry	0.	0.	4950.	0.
15 coal mine	14.	0.	3972383.	0.
16 oil/gas pr	1774152.	0.	547424139.	0.
17 other mine	2446119.	69248.	11847873.	0.
18 constructi	43038485.	216318946.	5743045.	2071970.
19 manufact	12143038.	69164528.	2032191.	8511590.
20 trans/comm	17190097.	9756908.	26335409.	31330180.
21 gs/elec ut	69787424.	7194878.	32170063.	32585348.
22 wholesale	71350200.	115120897.	14106406.	100134124.
23 retail	1614197.	154428259.	8850058.	14820480.
24 f i r e	352392.	31629953.	5554654.	42343163.
25 other serv	2323340.	22608462.	3062222.	13251103.
26 education	196520.	152089.	24529.	1506024.
27 health ser	350028.	0.	118550.	34310.
28 wat/sew/tr	1860.	5167308.	736124.	664527.
29 local govt	19673367.	5965302.	4552597.	16641564.
30 households	166917532.	309756181.	145640525.	375627010.
31 state govt	19817029.	10063341.	4102289.	11654170.
32 fed govt	89298510.	64427719.	34000112.	17602946.
33 rents	162417480.	173562601.	68016575.	44487323.
34 impt wyom	0.	0.	0.	0.
35 impt world	211448979.	183653466.	407387682.	131538278.
	21	22	23	24
	gs/elec ut	wholesale	retail	f i r e
1 cattle	0.	7240025.	25244.	5.
2 sheep	0.	0.	0.	0.
3 oats	0.	0.	0.	0.
4 grass hay	0.	0.	0.	0.
5 baled alfa	0.	0.	0.	0.
6 grain crn	0.	213580.	0.	0.
7 fd barley	0.	0.	0.	0.
8 mlt barley	0.	0.	0.	0.
9 all wheat	0.	423200.	0.	0.
10 dry beans	0.	0.	0.	0.
11 potatoes	0.	0.	0.	0.
12 sugar beet	0.	0.	0.	0.
13 other agri	0.	0.	0.	0.
14 forestry	0.	0.	0.	0.
15 coal mine	51252312.	0.	0.	0.
16 oil/gas pr	95472736.	0.	0.	0.
17 other mine	0.	0.	0.	0.
18 constructi	6614028.	3970120.	8929698.	2359647.
19 manufact	326285.	147173159.	17939471.	11881580.
20 trans/comm	2617754.	38794227.	30375392.	17380145.
21 gs/elec ut	79961786.	6364694.	20715966.	2940565.
22 wholesale	10992016.	34769529.	407053078.	5358782.
23 retail	3664259.	33127117.	13913687.	7443701.
24 f i r e	2974046.	40213103.	18179899.	13370127.
25 other serv	5203294.	26530104.	17198043.	23620655.
26 education	20569.	0.	82129.	710071.
27 health ser	107526.	195504.	20850.	0.
28 wat/sew/tr	68373.	819992.	1303950.	414056.
29 local govt	30978988.	10256837.	4298242.	2018026.
30 households	121044407.	198685853.	348648858.	441548425.
31 state govt	9266751.	33285862.	6813564.	1231568.
32 fed govt	20630466.	49749079.	36793129.	31440931.
33 rents	92534055.	141116101.	105237485.	140053928.
34 impt wyom	0.	0.	0.	0.
35 impt world	150947676.	1988143469.	2183988584.	215399698.

## APPENDIX III. TRANSACTIONS AMONG SECTORS

	25 other serv	26 education	27 health ser	28 wat/sew/tr
1 cattle	0.	0.	0.	0.
2 sheep	0.	0.	0.	0.
3 oats	0.	0.	0.	0.
4 grass hay	0.	0.	0.	0.
5 baled alfa	0.	0.	0.	0.
6 grain crn	0.	0.	0.	0.
7 fd barley	0.	0.	0.	0.
8 mlt barley	0.	0.	0.	0.
9 all wheat	0.	0.	0.	0.
10 dry beans	0.	0.	0.	0.
11 potatoes	0.	0.	0.	0.
12 sugar beet	0.	0.	0.	0.
13 other agri	0.	0.	0.	0.
14 forestry	0.	0.	0.	0.
15 coal mine	0.	0.	0.	0.
16 oil/gas pr	0.	0.	0.	0.
17 other mine	0.	0.	0.	0.
18 constructi	4168610.	29050882.	1309638.	22996311.
19 manufact	8457403.	875592.	302124.	4124659.
20 trans/comm	18933933.	9083004.	5775913.	1422118.
21 gs/elec ut	32738494.	19945075.	4791813.	1709287.
22 wholesale	34353616.	58527068.	54079188.	5318644.
23 retail	15658578.	12760627.	8573377.	5238201.
24 f i r e	14241836.	896522.	19591429.	3410870.
25 other serv	26156873.	19371097.	13406569.	2158933.
26 education	189478.	13676599.	1078256.	0.
27 health ser	0.	1273743.	18944073.	0.
28 wat/sew/tr	6183696.	541565.	876973.	0.
29 local govt	10234788.	0.	1942913.	3533.
30 households	288585044.	426296872.	180136175.	21026231.
31 state govt	20027138.	24062071.	1531168.	57900.
32 fed govt	29255556.	7625659.	12789682.	544189.
33 rents	107645006.	600312.	35525106.	477608.
34 impt wyom	0.	0.	0.	0.
35 impt world	188099439.	85502503.	67532330.	100000.
	29 local govt	SUB-TOTALS	30 households	31 st/fed gov
1 cattle	0.	45557662.	22111810.	10089329.
2 sheep	0.	2846129.	0.	0.
3 oats	0.	597145.	0.	0.
4 grass hay	0.	21512054.	0.	0.
5 baled alfa	0.	8480766.	0.	0.
6 grain crn	0.	2092137.	0.	0.
7 fd barley	0.	10160672.	0.	0.
8 mlt barley	0.	37.	0.	0.
9 all wheat	0.	2909941.	0.	0.
10 dry beans	0.	150.	0.	0.
11 potatoes	0.	472077.	0.	0.
12 sugar beet	0.	1071443.	0.	0.
13 other agri	0.	26984008.	0.	0.
14 foresfry	0.	8093547.	0.	0.
15 coal mine	0.	75172981.	0.	0.
16 oil/gas pr	0.	1074301736.	0.	0.
17 other mine	0.	14363534.	0.	0.
18 constructi	47854774.	563867839.	20757070.	125571.
19 manufact	2145824.	328248857.	128817531.	4854436.
20 trans/comm	5355932.	247732060.	142277907.	75616111.
21 gs/elec ut	5599790.	523439537.	118557090.	512138.
22 wholesale	18093976.	1191902878.	41159503.	85064633.
23 retail	10337778.	442808408.	2414871223.	8730802.
24 f i r e	25909086.	385654270.	398763966.	19172028.
25 other serv	31721529.	274637452.	244497439.	10452422.
26 education	221921350.	240249501.	33391544.	427199726.
27 health ser	1553042.	23394657.	242400240.	863663.
28 wat/sew/tr	66527.	23089890.	31920997.	2171349.
29 local govt	84284.	356496276.	74764338.	21895045.
30 households	53077853.	3836980458.	17521983.	956190212.
31 state govt	1223679.	412135180.	306288257.	111674370.
32 fed govt	794078.	1813699363.	968847720.	8348781.
33 rents	8571824.	3451146116.	200252236.	66958892.
34 impt wyom	17327197.	31678189.	28953142.	39359.
35 impt world	1517136.	6557700388.	592367148.	549731763.

## APPENDIX III. TRANSACTIONS AMONG SECTORS

	32 investment	33 hous const	34 comm const	35 road const
1 cattle	0.	0.	0.	0.
2 sheep	0.	0.	0.	0.
3 oats	0.	0.	0.	0.
4 grass hay	0.	0.	0.	0.
5 baled alfa	0.	0.	0.	0.
6 grain crn	0.	0.	0.	0.
7 fd barley	0.	0.	0.	0.
8 mlt barley	0.	0.	0.	0.
9 all wheat	0.	0.	0.	0.
10 dry beans	0.	0.	0.	0.
11 potatoes	0.	0.	0.	0.
12 sugar beet	0.	0.	0.	0.
13 other agri	0.	0.	0.	0.
14 forestry	0.	0.	0.	0.
15 coal mine	0.	0.	0.	0.
16 oil/gas pr	0.	0.	0.	0.
17 other mine	0.	0.	0.	0.
18 constructi	687360081.	0.	0.	0.
19 manufact	0.	0.	0.	0.
20 trans/comm	0.	0.	0.	0.
21 gs/elec ut	0.	0.	0.	0.
22 wholesale	0.	0.	0.	0.
23 retail	0.	0.	0.	0.
24 f i r e	0.	0.	0.	0.
25 other serv	0.	0.	0.	0.
26 education	0.	0.	0.	0.
27 health ser	0.	0.	0.	0.
28 wat/sew/tr	0.	0.	0.	0.
29 local govt	0.	0.	0.	0.
30 households	0.	0.	0.	0.
31 state govt	0.	0.	0.	0.
32 fed govt	0.	0.	0.	0.
33 rents	0.	0.	0.	0.
34 impt wyom	0.	0.	0.	0.
35 impt world	0.	0.	0.	0.

	36 coal const	37 exports	TOTALS
1 cattle	0.	303753148.	381511949.
2 sheep	0.	30849614.	33695743.
3 oats	0.	4448611.	5045756.
4 grass hay	0.	36319000.	57831054.
5 baled alfa	0.	76756851.	85237617.
6 grain crn	0.	14932821.	17024958.
7 fd barley	0.	21194831.	31355503.
8 mlt barley	0.	3228.	3265.
9 all wheat	0.	18625833.	21535774.
10 dry beans	0.	1676080.	1676230.
11 potatoes	0.	2152732.	2624809.
12 sugar beet	0.	324217.	1395660.
13 other agri	0.	20645855.	47629863.
14 forestry	0.	53877905.	61971452.
15 coal mine	0.	1158213203.	1233386184.
16 oil/gas pr	0.	4429207938.	5503509674.
17 other mine	0.	880152771.	894516305.
18 constructi	0.	106929525.	1379040086.
19 manufact	0.	867628951.	1329549775.
20 trans/comm	0.	395921777.	861547855.
21 gs/elec ut	0.	42168562.	684677327.
22 wholesale	0.	1442944541.	2761071555.
23 retail	0.	355106900.	3221517333.
24 f i r e	0.	113581646.	917171910.
25 other serv	0.	275342175.	804929488.
26 education	0.	9248420.	710089191.
27 health ser	0.	161528173.	428186733.
28 wat/sew/tr	0.	11406259.	68588495.
29 local govt	0.	0.	453155659.
30 households	0.	1217828512.	6028521165.
31 state govt	0.	0.	830097807.
32 fed govt	0.	0.	2790895864.
33 rents	0.	0.	3718357244.
34 impt wyom	0.	0.	60670690.
35 impt world	0.	0.	7699799299.

## APPENDIX IV. SALES DISTRIBUTION COEFFICIENTS

	1	2	3	4
	cattle	sheep	oats	grass hay
1 cattle	.082712015	.000000000	.000000000	.000000000
2 sheep	.000000000	.076935713	.007529230	.000000000
3 oats	.000000000	.000000000	.000000000	.000000000
4 grass hay	.325205001	.030341346	.002605503	.000000000
5 baled alfa	.097808542	.001370170	.000000000	.000000000
6 grain crn	.000000000	.000000000	.000000000	.000000000
7 fd barley	.000000000	.000000000	.000000000	.000000000
8 mit barley	.000000000	.000000000	.000000000	.000000000
9 all wheat	.000000000	.000000000	.000000000	.000000000
10 dry beans	.000000000	.000000000	.000002386	.000000000
11 potatoes	.000000000	.000000000	.000000000	.000000000
12 sugar beet	.000000000	.000000000	.000000000	.000000000
13 other agri	.000000000	.034450739	.005620423	.066398238
14 forestry	.000000000	.000000000	.000000000	.000000000
15 coal mine	.000000000	.000000000	.000000000	.000000000
16 oil/gas pr	.000000000	.000000000	.000000000	.000000000
17 other mine	.000000000	.000000000	.000000000	.000000000
18 constructi	.000000000	.000523413	.000074034	.000000000
19 manufact	.000000000	.000110711	.000021178	.000368426
20 trans/coam	.003489317	.001182588	.000176647	.000684003
21 gs/elec ut	.017563124	.000328997	.000056210	.000859659
22 wholesale	.016204127	.002463395	.000467624	.008915661
23 retail	.031899383	.000242014	.000036620	.000143714
24 f i r e	.080779185	.008310563	.001318778	.011302833
25 other serv	.013704224	.001226340	.000227457	.006672290
26 education	.000000000	.000000000	.000000063	.000000000
27 health ser	.000000000	.000000000	.000000028	.000000000
28 wat/sew/tr	.000000000	.000000000	.000000044	.000000000
29 local govt	.029391446	.002150883	.000410259	.008992956
30 households	.004447762	.001264571	.000159594	.001345015
31 state govt	.004681430	.000000000	.000000000	.000000000
32 fed govt	.006162572	.000246912	.000036871	.000000000
33 rents	.000000000	.000000000	.000000000	.000000000
34 impt wyom	.229750906	.000000000	.000000000	.000000000
35 impt world	.000000000	.000000000	.000000000	.000000000
	5	6	7	8
	baled alfa	grain crn	fd barley	mit barley
1 cattle	.000000063	.000000000	.000000003	.000000163
2 sheep	.000000089	.000000000	.000000019	.000000148
3 oats	.000000000	.000000000	.000000000	.000000000
4 grass hay	.000000000	.000000000	.000000156	.000000259
5 baled alfa	.000000000	.000000000	.000000012	.000000000
6 grain crn	.000000000	.000000000	.000000000	.000000000
7 fd barley	.000000000	.000000000	.000000000	.000000670
8 mit barley	.000000000	.000000000	.001837672	.004594181
9 all wheat	.000000000	.000000000	.000000279	.000001207
10 dry beans	.000000000	.000000000	.000000379	.000008352
11 potatoes	.000000000	.000000000	.000002286	.000036955
12 sugar beet	.000000000	.000000000	.000004299	.000052305
13 other agri	.361509879	.013007386	.002746365	.000002079
14 forestry	.000000000	.000000000	.000000000	.000000113
15 coal mine	.000000000	.000000002	.000000000	.000000068
16 oil/gas pr	.000000000	.000000000	.000000006	.000000020
17 other mine	.000000000	.000000000	.000000000	.000000179
18 constructi	.000000000	.000000000	.000000000	.000000051
19 manufact	.000000000	.000119007	.000263108	.000000044
20 trans/coam	.000000000	.000194715	.000381557	.000000226
21 gs/elec ut	.001110934	.000256915	.000459289	.000000184
22 wholesale	.008552587	.003461480	.005953556	.000000202
23 retail	.000000000	.000000010	.000020154	.000000010
24 f i r e	.018074070	.003439321	.006174623	.000000257
25 other serv	.007467843	.001784689	.003629720	.000000288
26 education	.000000000	.000000000	.000000000	.000000224
27 health ser	.000000000	.000000002	.000003235	.000000170
28 wat/sew/tr	.079071731	.000515667	.000950830	.000001822
29 local govt	.004969006	.000998533	.003792756	.000000236
30 households	.002219571	.000210207	.000557070	.000000054
31 state govt	.000000000	.000000000	.000000000	.000000176
32 fed govt	.000000000	.000000002	.000000000	.000000020
33 rents	.000000000	.000000000	.000000000	.000000032
34 impt wyom	.000000000	.000000000	.000000000	.000000000
35 impt world	.000000000	.000000000	.000000000	.000000001

## APPENDIX IV. SALES DISTRIBUTION COEFFICIENTS

	9	10	11	12
	all wheat	dry beans	potatoes	sugar beet
1	cattle .00000000	.00000058	.00000058	.00000000
2	sheep .00000000	.00000237	.00000000	.00000000
3	oats .00000000	.00000000	.00000000	.00000000
4	grass hay .00000000	.00000000	.00000000	.00000000
5	baled alfa .00000000	.00000000	.00000000	.00000000
6	grain crn .00000294	.00001351	.00000000	.00000000
7	fd barley .00000000	.00000000	.00000000	.00000000
8	mt barley .00000000	.00000000	.00000000	.00000000
9	all wheat .00000000	.00000000	.00000000	.00000232
10	dry beans .00000000	.00002446	.00000000	.00000000
11	potatoes .000025715	.00000000	.00000000	.00000000
12	sugar beet .00000000	.00000000	.00000000	.00000000
13	other agri .011904170	.007769579	.001929483	.002160199
14	forestry .00000000	.00000000	.00000000	.00000000
15	coal mine .00000000	.00000000	.00000000	.00000000
16	oil/gas pr .00000013	.00000000	.00000010	.00000000
17	other mine .00000000	.00000000	.00000000	.00000006
18	constructi .00000000	.00000004	.00000000	.00000000
19	manufact .000245664	.00000000	.000017734	.000018099
20	trans/comm .000439035	.00000000	.000027431	.000022568
21	gs/elec ut .000481520	.000014814	.000034517	.000031250
22	wholesale .003309245	.000203090	.000590379	.000146103
23	retail .00000000	.00000000	.00000000	.000010801
24	f i r e .006945698	.000229496	.000357460	.000344006
25	other serv .001995067	.000169735	.000332694	.000114806
26	education .00000000	.00000013	.00000000	.00000000
27	health ser .000000019	.00000000	.00000000	.00000000
28	wat/sew/tr .000953833	.000985413	.00000000	.000487400
29	local govt .002211604	.000063400	.000069407	.000062047
30	households .000290809	.000048387	.000033969	.000053111
31	state govt .00000000	.000000017	.000000028	.00000000
32	fed govt .00000000	.00000000	.00000000	.00000000
33	rents .00000000	.000000001	.00000000	.00000002
34	impt wyom .00000000	.00000000	.00000000	.00000000
35	impt world .00000000	.00000000	.00000000	.00000000
	13	14	15	16
	other agri	forestry	coal mine	oil/gas pr
1	cattle .00000000	.00000018	.001090650	.00000052
2	sheep .00000000	.00000000	.00000000	.00000000
3	oats .00000000	.000000198	.000000793	.00000000
4	grass hay .013828332	.000000225	.000000069	.00000000
5	baled alfa .000316468	.00000000	.000000387	.00000000
6	grain crn .00000000	.00000000	.000000352	.000001175
7	fd barley .00000000	.000000287	.000000702	.00000000
8	mt barley .00000000	.002143951	.002756508	.00000000
9	all wheat .00000000	.00000000	.000000232	.00000000
10	dry beans .00000000	.000002983	.000047726	.00000000
11	potatoes .00000000	.000008001	.000003048	.000003810
12	sugar beet .00000000	.000002866	.000010748	.00000000
13	other agri .059034770	.000000924	.000000756	.00000000
14	forestry .00000000	.130520324	.000000904	.00000000
15	coal mine .00000000	.000000009	.016173502	.00000000
16	oil/gas pr .00000000	.000000008	.000000009	.078064793
17	other mine .00000000	.000000021	.000000123	.00000000
18	constructi .000451701	.002610999	.040887590	.078321505
19	manufact .001957785	.000067636	.002496757	.026784552
20	trans/comm .002080660	.001307941	.004075812	.024682937
21	gs/elec ut .000323380	.001766672	.023638450	.255310401
22	wholesale .003560096	.000295826	.014834780	.026166277
23	retail .000923875	.000321099	.004392619	.009309800
24	f i r e .003960906	.001729513	.025562702	.013538081
25	other serv .000581252	.001084442	.024609284	.020910660
26	education .00000000	.000000025	.0000963169	.000010872
27	health ser .00000000	.000073064	.001693329	.000091563
28	wat/sew/tr .00000000	.000146891	.003047217	.004888517
29	local govt .000677981	.000426297	.112867746	.384262049
30	households .002233252	.003141314	.035284312	.074776661
31	state govt .000130904	.000793429	.159467051	.158983538
32	fed govt .000215953	.000946265	.044082190	.456657564
33	rents .000932664	.002440831	.071572158	.562674787
34	impt wyom .006788220	.00000000	.00000000	.00000000
35	impt world .000452370	.001558201	.032240513	.062172357



## APPENDIX IV. SALES DISTRIBUTION COEFFICIENTS

	17	18	19	20
	other mine	constructi	manufact	trans/comm
1 cattle	.006226762	.000000000	.005236659	.005103589
2 sheep	.000000000	.000000000	.000000000	.000000000
3 oats	.000000000	.000000000	.047592472	.070752529
4 grass hay	.000000000	.000000000	.000000121	.000000000
5 baled alfa	.000000000	.000000000	.000000000	.000000000
6 grain crn	.000000059	.000000000	.000000000	.110338128
7 fd barley	.000000542	.000000000	.000000000	.324045288
8 mlt barley	.000000000	.000000000	.000000000	.000000000
9 all wheat	.000000000	.000000000	.004001342	.111466948
10 dry beans	.000000000	.000000000	.000000000	.000000000
11 potatoes	.000019049	.000000000	.179773081	.000000000
12 sugar beet	.000005016	.000000000	.767621054	.000000000
13 other agri	.000000504	.000000000	.000000000	.000000000
14 forestry	.000000000	.000000000	.000079875	.000000000
15 coal mine	.000000011	.000000000	.003220713	.000000000
16 oil/gas pr	.000322367	.000000000	.099468189	.000000000
17 other mine	.002734572	.000077414	.013245005	.000000000
18 constructi	.031209017	.156861971	.004164524	.001502473
19 manufact	.009133195	.052021014	.001528481	.006401859
20 trans/comm	.019952574	.011324859	.030567552	.036364991
21 gs/elec ut	.101927465	.010508422	.046985729	.047592270
22 wholesale	.025841489	.041694282	.005109033	.036266399
23 retail	.000501067	.047936498	.002747171	.004600466
24 f i r e	.000384216	.034486395	.006056284	.046167095
25 other serv	.002886389	.028087506	.003804336	.016462440
26 education	.000276754	.000214183	.000034544	.002120894
27 health ser	.000817466	.000000000	.000276865	.000080129
28 wat/sew/tr	.000027118	.075337825	.010732471	.009688607
29 local govt	.043414148	.013163914	.010046431	.036723725
30 households	.027687973	.051381785	.024158582	.062308317
31 state govt	.023873125	.012123079	.004941935	.014039514
32 fed govt	.031996360	.023084960	.012182508	.006307274
33 rents	.043679902	.046677226	.018292103	.011964241
34 impt wyom	.000000000	.000000000	.000000000	.000000000
35 impt world	.027461622	.023851721	.052908870	.017083339

	21	22	23	24
	gs/elec ut	wholesale	retail	f i r e
1 cattle	.000000000	.018977191	.000066168	.000000013
2 sheep	.000000000	.000000000	.000000000	.000000000
3 oats	.000000000	.000000000	.000000000	.000000000
4 grass hay	.000000000	.000000000	.000000000	.000000000
5 baled alfa	.000000000	.000000000	.000000000	.000000000
6 grain crn	.000000000	.012545112	.000000000	.000000000
7 fd barley	.000000000	.000000000	.000000000	.000000000
8 mlt barley	.000000000	.000000000	.000000000	.000000000
9 all wheat	.000000000	.019651023	.000000000	.000000000
10 dry beans	.000000000	.000000000	.000000000	.000000000
11 potatoes	.000000000	.000000000	.000000000	.000000000
12 sugar beet	.000000000	.000000000	.000000000	.000000000
13 other agri	.000000000	.000000000	.000000000	.000000000
14 forestry	.000000000	.000000000	.000000000	.000000000
15 coal mine	.041554148	.000000000	.000000000	.000000000
16 oil/gas pr	.017347609	.000000000	.000000000	.000000000
17 other mine	.000000000	.000000000	.000000000	.000000000
18 constructi	.004796110	.002878901	.006475300	.001711079
19 manufact	.000245410	.110693982	.013492892	.008936544
20 trans/comm	.003038431	.045028523	.035256767	.020173163
21 gs/elec ut	.116787548	.009295903	.030256539	.004294819
22 wholesale	.003981069	.012592766	.147425762	.001940834
23 retail	.001137433	.010283079	.004318986	.002310620
24 f i r e	.003242627	.043844674	.019821692	.014577558
25 other serv	.004464285	.032959538	.021365900	.029344999
26 education	.000028967	.000000000	.000115660	.000999974
27 health ser	.000251119	.000456586	.000048694	.000000000
28 wat/sew/tr	.000996858	.011955241	.019011206	.006036814
29 local govt	.068362796	.022634247	.009485134	.004453273
30 households	.020078624	.032957644	.057833231	.073243240
31 state govt	.011163445	.040098723	.008208146	.001483642
32 fed govt	.007392059	.017825487	.013183268	.011265534
33 rents	.024885736	.037951195	.028302145	.037665539
34 impt wyom	.000000000	.000000000	.000000000	.000000000
35 impt world	.019604105	.258207181	.283642274	.027974716

## APPENDIX IV. SALES DISTRIBUTION COEFFICIENTS

	25	26	27	28
	other serv	education	health ser	wat/sew/tr
1 cattle	.00000000	.00000000	.00000000	.00000000
2 sheep	.00000000	.00000000	.00000000	.00000000
3 oats	.00000000	.00000000	.00000000	.00000000
4 grass hay	.00000000	.00000000	.00000000	.00000000
5 baled alfa	.00000000	.00000000	.00000000	.00000000
6 grain crn	.00000000	.00000000	.00000000	.00000000
7 fd barley	.00000000	.00000000	.00000000	.00000000
8 mlt barley	.00000000	.00000000	.00000000	.00000000
9 all wheat	.00000000	.00000000	.00000000	.00000000
10 dry beans	.00000000	.00000000	.00000000	.00000000
11 potatoes	.00000000	.00000000	.00000000	.00000000
12 sugar beet	.00000000	.00000000	.00000000	.00000000
13 other agri	.00000000	.00000000	.00000000	.00000000
14 forestry	.00000000	.00000000	.00000000	.00000000
15 coal mine	.00000000	.00000000	.00000000	.00000000
16 oil/gas pr	.00000000	.00000000	.00000000	.00000000
17 other mine	.00000000	.00000000	.00000000	.00000000
18 constructi	.003022835	.021066017	.000949674	.016675593
19 manufact	.006361103	.000658563	.000227238	.003102298
20 trans/comm	.021976647	.010542658	.006704112	.001650655
21 gs/elec ut	.047815946	.029130620	.006998644	.002496485
22 wholesale	.012442132	.021197230	.019586304	.001926297
23 retail	.004860622	.003961061	.002661285	.001626004
24 f i r e	.015527990	.000977485	.021360695	.003718899
25 other serv	.032495856	.024065582	.016655582	.002682139
26 education	.000266837	.019260396	.001518480	.000000000
27 health ser	.000000000	.002974737	.044242550	.000000000
28 wat/sew/tr	.090156462	.007895858	.012786007	.000000000
29 local govt	.022585590	.000000000	.004287518	.000007796
30 households	.047869956	.070713341	.029880657	.003487793
31 state govt	.024126239	.028987031	.001844563	.000069751
32 fed govt	.010482496	.002732334	.004582644	.000194987
33 rents	.028949614	.000161445	.009553979	.000128446
34 impt wyom	.000000000	.000000000	.000000000	.000000000
35 impt world	.024429135	.011104511	.008770661	.000012987
	29	30	31	32
	local govt	households	st/fed gov	investment
1 cattle	.000000000	.057958368	.026445644	.000000000
2 sheep	.000000000	.000000000	.000000000	.000000000
3 oats	.000000000	.000000000	.000000000	.000000000
4 grass hay	.000000000	.000000000	.000000000	.000000000
5 baled alfa	.000000000	.000000000	.000000000	.000000000
6 grain crn	.000000000	.000000000	.000000000	.000000000
7 fd barley	.000000000	.000000000	.000000000	.000000000
8 mlt barley	.000000000	.000000000	.000000000	.000000000
9 all wheat	.000000000	.000000000	.000000000	.000000000
10 dry beans	.000000000	.000000000	.000000000	.000000000
11 potatoes	.000000000	.000000000	.000000000	.000000000
12 sugar beet	.000000000	.000000000	.000000000	.000000000
13 other agri	.000000000	.000000000	.000000000	.000000000
14 forestry	.000000000	.000000000	.000000000	.000000000
15 coal mine	.000000000	.000000000	.000000000	.000000000
16 oil/gas pr	.000000000	.000000000	.000000000	.000000000
17 other mine	.000000000	.000000000	.000000000	.000000000
18 constructi	.034701510	.015051825	.000091057	.498433721
19 manufact	.001613948	.096888085	.003651188	.000000000
20 trans/comm	.006216639	.165142199	.087767743	.000000000
21 gs/elec ut	.008178729	.173157611	.000747999	.000000000
22 wholesale	.006553244	.014907076	.030808558	.000000000
23 retail	.003208978	.749606776	.002710152	.000000000
24 f i r e	.028248887	.434775599	.020903418	.000000000
25 other serv	.039409078	.303750133	.012985513	.000000000
26 education	.312526022	.047024436	.601614179	.000000000
27 health ser	.003627020	.566108712	.002017024	.000000000
28 wat/sew/tr	.000969944	.465398710	.031657627	.000000000
29 local govt	.000185993	.164985997	.048316830	.000000000
30 households	.008804457	.002906514	.158611073	.000000000
31 state govt	.001474138	.368978516	.134531581	.000000000
32 fed govt	.000284524	.347145779	.002991434	.000000000
33 rents	.002305272	.053855029	.018007654	.000000000
34 impt wyom	.285594197	.477217945	.000648732	.000000000
35 impt world	.000197036	.076932804	.071395596	.000000000

APPENDIX IV. SALES DISTRIBUTION COEFFICIENTS

	33	34	35	36
	hou const	comm const	road const	coal const
1 cattle	.00000000	.00000000	.00000000	.00000000
2 sheep	.00000000	.00000000	.00000000	.00000000
3 oats	.00000000	.00000000	.00000000	.00000000
4 grass hay	.00000000	.00000000	.00000000	.00000000
5 baled alfa	.00000000	.00000000	.00000000	.00000000
6 grain crn	.00000000	.00000000	.00000000	.00000000
7 fd barley	.00000000	.00000000	.00000000	.00000000
8 mlt barley	.00000000	.00000000	.00000000	.00000000
9 all wheat	.00000000	.00000000	.00000000	.00000000
10 dry beans	.00000000	.00000000	.00000000	.00000000
11 potatoes	.00000000	.00000000	.00000000	.00000000
12 sugar beet	.00000000	.00000000	.00000000	.00000000
13 other agri	.00000000	.00000000	.00000000	.00000000
14 forestry	.00000000	.00000000	.00000000	.00000000
15 coal mine	.00000000	.00000000	.00000000	.00000000
16 oil/gas pr	.00000000	.00000000	.00000000	.00000000
17 other mine	.00000000	.00000000	.00000000	.00000000
18 constructi	.00000000	.00000000	.00000000	.00000000
19 manufact	.00000000	.00000000	.00000000	.00000000
20 trans/comm	.00000000	.00000000	.00000000	.00000000
21 gs/elec ut	.00000000	.00000000	.00000000	.00000000
22 wholesale	.00000000	.00000000	.00000000	.00000000
23 retail	.00000000	.00000000	.00000000	.00000000
24 f i r e	.00000000	.00000000	.00000000	.00000000
25 other serv	.00000000	.00000000	.00000000	.00000000
26 education	.00000000	.00000000	.00000000	.00000000
27 health ser	.00000000	.00000000	.00000000	.00000000
28 wat/sew/tr	.00000000	.00000000	.00000000	.00000000
29 local govt	.00000000	.00000000	.00000000	.00000000
30 households	.00000000	.00000000	.00000000	.00000000
31 state govt	.00000000	.00000000	.00000000	.00000000
32 fed govt	.00000000	.00000000	.00000000	.00000000
33 rents	.00000000	.00000000	.00000000	.00000000
34 impt wyom	.00000000	.00000000	.00000000	.00000000
35 impt world	.00000000	.00000000	.00000000	.00000000

	37
	exports
1 cattle	.794182528
2 sheep	.915534464
3 oats	.881654008
4 grass hay	.628018988
5 baled alfa	.900504422
6 grain crn	.877113529
7 fd barley	.675952511
8 mlt barley	.988667688
9 all wheat	.864878736
10 dry beans	.999910513
11 potatoes	.820148056
12 sugar beet	.232303713
13 other agri	.433464505
14 forestry	.869398784
15 coal mine	.939051546
16 oil/gas pr	.804796975
17 other mine	.983942681
18 constructi	.077539098
19 manufact	.652573501
20 trans/comm	.459547052
21 gs/elec ut	.061588956
22 wholesale	.522603095
23 retail	.110229703
24 f i r e	.123838993
25 other serv	.342069932
26 education	.013024308
27 health ser	.377237688
28 wat/sew/tr	.166299888
29 local govt	.000000000
30 households	.202011153
31 state govt	.000000000
32 fed govt	.000000000
33 rents	.000000000
34 impt wyom	.000000000
35 impt world	.000000000

## APPENDIX V. DIRECT INPUT COEFFICIENT MATRIX

	1	2	3	4
	cattle	sheep	oats	grass hay
1 cattle	.082712016	.000000000	.000000000	.000000000
2 sheep	.000000000	.076935713	.050280473	.000000000
3 oats	.000000000	.000000000	.000000000	.000000000
4 grass hay	.049295830	.052073996	.029862522	.000000000
5 baled alfa	.021852440	.003466016	.000000000	.000000000
6 grain crn	.000000000	.000000000	.000000000	.000000000
7 fd barley	.000000000	.000000000	.000000000	.000000000
8 mlt barley	.000000000	.000000000	.000000000	.000000000
9 all wheat	.000000000	.000000000	.000000000	.000000000
10 dry beans	.000000000	.000000000	.000000793	.000000000
11 potatoes	.000000000	.000000000	.000000000	.000000000
12 sugar beet	.000000000	.000000000	.000000000	.000000000
13 other agri	.000000000	.048697071	.053054488	.054685833
14 forestry	.000000000	.000000000	.000000000	.000000000
15 coal mine	.000000000	.000000000	.000000000	.000000000
16 oil/gas pr	.000000000	.000000000	.000000000	.000000000
17 other mine	.000000000	.000000000	.000000000	.000000000
18 constructi	.000000000	.021421311	.020234034	.000000000
19 manufact	.000000000	.004368386	.005580333	.008470208
20 trans/comm	.007879738	.030236935	.030161982	.010190045
21 gs/elec ut	.031519519	.006685028	.007627400	.010177734
22 wholesale	.117272221	.201853658	.255886928	.425667151
23 retail	.269360938	.023137967	.023380639	.008005700
24 f i r e	.194196801	.226207061	.239715515	.179257363
25 other serv	.028913732	.029295006	.036285346	.092869199
26 education	.000000000	.000000000	.000008918	.000000000
27 health ser	.000000000	.000000000	.000002378	.000000000
28 wat/sew/tr	.000000000	.000000000	.000000595	.000000000
29 local govt	.034910834	.028926058	.036845024	.070467495
30 households	.070282017	.226244959	.190678463	.140209272
31 state govt	.010185907	.000000000	.000000000	.000000000
32 fed govt	.045081414	.020450833	.020394169	.000000000
33 rents	.000000000	.000000000	.000000000	.000000000
34 impt wyom	.036536591	.000000000	.000000000	.000000000
35 impt world	.000000000	.000000000	.000000000	.000000000

	5	6	7	8
	baled alfa	grain crn	fd barley	mlt barley
1 cattle	.000000282	.000000000	.000000032	.018171161
2 sheep	.000000035	.000000000	.000000128	.001465416
3 oats	.000000000	.000000000	.000000000	.000000000
4 grass hay	.000000000	.000000000	.000000287	.004396249
5 baled alfa	.000000000	.000000000	.000000032	.000000000
6 grain crn	.000000000	.000000000	.000000000	.000000000
7 fd barley	.000000000	.000000000	.000000000	.006154748
8 mlt barley	.000000000	.000000000	.000000191	.004396249
9 all wheat	.000000000	.000000000	.000000191	.007620164
10 dry beans	.000000000	.000000000	.000000191	.004103165
11 potatoes	.000000000	.000000000	.000000191	.028429074
12 sugar beet	.000000000	.000000000	.000000191	.021395076
13 other agri	.202007829	.036390106	.004171804	.029015240
14 forestry	.000000000	.000000000	.000000000	.002051583
15 coal mine	.000000000	.000000176	.000000000	.024618992
16 oil/gas pr	.000000000	.000000000	.000001084	.032825322
17 other mine	.000000000	.000000000	.000000000	.046893318
18 constructi	.000000000	.000000000	.000000000	.020515826
19 manufact	.000000000	.009293768	.011156417	.016998828
20 trans/comm	.000000000	.009853534	.010483967	.057151231
21 gs/elec ut	.008923654	.010332126	.010029023	.036928488
22 wholesale	.277040887	.561375512	.524252414	.163247362
23 retail	.000000000	.000001880	.002070674	.009671747
24 f i r e	.194480202	.185283797	.180612382	.069167644
25 other serv	.070521528	.084379009	.093178845	.067995311
26 education	.000000000	.000000000	.000000000	.046600234
27 health ser	.000000000	.000000059	.000044171	.021395076
28 wat/sew/tr	.063626966	.002077468	.002079890	.036635404
29 local govt	.026417128	.026578088	.054813642	.031359906
30 households	.156981489	.074434126	.107104250	.094665885
31 state govt	.000000000	.000000000	.000000000	.042790152
32 fed govt	.000000000	.000000352	.000000000	.016119578
33 rents	.000000000	.000000000	.000000000	.035169988
34 impt wyom	.000000000	.000000000	.000000000	.000000000
35 impt world	.000000000	.000000000	.000000000	.002051583

## APPENDIX V. DIRECT INPUT COEFFICIENT MATRIX

	9	10	11	12
1 cattle	.00000000	.000013125	.000008382	.000000000
2 sheep	.000000000	.000004773	.000000000	.000000000
3 oats	.000000000	.000000000	.000000000	.000000000
4 grass hay	.000000000	.000000000	.000000000	.000000000
5 baled alfa	.000000000	.000000000	.000000000	.000000000
6 grain crn	.000000232	.000013721	.000000000	.000000000
7 fd barley	.000000000	.000000000	.000000000	.000000000
8 mlt barley	.000000000	.000000000	.000000000	.000000000
9 all wheat	.000000000	.000000000	.000000000	.000003583
10 dry beans	.000000000	.000024460	.000000000	.000000000
11 potatoes	.000000697	.000000000	.000000000	.000000000
12 sugar beet	.000000000	.000000000	.000000000	.000000000
13 other agri	.026328007	.220773456	.035012452	.073721393
14 forestry	.000000000	.000000000	.000000000	.000000000
15 coal mine	.000000000	.000000000	.000000000	.000000000
16 oil/gas pr	.000003436	.000000000	.000020954	.000000000
17 other mine	.000000000	.000000000	.000000000	.000003583
18 constructi	.000000000	.000002983	.000000000	.000000000
19 manufact	.015166532	.000000000	.008982749	.017242022
20 trans/comm	.017563799	.000000000	.009003703	.013931043
21 gs/elec ut	.015308760	.006051129	.009003703	.015330381
22 wholesale	.424273676	.334531468	.621028044	.289039594
23 retail	.000000000	.000000000	.000000000	.024932290
24 f i r e	.295805435	.125572719	.124905088	.226067237
25 other serv	.074568390	.081507992	.102024566	.066213118
26 education	.000000000	.000005369	.000000000	.000000000
27 health ser	.000000371	.000000000	.000000000	.000000000
28 wat/sew/tr	.003037829	.040321772	.000000000	.023952825
29 local govt	.046536567	.017139796	.011982586	.020146024
30 households	.081406268	.174025901	.078019010	.229412608
31 state govt	.000000000	.000008352	.000008763	.000000000
32 fed govt	.000000000	.000000000	.000000000	.000000000
33 rents	.000000000	.000002983	.000000000	.000004299
34 impt wyom	.000000000	.000000000	.000000000	.000000000
35 impt world	.000000000	.000000000	.000000000	.000000000

	13	14	15	16
1 cattle	.000000000	.000000113	.000337361	.000000004
2 sheep	.000000000	.000000000	.000000000	.000000000
3 oats	.000000000	.000000016	.000000003	.000000000
4 grass hay	.016790047	.000000210	.000000003	.000000000
5 baled alfa	.000566347	.000000000	.000000027	.000000000
6 grain crn	.000000000	.000000000	.000000005	.000000004
7 fd barley	.000000000	.000000145	.000000018	.000000000
8 mlt barley	.000000000	.000000113	.000000007	.000000000
9 all wheat	.000000000	.000000000	.000000004	.000000000
10 dry beans	.000000000	.000000081	.000000065	.000000000
11 potatoes	.000000000	.000000339	.000000006	.000000002
12 sugar beet	.000000000	.000000065	.000000012	.000000000
13 other agri	.059034816	.000000710	.000000029	.000000000
14 forestry	.000000000	.130520324	.000000045	.000000000
15 coal mine	.000000000	.000000178	.016173501	.000000000
16 oil/gas pr	.000000000	.000000694	.000000040	.078064794
17 other mine	.000000000	.000000307	.000000089	.000000000
18 constructi	.013078234	.058102108	.045716112	.019625385
19 manufact	.054650042	.001451071	.002691422	.006470670
20 trans/comm	.037635829	.018183437	.002847046	.003863995
21 gs/elec ut	.004648579	.019518665	.013122175	.031762503
22 wholesale	.206376567	.013180214	.033209296	.013127435
23 retail	.062487694	.016691960	.011473208	.005449556
24 f i r e	.076272208	.025596641	.019008961	.002256151
25 other serv	.009822984	.014085502	.016060449	.003058341
26 education	.000000000	.000000290	.000554519	.000001403
27 health ser	.000000000	.000504829	.000587862	.000007124
28 wat/sew/tr	.000000000	.000162575	.000169455	.000060924
29 local govt	.006450391	.003117226	.041468482	.031639905
30 households	.282663367	.305583916	.172461963	.081910038
31 state govt	.002281407	.010627861	.107325053	.023979587
32 fed govt	.012653878	.042615219	.099748798	.231576539
33 rents	.072811037	.146452596	.215772508	.380162118
34 impt wyom	.008646809	.000000000	.000000000	.000000000
35 impt world	.073129765	.193602596	.201271475	.086983526

## APPENDIX V. DIRECT INPUT COEFFICIENT MATRIX

	17	18	19	20
	other mine	constructi	manufact	trans/comm
1 cattle	.002655719	.000000000	.001502650	.002259979
2 sheep	.000000000	.000000000	.000000000	.000000000
3 oats	.000000000	.000000000	.000180618	.000414370
4 grass hay	.000000000	.000000000	.000000005	.000000000
5 baled alfa	.000000000	.000000000	.000000000	.000000000
6 grain crn	.000000001	.000000000	.000000000	.002180380
7 fd barley	.000000019	.000000000	.000000000	.011793429
8 mt barley	.000000000	.000000000	.000000000	.000000000
9 all wheat	.000000000	.000000000	.000064813	.002786296
10 dry beans	.000000000	.000000000	.000000000	.000000000
11 potatoes	.000000056	.000000000	.000354910	.000000000
12 sugar beet	.000000008	.000000000	.000805790	.000000000
13 other agri	.000000027	.000000000	.000000000	.000000000
14 forestry	.000000000	.000000000	.000003723	.000000000
15 coal mine	.000000016	.000000000	.002987766	.000000000
16 oil/gas pr	.001983364	.000000000	.411736483	.000000000
17 other mine	.002734571	.000050215	.008911192	.000000000
18 constructi	.048113688	.156861971	.004319541	.002404939
19 manufact	.013574975	.050154110	.001528481	.009879417
20 trans/comm	.019217195	.007075145	.019807765	.036364992
21 gs/elec ut	.078016927	.005217309	.024196209	.037821868
22 wholesale	.079763989	.083479007	.010609912	.116225845
23 retail	.001804547	.111982429	.006656432	.017202156
24 f i r e	.000393947	.022936210	.004177846	.049147780
25 other serv	.002597314	.016394347	.002303202	.015380577
26 education	.000219694	.000110286	.000018449	.001748045
27 health ser	.000391304	.000000000	.000089166	.000039824
28 wat/sew/tr	.000002079	.003747032	.000553664	.000771318
29 local govt	.021993298	.004325692	.003424164	.019315891
30 households	.186600853	.224617242	.109541237	.435990900
31 state govt	.022153901	.007297352	.003085472	.013527015
32 fed govt	.099828807	.046719250	.025572651	.020431769
33 rents	.181570144	.125857546	.051157600	.051636510
34 impt wyom	.000000000	.000000000	.000000000	.000000000
35 impt world	.236383557	.133174857	.306410258	.152676700
	21	22	23	24
	gs/elec ut	wholesale	retail	f i r e
1 cattle	.000000000	.002622179	.000007836	.000000005
2 sheep	.000000000	.000000000	.000000000	.000000000
3 oats	.000000000	.000000000	.000000000	.000000000
4 grass hay	.000000000	.000000000	.000000000	.000000000
5 baled alfa	.000000000	.000000000	.000000000	.000000000
6 grain crn	.000000000	.000077354	.000000000	.000000000
7 fd barley	.000000000	.000000000	.000000000	.000000000
8 mt barley	.000000000	.000000000	.000000000	.000000000
9 all wheat	.000000000	.000153274	.000000000	.000000000
10 dry beans	.000000000	.000000000	.000000000	.000000000
11 potatoes	.000000000	.000000000	.000000000	.000000000
12 sugar beet	.000000000	.000000000	.000000000	.000000000
13 other agri	.000000000	.000000000	.000000000	.000000000
14 forestry	.000000000	.000000000	.000000000	.000000000
15 coal mine	.074856155	.000000000	.000000000	.000000000
16 oil/gas pr	.139441942	.000000000	.000000000	.000000000
17 other mine	.000000000	.000000000	.000000000	.000000000
18 constructi	.009660066	.001437891	.002771892	.002572742
19 manufact	.000476553	.053302914	.005568640	.012954583
20 trans/comm	.003823340	.014050424	.009428909	.018949714
21 gs/elec ut	.116787548	.002305154	.006430500	.003206122
22 wholesale	.016054301	.012592766	.126354461	.005842724
23 retail	.005351804	.011997920	.004318986	.008115928
24 f i r e	.004343719	.014564310	.005643272	.014577558
25 other serv	.007599629	.009608626	.005338492	.025753792
26 education	.000030042	.000000000	.000025494	.000774196
27 health ser	.000157046	.000070807	.000006472	.000000000
28 wat/sew/tr	.000099862	.000296983	.000404763	.000451449
29 local govt	.045246113	.003714803	.001334229	.002200270
30 households	.176790442	.071959690	.108225047	.481423842
31 state govt	.013534479	.012055414	.002115017	.001342789
32 fed govt	.030131662	.018018033	.011421056	.034280303
33 rents	.135149875	.051109179	.032667056	.152701938
34 impt wyom	.000000000	.000000000	.000000000	.000000000
35 impt world	.220465422	.720062276	.677937879	.234852044

## APPENDIX V. DIRECT INPUT COEFFICIENT MATRIX

	25	26	27	28
	other serv	education	health ser	wat/sew/tr
1 cattle	.00000000	.00000000	.00000000	.00000000
2 sheep	.00000000	.00000000	.00000000	.00000000
3 oats	.00000000	.00000000	.00000000	.00000000
4 grass hay	.00000000	.00000000	.00000000	.00000000
5 baled alfa	.00000000	.00000000	.00000000	.00000000
6 grain crn	.00000000	.00000000	.00000000	.00000000
7 fd barley	.00000000	.00000000	.00000000	.00000000
8 mlt barley	.00000000	.00000000	.00000000	.00000000
9 all wheat	.00000000	.00000000	.00000000	.00000000
10 dry beans	.00000000	.00000000	.00000000	.00000000
11 potatoes	.00000000	.00000000	.00000000	.00000000
12 sugar beet	.00000000	.00000000	.00000000	.00000000
13 other agri	.00000000	.00000000	.00000000	.00000000
14 forestry	.00000000	.00000000	.00000000	.00000000
15 coal mine	.00000000	.00000000	.00000000	.00000000
16 oil/gas pr	.00000000	.00000000	.00000000	.00000000
17 other mine	.00000000	.00000000	.00000000	.00000000
18 constructi	.005178851	.040911596	.003058567	.335279476
19 manufact	.010507011	.001233073	.000705589	.060136320
20 trans/comm	.023522474	.012791357	.013489239	.020734064
21 gs/elec ut	.040672499	.028088126	.011190942	.024920904
22 wholesale	.042679038	.082422136	.126298142	.077544271
23 retail	.019453354	.017970457	.020022519	.076371436
24 fire	.017693272	.001262548	.045754405	.049729485
25 other serv	.032495856	.027279808	.031310099	.031476611
26 education	.000235397	.019260396	.002518191	.000000000
27 health ser	.000000000	.001793779	.044242551	.000000000
28 wat/sew/tr	.007682283	.000762672	.002048109	.000000000
29 local govt	.012715136	.000000000	.004537537	.000051510
30 households	.358522142	.600342714	.420695373	.306556287
31 state govt	.024880612	.033885984	.003575935	.000844165
32 fed govt	.036345489	.010739016	.029869403	.007934116
33 rents	.133732218	.000845404	.082966388	.006963385
34 impt wyom	.000000000	.000000000	.000000000	.000000000
35 impt world	.233684368	.120410934	.157717009	.001457971

	29	30	31	32
	local govt	households	st/fed gov	investment
1 cattle	.00000000	.003667866	.004275700	.000000000
2 sheep	.00000000	.000000000	.000000000	.000000000
3 oats	.00000000	.000000000	.000000000	.000000000
4 grass hay	.00000000	.000000000	.000000000	.000000000
5 baled alfa	.00000000	.000000000	.000000000	.000000000
6 grain crn	.00000000	.000000000	.000000000	.000000000
7 fd barley	.00000000	.000000000	.000000000	.000000000
8 mlt barley	.00000000	.000000000	.000000000	.000000000
9 all wheat	.00000000	.000000000	.000000000	.000000000
10 dry beans	.00000000	.000000000	.000000000	.000000000
11 potatoes	.00000000	.000000000	.000000000	.000000000
12 sugar beet	.00000000	.000000000	.000000000	.000000000
13 other agri	.00000000	.000000000	.000000000	.000000000
14 forestry	.00000000	.000000000	.000000000	.000000000
15 coal mine	.00000000	.000000000	.000000000	.000000000
16 oil/gas pr	.00000000	.000000000	.000000000	.000000000
17 other mine	.00000000	.000000000	.000000000	.000000000
18 constructi	.105603390	.003443145	.000053215	1.000000000
19 manufact	.004735291	.021368015	.002057234	.000000000
20 trans/comm	.011819188	.023600798	.032044926	.000000000
21 gs/elec ut	.012357321	.019666032	.000217036	.000000000
22 wholesale	.039928832	.006827463	.036049062	.000000000
23 retail	.022812863	.400574397	.003699977	.000000000
24 fire	.057174804	.066146233	.008124806	.000000000
25 other serv	.070001397	.040556786	.004429573	.000000000
26 education	.489724327	.005538928	.181040565	.000000000
27 health ser	.003427171	.040208906	.000366007	.000000000
28 wat/sew/tr	.000146808	.005294996	.000920184	.000000000
29 local govt	.000185993	.012401771	.009278778	.000000000
30 households	.117129406	.002906514	.405218464	.000000000
31 state govt	.002700350	.050806533	.047325852	.000000000
32 fed govt	.001752329	.160710678	.003538083	.000000000
33 rents	.018915849	.033217473	.028376132	.000000000
34 impt wyom	.038236744	.004802694	.000016680	.000000000
35 impt world	.003347934	.098740773	.237947777	.000000000

## APPENDIX V. DIRECT INPUT COEFFICIENT MATRIX

	33	34	35	36
	hous const	comm const	road const	coal const
1 cattle	.000000000	.000000000	.000000000	.000000000
2 sheep	.000000000	.000000000	.000000000	.000000000
3 oats	.000000000	.000000000	.000000000	.000000000
4 grass hay	.000000000	.000000000	.000000000	.000000000
5 baled alfa	.000000000	.000000000	.000000000	.000000000
6 grain crn	.000000000	.000000000	.000000000	.000000000
7 fd barley	.000000000	.000000000	.000000000	.000000000
8 mt barley	.000000000	.000000000	.000000000	.000000000
9 all wheat	.000000000	.000000000	.000000000	.000000000
10 dry beans	.000000000	.000000000	.000000000	.000000000
11 potatoes	.000000000	.000000000	.000000000	.000000000
12 sugar beet	.000000000	.000000000	.000000000	.000000000
13 other agri	.000000000	.000000000	.000000000	.000000000
14 forestry	.000000000	.000000000	.000000000	.000000000
15 coal mine	.000000000	.000000000	.000000000	.000000000
16 oil/gas pr	.000000000	.000000000	.000000000	.000000000
17 other mine	.000000000	.000000000	.000000000	.000000000
18 constructi	.000000000	.000000000	.000000000	.000000000
19 manufact	.000000000	.000000000	.000000000	.000000000
20 trans/comm	.000000000	.000000000	.000000000	.000000000
21 gs/elec ut	.000000000	.000000000	.000000000	.000000000
22 wholesale	.000000000	.000000000	.000000000	.000000000
23 retail	.000000000	.000000000	.000000000	.000000000
24 f i r e	.000000000	.000000000	.000000000	.000000000
25 other serv	.000000000	.000000000	.000000000	.000000000
26 education	.000000000	.000000000	.000000000	.000000000
27 health ser	.000000000	.000000000	.000000000	.000000000
28 wat/sew/tr	.000000000	.000000000	.000000000	.000000000
29 local govt	.000000000	.000000000	.000000000	.000000000
30 households	.000000000	.000000000	.000000000	.000000000
31 state govt	.000000000	.000000000	.000000000	.000000000
32 fed govt	.000000000	.000000000	.000000000	.000000000
33 rents	.000000000	.000000000	.000000000	.000000000
34 impt wyom	.000000000	.000000000	.000000000	.000000000
35 impt world	.000000000	.000000000	.000000000	.000000000

	37
	exports
1 cattle	.025201937
2 sheep	.002559546
3 oats	.000369094
4 grass hay	.003013332
5 baled alfa	.006368399
6 grain crn	.001238953
7 fd barley	.001758503
8 mt barley	.000000268
9 all wheat	.001545357
10 dry beans	.000139062
11 potatoes	.000178609
12 sugar beet	.000026900
13 other agri	.001712955
14 forestry	.004470168
15 coal mine	.096095188
16 oil/gas pr	.367484645
17 other mine	.073024937
18 constructi	.008871780
19 manufact	.071985854
20 trans/comm	.032849028
21 gs/elec ut	.003498661
22 wholesale	.119718914
23 retail	.029462679
24 f i r e	.009423696
25 other serv	.022844721
26 education	.000767327
27 health ser	.013401747
28 wat/sew/tr	.000946360
29 local govt	.000000000
30 households	.101041379
31 state govt	.000000000
32 fed govt	.000000000
33 rents	.000000000
34 impt wyom	.000000000
35 impt world	.000000000



## APPENDIX VI. TOTAL REQUIREMENTS MATRIX WITH HOUSEHOLDS ENDOGENOUS

	1	2	3	4
	cattle	sheep	oats	grass hay
1 cattle	1.09256424	.003640368	.003560275	.003542283
2 sheep	.000001186	1.083350231	.054473276	.000001506
3 oats	.000021038	.000038598	1.000038205	.000029292
4 grass hay	.053998412	.057606871	.033904329	1.001153352
5 baled alfa	.023879940	.003868592	.000301176	.000110208
6 grain crn	.000099851	.000180682	.000179556	.000138702
7 fd barley	.000438052	.000840272	.000818381	.000540288
8 mlt barley	.000000000	-.000000570	.000000285	-.000000142
9 all wheat	.000142811	.000252350	.000252778	.000208497
10 dry beans	.000000140	.000000281	.000000842	.000000000
11 potatoes	.000011146	.000017259	.000018458	.000020255
12 sugar beet	.000025161	.000040310	.000041232	.000045908
13 other agri	.008277765	.060267872	.061261435	.058227454
14 forestry	.000000787	-.000000787	.000000000	.000000000
15 coal mine	.004855912	.003118611	.003099487	.003266450
16 oil/gas pr	.023370085	.028134302	.028839504	.031627514
17 other mine	.000279869	.000429133	.000466449	.000522422
18 constructi	.017081208	.045688839	.043941580	.022539494
19 manufact	.031150066	.049778621	.051449946	.057055363
20 trans/comm	.037144554	.071225280	.069397812	.045805767
21 gs/elec ut	.062567616	.038990188	.038697439	.040661724
22 wholesale	.243776358	.330694316	.365716620	.503138903
23 retail	.464823423	.293248247	.275052838	.221535576
24 f i r e	.271329170	.324170846	.323806873	.240094222
25 other serv	.075318679	.086545504	.089018482	.139356587
26 education	.030169236	.029751210	.031931132	.045839879
27 health ser	.016594414	.025883646	.024033144	.020366007
28 wat/sew/tr	.004718279	.004843219	.004394052	.004182230
29 local govt	.055313995	.051723568	.056592295	.085705881
30 households	.387452489	.608494449	.563877464	.473434535
31 BUS. MULT.	2.905407061	3.202822308	3.125165343	2.999150158
	5	6	7	8
	baled alfa	grain crn	fd barley	mlt barley
1 cattle	.003522461	.003475847	.003523550	.023033640
2 sheep	.000001666	.000001421	.000001593	.001597226
3 oats	.000028282	.000028424	.000028588	.000048698
4 grass hay	.003783712	.000822828	.000250456	.006232026
5 baled alfa	1.000198754	.000098255	.000079418	.000528968
6 grain crn	.000124125	1.000139696	.000138522	.000223425
7 fd barley	.000506658	.000496141	1.000504761	.007267574
8 mlt barley	-.000000285	.000000000	-.000000712	1.004415700
9 all wheat	.000183788	.000216448	.000212840	.007959013
10 dry beans	.000000000	.000000140	.000000140	.004121308
11 potatoes	.000020495	.000021214	.000021214	.028575234
12 sugar beet	.000046962	.000048345	.000048016	.021536297
13 other agri	.214962212	.038762011	.004484949	.035514008
14 forestry	-.000000787	.000000787	.000000787	.002370068
15 coal mine	.003342209	.002931053	.003072273	.031463029
16 oil/gas pr	.032242517	.032250717	.032234317	.074001168
17 other mine	.000503764	.000522422	.000503764	.047755004
18 constructi	.044339820	.015397628	.019543633	.064423501
19 manufact	.058072152	.059971520	.059302990	.058013994
20 trans/comm	.042937534	.042063852	.042789205	.092062545
21 gs/elec ut	.041599077	.036134725	.038011739	.080859158
22 wholesale	.394490300	.623008971	.584083942	.292186312
23 retail	.257702062	.170360020	.187422510	.226984790
24 f i r e	.272619457	.235846586	.232681072	.145545111
25 other serv	.120049602	.122645851	.135268447	.118773420
26 education	.025135863	.022540460	.037068024	.077912277
27 health ser	.023277502	.015915401	.017752696	.042137813
28 wat/sew/tr	.068118939	.005546310	.005882837	.041645813
29 local govt	.043353353	.040244444	.068875422	.054361812
30 households	.547354756	.372374132	.411917733	.456988026
31 BUS. MULT.	3.198516951	2.841865649	2.885704726	3.048536958

## APPENDIX VI. TOTAL REQUIREMENTS MATRIX WITH HOUSEHOLDS ENDOGENOUS

	9	10	11	12
	all wheat	dry beans	potatoes	sugar beet
1 cattle	.003411980	.003614421	.003524725	.003627858
2 sheep	.000001829	.000006740	.000001614	.000001843
3 oats	.000033098	.000028089	.000027510	.000033173
4 grass hay	.000640246	.004123968	.000800748	.001497886
5 baled alfa	.000090509	.000212048	.000098150	.000123655
6 grain crn	.000152959	.000140103	.000139604	.000142666
7 fd barley	.000619816	.000494583	.000469666	.000614416
8 mt barley	-.000000430	-.000000051	-.000000087	.000000631
9 all wheat	1.000225834	.000189874	.000219044	.000210725
10 dry beans	-.000000140	1.000024409	.000000306	.000000126
11 potatoes	.000022772	.000021214	1.000021186	.000022483
12 sugar beet	.000049926	.000047291	.000049136	1.000052265
13 other agri	.028057706	.234934959	.037296447	.078481603
14 forestry	.000001573	-.000000393	.000000000	-.000001573
15 coal mine	.003595228	.003000192	.002758941	.003851925
16 oil/gas pr	.034423725	.031894015	.032299917	.036153931
17 other mine	.000522422	.000531751	.000559738	.000597054
18 constructi	.019719975	.033631674	.012062798	.025981109
19 manufact	.061911954	.058855277	.060814638	.064672679
20 trans/comm	.052558219	.041945986	.039838576	.052114419
21 gs/elec ut	.044791618	.037088239	.033832438	.048046957
22 wholesale	.490765064	.451646054	.679379736	.376619006
23 retail	.199207941	.247405154	.157829679	.281351712
24 f i r e	.352241708	.201728121	.172269669	.293343853
25 other serv	.119647606	.127529769	.136917782	.113919513
26 education	.033680426	.020197678	.014875819	.022132930
27 health ser	.019000714	.022352009	.014617640	.024540943
28 wat/sew/tr	.006929827	.044694421	.003381503	.028511768
29 local govt	.061508834	.033811343	.025336520	.036925100
30 households	.443563484	.526312402	.343054893	.578038222
31 BUS. MULT.	2.977374423	3.126461342	2.772478335	3.071608878
	13	14	15	16
	other agri	forestry	coal mine	oil/gas pr
1 cattle	.003231263	.002378278	.001826400	.000806492
2 sheep	.000002467	.000001195	.000000559	.000000424
3 oats	.000045062	.000021953	.000010354	.000007832
4 grass hay	.018024613	.000118734	.000090714	.000040196
5 baled alfa	.000673232	.000051971	.000039944	.000017618
6 grain crn	.000172346	.000097695	.000042182	.000029238
7 fd barley	.000809545	.000498775	.000198208	.000142822
8 mt barley	.000000213	.000000136	-.000000093	-.000000014
9 all wheat	.000242114	.000130294	.000059015	.000040345
10 dry beans	-.000000217	.000000105	.000000057	.000000014
11 potatoes	.000032776	.000009023	.000006690	.000005509
12 sugar beet	.000073852	.000019811	.000015085	.000012532
13 other agri	1.063957314	.000031742	.000020188	.000010660
14 forestry	.000000787	1.150113030	-.000000031	.000000056
15 coal mine	.002678033	.003561578	1.018688347	.003638400
16 oil/gas pr	.045747966	.017854540	.012722346	1.098758109
17 other mine	.000820949	.000219231	.000164423	.000140518
18 constructi	.028048234	.088214720	.066727065	.034147208
19 manufact	.091748189	.024452682	.018726374	.015550318
20 trans/comm	.068651202	.042279387	.016803847	.012109906
21 gs/elec ut	.031540310	.045828536	.028811222	.047197279
22 wholesale	.292643956	.071098460	.071542083	.036517576
23 retail	.288461692	.238713865	.142537105	.077973551
24 f i r e	.135517700	.074531516	.048642396	.019320473
25 other serv	.047645657	.047121504	.038659963	.016584190
26 education	.014216088	.010836362	.027065323	.020984993
27 health ser	.021921166	.022027584	.013214722	.006986120
28 wat/sew/tr	.003692839	.003828169	.002460004	.001288093
29 local govt	.021990948	.015523126	.049480858	.040062416
30 households	.517540430	.506848040	.293469182	.161150724
31 BUS. MULT.	2.700130724	2.366412041	1.852024530	1.593523597

## APPENDIX VI. TOTAL REQUIREMENTS MATRIX WITH HOUSEHOLDS ENDOGENOUS

	17	18	19	20
	other mine	constructi	manufact	trans/comm
1 cattle	.004661283	.002298663	.002848220	.005819499
2 sheep	.000001100	.000001461	.000010733	.000024422
3 oats	.000020393	.000026834	.000196904	.000448829
4 grass hay	.000231245	.000114725	.000148864	.000306680
5 baled alfa	.000101899	.000050276	.000062352	.000127417
6 grain crn	.000085529	.000075812	.000074803	.002338315
7 fd barley	.000411854	.000344920	.000385078	.012567715
8 mt barley	.000000004	-.000000066	.000000014	-.000000054
9 all wheat	.000118057	.000110688	.000163926	.003001202
10 dry beans	.000000007	-.000000008	.000000016	-.000000047
11 potatoes	.000011681	.000028878	.000360342	.000014222
12 sugar beet	.000026436	.000065617	.000818082	.000032340
13 other agri	.000047529	.000032809	.000120398	.000304885
14 forestry	.000000046	.000000361	.000004255	-.000000014
15 coal mine	.008006214	.002325153	.007283580	.005462059
16 oil/gas pr	.032525109	.040485480	.461787586	.028520038
17 other mine	1.003039833	.000792508	.009072429	.000361418
18 constructi	.068360245	1.196852261	.024039158	.017510771
19 manufact	.032807658	.081404490	1.015266072	.040089687
20 trans/comm	.034920108	.029244323	.032652473	1.065654142
21 gs/elec ut	.103912535	.027312237	.055203277	.070187995
22 wholesale	.121530381	.156033504	.046635242	.191349646
23 retail	.143624786	.306599698	.110908960	.288593001
24 f i r e	.032800856	.065081466	.028539943	.111658805
25 other serv	.025475889	.045873321	.020004843	.057780382
26 education	.019367114	.010442900	.014258531	.023923743
27 health ser	.013926533	.017374847	.010144365	.027356193
28 wat/sew/tr	.002355027	.007335554	.002244640	.005126890
29 local govt	.034454527	.015658374	.025601900	.036444785
30 households	.316595183	.410506556	.235434788	.644173325
31 BUS. MULT.	1.999419062	2.416473645	2.104271775	2.639178291
	21	22	23	24
	gs/elec ut	wholesale	retail	f i r e
1 cattle	.001666512	.003622792	.001162575	.002834095
2 sheep	.000000621	.000001075	.000000594	.000000527
3 oats	.000011493	.000019739	.000010933	.000025036
4 grass hay	.000082841	.000180000	.000057940	.000140457
5 baled alfa	.000036445	.000079195	.000025414	.000061532
6 grain crn	.000049087	.000126935	.000051200	.000099100
7 fd barley	.000239465	.000255577	.000216292	.000507758
8 mt barley	-.000000011	.000000015	.000000028	.000000000
9 all wheat	.000067228	.000222143	.000074510	.000131373
10 dry beans	-.000000019	.000000001	-.000000005	.000000000
11 potatoes	.000006042	.000021144	.000006563	.000012465
12 sugar beet	.000013673	.000048015	.000014894	.000027400
13 other agri	.000019471	.000045458	.000015900	.000033945
14 forestry	-.000000046	.000000202	.000000122	.000000000
15 coal mine	.087918339	.001038612	.001187238	.002183027
16 oil/gas pr	.182245900	.028318394	.010504022	.019450470
17 other mine	.000155947	.000534542	.000165605	.000373159
18 constructi	.036059531	.005752728	.006842176	.012667260
19 manufact	.016975015	.059590149	.018484069	.034147782
20 trans/comm	.020305177	.021670805	.018340282	.043041907
21 gs/elec ut	1.154822454	.011271408	.014866315	.027409493
22 wholesale	.062238672	1.030204100	.144925128	.060771218
23 retail	.156170850	.068883279	1.075409508	.266431955
24 f i r e	.039925452	.028089378	.022061840	1.066049534
25 other serv	.035632457	.018779208	.016421521	.060462499
26 education	.035952397	.004895785	.003977991	.011854021
27 health ser	.015047498	.005640895	.007025039	.026334587
28 wat/sew/tr	.002564954	.001283503	.001565409	.004549788
29 local govt	.067687678	.008152351	.005886984	.014658441
30 households	.344280384	.131121075	.165737907	.623774381
31 BUS. MULT.	2.260180102	1.429848503	1.515037994	2.278033211

## APPENDIX VI. TOTAL REQUIREMENTS MATRIX WITH HOUSEHOLDS ENDOGENOUS

	25	26	27	28
	other serv	education	health ser	wat/sew/tr
1 cattle	.002506333	.003843835	.003175696	.003303078
2 sheep	.000001340	.000001400	.000001197	.000002342
3 oats	.000024827	.000024866	.000022334	.000042091
4 grass hay	.000124934	.000191061	.000157970	.000165106
5 baled alfa	.000054785	.000084017	.000069389	.000072135
6 grain crn	.000107533	.000110128	.000104213	.000131723
7 fd barley	.000541311	.000528565	.000483460	.000634442
8 mt barley	-.000000047	-.000000012	-.000000004	-.000000195
9 all wheat	.000144736	.000151723	.000145591	.000185576
10 dry beans	-.000000001	-.000000025	-.000000094	.000000019
11 potatoes	.000011377	.000012399	.000010557	.000038945
12 sugar beet	.000025833	.000028173	.000023906	.000088490
13 other agri	.000033548	.000044119	.000037925	.000048869
14 forestry	.000000194	.000000442	.000000253	.000001035
15 coal mine	.005289818	.004874635	.002979466	.004925395
16 oil/gas pr	.024638615	.025095879	.019006372	.058162482
17 other mine	.000285274	.000313533	.000265096	.001009001
18 constructi	.020368478	.062218246	.015311855	.410973425
19 manufact	.032055013	.034963692	.029689694	.109792168
20 trans/comm	.045900212	.044818732	.040994369	.053794879
21 gs/elec ut	.068245578	.062675536	.037979947	.060358412
22 wholesale	.096249310	.160304547	.191767827	.186184702
23 retail	.236566731	.356947244	.279986913	.379047393
24 f i r e	.063673715	.069226386	.102055060	.114626501
25 other serv	1.064598595	.073563718	.070351812	.076980071
26 education	.016432576	1.033216089	.015577116	.012969389
27 health ser	.021835274	.035830870	1.072439869	.025915011
28 wat/sew/tr	.011266247	.006209485	.006360990	1.005823968
29 local govt	.026162368	.017572432	.018317472	.018371807
30 households	.515381187	.803315562	.618619854	.612835844
31 BUS. MULT.	2.252525694	2.796167279	2.525936104	3.136484105
	29	30	TOTALS	
	local govt	households		
1 cattle	.003363473	.005249309	1.205640627	
2 sheep	.000001603	.000001290	1.139494480	
3 oats	.000028434	.000023984	1.001394892	
4 grass hay	.000167427	.000260463	1.185418803	
5 baled alfa	.000073598	.000114753	1.031385643	
6 grain crn	.000121755	.000097920	1.005715408	
7 fd barley	.000589969	.000490716	1.033457081	
8 mt barley	-.000000013	.000000080	1.004414319	
9 all wheat	.000167421	.000132635	1.015562578	
10 dry beans	-.000000146	-.000000058	1.004147153	
11 potatoes	.000015220	.000013197	1.029409964	
12 sugar beet	.000034415	.000030140	1.023429541	
13 other agri	.000042543	.000053828	1.925429551	
14 forestry	.000000056	-.000000129	1.152491080	
15 coal mine	.004759424	.003121835	1.238276464	
16 oil/gas pr	.028286865	.022656452	2.574238335	
17 other mine	.000375656	.000353842	1.071636758	
18 constructi	.162117144	.015455538	2.636017300	
19 manufact	.042707716	.037345606	2.406845574	
20 trans/comm	.050027051	.041610352	2.312702903	
21 gs/elec ut	.060855583	.039546778	2.489305810	
22 wholesale	.164503708	.093073092	8.513076731	
23 retail	.331096302	.494267230	8.225144014	
24 f i r e	.121184388	.094247008	5.302909106	
25 other serv	.128758350	.062229927	3.291915151	
26 education	.512217257	.017621916	2.197044526	
27 health ser	.032991459	.050773105	1.693257067	
28 wat/sew/tr	.006088001	.007368672	1.304266025	
29 local govt	1.017497262	.021050656	2.068326950	
30 households	.673819930	1.203710527	14.491177467	
31 BUS. MULT.	3.341891848	2.210900664	.000000000	