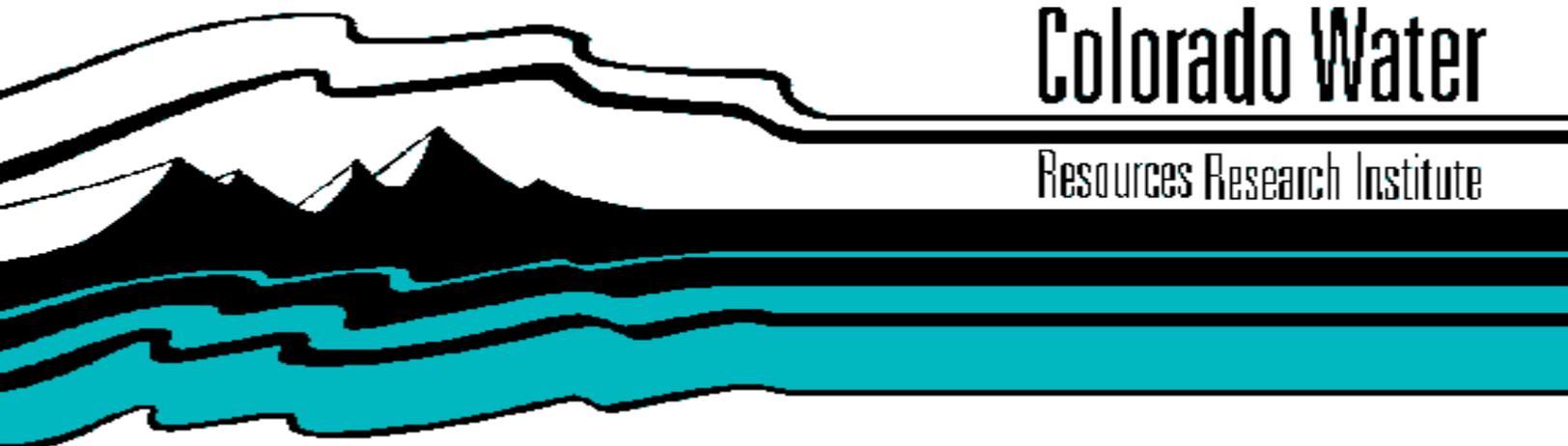


**THE ECONOMIC ROLE OF WATER IN COLORADO: AN  
INPUT-OUTPUT ANALYSIS**

by

**S. Lee Gray, John R. McKean, and Thomas A. Miller**



**Colorado Water**

Resources Research Institute

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**Colorado  
State  
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## INTRODUCTION

Continuing concern has been expressed by state and regional planning bodies, researchers, and the public over the adequacy of available water supplies to sustain Colorado's growth of population and economic activity. Policy makers require information relating Colorado's economy and water use as input to the decision making process. It is the relationship between economic activity by sector and the direct and indirect water requirements that constitutes the focus of this research.

Measurement of the direct and indirect water requirements by sector for Colorado requires measurement of the direct and indirect economic activity created as a given sector expands output. Thus an economic input-output (I/O) model is needed in order to address the indirect effects of sector expansion (or contraction) on water withdrawn and consumed. Current water withdrawn and water consumed by economic sector must be estimated in order to calibrate the input-output model for water.

The report includes a descriptive analysis of the current interdependence among producing sectors of the Colorado economy as well as sector-by-sector water use, income, and employment.

### Resource Requirement Analysis with the I/O Technique

The I/O modeling technique traces spending flows within the Colorado economy, in order to measure the direct, indirect, and induced effects on income and wealth in the state created by

changes in sales to final demand. The I/O technique also measures changes in resource input requirements (such as water) created by changes in sales to final demand. The method assumes that growth or decline of the economy is due to changes in sales to final demand and growth created by increased productivity is ignored. Examples of final demand change include: growth or decline of exports of goods and services by firms in the region; spending in Colorado by tourists, or other non-resident travelers; retirement income or other receipts<sup>1</sup> from outside the state by residents of Colorado; new investment and sales made to the federal government or other buyers located outside Colorado. The relative importance of each industry in terms of total sales and in terms of final demand sales as a driving force for the Colorado economy is shown in table 5.

Finance/insurance/real estate (F/I/R/E), non residential construction, machinery and equipment manufacturing, services, retail, transport, health services, food manufacturing, other manufacturing, and restaurants were the ten largest industries in terms of volume of sales in 1982. If the various farm and ranching sectors are grouped as agricultural production they would rank 7th in sales. If food manufacturing, which is ranked 8th, and livestock processing (12th) is combined with agricultural production then the agriproducing/processing sector ranks 2nd in sales. Thus, agricultural sales volume ranks among

---

<sup>1</sup> For example, in some Colorado counties, federal government payments as a percent of farm income rises above 100%. (Miller, Gray and Trock)

the largest for the Colorado economy. Agriculture is also noted for its relatively high water input requirements.<sup>2</sup> The Census of Agriculture shows agriculture accounting for 68.1 percent of water withdrawals in Colorado for 1969 and 71.1 percent of withdrawals for 1978. The Colorado Water Policy Plan (1982) shows agriculture accounting for 78.3 percent of consumptive use of water for 1982. Our estimates of current withdrawal and consumptive use of water by Colorado agricultural sectors are

TABLE 1 ESTIMATED COLORADO AGRICULTURAL WATER REQUIREMENTS

Industry	IMPLAN I/O Sales	Colorado Ag. Statistics		Estimated Water Requirements			
		Val.Prod		Acre-feet water		Gallons/\$sales	
No. Category	(Mil.\$)	Items included	(Mil.\$)	WTHDRWN	CU	WTHDRWN	CU
1 Dairy	146.55	Dairy products	138.70	2,711	2,711	6.0	6.0
2 Poultry	73.78	Turkey, chic., eggs	69.10	1,286	1,286	5.7	5.7
3 Ranching	439.00	Beef cow-calf	454.50	18,146	18,146	13.5	13.5
4 Feedlots	1,323.85	Cattle on feed	1,224.00	10,182	10,182	2.5	2.5
5 Sheep	60.17	All sheep & wool	52.40	1,330	1,330	7.2	7.2
6 Hogs	66.44	Hogs	62.30	586	586	2.9	2.9
7 Other LS	119.03	Horses, bees, goats, rabbits, etc.	13.00	2,299	2,299	6.3	6.3
8 Food grain	312.75	Wheat	294.61	158,877	102,435	165.5	106.7
9 Feed grain	476.04	Cn, GS, Barley, Oats	439.75	2,148,421	1,441,117	1,470.6	986.4
10 Hay/past.	276.00	All Hay, Pasture	235.24	3,380,048	2,024,343	3,990.6	2,390.0
11 Vegetables	130.85	Vegetables, Potato	104.44	206,106	127,960	513.3	318.7
12 Sugarbeets	36.00	Sugarbeets	32.20	79,518	54,811	719.7	496.1
13 Other crop	57.09	Beans, Seed crops, orchards, Nurseries	75.58	241,763	143,819	1,379.9	820.9
Total LS	2,228.82	Total Livestock	2,014.00	36,540	36,540	5.3	5.3
Total crop	1,288.73	Total Crops	1,181.81	6,214,734	3,894,485	1,571.4	984.7
Total Agr.	3,517.55	Total Agriculture	3,195.81	6,251,274	3,931,024	579.1	364.2

<sup>2</sup> Complete detailed industry dollar transactions-among-sectors and percentage distributions of sales and purchases for the Colorado economy are shown in appendices I, III and III.

shown in table 1. Our estimate of total withdrawals by agriculture of 6,251,274 acre feet lie between the 1969 and 1978 Census of Agriculture figures of 6,689,752 acre feet and 5,589,914 acre feet. Our estimate of total consumptive use by agriculture is 3,931,024 acre feet which is 95.3 percent of the figure used in the Colorado Water Policy Plan (1982) of 4,125,000 acre feet for 1982.

Our estimates of water withdrawn and consumed in Colorado by all industries and agencies in Colorado is shown in table 2. In addition to agriculture, other major water using sectors in Colorado include: households, electric power generation, other mining, other construction, refining, oil/gas extraction, other manufacturing, health services, lodging, finance/insurance/real estate and food manufacturing.

TABLE 2 ESTIMATED WATER WITHDRAWAL AND CONSUMPTION  
BY SECTOR (million gallons)

	WITHDRAWAL	CONSUMED
1 DAIRY	879.3	879.3
2 POULTRY	420.5	420.5
3 RANCHING	5,919.6	5,919.6
4 FEEDLOTS	3,309.6	3,309.6
5 SHEEP/GOAT	433.1	433.1
6 HOGS/PIGS	192.6	192.6
7 LVSTK NEC	749.8	749.8
8 FOOD GRAIN	51,759.8	33,370.2
9 FEED GRAIN	700,070.5	469,570.0
10 HAY/PAST.	1,101,404.0	659,639.3
11 VEGETABLES	67,164.0	41,701.0
12 SUGARBETS	25,932.1	17,875.4
13 CROPS NEC	78,773.3	46,862.0
14 AG SERVICE	9.5	9.5
15 COAL MINES	7,964.9	822.1
16 OIL/GAS EX	18,731.0	18,731.0
17 MINING NEC	38,162.3	19,081.1
18 RES CONSTR	9,613.1	961.3
19 CONSTR NEC	29,649.0	2,964.9
20 LS PRD MFG	33.2	0.0
21 FOOD MFG	11,340.8	1,072.7
22 AG INPUTS	8.3	0.0
23 WOOD/PAPER	86.2	8.6
24 PRINT/PUBL	80.8	0.0
25 REFINING	20,846.9	5,425.9
26 MACH/EQUIP	535.4	0.0
27 MANUPR NEC	17,946.4	1,794.6
28 TRANSPORT	232.3	0.0
29 COMMUNICAT	149.6	0.0
30 ELECT GENR	44,914.7	13,916.7
31 UTILITIES	24.0	0.0
32 WHOLESALE	404.9	0.0
33 RETAIL	710.9	0.0
34 F/I/R/E	12,853.2	0.0
35 LODGING	14,652.2	1,439.0
36 SERVICES	529.5	0.0
37 FOOD/DRINK	5,708.7	0.0
38 AUTO SERV	116.3	93.0
39 AMUSEMENTS	2,805.7	300.6
40 HEALTH SER	16,462.0	4,196.2
41 SCHOOLS	234.8	62.6
42 COLLEGES	415.9	166.3
43 ASSOC NEC	104.2	0.0
44 PRD GOVT	59.5	0.0
45 ST/LOC GOV	1,273.8	0.0
46 HOUSEHOLDS	263,127.2	62,398.7
TOTALS	2,556,799.0	1,414,369.0

Employment impacts are another important application of the I/O technique. Employment opportunities are of particular concern in Colorado in the late 1970's and 1980's with concurrent declines of the energy, mining, and agriculture sectors which are very important to Colorado's economy. The unemployment rate for Colorado increased rapidly, from 5.6% to 7.1%, between 1984 and 1986. Four agricultural counties in the eastern Colorado high plains: Sedgewick, Prowers, Washington and Logan counties had unemployment rates exceeding 7% in 1986. The unemployment rate in the energy and mining counties included: Mesa county over 11% in 1986, Garfield county 9.22%, Moffat 12.19%, Rio Blanco 7.69%, and Rout 8.10%. In south west Colorado, La Plata and Montezuma counties had unemployment rates of 8.43% and 12.87% respectively. The highest unemployment rates in Colorado in 1986 were found in Costilla 22.68%, Conejos 19.86%, San Juan 18.77%, Saguache 17.56%, Lake 17.29%, and Huerfano 14.72%. Twenty of the 63 Colorado counties had unemployment rates over 10% in 1986. Only Summit county had an unemployment rate below 4%. Chronic unemployment and underemployment plague many areas of Colorado.

TABLE 3 COLORADO EMPLOYMENT BY INDUSTRY

	<u>Employment<sup>1</sup></u>	<u>Percent of Total</u>	
1	DAIRY	2,101.9	0.19
2	POULTRY	782.4	0.05
3	RANCHING	4,189.5	0.29
4	FEEDLOTS	12,675.6	0.86
5	SHREP/GOAT	577.5	0.04
6	HOGS/PIGS	642.7	0.04
7	LVSTK NEC	1,323.8	0.09
8	FOOD GRAIN	8,390.8	0.57
9	FEED GRAIN	5,180.4	0.35
10	HAY/PAST.	2,690.2	0.18
11	VEGETABLES	3,596.9	0.25
12	SUGARBETS	1,021.7	0.07
13	CROPS NEC	3,937.8	0.27
14	AG SERVICE	9,997.6	0.68
			3.2% by ag. producers
15	COAL MINES	4,534.0	0.31
16	OIL/GAS EX	3,885.9	0.27
17	MINING NEC	5,491.0	0.38
18	RES CONSTR	23,400.5	1.60
19	CONSTR NEC	88,873.3	6.08
20	LS PRD MFG	6,748.0	0.46
21	FOOD MFG	21,907.7	1.49
22	AG INPUTS	1,601.6	0.11
23	WOOD/PAPER	8,892.1	0.61
24	PRINT/PUBL	17,351.1	1.19
25	REFINING	4,334.3	0.30
26	MACH/EQUIP	96,104.5	6.57
27	MANUFR NEC	54,206.3	3.71
28	TRANSPORT	41,597.5	2.85
29	COMMUNICAT	27,408.5	1.87
30	ELECT GENR	5,906.2	0.40
31	UTILITIES	4,688.0	0.32
32	WHOLESALE	80,680.3	5.52
33	RETAIL	140,709.7	9.63
34	F/I/R/E	95,032.0	6.50
35	LODGING	28,269.6	1.93
36	SERVICES	115,232.8	7.88
37	FOOD/DRINK	106,007.4	7.25
38	AUTO SERV	13,016.3	0.89
39	AMUSEMENTS	17,849.1	1.22
40	HEALTH SER	76,275.2	5.21
41	SCHOOLS	17,622.7	1.21
42	COLLEGES	9,911.5	0.68
43	ASSOC NEC	21,679.0	1.48
44	FED GOVT	11,976.2	0.82
45	ST/LOC GOV	253,617.5	17.35
	TOTAL	1,461,921.0	100.00

SOURCE: IMPLAN, Forest Service, USDA.

1/ Full time equivalent workers.

Table 3 shows employment indicated by IMPLAN (Alward and Palmer, 1981) for 1982 disaggregated to the industries and agencies described by our IMPLAN-based I/O model for Colorado. The ten largest employers in the state include: state and local government, retail, services, food/drink, manufacturing of machinery and equipment, F/I/R/E, non-residential construction, wholesale, health services, and other manufacturing. If farms, ranches, and food processors are aggregated to a single sector then agriproducing/processing ranks 9th with 77,368 employment in 1982.

Net value created by industry is a useful indicator of the standard of living that is created in Colorado. Table 4 shows payroll (wages and salaries) and value added for Colorado industries. The top ten sources of payroll are: state and local government, non-residential construction, machinery and equipment manufacturing, services, retail, F/I/R/E, health services, transport, other manufacturing, and food/drink. If return to entrepreneurs and capital is included with payroll to measure value added, then the top ten industries are: F/I/R/E, state and local government, services, machinery and equipment manufacturing, non-residential construction, retail, health services, transport, communication, and oil/gas exploration.

The major "basic" industries in Colorado are those which create sales to final demand and thus create business for local supply sectors. Table 5 shows the percent of total sales sold to

\*final demand for industries in Colorado. The larger the proportion of a sector's output that is sold to final demand the more "basic" that sector is said to be. Conversely, a sector which sells mainly to local producers and consumers is termed a "service" industry whose sales can only exist if the "basic" industries create sales to final demand. The industries with the strongest final demand market orientation include: residential construction, food grain farms, coal mines, non-residential construction, agricultural inputs, machinery and equipment manufacturing, mining, other manufacturing, food manufacturing, oil/gas exploration, and universities. Some of these basic industries are quite small and although they are strongly basic they are not all important sources of stimulus to the Colorado economy.

Basic sectors can also be defined in terms of their total sales to final demand. Using this criterion; non-residential construction, machinery and equipment manufacturing, finance\insurance\real estate, residential construction, other manufacturing, food manufacturing, transportation, services, oil/gas exploration, and retail are the top ten basic industries in Colorado. The rankings of sectors, of course, depend upon the somewhat arbitrary definitions of the industries. For example, if all agricultural producers are combined, then farming and ranching ranks 9th in sales to final demand and if livestock processing and food manufacturing is included then agri producing/processing ranks 5th in sales to final demand. Other

TABLE 4 COLORADO PAYROLL AND VALUE ADDED

	<u>Payroll</u>	<u>Value Added</u> <sup>1</sup>
	( <u>\$</u> )	( <u>\$</u> )
1 DAIRY	8,896,900.	35,150,100.
2 POULTRY	4,129,100.	6,957,901.
3 RANCHING	26,263,000.	49,071,500.
4 FEEDLOTS	79,332,700.	148,229,000.
5 SHEEP/GOAT	3,602,400.	6,731,700.
6 HOGS/PIGS	3,983,100.	7,442,300.
7 LVSTK NEC	7,813,300.	14,343,700.
8 FOOD GRAIN	17,726,600.	126,102,600.
9 FEED GRAIN	17,882,900.	185,628,600.
10 HAY/PAST.	9,371,398.	97,278,000.
11 VEGETABLES	17,997,400.	86,174,900.
12 SUGARBETS	3,765,000.	19,606,600.
13 CROPS NEC	18,104,500.	29,196,200.
14 AG SERVICE	98,361,900.	147,761,600.
15 COAL MINES	169,743,600.	268,236,800.
16 OIL/GAS EX	174,531,600.	1,539,755,000.
17 MINING NEC	149,656,900.	183,575,000.
18 RES CONSTR	616,210,500.	745,787,600.
19 CONSTR NEC	2,485,395,000.	2,989,743,000.
20 LS PRD MFG	186,605,300.	243,052,400.
21 FOOD MFG	448,940,900.	1,017,793,000.
22 AG INPUTS	35,504,600.	73,240,800.
23 WOOD/PAPER	112,706,600.	145,513,900.
24 PRINT/PUBL	342,222,100.	462,974,300.
25 REFINING	124,452,200.	239,800,600.
26 MACH/EQUIP	2,484,431,000.	3,060,699,000.
27 MANUFR NEC	931,803,000.	1,199,560,000.
28 TRANSPORT	1,208,527,000.	1,822,818,000.
29 COMMUNICAT	774,072,100.	1,587,438,000.
30 ELECT GENR	156,408,200.	593,461,200.
31 UTILITIES	100,305,000.	299,250,500.
32 WHOLESALE	209,326,700.	338,306,500.
33 RETAIL	1,836,638,000.	2,864,343,000.
34 F/I/R/E	1,808,829,000.	9,438,804,000.
35 LODGING	188,770,000.	280,869,600.
36 SERVICES	2,213,411,000.	3,717,388,000.
37 FOOD/DRINK	828,189,600.	1,161,371,000.
38 AUTO SERV	291,667,900.	537,095,100.
39 AMUSEMENTS	165,725,900.	273,184,700.
40 HEALTH SER	1,453,452,000.	1,851,179,000.
41 SCHOOLS	72,211,500.	72,197,200.
42 COLLEGES	247,516,600.	252,300,100.
43 ASSOC NEC	288,189,900.	292,280,300.
44 FED GOVT	313,641,400.	302,957,100.
45 ST/LOC GOV	4,873,723,000.	4,933,669,000.

1/ The sum of payroll, profits and property income.

"sectors" not delineated here have been shown to have important export sales; two examples are the non-resident spending on hunting and fishing in Colorado (McKean and Nobe, 1983 and 1984) and exports by the ski industry. These "sectors" are hidden in the data presented here. For example, both hunting and fishing and skiing spending are included in such sectors as; retail, services, lodging, food/drink, transport, auto services, amusements, health services and manufacturing.

In this study, the accounting focus is on state rather than either local or national impacts. The presence of adequate amounts of the water resource in Colorado has allowed economic growth to develop along different patterns than if water were less available. An I/O model for Colorado is used to estimate the indirect and induced input requirements of water throughout the state economy as any given sector expands sales to final demand. Thus the total water multiplier effect for an industry is estimated as the sum of the direct, indirect, and induced water requirements as a given industry expands sales to final demand or output. A multiplier based upon final demand presumes that final demand is exogenously determined whereas a multiplier based upon output assumes that output is exogenously determined. An example of the former would be federal programs creating spending in Colorado but determined outside Colorado or exports to consumers and business outside Colorado. An example of exogenous changes in output driving the economy might be a decision at the national level to create farm land set asides or

TABLE 5 FINAL DEMAND SALES AND TOTAL SALES BY SECTOR <sup>1</sup>

	<u>Sales to Final Demand</u> <sup>2</sup>	<u>Total Sales</u>	<u>(Final Demand Sales/Total Sales) x 100</u>
	( <u>\$</u> )	( <u>\$</u> )	( <u>percent</u> )
1 DAIRY	22,480,500.	146,551,400.	15.34
2 POULTRY	8,049,600.	73,778,700.	10.91
3 RANCHING	6,049,300.	438,495,900.	1.38
4 FEEDLOTS	745,148,700.	1,323,852,000.	5.63
5 SHEEP/GOAT	34,345,500.	60,166,300.	57.08
6 HOGS/PIGS	11,786,800.	66,441,400.	17.74
7 LVSTK NEC	34,104,400.	119,030,400.	28.65
8 FOOD GRAIN	292,687,119.	312,748,619.	93.59
9 FED GRAIN	234,571,654.	476,044,154.	49.28
10 HAY/PAST.	175,913,900.	275,999,700.	63.74
11 VEGETABLES	74,493,064.	130,847,464.	56.93
12 SUGARBEETS	15,710,600.	36,031,900.	43.60
13 CROPS NEC	17,898,639.	57,086,239.	31.35
14 AG SERVICE	150,001,500.	238,076,900.	63.01
15 COAL MINES	454,624,191.	513,869,891.	88.47
16 OIL/GAS EX	1,665,895,600.	2,464,615,200.	67.59
17 MINING NEC	283,919,490.	353,355,390.	80.35
18 RES CONSTR	2,403,281,800.	2,403,281,800.	100.00
19 CONSTR NEC	6,416,951,200.	7,412,272,300.	86.57
20 LS PRD MFG	877,633,300.	1,845,799,400.	47.55
21 FOOD MFG	2,229,214,276.	3,065,090,976.	72.73
22 AG INPUTS	167,210,100.	208,870,900.	86.05
23 WOOD/PAPER	132,864,100.	431,259,100.	30.81
24 PRINT/PUBL	338,220,683.	1,010,662,683.	33.47
25 REFINING	195,311,500.	1,427,874,400.	13.68
26 MACH/EQUIP	5,568,791,549.	6,693,597,649.	83.20
27 MANUFR NEC	2,319,531,492.	2,991,078,192.	77.55
28 TRANSPORT	2,000,936,800.	3,872,711,200.	51.67
29 COMMUNICAT	1,096,518,189.	1,870,222,389.	58.63
30 ELECT GENR	690,075,200.	1,176,393,700.	58.66
31 UTILITIES	329,310,800.	1,204,852,300.	27.33
32 WHOLESALE	307,464,135.	506,246,935.	60.73
33 RETAIL	1,161,853,500.	3,949,866,200.	29.42
34 F/I/R/E	4,852,282,473.	12,853,208,073.	37.75
35 LODGING	312,331,400.	654,117,600.	47.75
36 SERVICES	1,761,525,384.	5,295,191,184.	33.27
37 FOOD/DRINK	756,635,200.	2,854,365,200.	26.50
38 AUTO SERV	290,811,300.	1,163,558,500.	24.99
39 AMUSEMENTS	139,098,000.	501,032,700.	27.76
40 HEALTH SER	749,593,400.	3,227,850,800.	23.22
41 SCHOOLS	72,551,600.	156,543,100.	46.35
42 COLLEGES	270,676,300.	415,993,800.	65.07
43 ASSOC NEC	188,695,800.	579,336,700.	32.57

1/ Excludes sales by government agencies of Colorado or agencies located in Colorado.

2/ Final Demand excludes Colorado households.

by the U.S. Forest Service to restrict logging activity on public lands or a shortage of water available for irrigation.

#### The IMPLAN Input-Output Data

In the past, data necessary to construct regional I/O tables were expensive to procure. Affordable data to implement the I/O model are now available from the Rocky Mountain Forest and Range Experiment Station, Forest Service, USDA located in Fort Collins, Colorado. These county-level data are estimated or "synthesized" from the national I/O model rather than based upon personal interview survey as in the conventional I/O study.

The 1977 Bureau of Economic Analysis I/O data for the United States have been updated to 1982 by Engineering-Economics Associates under contract to the Forest Service for the IMPLAN system (Alward and Palmer, 1981). IMPLAN I/O data are available only to government agencies and universities through the USDA IMPLAN computerized data retrieval and I/O model synthesizer program. The USDA IMPLAN computer system can be operated via a series of user job submissions to create data sets corresponding to any county or combination of counties (within a state) in the United States.<sup>3</sup>

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<sup>3</sup> In order to access IMPLAN, a user account must be set up on the U.S.D.A. Univac computer located at the Craddock Building in Fort Collins. The Implan system was used in combination with the IMS I/O Analysis computer program (1988) to generate, retrieve, store and analyze the Colorado I/O data. The data for each county consist of a 528 x 528 matrix containing as many as 278,784 observations on transactions among industries. Four

ANALYSIS OF THE ECONOMY OF COLORADOIntroduction

An economic description of the state economy is included in this report. This description of the economy hinges on two major components of the interindustry model. These components are: the transactions-among-sectors table showing spending flows among industries and agencies in Colorado; and the total requirements multipliers which measure the cumulative spending and employment and water use impacts of changes in sales to final demands or output.<sup>4</sup> These tables are discussed and interpreted in turn. Because of the size of the transactions-among-sectors table, it is presented in appendix I.

Total requirements multipliers pertain to both economic and resource inputs. Multipliers calculated for Colorado show the impacts of new final demand sales on: water withdrawal, water consumptive use, industry sales, employment, payroll and Colorado's balance of trade with the rest of the world.<sup>5</sup> Generalized growth multipliers (Gray, McKean, Sparling, 1979) are

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additional matrices are retrieved containing imports, exports and employment by the 528 industries.

<sup>4</sup> Processing of the input-output data was accomplished on program IMS. (McKean and Johnston, 1988)

<sup>5</sup> Trade balance multipliers show the change in wealth in Colorado per dollar of exports of a given industry. Trade balance multipliers are found by subtracting the multipliers in the import row of the inverse from one.

also presented for industry sales<sup>6</sup>, withdrawal and consumptive use of water, and for employment.

### The Transactions-Among-Sectors Table

The first essential component of any I/O study is the tabulation of data which describe the dollar flows of commodities and merchandise from each supplying sector to each purchasing sector. These flows are typically measured over a one year time period (1982). The information is arrayed with the selling sectors listed at the left of the table and the purchasing sectors listed across the top. The information in this table, termed the transactions-among-sectors table does two things simultaneously: it identifies the estimated dollar value of sales by sector to each of the other sectors, or it identifies the purchases of inputs for processing by each sector from each of the other sectors, and it shows sales for final consumption.

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. Figure 1 shows the quadrants of a transactions-among-sectors table. The Major portion of the table is in quadrant 1 where all the intermediate processing sales (purchases) are displayed. Intermediate processing includes all

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<sup>6</sup> See the final column (row sums) of the interdependency matrix in appendix VI. The row sums show the cumulative impact on industry sales for the industry at the row head if all sectors expand sales to final demand by one dollar.

producers, handlers, dealers and merchandisers who create products and services. When the production process is completed, these products and services are sold to sectors listed in quadrant 2 of

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

\ PURCHASING INDUSTRIES S E L L I N G  I N D U S T R I E S	QUADRANT 1 INTERMEDIATE PROCESSING {sales among local firms and agencies excluding final consumption}	F Q I U N A A D L R A D N E T M A 2 N D S {sales for final consumption}
	QUADRANT 3 FINAL PAYMENTS {imports, saving and other leakages}	QUADRANT 4

the table. Quadrant 2 shows the purchases for final use by state and federal government, capital formation, or exports. Goods and services sold for final use are those which will not receive any further processing within Colorado. Thus goods sold for final use are either consumed locally or shipped out of the state.

Quadrant 3 shows sectors which supply inputs in Colorado but do not make purchases in the state. Purchases from these sectors are termed "leakages" since the money is not returned to the Colorado economy. Imports are the primary outlays in Quadrant 4 but profits, interest, savings and taxes are other forms of leakages also included in this quadrant.<sup>7</sup>

#### Colorado Transactions-Among-Sectors

The transactions-among-sectors table for the state of Colorado is found in appendix I. A detailed description of the industry and agency sectors in the I/O model is shown in appendix VI.

The rows and columns of the transactions-among-sectors which are numbered 1-46 identify the intermediate processing sectors (sector 46, households may be excluded in some analyses). This quadrant of the transactions-among-sectors table shows purchases and sales by the local producers, services, and merchandisers in Colorado.

Final demands, i.e. the demands for goods and services that will not be further processed in Colorado are identified in columns 47-55.

Rows 47-51 contain the final payments sectors. These payments are for inputs not provided by local suppliers (imports), or for profits, savings and taxes. All final payments

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<sup>7</sup> See Appendix V for a more complete description of the I/O technique and a mathematical formulation of the model.

are leakages from local spending. Thus the entries in rows 1-46 are receipts to the sectors listed at the left of the table who are located in Colorado. Entries in rows 47-51 are receipts of firms located outside the state, government receipts, or withdrawals from the spending stream in the form of savings.

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 I). 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, dairy. Dairy sells \$9,600 of output within the sector, \$27,900 to poultry, \$3,201,300 to ranches, and so on across the row. At the right of the table, dairy sales to final demand sectors are shown. For example, dairy sales to domestic exports are \$22,476,900. Dairy total sales were \$146,551,400 as shown by the row (and column) total for dairy.

The distribution of purchases by the dairy sector is shown in column 1. Purchases by dairy from dairy are \$9,600, from poultry are \$2,100, from ranching are \$205,600, and so on down the column. Total spending by the dairy sector, shown at the foot of the column, is \$146,551,400 just equal to the sales shown by the dairy row total. All intermediate processing sectors in the I/O model show spending equal to sales. This accounting equality is brought about by including saving and profit as items

in the spending column.

Other information can be obtained directly from the transactions table. The household row (row 46) represents wages paid and self employment income. Similarly, industry payments to local and county taxes (row 47) may be obtained from the transactions-among-sectors table.

While these and other items, obtained directly from the transactions-among-sectors table, are useful as initial indicators of the relative importance of each sector in the state's economy, the important question of interdependencies is not yet addressed.

#### Definitions and Conventions of the IMPLAN I/O Table

The IMPLAN data base is the 1977 Bureau of Economic Analysis I/O table updated to 1982. Production is classified into 528 industry/commodity categories. Margins: The I/O tables do not trace actual flows of commodities to and from trade. If trade were shown as buying and reselling commodities, industrial and final users would make most of their purchases from a single source - trade. To show the links between the production of commodities and the purchases of them by industrial and final users, commodities are shown as if moving directly to the users, bypassing trade. Production in trade is measured by the margin, which is defined to consist of operating expenses, profits, sales taxes, excise taxes, and customs duties. The margin associated with a commodity is shown as a separate purchase from trade by

the user of the commodity. The commodities are valued at producer's prices which exclude distribution costs (trade margins and transport costs). They are defined to include excise taxes collected and paid by the producer. As in the case of trade, transportation cost is shown as a separate purchase by the user from the transport sector. Multiple product firms: Secondary products of multiple products producers are "redefined", i.e. are excluded from the primary industry sales of the multiple product producer and attributed to the industry/commodity category which they belong. Two kinds of "redefinition" took place. Construction work by any industry, manufacturing by trade and services, wholesaling by manufacturers, and rental by all industries were reallocated to the respective primary industries e.g. construction, manufacturing, wholesale or real estate and rental respectively. It was assumed that these reallocations purchased inputs in the proportions for the sectors to which they were reallocated. All other joint production that was reallocated was incorporated in its primary sector under the assumption that inputs were purchased in the proportions from which the production was reallocated.

The result of the above manipulations of the I/O data imply that industry outputs do not match those shown in other government publications. The largest reduction will be in the trade sectors where only the value added by trade is shown in place of total sales. Other sectors will vary either up or down depending upon the effects of redefining secondary products into

primary sectors.

### Input-Output Multipliers

The use of demand driven I/O multipliers to identify the sectors of the economy which can provide the greatest boost to income and employment is well known among regional scientists. These multipliers are termed "backward-linked" or input requirement multipliers since they show the dollar amount (or physical amount) of inputs that are 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 industry exports although government purchases and support payments might also be important in some instances.<sup>8</sup> In contrast, a forward-linked multiplier would reveal the effect of a new input supply to attract downstream user industries. For example, the creation of a new supply of irrigation water might attract new farm producers in an arid region if it had a suitable growing climate and adequate demand for farm products. Generally such forward links are much less consistent and predictable than are backward (input requirement) links and thus I/O forecasting usually measures only backward linked effects.

Conceptually, the profit-motivated intermediate processing sectors of the economy must always move toward a stable

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<sup>8</sup> For example, impacts of federal defense industry operations are large in the Denver metropolitan area.

equilibrium where sales equal receipts in each industry. Receipts can be disturbed when final demands such as exports or government purchases from industry change. Changes in final demand set off a series of transactions as each industry responds to either direct or indirect changes in their demands. An example of direct change in demand would occur if lodging exports increased, while an example of an indirect demand change could be the response of hotels and motels to increase output and in so doing they purchase more labor, supplies, electricity and similar inputs thus creating the indirect or "derived" demand for other sectors of the economy.<sup>9</sup> When the other sectors find their demand rising they too will buy more inputs and thus the original export change causes a series of reactions and reverberations throughout the economy. These reverberations gradually die out since during each round of spending part of the spending leaks out to saving, taxes, and imports. The greater the leakage the faster the effects die out and the smaller the multiplier effect will be.<sup>10</sup>

Multiplier effects are usually distinguished as "type I" or "type II." Type II multipliers include households in the

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<sup>9</sup> In addition to the added dollar spending on inputs, the I/O model can be calibrated to project physical input requirements. Appendix VII shows selected technical input requirements (some in dollars and some in physical units); these are the inputs per dollar of sales of a given sector and exclude the indirect spending requirements on themselves and on other sectors in the economy.

<sup>10</sup> A more detailed description of the input-output technique is shown in appendix V.

interdependency matrix calculations while type I multipliers exclude households. Including households in the interdependency calculations increases the size of the multipliers but it requires the assumption that households have stable spending patterns as is assumed for the production-based spending of the other intermediate processing sectors. Type I and type II business multipliers are shown in table 6. State and local government, federal government enterprises, other livestock, colleges and universities, associations, other schools, health services, retail, other mining, and wholesale create the largest increase in sales throughout the Colorado economy per dollar of added sales to final demand. Type I and type II employment multipliers are shown in table 7. Wholesale, other schools, crops nec, state and local government, lodging, associations, agricultural services, amusements, restaurants, and retail establishments create the greatest employment increase per dollar of added sales to final demand. Table 8 shows the effects on payroll throughout the economy as the sectors listed increase sales to final demand by \$1. generally the same group of sectors having high employment multipliers also have high payroll multipliers. The top sectors for creating payroll throughout the Colorado economy include; state and local government, federal government enterprises, colleges and universities, associations, other schools, health services, retail, other mining, services and wholesale. Table 9 shows value added multipliers. Value added is a measure of the net value of goods and services created

TABLE 6 BUSINESS MULTIPLIERS FOR COLORADO

Business sales created throughout the economy for a \$1 sale to final demand by the sector listed.

	NAME (RANK)	MULTIPLIER	TYPE I	NAME (RANK)	MULTIPLIER	TYPE II
1	DAIRY ( 12)	1.4187		DAIRY ( 41)	1.6589	
2	POULTRY ( 17)	1.3978		POULTRY ( 40)	1.6666	
3	RANCHING ( 8)	1.4894		RANCHING ( 36)	1.7675	
4	FEEDLOTS ( 4)	1.6354		FEEDLOTS ( 32)	1.8706	
5	SHEEP/GOAT ( 3)	1.6385		SHEEP/GOAT ( 26)	1.9488	
6	HOGS/PIGS ( 6)	1.5159		HOGS/PIGS ( 34)	1.7907	
7	LVSTK NEC ( 1)	2.3731		LVSTK NEC ( 3)	2.7305	
8	FOOD GRAIN ( 9)	1.4304		FOOD GRAIN ( 38)	1.6945	
9	FEED GRAIN ( 15)	1.4101		FEED GRAIN ( 43)	1.6215	
10	HAY/PAST. ( 20)	1.3669		HAY/PAST. ( 45)	1.5734	
11	VEGETABLES ( 43)	1.2214		VEGETABLES ( 44)	1.5828	
12	SUGARBEETS ( 26)	1.3111		SUGARBEETS ( 42)	1.6337	
13	CROPS NEC ( 25)	1.3241		CROPS NEC ( 21)	2.0759	
14	AG SERVICE ( 40)	1.2354		AG SERVICE ( 17)	2.1558	
15	COAL MINES ( 41)	1.2328		COAL MINES ( 23)	2.0037	
16	OIL/GAS EX ( 33)	1.2752		OIL/GAS EX ( 46)	1.5357	
17	MINING NEC ( 30)	1.2920		MINING NEC ( 9)	2.2844	
18	RES CONSTR ( 31)	1.2831		RES CONSTR ( 25)	1.9684	
19	CONSTR NEC ( 34)	1.2714		CONSTR NEC ( 20)	2.0909	
20	LS PRD MFG ( 2)	1.8782		LS PRD MFG ( 13)	2.2408	
21	FOOD MFG ( 24)	1.3253		FOOD MFG ( 35)	1.7775	
22	AG INPUTS ( 18)	1.3957		AG INPUTS ( 30)	1.9013	
23	WOOD/PAPER ( 39)	1.2428		WOOD/PAPER ( 31)	1.8813	
24	PRINT/PUBL ( 29)	1.2965		PRINT/PUBL ( 18)	2.1447	
25	REFINING ( 5)	1.5746		REFINING ( 29)	1.9208	
26	MACH/EQUIP ( 27)	1.3005		MACH/EQUIP ( 16)	2.2103	
27	MANUFR NEC ( 37)	1.2541		MANUFR NEC ( 24)	1.9967	
28	TRANSPORT ( 11)	1.4192		TRANSPORT ( 14)	2.2379	
29	COMMUNICAT ( 44)	1.1295		COMMUNICAT ( 22)	2.0154	
30	ELECT GENR ( 23)	1.3376		ELECT GENR ( 37)	1.7269	
31	UTILITIES ( 7)	1.5137		UTILITIES ( 33)	1.7976	
32	WHOLESALE ( 28)	1.2981		WHOLESALE ( 10)	2.2769	
33	RETAIL ( 38)	1.2462		RETAIL ( 8)	2.2899	
34	F/I/R/E ( 35)	1.2699		F/I/R/E ( 39)	1.6827	
35	LODGING ( 10)	1.4275		LODGING ( 15)	2.2302	
36	SERVICES ( 36)	1.2643		SERVICES ( 12)	2.2436	
37	FOOD/DRINK ( 13)	1.4118		FOOD/DRINK ( 19)	2.1337	
38	AUTO SERV ( 32)	1.2773		AUTO SERV ( 28)	1.9376	
39	AMUSEMENTS ( 19)	1.3942		AMUSEMENTS ( 11)	2.2573	
40	HEALTH SER ( 22)	1.3393		HEALTH SER ( 7)	2.4110	
41	SCHOOLS ( 16)	1.3991		SCHOOLS ( 6)	2.5181	
42	COLLEGES ( 21)	1.3466		COLLEGES ( 4)	2.6896	
43	ASSOC NEC ( 14)	1.4103		ASSOC NEC ( 5)	2.6187	
44	FED GOVT ( 42)	1.2296		FED GOVT ( 2)	2.7985	
45	ST/LOC GOV ( 45)	1.0550		ST/LOC GOV ( 1)	2.8695	
46				HOUSEHOLDS ( 27)	1.9468	

or the residual payments of wages, rents, and profits. The top sectors for creating value added throughout the Colorado economy include; state and local government, federal government enterprises, colleges and universities, retail, communications, services, wholesale, associations, health services, and other schools. Table 10 shows the import multipliers and one minus the import multipliers which is the trade balance multipliers. Import multipliers show how much of the stimulus to the Colorado economy created by added exports leaks out to imports. Poultry farming, according to the table, leaks 78.56 cents for every dollar of exports. That is, the total Colorado economy imports 78.56 cents for every dollar of poultry exports. Either the poultry industry has a high propensity to import or else the sectors that poultry farms buy from in Colorado have a high propensity to import, or both. The trade balance multipliers show the net increase in wealth in Colorado for each dollar of exports by the sectors listed. The top ten sectors for creating added wealth directly and indirectly include; finance/insurance/real estate, oil/gas exploration, communications, vegetable farming, sugarbeet farming, retail, services, wholesale, food grain farms, and amusements. Several other multiplier effects are revealed in the interdependency matrix shown in appendix I. The direct, indirect, and induced effects on the receipts of a particular intermediate processing sector (row heading of the interdependency matrix) when an industry (column heading of the interdependency matrix) expands

sales to final demand by one dollar are shown by the row elements. For example, elements in row 31 of the interdependency matrix (see appendix IV) show the effects on total utility sales in Colorado as the sectors shown at the column heads expand sales to final demand.

TABLE 7 EMPLOYMENT MULTIPLIERS FOR COLORADO  
 Employment created throughout the economy for a \$1 million sale  
 to final demand by the sector listed.

NAME (RANK)	MULTIPLIER I	NAME (RANK)	MULTIPLIER II
DAIRY ( 25)	19.22	DAIRY ( 28)	20.97
POULTRY ( 28)	16.80	POULTRY ( 31)	18.77
RANCHING ( 34)	15.80	RANCHING ( 34)	17.83
FEEDLOTS ( 30)	16.52	FEEDLOTS ( 32)	18.24
SHEEP/GOAT ( 26)	17.45	SHEEP/GOAT ( 30)	19.71
HOGS/PIGS ( 32)	16.15	HOGS/PIGS ( 33)	18.15
LVSTK NEC ( 17)	26.71	LVSTK NEC ( 18)	29.32
FOOD GRAIN ( 12)	32.63	FOOD GRAIN ( 15)	34.56
FEED GRAIN ( 33)	15.87	FEED GRAIN ( 35)	17.42
HAY/PAST. ( 36)	14.14	HAY/PAST. ( 38)	15.65
VEGETABLES ( 14)	31.21	VEGETABLES ( 16)	33.85
SUGARBEETS ( 11)	32.91	SUGARBEETS ( 14)	35.27
CROPS NEC ( 3)	75.11	CROPS NEC ( 3)	80.60
AG SERVICE ( 6)	46.36	AG SERVICE ( 7)	53.08
COAL MINES ( 40)	11.75	COAL MINES ( 36)	17.37
OIL/GAS EX ( 45)	4.70	OIL/GAS EX ( 46)	6.60
MINING NEC ( 23)	19.97	MINING NEC ( 23)	27.21
RES CONSTR ( 35)	15.75	RES CONSTR ( 29)	20.75
CONSTR NEC ( 29)	16.76	CONSTR NEC ( 26)	22.74
LS PRD MFG ( 37)	12.73	LS PRD MFG ( 39)	15.38
FOOD MFG ( 39)	12.05	FOOD MFG ( 40)	15.35
AG INPUTS ( 38)	12.31	AG INPUTS ( 37)	16.00
WOOD/PAPER ( 19)	24.48	WOOD/PAPER ( 19)	29.14
PRINT/PUBL ( 20)	22.67	PRINT/PUBL ( 20)	28.86
REFINING ( 43)	6.96	REFINING ( 44)	9.49
MACH/EQUIP ( 24)	19.40	MACH/EQUIP ( 24)	26.04
MANUFR NEC ( 22)	21.80	MANUFR NEC ( 22)	27.22
TRANSPORT ( 31)	16.29	TRANSPORT ( 27)	22.26
COMMUNICAT ( 27)	17.22	COMMUNICAT ( 25)	23.69
ELECT GENR ( 42)	7.90	ELECT GENR ( 43)	10.74
UTILITIES ( 44)	6.58	UTILITIES ( 45)	8.65
WHOLESALE ( 1)	164.88	WHOLESALE ( 1)	172.02
RETAIL ( 10)	39.36	RETAIL ( 10)	46.97
F/I/R/E ( 41)	11.10	F/I/R/E ( 42)	14.11
LODGING ( 4)	49.70	LODGING ( 5)	55.56
SERVICES ( 18)	26.63	SERVICES ( 17)	33.78
FOOD/DRINK ( 9)	41.93	FOOD/DRINK ( 9)	47.20
AUTO SERV ( 21)	22.59	AUTO SERV ( 21)	27.41
AMUSEMENTS ( 8)	43.33	AMUSEMENTS ( 8)	49.63
HEALTH SER ( 15)	29.05	HEALTH SER ( 13)	36.87
SCHOOLS ( 2)	118.83	SCHOOLS ( 2)	127.00
COLLEGES ( 16)	28.95	COLLEGES ( 12)	38.75
ASSOC NEC ( 7)	44.44	ASSOC NEC ( 6)	53.25
FED GOVT ( 13)	31.50	FED GOVT ( 11)	42.95
ST/LOC GOV ( 5)	48.40	ST/LOC GOV ( 4)	61.65
		HOUSEHOLDS ( 41)	14.20

TABLE 8 TYPE II PAYROLL MULTIPLIERS

Payroll created throughout the economy for a \$1 increase in sales to final demand by sector.

NAME (RANK)	MULTIPLIER
DAIRY ( 43)	.1494
POULTRY ( 40)	.1673
RANCHING ( 38)	.1731
FEEDLOTS ( 44)	.1464
SHEEP/GOAT ( 36)	.1931
HOGS/PIGS ( 39)	.1710
LVSTK NEC ( 32)	.2224
FOOD GRAIN ( 41)	.1644
FEED GRAIN ( 45)	.1315
HAY/PAST. ( 46)	.1285
VEGETABLES ( 31)	.2249
SUGARBEETS ( 35)	.2008
CROPS NEC ( 20)	.4680
AG SERVICE ( 11)	.5729
COAL MINES ( 19)	.4799
OIL/GAS EX ( 42)	.1622
MINING NEC ( 8)	.6178
RES CONSTR ( 23)	.4266
CONSTR NEC ( 16)	.5101
LS PRD MFG ( 30)	.2257
FOOD MFG ( 27)	.2814
AG INPUTS ( 26)	.3147
WOOD/PAPER ( 25)	.3974
PRINT/PUBL ( 15)	.5279
REFINING ( 33)	.2154
MACH/EQUIP ( 12)	.5664
MANUPR NEC ( 21)	.4622
TRANSPORT ( 17)	.5096
COMMUNICAT ( 13)	.5515
ELECT GENR ( 29)	.2423
UTILITIES ( 37)	.1767
WHOLESALE ( 10)	.6093
RETAIL ( 7)	.6497
F/I/R/E ( 28)	.2569
LODGING ( 18)	.4996
SERVICES ( 9)	.6096
FOOD/DRINK ( 22)	.4494
AUTO SERV ( 24)	.4110
AMUSEMENTS ( 14)	.5373
HEALTH SER ( 6)	.6671
SCHOOLS ( 5)	.6966
COLLEGES ( 3)	.8360
ASSOC NEC ( 4)	.7522
FED GOVT ( 2)	.9766
ST/LOC GOV ( 1)	1.1296
HOUSEHOLDS ( 34)	.2119

TABLE 9 TYPE II VALUE ADDED MULTIPLIERS

Value added created throughout the economy for a \$1 increase in sales to final demand by sector.

NAME (RANK)	MULTIP
DAIRY ( 40)	.5225
POULTRY ( 46)	.3816
RANCHING ( 43)	.4524
FEEDLOTS ( 45)	.3919
SHEEP/GOAT ( 41)	.4799
HOGS/PIGS ( 44)	.4493
LVSTK NEC ( 39)	.5641
FOOD GRAIN ( 30)	.7393
FEED GRAIN ( 34)	.6752
HAY/PAST. ( 36)	.6316
VEGETABLES ( 21)	.9198
SUGARBEETS ( 26)	.8488
CROPS NEC ( 18)	.9503
AG SERVICE ( 12)	1.0963
COAL MINES ( 20)	.9476
OIL/GAS EX ( 22)	.8857
MINING NEC ( 14)	1.0579
RES CONSTR ( 31)	.7339
CONSTR NEC ( 24)	.8729
LS PRD MFG ( 42)	.4644
FOOD MFG ( 35)	.6606
AG INPUTS ( 32)	.7198
WOOD/PAPER ( 33)	.7003
PRINT/PUBL ( 19)	.9484
REFINING ( 37)	.6010
MACH/EQUIP ( 17)	.9620
MANUPR NEC ( 27)	.8119
TRANSPORT ( 16)	.9873
COMMUNICAT ( 5)	1.2648
ELECT GENR ( 28)	.7932
UTILITIES ( 38)	.5894
WHOLESALE ( 7)	1.2136
RETAIL ( 4)	1.2785
F/I/R/E ( 13)	1.0643
LODGING ( 15)	.9935
SERVICES ( 6)	1.2380
FOOD/DRINK ( 25)	.8512
AUTO SERV ( 23)	.8754
AMUSEMENTS ( 11)	1.0982
HEALTH SER ( 9)	1.1800
SCHOOLS ( 10)	1.1251
COLLEGES ( 3)	1.3248
ASSOC NEC ( 8)	1.1981
FED GOVT ( 2)	1.4380
ST/LOC GOV ( 1)	1.6550
HOUSEHOLDS ( 29)	.7520

TABLE 10 TYPE II IMPORT MULTIPLIERS TYPE II TRADE BALANCE MULTIPLIERS (Wealth)  
Imports and wealth created throughout the economy for a \$1 increase in sales to final demand for the sector listed.

<u>NAME (RANK)</u>	<u>MULTIPLIER</u>	<u>NAME</u>	<u>MULTIPLIER</u>
DAIRY ( 12)	.6269	DAIRY	.3731
POULTRY ( 1)	.7856	POULTRY	.2144
RANCHING ( 5)	.7207	RANCHING	.2793
FEEDLOTS ( 3)	.7544	FEEDLOTS	.2456
SHEEP/GOAT ( 6)	.7131	SHEEP/GOAT	.2869
HOGS/PIGS ( 4)	.7217	HOGS/PIGS	.2783
LVSTK NEC ( 9)	.6583	LVSTK NEC	.3417
FOOD GRAIN ( 38)	.4250	FOOD GRAIN	.5750 (9)
FEED GRAIN ( 35)	.4563	FEED GRAIN	.5437
HAY/PAST. ( 30)	.4968	HAY/PAST.	.5032
VEGETABLES ( 43)	.3050	VEGETABLES	.6950 (4)
SUGARBETS ( 42)	.3520	SUGARBETS	.6480 (5)
CROPS NEC ( 27)	.5176	CROPS NEC	.4824
AG SERVICE ( 32)	.4766	AG SERVICE	.5234
COAL MINES ( 25)	.5323	COAL MINES	.4677
OIL/GAS EX ( 45)	.2764	OIL/GAS EX	.7236 (2)
MINING NEC ( 21)	.5599	MINING NEC	.4401
RES CONSTR ( 8)	.6926	RES CONSTR	.3074
CONSTR NEC ( 11)	.6372	CONSTR NEC	.3628
LS PRD MFG ( 2)	.7613	LS PRD MFG	.2387
FOOD MFG ( 13)	.6208	FOOD MFG	.3792
AG INPUTS ( 17)	.5949	AG INPUTS	.4051
WOOD/PAPER ( 7)	.6971	WOOD/PAPER	.3029
PRINT/PUBL ( 19)	.5795	PRINT/PUBL	.4200
REFINING ( 14)	.6144	REFINING	.3856
MACH/EQUIP ( 15)	.6043	MACH/EQUIP	.3957
MANUPR NEC ( 10)	.6503	MANUPR NEC	.3497
TRANSPORT ( 26)	.5223	TRANSPORT	.4777
COMMUNICAT ( 44)	.2867	COMMUNICAT	.7133 (3)
ELECT GENR ( 36)	.4491	ELECT GENR	.5509
UTILITIES ( 18)	.5872	UTILITIES	.4128
WHOLESALE ( 39)	.3957	WHOLESALE	.6043 (8)
RETAIL ( 41)	.3711	RETAIL	.6289 (6)
F/I/R/E ( 46)	.1926	F/I/R/E	.8074 (1)
LODGING ( 29)	.5061	LODGING	.4939
SERVICES ( 40)	.3716	SERVICES	.6284 (7)
FOOD/DRINK ( 16)	.5981	FOOD/DRINK	.4019
AUTO SERV ( 24)	.5356	AUTO SERV	.4644
AMUSEMENTS ( 37)	.4390	AMUSEMENTS	.5610 (10)
HEALTH SER ( 31)	.4871	HEALTH SER	.5129
SCHOOLS ( 20)	.5714	SCHOOLS	.4286
COLLEGES ( 28)	.5111	COLLEGES	.4889
ASSOC NEC ( 22)	.5541	ASSOC NEC	.4459
FED GOVT ( 23)	.5387	FED GOVT	.4613
ST/LOC GOV ( 33)	.4746	ST/LOC GOV	.5254
HOUSEHOLDS ( 34)	.4599	HOUSEHOLDS	.5401

Table 11 presents growth impact multipliers on Colorado employment (Gray, McKean and Sparling, 1979). These multipliers show the employment created in a particular industry if all processing sectors of the Colorado economy expand sales to final demand by \$1 million. The industries whose employment rises most rapidly when a general economic expansion occurs in Colorado include: wholesale trade, grade and high schools, retail trade, restaurants, services, other crops, state and local government, lodging, agricultural services and nurseries, and finance/insurance/real estate.

TABLE 11 GROWTH MULTIPLIERS ON EMPLOYMENT

Jobs created in the sector listed if all sectors expand sales to final demand by \$1 million.

	<u>JOBS</u>
1	DAIRY 16.62
2	POULTRY 11.19
3	RANCHING 14.51
4	FEEDLOTS 14.44
5	SHEEP/GOAT 11.46
6	HOGS/PIGS 10.52
7	LVSTR NEC 23.60
8	FOOD GRAIN 28.59
9	FEED GRAIN 17.43
10	HAY/PAST. 15.67
11	VEGETABLES 28.99
12	SUGARBEETS 29.69
13	CROPS NEC 75.07
14	AG SERVICE 52.68
15	COAL MINES 9.67
16	OIL/GAS EX 3.36
17	MINING NEC 16.92
18	RES CONSTR 9.73
19	CONSTR NEC 2.26
20	LS PRD MFG 6.00
21	FOOD MFG 13.40
22	AG INPUTS 8.76
23	WOOD/PAPER 24.76
24	PRINT/PUBL 27.37
25	REFINING 6.67
26	MACH/EQUIP 21.66
27	MANUFR NEC 24.71
28	TRANSPORT 27.16
29	COMMUNICAT 23.22
30	ELECT GENR 7.16
31	UTILITIES 7.46
32	WHOLESALE 188.97
33	RETAIL 89.51
34	F/I/R/E 50.45
35	LODGING 53.16
36	SERVICES 75.22
37	FOOD/DRINK 84.62
38	AUTO SERV 18.25
39	AMUSEMENTS 46.52
40	HEALTH SER 57.35
41	SCHOOLS 117.62
42	COLLEGES 25.79
43	ASSOC NEC 46.44
44	FED GOVT 35.21
45	ST/LOC GOV 62.03

COLORADO DIRECT AND INDIRECT WATER REQUIREMENTS  
AND WATER REQUIREMENTS FOR GENERAL GROWTH

The previous chapter presented what may be appropriately called the results of traditional applications of the Leontief interindustry model. In addition to the descriptive analysis and the attendant development of various multipliers, application of the model can be extended to other questions. The I/O technique, because of the detailed analysis of interdependence among economic sectors, is readily adaptable to an examination of water resource use associated with economic activity in the state.

This chapter summarizes the multiplier effects on total state water withdrawal and consumptive use with increased (decreased) economic activity in Colorado. Changes in total state water requirements are related to changes in sales to final demand for each of the processing sectors.

Multipliers are also shown which represent the water input and consumption requirements for individual industries when all processing sectors expand final demand sales. The latter multipliers are referred to as growth impact multipliers (Gray, McKean and Sparling, 1979).

Water Use Analysis

The water use analysis requires data pertaining to water withdrawals and consumptive use on a sector-by-sector basis. It is further required that these data be related to economic activity on a gallon per dollar basis. These data, particularly

for consumptive use, are difficult to obtain on a sector-by-sector basis and for a rather small regional economy. For example the 1977 and 1982 Census of Manufacturers fails to provide a cross tabulation of water use with value of sales or any measure of economic activity. Thus the manufacturing sector water requirements coefficients are based upon the ratios which can be derived from the 1972 Census of Manufacturers.

Water use by commercial establishments is very small relative to agriculture, the extractive industries, electricity generation, and manufacturing.<sup>11</sup> Little detailed information is available from secondary sources for the commercial sectors and thus most coefficients are based upon results from our past I/O surveys (see bibliography and end of this report), a ratio to current employment, and/or Water Resources Council estimates. The Water Resources Council Report provides no detail among commercial establishments. WRC data also were at variance with other data sources used in the agricultural and manufacturing sectors. The primary source for the agricultural sectors was the Census of Agriculture. Other sources included the Colorado Water Policy Plan, and publications by the Denver Water Board, Lawrence Conklin (1974, 1975), Ronda Skaggs (1985), Kenneth Leathers (1976), Richard Gardner (1983), Norman Dalsted et. al. (1987) and Robert Young et. al. (1982).

Water use estimates for the extractive sectors are based mainly on the Census of Mineral Industries. Unfortunately,

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<sup>11</sup> The only other major water using sector is households.

disclosure problems limit the available data to rather large regions in some cases. Withdrawal and consumptive use figures vary considerably among regions and their accuracy for a given portion of Colorado is questionable.

Estimates of withdrawal and consumptive use by sectors were shown earlier in the introduction in table 2. These water input and consumption use figures were expressed per dollar of sales by dividing by the total industry sales estimates provided by IMPLAN. The resulting water use coefficients are presented in appendix VII.

Estimates of total withdrawal (excluding system losses) and total consumptive use of water are valuable from a descriptive point of view and provide some gauge of consistency. However, the I/O model also allows analysis of direct and indirect water use which parallels the previous discussion of direct and indirect production. The purpose of such analysis is to isolate the effect of economic interdependence on total water requirements. A specific question to be addressed is that of determining the likely impact of expanding sales to final demand by any or all of Colorado's processing sectors on state water requirements. The assessment requires estimation of the direct plus indirect water requirements per dollar of output delivered to final demand for each processing sector.

Table 12 shows the type I and type II multipliers for water withdrawal and for consumptive use. As explained earlier, a type I multiplier assumes that households are not an interdependent

part of the economy. Conversely, a type II multiplier includes households in the interdependency matrix as shown in appendix IV. A water requirements multiplier shows the gallons of water required throughout Colorado's economy as the sector listed at the left in table 12 increases sales to final demand by \$1. The range of values is extreme. For example, a dollars worth of sales to final demand of hay implies that over 4,000 gallons is withdrawn throughout Colorado while a dollars worth of sales by utilities requires only 4.7 gallons (with type II multipliers). The sectors with the largest direct and indirect withdrawal requirements are: hay and pasture, feed grains, other crops, sugarbeets, dairy, ranching, other livestock, vegetables, hogs/pigs, and feedlots. It is notable that livestock products manufacturing requires withdrawal of some 186 gallons directly and indirectly but requires only .012 gallons per dollar of output directly (see appendix VII). Clearly, the livestock processing sector creates a demand for water in Colorado through its backward linked ties to the farm and ranch sectors which provide its inputs. A similar effect is noted with food manufacturing which has a direct and indirect water withdrawal requirement of 30 gallons per dollar of sales to final demand but directly only requires 3.7 gallons per dollar of output. The importance of the water multiplier analysis in order to measure the total water requirement effects of economic expansion are demonstrated by these examples. Without the measurement of the backward linked effects from agricultural processors to

agricultural producers, the projection of increased water use by expansion in the agricultural processing sectors would be greatly understated.

Water consumption multipliers are shown in table 13. Again a wide range in water consumption rates exists among the sectors. The largest consumer is hay and pasture with 2,400 gallons required throughout the economy of Colorado for one dollar of sales to final demand while finance/insurance/real estate only creates 1.9 gallons of consumption per dollar of sales to final demand. The sectors creating the highest direct and indirect water consumption per dollar of sales to final demand are: hay/pasture, feed grains, other crops, sugarbeets, dairy, other livestock, ranching, vegetable producers, hog/pigs, and feedlots. Among the non agricultural sectors livestock product manufacturing, other mining, amusements and food manufacturing, ag services, food and drink and electric generating and stand out. Several of these sectors have nominal direct water consumption and create water consumption through indirect effects on demand created by their factor input sources. Basing prediction of water consumption on direct water consumption requirements (appendix VII) which ignores indirect effects will lead to serious understatement of the water consumed as the economy expands.

TABLE 12 WATER WITHDRAWAL MULTIPLIERS

TYPE I		TYPE II	
NAME (RANK)	MULTIPLIER	NAME (RANK)	MULTIPLIER
DAIRY ( 5)	642.165	DAIRY ( 5)	644.480
POULTRY ( 14)	120.689	POULTRY ( 15)	123.281
RANCHING ( 6)	567.846	RANCHING ( 7)	570.527
FEEDLOTS ( 10)	368.001	FEEDLOTS ( 10)	370.268
SHEEP/GOAT ( 11)	219.632	SHEEP/GOAT ( 11)	222.623
HOGS/PIGS ( 9)	383.616	HOGS/PIGS ( 9)	386.265
LVSTK NEC ( 7)	567.419	LVSTK NEC ( 6)	570.864
FOOD GRAIN ( 12)	196.663	FOOD GRAIN ( 12)	199.209
FEED GRAIN ( 2)	1,558.020	FEED GRAIN ( 2)	1,560.050
HAY/PAST. ( 1)	4,013.084	HAY/PAST. ( 1)	4,015.070
VEGETABLES ( 8)	543.825	VEGETABLES ( 8)	547.309
SUGARBEETS ( 4)	757.522	SUGARBEETS ( 4)	760.633
CROPS NEC ( 3)	1,448.590	CROPS NEC( 3)	1,455.830
AG SERVICE ( 21)	21.306	AG SERVICE ( 20)	30.180
COAL MINES ( 23)	17.449	COAL MINES ( 22)	24.882
OIL/GAS EX ( 24)	8.836	OIL/GAS EX ( 35)	11.348
MINING NEC ( 15)	115.720	MINING NEC ( 14)	125.289
RES CONSTR ( 29)	4.804	RES CONSTR ( 34)	11.412
CONSTR NEC ( 28)	5.154	CONSTR NEC ( 32)	13.055
LS PRD MFG ( 13)	182.684	LS PRD MFG ( 13)	186.180
FOOD MFG ( 18)	26.034	FOOD MFG ( 19)	30.393
AG INPUTS ( 27)	5.761	AG INPUTS ( 37)	10.636
WOOD/PAPER ( 35)	2.210	WOOD/PAPER ( 43)	8.366
PRINT/PUBL ( 39)	1.321	PRINT/PUBL ( 42)	9.498
REFINING ( 22)	19.282	REFINING ( 23)	22.619
MACH/EQUIP ( 41)	1.204	MACH/EQUIP ( 40)	9.977
MANUPR NEC ( 25)	8.573	MANUPR NEC ( 29)	15.732
TRANSPORT ( 33)	2.575	TRANSPORT ( 39)	10.469
COMMUNICAT ( 40)	1.213	COMMUNICAT ( 41)	9.755
ELECT GENR ( 16)	40.134	ELECT GENR ( 17)	43.887
UTILITIES ( 37)	1.924	UTILITIES ( 46)	4.662
WHOLESALE ( 32)	2.701	WHOLESALE ( 33)	12.139
RETAIL ( 43)	1.138	RETAIL ( 36)	11.201
F/I/R/E ( 38)	1.770	F/I/R/E ( 45)	5.750
LODGING ( 19)	26.011	LODGING ( 18)	33.750
SERVICES ( 42)	1.144	SERVICES ( 38)	10.587
FOOD/DRINK ( 20)	22.490	FOOD/DRINK ( 21)	29.451
AUTO SERV ( 44)	0.955	AUTO SERV ( 44)	7.321
AMUSEMENTS ( 17)	37.664	AMUSEMENTS ( 16)	45.986
HEALTH SER ( 26)	7.871	HEALTH SER ( 25)	18.205
SCHOOLS ( 30)	3.867	SCHOOLS ( 30)	14.656
COLLEGES ( 31)	3.235	COLLEGES ( 28)	16.184
ASSOC NEC ( 34)	2.451	ASSOC NEC ( 31)	14.102
FED GOVT ( 36)	2.138	FED GOVT ( 27)	17.265
ST/LOC GOV ( 45)	0.625	ST/LOC GOV ( 26)	18.121
		HOUSEHOLDS ( 24)	18.770

TABLE 13 WATER CONSUMPTION MULTIPLIERS

TYPE I			TYPE II		
NAME	(RANK)	MULTIPLIER	NAME	(RANK)	MULTIPLIER
DAIRY	( 5)	387.030	DAIRY	( 5)	387.983
POULTRY	( 14)	81.341	POULTRY	( 14)	82.408
RANCHING	( 7)	345.660	RANCHING	( 7)	346.764
FEEDLOTS	( 10)	237.163	FEEDLOTS	( 10)	238.096
SHEEP/GOAT	( 11)	139.341	SHEEP/GOAT	( 11)	140.572
HOGS/PIGS	( 9)	239.347	HOGS/PIGS	( 9)	240.437
LVSTK NEC	( 6)	356.025	LVSTK NEC	( 6)	357.443
FOOD GRAIN	( 12)	125.733	FOOD GRAIN	( 12)	126.781
FEED GRAIN	( 2)	1,042.820	FEED GRAIN	( 2)	1,043.662
HAY/PAST.	( 1)	2,403.360	HAY/PAST.	( 1)	2,404.181
VEGETABLES	( 8)	337.099	VEGETABLES	( 8)	338.533
SUGARBEETS	( 4)	520.907	SUGARBEETS	( 4)	522.187
CROPS NEC	( 3)	861.400	CROPS NEC	( 3)	864.383
AG SERVICE	( 18)	12.666	AG SERVICE	( 18)	16.319
COAL MINES	( 26)	2.045	COAL MINES	( 31)	5.104
OIL/GAS EX	( 21)	8.119	OIL/GAS EX	( 21)	9.153
MINING NEC	( 15)	57.685	MINING NEC	( 15)	61.624
RES CONSTR	( 37)	.683	RES CONSTR	( 43)	3.402
CONSTR NEC	( 36)	.832	CONSTR NEC	( 39)	4.083
LS PRD MFG	( 13)	115.550	LS PRD MFG	( 13)	116.989
FOOD MFG	( 17)	14.783	FOOD MFG	( 17)	16.577
AG INPUTS	( 24)	3.060	AG INPUTS	( 32)	5.066
WOOD/PAPER	( 32)	1.011	WOOD/PAPER	( 42)	3.544
PRINT/PUBL	( 39)	.498	PRINT/PUBL	( 41)	3.864
REFINING	( 22)	6.764	REFINING	( 22)	8.137
MACH/EQUIP	( 40)	.408	MACH/EQUIP	( 40)	4.019
MANUFR NEC	( 27)	1.678	MANUFR NEC	( 34)	4.625
TRANSPORT	( 33)	.978	TRANSPORT	( 37)	4.227
COMMUNICAT	( 38)	.579	COMMUNICAT	( 38)	4.095
ELECT GENR	( 20)	12.525	ELECT GENR	( 20)	14.070
UTILITIES	( 28)	1.573	UTILITIES	( 45)	2.700
WHOLESALE	( 34)	.914	WHOLESALE	( 33)	4.798
RETAIL	( 43)	.337	RETAIL	( 35)	4.478
F/I/R/E	( 44)	.241	F/I/R/E	( 46)	1.879
LODGING	( 23)	3.851	LODGING	( 26)	7.036
SERVICES	( 41)	.401	SERVICES	( 36)	4.287
FOOD/DRINK	( 19)	12.641	FOOD/DRINK	( 19)	15.506
AUTO SERV	( 42)	.378	AUTO SERV	( 44)	2.998
AMUSEMENTS	( 16)	21.415	AMUSEMENTS	( 16)	24.840
HEALTH SER	( 25)	2.642	HEALTH SER	( 27)	6.894
SCHOOLS	( 29)	1.511	SCHOOLS	( 29)	5.952
COLLEGES	( 30)	1.452	COLLEGES	( 28)	6.781
ASSOC NEC	( 35)	.855	ASSOC NEC	( 30)	5.650
FED GOVT	( 31)	1.073	FED GOVT	( 25)	7.299
ST/LOC GOV	( 45)	.126	ST/LOC GOV	( 24)	7.327
			HOUSEHOLDS	( 23)	7.725

TABLE 14 GROWTH EFFECTS ON WATER WITHDRAWALS AND CONSUMPTION

TYPE II GROWTH MULTIPLIERS FOR WITHDRAWAL			TYPE II GROWTH MULTIPLIERS FOR CONSUMPTION		
1	DAIRY	6.955	DAIRY	6.955	
2	POULTRY	6.016	POULTRY	6.016	
3	RANCHING	20.505	RANCHING	20.505	
4	FEEDLOTS	3.771	FEEDLOTS	3.771	
5	SHEEP/GOAT	8.599	SHEEP/GOAT	8.599	
6	HOGS/PIGS	3.154	HOGS/PIGS	3.154	
7	LVSTK NEC	13.370	LVSTK NEC	13.370	
8	FOOD GRAIN	176.374	FOOD GRAIN	113.711	
9	FEED GRAIN	2,356.809	FEED GRAIN	1,580.820	
10	HAY/PAST.	6,416.261	HAY/PAST.	3,842.740	
11	VEGETABLES	541.464	VEGETABLES	336.186	
12	SUGARBEETS	753.765	SUGARBEETS	519.581	
13	CROPS NEC	1,501.802	CROPS NEC	893.419	
14	AG SERVICE	.050	AG SERVICE	.050	
15	COAL MINES	16.990	COAL MINES	1.753	
16	OIL/GAS EX	16.210	OIL/GAS EX	16.210	
17	MINING NEC	117.607	MINING NEC	58.803	
18	RES CONSTR	4.000	RES CONSTR	.400	
19	CONSTR NEC	7.563	CONSTR NEC	.756	
20	LS PRD MFG	.029	LS PRD MFG	0.0	
21	FOOD MFG	6.939	FOOD MFG	.656	
22	AG INPUTS	.045	AG INPUTS	0.0	
23	WOOD/PAPER	.240	WOOD/PAPER	.024	
24	PRINT/PUBL	.127	PRINT/PUBL	0.0	
25	REFINING	32.102	REFINING	8.355	
26	MACH/EQUIP	.120	MACH/EQUIP	0.0	
27	MANUPR NEC	8.183	MANUPR NEC	.818	
28	TRANSPORT	.151	TRANSPORT	0.0	
29	COMMUNICAT	.126	COMMUNICAT	0.0	
30	ELECT GENR	54.466	ELECT GENR	16.876	
31	UTILITIES	.038	UTILITIES	0.0	
32	WHOLESALE	.948	WHOLESALE	0.0	
33	RETAIL	.452	RETAIL	0.0	
34	F/I/R/E	6.824	F/I/R/E	0.0	
35	LODGING	27.557	LODGING	2.706	
36	SERVICES	.345	SERVICES	0.0	
37	FOOD/DRINK	4.557	FOOD/DRINK	0.0	
38	AUTO SERV	.163	AUTO SERV	.130	
39	AMUSEMENTS	7.312	AMUSEMENTS	.783	
40	HEALTH SER	12.378	HEALTH SER	3.155	
41	SCHOOLS	1.567	SCHOOLS	.417	
42	COLLEGES	1.082	COLLEGES	.433	
43	ASSOC NEC	.223	ASSOC NEC	0.0	
44	FED GOVT	.174	FED GOVT	0.0	
45	ST/LOC GOV	.311	ST/LOC GOV	0.0	
46	HOUSEHOLDS	140.536	HOUSEHOLDS	33.327	

## APPENDIX I TRANSACTIONS AMONG SECTORS

	1	2	3	4	5	6	7
	DAIRY	POULTRY	RANCHING	FEEDLOTS	SHEEP/GOAT	HOGS/PIGS	LVSTK NEC
1 DAIRY	9600.	27900.	3201300.	764300.	388100.	423900.	137100.
2 POULTRY	2100.	8900.	4000.	1400.	900.	500.	400.
3 RANCHING	205600.	308000.	1750800.	379954900.	145700.	176100.	60600.
4 FEEDLOTS	0.	0.	0.	0.	0.	0.	0.
5 SHEEP/GOAT	0.	0.	0.	0.	9041700.	0.	0.
6 HOGS/PIGS	0.	0.	0.	0.	0.	2529800.	0.
7 LVSTK NEC	2800.	6000.	862300.	214200.	108200.	121800.	57754700.
8 FOOD GRAIN	132900.	228700.	1396100.	267800.	124900.	145100.	57200.
9 FEED GRAIN	272800.	4674400.	1163800.	171068200.	2149600.	4965600.	6370200.
10 HAY/PAST.	23011200.	149400.	58848600.	146700.	1707700.	3972600.	5946000.
11 VEGETABLES	17200.	28200.	364900.	78200.	37600.	43800.	14400.
12 SUGARBETS	6600.	10500.	44800.	8900.	4100.	5100.	1800.
13 CROPS NEC	6200.	17800.	22100.	5800.	3100.	3200.	1400.
14 AG SERVICE	1396800.	3698600.	5766300.	1419200.	724400.	784000.	333900.
15 COAL MINES	0.	18600.	0.	0.	0.	0.	0.
16 OIL/GAS EX	281600.	9300.	2307300.	526700.	223600.	390300.	185300.
17 MINING NEC	2800.	100.	100.	0.	0.	0.	0.
18 RES CONSTR	0.	0.	0.	0.	0.	0.	0.
19 CONSTR NEC	955500.	337300.	3197500.	832500.	436300.	455000.	204300.
20 LS PRD MFG	11100.	32600.	49600.	14300.	7600.	7100.	13200.
21 FOOD MFG	6876300.	7049500.	21928900.	5839400.	3138900.	3037800.	2015600.
22 AG INPUTS	326100.	98300.	2121800.	616200.	337700.	325800.	168700.
23 WOOD/PAPER	12500.	8300.	21200.	4600.	2200.	2600.	1100.
24 PRINT/PUBL	29800.	18200.	113000.	31700.	18000.	14500.	8000.
25 REFINING	795000.	552200.	2415000.	802500.	471700.	377700.	231000.
26 MACH/EQUIP	66700.	25200.	286300.	102900.	63600.	42200.	25900.
27 MANUPR NEC	111600.	44400.	309600.	95700.	53000.	49100.	146500.
28 TRANSPORT	2823700.	1103100.	7880000.	1997500.	1063200.	1020700.	534000.
29 COMMUNICAT	238400.	119100.	1116400.	282500.	148500.	150700.	74900.
30 ELECT GENR	564300.	314500.	1902900.	580500.	325400.	297900.	167900.
31 UTILITIES	7900.	3300.	47500.	10600.	5200.	5900.	2300.
32 WHOLESALE	134700.	68800.	910000.	252700.	140000.	124600.	68300.
33 RETAIL	106100.	84300.	890800.	217500.	113700.	113200.	55300.
34 P/I/R/E	5408400.	1529000.	26952200.	6927800.	3711500.	3526600.	1568800.
35 LODGING	94400.	43400.	446100.	105000.	53700.	56300.	27800.
36 SERVICES	611400.	170000.	3170600.	861500.	465900.	450200.	220400.
37 FOOD/DRINK	26900.	12900.	131300.	32100.	16900.	16800.	8200.
38 AUTO SERV	292900.	73400.	2852300.	736100.	391000.	387300.	189900.
39 AMUSEMENTS	100.	100.	1200.	300.	0.	100.	0.
40 HEALTH SER	542800.	958200.	6228500.	1621900.	861700.	862500.	425800.
41 SCHOOLS	0.	0.	0.	0.	0.	0.	0.
42 COLLEGES	0.	0.	0.	0.	0.	0.	0.
43 ASSOC NEC	56200.	32800.	203900.	59000.	33300.	28600.	16400.
44 FED GOVT	29000.	14200.	145100.	35500.	18300.	19500.	9600.
45 ST/LOC GOV	153000.	61300.	897600.	205200.	102800.	112400.	52300.
SUB-TOTALS	45623000.	21940800.	159951700.	576721800.	26639700.	25046900.	77099200.
46 HOUSEHOLDS	8896900.	4129100.	26263000.	79332700.	3602400.	3983100.	7813300.
47 IND BUS TX	2405800.	665000.	8998700.	27182300.	1234800.	1364800.	2360200.
48 PROFITS	16834000.	1534300.	9787100.	29563500.	1342600.	1484300.	2954400.
49 PROP INC	7013400.	629500.	4022700.	12150500.	551900.	610100.	1215800.
50 COMP IMPS	65409900.	44831500.	226377600.	598389700.	26531300.	33628000.	27421800.
51 N C IMPS	368400.	48500.	3095100.	511500.	263600.	324200.	165700.
TOTALS	146551400.	73778700.	438495900.	1323852000.	60166300.	66441400.	119030400.

## APPENDIX I TRANSACTIONS AMONG SECTORS (continued)

	8	9	10	11	12	13	14
	FOOD GRAIN	FEED GRAIN	HAY/PAST.	VEGETABLES	SUGARBEETS	CROPS NEC	AG SERVICE
1 DAIRY	218300.	5615300.	3238200.	38600.	3200.	4600.	2600.
2 POULTRY	282500.	615200.	379200.	18900.	400.	800.	597700.
3 RANCHING	1787700.	1763100.	829300.	606000.	123700.	97800.	61600.
4 FEEDLOTS	0.	0.	0.	0.	0.	0.	0.
5 SHEEP/GOAT	0.	0.	0.	0.	0.	0.	0.
6 HOGS/PIGS	0.	0.	0.	0.	0.	0.	0.
7 LVSTK NEC	5131600.	10388400.	1565500.	406300.	189100.	84300.	1358600.
8 FOOD GRAIN	11144900.	898200.	357100.	245000.	49900.	28500.	22600.
9 FEED GRAIN	0.	16836000.	0.	0.	0.	0.	61000.
10 HAY/PAST.	725500.	718700.	383100.	287100.	58700.	56300.	31800.
11 VEGETABLES	110200.	104800.	62300.	2142100.	9700.	10000.	5500.
12 SUGARBEETS	41100.	39100.	23200.	17800.	1175800.	3600.	4700.
13 CROPS NEC	15500.	718600.	422400.	600700.	2000.	2383600.	2517400.
14 AG SERVICE	4550500.	4584900.	3263600.	2614500.	533500.	721600.	419600.
15 COAL MINES	400.	1100.	0.	100.	0.	5800.	0.
16 OIL/GAS EX	5023700.	5696700.	6801000.	1193900.	489300.	543800.	1199100.
17 MINING NEC	124800.	333500.	2000.	32000.	11000.	9500.	5900.
18 RES CONSTR	0.	0.	0.	0.	0.	0.	0.
19 CONSTR NEC	2772700.	3996000.	2797700.	849800.	296500.	298700.	1901900.
20 LS PRD MFG	400.	900.	600.	100.	0.	100.	8600.
21 FOOD MFG	60200.	111100.	102000.	16100.	6000.	16100.	220900.
22 AG INPUTS	2223500.	4011600.	2824200.	737100.	325800.	395300.	2257800.
23 WOOD/PAPER	19100.	29100.	23100.	25700.	3200.	78500.	344400.
24 PRINT/PUBL	50300.	78100.	49500.	22800.	5800.	336500.	86800.
25 REFINING	5274000.	8765100.	7025400.	1195100.	479400.	3666400.	3360700.
26 MACH/EQUIP	265900.	487600.	375600.	83000.	39900.	177500.	675900.
27 MANUFR NEC	195800.	368600.	239500.	270400.	26200.	109400.	445000.
28 TRANSPORT	4301000.	6367800.	3980300.	1366300.	227200.	507300.	3690300.
29 COMMUNICAT	510500.	840100.	501100.	221700.	53800.	237400.	62300.
30 ELECT GENR	744500.	1905700.	1643700.	452800.	0.	410800.	828900.
31 UTILITIES	1463800.	3664200.	2120200.	543600.	1500.	615400.	258100.
32 WHOLESALE	375400.	404800.	270900.	106300.	35900.	57800.	549300.
33 RETAIL	2110000.	2679400.	1593900.	276400.	136800.	160900.	1031600.
34 F/I/R/E	41771400.	46385700.	27897900.	5963500.	3458100.	1384300.	7411900.
35 LODGING	410000.	597800.	313800.	103400.	35500.	33600.	148100.
36 SERVICES	3651700.	6074700.	4245200.	809600.	482300.	599300.	4265700.
37 FOOD/DRINK	52100.	97400.	57900.	26000.	7900.	10400.	1334600.
38 AUTO SERV	1162900.	1017500.	634900.	282900.	113900.	114600.	2063200.
39 AMUSEMENTS	600.	800.	500.	200.	0.	2300.	2117800.
40 HEALTH SER	0.	0.	0.	0.	0.	0.	0.
41 SCHOOLS	0.	0.	0.	0.	0.	0.	0.
42 COLLEGES	0.	0.	0.	0.	0.	0.	110100.
43 ASSOC NEC	85100.	137400.	92100.	42600.	9100.	26000.	109900.
44 FED GOVT	109000.	183600.	111800.	31000.	6300.	14900.	793200.
45 ST/LOC GOV	924300.	1444800.	799900.	180600.	40300.	92800.	565700.
SUB-TOTALS	97690900.	137963400.	75028600.	21810000.	8437700.	13296500.	40930800.
46 HOUSEHOLDS	17726600.	17882900.	9371400.	17997400.	3765000.	18104500.	98361900.
47 IND BUS TX	6690800.	10249700.	5371200.	1659800.	565100.	797200.	5314300.
48 PROFITS	71750500.	111130900.	58237900.	46923900.	10777300.	7264700.	13893600.
49 PROP INC	29934700.	46365100.	24297500.	19593800.	4499200.	3029800.	30191800.
50 COMP IMPS	88217119.	151447754.	103139700.	22748364.	7943300.	14518639.	49044200.
51 N C IMPS	738000.	1004400.	553400.	114200.	44300.	74900.	340300.
TOTALS	312748619.	476044154.	275999700.	130847464.	36031900.	57086239.	238076900.

## APPENDIX I TRANSACTIONS AMONG SECTORS (continued)

	15	16	17	18	19	20	21
	COAL MINES	OIL/GAS EX	MINING NEC	RES CONSTR	CONSTR NEC	LS PRD MFG	FOOD MFG
1 DAIRY	0.	0.	0.	0.	0.	86516100.	5200.
2 POULTRY	0.	0.	0.	0.	0.	27719200.	1018900.
3 RANCHING	0.	0.	0.	0.	0.	43561200.	0.
4 FEEDLOTS	0.	900.	0.	0.	0.	550581000.	286000.
5 SHEEP/GOAT	0.	0.	0.	0.	0.	16779100.	0.
6 HOGS/PIGS	0.	0.	0.	0.	0.	52124800.	0.
7 LVSTK NEC	0.	0.	0.	0.	0.	161700.	1286900.
8 FOOD GRAIN	6500.	2900.	31700.	43000.	125700.	5900.	4095700.
9 FEED GRAIN	0.	0.	0.	0.	0.	0.	23967400.
10 HAY/PAST.	0.	0.	0.	0.	0.	0.	0.
11 VEGETABLES	0.	0.	0.	0.	0.	0.	3931300.
12 SUGARBEETS	0.	0.	0.	0.	0.	0.	18704800.
13 CROPS NEC	600.	43800.	0.	20000.	28800.	800.	2648200.
14 AG SERVICE	89000.	8000.	23900.	1860200.	13845800.	10600.	41000.
15 COAL MINES	31807200.	0.	81000.	900.	10200.	13600.	397200.
16 OIL/GAS EX	3807300.	67238200.	954000.	3757200.	27908100.	856100.	2015400.
17 MINING NEC	22300.	9600.	20129300.	1385900.	16190600.	0.	50300.
18 RES CONSTR	0.	0.	0.	0.	0.	0.	0.
19 CONSTR NEC	3216500.	119498200.	1636600.	2366600.	7432800.	2983500.	17318300.
20 LS PRD MFG	0.	30700.	0.	1100.	2000.	145103600.	16856200.
21 FOOD MFG	8400.	74300.	31700.	36600.	243300.	6187600.	132518400.
22 AG INPUTS	134900.	264700.	95200.	162700.	960300.	73600.	252300.
23 WOOD/PAPER	378100.	31500.	450000.	92376700.	40375700.	11776000.	38262100.
24 PRINT/PUBL	557300.	2196000.	713300.	271900.	233800.	4723600.	91428700.
25 REFINING	6394400.	14362800.	4640300.	16616800.	104953300.	3723200.	17602500.
26 MACH/EQUIP	4368200.	6163600.	2743900.	21709900.	81271600.	622100.	3726800.
27 MANUPR NEC	1183400.	6096500.	847500.	48947800.	194275700.	1131200.	94565500.
28 TRANSPORT	3090400.	8601900.	4172900.	40658500.	157079000.	10803300.	59383700.
29 COMMUNICAT	698000.	3563500.	1083100.	5491300.	17159800.	2398400.	38148000.
30 ELEC GENR	4072100.	12855800.	3900200.	2321400.	7325500.	4163700.	11850900.
31 UTILITIES	311400.	10842200.	6590300.	2965900.	10115700.	4713600.	23482000.
32 WHOLESALE	398300.	328700.	809800.	2209800.	6245200.	714500.	1203500.
33 RETAIL	981000.	1083200.	957800.	142159300.	133049300.	136900.	690500.
34 P/I/R/E	12948800.	205154800.	11391100.	24633900.	142084000.	8785300.	27692800.
35 LODGING	451300.	2372800.	863900.	2424200.	7063400.	176800.	1742300.
36 SERVICES	12317100.	31780200.	6342100.	107490000.	501447100.	13973500.	78976800.
37 FOOD/DRINK	808200.	16524000.	1154100.	2672200.	7023400.	3355200.	10153500.
38 AUTO SERV	3113100.	7340500.	4239500.	5105400.	56531000.	809700.	11729800.
39 AMUSEMENTS	29300.	187600.	23700.	8300.	67500.	33400.	609300.
40 HEALTH SER	0.	0.	0.	0.	0.	0.	13400.
41 SCHOOLS	0.	0.	0.	0.	0.	0.	0.
42 COLLEGES	312400.	500600.	200200.	0.	0.	1600.	67000.
43 ASSOC NEC	151200.	751000.	163000.	106900.	191800.	208500.	2054000.
44 FED GOVT	290800.	1096300.	1017000.	1837900.	4585100.	1885600.	3455000.
45 ST/LOC GOV	1019400.	6625000.	2814700.	2240000.	7089900.	3212600.	12765200.
SUB-TOTALS	92966900.	525629800.	78101800.	531882300.	1544915400.	1010027100.	754996800.
46 HOUSEHOLDS	169743600.	174531600.	149656900.	616210500.	2485395000.	186605300.	448940900.
47 IND BUS TX	22360700.	279780900.	37282600.	26385400.	64317600.	5055200.	297190000.
48 PROFITS	1621500.	54361500.	-27975400.	61106200.	260305200.	593400.	3124200.
49 PROP INC	74511000.	1031081300.	24610900.	42085600.	179725400.	50798500.	268538000.
50 COMP IMPS	151822991.	386533800.	86295090.	1121580100.	2867363400.	591276900.	1227947576.
51 N C IMPS	843200.	12696300.	5383500.	4031700.	10250300.	1443000.	64353500.
TOTALS	513869891.	2464615200.	353355390.	2403281800.	7412272300.	1845799400.	3065090976.

## APPENDIX I TRANSACTIONS AMONG SECTORS (continued)

	22	23	24	25	26	27	28
	AG INPUTS	WOOD/PAPER	PRINT/PUBL	REFINING	MACH/EQUIP	MANUFR NEC	TRANSPORT
1 DAIRY	100.	100.	0.	2400.	0.	0.	14600.
2 POULTRY	0.	0.	0.	23000.	0.	0.	43700.
3 RANCHING	1100.	9700.	100.	36000.	0.	0.	0.
4 FEEDLOTS	0.	0.	0.	8600.	23100.	83800.	11500.
5 SHEEP/GOAT	0.	0.	0.	0.	0.	0.	0.
6 HOGS/PIGS	0.	0.	0.	0.	0.	0.	0.
7 LVSTK NEC	0.	243400.	0.	32900.	0.	179500.	0.
8 FOOD GRAIN	2400.	5700.	3500.	15800.	6900.	39000.	81100.
9 FEED GRAIN	417900.	0.	0.	6300.	0.	0.	0.
10 HAY/PAST.	600.	5100.	0.	54500.	0.	0.	0.
11 VEGETABLES	100.	700.	0.	3300.	0.	0.	1000.
12 SUGARBEETS	0.	165700.	0.	1300.	0.	1200.	0.
13 CROPS NEC	100.	85400.	0.	69800.	3300.	42100.	40700.
14 AG SERVICE	16300.	56600.	3400.	344000.	94400.	48700.	99600.
15 COAL MINES	35000.	35100.	12700.	364300.	197400.	3299400.	2300.
16 OIL/GAS EX	208300.	795400.	414000.	330420500.	630200.	4433100.	23043900.
17 MINING NEC	192100.	31500.	0.	4165600.	3400.	26704600.	0.
18 RES CONSTR	0.	0.	0.	0.	0.	0.	0.
19 CONSTR NEC	1334800.	2471300.	2592800.	8677000.	19920800.	26968900.	88504800.
20 LS PRD MFG	3100.	200.	0.	440600.	654100.	1330400.	567000.
21 FOOD MFG	299600.	108200.	45300.	1622600.	307300.	260600.	577500.
22 AG INPUTS	5471300.	218900.	155600.	2830900.	3469800.	2598300.	221200.
23 WOOD/PAPER	688900.	18977400.	1317500.	2248200.	14902000.	11211000.	413900.
24 PRINT/PUBL	3297800.	1432300.	47946600.	9832600.	30806400.	12328600.	24219700.
25 REFINING	16284200.	5341600.	8607900.	99537200.	74511200.	61141000.	228194000.
26 MACH/EQUIP	2961100.	1551800.	8024000.	4236200.	630243800.	19364200.	24675700.
27 MANUFR NEC	2021200.	6525700.	1987300.	4317600.	73139600.	76690800.	8622300.
28 TRANSPORT	6354000.	12001800.	24815200.	42272200.	99206500.	79789600.	328396900.
29 COMMUNICAT	924300.	1377200.	11262500.	6013100.	32665900.	11763100.	27933700.
30 ELECT GENR	968200.	2100900.	3484100.	8116700.	22858500.	23163700.	30547000.
31 UTILITIES	3499800.	2022100.	1651300.	29605200.	17150300.	31589100.	13784200.
32 WHOLESALE	322300.	311400.	1414600.	431000.	11118300.	3158400.	4816300.
33 RETAIL	24800.	218200.	411800.	939600.	1623300.	2158500.	8557500.
34 F/I/R/E	4136200.	6833500.	22335600.	13955000.	108820900.	44232500.	83321100.
35 LODGING	672600.	429300.	5782000.	757400.	29645700.	4421000.	4336800.
36 SERVICES	6104200.	9736200.	43257300.	22998100.	230341400.	75070200.	133713800.
37 FOOD/DRINK	1322200.	2365800.	20462300.	6106500.	73645000.	20230900.	71725800.
38 AUTO SERV	304700.	1852700.	4328600.	1311800.	15291900.	7720200.	44688500.
39 AMUSEMENTS	8800.	63800.	255400.	127000.	2478800.	230300.	1899100.
40 HEALTH SER	0.	153100.	205500.	0.	4175300.	1052200.	0.
41 SCHOOLS	0.	0.	0.	0.	0.	0.	0.
42 COLLEGES	91200.	59600.	169400.	718400.	1923800.	433900.	685900.
43 ASSOC NEC	51200.	315400.	1568900.	425600.	6809600.	1629400.	6438900.
44 FED GOVT	263100.	806900.	14273600.	1389600.	12593900.	5464300.	4158600.
45 ST/LOC GOV	729500.	685400.	1422000.	5238500.	7977900.	7065500.	10963100.
SUB-TOTALS	59013100.	79395100.	228210800.	609696900.	1527240700.	565898000.	1175301700.
46 HOUSEHOLDS	35504600.	112706600.	342222100.	124452200.	2484431500.	931803000.	1208526500.
47 IND BUS TX	2628600.	4968600.	10824000.	32594200.	69278200.	41996500.	124014000.
48 PROFITS	-718600.	1480600.	4661200.	-1372600.	1828300.	1683100.	46838000.
49 PROP INC	35826200.	26358100.	105267000.	84126800.	505161000.	224077500.	443439900.
50 COMP IMPS	73709800.	205486000.	317532283.	567053500.	2080114349.	1200791292.	701866600.
51 N C IMPS	2907200.	864100.	1945300.	11323400.	25543600.	24828800.	172724500.
TOTALS	208870900.	431259100.	1010662683.	1427874400.	6693597649.	2991078192.	3872711200.

## APPENDIX I TRANSACTIONS AMONG SECTORS (continued)

	29	30	31	32	33	34	35
	COMMUNICAT	ELECT GENR	UTILITIES	WHOLESALE	RETAIL	F/I/R/E	LODGING
1 DAIRY	0.	0.	0.	3900.	0.	0.	38900.
2 POULTRY	0.	0.	0.	1100.	0.	0.	57500.
3 RANCHING	0.	0.	0.	52000.	0.	0.	0.
4 FEEDLOTS	0.	0.	0.	0.	0.	0.	53200.
5 SHEEP/GOAT	0.	0.	0.	0.	0.	0.	0.
6 HOGS/PIGS	0.	0.	0.	0.	0.	0.	0.
7 LVSTK NEC	0.	0.	0.	900.	0.	0.	0.
8 FOOD GRAIN	1100.	1200.	500.	20400.	17200.	5700.	3000.
9 FEED GRAIN	0.	0.	0.	0.	0.	0.	0.
10 HAY/PAST.	0.	0.	0.	26200.	0.	0.	0.
11 VEGETABLES	0.	0.	0.	4800.	0.	0.	116700.
12 SUGARBEETS	0.	0.	0.	1600.	0.	0.	0.
13 CROPS NEC	0.	0.	0.	29700.	24100.	77900.	513000.
14 AG SERVICE	12800.	71200.	17900.	562500.	119900.	33175900.	1388500.
15 COAL MINES	0.	17327300.	0.	0.	0.	34500.	0.
16 OIL/GAS EX	289700.	10875700.	180907200.	596500.	7085200.	3844800.	3252400.
17 MINING NEC	0.	15800.	0.	0.	0.	0.	0.
18 RES CONSTR	0.	0.	0.	0.	0.	0.	0.
19 CONSTR NEC	20299900.	37274800.	10151300.	2297100.	18907300.	364803500.	19893900.
20 LS PRD MFG	500.	0.	3900.	2000.	5800.	3500.	709100.
21 FOOD MFG	3500.	10800.	10300.	34500.	31900.	27400.	376200.
22 AG INPUTS	15900.	41200.	38900.	7000.	28100.	345900.	197800.
23 WOOD/PAPER	62100.	32100.	109500.	837900.	2093800.	276800.	682800.
24 PRINT/PUBL	3097600.	1212600.	386600.	6154700.	87386300.	95821100.	10189300.
25 REFINING	1123800.	71063600.	4328200.	3388200.	25629000.	15998100.	4678000.
26 MACH/EQUIP	25000300.	6189200.	415700.	585200.	2797200.	7275000.	307400.
27 MANUFR NEC	484400.	2030000.	609200.	521500.	4284400.	5997300.	2741400.
28 TRANSPORT	5356500.	25853500.	2264400.	10805200.	22721100.	40277500.	3998100.
29 COMMUNICAT	11193200.	2516100.	830200.	6955200.	67663200.	88177500.	15424400.
30 ELECT GENR	2237200.	17600.	1756400.	2067400.	36454100.	27972300.	16869500.
31 UTILITIES	3216600.	70312300.	220495700.	2663100.	12582700.	45722400.	9298200.
32 WHOLESALE	885200.	274700.	124900.	375600.	1417500.	1741500.	187800.
33 RETAIL	315700.	114100.	405600.	775900.	4855300.	10934700.	910100.
34 F/I/R/E	27645000.	12815900.	7215000.	15809600.	210289200.	1344244400.	51895700.
35 LODGING	778600.	612500.	424500.	1837400.	4711600.	18400700.	427900.
36 SERVICES	27317100.	11110500.	4601300.	28096500.	165085500.	408666300.	47473100.
37 FOOD/DRINK	7111200.	1460500.	556900.	15828500.	19160800.	69918900.	7025300.
38 AUTO SERV	1498500.	1755700.	501500.	9679100.	32244700.	17330900.	6157900.
39 AMUSEMENTS	41229700.	97900.	9000.	1537800.	2419100.	600600.	256400.
40 HEALTH SER	0.	0.	0.	0.	572600.	11180600.	0.
41 SCHOOLS	0.	0.	0.	0.	0.	0.	0.
42 COLLEGES	563100.	929800.	0.	0.	0.	165800.	0.
43 ASSOC NEC	708900.	348200.	193500.	572100.	3198800.	7140200.	2009800.
44 FED GOVT	2812200.	2777500.	1589100.	1826400.	17063000.	79874300.	3552100.
45 ST/LOC GOV	1786100.	2808400.	5974000.	870100.	8660100.	16205700.	6729300.
SUB-TOTALS	185046400.	279950700.	443921200.	114827600.	757509500.	2716241700.	217414700.
46 HOUSEHOLDS	774072100.	156408200.	100305000.	209326700.	1836638100.	1808828800.	188770000.
47 IND BUS TX	149440700.	61043900.	32457400.	62844700.	588942800.	1541742900.	22853500.
48 PROFITS	-4031900.	2857400.	1266100.	9452300.	126103400.	-51509600.	-16332700.
49 PROP INC	667956700.	373151700.	165222000.	56682800.	312659100.	6139741200.	85578800.
50 COMP IMPS	72392889.	300782000.	460767100.	51438935.	325121000.	682666873.	154518800.
51 N C IMPS	25345500.	2199800.	913500.	1673900.	2892300.	15496200.	1314500.
TOTALS	1870222389.	1176393700.	1204852300.	506246935.	3949866200.	12853208073.	654117600.

## APPENDIX I TRANSACTIONS AMONG SECTORS (continued)

	36	37	38	39	40	41	42
	SERVICBS	FOOD/DRINK	AUTO SERV	AMUSEMENTS	HEALTH SER	SCHOOLS	COLLEGES
1 DAIRY	0.	2838600.	0.	37000.	544700.	25200.	200.
2 POULTRY	0.	8401900.	0.	22600.	876200.	100.	100.
3 RANCHING	0.	0.	0.	30900.	0.	1800.	1000.
4 FEEDLOTS	0.	9964900.	0.	167400.	467200.	19000.	200.
5 SHEEP/GOAT	0.	0.	0.	0.	0.	0.	0.
6 HOGS/PIGS	0.	0.	0.	0.	0.	0.	0.
7 LVSTK NEC	76900.	81800.	0.	533400.	8100.	6600.	100600.
8 FOOD GRAIN	4600.	29200.	7800.	18100.	7500.	1600.	1000.
9 FEED GRAIN	70000.	0.	0.	8698000.	0.	0.	0.
10 HAY/PAST.	0.	0.	0.	14800.	0.	1400.	700.
11 VEGETABLES	0.	10942700.	0.	80800.	512000.	200.	100.
12 SUGARBETS	0.	0.	0.	1000.	0.	0.	0.
13 CROPS NEC	0.	238100.	0.	32500.	117600.	4400.	221100.
14 AG SERVICE	106200.	25300.	2100.	422900.	429500.	122700.	502900.
15 COAL MINES	0.	0.	0.	0.	0.	33600.	51100.
16 OIL/GAS EX	2745300.	1640400.	2929800.	895900.	4222800.	899400.	340800.
17 MINING NEC	0.	0.	0.	0.	4200.	0.	0.
18 RES CONSTR	0.	0.	0.	0.	0.	0.	0.
19 CONSTR NEC	12549700.	14113500.	7483800.	10128300.	26488000.	5376500.	8132700.
20 LS PRD MFG	5700.	213006700.	0.	1013700.	16009300.	432700.	14800.
21 FOOD MFG	265200.	155124100.	700.	1232200.	5870100.	226400.	67400.
22 AG INPUTS	1497700.	85800.	69500.	37700.	1165700.	24700.	86700.
23 WOOD/PAPER	857500.	7839600.	136100.	137300.	602200.	69500.	146800.
24 PRINT/PUBL	52882200.	20891300.	8364400.	6347500.	13956300.	2144400.	6201700.
25 REFINING	24893600.	5245300.	11401600.	1566700.	40873600.	1238800.	3410600.
26 MACH/EQUIP	47553200.	2879000.	19098200.	741800.	55391800.	794800.	1898200.
27 MANUPR NEC	5508000.	3949300.	11327000.	1115600.	4039700.	543400.	615000.
28 TRANSPORT	69181500.	38250400.	27441200.	5083000.	29571400.	2452700.	9801900.
29 COMMUNICAT	68779100.	19149500.	11949100.	6306700.	21913900.	2576200.	4027400.
30 ELBCT GENR	14713500.	21130500.	3484200.	3109100.	26308600.	1096600.	3035300.
31 UTILITIES	14013400.	14719500.	6183100.	2533200.	14513600.	1517300.	4907800.
32 WHOLESALE	3479200.	2101000.	57446100.	400600.	2152800.	335200.	269300.
33 RETAIL	4317200.	1774200.	18438700.	417800.	2338300.	95600.	490700.
34 F/I/R/E	182030100.	108172100.	25083100.	21855200.	181946400.	12577900.	32396800.
35 LODGING	37812800.	662200.	390800.	1817600.	3810600.	134400.	208600.
36 SERVICES	352609600.	90115600.	23389400.	24769400.	169221200.	8460800.	17541700.
37 FOOD/DRINK	77652600.	6103400.	3150100.	6345600.	35336100.	1316600.	4519500.
38 AUTO SERV	37666400.	3943600.	5331400.	5952900.	18077400.	1844700.	5877500.
39 AMUSEMENTS	2516300.	24437500.	65900.	31506200.	956500.	1172400.	1220800.
40 HEALTH SER	270900.	1538800.	0.	683600.	125446000.	158000.	0.
41 SCHOOLS	0.	0.	0.	0.	0.	0.	0.
42 COLLEGES	1850600.	0.	0.	0.	142700.	161300.	0.
43 ASSOC NEC	18805100.	3815700.	603800.	1969800.	6842300.	732200.	820100.
44 FED GOVT	35712000.	3872700.	752500.	1057800.	9279800.	602700.	1723500.
45 ST/LOC GOV	6976600.	5989500.	2021800.	1419200.	8208600.	853100.	1653800.
SUB-TOTALS	1077402700.	803073700.	246552200.	148503800.	827652700.	48054900.	110288400.
46 HOUSEHOLDS	2213410700.	828189600.	291667900.	165725900.	1453452000.	72211500.	247516600.
47 IND BUS TX	54678400.	116370300.	26319900.	28758400.	6828600.	0.	3172800.
48 PROFITS	537765100.	62369200.	31211800.	1840100.	207515400.	0.	3945600.
49 PROP INC	911533700.	154441700.	187895500.	76860300.	183383200.	-14300.	-2334900.
50 COMP IMPS	484364084.	851246100.	372852000.	77989200.	545712300.	36124600.	53026400.
51 N C IMPS	16036500.	38674600.	7059200.	1355000.	3306600.	166400.	378900.
TOTALS	5295191184.	2854365200.	1163558500.	501032700.	3227850800.	156543100.	415993800.

## APPENDIX I TRANSACTIONS AMONG SECTORS (continued)

	43	44	45		46	47	48
	ASSOC NEC	FED GOVT	ST/LOC GOV	SUB-TOTALS	HOUSEHOLDS	FED N MILI	FED MILITA
1 DAIRY	2000.	19900.	200.	104122100.	19948800.	3600.	0.
2 POULTRY	0.	64500.	100.	40141800.	25587300.	100.	0.
3 RANCHING	200.	0.	5000.	431569900.	876700.	900.	0.
4 FEEDLOTS	2700.	87000.	0.	561756500.	16946800.	200.	300.
5 SHEEP/GOAT	0.	0.	0.	25820800.	0.	0.	0.
6 HOGS/PIGS	0.	0.	0.	54654600.	0.	0.	0.
7 LVSTK NEC	130000.	0.	100.	81036600.	3889400.	0.	11600.
8 FOOD GRAIN	1700.	6400.	3500.	19695200.	366300.	6656500.	7200.
9 FEED GRAIN	0.	0.	0.	240721200.	751300.	9122600.	0.
10 HAY/PAST.	100.	0.	2400.	96149200.	3936600.	500.	0.
11 VEGETABLES	0.	109700.	300.	18732600.	37621800.	100.	0.
12 SUGARBRETS	0.	0.	200.	20262900.	58400.	0.	0.
13 CROPS NEC	44900.	1200.	21500.	11029400.	28158200.	100.	100.
14 AG SERVICE	372700.	6200.	179800.	84871900.	3203500.	578000.	65400.
15 COAL MINES	0.	772100.	4187000.	58687900.	557800.	0.	0.
16 OIL/GAS EX	473000.	336600.	5260700.	717949500.	80770100.	420300.	196400.
17 MINING NEC	0.	300.	3500.	69430700.	5200.	0.	100.
18 RES CONSTR	0.	0.	0.	0.	0.	0.	4679200.
19 CONSTR NEC	24338200.	1591600.	87236400.	995321100.	0.	532545100.	12738000.
20 LS PRD MFG	128700.	2192700.	200.	398664500.	569501600.	519400.	403000.
21 FOOD MFG	96200.	1778200.	15800.	357911100.	477965600.	316600.	183500.
22 AG INPUTS	21900.	11400.	814000.	38169500.	3491300.	53100.	521300.
23 WOOD/PAPER	101100.	120600.	6100.	248096400.	50298600.	370700.	178600.
24 PRINT/PUBL	25734800.	1702100.	1252800.	574577300.	97864700.	1021200.	1513700.
25 REFINING	5123900.	1739900.	14100000.	933124500.	299438400.	1543800.	14357000.
26 MACH/EQUIP	1265600.	587800.	1353600.	988515100.	136291000.	21492600.	27793100.
27 MANUFR NEC	981400.	1343400.	276500.	569184400.	102362300.	1304500.	1362600.
28 TRANSPORT	9209400.	26835200.	7546900.	1250138200.	621636200.	8853800.	43705800.
29 COMMUNICAT	5034600.	1294700.	1336500.	500166800.	273537400.	6189400.	3400.
30 ELECT GENR	3702800.	1167000.	22461300.	335451900.	150866600.	38900.	6678300.
31 UTILITIES	3887700.	1778800.	39345700.	634763700.	240777800.	1430900.	1413500.
32 WHOLESALE	393800.	251100.	310400.	109128300.	89654500.	844700.	1277900.
33 RETAIL	429300.	545200.	1590800.	351310800.	2436701900.	34500.	325000.
34 F/I/R/E	40034200.	7488300.	6296000.	3188017500.	4812908100.	10988800.	4121900.
35 LODGING	8821900.	356500.	408400.	145225400.	196560800.	1686500.	6822300.
36 SERVICES	19090300.	10737400.	9736800.	2717649000.	816016800.	154524500.	4739400.
37 FOOD/DRINK	11312700.	1556900.	4457000.	512193100.	1585536900.	990200.	3556000.
38 AUTO SERV	4830500.	2864800.	1042100.	331279800.	541467400.	403900.	1238500.
39 AMUSEMENTS	1907300.	315400.	10600.	118405700.	243529000.	465200.	0.
40 HEALTH SER	0.	0.	61000.	157012400.	2321245000.	5343000.	13456100.
41 SCHOOLS	0.	0.	0.	0.	83991500.	0.	0.
42 COLLEGES	27400.	114000.	166400.	9395200.	135922300.	33378900.	2397500.
43 ASSOC NEC	2437300.	64800.	269200.	72329600.	318311300.	465100.	921200.
44 FED GOVT	8860000.	2997900.	1651300.	230643500.	90117300.	3802200.	3636800.
45 ST/LOC GOV	2938100.	1071300.	5845600.	155493000.	231382100.	228917100.	795837300.
SUB-TOTALS	181736400.	71910900.	217255700.		17150054600.	1034307500.	954142000.
46 HOUSEHOLDS	288189900.	313641400.	4873723000.	25610037900.	0.	0.	0.
47 IND BUS TX	280200.	0.	0.	3789270700.	0.	0.	0.
48 PROFITS	39000.	0.	0.	1703506800.	0.	0.	0.
49 PROP INC	3771200.	-10684300.	59946400.	12645503800.	0.	0.	0.
50 COMP IMPS	102902500.	36486570.	156225800.	17803639708.	20439544400.	0.	0.
51 N C IMPS	2417500.	13709800.	713900.	480439000.	0.	0.	0.
TOTALS	579336700.	425064370.	5307864800.		37589599000.	1034307500.	954142000.

## APPENDIX I TRANSACTIONS AMONG SECTORS (continued)

	49	50	51	52	53	54	55
	ST/LO N ED	ST/LOC ED	INVENTORY	CAPITAL	DOM EXPORT	FOR EXPORT	TOTALS
1 DAIRY	0.	0.	0.	0.	22476900.	0.	146551400.
2 POULTRY	440900.	1151000.	0.	0.	6457600.	0.	73778700.
3 RANCHING	0.	0.	0.	0.	6048400.	0.	438495900.
4 FEEDLOTS	444200.	1703600.	32028300.	0.	710972100.	0.	1323852000.
5 SHEEP/GOAT	0.	0.	222300.	0.	34123200.	0.	60166300.
6 HOGS/PIGS	0.	0.	0.	0.	11786800.	0.	66441400.
7 LVSTK NEC	49200.	0.	217200.	0.	33826400.	0.	119030400.
8 FOOD GRAIN	0.	0.	5622400.	11800.	141193500.	139195719.	312748619.
9 FEED GRAIN	0.	0.	1168700.	0.	156045500.	68234854.	476044154.
10 HAY/PAST.	0.	0.	0.	0.	175913400.	0.	275999700.
11 VEGETABLES	0.	0.	0.	0.	72220500.	2272464.	130847464.
12 SUGARBETS	0.	0.	0.	0.	15710600.	0.	36031900.
13 CROPS NEC	0.	0.	0.	400.	16341400.	1556639.	57086239.
14 AG SERVICE	0.	0.	0.	0.	149358100.	0.	238076900.
15 COAL MINES	404100.	782300.	0.	0.	385644000.	67793791.	513869891.
16 OIL/GAS EX	100.	200.	581700.	1597800.	1663099100.	0.	2464615200.
17 MINING NEC	200.	500.	75600.	0.	221783600.	62059490.	353355390.
18 RES CONSTR	17960200.	3946000.	0.	2340282600.	36413800.	0.	2403281800.
19 CONSTR NEC	827518100.	622225500.	0.	1905798800.	2516125700.	0.	7412272300.
20 LS PRD MFG	8294200.	35620400.	5200.	0.	832791100.	0.	1845799400.
21 FOOD MFG	12200.	49600.	154300.	89300.	2208933300.	19475476.	3065090976.
22 AG INPUTS	0.	0.	0.	40029200.	126606500.	0.	208870900.
23 WOOD/PAPER	0.	0.	1500.	39190900.	93122400.	0.	431259100.
24 PRINT/PUBL	0.	0.	232700.	496000.	328470800.	6486283.	1010662683.
25 REFINING	100.	0.	600.	5914500.	173495500.	0.	1427874400.
26 MACH/EQUIP	0.	100.	28800.	691093600.	4001020900.	827362449.	6693597649.
27 MANUFR NEC	15400.	95100.	11500.	15574700.	2175235500.	125932192.	2991078192.
28 TRANSPORT	10363000.	21069800.	1000.	19892800.	1897050600.	0.	3872711200.
29 COMMUNICAT	12764100.	32188800.	0.	21808200.	1002778400.	20785889.	1870222389.
30 ELECT GENR	26865600.	45594000.	0.	0.	610898400.	0.	1176393700.
31 UTILITIES	0.	0.	700.	55100.	326410600.	0.	1204852300.
32 WHOLESALE	0.	0.	0.	23249900.	33274200.	248817435.	506246935.
33 RETAIL	0.	175900.	0.	27022300.	1134295800.	0.	3949866200.
34 F/I/R/E	87518600.	0.	0.	147089500.	4512199200.	90364473.	12853208073.
35 LODGING	0.	0.	0.	354200.	303468400.	0.	654117600.
36 SERVICES	0.	0.	0.	777100.	1503501700.	97982684.	5295191184.
37 FOOD/DRINK	0.	0.	0.	0.	752089000.	0.	2854365200.
38 AUTO SERV	0.	0.	0.	0.	289168900.	0.	1163558500.
39 AMUSEMENTS	0.	0.	0.	0.	138632800.	0.	501032700.
40 HEALTH SER	0.	0.	0.	0.	730794300.	0.	3227850800.
41 SCHOOLS	0.	0.	0.	0.	72551600.	0.	156543100.
42 COLLEGES	0.	2497900.	0.	0.	232402000.	0.	415993800.
43 ASSOC NEC	112100.	0.	0.	0.	187197400.	0.	579336700.
44 FED GOVT	10156300.	3503700.	0.	193700.	81031300.	1979570.	425064370.
45 ST/LOC GOV	1980163600.	1734745300.	0.	2029600.	179296800.	0.	5307864800.
SUB-TOTALS	2983082200.	2505349700.	40352500.	5282552000.	30302258000.	1780299408.	
46 HOUSEHOLDS	0.	0.	0.	0.	11979561100.	0.	37589599000.
47 IND BUS TX	0.	0.	0.	0.	0.	0.	3789270700.
48 PROFITS	0.	0.	0.	0.	0.	0.	1703506800.
49 PROP INC	0.	0.	0.	0.	0.	0.	12645503800.
50 COMP INPS	0.	0.	0.	0.	0.	0.	38243184108.
51 N C INPS	0.	0.	0.	0.	0.	0.	480439000.
TOTALS	2983082200.	2505349700.	40352500.	5282552000.	42281819100.	1780299408.	

## APPENDIX II SALES COEFFICIENT MATRIX

	1	2	3	4	5	6	7
	DAIRY	POULTRY	RANCHING	FEEDLOTS	SHEEP/GOAT	HOGS/PIGS	LVSTK NEC
1 DAIRY	.00006551	.00019038	.02184421	.00521524	.00264822	.00289250	.00093551
2 POULTRY	.00002846	.00012063	.00005422	.00001898	.00001220	.00000678	.00000542
3 RANCHING	.00046888	.00070240	.00399274	.86649590	.00033227	.00040160	.00013820
4 FEEDLOTS	.00000000	.00000000	.00000000	.00000000	.00000000	.00000000	.00000000
5 SHEEP/GOAT	.00000000	.00000000	.00000000	.00000000	.15027848	.00000000	.00000000
6 HOGS/PIGS	.00000000	.00000000	.00000000	.00000000	.00000000	.03807566	.00000000
7 LVSTK NEC	.00002352	.00005041	.00724437	.00179954	.00090901	.00102327	.48520966
8 FOOD GRAIN	.00042494	.00073126	.00446397	.00085628	.00039936	.00046395	.00018289
9 FEED GRAIN	.00057306	.00981926	.00244473	.35935364	.00451555	.01043097	.01338153
10 HAY/PAST.	.08337400	.00054130	.21321980	.00053152	.00618733	.01439349	.02154350
11 VEGETABLES	.00013145	.00021552	.00278874	.00059764	.00028736	.00033474	.00011005
12 SUGARBEETS	.00018317	.00029141	.00124334	.00024700	.00011379	.00014154	.00004996
13 CROPS NEC	.00010861	.00031181	.00038713	.00010160	.00005430	.00005606	.00002452
14 AG SERVICE	.00586701	.01553532	.02422033	.00596110	.00304271	.00329305	.00140249
15 COAL MINES	.00000000	.00003620	.00000000	.00000000	.00000000	.00000000	.00000000
16 OIL/GAS EX	.00011426	.00000377	.00093617	.00021370	.00009072	.00015836	.00007518
17 MINING NEC	.00000792	.00000028	.00000028	.00000000	.00000000	.00000000	.00000000
18 RES CONSTR	.00000000	.00000000	.00000000	.00000000	.00000000	.00000000	.00000000
19 CONSTR NEC	.00012891	.00004551	.00043138	.00011231	.00005886	.00006138	.00002756
20 LS PRD MFG	.00000601	.00001766	.00002687	.00000775	.00000412	.00000385	.00000715
21 FOOD MFG	.00224342	.00229993	.00715440	.00190513	.00102408	.00099110	.00065760
22 AG INPUTS	.00156125	.00047063	.01015843	.00295015	.00161679	.00155982	.00080768
23 WOOD/PAPER	.00002898	.00001925	.00004916	.00001067	.00000510	.00000603	.00000255
24 PRINT/PUBL	.00002949	.00001801	.00011181	.00003137	.00001781	.00001435	.00000792
25 REFINING	.00055677	.00038673	.00169133	.00056202	.00033035	.00026452	.00016178
26 MACH/EQUIP	.00000996	.00000376	.00004277	.00001537	.00000950	.00000630	.00000387
27 MANUFR NEC	.00003731	.00001484	.00010351	.00003200	.00001772	.00001642	.00004898
28 TRANSPORT	.00072913	.00028484	.00203475	.00051579	.00027454	.00026356	.00013789
29 COMMUNICAT	.00012747	.00006368	.00059693	.00015105	.00007940	.00008058	.00004005
30 ELECT GENR	.00047969	.00026734	.00161757	.00049346	.00027661	.00025323	.00014272
31 UTILITIES	.00000656	.00000274	.00003942	.00000880	.00000432	.00000490	.00000191
32 WHOLESale	.00026608	.00013590	.00179754	.00049916	.00027654	.00024612	.00013491
33 RETAIL	.00002686	.00002134	.00022553	.00005507	.00002879	.00002866	.00001400
34 F/I/R/E	.00042078	.00011896	.00209692	.00053899	.00028876	.00027438	.00012206
35 LODGING	.00014432	.00006635	.00068199	.00016052	.00008210	.00008607	.00004250
36 SERVICES	.00011546	.00003210	.00059877	.00016269	.00008799	.00008502	.00004162
37 FOOD/DRINK	.00000942	.00000452	.00004600	.00001125	.00000592	.00000589	.00000287
38 AUTO SERV	.00025173	.00006308	.00245136	.00063263	.00033604	.00033286	.00016321
39 AMUSEMENTS	.00000020	.00000020	.00000240	.00000060	.00000000	.00000020	.00000000
40 HEALTH SER	.00016816	.00029685	.00192961	.00050247	.00026696	.00026721	.00013191
41 SCHOOLS	.00000000	.00000000	.00000000	.00000000	.00000000	.00000000	.00000000
42 COLLEGES	.00000000	.00000000	.00000000	.00000000	.00000000	.00000000	.00000000
43 ASSOC NEC	.00009701	.00005662	.00035195	.00010184	.00005748	.00004937	.00002831
44 FED GOVT	.00006822	.00003341	.00034136	.00008352	.00004305	.00004588	.00002258
45 ST/LOC GOV	.00002883	.00001155	.00016911	.00003866	.00001937	.00002118	.00000985
46 HOUSEHOLDS	.00023669	.00010985	.00069868	.00211050	.00009584	.00010596	.00020786
47 IND BUS TX	.00063490	.00017550	.00237478	.00717349	.00032587	.00036017	.00062286
48 PROFITS	.00988197	.00090067	.00574527	.01735449	.00078814	.00087132	.00173430
49 PROP INC	.00055462	.00004978	.00031811	.00096086	.00004364	.00004825	.00009614
50 COMP INPS	.00171037	.00117227	.00591942	.01564696	.00069375	.00087932	.00071704
51 N C INPS	.00076680	.00010095	.00644223	.00106465	.00054866	.00067480	.00034489

## APPENDIX II SALES COEFFICIENT MATRIX (continued)

	8	9	10	11	12	13	14
	FOOD GRAIN	FEED GRAIN	HAY/PAST.	VEGETABLES	SUGARBEETS	CROPS NEC	AG SERVICE
1 DAIRY	.00148958	.03831625	.02209600	.00026339	.00002184	.00003139	.00001774
2 POULTRY	.00382902	.00833845	.00513969	.00025617	.00000542	.00001084	.00810125
3 RANCHING	.00407689	.00402079	.00189124	.00138200	.00028210	.00022304	.00014048
4 FEEDLOTS	.00000000	.00000000	.00000000	.00000000	.00000000	.00000000	.00000000
5 SHEEP/GOAT	.00000000	.00000000	.00000000	.00000000	.00000000	.00000000	.00000000
6 HOGS/PIGS	.00000000	.00000000	.00000000	.00000000	.00000000	.00000000	.00000000
7 LVSTK NEC	.04311168	.08727518	.01315210	.00341341	.00158867	.00070822	.01141389
8 FOOD GRAIN	.03563533	.00287196	.00114181	.00078338	.00015955	.00009113	.00007226
9 FEED GRAIN	.00000000	.03536647	.00000000	.00000000	.00000000	.00000000	.00012814
10 HAY/PAST.	.00262863	.00260399	.00138804	.00104022	.00021268	.00020399	.00011522
11 VEGTABLES	.00084220	.00080093	.00047613	.01637097	.00007413	.00007642	.00004203
12 SUGARBEETS	.00114066	.00108515	.00064387	.00049401	.03263220	.00009991	.00013044
13 CROPS NEC	.00027152	.01258797	.00739933	.01052268	.00003503	.04175437	.04409819
14 AG SERVICE	.01911357	.01925806	.01370818	.01098175	.00224087	.00303095	.00176246
15 COAL MINES	.00000078	.00000214	.00000000	.00000019	.00000000	.00001129	.00000000
16 OIL/GAS EX	.00203833	.00231140	.00275946	.00048442	.00019853	.00022064	.00048653
17 MINING NEC	.00035319	.00094381	.00000566	.00009056	.00003113	.00002689	.00001670
18 RES CONSTR	.00000000	.00000000	.00000000	.00000000	.00000000	.00000000	.00000000
19 CONSTR NEC	.00037407	.00053911	.00037744	.00011465	.00004000	.00004030	.00025659
20 LS PRD MFG	.00000022	.00000049	.00000033	.00000005	.00000000	.00000005	.00000466
21 FOOD MFG	.00001964	.00003625	.00003328	.00000525	.00000196	.00000525	.00007207
22 AG INPUTS	.01064533	.01920612	.01352127	.00352897	.00155982	.00189256	.01080955
23 WOOD/PAPER	.00004429	.00006748	.00005356	.00005959	.00000742	.00018203	.00079859
24 PRINT/PUBL	.00004977	.00007728	.00004898	.00002256	.00000574	.00033295	.00008588
25 REFINING	.00369360	.00613857	.00492018	.00083698	.00033574	.00256773	.00235364
26 MACH/EQUIP	.00003972	.00007285	.00005611	.00001240	.00000596	.00002652	.00010098
27 MANUPR NEC	.00006546	.00012323	.00008007	.00009040	.00000876	.00003658	.00014878
28 TRANSPORT	.00111059	.00164427	.00102778	.00035280	.00005867	.00013099	.00095290
29 COMMUNICAT	.00027296	.00044920	.00026794	.00011854	.00002877	.00012694	.00003331
30 BLECT GENR	.00063287	.00161995	.00139724	.00038491	.00000000	.00034920	.00070461
31 UTILITIES	.00121492	.00304120	.00175972	.00045118	.00000124	.00051077	.00021422
32 WHOLESALE	.00074154	.00079961	.00053511	.00020998	.00007091	.00011417	.00108504
33 RETAIL	.00053420	.00067835	.00040353	.00006998	.00003463	.00004074	.00026117
34 F/I/R/E	.00324988	.00360888	.00217050	.00046397	.00026905	.00010770	.00057666
35 LODGING	.00062680	.00091390	.00047973	.00015808	.00005427	.00005137	.00022641
36 SERVICES	.00068963	.00114721	.00080171	.00015289	.00009108	.00011318	.00080558
37 FOOD/DRINK	.00001825	.00003412	.00002028	.00000911	.00000277	.00000364	.00046756
38 AUTO SERV	.00099943	.00087447	.00054565	.00024313	.00009789	.00009849	.00177318
39 AMUSEMENTS	.00000120	.00000160	.00000100	.00000040	.00000000	.00000459	.00422687
40 HEALTH SER	.00000000	.00000000	.00000000	.00000000	.00000000	.00000000	.00000000
41 SCHOOLS	.00000000	.00000000	.00000000	.00000000	.00000000	.00000000	.00000000
42 COLLEGES	.00000000	.00000000	.00000000	.00000000	.00000000	.00000000	.00026467
43 ASSOC NEC	.00014689	.00023717	.00015897	.00007353	.00001571	.00004488	.00018970
44 FED GOVT	.00025643	.00043193	.00026302	.00007293	.00001482	.00003505	.00186607
45 ST/LOC GOV	.00017414	.00027220	.00015070	.00003402	.00000759	.00001748	.00010658
46 HOUSEHOLDS	.00047158	.00047574	.00024931	.00047879	.00010016	.00048164	.00261673
47 IND BUS TX	.00176572	.00270493	.00141748	.00043803	.00014913	.00021038	.00140246
48 PROFITS	.04211929	.06523655	.03418707	.02754547	.00632654	.00426456	.00815588
49 PROP INC	.00236722	.00366653	.00192143	.00154947	.00035579	.00023960	.00238755
50 COMP INPS	.00230674	.00396012	.00269694	.00059483	.00020770	.00037964	.00128243
51 N C INPS	.00153610	.00209059	.00115186	.00023770	.00009221	.00015590	.00070831

## APPENDIX II SALES COEFFICIENT MATRIX (continued)

	15	16	17	18	19	20	21
	COAL MINES	OIL/GAS EX	MINING NEC	RES CONSTR	CONSTR NEC	LS PRD MFG	FOOD MFG
1 DAIRY	.00000000	.00000000	.00000000	.00000000	.00000000	.59034646	.00003548
2 POULTRY	.00000000	.00000000	.00000000	.00000000	.00000000	.37570735	.01381022
3 RANCHING	.00000000	.00000000	.00000000	.00000000	.00000000	.09934232	.00000000
4 FEEDLOTS	.00000000	.00000068	.00000000	.00000000	.00000000	.41589317	.00021604
5 SHEEP/GOAT	.00000000	.00000000	.00000000	.00000000	.00000000	.27887871	.00000000
6 HOGS/PIGS	.00000000	.00000000	.00000000	.00000000	.00000000	.78452290	.00000000
7 LVSTK NEC	.00000000	.00000000	.00000000	.00000000	.00000000	.00135848	.01081152
8 FOOD GRAIN	.00002078	.00000927	.00010136	.00013749	.00040192	.00001886	.01309582
9 FEED GRAIN	.00000000	.00000000	.00000000	.00000000	.00000000	.00000000	.05034701
10 HAY/PAST.	.00000000	.00000000	.00000000	.00000000	.00000000	.00000000	.00000000
11 VEGETABLES	.00000000	.00000000	.00000000	.00000000	.00000000	.00000000	.03004491
12 SUGARBEETS	.00000000	.00000000	.00000000	.00000000	.00000000	.00000000	.51911778
13 CROPS NEC	.00001051	.00076726	.00000000	.00035035	.00050450	.00001401	.04638946
14 AG SERVICE	.00037383	.00003360	.00010039	.00781344	.05815684	.00004452	.00017221
15 COAL MINES	.06189738	.00000000	.00015763	.00000175	.00001985	.00002647	.00077296
16 OIL/GAS EX	.00154478	.02728142	.00038708	.00152446	.01132351	.00034736	.00081773
17 MINING NEC	.00006311	.00002717	.05696616	.00392211	.04581959	.00000000	.00014235
18 RES CONSTR	.00000000	.00000000	.00000000	.00000000	.00000000	.00000000	.00000000
19 CONSTR NEC	.00043394	.01612167	.00022080	.00031928	.00100277	.00040251	.00233644
20 LS PRD MFG	.00000000	.00001663	.00000000	.00000060	.00000108	.07861288	.00913219
21 FOOD MFG	.00000274	.00002424	.00001034	.00001194	.00007938	.00201873	.04323474
22 AG INPUTS	.00064585	.00126729	.00045578	.00077895	.00459758	.00035237	.00120792
23 WOOD/PAPER	.00087674	.00007304	.00104346	.21420232	.09362284	.02730609	.08872184
24 PRINT/PUBL	.00055142	.00217283	.00070577	.00026903	.00023133	.00467377	.09046411
25 REFINING	.00447827	.01005887	.00324980	.01163744	.07350317	.00260751	.01232776
26 MACH/EQUIP	.00065259	.00092082	.00040993	.00324338	.01214169	.00009294	.00055677
27 MANUPR NEC	.00039564	.00203823	.00028334	.01636460	.06495173	.00037819	.03161586
28 TRANSPORT	.00079799	.00222116	.00107751	.01049872	.04056047	.00278960	.01533388
29 COMMUNICAT	.00037322	.00190539	.00057913	.00293617	.00917527	.00128241	.02039757
30 ELECT GENR	.00346151	.01092814	.00331539	.00197332	.00622708	.00353938	.01007392
31 UTILITIES	.00025845	.00899878	.00546980	.00246163	.00839580	.00391218	.01948953
32 WHOLESALE	.00078677	.00064929	.00159961	.00436506	.01233627	.00141137	.00237730
33 RETAIL	.00024836	.00027424	.00024249	.03599092	.03368451	.00003466	.00017482
34 F/I/R/E	.00100744	.01596137	.00088625	.00191656	.01105436	.00068351	.00215454
35 LODGING	.00068994	.00362748	.00132071	.00370606	.01079836	.00027029	.00266359
36 SERVICES	.00232609	.00600171	.00119771	.02029955	.09469858	.00263890	.01491482
37 FOOD/DRINK	.00028315	.00578903	.00040433	.00093618	.00246058	.00117546	.00355718
38 AUTO SERV	.00267550	.00630866	.00364356	.00438775	.04858458	.00069588	.01008097
39 AMUSEMENTS	.00005848	.00037443	.00004730	.00001657	.00013472	.00006666	.00121609
40 HEALTH SER	.00000000	.00000000	.00000000	.00000000	.00000000	.00000000	.00000415
41 SCHOOLS	.00000000	.00000000	.00000000	.00000000	.00000000	.00000000	.00000000
42 COLLEGES	.00075097	.00120338	.00048126	.00000000	.00000000	.00000385	.00016106
43 ASSOC NEC	.00026099	.00129631	.00028136	.00018452	.00033107	.00035989	.00354543
44 FED GOVT	.00068413	.00257914	.00239258	.00432382	.01078684	.00443603	.00812818
45 ST/LOC GOV	.00019205	.00124815	.00053029	.00042202	.00133573	.00060525	.00240496
46 HOUSEHOLDS	.00451571	.00464308	.00398134	.01639311	.06611922	.00496428	.01194322
47 IND BUS TX	.00590106	.07383503	.00983899	.00696319	.01697361	.00133408	.07842934
48 PROFITS	.00095186	.03191153	-.01642224	.03587083	.15280550	.00034834	.00183398
49 PROP INC	.00589229	.08153738	.00194622	.00332811	.01421259	.00401712	.02123585
50 COMP IMPS	.00396994	.01010726	.00225648	.02932758	.07497711	.01546097	.03210893
51 N C IMPS	.00175506	.02642646	.01120538	.00839170	.02133528	.00300350	.13394729

## APPENDIX II SALES COEFFICIENT MATRIX (continued)

	22	23	24	25	26	27	28
	AG INPUTS	WOOD/PAPER	PRINT/PUBL	REFINING	MACH/EQUIP	MANUPR NEC	TRANSPORT
1 DAIRY	.00000068	.00000068	.00000000	.00001638	.00000000	.00000000	.00009962
2 POULTRY	.00000000	.00000000	.00000000	.00031174	.00000000	.00000000	.00059231
3 RANCHING	.00000251	.00002212	.00000023	.00008210	.00000000	.00000000	.00000000
4 FREDLOTS	.00000000	.00000000	.00000000	.00000650	.00001745	.00006330	.00000869
5 SHEEP/GOAT	.00000000	.00000000	.00000000	.00000000	.00000000	.00000000	.00000000
6 HOGS/PIGS	.00000000	.00000000	.00000000	.00000000	.00000000	.00000000	.00000000
7 LVSTK NEC	.00000000	.00204486	.00000000	.00027640	.00000000	.00150802	.00000000
8 FOOD GRAIN	.00000767	.00001823	.00001119	.00005052	.00002206	.00012470	.00025931
9 FEED GRAIN	.00087786	.00000000	.00000000	.00001323	.00000000	.00000000	.00000000
10 HAY/PAST.	.00000217	.00001848	.00000000	.00019746	.00000000	.00000000	.00000000
11 VEGETABLES	.00000076	.00000535	.00000000	.00002522	.00000000	.00000000	.00000764
12 SUGARBETS	.00000000	.00459870	.00000000	.00003608	.00000000	.00003330	.00000000
13 CROPS NEC	.00000175	.00149598	.00000000	.00122271	.00005781	.00073748	.00071296
14 AG SERVICE	.00006847	.00023774	.00001428	.00144491	.00039651	.00020456	.00041835
15 COAL MINES	.00006811	.00006831	.00002471	.00070893	.00038414	.00642069	.00000448
16 OIL/GAS EX	.00008452	.00032273	.00016798	.13406576	.00025570	.00179870	.00934990
17 MINING NEC	.00054365	.00008915	.00000000	.01178870	.00000962	.07557434	.00000000
18 RES CONSTR	.00000000	.00000000	.00000000	.00000000	.00000000	.00000000	.00000000
19 CONSTR NEC	.00018008	.00033341	.00034980	.00117063	.00268754	.00363841	.01194031
20 LS PRD MFG	.00000168	.00000011	.00000000	.00023870	.00035437	.00072077	.00030718
21 FOOD MFG	.00009775	.00003530	.00001478	.00052938	.00010026	.00008502	.00018841
22 AG INPUTS	.02619465	.00104802	.00074496	.01355335	.01661218	.01243974	.00105903
23 WOOD/PAPER	.00159742	.04400464	.00305501	.00521311	.03455463	.02599597	.00095975
24 PRINT/PUBL	.00326301	.00141719	.04744075	.00972886	.03048139	.01219853	.02396418
25 REFINING	.01140450	.00374095	.00602847	.06971005	.05218330	.04281959	.15981378
26 MACH/EQUIP	.00044238	.00023183	.00119876	.00063287	.09415621	.00289294	.00368646
27 MANUPR NEC	.00067574	.00218172	.00066441	.00144349	.02445259	.02563985	.00288267
28 TRANSPORT	.00164071	.00309907	.00640771	.01091540	.02561681	.02060303	.08479767
29 COMMUNICAT	.00049422	.00073638	.00602201	.00321518	.01746632	.00628968	.01493603
30 ELECT GENR	.00082302	.00178588	.00296168	.00689965	.01943099	.01969043	.02596665
31 UTILITIES	.00290475	.00167830	.00137054	.02457164	.01423436	.02621823	.01144057
32 WHOLESALE	.00063665	.00061511	.00279429	.00085136	.02196221	.00623885	.00951374
33 RETAIL	.00000628	.00005524	.00010426	.00023788	.00041098	.00054647	.00216653
34 F/I/R/E	.00032180	.00053166	.00173775	.00108572	.00846644	.00344136	.00648251
35 LODGING	.00102826	.00065630	.00883939	.00115790	.04532167	.00675872	.00663000
36 SERVICES	.00115278	.00183869	.00816917	.00434320	.04350011	.01417705	.02525193
37 FOOD/DRINK	.00046322	.00082884	.00716877	.00213935	.02580083	.00708771	.02512846
38 AUTO SERV	.00026187	.00159227	.00372014	.00112740	.01314236	.00663499	.03840675
39 AMUSEMENTS	.00001756	.00012734	.00050975	.00025348	.00494738	.00045965	.00379037
40 HEALTH SER	.00000000	.00004743	.00006366	.00000000	.00129352	.00032598	.00000000
41 SCHOOLS	.00000000	.00000000	.00000000	.00000000	.00000000	.00000000	.00000000
42 COLLEGES	.00021923	.00014327	.00040722	.00172695	.00462459	.00104304	.00164882
43 ASSOC NEC	.00008838	.00054442	.00270810	.00073463	.01175413	.00281253	.01111426
44 FED GOVT	.00061897	.00189830	.03357986	.00326915	.02962822	.01285523	.00978346
45 ST/LOC GOV	.00013744	.00012913	.00026790	.00098693	.00150303	.00133114	.00206544
46 HOUSEHOLDS	.00094453	.00299835	.00910417	.00331081	.06609359	.02478885	.03215056
47 IND BUS TX	.00069370	.00131123	.00285649	.00860171	.01828273	.01108300	.03272767
48 PROFITS	-.00042184	.00086915	.00273624	-.00080575	.00107326	.00098802	.02749505
49 PROP INC	.00283312	.00208439	.00832446	.00665270	.03994787	.01771993	.03506700
50 COMP IMPS	.00192740	.00537314	.00830298	.01482757	.05439177	.03139883	.01835272
51 N C IMPS	.00605113	.00179856	.00404901	.02356886	.05316721	.05167940	.35951390

## APPENDIX II SALES COEFFICIENT MATRIX (continued)

	29	30	31	32	33	34	35
	COMMUNICAT	ELECT GENR	UTILITIES	WHOLESALE	RETAIL	F/I/R/E	LODGING
1 DAIRY	.00000000	.00000000	.00000000	.00002661	.00000000	.00000000	.00026544
2 POULTRY	.00000000	.00000000	.00000000	.00001491	.00000000	.00000000	.00077936
3 RANCHING	.00000000	.00000000	.00000000	.00011859	.00000000	.00000000	.00000000
4 FEEDLOTS	.00000000	.00000000	.00000000	.00000000	.00000000	.00000000	.00004019
5 SHEEP/GOAT	.00000000	.00000000	.00000000	.00000000	.00000000	.00000000	.00000000
6 HOGS/PIGS	.00000000	.00000000	.00000000	.00000000	.00000000	.00000000	.00000000
7 LVSTK NEC	.00000000	.00000000	.00000000	.00000756	.00000000	.00000000	.00000000
8 FOOD GRAIN	.00000352	.00000384	.00000160	.00006523	.00005500	.00001823	.00000959
9 FEED GRAIN	.00000000	.00000000	.00000000	.00000000	.00000000	.00000000	.00000000
10 HAY/PAST.	.00000000	.00000000	.00000000	.00009493	.00000000	.00000000	.00000000
11 VEGETABLES	.00000000	.00000000	.00000000	.00003668	.00000000	.00000000	.00089188
12 SUGARBETS	.00000000	.00000000	.00000000	.00004441	.00000000	.00000000	.00000000
13 CROPS NEC	.00000000	.00000000	.00000000	.00052027	.00042217	.00136460	.00898640
14 AG SERVICE	.00005376	.00029906	.00007519	.00236268	.00050362	.13934951	.00583215
15 COAL MINES	.00000000	.03371924	.00000000	.00000000	.00000000	.00006714	.00000000
16 OIL/GAS EX	.00011754	.00441274	.07340180	.00024203	.00287477	.00156000	.00131964
17 MINING NEC	.00000000	.00004471	.00000000	.00000000	.00000000	.00000000	.00000000
18 RES CONSTR	.00000000	.00000000	.00000000	.00000000	.00000000	.00000000	.00000000
19 CONSTR NEC	.00273869	.00502880	.00136953	.00030990	.00255081	.04921615	.00268391
20 LS PRD MFG	.00000027	.00000000	.00000211	.00000108	.00000314	.00000190	.00038417
21 FOOD MFG	.00000114	.00000352	.00000336	.00001126	.00001041	.00000894	.00012274
22 AG INPUTS	.00007612	.00019725	.00018624	.00003351	.00013453	.00165605	.00094700
23 WOOD/PAPER	.00014400	.00007443	.00025391	.00194292	.00485509	.00064184	.00158327
24 PRINT/PUBL	.00306492	.00119981	.00038252	.00608977	.08646436	.09481017	.01008180
25 REFINING	.00078704	.04976880	.00303122	.00237290	.01794906	.01120414	.00327620
26 MACH/EQUIP	.00373496	.00092464	.00006210	.00008743	.00041789	.00108686	.00004592
27 MANUFR NEC	.00016195	.00067869	.00020367	.00017435	.00143239	.00200506	.00091653
28 TRANSPORT	.00138314	.00667581	.00058471	.00279009	.00586698	.01040034	.00103238
29 COMMUNICAT	.00598496	.00134535	.00044390	.00371892	.03617923	.04714814	.00824736
30 ELECT GENR	.00190174	.00001496	.00149304	.00175740	.03098801	.02377801	.01434001
31 UTILITIES	.00266970	.05835761	.18300641	.00221031	.01044335	.03794855	.00771729
32 WHOLESALE	.00174855	.00054262	.00024672	.00074193	.00280002	.00344002	.00037097
33 RETAIL	.00007993	.00002889	.00010269	.00019644	.00122923	.00276837	.00023041
34 F/I/R/E	.00215082	.00099710	.00056134	.00123001	.01636083	.10458435	.00403757
35 LODGING	.00119031	.00093638	.00064897	.00280898	.00720299	.02813057	.00065416
36 SERVICES	.00515885	.00209822	.00086896	.00530604	.03117649	.07717687	.00896532
37 FOOD/DRINK	.00249134	.00051167	.00019510	.00554537	.00671281	.02449543	.00246125
38 AUTO SERV	.00128786	.00150891	.00043101	.00831853	.02771214	.01489474	.00529230
39 AMUSEMENTS	.08228944	.00019540	.00001796	.00306926	.00482823	.00119872	.00051174
40 HEALTH SER	.00000000	.00000000	.00000000	.00000000	.00017739	.00346379	.00000000
41 SCHOOLS	.00000000	.00000000	.00000000	.00000000	.00000000	.00000000	.00000000
42 COLLEGES	.00135363	.00223513	.00000000	.00000000	.00000000	.00039856	.00000000
43 ASSOC NEC	.00122364	.00060103	.00033400	.00098751	.00552149	.01232478	.00346914
44 FED GOVT	.00661594	.00653430	.00373849	.00429676	.04014216	.18791107	.00835662
45 ST/LOC GOV	.00033650	.00052910	.00112550	.00016393	.00163156	.00305315	.00126780
46 HOUSEHOLDS	.02059272	.00416094	.00266842	.00556874	.04886027	.04812046	.00502187
47 IND BUS TX	.03943785	.01610967	.00856561	.01658491	.15542379	.40687061	.00603111
48 PROFITS	-.00236682	.00167736	.00074323	.00554873	.07402577	-.03023739	-.00958769
49 PROP INC	.05282168	.02950865	.01306567	.00448245	.02472492	.48552761	.00676753
50 COMP INPS	.00189296	.00786498	.01204835	.00134505	.00850141	.01785068	.00404043
51 N C INPS	.05275488	.00457873	.00190139	.00348411	.00602012	.03225425	.00273604

## APPENDIX II SALES COEFFICIENT MATRIX (continued)

	36	37	38	39	40	41	42	
	SERVICES	FOOD/DRINK	AUTO SERV	AMUSEMENTS	HEALTH SER	SCHOOLS	COLLEGES	
1	DAIRY	.00000000	.01936931	.00000000	.00025247	.00371678	.000017195	.00000136
2	POULTRY	.00000000	.11387975	.00000000	.00030632	.01187606	.00000136	.00000136
3	RANCHING	.00000000	.00000000	.00000000	.00007047	.00000000	.00000410	.00000228
4	FEEDLOTS	.00000000	.00752720	.00000000	.00012645	.00035291	.00001435	.00000015
5	SHEEP/GOAT	.00000000	.00000000	.00000000	.00000000	.00000000	.00000000	.00000000
6	HOGS/PIGS	.00000000	.00000000	.00000000	.00000000	.00000000	.00000000	.00000000
7	LVSTK NEC	.00064605	.00068722	.00000000	.00448121	.00006805	.00005545	.00084516
8	FOOD GRAIN	.00001471	.00009337	.00002494	.00005787	.00002398	.00000512	.00000320
9	FEED GRAIN	.00014705	.00000000	.00000000	.01827141	.00000000	.00000000	.00000000
10	HAY/PAST.	.00000000	.00000000	.00000000	.00005362	.00000000	.00000507	.00000254
11	VEGETABLES	.00000000	.08362944	.00000000	.00061751	.00391295	.00000153	.00000076
12	SUGARBEETS	.00000000	.00000000	.00000000	.00002775	.00000000	.00000000	.00000000
13	CROPS NEC	.00000000	.00417088	.00000000	.00056931	.00206004	.00007708	.00387309
14	AG SERVICE	.00044607	.00010627	.00000882	.00177632	.00180404	.00051538	.00211234
15	COAL MINES	.00000000	.00000000	.00000000	.00000000	.00000000	.00006539	.00009944
16	OIL/GAS EX	.00111389	.00066558	.00118875	.00036351	.00171337	.00036493	.00013828
17	MINING NEC	.00000000	.00000000	.00000000	.00000000	.00001189	.00000000	.00000000
18	RES CONSTR	.00000000	.00000000	.00000000	.00000000	.00000000	.00000000	.00000000
19	CONSTR NEC	.00169310	.00190407	.00100965	.00136642	.00357353	.00072535	.00109719
20	LS PRD MFG	.00000309	.11540079	.00000000	.00054919	.00867337	.00023442	.00000802
21	FOOD MFG	.00008652	.05060995	.00000023	.00040201	.00191515	.00007386	.00002199
22	AG INPUTS	.00717046	.00041078	.00033274	.00018049	.00558096	.00011825	.00041509
23	WOOD/PAPER	.00198836	.01817840	.00031559	.00031837	.00139638	.00016116	.00034040
24	PRINT/PUBL	.05232428	.02067089	.00827615	.00628053	.01380906	.00212178	.00613627
25	REFINING	.01743403	.00367350	.00798502	.00109723	.02862549	.00086758	.00238859
26	NACH/EQUIP	.00710428	.00043011	.00285320	.00011082	.00827534	.00011874	.00028358
27	MANUPR NEC	.00184148	.00132036	.00378693	.00037298	.00135058	.00018167	.00020561
28	TRANSPORT	.01786384	.00987690	.00708579	.00131252	.00763584	.00063333	.00253102
29	COMMUNICAT	.03677589	.01023916	.00638913	.00337217	.01171727	.00137748	.00215343
30	ELECT GENR	.01250729	.01796210	.00296176	.00264291	.02236377	.00093217	.00258017
31	UTILITIES	.01163080	.01221685	.00513183	.00210250	.01204596	.00125932	.00407336
32	WHOLESALE	.00687254	.00415015	.11347446	.00079131	.00425247	.00066213	.00053195
33	RETAIL	.00109300	.00044918	.00466818	.00010578	.00059199	.00002420	.00012423
34	F/I/R/E	.01416223	.00841596	.00195151	.00170037	.01415572	.00097858	.00252052
35	LODGING	.05780734	.00101236	.00059745	.00277871	.00582556	.00020547	.00031890
36	SERVICES	.06659053	.01701838	.00441710	.00467772	.03195752	.00159783	.00331276
37	FOOD/DRINK	.02720486	.00213827	.00110361	.00222312	.01237967	.00046126	.00158336
38	AUTO SERV	.03237173	.00338926	.00458198	.00511612	.01553631	.00158540	.00505131
39	AMUSEMENTS	.00502223	.04877426	.00013153	.06288252	.00190906	.00233997	.00243657
40	HEALTH SER	.00008393	.00047673	.00000000	.00021178	.03886363	.00004895	.00000000
41	SCHOOLS	.00000000	.00000000	.00000000	.00000000	.00000000	.00000000	.00000000
42	COLLEGES	.00444862	.00000000	.00000000	.00000000	.00034303	.00038775	.00000000
43	ASSOC NEC	.03245971	.00658633	.00104223	.00340010	.01181058	.00126386	.00141558
44	FED GOVT	.08401551	.00911086	.00177032	.00248856	.02183152	.00141790	.00405468
45	ST/LOC GOV	.00131439	.00112842	.00038091	.00026738	.00154650	.00016072	.00031158
46	HOUSEHOLDS	.05888359	.02203241	.00775927	.00440882	.03866633	.00192105	.00658471
47	IND BUS TX	.01442980	.03071047	.00694590	.00758943	.00180209	.00000000	.00083731
48	PROFITS	.31568122	.03661224	.01832209	.00108018	.12181660	.00000000	.00231616
49	PROP INC	.07208362	.01221317	.01485868	.00607807	.01450185	-.00000113	-.00018464
50	COMP INPS	.01266537	.02225877	.00974950	.00203930	.01426953	.00094460	.00138656
51	W C INPS	.03337885	.08049846	.01469323	.00282034	.00688246	.00034635	.00078865

## APPENDIX II SALES COEFFICIENT MATRIX (continued)

	43	44	45	46	47	48	49
	ASSOC NEC	FED GOVT	ST/LOC GOV	HOUSEHOLDS	FED N MILI	FED MILITA	FED CCC
1 DAIRY	.00001365	.00013579	.00000136	.13612152	.00002456	.00000000	.00000000
2 POULTRY	.00000000	.00087424	.00000136	.34681148	.00000136	.00000000	.00000000
3 RANCHING	.00000046	.00000000	.00001140	.00199933	.00000205	.00000000	.00000000
4 FEEDLOTS	.00000204	.00006572	.00000000	.01280113	.00000015	.00000023	.00000000
5 SHEEP/GOAT	.00000000	.00000000	.00000000	.00000000	.00000000	.00000000	.00000000
6 HOGS/PIGS	.00000000	.00000000	.00000000	.00000000	.00000000	.00000000	.00000000
7 LVSTK NEC	.00109216	.00000000	.00000084	.03267569	.00000000	.00009745	.00000000
8 FOOD GRAIN	.00000544	.00002046	.00001119	.00117123	.02128387	.00002302	.00000000
9 FEED GRAIN	.00000000	.00000000	.00000000	.00157821	.01916335	.00000000	.00000000
10 HAY/PAST.	.00000036	.00000000	.00000870	.01426306	.00000181	.00000000	.00000000
11 VEGETABLES	.00000000	.00083838	.00000229	.28752411	.00000076	.00000000	.00000000
12 SUGARBETS	.00000000	.00000000	.00000555	.00162079	.00000000	.00000000	.00000000
13 CROPS NEC	.00078653	.00002102	.00037662	.49325723	.00000175	.00000175	.00000000
14 AG SERVICE	.00156546	.00002604	.00075522	.01345574	.00242779	.00027470	.00000000
15 COAL MINES	.00000000	.00150252	.00814798	.00108549	.00000000	.00000000	.00000000
16 OIL/GAS EX	.00019192	.00013657	.00213449	.03277189	.00017053	.00007969	.00000000
17 MINING NEC	.00000000	.00000085	.00000991	.00001472	.00000000	.00000028	.00000000
18 RES CONSTR	.00000000	.00000000	.00000000	.00000000	.00000000	.00194700	.00000000
19 CONSTR NEC	.00328350	.00021472	.01176918	.00000000	.07184640	.00171850	.00000000
20 LS PRD MFG	.00006973	.00118794	.00000011	.30853927	.00028140	.00021833	.00000000
21 FOOD MFG	.00003139	.00058015	.00000515	.15593847	.00010329	.00005987	.00000000
22 AG INPUTS	.00010485	.00005458	.00389714	.01671511	.00025422	.00249580	.00000000
23 WOOD/PAPER	.00023443	.00027965	.00001414	.11663197	.00085958	.00041414	.00000000
24 PRINT/PUBL	.02546329	.00168414	.00123958	.09683221	.00101043	.00149773	.00000000
25 REFINING	.00358848	.00121852	.00987482	.20970920	.00108119	.01005481	.00000000
26 MACH/EQUIP	.00018908	.00008782	.00020222	.02036140	.00321092	.00415219	.00000000
27 MANUFR NEC	.00032811	.00044914	.00009244	.03422254	.00043613	.00045555	.00000000
28 TRANSPORT	.00237802	.00692931	.00194874	.16051706	.00228620	.01128558	.00000000
29 COMMUNICAT	.00269198	.00069227	.00071462	.14625929	.00330945	.00000182	.00000000
30 ELECT GENR	.00314759	.00099201	.01909335	.12824499	.00003307	.00567693	.00000000
31 UTILITIES	.00322670	.00147636	.03265604	.19984010	.00118761	.00117317	.00000000
32 WHOLESALE	.00077788	.00049600	.00061314	.17709638	.00166855	.00252426	.00000000
33 RETAIL	.00010869	.00013803	.00040275	.61690745	.00000873	.00008228	.00000000
34 F/I/R/E	.00311472	.00058260	.00048984	.37445189	.00085495	.00032069	.00000000
35 LODGING	.01348672	.00054501	.00062435	.30049765	.00257828	.01042978	.00000000
36 SERVICES	.00360521	.00202776	.00183880	.15410526	.02918204	.00089504	.00000000
37 FOOD/DRINK	.00396330	.00054545	.00156147	.55547794	.00034691	.00124581	.00000000
38 AUTO SERV	.00415149	.00246210	.00089561	.46535469	.00034712	.00106441	.00000000
39 AMUSEMENTS	.00380674	.00062950	.00002116	.48605410	.00092848	.00000000	.00000000
40 HEALTH SR	.00000000	.00000000	.00001890	.71913020	.00165528	.00416875	.00000000
41 SCHOOLS	.00000000	.00000000	.00000000	.53653914	.00000000	.00000000	.00000000
42 COLLEGES	.00006587	.00027404	.00040001	.32674117	.08023894	.00576331	.00000000
43 ASSOC NEC	.00420705	.00011185	.00046467	.54944094	.00080281	.00159009	.00000000
44 FED GOVT	.02084390	.00705281	.00388482	.21200860	.00894500	.00855588	.00000000
45 ST/LOC GOV	.00055354	.00020183	.00110131	.04359231	.04312791	.14993549	.00000000
46 HOUSEHOLDS	.00766675	.00834383	.12965616	.00000000	.00000000	.00000000	.00000000
47 IND BUS TX	.00007395	.00000000	.00000000	.00000000	.00000000	.00000000	.00000000
48 PROFITS	.00002289	.00000000	.00000000	.00000000	.00000000	.00000000	.00000000
49 PROP INC	.00029822	-.00084491	.00474053	.00000000	.00000000	.00000000	.00000000
50 COMP IMPS	.00269074	.00095407	.00408506	.53446241	.00000000	.00000000	.00000000
51 N C IMPS	.00503186	.02853598	.00148593	.00000000	.00000000	.00000000	.00000000



## APPENDIX III DIRECT INPUT COEFFICIENT MATRIX

	1	2	3	4	5	6	7
	DAIRY	POULTRY	RANCHING	FEEDLOTS	SHEEP/GOAT	HOGS/PIGS	LVSTK NEC
1 DAIRY	.00006551	.00037816	.00730064	.00057733	.00645045	.00638006	.00115181
2 POULTRY	.00001433	.00012063	.00000912	.00000106	.00001496	.00000753	.00000336
3 RANCHING	.00140292	.00417465	.00399274	.28700708	.00242162	.00265046	.00050911
4 FEEDLOTS	.00000000	.00000000	.00000000	.00000000	.00000000	.00000000	.00000000
5 SHEEP/GOAT	.00000000	.00000000	.00000000	.00000000	.15027848	.00000000	.00000000
6 HOGS/PIGS	.00000000	.00000000	.00000000	.00000000	.00000000	.03807566	.00000000
7 LVSTK NEC	.00001911	.00008132	.00196650	.00016180	.00179835	.00183319	.48520966
8 FOOD GRAIN	.00090685	.00309981	.00318384	.00020229	.00207591	.00218388	.00048055
9 FEED GRAIN	.00186146	.06335704	.00265407	.12922003	.03572764	.07473653	.05351742
10 HAY/PAST.	.15701795	.00202497	.13420559	.00011081	.02838300	.05979103	.04995363
11 VEGETABLES	.00011736	.00038222	.00083216	.00005907	.00062493	.00065923	.00012098
12 SUGARBEETS	.00004504	.00014232	.00010217	.00000672	.00006814	.00007676	.00001512
13 CROPS NEC	.00004231	.00024126	.00005040	.00000438	.00005152	.00004816	.00001176
14 AG SERVICE	.00953113	.05013100	.01315018	.00107202	.01203996	.01179987	.00280517
15 COAL MINES	.00000000	.00025211	.00000000	.00000000	.00000000	.00000000	.00000000
16 OIL/GAS EX	.00192151	.00012605	.00526185	.00039785	.00371637	.00587435	.00155675
17 MINING NEC	.00001911	.00000136	.00000023	.00000000	.00000000	.00000000	.00000000
18 RES CONSTR	.00000000	.00000000	.00000000	.00000000	.00000000	.00000000	.00000000
19 CONSTR NEC	.00651990	.00457178	.00729197	.00062885	.00725157	.00684814	.00171637
20 LS PRD MFG	.00007574	.00044186	.00011311	.00001080	.00012632	.00010686	.00011090
21 FOOD MFG	.04692074	.09554926	.05000936	.00441092	.05217040	.04572149	.01693349
22 AG INPUTS	.00222516	.00133236	.00483881	.00046546	.00561278	.00490357	.00141728
23 WOOD/PAPER	.00008529	.00011250	.00004835	.00000347	.00003657	.00003913	.00000924
24 PRINT/PUBL	.00020334	.00024668	.00025770	.00002395	.00029917	.00021824	.00006721
25 REFINING	.00542472	.00748454	.00550746	.00060619	.00783994	.00568471	.00194068
26 MACH/EQUIP	.00045513	.00034156	.00065291	.00007773	.00105707	.00063515	.00021759
27 MANUFR NEC	.00076151	.00060180	.00070605	.00007229	.00088089	.00073900	.00123078
28 TRANSPORT	.01926764	.01495147	.01797052	.00150885	.01767102	.01536241	.00448625
29 COMMUNICAT	.00162673	.00161429	.00254598	.00021339	.00246816	.00226816	.00062925
30 ELECT GENR	.00385053	.00426275	.00433961	.00043849	.00540834	.00448365	.00141056
31 UTILITIES	.00005391	.00004473	.00010832	.00000801	.00008643	.00008880	.00001932
32 WHOLESALE	.00091913	.00093252	.00207528	.00019088	.00232688	.00187534	.00057380
33 RETAIL	.00072398	.00114261	.00203149	.00016429	.00188976	.00170376	.00046459
34 F/I/R/E	.03690446	.02072414	.06146511	.00523306	.06168736	.05307835	.01317983
35 LODGING	.00064414	.00058825	.00101734	.00007931	.00089253	.00084736	.00023355
36 SERVICES	.00417192	.00230419	.00723063	.00065075	.00774354	.00677590	.00185163
37 FOOD/DRINK	.00018355	.00017485	.00029943	.00002425	.00028089	.00025285	.00006889
38 AUTO SERV	.00199862	.00099487	.00650474	.00055603	.00649865	.00582920	.00159539
39 AMUSEMENTS	.00000068	.00000136	.00000274	.00000023	.00000000	.00000151	.00000000
40 HEALTH SER	.00370382	.01298749	.01420424	.00122514	.01432197	.01298136	.00357724
41 SCHOOLS	.00000000	.00000000	.00000000	.00000000	.00000000	.00000000	.00000000
42 COLLEGES	.00000000	.00000000	.00000000	.00000000	.00000000	.00000000	.00000000
43 ASSOC NEC	.00038348	.00044457	.00046500	.00004457	.00055347	.00043045	.00013778
44 FED GOVT	.00019788	.00019247	.00033090	.00002682	.00030416	.00029349	.00008065
45 ST/LOC GOV	.00104400	.00083086	.00204700	.00015500	.00170860	.00169172	.00043938
46 HOUSEHOLDS	.06070839	.05596602	.05989338	.05992566	.05987405	.05994907	.06564121
47 IND BUS TX	.01641608	.00901344	.02052174	.02053273	.02052312	.02054141	.01982855
48 PROFITS	.11486755	.02079597	.02231971	.02233142	.02231482	.02233999	.02482055
49 PROP INC	.04785625	.00853227	.00917386	.00917814	.00917291	.00918253	.01021420
50 COMP IMPS	.44632736	.60764828	.51625933	.45200649	.44096612	.50613021	.23037644
51 N C IMPS	.00251379	.00065737	.00705845	.00038637	.00438119	.00487949	.00139208

## APPENDIX III DIRECT INPUT COEFFICIENT MATRIX (continued)

	8	9	10	11	12	13	14
	FOOD GRAIN	FEED GRAIN	HAY/PAST.	VEGETABLES	SUGARBEETS	CROPS NEC	AG SERVICE
1 DAIRY	.00069800	.01179575	.01173262	.00029500	.00008881	.00008058	.00001092
2 POULTRY	.00090328	.00129232	.00137391	.00014444	.00001110	.00001401	.00251053
3 RANCHING	.00571609	.00370365	.00300471	.00463135	.00343307	.00171320	.00025874
4 FEEDLOTS	.00000000	.00000000	.00000000	.00000000	.00000000	.00000000	.00000000
5 SHEEP/GOAT	.00000000	.00000000	.00000000	.00000000	.00000000	.00000000	.00000000
6 HOGS/PIGS	.00000000	.00000000	.00000000	.00000000	.00000000	.00000000	.00000000
7 LVSTK NEC	.01640807	.02182235	.00567211	.00310514	.00524813	.00147671	.00570656
8 FOOD GRAIN	.03563533	.00188680	.00129384	.00187241	.00138488	.00049924	.00009493
9 FEED GRAIN	.00000000	.03536647	.00000000	.00000000	.00000000	.00000000	.00025622
10 HAY/PAST.	.00231975	.00150973	.00138804	.00219416	.00162911	.00098623	.00013357
11 VEGETABLES	.00035236	.00022015	.00022572	.01637097	.00026921	.00017517	.00002310
12 SUGARBEETS	.00013142	.00008214	.00008406	.00013604	.03263220	.00006306	.00001974
13 CROPS NEC	.00004956	.00150952	.00153044	.00459084	.00005551	.04175437	.01057389
14 AG SERVICE	.01455002	.00963125	.01182465	.01998128	.01480632	.01264052	.00176246
15 COAL MINES	.00000128	.00000231	.00000000	.00000076	.00000000	.00010160	.00000000
16 OIL/GAS EX	.01606306	.01196675	.02464133	.00912436	.01357963	.00952594	.00503661
17 MINING NEC	.00039904	.00070057	.00000725	.00024456	.00030529	.00016641	.00002478
18 RES CONSTR	.00000000	.00000000	.00000000	.00000000	.00000000	.00000000	.00000000
19 CONSTR NEC	.00886559	.00839418	.01013661	.00649459	.00822882	.00523243	.00798860
20 LS PRD MFG	.00000128	.00000189	.00000217	.00000076	.00000000	.00000175	.00003612
21 FOOD MFG	.00019249	.00023338	.00036957	.00012304	.00016652	.00028203	.00092785
22 AG INPUTS	.00710954	.00842695	.01023262	.00563328	.00904199	.00692461	.00948349
23 WOOD/PAPER	.00006107	.00006113	.00008370	.00019641	.00008881	.00137511	.00144659
24 PRINT/PUBL	.00016083	.00016406	.00017935	.00017425	.00016097	.00589459	.00036459
25 REFINING	.01686338	.01841237	.02545438	.00913354	.01330488	.06422564	.01411603
26 MACH/EQUIP	.00085020	.00102427	.00136087	.00063433	.00110735	.00310933	.00283900
27 MANUF NR NEC	.00062606	.00077430	.00086775	.00206653	.00072713	.00191640	.00186914
28 TRANSPORT	.01375226	.01337649	.01442139	.01044193	.00630552	.00888655	.01550045
29 COMMUNICAT	.00163230	.00176475	.00181558	.00169434	.00149312	.00415862	.00026168
30 ELECT GENR	.00238051	.00400320	.00595544	.00346052	.00000000	.00719613	.00348165
31 UTILITIES	.00468044	.00769719	.00768189	.00415446	.00004163	.01078018	.00108410
32 WHOLESALE	.00120033	.00085034	.00098152	.00081240	.00099634	.00101250	.00230724
33 RETAIL	.00674663	.00562847	.00577501	.00211238	.00379664	.00281854	.00433305
34 F/I/R/E	.13356222	.09743991	.10107946	.04557597	.09597329	.02424928	.03113238
35 LODGING	.00131096	.00125577	.00113696	.00079023	.00098524	.00058858	.00062207
36 SERVICES	.01167615	.01276079	.01538118	.00618736	.01338536	.01049815	.01791732
37 FOOD/DRINK	.00016659	.00020460	.00020978	.00019870	.00021925	.00018218	.00560575
38 AUTO SERV	.00371832	.00213741	.00230036	.00216206	.00316109	.00200749	.00866611
39 AMUSEMENTS	.00000192	.00000168	.00000181	.00000153	.00000000	.00004029	.00889545
40 HEALTH SER	.00000000	.00000000	.00000000	.00000000	.00000000	.00000000	.00000000
41 SCHOOLS	.00000000	.00000000	.00000000	.00000000	.00000000	.00000000	.00000000
42 COLLEGES	.00000000	.00000000	.00000000	.00000000	.00000000	.00000000	.00046246
43 ASSOC NEC	.00027210	.00028863	.00033370	.00032557	.00025255	.00045545	.00046162
44 FED GOVT	.00034852	.00038568	.00040507	.00023692	.00017485	.00026101	.00333170
45 ST/LOC GOV	.00295541	.00303501	.00289819	.00138023	.00111845	.00162561	.00237612
46 HOUSEHOLDS	.05668003	.03756563	.03395438	.13754489	.10449074	.31714298	.41315180
47 IND BUS TX	.02139354	.02153099	.01946089	.01268500	.01568333	.01396484	.02232178
48 PROFITS	.22941908	.23344662	.21100711	.35861528	.29910440	.12725834	.05835761
49 PROP INC	.09571489	.09739664	.08803452	.14974536	.12486713	.05307409	.12681533
50 COMP IMPS	.28207037	.31813804	.37369497	.17385407	.22045188	.25432818	.20600151
51 N C IMPS	.00235972	.00210989	.00200507	.00087277	.00122947	.00131205	.00142937

## APPENDIX III DIRECT INPUT COEFFICIENT MATRIX (continued)

	15	16	17	18	19	20	21
	COAL MINES	OIL/GAS EX	MINING NEC	RES CONSTR	CONSTR NEC	LS PRD MFG	FOOD MFG
1 DAIRY	.00000000	.00000000	.00000000	.00000000	.00000000	.04687189	.00000170
2 POULTRY	.00000000	.00000000	.00000000	.00000000	.00000000	.01501745	.00033242
3 RANCHING	.00000000	.00000000	.00000000	.00000000	.00000000	.02360018	.00000000
4 FEEDLOTS	.00000000	.00000037	.00000000	.00000000	.00000000	.29828864	.00009331
5 SHEEP/GOAT	.00000000	.00000000	.00000000	.00000000	.00000000	.00909042	.00000000
6 HOGS/PIGS	.00000000	.00000000	.00000000	.00000000	.00000000	.02823969	.00000000
7 LVSTK NEC	.00000000	.00000000	.00000000	.00000000	.00000000	.00008760	.00041986
8 FOOD GRAIN	.00001265	.00000118	.00008971	.00001789	.00001696	.00000320	.00133624
9 FEED GRAIN	.00000000	.00000000	.00000000	.00000000	.00000000	.00000000	.00781947
10 HAY/PAST.	.00000000	.00000000	.00000000	.00000000	.00000000	.00000000	.00000000
11 VEGETABLES	.00000000	.00000000	.00000000	.00000000	.00000000	.00000000	.00128260
12 SUGARBEETS	.00000000	.00000000	.00000000	.00000000	.00000000	.00000000	.00610253
13 CROPS NEC	.00000117	.00001777	.00000000	.00000832	.00000389	.00000043	.00086399
14 AG SERVICE	.00017320	.00000325	.00006764	.00077402	.00186796	.00000574	.00001338
15 COAL MINES	.06189738	.00000000	.00022923	.00000037	.00000138	.00000737	.00012959
16 OIL/GAS EX	.00740907	.02728142	.00269983	.00156336	.00376512	.00046381	.00065753
17 MINING NEC	.00004340	.00000390	.05696616	.00057667	.00218430	.00000000	.00001641
18 RES CONSTR	.00000000	.00000000	.00000000	.00000000	.00000000	.00000000	.00000000
19 CONSTR NEC	.00625937	.04848554	.00463160	.00098474	.00100277	.00161637	.00565017
20 LS PRD MFG	.00000000	.00001246	.00000000	.00000046	.00000027	.07861288	.00549941
21 FOOD MFG	.00001635	.00003015	.00008971	.00001523	.00003282	.00335226	.04323474
22 AG INPUTS	.00026252	.00010740	.00026942	.00006770	.00012956	.00003987	.00008231
23 WOOD/PAPER	.00073579	.00001278	.00127351	.03843773	.00544714	.00637989	.01248319
24 PRINT/PUBL	.00108452	.00089101	.00201865	.00011314	.00003154	.00255911	.02982903
25 REFINING	.01244362	.00582760	.01313210	.00691421	.01415940	.00201712	.00574290
26 MACH/EQUIP	.00850060	.00250084	.00776527	.00903344	.01096446	.00033704	.00121589
27 MANUFR NEC	.00230292	.00247361	.00239844	.02036707	.02621001	.00061285	.03085243
28 TRANSPORT	.00601397	.00349016	.01180936	.01691791	.02119175	.00585291	.01937420
29 COMMUNICAT	.00135832	.00144586	.00306519	.00228492	.00231505	.00129938	.01244596
30 ELECT GENR	.00792438	.00521615	.01103761	.00096593	.00098829	.00225577	.00386641
31 UTILITIES	.00060599	.00439915	.01865063	.00123410	.00136472	.00255369	.00766111
32 WHOLESALB	.00077510	.00013337	.00229174	.00091949	.00084255	.00038710	.00039265
33 RETAIL	.00190904	.00043950	.00271059	.05915216	.01794987	.00007417	.00022528
34 F/I/R/E	.02519860	.08324009	.03223695	.01025011	.01916875	.00475962	.00903490
35 LODGING	.00087824	.00096275	.00244485	.00100870	.00095293	.00009579	.00056843
36 SERVICES	.02396930	.01289459	.01794822	.04472634	.06765093	.00757043	.02576654
37 FOOD/DRINK	.00157277	.00670449	.00326612	.00111190	.00094754	.00181775	.00331263
38 AUTO SERV	.00605815	.00297836	.01199784	.00212435	.00762668	.00043867	.00382690
39 AMUSEMENTS	.00005702	.00007612	.00006707	.00000345	.00000911	.00001810	.00019879
40 HEALTH SER	.00000000	.00000000	.00000000	.00000000	.00000000	.00000000	.00000437
41 SCHOOLS	.00000000	.00000000	.00000000	.00000000	.00000000	.00000000	.00000000
42 COLLEGES	.00060794	.00020311	.00056657	.00000000	.00000000	.00000087	.00002186
43 ASSOC NEC	.00029424	.00030471	.00046129	.00004448	.00002588	.00011296	.00067013
44 FED GOVT	.00056590	.00044482	.00287812	.00076475	.00061858	.00102156	.00112721
45 ST/LOC GOV	.00198377	.00268805	.00796563	.00093206	.00095651	.00174049	.00416471
46 HOUSEHOLDS	.33032408	.07081495	.42353083	.25640376	.33530811	.10109728	.14646903
47 IND BUS TX	.04351432	.11351910	.10551021	.01097890	.00867718	.00273876	.09695960
48 PROFITS	.00315547	.02205679	-.07917072	.02542615	.03511814	.00032149	.00101928
49 PROP INC	.14499974	.41835387	.06964914	.01751172	.02424700	.02752114	.08761176
50 COMP IMPS	.29545026	.15683333	.24421614	.46668689	.38684000	.32033649	.40062353
51 N C IMPS	.00164088	.00515143	.01523537	.00167758	.00138288	.00078178	.02099562

## APPENDIX III DIRECT INPUT COEFFICIENT MATRIX (continued)

	22	23	24	25	26	27	28
	AG INPUTS	WOOD/PAPER	PRINT/PUBL	REFINING	MACH/EQUIP	MANUFR NEC	TRANSPORT
1 DAIRY	.00000048	.00000023	.00000000	.00000168	.00000000	.00000000	.00000377
2 POULTRY	.00000000	.00000000	.00000000	.00001611	.00000000	.00000000	.00001128
3 RANCHING	.00000527	.00002249	.00000010	.00002521	.00000000	.00000000	.00000000
4 FEEDLOTS	.00000000	.00000000	.00000000	.00000602	.00000345	.00002802	.00000297
5 SHEEP/GOAT	.00000000	.00000000	.00000000	.00000000	.00000000	.00000000	.00000000
6 HOGS/PIGS	.00000000	.00000000	.00000000	.00000000	.00000000	.00000000	.00000000
7 LVSTK NEC	.00000000	.00056439	.00000000	.00002304	.00000000	.00006001	.00000000
8 FOOD GRAIN	.00001149	.00001322	.00000346	.00001107	.00000103	.00001304	.00002094
9 FEED GRAIN	.00200076	.00000000	.00000000	.00000441	.00000000	.00000000	.00000000
10 HAY/PAST.	.00000287	.00001183	.00000000	.00003817	.00000000	.00000000	.00000000
11 VEGETABLES	.00000048	.00000162	.00000000	.00000231	.00000000	.00000000	.00000026
12 SUGARBEETS	.00000000	.00038422	.00000000	.00000091	.00000000	.00000040	.00000000
13 CROPS NEC	.00000048	.00019802	.00000000	.00004888	.00000049	.00001408	.00001051
14 AG SERVICE	.00007804	.00013124	.00000336	.00024092	.00001410	.00001628	.00002572
15 COAL MINES	.00016757	.00008139	.00001257	.00025513	.00002949	.00110308	.00000059
16 OIL/GAS EX	.00099727	.00184437	.00040963	.23140726	.00009415	.00148211	.00595033
17 MINING NEC	.00091971	.00007304	.00000000	.00291734	.00000051	.00892808	.00000000
18 RES CONSTR	.00000000	.00000000	.00000000	.00000000	.00000000	.00000000	.00000000
19 CONSTR NEC	.00639055	.00573043	.00256545	.00607687	.00297610	.00901645	.02285345
20 LS PRD MFG	.00001484	.00000046	.00000000	.00030857	.00009772	.00044479	.00014641
21 FOOD MFG	.00143438	.00025089	.00004482	.00113637	.00004591	.00008713	.00014912
22 AG INPUTS	.02619465	.00050758	.00015396	.00198260	.00051838	.00086868	.00005712
23 WOOD/PAPER	.00329821	.04400464	.00130360	.00157451	.00222631	.00374815	.00010688
24 PRINT/PUBL	.01578870	.00332121	.04744075	.00688618	.00460237	.00412179	.00625394
25 REFINING	.07796299	.01238606	.00851709	.06971005	.01113171	.02044112	.05892358
26 MACH/EQUIP	.01417670	.00359830	.00793935	.00296679	.09415621	.00647399	.00637169
27 MANUFR NEC	.00967679	.01513174	.00196633	.00302380	.01092680	.02563985	.00222642
28 TRANSPORT	.03042070	.02782967	.02455339	.02960498	.01482110	.02667587	.08479767
29 COMMUNICAT	.00442522	.00319344	.01114368	.00421122	.00488017	.00393273	.00721296
30 ELECT GENR	.00463540	.00487155	.00344734	.00568446	.00341498	.00774426	.00788776
31 UTILITIES	.01675580	.00468883	.00163388	.02073376	.00256219	.01056111	.00355932
32 WHOLESALE	.00154306	.00072207	.00139968	.00030185	.00166104	.00105594	.00124365
33 RETAIL	.00011873	.00050596	.00040746	.00065804	.00024252	.00072165	.00220969
34 F/I/R/E	.01980266	.01584546	.02209996	.00977327	.01625746	.01478815	.02151493
35 LODGING	.00322017	.00099546	.00572100	.00053044	.00442896	.00147806	.00111984
36 SERVICES	.02922475	.02257622	.04280093	.01610653	.03441220	.02509804	.03452718
37 FOOD/DRINK	.00633023	.00548580	.02024642	.00427664	.01100230	.00676375	.01852082
38 AUTO SERV	.00145880	.00429603	.00428293	.00091871	.00228456	.00258108	.01153933
39 AMUSEMENTS	.00004213	.00014794	.00025271	.00008894	.00037032	.00007700	.00049038
40 HEALTH SER	.00000000	.00035501	.00020333	.00000000	.00062378	.00035178	.00000000
41 SCHOOLS	.00000000	.00000000	.00000000	.00000000	.00000000	.00000000	.00000000
42 COLLEGES	.00043663	.00013820	.00016761	.00050313	.00028741	.00014506	.00017711
43 ASSOC NEC	.00024513	.00073135	.00155235	.00029807	.00101733	.00054475	.00166263
44 FED GOVT	.00125963	.00187103	.01412301	.00097319	.00188148	.00182687	.00107382
45 ST/LOC GOV	.00349259	.00158930	.00140700	.00366874	.00119187	.00236219	.00283086
46 HOUSEHOLDS	.16998347	.26134312	.33861159	.08715907	.37116535	.31152746	.31206213
47 IND BUS TX	.01258481	.01152115	.01070980	.02282708	.01034992	.01404059	.03202253
48 PROFITS	-.00344040	.00343320	.00461202	-.00096129	.00027314	.00056271	.01209437
49 PROP INC	.17152318	.06111894	.10415641	.05891751	.07546928	.07491529	.11450374
50 COMP IMPS	.35289645	.47647922	.31418226	.39713122	.31076178	.40145767	.18123391
51 N C IMPS	.01391865	.00200367	.00192478	.00793025	.00381612	.00830095	.04460041

## APPENDIX III DIRECT INPUT COEFFICIENT MATRIX (continued)

	29	30	31	32	33	34	35
	COMMUNICAT	ELECT GENR	UTILITIES	WHOLESALE	RETAIL	F/I/R/E	LODGING
1 DAIRY	.00000000	.00000000	.00000000	.00000770	.00000000	.00000000	.00005947
2 POULTRY	.00000000	.00000000	.00000000	.00000217	.00000000	.00000000	.00008790
3 RANCHING	.00000000	.00000000	.00000000	.00010272	.00000000	.00000000	.00000000
4 FEEDLOTS	.00000000	.00000000	.00000000	.00000000	.00000000	.00000000	.00008133
5 SHEEP/GOAT	.00000000	.00000000	.00000000	.00000000	.00000000	.00000000	.00000000
6 HOGS/PIGS	.00000000	.00000000	.00000000	.00000000	.00000000	.00000000	.00000000
7 LVSTK NEC	.00000000	.00000000	.00000000	.00000178	.00000000	.00000000	.00000000
8 FOOD GRAIN	.00000059	.00000102	.00000041	.00004030	.00000435	.00000044	.00000459
9 FEED GRAIN	.00000000	.00000000	.00000000	.00000000	.00000000	.00000000	.00000000
10 HAY/PAST.	.00000000	.00000000	.00000000	.00005175	.00000000	.00000000	.00000000
11 VEGETABLES	.00000000	.00000000	.00000000	.00000948	.00000000	.00000000	.00017841
12 SUGARBEETS	.00000000	.00000000	.00000000	.00000316	.00000000	.00000000	.00000000
13 CROPS NEC	.00000000	.00000000	.00000000	.00005867	.00000610	.00000606	.00078426
14 AG SERVICE	.00000684	.00006052	.00001486	.00111112	.00003036	.00258114	.00212271
15 COAL MINES	.00000000	.01472917	.00000000	.00000000	.00000000	.00000268	.00000000
16 OIL/GAS EX	.00015490	.00924495	.15014886	.00117828	.00179378	.00029913	.00497219
17 MINING NEC	.00000000	.00001343	.00000000	.00000000	.00000000	.00000000	.00000000
18 RES CONSTR	.00000000	.00000000	.00000000	.00000000	.00000000	.00000000	.00000000
19 CONSTR NEC	.01085427	.03168565	.00842535	.00453751	.00478682	.02838229	.03041334
20 LS PRD MFG	.00000027	.00000000	.00000324	.00000395	.00000147	.00000027	.00108406
21 FOOD MFG	.00000187	.00000918	.00000855	.00006815	.00000808	.00000213	.00057513
22 AG INPUTS	.00000850	.00003502	.00003229	.00001383	.00000711	.00002691	.00030239
23 WOOD/PAPER	.00003320	.00002729	.00009088	.00165512	.00053009	.00002154	.00104385
24 PRINT/PUBL	.00165627	.00103078	.00032087	.01215751	.02212386	.00745503	.01557717
25 REFINING	.00060089	.06040801	.00359231	.00669278	.00648857	.00124468	.00715162
26 MACH/EQUIP	.01336755	.00526116	.00034502	.00115596	.00070818	.00056601	.00046995
27 MANUFR NEC	.00025901	.00172561	.00050562	.00103013	.00108469	.00046660	.00419099
28 TRANSPORT	.00286410	.02197691	.00187940	.02134373	.00575237	.00313365	.00611220
29 COMMUNICAT	.00598496	.00213882	.00068905	.01373875	.01713050	.00686035	.02358047
30 ELECT GENR	.00119622	.00001496	.00145777	.00408378	.00922920	.00217629	.02578971
31 UTILITIES	.00171990	.05976936	.18300641	.00526048	.00318560	.00355728	.01421488
32 WHOLESALE	.00047331	.00023351	.00010366	.00074193	.00035887	.00013549	.00028710
33 RETAIL	.00016880	.00009699	.00033664	.00153265	.00122923	.00085074	.00139134
34 F/I/R/E	.01478166	.01089423	.00598829	.03122903	.05323958	.10458435	.07933696
35 LODGING	.00041631	.00052066	.00035233	.00362945	.00119285	.00143160	.00065416
36 SERVICES	.01460634	.00944454	.00381897	.05549960	.04179521	.03179489	.07257579
37 FOOD/DRINK	.00380233	.00124151	.00046221	.03126636	.00485100	.00543980	.01074012
38 AUTO SERV	.00080124	.00149244	.00041623	.01911933	.00816349	.00134837	.00941406
39 AMUSEMENTS	.02204535	.00008322	.00000747	.00303765	.00061245	.00004673	.00039198
40 HEALTH SER	.00000000	.00000000	.00000000	.00000000	.00014497	.00086987	.00000000
41 SCHOOLS	.00000000	.00000000	.00000000	.00000000	.00000000	.00000000	.00000000
42 COLLEGES	.00030109	.00079038	.00000000	.00000000	.00000000	.00001290	.00000000
43 ASSOC NEC	.00037905	.00029599	.00016060	.00113008	.00080985	.00055552	.00307254
44 FED GOVT	.00150367	.00236103	.00131892	.00360773	.00431989	.00621435	.00543037
45 ST/LOC GOV	.00095502	.00238730	.00495828	.00171873	.00219250	.00126083	.01028760
46 HOUSEHOLDS	.41389308	.13295566	.08325087	.41348734	.46498742	.14072975	.28858725
47 IND BUS TX	.07990531	.05189071	.02693890	.12413843	.14910449	.11995005	.03493791
48 PROFITS	-.00215584	.00242895	.00105083	.01867132	.03192599	-.00400753	-.02496906
49 PROP INC	.35715362	.31719968	.13713050	.11196670	.07915688	.47768162	.13083091
50 COMP INPS	.03870817	.25568141	.38242621	.10160839	.08231190	.05311257	.23622480
51 N C INPS	.01355213	.00186995	.00075818	.00330649	.00073225	.00120563	.00200958

## APPENDIX III DIRECT INPUT COEFFICIENT MATRIX (continued)

	36	37	38	39	40	41	42
	SERVICES	FOOD/DRINK	AUTO SERV	AMUSEMENTS	HEALTH SER	SCHOOLS	COLLEGES
1 DAIRY	.00000000	.00099448	.00000000	.00007385	.00016875	.00016098	.00000048
2 POULTRY	.00000000	.00294353	.00000000	.00004511	.00027145	.00000064	.00000024
3 RANCHING	.00000000	.00000000	.00000000	.00006167	.00000000	.00001150	.00000240
4 FEEDLOTS	.00000000	.00349111	.00000000	.00033411	.00014474	.00012137	.00000048
5 SHEEP/GOAT	.00000000	.00000000	.00000000	.00000000	.00000000	.00000000	.00000000
6 HOGS/PIGS	.00000000	.00000000	.00000000	.00000000	.00000000	.00000000	.00000000
7 LVSTK NEC	.00001452	.00002866	.00000000	.00106460	.00000251	.00004216	.00024183
8 FOOD GRAIN	.00000087	.00001023	.00000670	.00003613	.00000232	.00001022	.00000240
9 FEED GRAIN	.00001322	.00000000	.00000000	.01736014	.00000000	.00000000	.00000000
10 HAY/PAST.	.00000000	.00000000	.00000000	.00002954	.00000000	.00000894	.00000168
11 VEGETABLES	.00000000	.00383367	.00000000	.00016127	.00015862	.00000128	.00000024
12 SUGARBEETS	.00000000	.00000000	.00000000	.00000200	.00000000	.00000000	.00000000
13 CROPS NEC	.00000000	.00008342	.00000000	.00006487	.00003643	.00002811	.00053150
14 AG SERVICE	.00002006	.00000886	.00000180	.00084406	.00013306	.00078381	.00120891
15 COAL MINES	.00000000	.00000000	.00000000	.00000000	.00000000	.00021464	.00012284
16 OIL/GAS EX	.00051845	.00057470	.00251797	.00178811	.00130824	.00574538	.00081924
17 MINING NEC	.00000000	.00000000	.00000000	.00000000	.00000130	.00000000	.00000000
18 RES CONSTR	.00000000	.00000000	.00000000	.00000000	.00000000	.00000000	.00000000
19 CONSTR NEC	.00237002	.00494453	.00643182	.02021485	.00820608	.03434517	.01955005
20 LS PRD MFG	.00000108	.07462489	.00000000	.00202322	.00495974	.00276410	.00003558
21 FOOD MFG	.00005008	.05434627	.00000060	.00245932	.00181858	.00144625	.00016202
22 AG INPUTS	.00028284	.00003006	.00005973	.00007524	.00036114	.00015778	.00020842
23 WOOD/PAPER	.00016194	.00274653	.00011697	.00027403	.00018656	.00044397	.00035289
24 PRINT/PUBL	.00998683	.00731907	.00718864	.01266883	.00432371	.01369846	.01490815
25 REFINING	.00470117	.00183764	.00979891	.00312694	.01266279	.00791348	.00819868
26 MACH/EQUIP	.00898045	.00100863	.01641361	.00148054	.01716058	.00507720	.00456305
27 MANUFR NEC	.00104019	.00138360	.00973479	.00222660	.00125151	.00347125	.00147839
28 TRANSPORT	.01306497	.01340067	.02358386	.01014505	.00916133	.01566789	.02356261
29 COMMUNICAT	.01298897	.00670885	.01026944	.01258740	.00678901	.01645681	.00968139
30 ELECT GENR	.00277865	.00740287	.00299443	.00620538	.00815050	.00700510	.00729650
31 UTILITIES	.00264644	.00515684	.00531396	.00505596	.00449637	.00969254	.01179777
32 WHOLESALE	.00065705	.00073607	.04937105	.00079955	.00066695	.00214126	.00064737
33 RETAIL	.00081531	.00062157	.01584682	.00083388	.00072441	.00061069	.00117958
34 F/I/R/E	.03437649	.03789708	.02155723	.04362031	.05636766	.08034784	.07787808
35 LODGING	.00714097	.00023200	.00033587	.00362771	.00118054	.00085855	.00050145
36 SERVICES	.06659053	.03157115	.02010161	.04943669	.05242535	.05404774	.04216818
37 FOOD/DRINK	.01466474	.00213827	.00270730	.01266504	.01094725	.00841046	.01086434
38 AUTO SERV	.00711332	.00138160	.00458198	.01188126	.00560044	.01178398	.01412882
39 AMUSEMENTS	.00047520	.00856145	.00005664	.06288252	.00029633	.00748931	.00293466
40 HEALTH SER	.00005116	.00053910	.00000000	.00136438	.03886363	.00100931	.00000000
41 SCHOOLS	.00000000	.00000000	.00000000	.00000000	.00000000	.00000000	.00000000
42 COLLEGES	.00034949	.00000000	.00000000	.00000000	.00004421	.00103039	.00000000
43 ASSOC NEC	.00355135	.00133679	.00051893	.00393148	.00211977	.00467731	.00197142
44 FED GOVT	.00674423	.00135676	.00064672	.00211124	.00287492	.00385006	.00414309
45 ST/LOC GOV	.00131754	.00209836	.00173760	.00283255	.00254305	.00544962	.00397554
46 HOUSEHOLDS	.41800393	.29014844	.25066887	.33076863	.45028475	.46128830	.59500069
47 IND BUS TX	.01032605	.04076924	.02262018	.05739825	.00211553	.00000000	.00762704
48 PROFITS	.10155726	.02185046	.02682444	.00367261	.06428903	.00000000	.00948476
49 PROP INC	.17214368	.05410720	.16148350	.15340376	.05681279	-.00009135	-.00561282
50 COMP IMPS	.09147244	.29822606	.32044113	.15565691	.16906367	.23076456	.12746921
51 N C IMPS	.00302850	.01354928	.00606691	.00270441	.00102440	.00106297	.00091083

## APPENDIX III DIRECT INPUT COEFFICIENT MATRIX (continued)

	43	44	45	46	47	48	49
	ASSOC NEC	FED GOVT	ST/LOC GOV	HOUSEHOLDS	FED N MILI	FED MILITA	FED CCC
1 DAIRY	.00000345	.00004682	.00000004	.00053070	.00000348	.00000000	.00000000
2 POULTRY	.00000000	.00015174	.00000002	.00068070	.00000010	.00000000	.00000000
3 RANCHING	.00000035	.00000000	.00000094	.00002332	.00000087	.00000000	.00000000
4 FEEDLOTS	.00000466	.00020467	.00000000	.00045084	.00000019	.00000031	.00000000
5 SHEEP/GOAT	.00000000	.00000000	.00000000	.00000000	.00000000	.00000000	.00000000
6 HOGS/PIGS	.00000000	.00000000	.00000000	.00000000	.00000000	.00000000	.00000000
7 LVSTK NEC	.00022439	.00000000	.00000002	.00010347	.00000000	.00001216	.00000000
8 FOOD GRAIN	.00000293	.00001506	.00000066	.00000974	.00643571	.00000755	.00000000
9 FEED GRAIN	.00000000	.00000000	.00000000	.00001999	.00882001	.00000000	.00000000
10 HAY/PAST.	.00000017	.00000000	.00000045	.00010473	.00000048	.00000000	.00000000
11 VEGETABLES	.00000000	.00025808	.00000006	.00100086	.00000010	.00000000	.00000000
12 SUGARBRETS	.00000000	.00000000	.00000004	.00000155	.00000000	.00000000	.00000000
13 CROPS NEC	.00007750	.00000282	.00000405	.00074910	.00000010	.00000010	.00000000
14 AG SERVICE	.00064332	.00001459	.00003387	.00008522	.00055883	.00006854	.00000000
15 COAL MINES	.00000000	.00181643	.00078883	.00001484	.00000000	.00000000	.00000000
16 OIL/GAS EX	.00081645	.00079188	.00099111	.00214874	.00040636	.00020584	.00000000
17 MINING NEC	.00000000	.00000071	.00000066	.00000014	.00000000	.00000010	.00000000
18 RES CONSTR	.00000000	.00000000	.00000000	.00000000	.00000000	.00490409	.00000000
19 CONSTR NEC	.04201046	.00374437	.01643531	.00000000	.51488083	.01335021	.00000000
20 LS PRD MFG	.00022215	.00515851	.00000004	.01515051	.00050217	.00042237	.00000000
21 FOOD MFG	.00016605	.00418337	.00000298	.01271537	.00030610	.00019232	.00000000
22 AG INPUTS	.00003780	.00002682	.00015336	.00009288	.00005134	.00054635	.00000000
23 WOOD/PAPER	.00017451	.00028372	.00000115	.00133810	.00035840	.00018718	.00000000
24 PRINT/PUBL	.04442115	.00400433	.00023603	.00260350	.00098733	.00158645	.00000000
25 REFINING	.00884443	.00409326	.00265644	.00796599	.00149259	.01504703	.00000000
26 MACH/EQUIP	.00218457	.00138285	.00025502	.00362576	.02077970	.02912889	.00000000
27 MANUF NR	.00169401	.00316046	.00005209	.00272315	.00126123	.00142809	.00000000
28 TRANSPORT	.01589646	.06313209	.00142183	.01653745	.00856012	.04580639	.00000000
29 COMMUNICAT	.00869028	.00304589	.00025180	.00727694	.00598410	.00000356	.00000000
30 ELECT GENR	.00639145	.00274547	.00423170	.00401352	.00003761	.00699927	.00000000
31 UTILITIES	.00671061	.00418478	.00741272	.00640544	.00138344	.00148144	.00000000
32 WHOLESALE	.00067974	.00059073	.00005848	.00238509	.00081668	.00133932	.00000000
33 RETAIL	.00074102	.00128263	.00029971	.06482383	.00003336	.00034062	.00000000
34 F/I/R/E	.06910351	.01761686	.00118616	.12803829	.01062431	.00432001	.00000000
35 LODGING	.01522759	.00083870	.00007694	.00522913	.00163056	.00715019	.00000000
36 SERVICES	.03295199	.02526064	.00183441	.02170858	.14939899	.00496719	.00000000
37 FOOD/DRINK	.01952699	.00366274	.00083970	.04218020	.00095736	.00372691	.00000000
38 AUTO SERV	.00833798	.00673969	.00019633	.01440471	.00039050	.00129802	.00000000
39 AMUSEMENTS	.00329221	.00074201	.00000200	.00647863	.00044977	.00000000	.00000000
40 HEALTH SER	.00000000	.00000000	.00001149	.06175232	.00516578	.01410283	.00000000
41 SCHOOLS	.00000000	.00000000	.00000000	.00223443	.00000000	.00000000	.00000000
42 COLLEGES	.00004730	.00026819	.00003135	.00361596	.03227174	.00251273	.00000000
43 ASSOC NEC	.00420705	.00015245	.00005072	.00846807	.00044967	.00096547	.00000000
44 FED GOVT	.01529335	.00705281	.00031110	.00239740	.00367608	.00381159	.00000000
45 ST/LOC GOV	.00507149	.00252032	.00110131	.00615548	.22132403	.83408685	.00000000
46 HOUSEHOLDS	.49744803	.73786801	.91820783	.00000000	.00000000	.00000000	.00000000
47 IND BUS TX	.00048366	.00000000	.00000000	.00000000	.00000000	.00000000	.00000000
48 PROFITS	.00006732	.00000000	.00000000	.00000000	.00000000	.00000000	.00000000
49 PROP INC	.00650951	-.02513572	.01129388	.00000000	.00000000	.00000000	.00000000
50 COMP INPS	.17762123	.08583775	.02943289	.54375532	.00000000	.00000000	.00000000
51 N C INPS	.00417288	.03225347	.00013450	.00000000	.00000000	.00000000	.00000000



## APPENDIX IV (I-A) INVERSE MATRIX WITH HOUSEHOLDS

	1	2	3	4	5	6	7
	DAIRY	POULTRY	RANCHING	FEEDLOTS	SHEEP/GOAT	HOGS/PIGS	LVSTK NEC
1 DAIRY	1.00223828	.00158494	.00931251	.00502002	.00893169	.00870444	.00508759
2 POULTRY	.00047138	1.00060193	.00048630	.00043966	.00043955	.00047843	.00058995
3 RANCHING	.00235479	.00506919	1.00500544	.28921119	.00376715	.00381943	.00234777
4 FEEDLOTS	.00120335	.00156283	.00142223	1.00109724	.00160488	.00139591	.00171361
5 SHEEP/GOAT	.00003933	.00005157	.00004649	.00003579	1.17690866	.00004563	.00005607
6 HOGS/PIGS	.00010794	.00014152	.00012759	.00009821	.00014408	1.03970802	.00015386
7 LVSTK NEC	.00216457	.00388499	.00590342	.00780191	.00680663	.00824302	1.94847822
8 FOOD GRAIN	.00124899	.00352770	.00360972	.00153108	.00279936	.00271034	.00139192
9 FEED GRAIN	.00272556	.06707026	.00385386	.13560113	.04486379	.08174432	.10876602
10 HAY/PAST.	.15804877	.00330290	.13687386	.04039366	.03581311	.06470258	.09879188
11 VEGETABLES	.00041801	.00076164	.00118332	.00056032	.00111135	.00102686	.00061886
12 SUGARBETS	.00039045	.00080849	.00047570	.00019715	.00052422	.00043559	.00029464
13 CROPS NEC	.00060412	.00116441	.00064905	.00051870	.00059224	.00063941	.00066256
14 AG SERVICE	.01185829	.05135132	.01550388	.00703880	.01572106	.01446165	.00815410
15 COAL MINES	.00013397	.00041504	.00015202	.00008260	.00018571	.00015289	.00012541
16 OIL/GAS EX	.01157821	.00693632	.01497434	.00855497	.01278890	.01483987	.01249746
17 MINING NEC	.00014712	.00018318	.00014220	.00017795	.00019162	.00019601	.00020937
18 RES CONSTR	.00000000	.00000000	.00000000	.00000000	.00000000	.00000000	.00000000
19 CONSTR NEC	.01347174	.01031289	.01558858	.00824596	.01662379	.01498415	.01061564
20 LS PRD MFG	.00367659	.00482044	.00434596	.00334517	.00490780	.00426551	.00524079
21 FOOD MFG	.05202418	.10332281	.05625218	.02269915	.06840603	.05355441	.03875073
22 AG INPUTS	.00420522	.00265571	.00678372	.00368481	.00789425	.00694084	.00502910
23 WOOD/PAPER	.00123426	.00200655	.00133529	.00070753	.00154274	.00127896	.00110531
24 PRINT/PUBL	.00431587	.00588262	.00518323	.00289802	.00597692	.00494366	.00427869
25 REFINING	.01598256	.01614711	.01662668	.01027671	.01947157	.01635880	.01483206
26 MACH/EQUIP	.00285192	.00294749	.00370575	.00225162	.00458297	.00360288	.00325870
27 MANUPR NEC	.00384916	.00525525	.00420917	.00216763	.00503326	.00414036	.00529989
28 TRANSPORT	.03063690	.02662641	.03059422	.01560327	.03374977	.02814379	.02105821
29 COMMUNICAT	.00559768	.00612291	.00733402	.00417156	.00812979	.00698014	.00584446
30 ELECT GENR	.00685765	.00705388	.00773065	.00413540	.00958665	.00783991	.00618426
31 UTILITIES	.00538116	.00515723	.00600474	.00462364	.00605985	.00592509	.00631741
32 WHOLESALE	.00192783	.00198721	.00343727	.00172695	.00417874	.00326028	.00243210
33 RETAIL	.01199373	.01316472	.01493983	.01170803	.01614147	.01451901	.01712904
34 F/I/R/E	.08859760	.06537800	.12034830	.07222145	.12927663	.11280654	.09225839
35 LODGING	.00214425	.00212024	.00278520	.00176538	.00293241	.00262229	.00243526
36 SERVICES	.02092664	.01952485	.02740247	.01642209	.03022572	.02637843	.02267387
37 FOOD/DRINK	.00889877	.00994362	.01063380	.00802122	.01182318	.01036121	.01192803
38 AUTO SERV	.00602779	.00560357	.01122143	.00596899	.01269794	.01064876	.00822460
39 AMUSEMENTS	.00144126	.00197510	.00171893	.00131178	.00189969	.00167824	.00194887
40 HEALTH SER	.01361550	.02445046	.02617247	.01509107	.03021010	.02528369	.02171613
41 SCHOOLS	.00033404	.00037394	.00038686	.00032714	.00043158	.00038226	.00049711
42 COLLEGES	.00058447	.00066705	.00067903	.00055889	.00075748	.00066989	.00084578
43 ASSOC NEC	.00202873	.00226949	.00240062	.00171585	.00278222	.00234429	.00256015
44 FED GOVT	.00176919	.00186843	.00231437	.00143836	.00251183	.00220774	.00198776
45 ST/LOC GOV	.00325212	.00319931	.00454029	.00273486	.00457388	.00421995	.00364372
46 HOUSEHOLDS	.14949717	.16735188	.17313747	.14640948	.19314900	.17107693	.22247563
BUS. MULT.	1.65885713	1.66660743	1.76753447	1.87059237	1.94875124	1.79072242	2.73051097

## APPENDIX IV (I-A) INVERSE MATRIX WITH HOUSEHOLDS (continued)

	8	9	10	11	12	13	14
	FOOD GRAIN	FEED GRAIN	HAY/PAST.	VEGETABLES	SUGARBEETS	CROPS NEC	AG SERVICE
1 DAIRY	.00116962	.01264243	.01205219	.00075968	.00050761	.00088970	.00102026
2 POULTRY	.00118958	.00154589	.00157560	.00047397	.00029975	.00060446	.00321799
3 RANCHING	.00644531	.00430704	.00342883	.00535054	.00412063	.00300917	.00182577
4 FEEDLOTS	.00120187	.00097325	.00095699	.00157966	.00143103	.00325696	.00414149
5 SHEEP/GOAT	.00003905	.00003162	.00003108	.00005138	.00004652	.00010597	.00013454
6 HOGS/PIGS	.00010716	.00008678	.00008530	.00014099	.00012766	.00029081	.00036920
7 LVSTK NEC	.03345917	.04438873	.01135344	.00659721	.01091094	.00336749	.01144001
8 FOOD GRAIN	1.03701951	.00210833	.00139501	.00201958	.00152370	.00058337	.00016227
9 FEED GRAIN	.00221297	1.03948628	.00098553	.00073444	.00093675	.00087130	.00208928
10 HAY/PAST.	.00516874	.00639233	1.00434733	.00345252	.00290633	.00182492	.00122377
11 VEGETABLES	.00059947	.00042167	.00040957	1.01693717	.00054733	.00077795	.00077248
12 SUGARBEETS	.00017049	.00011960	.00011400	.00017379	1.03376109	.00012481	.00009716
13 CROPS NEC	.00038672	.00188675	.00186037	.00529711	.00041375	1.04412294	.01154800
14 AG SERVICE	.01603102	.01098397	.01267180	.02093133	.01597812	.01377741	1.00268023
15 COAL MINES	.00010388	.00012653	.00015492	.00011545	.00005908	.00035235	.00018260
16 OIL/GAS EX	.02578115	.02229912	.03644629	.01605650	.02095644	.03501111	.01543248
17 MINING NEC	.00059114	.00092565	.00019127	.00038744	.00046930	.00052768	.00021392
18 RES CONSTR	.00000000	.00000000	.00000000	.00000000	.00000000	.00000000	.00000000
19 CONSTR NEC	.01797297	.01602623	.01817879	.01205365	.01548724	.01383587	.01622430
20 LS PRD MFG	.00365031	.00295597	.00290540	.00480256	.00434858	.00990568	.01257599
21 FOOD MFG	.00420518	.00438046	.00383144	.00441430	.00409016	.00848681	.01147679
22 AG INPUTS	.00799514	.00941663	.01089018	.00630707	.00994252	.00788545	.01009093
23 WOOD/PAPER	.00066211	.00059497	.00063679	.00086331	.00073137	.00277578	.00296333
24 PRINT/PUBL	.00396306	.00337862	.00347969	.00323009	.00369613	.01199223	.00694915
25 REFINING	.02481853	.02637968	.03345658	.01622051	.02032803	.08181905	.02722225
26 MACH/EQUIP	.00337569	.00329268	.00374570	.00310625	.00370886	.00809089	.00831584
27 MANUPR NEC	.00246682	.00245088	.00259058	.00381573	.00252149	.00509454	.00541166
28 TRANSPORT	.02340310	.02231797	.02309607	.01952940	.01503123	.02627218	.03426823
29 COMMUNICAT	.00592037	.00536625	.00539297	.00551812	.00565174	.01145051	.00880793
30 ELEC GENR	.00493249	.00633997	.00818652	.00586487	.00235013	.01196769	.00849386
31 UTILITIES	.01022430	.01370428	.01368986	.00928892	.00409131	.02260671	.00994209
32 WHOLESALE	.00227632	.00171418	.00179877	.00191325	.00209716	.00301021	.00494801
33 RETAIL	.01858062	.01518444	.01494242	.01744039	.01773626	.03418097	.04257828
34 F/I/R/E	.18928753	.14261965	.14276549	.09338823	.14927705	.11097696	.13302346
35 LODGING	.00299536	.00267853	.00253008	.00252962	.00277088	.00399183	.00469041
36 SERVICES	.03035934	.02858691	.03124970	.02160060	.03107269	.03805543	.04988979
37 FOOD/DRINK	.01009416	.00831902	.00838797	.01189051	.01129173	.02371381	.03388853
38 AUTO SERV	.00795177	.00565305	.00572383	.00685322	.00764887	.01097253	.01945551
39 AMUSEMENTS	.00160780	.00129232	.00129248	.00206841	.00185592	.00403557	.01416380
40 HEALTH SER	.01099528	.00889924	.00856625	.01467335	.01317051	.03028664	.03712354
41 SCHOOLS	.00036736	.00029401	.00028721	.00050263	.00044882	.00104576	.00128031
42 COLLEGES	.00065039	.00052938	.00052850	.00086019	.00077594	.00179259	.00260195
43 ASSOC NEC	.00206955	.00176317	.00178319	.00254460	.00232066	.00496830	.00597297
44 FED GOVT	.00260718	.00221347	.00225058	.00196973	.00223843	.00325498	.00675904
45 ST/LOC GOV	.00500270	.00482375	.00460210	.00350784	.00316413	.00591481	.00712539
46 HOUSEHOLDS	.16440701	.13158343	.12853630	.22494872	.20086525	.46801842	.57299135
BUS. MULT.	1.69451929	1.62148512	1.57338497	1.58276484	1.63370913	2.07590064	2.15578616

## APPENDIX IV (I-A) INVERSE MATRIX WITH HOUSEHOLDS (continued)

	15	16	17	18	19	20	21
	COAL MINES	OIL/GAS EX	MINING NEC	RES CONSTR	CONSTR NEC	LS PRD MFG	FOOD MFG
1 DAIRY	.00079133	.00030518	.00102568	.00070886	.00084431	.05349730	.00090130
2 POULTRY	.00057054	.00022468	.00073987	.00051280	.00061289	.01670057	.00080838
3 RANCHING	.00123438	.00049296	.00160328	.00110909	.00131908	.12014913	.00155902
4 FREEDLOTS	.00335787	.00134446	.00436069	.00301441	.00358670	.32542214	.00405402
5 SHEEP/GOAT	.00010921	.00004349	.00014178	.00009800	.00011663	.01166567	.00013474
6 HOGS/PIGS	.00029969	.00011934	.00038908	.00026894	.00032006	.03201261	.00036976
7 LVSTK NEC	.00017776	.00006811	.00022994	.00021184	.00021721	.00342605	.00149190
8 FOOD GRAIN	.00004420	.00001406	.00013800	.00004709	.00005108	.00083930	.00150492
9 FEED GRAIN	.00067892	.00026967	.00088125	.00061340	.00072825	.04845034	.00929320
10 HAY/PAST.	.00037634	.00014539	.00048795	.00034039	.00040341	.02715045	.00051784
11 VEGETABLES	.00060718	.00023469	.00078743	.00054360	.00064730	.00049718	.00174236
12 SUGARBETS	.00005383	.00002120	.00007041	.00006402	.00005956	.00017250	.00663459
13 CROPS NEC	.00040849	.00016287	.00052354	.00038607	.00045676	.00039713	.00120994
14 AG SERVICE	.00066805	.00049771	.00069096	.00117972	.00235924	.00487031	.00060241
15 COAL MINES	1.06621170	.00013385	.00057701	.00014444	.00016050	.00013405	.00032381
16 OIL/GAS EX	.01651829	1.03292437	.01665915	.00870127	.01345274	.00776293	.00804121
17 MINING NEC	.00020343	.00021455	1.06058182	.00091291	.00270170	.00012406	.00043531
18 RES CONSTR	.00000000	.00000000	.00000000	1.00000000	.00000000	.00000000	.00000000
19 CONSTR NEC	.01344886	.05513763	.01384448	.00734238	1.00844253	.00850341	.01128887
20 LS PRD MFG	.01020842	.00406495	.01325309	.00916079	.01090200	1.09044092	.01259511
21 FOOD MFG	.00819595	.00323493	.01070433	.00735342	.00876547	.02200406	1.05043052
22 AG INPUTS	.00047260	.00020473	.00051997	.00028031	.00038811	.00201936	.00042621
23 WOOD/PAPER	.00197762	.00075364	.00287799	.04132819	.00702346	.00808153	.01458473
24 PRINT/PUBL	.00638999	.00374880	.00884796	.00654910	.00658102	.00631082	.03639757
25 REFINING	.02289782	.01093997	.02641528	.01705538	.02591851	.01107370	.01465571
26 MACH/EQUIP	.01424648	.00523527	.01449802	.01434043	.01733651	.00302110	.00508287
27 MANUPR NEC	.00532819	.00506357	.00614814	.02398111	.02993920	.00304887	.03521305
28 TRANSPORT	.02108476	.01093843	.03175448	.03318230	.03957053	.02083401	.03351747
29 COMMUNICAT	.00847456	.00496013	.01223605	.01009121	.01084686	.00599458	.01822078
30 ELECT GENR	.01242856	.00718866	.01689441	.00552163	.00585605	.00614953	.00718803
31 UTILITIES	.00804222	.00897763	.03358313	.00825354	.00951073	.00801742	.01502504
32 WHOLESALE	.00295464	.00102149	.00538001	.00278845	.00326978	.00196909	.00187118
33 RETAIL	.03397825	.01229471	.04401536	.08757795	.05194798	.01607574	.01926092
34 F/I/R/E	.11147584	.12553765	.14260118	.08909706	.11126108	.06921282	.06376587
35 LODGING	.00437324	.00245294	.00691373	.00439979	.00500010	.00213194	.00304072
36 SERVICES	.05202892	.03013124	.05231476	.07373119	.10026483	.02563274	.04772877
37 FOOD/DRINK	.02527812	.01578858	.03374003	.02332296	.02725669	.01371346	.01897493
38 AUTO SERV	.01529759	.00676742	.02409296	.01097395	.01773414	.00651506	.00996454
39 AMUSEMENTS	.00395777	.00153524	.00512857	.00360320	.00425376	.00197536	.00289202
40 HEALTH SER	.03101608	.01057187	.03992665	.02759826	.03298351	.01782968	.01825237
41 SCHOOLS	.00107231	.00036243	.00138047	.00095328	.00113995	.00050440	.00062894
42 COLLEGES	.00244497	.00082831	.00290816	.00161266	.00193055	.00085414	.00110280
43 ASSOC NEC	.00491655	.00199571	.00637935	.00433940	.00513548	.00249510	.00359722
44 FRD GOVT	.00350491	.00219064	.00675167	.00384820	.00410035	.00283074	.00362854
45 ST/LOC GOV	.00601551	.00437201	.01358650	.00467285	.00530991	.00459531	.00701761
46 HOUSEHOLDS	.47990218	.16220054	.61781674	.42663039	.51017457	.22573725	.28147416
BUS. MULT.	2.00372412	1.53571569	2.28440131	1.96844623	2.09088110	2.24084387	1.77745128

## APPENDIX IV (I-A) INVERSE MATRIX WITH HOUSEHOLDS (continued)

	22	23	24	25	26	27	28
	AG INPUTS	WOOD/PAPER	PRINT/PUBL	REFINING	MACH/EQUIP	MANUFR NEC	TRANSPORT
1 DAIRY	.00058757	.00068583	.00097740	.00041217	.00099360	.00081789	.00095104
2 POULTRY	.00041276	.00049517	.00071619	.00031025	.00071950	.00058272	.00070280
3 RANCHING	.00091022	.00110277	.00157117	.00069608	.00157791	.00131396	.00152821
4 FEEDLOTS	.00243682	.00293014	.00428545	.00182233	.00429901	.00358175	.00416349
5 SHEEP/GOAT	.00007903	.00009513	.00013869	.00005919	.00013946	.00011586	.00013485
6 HOGS/PIGS	.00021687	.00026105	.00038060	.00016243	.00038270	.00031793	.00037006
7 LVSTK NEC	.00022383	.00130747	.00020556	.00014258	.00021649	.00029839	.00020281
8 FOOD GRAIN	.00004243	.00004322	.00004143	.00003153	.00003913	.00004638	.00006087
9 FEED GRAIN	.00263945	.00065942	.00086047	.00038619	.00086858	.00072090	.00084050
10 HAY/PAST.	.00028762	.00039996	.00046400	.00024365	.00047241	.00039721	.00045343
11 VEGETABLES	.00043279	.00052610	.00075354	.00030511	.00075962	.00060945	.00072274
12 SUGARBETS	.00005013	.00046367	.00006760	.00003667	.00006836	.00005656	.00006567
13 CROPS NEC	.00028286	.00055547	.00045347	.00024999	.00048360	.00040846	.00045019
14 AG SERVICE	.00048989	.00054729	.00053896	.00059136	.00055301	.00047499	.00060452
15 COAL MINES	.00038279	.00027891	.00021081	.00047544	.00022397	.00143888	.00026843
16 OIL/GAS EX	.02953675	.01099665	.00879467	.26407673	.00957274	.01442488	.02955374
17 MINING NEC	.00145365	.00035955	.00013807	.00347053	.00024747	.00988644	.00038328
18 RES CONSTR	.00000000	.00000000	.00000000	.00000000	.00000000	.00000000	.00000000
19 CONSTR NEC	.01418705	.01220996	.01036396	.02427693	.01069297	.01630993	.03342293
20 LS PRD MFG	.00738730	.00889207	.01296425	.00553293	.01303571	.01082974	.01260518
21 FOOD MFG	.00746686	.00738524	.01029619	.00539013	.01032823	.00835682	.01005828
22 AG INPUTS	1.02723781	.00073084	.00036850	.00232247	.00080493	.00112218	.00038541
23 WOOD/PAPER	.00462112	1.04708454	.00276541	.00249505	.00396769	.00521759	.00164822
24 PRINT/PUBL	.02182816	.00826775	1.05612586	.01115744	.01156741	.00969140	.01356248
25 REFINING	.09499576	.02309264	.02022098	1.08385946	.02367648	.03271954	.07880450
26 MACH/EQUIP	.02000425	.00808966	.01425072	.00705016	1.10906499	.01182733	.01307001
27 MANUFR NEC	.01289233	.01866112	.00522276	.00601751	.01544889	1.02927169	.00633267
28 TRANSPORT	.04790888	.04428528	.04482066	.04371428	.03460018	.04432729	1.11087342
29 COMMUNICAT	.01060035	.00952134	.02008977	.00900307	.01386477	.01111237	.01617789
30 ELECT GENR	.00868655	.00879136	.00845556	.00989183	.00868005	.01222008	.01349764
31 UTILITIES	.02867933	.01234731	.00995007	.03287491	.01166177	.02088897	.01424336
32 WHOLESALE	.00305641	.00255552	.00376666	.00141548	.00411890	.00305253	.00399361
33 RETAIL	.02135925	.02708111	.03554979	.01563638	.03782750	.03161604	.03684936
34 F/I/R/E	.08252393	.08729238	.11750454	.07531460	.11647241	.09704665	.11698239
35 LODGING	.00601950	.00398016	.00996415	.00265746	.00898474	.00492046	.00510967
36 SERVICES	.05434121	.04734901	.07688026	.03798105	.06974675	.05297658	.07034400
37 FOOD/DRINK	.02412595	.02597979	.04798786	.01824544	.04026219	.03028420	.04605928
38 AUTO SERV	.00826484	.01222040	.01471158	.00656802	.01309493	.01163891	.02243375
39 AMUSEMENTS	.00284302	.00351299	.00503801	.00209448	.00522412	.00397329	.00507138
40 HEALTH SER	.02037482	.02608395	.03435920	.01396383	.03731883	.03025081	.03295819
41 SCHOOLS	.00070328	.00088815	.00117973	.00048151	.00126565	.00103293	.00113881
42 COLLEGES	.00169545	.00164235	.00216142	.00142173	.00243464	.00189815	.00213961
43 ASSOC NEC	.00351071	.00465607	.00684467	.00263267	.00661871	.00506371	.00682634
44 FED GOVT	.00390176	.00448479	.01829710	.00300153	.00556204	.00478466	.00459857
45 ST/LOC GOV	.00689931	.00506382	.00594157	.00680994	.00597381	.00645429	.00761887
46 HOUSEHOLDS	.31474645	.39748296	.52797897	.21549511	.56643126	.46227842	.50966407
BUS. MULT.	1.90132710	1.88134038	2.14465830	1.92077760	2.21034807	1.99665924	2.23792653

## APPENDIX IV (I-A) INVERSE MATRIX WITH HOUSEHOLDS (continued)

	29	30	31	32	33	34	35
	COMMUNICAT	ELECT GENR	UTILITIES	WHOLESALE	RETAIL	F/I/R/E	LODGING
1 DAIRY	.00092611	.00040966	.00029890	.00116764	.00108742	.00045538	.00099826
2 POULTRY	.00066342	.00029694	.00021622	.00085666	.00078506	.00033865	.00075213
3 RANCHING	.00144348	.00064494	.00046967	.00197655	.00170259	.00072438	.00155409
4 FEEDLOTS	.00392249	.00175117	.00127841	.00510986	.00463446	.00197201	.00424018
5 SHEEP/GOAT	.00012732	.00005691	.00004154	.00016518	.00015062	.00006394	.00013607
6 HOGS/PIGS	.00034939	.00015617	.00011399	.00045327	.00041333	.00017546	.00037340
7 LVSTK NEC	.00026615	.00009494	.00006634	.00026649	.00024065	.00013030	.00022924
8 FOOD GRAIN	.00003694	.00001891	.00001254	.00008685	.00004573	.00001876	.00004239
9 FEED GRAIN	.00121658	.00035621	.00025773	.00107696	.00095030	.00040167	.00085726
10 HAY/PAST.	.00044255	.00019750	.00014217	.00061845	.00051635	.00021822	.00046403
11 VEGETABLES	.00070777	.00031369	.00022933	.00090281	.00083495	.00035034	.00085953
12 SUGARBETS	.00006226	.00002837	.00002041	.00008366	.00007364	.00003110	.00006452
13 CROPS NEC	.00046548	.00021125	.00015431	.00059541	.00055480	.00025785	.00127079
14 AG SERVICE	.00053238	.00039380	.00026976	.00174923	.00072173	.00316937	.00287777
15 COAL MINES	.00011917	.01579203	.00008990	.00019583	.00027651	.00010852	.00053732
16 OIL/GAS EX	.00566082	.03996664	.19248721	.01039755	.01050058	.00434261	.01604790
17 MINING NEC	.00010323	.00036979	.00010717	.00013637	.00013474	.00012945	.00023396
18 RES CONSTR	.00000000	.00000000	.00000000	.00000000	.00000000	.00000000	.00000000
19 CONSTR NEC	.01728668	.03842884	.02244006	.01336629	.01390862	.03501720	.04081432
20 LS PRD MFG	.01190118	.00531965	.00388276	.01543969	.01407935	.00597670	.01271896
21 FOOD MFG	.00952997	.00431968	.00311446	.01224120	.01125604	.00475118	.00981141
22 AG INPUTS	.00018134	.00027315	.00013482	.00025081	.00022613	.00015856	.00055367
23 WOOD/PAPER	.00134657	.00093732	.00064997	.00328646	.00207749	.00083295	.00253893
24 PRINT/PUBL	.00738118	.00446710	.00263136	.02008932	.03030087	.01176411	.02317229
25 REFINING	.00938341	.07188873	.00942392	.01897237	.01822736	.00674883	.01922428
26 MACH/EQUIP	.01924156	.00901642	.00277091	.00743180	.00684893	.00372440	.00658924
27 MANUFR NEC	.00340300	.00446873	.00259731	.00468762	.00464892	.00279439	.00815002
28 TRANSPORT	.01829114	.03446053	.00897846	.04223991	.02551638	.01287432	.02457984
29 COMMUNICAT	1.01376209	.00641085	.00385618	.02365058	.02703115	.01192243	.03264471
30 ELECT GENR	.00554583	1.00306375	.00432912	.00960120	.01456394	.00473779	.03055010
31 UTILITIES	.00917720	.07856778	1.22784693	.01538191	.01325738	.00863946	.02697868
32 WHOLESALE	.00258201	.00137443	.00089696	1.00407419	.00322509	.00128291	.00280559
33 RETAIL	.03676033	.01695585	.01257408	.04229268	1.04440077	.01857307	.03534444
34 F/I/R/E	.10876772	.05945666	.05598861	.14096095	.16925244	1.16252085	.17822264
35 LODGING	.00427848	.00245918	.00190758	.00824980	.00598399	.00367779	1.00489330
36 SERVICES	.04367321	.02836479	.01854155	.09283147	.07875810	.05362965	.10954206
37 FOOD/DRINK	.03055890	.01429284	.01061743	.06216370	.03716646	.01925058	.03704196
38 AUTO SERV	.01089916	.00680651	.00448958	.03087139	.02016677	.00674085	.01957076
39 AMUSEMENTS	.02808394	.00214798	.00148910	.00879523	.00631523	.00241276	.00519956
40 HEALTH SER	.03566157	.01566953	.01143543	.03941153	.04215720	.01761432	.03236955
41 SCHOOLS	.00123233	.00054150	.00039489	.00136155	.00145172	.00057425	.00111650
42 COLLEGES	.00234229	.00174909	.00070036	.00228530	.00242969	.00098627	.00191426
43 ASSOC NEC	.00566680	.00272422	.00195880	.00717385	.00709967	.00319992	.00817325
44 FED GOVT	.00459755	.00413127	.00288677	.00773648	.00871906	.00879949	.00967211
45 ST/LOC GOV	.00529869	.00518998	.00806673	.00684839	.00745649	.00359847	.01478212
46 HOUSEHOLDS	.55151726	.24234500	.17672852	.60935061	.64970230	.25699976	.49968083
BUS. MULT.	2.01539694	1.72689028	1.79758824	2.27688506	2.28985098	1.68269125	2.23019423

## APPENDIX IV (I-A) INVERSE MATRIX WITH HOUSEHOLDS (continued)

	36	37	38	39	40	41	42
	SERVICES	FOOD/DRINK	AUTO SERV	AMUSEMENTS	HEALTH SER	SCHOOLS	COLLEGES
1 DAIRY	.00107575	.00575821	.00069767	.00138421	.00160126	.00149959	.00142664
2 POULTRY	.00078276	.00473919	.00050467	.00080628	.00120232	.00090910	.00103374
3 RANCHING	.00170747	.01118371	.00110103	.00201775	.00247836	.00224976	.00224607
4 FEEDLOTS	.00465333	.03096248	.00298343	.00518025	.00676581	.00611072	.00610417
5 SHEEP/GOAT	.00015088	.00097423	.00009691	.00015881	.00022042	.00019748	.00019825
6 HOGS/PIGS	.00041405	.00267347	.00026593	.00043579	.00060487	.00054192	.00054403
7 LVSTK NEC	.00026102	.00064093	.00015497	.00326757	.00027994	.00038939	.00080439
8 FOOD GRAIN	.00004185	.00020701	.00003632	.00012423	.00005503	.00006221	.00005817
9 FEED GRAIN	.00095998	.00556251	.00060799	.02038458	.00130412	.00134235	.00131328
10 HAY/PAST.	.00051189	.00270978	.00033480	.00080800	.00072119	.00068700	.00070451
11 VEGETABLES	.00082795	.00456719	.00053554	.00091612	.00105500	.00091675	.00109338
12 SUGARBETS	.00007337	.00042552	.00004749	.00008702	.00009155	.00009076	.00009757
13 CROPS NEC	.00052168	.00056042	.00035148	.00057881	.00061024	.00063265	.00127484
14 AG SERVICE	.00064908	.00114313	.00048247	.00177455	.00092382	.00169565	.00216828
15 COAL MINES	.00017788	.00023089	.00015267	.00022368	.00027288	.00049470	.00041663
16 OIL/GAS EX	.00836538	.00760859	.01104627	.01006701	.01245683	.01730350	.01377762
17 MINING NEC	.00011981	.00013078	.00021389	.00019038	.00017891	.00025798	.00021451
18 RES CONSTR	.00000000	.00000000	.00000000	.00000000	.00000000	.00000000	.00000000
19 CONSTR NEC	.01086616	.01275787	.01316379	.03030350	.01834118	.04609207	.03191835
20 LS PRD MFG	.01410373	.09106597	.00905818	.01484434	.02060353	.01845920	.01853112
21 FOOD MFG	.01125005	.06635123	.00723509	.01278484	.01405209	.01390173	.01492808
22 AG INPUTS	.00050946	.00039758	.00023779	.00047610	.00065475	.00043790	.00051700
23 WOOD/PAPER	.00165273	.00526429	.00130090	.00179212	.00192033	.00236544	.00242923
24 PRINT/PUBL	.01776210	.01498614	.01328931	.02091870	.01251544	.02294925	.02498481
25 REFINING	.01605470	.01182618	.01996016	.01453019	.02624909	.02210655	.02439522
26 MACH/EQUIP	.01578559	.00555257	.02230407	.00746802	.02584701	.01280793	.01280451
27 MANUFR NEC	.00451242	.00597298	.01269713	.00616982	.00537011	.00845246	.00655123
28 TRANSPORT	.03280764	.03054700	.03982431	.02933228	.03059940	.03924587	.05045780
29 COMMUNICAT	.02277755	.01470886	.01768901	.02240610	.01740735	.02783498	.02239630
30 ELECT GENR	.00814980	.01186566	.00708612	.01156084	.01417602	.01319798	.01433364
31 UTILITIES	.01188010	.01398828	.01313790	.01496414	.01567191	.02236648	.02634401
32 WHOLESALE	.00337678	.00268089	.05133428	.00362838	.00355426	.00547762	.00454621
33 RETAIL	.04133249	.03064682	.04340723	.03722117	.04516052	.04761565	.05709363
34 F/I/R/E	.14370884	.12276772	.09769957	.14808717	.17942947	.21081873	.22857836
35 LODGING	.01186586	.00371843	.00364250	.00812312	.00626498	.00627089	.00659907
36 SERVICES	1.10366971	.06110869	.04841430	.08795427	.09413754	.09909098	.09059969
37 FOOD/DRINK	.04553355	1.02526366	.02535116	.04096781	.04477660	.04391583	.05247855
38 AUTO SERV	.01874078	.01041445	1.01358269	.02322026	.01832567	.02539676	.02982007
39 AMUSEMENTS	.00589237	.01298808	.00386068	1.07192532	.00597926	.01412144	.01018510
40 HEALTH SER	.03947144	.02994346	.02658622	.03629913	1.08361283	.04614497	.05407233
41 SCHOOLS	.00136224	.00100419	.00091849	.00120064	.00149077	1.00155655	.00186809
42 COLLEGES	.00263704	.00168694	.00154966	.00201962	.00254930	.00364482	1.00311861
43 ASSOC NEC	.00960223	.00583117	.00461668	.00955005	.00872684	.01156746	.01005914
44 FED GOVT	.01095014	.00461254	.00360638	.00618349	.00743553	.00887570	.00963764
45 ST/LOC GOV	.00638450	.00629646	.00534387	.00765813	.00816151	.01136210	.01084757
46 HOUSEHOLDS	.60965620	.44941586	.41105990	.53733688	.66718169	.69661700	.83604583
BUS. MULT.	2.24359034	2.13374200	1.93757088	2.25733145	2.41101757	2.51807585	2.68961726

## APPENDIX IV (I-A) INVERSE MATRIX WITH HOUSEHOLDS (continued)

	43	44	45	46	
	ASSOC NEC	FED GOVT	ST/LOC GOV	HOUSEHOLDS	TOTALS
1 DAIRY	.00135643	.00193591	.00182992	.00195715	1.15928651
2 POULTRY	.00098166	.00139958	.00131402	.00140448	1.05551046
3 RANCHING	.00216064	.00319524	.00283978	.00303346	1.51895845
4 FEEDLOTS	.00588602	.00872500	.00772366	.00825300	1.50845703
5 SHEEP/GOAT	.00019086	.00028270	.00025141	.00026868	1.19442764
6 HOGS/PIGS	.00052375	.00077578	.00068990	.00073729	1.08780199
7 LVSTK NEC	.00074163	.00037967	.00039790	.00042466	2.12225589
8 FOOD GRAIN	.00005602	.00008938	.00006884	.00007238	1.06570806
9 FEED GRAIN	.00126306	.00171474	.00155494	.00166127	1.60261757
10 HAY/PAST.	.00066614	.00092225	.00086830	.00092781	1.60784370
11 VEGETABLES	.00103245	.00150604	.00140375	.00150122	1.05486889
12 SUGARBRETS	.00009241	.00013724	.00012289	.00013124	1.04733300
13 CROPS NEC	.00073992	.00082912	.00094720	.00100995	1.08834116
14 AG SERVICE	.00159786	.00088831	.00093009	.00091660	1.25469527
15 COAL MINES	.00029247	.00217469	.00108861	.00018802	1.09613945
16 OIL/GAS EX	.01255934	.01273928	.01265196	.00979019	2.13293856
17 MINING NEC	.00026980	.00019247	.00017909	.00013042	1.08895936
18 RES CONSTR	.00000000	.00000000	.00000000	.00000000	1.00000000
19 CONSTR NEC	.05395611	.01559357	.02688873	.01053558	1.89077261
20 LS PRD MFG	.01784033	.02642515	.02350006	.02511423	1.64248333
21 FOOD MFG	.01415450	.02112805	.01883138	.02012404	1.87563008
22 AG INPUTS	.00032682	.00034099	.00046229	.00031132	1.14345549
23 WOOD/PAPER	.00229612	.00258143	.00248721	.00254180	1.20116639
24 PRINT/PUBL	.05555288	.01406779	.00999945	.01028514	1.59431096
25 REFINING	.02419705	.02346666	.01924639	.01666853	2.19883547
26 MACH/EQUIP	.00998088	.00970841	.00851721	.00845749	1.50881200
27 MANUFR NEC	.00710793	.00840628	.00562115	.00540608	1.36389311
28 TRANSPORT	.04225939	.09545093	.02994805	.02955685	2.52871281
29 COMMUNICAT	.02103212	.01663471	.01427016	.01481672	1.58473401
30 ELECT GENR	.01337938	.01069486	.01228919	.00848222	1.42658133
31 UTILITIES	.01955192	.01788154	.02266514	.01399719	1.91736997
32 WHOLESALE	.00408528	.00459570	.00407964	.00425935	1.18578162
33 RETAIL	.05150003	.06600573	.07489768	.07967014	2.51276186
34 F/I/R/E	.20810724	.18227796	.18433055	.19497879	6.82426797
35 LODGING	.02098639	.00746219	.00727112	.00764080	1.23023586
36 SERVICES	.08145442	.07503563	.05222262	.05195961	3.45680810
37 FOOD/DRINK	.05790785	.05141976	.05349700	.05625566	2.27867431
38 AUTO SERV	.02301682	.02476832	.01961842	.02057638	1.63195559
39 AMUSEMENTS	.01000740	.00868418	.00887626	.00949066	1.30584790
40 HEALTH SER	.04867440	.06308747	.07291788	.07821243	2.42708399
41 SCHOOLS	.00168091	.00218232	.00252408	.00270796	1.04485984
42 COLLEGES	.00286323	.00389149	.00418352	.00444482	1.08257278
43 ASSOC NEC	1.01160723	.00942612	.01045168	.01112637	1.24109696
44 FED GOVT	.02095358	1.01243195	.00581867	.00579736	1.24972233
45 ST/LOC GOV	.01153487	.01030288	1.00962903	.00901081	1.29840878
46 HOUSEHOLDS	.75227314	.97667627	1.12962787	1.21192196	20.07659803
BUS. MULT.	2.61869861	2.79851576	2.86953471	1.94675809	

## APPENDIX V Equilibrium Conditions for an I/O Model

There are  $N$  balance equations in the I/O model corresponding to the  $N$  dependent sectors of the model. It is assumed that the private industries act to satisfy all increased demands through a profit motive. Aggregating the final demand columns together as,  $Y_i = \sum D_{ij}$ ,  $i = 1 \dots N$ ; the  $N$  balance equations across columns of the transactions table are:

$$X_1 = \sum Z_{1,j} + Y_1 \quad j = 1 \dots N$$

. . . . .  
 . . . . .  
 . . . . .

$$X_N = \sum Z_{N,j} + Y_N \quad j = 1 \dots N$$

where  $X_i$  is total output produced in industry  $i$ , the  $Z$ 's are input demands among the intermediate processing sectors, and  $Y_i$  stands for the total final demand for industry  $i$ . It is evident that we now have  $N^2$  unknowns (the  $Z$ 's) which are the dependent intermediate processing spending flows among industries and only  $N$  equations. A solution will not be possible for this system of simultaneous equations unless the number of unknowns can be reduced to equal the number of equations.

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 coefficients in place of the  $Z_{ij}$ 's. A sector's direct input coefficient is as  $a_{ij} = Z_{ij}/X_j$ . Thus we can replace the  $Z$ 's above with  $Z_{ij} = (a_{ij})(X_j)$ . For the Colorado economy, the direct input coefficients for Colorado are shown in appendix III. Now we can write the  $N$  balance equations as:

$$X_1 = .24468 X_1 + .37552 X_2 + .00002 X_3 + \dots + .20451 X_N + Y_1$$

. . . . .  
 . . . . .  
 . . . . .

$$X_N = .16552 X_1 + .06537 X_2 + .07741 X_3 + \dots + .00000 X_N + Y_N.$$

Equation sets of this type are easily solved by a microcomputer, and the 46 equation Colorado I/O model was solved in less than 2 minutes using a small microcomputer and the IMS interindustry modeling system program. The solution is presented in the form of a table or matrix called the "inverse" or Leontief matrix after the Nobel prize winning founder of input-output.

The "inverse" matrix shows the "total requirements" per rupee of exports by the industry named at the head of the column. Total requirements are composed of the direct and indirect requirements. If households is included as a dependent sector in quadrant one, then the total requirements are said to also include "induced" requirements. The multiplier estimates for the

Colorado economy are shown with and without the induced requirements. Each entry in the inverse matrix is an interdependency coefficient. Each coefficient,  $b_{ij}$  represents the direct, indirect, and induced requirements of sector  $i$  per unit of final demand in the output of sector  $j$ .

The immediate impacts computed in the direct input coefficients table shown in appendix III are followed by even longer term effects which can be found by calculating "total requirements". Successive rounds of production and demand arise because suppliers need local inputs to make and sell their outputs. In turn, manufacturers must buy inputs from other industries, and so on. In this way, many direct requirements reciprocate throughout an economy. "Total requirements" coefficients indicate the cumulative influences of each industry on each other and back on itself. The total requirements matrix (with households endogenous) for Colorado is shown in appendix IV. Total requirements Type II, which include direct, indirect and induced requirements, are interpreted as follows: if a given sector increases its output by \$1 to satisfy an increase of sales to final demand, the elements of the inverse column for that sector show the direct, indirect, and induced input requirements created throughout the economy for the output of the sectors listed at the left of the matrix. Note that the total requirements are much larger than the direct requirements shown by the technical coefficients because the total requirements incorporate all of the cumulative effects of each industry

supplying each other industry to reach a new equilibrium of the economy while the technical coefficients only show the initial round of spending.

## APPENDIX VI Aggregation of IMPLAN Sectors to Form the Colorado I/O Model

IMPLAN Industry Classification		<u>Colorado Input-Output Model Sector Number</u>	
Ind. No.	Industry Title	Related SIC code	
1	Dairy farm products	0241	1
2	Poultry and eggs	025	2
3	Ranch fed cattle	021	3
4	Range fed cattle	021	3
5	Cattle feedlots	021	4
6	Sheep, lambs and goats	021	5
7	Hogs, pigs, and swine	021	6
8	Other meat animals and products	021	7
9	Miscellaneous livestock	027	7
11	Food grains	011	8
12	Feed grains	011	9
13	Hay and pasture	011	10
18	Vegetables	0134	11
19	Sugar crops	0133	12
14	Grass seeds	0139	13
16	Fruits	017	13
20	Miscellaneous crops	011	13
22	Forest products	018	13
23	Greenhouse and nursery products	018	13
24	Forestry products	081-4,097	14
26	Agri.,forestry, fishery services	07,08,09	14
27	Landscape and hort. services	078	14
39 - 40	Coal Mining	111,121	15
41	Crude petroleum	1311	16
42 - 43	Natural gas	132	16
28 - 29	Iron and ferroalloy ore mining	1011,1061	17
30 - 38	Nonferrous metal ores mining	102-109	17
44 - 64	Stone and clay mining	14	17
65	Chemical, fert, mineral mining	1479	17
66	New residential construction	pt.15-17	18
67 - 75	Construction nec	15-16-17	19
82 - 91	Animal products manuf	201-202	20
92 - 123	Food prod manuf nec	pt.20	21
124	Manufactured ice	2097	21
125 - 126	Food prep nec	2098-9	21
216 - 219	Agricultural chemicals & fert	287	22
332	Farm Machinery & Equip manuf	3523	22
160 - 199	Lumber & wood products manuf	24,25,26	23
200 - 214	Printing and publishing	27	24
215	Industrial chemicals	281	25
220 - 239	Chemical & petroleum manuf	28-29	25
76	Guided missile manuf	3761	26
78	Tanks	3795	26
330 - 331	Machinery and equipment manuf	351	26

## IMPLAN Industry Classification

<u>Ind. No.</u>	<u>Industry Title</u>	<u>Related SIC code</u>	<u>Colorado Input-Output Model Sector Number</u>
333 - 370	Mach & equip manuf nec	pt.35	26
371 - 415	Elect & Motor Vehic. equip manuf	36-37	26
416 - 425	Scientific & Optical equip manuf	38	26
77	Ammunition	3483	27
79 - 81	Other ordnance	348	27
131 - 159	Fabric & Apparel manuf	22-23	27
240 - 254	Rubber & Leather manuf	30-31	27
255 - 279	Stone & clay product manuf	32	27
280 - 302	Iron & steel manuf	33	27
303 - 329	Metal manuf	34	27
426 - 429	Jewelry manuf	pt.391-6	27
430 - 445	Miscellaneous manuf	pt.39	27
446	Railroads	40	28
447 - 453	Transportation nec	41-47	28
454	Communication nec	pt.48	29
455	Radio and TV broadcasting	483	29
456	Electric services	491pt.493	30
457	Gas production & dist.	492pt.493	31
458 - 459	Water,sewerage,& irrigation syst	494-495	31
460	Recreational rel. wholesale trade	pt.50	32
461	Other wholesale trade	pt.50,51	32
462	Recreational rel. retail trade	pt.55-59	33
463	Other retail trade	52-7	33
464	Banking	60	34
465 - 470	Finance, insurance, real estate	61-67	34
471	Hotels and lodging	70	35
472 - 490	Personal and business services	pt72-76,8	36
491	Eating and Drinking places	58	37
492 - 494	Automobile service	75	38
495 - 501	Amusements	pt78-79	39
502	Amu. & Rec. services nec	799	39
503 - 506	Health services	80	40
514 - 515	Residential care & soc.serv. nec	83	40
507	Schools	821	41
508 - 509	Colleges & other edu.	pt.82	42
510 - 513	Other associations	84-86-89	43
516	U.S.Postal service	4311	44
517 - 518	Fed. Govt. nec	several	44
519	Local Govt. pass transit	pt41	45
520	State & Local electric utilities	pt.491	45
521	Other State and local govt.	several	45
522			:
523			:
524			:
525	Government industry		:
526	Rest of the world industry		:

## IMPLAN Industry Classification

Colorado Input-Output  
Model Sector Number

<u>Ind. No.</u>	<u>Industry Title</u>	<u>Related</u> <u>SIC code</u>	
527	Household industry		:
528	Inventory valuation adjustment		:
529			:
530			:
531			:
532-543			:

## APPENDIX VII TECHNICAL RESOURCE COEFFICIENTS

Dollar and Physical Direct Input Requirements per Dollar of Output

		EMPLOYMENT	PAYROLL	VALUE ADD	IMPORTS	WITHDRAWAL	CONSUMED
1	DAIRY	.14342900E-04	.60708390E-01	.23984830E+00	.44884120E+00	.60000000E+01	.60000000E+01
2	POULTRY	.10604760E-04	.55966020E-01	.94307710E-01	.60830560E+00	.57000000E+01	.57000000E+01
3	RANCHING	.95542910E-05	.59893380E-01	.11190870E+00	.52331780E+00	.13500000E+02	.13500000E+02
4	FEBDLOTS	.95748260E-05	.59925660E-01	.11196800E+00	.45239290E+00	.25000000E+01	.25000000E+01
5	SHEEP/GOAT	.95990370E-05	.59874050E-01	.11188490E+00	.44534730E+00	.72000000E+01	.72000000E+01
6	HOGS/PIGS	.96746480E-05	.59949070E-01	.11201300E+00	.51100970E+00	.29000000E+01	.29000000E+01
7	LVSTK NEC	.11122340E-04	.65641210E-01	.12050450E+00	.23176850E+00	.63000000E+01	.63000000E+01
8	FOOD GRAIN	.26829470E-04	.56680030E-01	.40320750E+00	.28443010E+00	.16550000E+03	.10670000E+03
9	FEBD GRAIN	.10882190E-04	.37565630E-01	.38993990E+00	.32024790E+00	.14706000E+04	.98640000E+03
10	HAY/PAST.	.97473590E-05	.33954380E-01	.35245690E+00	.37570010E+00	.39906000E+04	.23900000E+04
11	VEGETABLES	.27489400E-04	.13754490E+00	.65859050E+00	.17472680E+00	.51330000E+03	.31870000E+03
12	SUGARBEETS	.28356030E-04	.10449070E+00	.54414560E+00	.22168130E+00	.71970000E+03	.49610000E+03
13	CROPS NEC	.68980730E-04	.31714300E+00	.51144020E+00	.25564020E+00	.13799000E+04	.82090000E+03
14	AG SERVICE	.41993260E-04	.41315180E+00	.62064650E+00	.20743090E+00	.40000000E-01	.40000000E-01
15	COAL MINES	.88233410E-05	.33032410E+00	.52199360E+00	.29709110E+00	.15500000E+02	.16000000E+01
16	OIL/GAS EX	.75766910E-05	.70814950E-01	.62474470E+00	.16198480E+00	.76000000E+01	.76000000E+01
17	MINING NEC	.15539850E-04	.42353080E+00	.51951940E+00	.25945150E+00	.10800000E+03	.54000000E+02
18	RES CONSTR	.97369100E-05	.25640380E+00	.31032050E+00	.46836450E+00	.40000000E+01	.40000000E+01
19	CONSTR NEC	.11990030E-04	.33530810E+00	.40335040E+00	.38822290E+00	.40000000E+01	.40000000E+01
20	LS PRD MFG	.36558840E-05	.10109730E+00	.13167870E+00	.32111830E+00	.18000000E-01	.00000000E+00
21	FOOD MFG	.71474860E-05	.14646900E+00	.33205970E+00	.42161910E+00	.37000000E+01	.35000000E+01
22	AG INPUTS	.76681270E-05	.16998350E+00	.35065110E+00	.36681510E+00	.40000000E-01	.00000000E+00
23	WOOD/PAPER	.20619050E-04	.26134310E+00	.33741640E+00	.47848290E+00	.20000000E+00	.20000000E-01
24	PRINT/PUBL	.17168130E-04	.33861160E+00	.45808980E+00	.31610700E+00	.80000000E-01	.00000000E+00
25	REFINING	.30355400E-05	.87159070E-01	.16794240E+00	.40506150E+00	.14600000E+02	.38000000E+01
26	MACH/EQUIP	.14357680E-04	.37116530E+00	.45725770E+00	.31457790E+00	.80000000E-01	.00000000E+00
27	MANUFR NEC	.18122680E-04	.31152750E+00	.40104600E+00	.40975860E+00	.60000000E+01	.60000000E+01
28	TRANSPORT	.10741190E-04	.31206210E+00	.47068280E+00	.22583430E+00	.60000000E-01	.00000000E+00
29	COMMUNICAT	.14655240E-04	.41389310E+00	.84879620E+00	.52260300E-01	.80000000E-01	.00000000E+00
30	ELECT GENR	.50206800E-05	.13295570E+00	.50447500E+00	.25755140E+00	.38180000E+02	.11830000E+02
31	UTILITIES	.38909790E-05	.83250870E-01	.24837110E+00	.38318440E+00	.20000000E-01	.00000000E+00
32	WHOLESALE	.15936960E-03	.41348730E+00	.66826380E+00	.10491490E+00	.80000000E+00	.00000000E+00
33	RETAIL	.35623900E-04	.46498740E+00	.72517480E+00	.83044150E-01	.18000000E+00	.00000000E+00
34	F/I/R/E	.73936470E-05	.14072980E+00	.73435390E+00	.54318200E-01	.10000000E+01	.00000000E+00
35	LODGING	.43217960E-04	.28858720E+00	.42938700E+00	.23823440E+00	.22400000E+02	.22000000E+01
36	SERVICES	.21761770E-04	.41800390E+00	.70203090E+00	.94500950E-01	.10000000E+00	.00000000E+00
37	FOOD/DRINK	.37138690E-04	.29014840E+00	.40687530E+00	.31177530E+00	.20000000E+01	.00000000E+00
38	AUTO SERV	.11186680E-04	.25066890E+00	.46159700E+00	.32650800E+00	.10000000E+00	.80000000E-01
39	AMUSEMENTS	.35624610E-04	.33076860E+00	.54524330E+00	.15836130E+00	.56000000E+01	.60000000E+00
40	HEALTH SER	.23630340E-04	.45028470E+00	.57350210E+00	.17008810E+00	.51000000E+01	.13000000E+01
41	SCHOOLS	.11257420E-03	.46128830E+00	.46119700E+00	.23182750E+00	.15000000E+01	.40000000E+00
42	COLLEGES	.23826200E-04	.59500070E+00	.60649970E+00	.12838000E+00	.10000000E+01	.40000000E+00
43	ASSOC NEC	.37420450E-04	.49744800E+00	.50450850E+00	.18179410E+00	.18000000E+00	.00000000E+00
44	FED GOVT	.28175070E-04	.73786800E+00	.71273230E+00	.11809120E+00	.14000000E+00	.00000000E+00
45	ST/LOC GOV	.47781450E-04	.91820780E+00	.92950170E+00	.29567390E-01	.24000000E+00	.00000000E+00
46	HOUSEHOLDS	.00000000E+00	.00000000E+00	.27190000E+00	.27190000E+00	.70000000E+01	.16500000E+01

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