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APPLICATION OF INPUT-OUTPUT METHODOLOGY FOR LOCAL COMMUNITY IMPACT ANALYSIS: SWINE PRODUCTION IN REDWOOD COUNTY, MINNESOTA

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SUMMARY

In Redwood county (Minnesota) a controversy is brewing about a permit to build a 1200 sow unit (farrow-to-finish). Opponents are concerned about the environmental risks and the demise of the family farm. Proponents want to be able to adopt high technology to stay competitive. The Redwood county board has to make a decision, weighing all the costs and benefits involved with this proposed hog unit.

The analysis done in this paper, used input-output technique to measure the economic impact of placing the proposed hog unit on the economy of Redwood county and Minnesota state. An input-output model is an accounting system showing economic transactions between business, households and governments. Given predicted changes in final demand it can estimate employment, income, industry output and value added. However, these predictions are only a small part of the consequences involved with the new unit. Therefore, this paper can only be seen as an additional information source for local people and decision makers and does not have the pretention to give a complete determination of all costs and benefits involved.

Minnesota is the third ranked hog producing state in the U.S. Hog production in Minnesota is concentrated in the south. The number of hog farms is declining, while the average size is increasing. Operations which produce 2,000 head per year or more, show the fastest growth. Larger hog units have advantages in producing and marketing their hogs.

To determine the impacts of the new unit in the hog industry on other industries, the static regional input-output model IMPLAN (IMpact analysis for PLANning) used multipliers which consider direct, indirect (changes in related industries) and induced effects (due to changes in income and population). IMPLAN assumes linear production functions, unlimited resources and no time dimension. The production function of the hog industry in IMPLAN was adjusted, because the new unit will operate more efficient than an average farrow-to-finish unit in southern Minnesota. Estimated changes in final demand, in respectively the hog and transportation industry, were used to determine the direct, indirect and induced effects on county and state level.

Building this 1200 sow unit in Redwood county will increase final demand, total industry output, employee income, proprietors income, total value added and the number of jobs and population on both levels. The total value added in Redwood county will increase with 1.5550 million dollars (1991) and in Minnesota with 1.9030 million dollars (1991). The jobs will increase with this new unit respectively 18 and 26, and the population with 45 and 52.

1 INTRODUCTION AND PROBLEM SETTING

There is controversy brewing in Redwood county (as in many other counties) in Minnesota as this county received an application for a permit for a large swine production unit of 1200 sows. Opposition groups fear the demise of the small family farm and are concerned about the environmental risks associated with handling large amounts of swine wastes from the single location. Proponents of larger units want to be free to adopt high technology systems to stay competitive with other areas and states. The decision will fall to environmental officers, zoning boards and county commissioners, who must weigh the demographic, economic, social and environmental issues (Lazarus and Koehler, 1992). Therefore it is important to answer the following question: what are the costs and benefits of placing this large swine operation in Redwood county?

Placing this new large hog operation in Redwood county could have the following consequences:

- Pollution of ground water, surface water and soil;
- Nuisance from odors;
- Declining real estate prices of neighbors;
- Declining hog prices as a result of the increased hog supply;
- Advantages for neighbor hog producers; the bigger the output of an industry, the better its markets and its services usually are;
- An increase in (local) employment, output, income and demand in the hog sector and other sectors.

The best way to determine all costs and benefits is to carry out a cost - benefit analysis. Such an analysis requires very specific data which were not available. The analysis done in this paper, uses input-output technique to measure the economic impacts of placing the proposed hog unit. It is an easy way to predict changes in employment, income and industry output as a result of placing this new hog unit. However, it only measures a small part of the consequences and therefore, this paper can only be seen as an additional information source for local people and decision makers and does not have the pretention to give a complete determination of all costs and benefits involved.

Chapter two will give a short review of the hog industry and discusses the economies of size of hog operations in Minnesota. Chapter three will explain briefly the basic principles of input-output technique and will discuss the assumptions and data used in the impact analysis. In chapter four the results of the impact analysis for Redwood county and Minnesota state will be described. Chapter five discusses the conclusions and further recommendations.

2 HOG INDUSTRY IN MINNESOTA

2.1 Hog farms and sizes

Minnesota is the third ranked state producing hogs in the U.S. Iowa and Illinois are first and second. Hog production in Minnesota is concentrated in the southeast and southwest. The regional distribution of hog production for 1990 is presented in Figure 2.1.

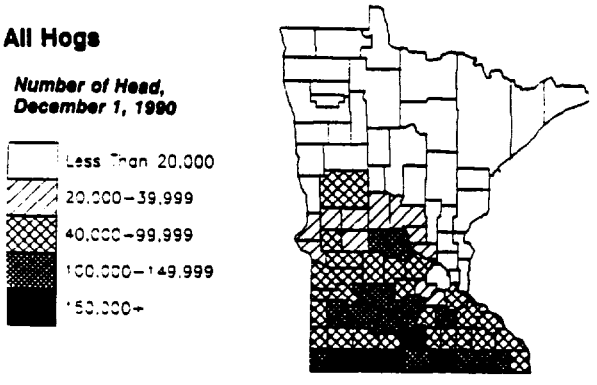

Figure 2.1 Regional distribution of Minnesota hog production in number of head, 1990 (USDA NASS, 1991)

The number of hog operations declined from 20,800 in 1982 to 14,000 in 1991 (see Table 2.1). The average inventory on all farms reporting hogs was 214 head in 1982, compared to 350 head in 1991.

Table 2.1 Minnesota number of hog operations and number of hogs and pigs

Year	Number of hog farms	All hogs and pigs on farms
		1,000 head
1982	20,800	4,470
1987	16,042	4,500
1991	14,000	4,900

Source: USDA hogs and pigs report 1992 and USDC, 1987 Census of Agriculture, Minnesota.

Table 2.2 shows the number of Minnesota hog farms by size groups and percent change. The number of farms with small inventories are declining and the fastest percent growth is for the 2,000 - 4,999 category.

Table 2.2 Number of Minnesota hog farms by size groups

inventory	1978	1987	% change
1-99	14,733	7,053	-52
100-199	4,590	2,709	-41
200-499	4,623	3,812	-18
500-999	1,281	1,717	34
1,000-1,999	385	577	50
2,000-4,999	82	157	92
5,000 >	9	17	89
Total	25,703	16,042	-38

Source: USDC Census of Agricultural Minnesota, 1982 and 1987

2.2 Production and marketing

Hog production includes three types of enterprises: (1) Farrow-to-finish operations; all phases of slaughter hog production are carried out in one enterprise, (2) feeder pig production; pigs are produced and sold to another enterprise for finishing to slaughter weight, and (3) feeder pig finishing; pigs are bought from other producers and fed to slaughter weight.

The farrow-to-finish operation is the major type of enterprise in Minnesota (Lazarus, 1990).

Table 2.3 gives an indication of the hog production, marketings and prices for Minnesota for the years 1986-1990. The production of hogs (in 1,000 Lbs) in 1990 shows an increase of 16 percent compared to the production in 1986. Marketings in 1990 give a 18.5 percent increase compared to 1986.

Table 2.3 Minnesota hog production, marketings and prices 1986 - 1990

Year	Production	Marketings[1]	Price per 100 Lbs
	1,000 Lbs.		Dollars
1986	1,479,217	1,460,285	50.70
1987	1,620,532	1,596,416	51.80
1988	1,739,084	1,719,578	43.10
1989	1,786,655	1,824,077	43.60
1990	1,714,520	1,730,811	55.20

1 Excludes interfarm sales.
Source: USDA NASS, 1991

Hog marketing in Minnesota, just like in the other States of the U.S, is dominated commonly by the direct cash sale of hogs on a liveweight basis by individual producers to packing plants and country buying stations. This has been the trend for many years,

in contrast to sale through terminal or auction markets. Direct selling has been encouraged by the relocation of packing plants from terminal market points to areas of high density hog production, by good highways and road transportation. Improved market information and communication technology contributed also.

Hogs are sold on the basis of individual packer base price bids, with premiums or discounts for specified variations in weight and/or quality. Base prices can fluctuate from day to day and may vary somewhat from one packing plant or buying point to another, even within a relatively small geographic area. Prices may also show some variation between geographic regions, as well as seasonal and cyclical changes (Futrell, 1990). Packers award premiums to producers who can produce larger quantities and are more able to deliver consistent quantities. For many small pork producers which operate independent (i.e. using different genetics, nutrition, management and marketing practices) it is difficult to deliver a consistent uniform product. Producers in Minnesota, frequently sell lighter hogs to one packer and heavier ones to another. The quality (light) hogs are sold to packers as Hormel, Farmstaed, Montfort and Morrell, located in the southern part of Minnesota. Heavy hogs are sold to Iowa Beef Processors (IBP plants) in the northern part of Iowa (Lazarus, 1992).

2.3 Economies of size

Some people feel that the only way they can make it in the swine industry is to become larger. But are large units more efficient and/or profitable?

Economies of size reveal the costs to produce a unit of product associated with increasing use of some or all the inputs and is a major issue for hog producers and all associated business. Suppliers of inputs and services, marketing agencies and slaughter plants will all be affected by shifting economies in the production sector.

On average, larger hog operations can have advantages on the production side and in marketing their hogs. Larger units are more able to effectively gain access to capital, consistent genetics, technology and markets. They can spread their costs of the resources over a larger produced volume of pork. As a result of more available capital, larger units are allowed to build more adequate systems to invest in animal welfare techniques and control the health of their employees. For instance, larger units are able to use the all-in/all-out system, that promotes high health of the hogs with reduced reliance on antibiotics (Lazarus and Koehler, 1992).

A study of van Arsdall and Nelson (1985) compared the economies of size of different farm sizes in the North Central part of the U.S. which includes southern Minnesota. Table 2.4 presents the outcome of this study for different sizes of farrow-to-finish units.

Table 2.4 Farrow to finish hog production costs and returns, North Central 1983, in dollars/cwt

	Annual sales (head)					
	140	300	650	1,600	3,000	10,000
Gross income						
Market hogs	44.19	44.80	44.52	44.59	44.65	44.56
Cull sows	2.21	2.47	2.37	2.32	2.26	2.34
Total	46.40	47.27	46.89	46.91	46.91	46.90
Variable cash costs[1]						
Feed	31.65	31.54	31.52	30.70	29.39	28.04
Other	7.69	7.05	7.31	6.96	6.42	8.59
Total	39.34	38.59	38.83	37.66	35.81	36.63
Fixed cash costs[2]	4.01	3.29	2.38	1.65	1.22	1.04
Total cash costs	43.35	41.88	41.21	39.31	37.03	37.67
Returns over cash costs	3.05	5.39	5.68	7.60	9.88	9.23
Unpaid labor[3]	9.43	6.35	4.04	4.00	3.33	1.08
Cash costs plus unpaid labor	52.78	48.23	45.25	43.31	40.36	38.75
Returns over cash costs and unpaid labor	-6.38	-0.96	1.64	3.60	6.55	8.15
Capital costs[4]:						
Replacement	7.71	7.35	6.29	6.14	5.05	4.58
Interest	3.89	3.26	2.75	2.60	2.14	1.90
Total	11.60	10.61	9.04	8.74	7.19	6.48
Total all costs	64.38	58.84	54.29	52.05	47.55	45.23
Returns over total costs	-17.98	-11.57	-7.40	-5.14	-0.64	1.67

Source: van Arsdall and Nelson, 1985.

[1]Variable cash expenses: Purchases for immediate use plus farm produced inputs including; feed, veterinary services and medicines, custom services, energy (fuel and oil), bedding, repairs, hired labor, marketing costs and interest on operating capital.

[2]Fixed cash expenses: a) Personal property, real estate taxes, property insurance rent and general business overhead costs (telephone, office supplies, liability insurance etc.) and b) Interest and principal payments on debt. These expenses are determined by equity position.

[3]Unpaid labor: Opportunity cost -what unpaid workers could earn in other activities- is the most realistic way to prices unpaid labor. Unpaid workers in small operations are assigned the same relatively low wage rates as their counterparts; those in larger operations are valued according to the higher wage rates paid to employees in these operations.

[4]Capital costs: Investments include outlays for depreciable assets such as machinery, equipment, buildings and breeding stock. The capital investments cost are measured in terms of their current replacement costs. Investments in depreciable assets fall into three subcategories: (a) hog buildings and equipment, (b) breeding stock and (c) general purpose machinery, equipment.

Larger hog operations have an advantage compared to smaller operations by having an improved feed conversion rate (more knowledge) plus lower feed prices (discount because of large quantity purchases) and more efficient use of other variable inputs. Larger units have higher returns over cash costs and higher returns over cash costs plus unpaid labor. If the capital costs are also included, the returns are less negative in larger units than in smaller operations.

Economies of size are substantial and continue to increase for operations producing more heads of hogs. A large size alone, however, is no assurance of success. Performance varies greatly among hog producers both in physical and economic performance and among operations of both similar and different sizes (van Arsdall and Nelson, 1985).

Besides the advantages of larger hog operations, very large units (400-1200 sows) must be managed more intensely and cost effective, otherwise high production costs will lead to elimination. When the labor is large enough, one should allow one or more individuals to spend most of their time managing. In general, detailed records are more profitable and easier to implement in larger units.

Larger units can have more problems with environmental issues. But if environmental legislation becomes more restrictive and severe in the future, larger units might be more able to invest in waste management systems, because of their access to capital (Lazarus and Koehler, 1992).

3 DETERMINATION OF ECONOMIC IMPACTS: AN INPUT-OUTPUT APPROACH

3.1 Background input-output technique

3.1.1 Basic structure of an input-output model

An input-output model is an accounting system showing economic transactions between business, households and governments. The transaction table comprises four basic elements: (1) interindustry transactions, which show the purchases of individual industries from one another, (2) final demands, which are all purchases by sectors other than the producing industries, (3) primary input purchases and the corresponding income payments to their owners: households, businesses and government agencies, and (4) individual industry purchases from input-supplying industries outside the area (imports).

After a transaction table has been constructed for a given year, a table of technical coefficients or direct requirements (inputs) can be developed from it (matrix A_{ij}). The standard notation for the technical coefficients, A_{ij}, is,

$$A_{ij} = X_{ij}/X_j \qquad i, j = 1,....,n$$

Where X_{ij} is the sales by sector i to sector j, and X_j is the total purchases of sector j. A column of A_{ij} represents a special type of production function. The technical or direct coefficients embody most of the simplifying assumptions of input-output analysis: constant and linear production functions. The assumptions will be discussed in 3.2.

Leontief developed a method of determining the total output requirements resulting from a final demand change using matrix algebra techniques. In matrix notation,

$$X = AX + Y$$

where X is the vector of total outputs, A is the matrix of direct coefficients, and Y is the vector of final demands. The above may also be written as,

$$(I - A)\ X = Y$$

where I is the identity matrix. The next step is to find the Leontief inverse by inverting the (I - A) matrix. The result is a matrix of total requirement coefficients. Each entry represents the output required both directly and indirectly from each row sector per dollar of deliveries to final demand by each column sector. So finally,

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

When an interindustry flows table is converted into a direct and indirect coefficients table it becomes an operational analytical tool with a wide variety of uses: measuring the economic interdependence of the region's industrial structure, providing a set of multipliers, calculating the effects on the economic activity in individual regions of changes in the level and pattern of national demand, evaluating economic impact, and as a technique for long-run projections and forecasts (Richardson, 1972).

3.1.2 Different types of input-output models

Open or closed

An input-output model can be open or closed. The difference is that in an open model the households are considered exogenous while in a closed model the households are included (i.e. endogenous) in the interindustry matrix. In other words, a model is open if some inputs to production are considered not reproducible in the accounting period, for example labor. By contrast, if a model assumes that all inputs can be reproduced during the accounting period, it is called closed (Toyomane, 1988).

A closed system takes into account the demand factors as well as supply factors. Final demand is not given but is determined simultaneously with other supply variables (total output requirements in each industry). When a set of variables is solved simultaneously, all interactions among the variables are taken into consideration in the solution. Thus, by solving final demand and output requirements simultaneously, the closed system takes into account both the impact of demand on supply and that of supply on demand. Figure 3.1 shows the interactions of demand and supply.

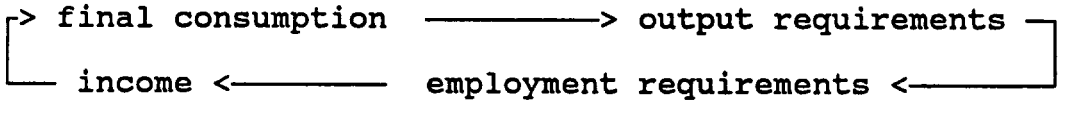

Figure 3.1 Relation between supply and demand

The equilibrium output levels calculated from a closed system incorporate not only the outputs required to meet a given final demand but also the outputs required to meet the change in final demand which is induced by changes in production and income. The open system is capable of evaluating only the direct and indirect effect on the output requirements (Yan, 1969).

Static or dynamic

In summary, an input-output model is static if it lacks capital formation processes and describes interindustry relationship only as a one-shot equilibrium pattern of flows of commodities and services. A dynamic model, on the other hand, explicitly incorporates capital stock into the system, and determines the levels of total outputs of commodities and services over some extended period of time while taking capital formation into account.

The input-output technique is originally intended for short-term analysis, as the assumption of fixed coefficients indicates. However, using variable coefficients instead, it is also possible to apply the technique to medium- and long-term forecasting. Several types of input-output applications can be identified with respect to whether and how coefficients are variable:

(1) *Static formulations*. This original and dominant type uses constant coefficients and projected changes in final demand. It is only suitable for short-run analysis;
(2) *Comparative static, exogenous formulations*. This type is characterized by variable coefficients, which are projected exogenously for some point of time in the future. Changes in final demand for the year are also given. This type can be used for medium- to long-term forecasts;
(3) *Comparative static, endogenous formulations*. When an input-output model is embedded in a larger modeling framework, which contains variables that the standard input-output model lacks, it may be possible to vary coefficients endogenously within the expanded model. Final demand may also be endogenously given;
(4) *Dynamic formulations*. Dynamic input-output models are in principle more appropriate for longer-run predictions. It should be noted however, that input and capital coefficients in the standard dynamic model are also held constant. Therefore "dynamic" formulations do not automatically qualify for long-term forecasting unless their coefficients vary over time (Toyomane, 1988).

Regional or interregional

The initial development of input-output theory, and early empirical work in interindustry analysis, was national in scope. Since the end of Wold War II, however, there has been a great deal of interest in regional economic analysis.

There are a number of variations of input-output analysis at the regional level which can be classified in a number of ways. One major distinction is between interregional models and regional models. In the former, a single model includes more than one region, while regional models are similar to national models except that they cover a smaller geographic area. Interregional input-output models have been used primarily for the study of

regional balance of payments and interregional trade flows. The primary use of regional models however, has been in making local or regional impact studies. Local and regional impact studies are designed to measure the direct, indirect and induced income and employment effects of changes in final demand in one or more sectors of the local or regional economy. This is done by computing output, income and employment multipliers.

A further distinction can be made between balanced regional models and what have been called pure interregional models. A balanced regional model is constructed by desaggregating a national input-output table into its component regional. The pure interregional model is implemented by aggregating a number of regional tables, and the latter may or may not include all the regions in the national economy. The two models should not be viewed as alternatives but as complements. The Leontief balanced regional model is particularly useful for determining regional implications of national projections, and the pure interregional model for determining national implications of regional projections. The economic system is described in both cases in terms of interdependent industries and of interrelated regions. While interregional input-output models are more complex than national or regional models, the basic principles of input-output analysis remain unchanged (Richardson, 1972).

3.1.3 Multipliers

The notion of a multiplier rests upon the difference between the initial effect of a change in final demand and the total effects of that change. Total effects can be calculated either as direct and indirect effects, or as direct, indirect, and induced effects. Direct effects are simply the production changes equal to the immediate final demand changes. Indirect effects are production changes in backward-linked industries caused by the changing input needs of directly affected industries (additional purchases to produce additional output). Induced effects are the changes in regional household spending patterns caused by changes in household income (or income and population), generated from the direct and indirect effects (Alward et al., 1992).

Multiplier Type I

The Leontief Inverse is a matrix of Type I multipliers. The direct effects (produced by a change in final demand) plus the indirect effects divided by the direct effects. Increased demands are assumed to lead to increased employment and population, with the average income level remaining constant (Alward et al., 1992). The direct and indirect changes are obtained by multiplying each column entry in the standard inverse matrix (i.e. households excluded) by the supplying industry's

corresponding household row coefficient from the direct coefficients table, and summing the row multiplications (Richardson, 1972).

Multiplier Type II

The sum of the direct, indirect, and induced effects divided by the direct effects yields Type II multipliers. This is done for a model which is closed with respect to households. Households are brought into the transactions matrix as an industry and the resulting matrix is inverted in the same manner as the open model. The total requirements coefficients for the closed model, therefore, include induced effects in addition to direct and indirect effects. Since households are defined as a production sector, the relationship between changes in final demand and household expenditures is linear, in the same way as industrial production functions are linear. The assumption is that an increase in output will raise income levels, and therefore increase household spending proportionately. Population is assumed stable. Thus, if household income doubles, all household purchases (input to the household sector) will also double (Alward, 1992). This multiplier tends to over-estimate economic impacts, because a smaller fraction of marginal income increase is spent on consumption, and because high income groups have higher propensities to import (Richardson, 1972).

Multiplier Type III

The Type III multiplier compares direct, indirect, and induced effects to the direct effects generated by a change in final demand. The Type III (open model) induced effect are quite different from the induced effects of a Type II multiplier. To minimize the over-estimation that occurs with a linear consumption function, Type III estimates induced effects based on the changes in employment and population. The resulting multipliers are typically five to fifteen percent smaller than Type II multipliers. To estimate induced effects, direct, and indirect effects are converted to changes in employment based on each sector's employment-to-output ratio. Employment change is then multiplied by the region's population-to-employment ratio, converting it into population change. Population change is multiplied by average regional per-capita consumption rates by sector to estimate the regional household consumption generated by the initial final demand changes. This change in household consumption is treated as an additional set of final demand changes and are multiplied by the Leontief Inverse matrix to generate the first round of induced (additional direct and indirect) effects (Alward et al., 1992).

3.2 Impact analysis

An impact analysis of building a new hog operation of 1200 sows on the local economy of Redwood county and on the state economy of Minnesota was done using the static regional input-output model IMPLAN. This model was developed by the USDA Forest Service and it provides a data base for constructing a 528-industry transactions table for any county or combination of counties in the U.S., using economic statistics for 1985.

IMPLAN calculates impacts of an industry on other industries by means of a set of multipliers. The Leontief Inverse calculated in IMPLAN is an open model, that is, household consumption is included as a component of final demand rather than as an industry. Two types of multipliers are provided, Type I and Type III, for the following impact measures: Industry Output, Personal Income, Total Income, Value Added, and Employment.

An impact analysis can be accomplished in the model construction phase (i.e. adding or removing industries, changing production functions or import/export trades) or by 'shocking' the model economy with changes in final demand. This research used a combination of both.

Any static input-output modeling system, such as IMPLAN, contains a number of assumptions:

1. Industries produce commodities using fixed recipes (linear production functions). There is no substitution of inputs and an increase of n times in inputs leads to an increase in n times in gross output;
2. Resources (including labor) are unlimited;
3. There is no time dimension. All changes are assumed to be average annual change. This implies the following:
   a. there is no new technology,
   b. trade relationships are static,
   c. there are no relative price changes,
   d. there are no structural changes.

The assumption of fixed factor proportion can be justified on the ground that, under given technology, there is only one 'best input combination' and once a certain combination is adopted, it will be retained for a while.

The assumption of the unlimited resources implies that the primary factors have no opportunity costs. This means that, for example, workers could not earn more in other activities as they do now, so they have no alternatives. In most cases this assumption is hard to justify but in this project it should not be such a problem. There are only 6 hired workers involved to run the proposed hog unit. They are "low educated", available and will get their best wages.

This paper considers the effects on the short-term. As mentioned before a static input-output model can be used for short-term analysis.

The proposed 1200 sow unit will finish 24,000 hogs per year. According to the estimated figures (see Table 3.1), this unit will operate more efficient than the average unit in Redwood county and Minnesota state as will be discussed below. Therefore the production function has to be adjusted in IMPLAN. The figures of the base year data of number of employees, payroll, taxes, total industry output and proprietors income, are replaced by estimated figures of the new unit. After the model has estimated the multipliers, an impact analysis is done using the estimated gross revenue and hauling figures as a change in final demand in the hogs, pigs and swine industry and in the motor freight transport industry, respectively.

The figures of the new unit, used in the IMPLAN model are presented in Table 3.1 and are given in 1991 and 1985 dollars. To put the figures in 1985 terms, they are divided by the 1991 GNP deflator of 135 and multiplied by the 1985 deflator of 110.9.

Table 3.1 Estimated figures of the 1200 sow unit

	1991 $	1985 $
Gross Revenue	2,846,675	2,338,491
Hauling	43,937	36,093
Proprietors income	805,705	661,871
Taxes	45,717	37,555
Payroll	160,000	131,437
Hired workers # = 6		

Source: Lazarus, 1992

Table 3.2 presents figures of an average farrow-to-finish unit and the proposed unit. The figures indicate that the proposed unit is expected to use less labor per sow (1 full-time worker for 200 sows) than an average unit (1 worker per 100 sows) and will wean 5 pigs more per sow per year. As discussed in chapter two, feed and veterinarian costs per Cwt will decrease as the farm size increases.

Table 3.2 Figures of an average farrow-to-finish unit in Minnesota and the proposed unit, 1991

	Average unit	Proposed unit
Number of sows	109	1200
Pigs weaned/sow/year	15	20
Number of sows/employee	100	200
Feed costs/Cwt	$ 24.92	$ 19.75
Veterinarian costs/Cwt	$ 1.73	$ 0.53

Source: Lazarus, 1992 and Olson, 1992

The original data of Redwood and Minnesota economy (before construction of the 1200 sow unit) are presented in Appendix A and B respectively. The data base consists estimates of sectoral activity for:

a. Employment: The number of people a given industry employs.
b. Value added: Costs added to the intermediate costs of producing goods and services (to form the producer price) are considered value added. There are four components of value added:
   * Employee compensation (e.g. wages and salaries);
   * Proprietary income (includes self-employed income);
   * Indirect business taxes (e.g. sales and excise taxes);
   * Other property income (e.g. interest and corporate profits).
c. Industry output: The total value of all production for an industry during the year.
d. Final demand: Purchases for final use or consumption.

4 RESULTS

4.1 Redwood county

4.1.1 Direct effects

Table 4.1 shows the direct effects of the impact analysis in million dollars of 1991.

The direct effects appear only in industry 7 (hogs, pigs and swine) and industry 448 (motor freight transport). An increase in Final Demand (FD) of 2.8467 million dollars (1991) in industry 7 causes a similar increase in the Total Industry Output (TIO). TIO is the total value of all production for an industry during the year. Total Industry Output is equal to the Total Industry Outlay, i.e. the sum of a column in the interindustry matrix, plus the associated Value Added and Imports.

This increase in TIO makes the total payroll costs (wages and salaries and benefits) paid by local industries rise with 0.1749 million dollars. This is called the Employee Compensation Income (ECI). The income from self employment in this county will grow with 0.8197 million dollars.

Total Income (TI) is the sum of the Employee Compensation Income (ECI) and Proprietary Income (PI). The Total Value Added (TVA), the amount added to the intermediate costs goods and services, is the sum of Employee Compensation Income (ECI), Proprietary Income (PI), Indirect Business Taxes, and other Property Income. The TVA of the direct effects of the 1200 sow unit is 1.0419 million dollars. Employment (E) contents the number of jobs (annual average) required by a given industry, including self employed.

Table 4.1 Direct effects of the 1200 sow unit on Redwood county ($MM 1991)

Industry	FD[1]	TIO[2]	ECI[3]	PI[4]	TI[5]	TVA[6]	E[7*]
7 Hogs, pigs and swine	2.8467	2.8467	0.1600	0.8057	0.9657	1.0115	6.00
448 Motor fr. transport	0.0439	0.0439	0.0149	0.0140	0.0289	0.0304	0.59
Total direct	2.8906	2.8906	0.1749	0.8197	0.9946	1.0419	6.59

Change in population* = 17

[1] Final Demand
[2] Total Industry Output
[3] Employee Compensation Income
[4] Property Income
[5] Total Income
[6] Total Value Added
[7] Employment
* in numbers

IMPLAN calculated an increase of 6 jobs in the hogs, pigs and swine industry and 0.59 in the motor freight transport industry. A direct increase of 17 in the population can be seen as the members of the families of the 7 new employees (employees included).

4.1.2 Indirect effects

The indirect effects contain the changes that appear in all the industries that are connected with the hogs, pigs and swine industry and the motor freight transport industry. Both direct and indirect linkages are considered.

For instance, industry B makes no purchases from industry A, but does purchase inputs from industry C. This industry C purchases inputs from industry A. Hence, if the output from industry B expanses, industry A will benefit in the second round of purchases.

The interactions become very complex and interwoven as the various rounds of spending and respending evolve, because the industries in IMPLAN are very desaggregated.

Table 4.2 gives the most striking indirect effects in million dollars of 1991.

Table 4.2 Indirect effects of the 1200 sow unit on Redwood county ($MM 1991)

Industry	FD	TIO	ECI	PI	TI	TVA	E*
7 Hogs, pigs and swine	0.0000	0.3035	0.0170	0.0860	0.1030	0.1079	0.64
12 Feed grains	0.0000	0.0611	0.0013	0.0150	0.0163	0.0179	0.46
13 Hay and pasture	0.0000	0.0164	0.0004	0.0038	0.0040	0.0045	0.12
26 Agricult. forest	0.0000	0.0215	0.0071	0.0021	0.0091	0.0097	0.66
332 Farm equipment	0.0000	0.0173	0.0045	0.0032	0.0077	0.0078	0.17
448 Motor fr. transport	0.0000	0.0387	0.0131	0.0123	0.0254	0.0269	0.52
461 Other wholesale tr.	0.0000	0.1049	0.0461	0.0173	0.0634	0.0761	1.36
463 Other retail trade	0.0000	0.0095	0.0038	0.0015	0.0052	0.0060	0.21
464 Banking	0.0000	0.0554	0.0186	0.0099	0.0285	0.0299	0.71
465 Credit agencies	0.0000	0.0093	0.0090	-0.0007	0.0083	0.0088	0.28
490 Accounting, audit.	0.0000	0.0055	0.0023	0.0011	0.0034	0.0034	0.14
491 Eat/drinking place	0.0000	0.0049	0.0011	0.0005	0.0016	0.0024	0.12
493 Auto repair	0.0000	0.0139	0.0026	0.0038	0.0063	0.0066	0.16
506 Other medical	0.0000	0.0095	0.0073	-0.0012	0.0061	0.0061	0.13
Other indirect	0.0000	0.0972	0.0159	0.0310	0.0474	0.0520	0.98
Total indirect	0.0000	0.7686	0.1501	0.1856	0.3357	0.3658	6.66

Change in population* = 17
* in numbers

Besides the indirect effects in the hogs, pigs and swine industry and the motor freight transport industry themselves, a considerable increase in the TVA of a part of the wholesale

industry takes place. Predictably, there is also an increase in the industry of feed grains. Because a new operation requires new investments and capital, the banking industry shares an increase in income and employment too.

There is an increase in the population amount of 17. Note that industries 465 and 506 show a decrease in Property Income. The reason for this is that the capital consumption allowance for these industries is bigger than the remaining cash flow (after the substraction of taxes, payroll etc.). Also, the figures are averages of 1985 and at that time it could be the case that those industries were not in good shape.

The indirect effects of building a 1200 sow operation in Redwood county will increase the TVA of this county with 0.3658 million dollars and will create jobs for 7 people in different industries. The indirect effects do not change the final demand because the households are still considered exogenous (multiplier Type I).

4.1.3 Induced effects

The induced effects take into account the repercussionary effects of secondary rounds of consumers spending in addition to the direct and indirect interindustry effects (multiplier Type III).

Table 4.3 gives a summary of the industries which are mostly affected.

Table 4.3 Induced effects of the 1200 sow unit on Redwood county ($MM 1991)

Industry	FD	TIO	ECI	PI	TI	TVA	E*
461 Other wholesale tr.	0.0212	0.0304	0.0110	0.0041	0.0151	0.0180	0.32
463 Other retail trade	0.0616	0.0627	0.0250	0.0096	0.0346	0.0390	1.39
491 Eat/drinking place	0.0246	0.0263	0.0061	0.0027	0.0089	0.0129	0.64
503 Doctors and dentists	0.0122	0.0122	0.0055	0.0030	0.0085	0.0085	0.16
505 Nursing and protec.	0.0061	0.0061	0.0041	-0.0002	0.0039	0.0040	0.22
512 Religious organiz.	0.0028	0.0028	0.0012	0.0005	0.0018	0.0016	0.10
527 Household industry	0.0018	0.0018	0.0010	0.0009	0.0744	0.0018	0.14
Other induced	0.0723	0.0953	0.0284	0.0280	0.0163	0.0615	1.42
Total induced	0.2026	0.2376	0.0823	0.0486	0.1309	0.1473	4.39

Change in population* = 11
* in numbers

Considering also the income expansion due to successive 'rounds' of consumer spending (i.e. households endogenous = industry 527), many industries who are not direct or even indirect related to the hog industry gain.

Especially a part of the retail trade and the 'eating and

drinking' industry are provided with more employment possibilities. A change of 11 in the population takes place, when considering the induced effects.

All the industries together will increase the TVA of the county with an amount of 0.1473 million dollars, and 4.39 people can be employed, additionally to the base year (1985) situation in Redwood county.

4.1.4 Total effects

Table 4.4 gives a summary of the total effects (the sum of direct, indirect and induced effects) of building the new 1200 sow unit in Redwood county.

Table 4.4 Total effects of the 1200 sow unit on Redwood county ($MM 1991)

	Industry	FD	TIO	ECI	PI	TI	TVA	E*
1	Dairy farm products	0.0006	0.0050	0.0002	0.0027	0.0029	0.0029	0.10
7	Hogs, pigs and swine	2.8467	3.1503	0.1771	0.8917	1.0687	1.1193	6.64
12	Feed grains	0.0001	0.0612	0.0013	0.0150	0.0163	0.0179	0.46
13	Hay and pasture	0.0000	0.0164	0.0004	0.0038	0.0041	0.0045	0.12
26	Agricul. forestry	0.0000	0.0217	0.0071	0.0021	0.0091	0.0097	0.67
74	Maintenance and rep.	0.0000	0.0091	0.0026	0.0019	0.0045	0.0046	0.11
332	Farm equipment	0.0001	0.0174	0.0045	0.0033	0.0077	0.0078	0.17
448	Motor fr. transport	0.0449	0.0853	0.0289	0.0271	0.0560	0.0593	1.14
454	Communications, exc.	0.0054	0.0136	0.0043	0.0044	0.0086	0.0102	0.10
461	Other wholesale	0.0211	0.1298	0.0571	0.0214	0.0784	0.0941	1.68
463	Other retail trade	0.0616	0.0723	0.0287	0.0111	0.0399	0.0449	1.60
464	Banking	0.0049	0.0618	0.0207	0.0110	0.0318	0.0334	0.79
465	Credit agencies	0.0012	0.0116	0.0113	-0.0010	0.0103	0.0110	0.35
470	Real estate	0.0055	0.0207	0.0009	0.0131	0.0140	0.0177	0.13
488	Legal services	0.0032	0.0130	0.0052	0.0047	0.0100	0.0100	0.17
490	Accounting, audit.	0.0007	0.0075	0.0032	0.0016	0.0047	0.0047	0.20
491	Eat/drinking place	0.0246	0.0312	0.0073	0.0032	0.0105	0.0153	0.76
493	Auto repair	0.0062	0.0212	0.0039	0.0058	0.0096	0.0101	0.24
503	Doctor and dentists	0.0122	0.0122	0.0055	0.0030	0.0085	0.0085	0.16
505	Nursing and protec.	0.0061	0.0061	0.0041	-0.0002	0.0039	0.0040	0.22
506	Other medical	0.0023	0.0122	0.0094	-0.0015	0.0078	0.0078	0.17
512	Religious organiz.	0.0028	0.0028	0.0012	0.0005	0.0016	0.0016	0.10
527	Household industry	0.0018	0.0018	0.0010	0.0009	0.0018	0.0018	0.14
	Other total	0.0412	0.1127	0.0213	0.0283	0.0504	0.0539	1.41
	Total	3.0932	3.8969	0.4072	1.0539	1.4611	1.5550	17.63

Change in population* = 45
* in numbers

The largest total effects can be traced in part of the wholesale trade, part of the retail trade, the banking industry and the 'eating and drinking' industry, and of course in the hogs, pigs and swine industry and motor freight transport industry.

Compared to the situation in Redwood county, before construction of the 1200 sow unit, 18 employees could be added, divided over several industries. Though, most of the jobs would be created in the hogs, pigs and swine industry itself.

All affected industries together show an increase of TVA with 1.5550 million dollars. The Total Income increases with 1.4611 million dollars. About seventy-two percent of this TI increase is contributed by PI increase.

The Total Final Demand change will increase with 3.0932 million dollars and TIO will increase with 3.8969 million dollars. Notice a decline in the PI of industries 465, 505 and 506. The population will increase with 45 people in Redwood county.

The total effects of FD, TIO, ECI, PI, TI and TVA are shown in Figure 4.1. The total effects of the TVA in Redwood of the industries which are mostly affected are shown in Figure 4.2. Apperently in some industries, the change in TVA is very small, but the dollars involved are appreciable. Figure 4.3 presents a graphic illustration of the change in employment and population due to direct, indirect and induced effects in Redwood county.

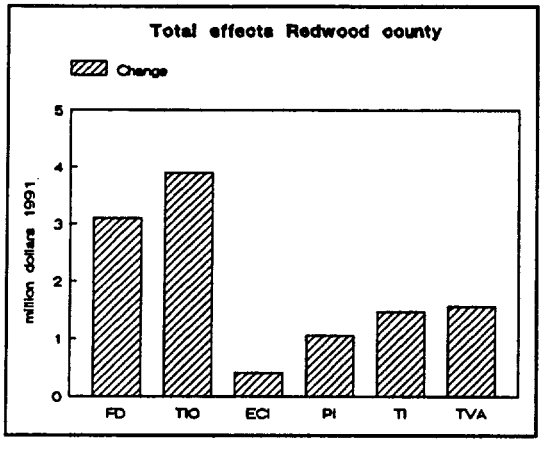

Figure 4.1 Total effects Redwood county

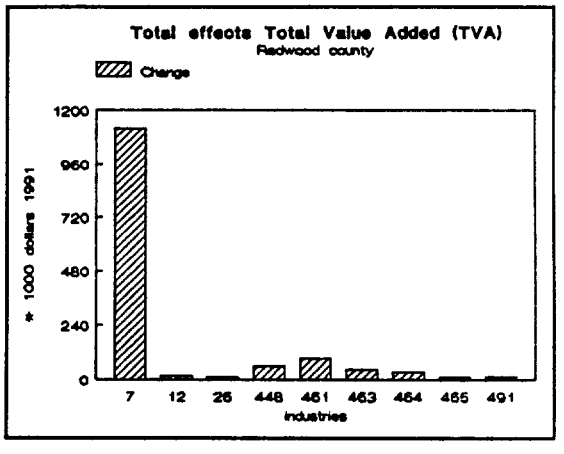

Figure 4.2 Total effects Total Value Added of the most affected industries in Redwood county

Figure 4.3 Total effects Employment and Population in Redwood county divided in direct, indirect and induced effects

4.2 Minnesota state

4.2.1 Direct effects

Table 4.5 presents the direct effects of the impact analysis for Minnesota state in million dollars of 1991.

The direct effects for Minnesota appear in industry 7 and 448 and are almost the same as for Redwood county (Table 4.1). There is only a small difference in the ECI and PI figures at county - state level, due to the difference of the estimated multipliers. The data is based on the state average, instead of the average of Redwood county.

Table 4.5 Direct effects of the 1200 sow unit on Minnesota state ($MM 1991)

Industry	FD	TIO	ECI	PI	TI	TVA	E*
7 Hogs, pigs and swine	2.8467	2.8467	0.1600	0.8057	0.9657	1.0115	6.00
448 Motor fr. transport	0.0439	0.0439	0.0158	0.0130	0.0289	0.0304	0.59
Total direct	2.8906	2.8906	0.1758	0.8187	0.9946	1.0419	6.59

Change in population* = 13
* in numbers

Notice that the population change in the state is smaller than the population change in Redwood county (Table 4.1). This is also due to the fact that the multipliers are based on state

averages.

4.2.2 Indirect effects

Table 4.6 gives a summary of the indirect effects of the proposed 1200 sow unit on the whole economy of Minnesota state in million dollars of 1991. The results indicate that the TVA and E figures yields the largest increase for the feed grains, other wholesale, banking and real estate industries.

The population will increase with 19 people and all industries together will increase the TVA of the state with 0.4553 million dollars and Employment with 9 people.

Table 4.6 Indirect effects of the 1200 sow unit on Minnesota state ($MM 1991)

	Industry	FD	TIO	ECI	PI	TI	TVA	E*
1	Dairy farm products	0.0000	0.0282	0.0015	0.0149	0.0163	0.0167	0.55
12	Feed grains	0.0000	0.1037	0.0024	0.0253	0.0278	0.0303	0.78
13	Hay and pasture	0.0000	0.0317	0.0007	0.0072	0.0079	0.0086	0.23
21	Oil bearing crops	0.0000	0.0149	0.0005	0.0055	0.0061	0.0065	0.14
26	Agricul. forestry	0.0000	0.0172	0.0057	0.0016	0.0073	0.0078	0.53
74	Maintenance and rep.	0.0000	0.0107	0.0032	0.0021	0.0052	0.0054	0.12
332	Farm equipment	0.0000	0.0158	0.0040	0.0030	0.0071	0.0072	0.16
446	Railroads and rel.	0.0000	0.0122	0.0062	0.0007	0.0069	0.0072	0.11
448	Motor fr. transport	0.0000	0.0386	0.0139	0.0114	0.0253	0.0268	0.51
456	Electric services	0.0000	0.0335	0.0055	0.0119	0.0174	0.0198	0.12
461	Other wholesale	0.0000	0.1074	0.0503	0.0146	0.0649	0.0778	1.39
463	Other retail trade	0.0000	0.0119	0.0050	0.0016	0.0066	0.0074	0.26
464	Banking	0.0000	0.0466	0.0173	0.0067	0.0240	0.0251	0.60
465	Credit agencies	0.0000	0.0097	0.0089	-0.0001	0.0088	0.0093	0.30
467	Insurance carriers	0.0000	0.0212	0.0074	-0.0007	0.0067	0.0079	0.21
468	Insurance agents	0.0000	0.0049	0.0018	0.0011	0.0029	0.0030	0.10
470	Real estate	0.0000	0.1001	0.0044	0.0650	0.0694	0.0855	0.58
471	Hotels and lodging	0.0000	0.0035	0.0013	0.0005	0.0019	0.0022	0.10
478	Miscell. repair shop	0.0000	0.0079	0.0023	0.0026	0.0049	0.0051	0.21
490	Accounting, audit.	0.0000	0.0060	0.0024	0.0013	0.0038	0.0038	0.16
491	Eat/drinking place	0.0000	0.0060	0.0015	0.0005	0.0021	0.0029	0.15
493	Auto repair	0.0000	0.0135	0.0029	0.0033	0.0061	0.0065	0.15
506	Other medical	0.0000	0.0217	0.0108	0.0032	0.0139	0.0140	0.30
	Other indirect	0.0000	0.1952	0.0362	0.0270	0.0629	0.0685	1.47
	Total indirect	0.0000	0.8622	0.1961	0.2102	0.4062	0.4553	9.23

Change in population* = 19
* in numbers

4.2.3 Induced effects

Building a 1200 sow unit in Redwood county 'trickles its way down' to other industries. Due to the fact that the 'new' employees are spending their payrolls, also industries such as

wholesale, real estate, retail and eat/drinking place gain profits. Table 4.7 gives a summary of the induced effects in million dollars of 1991. For all industries the number of jobs will increase with 10 and Total Value Added with 0.4060 million dollars.

Table 4.7 Induced effects of the 1200 sow unit on Minnesota state ($MM 1991)

	Industry	FD	TIO	ECI	PI	TI	TVA	E*
454	Communications exc.	0.0097	0.0145	0.0049	0.0044	0.0093	0.0108	0.11
461	Other wholesale	0.0243	0.0344	0.0162	0.0046	0.0208	0.0250	0.45
463	Other retail trade	0.0813	0.0834	0.0357	0.0108	0.0465	0.0523	1.87
464	Banking	0.0054	0.0130	0.0049	0.0018	0.0067	0.0071	0.17
465	Credit agencies	0.0016	0.0058	0.0052	-0.0001	0.0051	0.0055	0.18
467	Insurance carriers	0.0222	0.0262	0.0093	-0.0009	0.0084	0.0097	0.26
468	Insurance agents	0.0007	0.0063	0.0023	0.0015	0.0038	0.0040	0.14
470	Real estate	0.0396	0.0698	0.0030	0.0454	0.0484	0.0595	0.41
471	Hotels and lodging	0.0051	0.0066	0.0026	0.0010	0.0035	0.0039	0.18
472	Laundry, cleaning	0.0027	0.0032	0.0010	0.0011	0.0021	0.0021	0.11
474	Portrait and photo.	0.0026	0.0026	0.0007	0.0009	0.0017	0.0017	0.12
477	Beauty and barber	0.0022	0.0022	0.0009	0.0010	0.0018	0.0019	0.12
479	Services buildings	0.0012	0.0019	0.0010	0.0004	0.0013	0.0015	0.13
480	Pers. supply serv.	0.0006	0.0023	0.0015	0.0005	0.0019	0.0019	0.13
488	Legal services	0.0037	0.0093	0.0040	0.0032	0.0071	0.0071	0.12
490	Accounting, audit.	0.0011	0.0040	0.0017	0.0009	0.0026	0.0026	0.11
491	Eat/drinking place	0.0335	0.0380	0.0095	0.0033	0.0128	0.0186	0.93
493	Auto repair	0.0078	0.0101	0.0022	0.0024	0.0046	0.0049	0.11
503	Doctors and dentists	0.0225	0.0228	0.0124	0.0034	0.0159	0.0161	0.30
504	Hospitals	0.0286	0.0286	0.0141	0.0016	0.0157	0.0157	0.56
505	Nursing and protect.	0.0063	0.0063	0.0035	0.0005	0.0040	0.0040	0.22
506	Other medical/health	0.0077	0.0094	0.0046	0.0013	0.0060	0.0061	0.13
508	Colleges/universit.	0.0046	0.0047	0.0026	0.0002	0.0028	0.0028	0.18
512	Religious organiz.	0.0038	0.0038	0.0022	0.0000	0.0022	0.0022	0.13
515	Social services	0.0028	0.0028	0.0018	0.0000	0.0018	0.0018	0.10
527	Household industry	0.0022	0.0022	0.0013	0.0009	0.0022	0.0022	0.17
	Other induced	0.1734	0.2699	0.0581	0.0588	0.1172	0.1350	2.33
	Total induced	0.4958	0.6841	0.2072	0.1489	0.3562	0.4060	9.77

Change in population* = 20
* in numbers

4.2.4 Total effects

A summary of the total effects of building a new 1200 sow unit on the economy of Minnesota state are presented in Table 4.8.

The largest total effects can be traced in industry 7, 448, 461, 463, 470 and 491. All industries together will increase Total Value Added with 1.9030 million dollar and the number of jobs with 26. The total population will increase with 52 people in Minnesota.

Table 4.8 Total effects of the 1200 sow unit on Minnesota state ($MM 1991)

	Industry	FD	TIO	ECI	PI	TI	TVA	E*
1	Dairy farm products	0.0010	0.0315	0.0016	0.0166	0.0183	0.0186	0.61
7	Hogs, pigs and swine	2.8467	2.8467	0.1600	0.8057	0.9657	1.0115	6.00
12	Feed grains	0.0000	0.1043	0.0024	0.0254	0.0279	0.0306	0.79
13	Hay and pasture	0.0000	0.0318	0.0007	0.0072	0.0079	0.0088	0.23
21	Oil bearing crops	0.0000	0.0155	0.0005	0.0057	0.0063	0.0067	0.15
26	Agriculture, forest.	0.0000	0.0175	0.0058	0.0016	0.0074	0.0079	0.54
74	Maintenance/repair	0.0000	0.0140	0.0041	0.0027	0.0069	0.0071	0.16
332	Farm equipment	0.0000	0.0159	0.0040	0.0030	0.0071	0.0072	0.16
446	Railroads and rel.	0.0004	0.0136	0.0069	0.0009	0.0078	0.0080	0.13
448	Motor freight trans.	0.0453	0.0883	0.0319	0.0261	0.0580	0.0612	1.18
450	Air transportation	0.0101	0.0146	0.0049	0.0017	0.0066	0.0072	0.10
454	Communications exc.	0.0097	0.0256	0.0085	0.0078	0.0163	0.0191	0.19
456	Electric services	0.0119	0.0544	0.0088	0.0192	0.0281	0.0320	0.19
461	Other wholesale	0.0243	0.1419	0.0665	0.0192	0.0857	0.1029	1.84
463	Other retail trade	0.0813	0.0962	0.0407	0.0124	0.0531	0.0598	2.13
464	Banking	0.0054	0.0596	0.0222	0.0085	0.0307	0.0321	0.77
465	Credit agencies	0.0016	0.0156	0.0141	-0.0002	0.0139	0.0147	0.48
467	Insurance carriers	0.0222	0.0474	0.0167	-0.0016	0.0151	0.0177	0.48
468	Insurance agents	0.0007	0.0112	0.0041	0.0026	0.0067	0.0071	0.24
470	Real estate	0.0396	0.1698	0.0074	0.1104	0.1178	0.1450	0.99
471	Hotels and lodging	0.0051	0.0101	0.0039	0.0015	0.0055	0.0061	0.27
472	Laundry, cleaning	0.0027	0.0034	0.0011	0.0011	0.0022	0.0023	0.11
474	Portrait and photo.	0.0026	0.0026	0.0007	0.0009	0.0017	0.0017	0.12
477	Beauty and barber	0.0022	0.0022	0.0009	0.0010	0.0018	0.0019	0.12
478	Miscel. repair shop	0.0000	0.0089	0.0026	0.0028	0.0054	0.0057	0.23
479	Services buildings	0.0012	0.0026	0.0013	0.0006	0.0018	0.0019	0.17
480	Pers. supply serv.	0.0006	0.0035	0.0022	0.0007	0.0029	0.0029	0.20
481	Computer/data proc.	0.0000	0.0072	0.0033	0.0018	0.0050	0.0051	0.10
482	Management/consult.	0.0000	0.0058	0.0027	0.0011	0.0038	0.0039	0.10
486	Other business serv.	0.0010	0.0061	0.0027	0.0012	0.0039	0.0040	0.14
488	Legal services	0.0037	0.0155	0.0066	0.0052	0.0118	0.0118	0.20
490	Accounting, audit.	0.0011	0.0100	0.0041	0.0022	0.0063	0.0063	0.26
491	Eat/drinking place	0.0335	0.0439	0.0110	0.0038	0.0147	0.0217	1.07
493	Auto repair	0.0078	0.0236	0.0050	0.0057	0.0107	0.0113	0.27
503	Doctors and dentists	0.0225	0.0230	0.0125	0.0034	0.0161	0.0162	0.30
504	Hospitals	0.0286	0.0286	0.0141	0.0016	0.0157	0.0157	0.56
505	Nursing and protect.	0.0063	0.0063	0.0035	0.0005	0.0040	0.0040	0.22
506	Other medical/health	0.0077	0.0309	0.0155	0.0045	0.0198	0.0200	0.43
508	Colleges/universit.	0.0046	0.0049	0.0027	0.0002	0.0029	0.0029	0.18
512	Religious organiz.	0.0038	0.0038	0.0022	0.0000	0.0022	0.0022	0.13
515	Social services	0.0028	0.0028	0.0018	0.0000	0.0018	0.0018	0.10
516	US postal service	0.0015	0.0090	0.0067	-0.0012	0.0055	0.0055	0.16
527	Household industry	0.0022	0.0022	0.0013	0.0009	0.0022	0.0022	0.17
	Other total	0.1447	0.3646	0.0590	0.0634	0.1226	0.1407	2.62
	Total	3.3864	4.4369	0.5792	1.1778	1.7569	1.9030	25.59

Change in population* = 52
* in numbers

Figure 4.4 shows the total effects (FD, TIO, ECI, PI, TI and TVA) on the economy of Minnesota state. Figure 4.5 presents the increase in Total Value Added in the industries which are mostly affected. Although for some industries the bars in the figure are

are very small, the involved amount of dollars is worth mentioning.

The change in employment and population is illustrated in the graph of Figure 4.6. The total effects are divided in changes due to direct, indirect and induced effects.

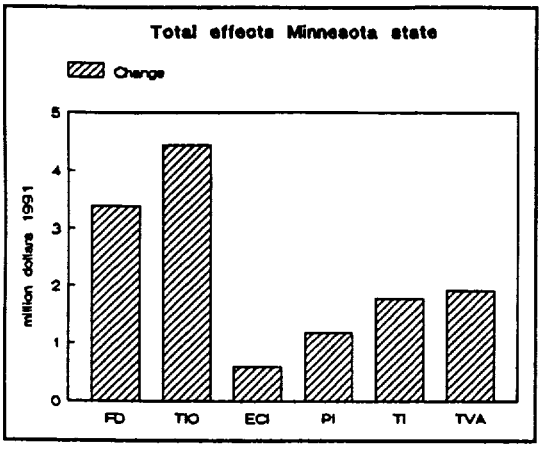

Figure 4.4 Total effects Minnesota state

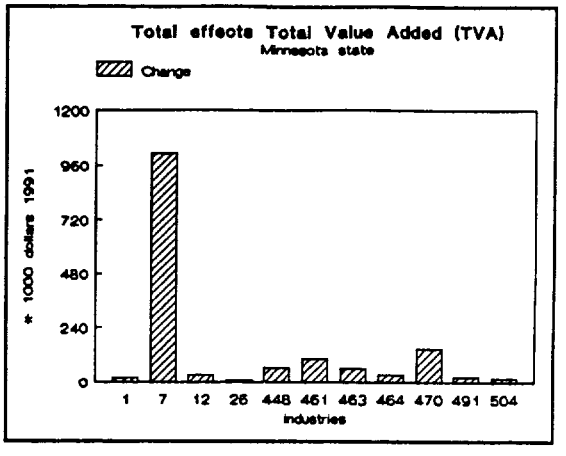

Figure 4.5 Total effects Total Value Added of the most affected industries Minnesota state

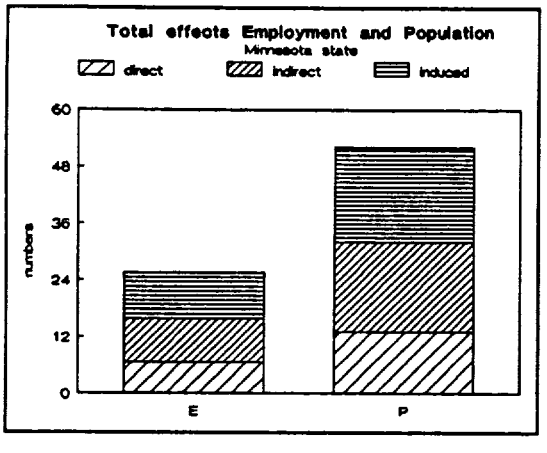

Figure 4.6 Total effects Employment and Population in Minnesota state divided in direct, indirect and induced effects

5 CONCLUSIONS AND RECOMMENDATIONS

The input-output model IMPLAN was used for evaluating output, income and employment repercussions in the short run, on county and on state level, caused by the expansion of the hog industry in Redwood county by building the proposed 1200 sow unit.

The conclusions drawn from this economic impact study are bound by the assumptions of IMPLAN. If these assumptions do not apply, the conclusions may be invalid. In this research the symplifying assumptions (linear production functions, unlimited resources and no time dimension) of IMPLAN could be justified. The results turned out to be reasonable. For instance, the increase in employment in various industries, as described in Chapter four, can be legitimized. For example, one additional employee in the eat and drinking sector in Redwood can be easily accomplished, just like the additional employees in other industries.

In general, according to Maki (1992), the validation of IMPLAN is quite reasonable. This statement is based on various facts. The model predicted very well during the years it has been used in many cases. Frequently validation checks at local information sources take place, to confirm and update the data, used by IMPLAN. A historical evaluation is also part of the validation of the model (Maki, 1992).

Table 5.1 presents the total direct, total indirect, total induced and the sum of these effects of building the 1200 sow unit for Redwood county.

Table 5.1 All total effects 1200 sow unit Redwood county ($MM 1991)

Effects	FD[1]	TIO[2]	ECI[3]	PI[4]	TI[5]	TVA[6]	E[7]*	P[8]*
Total direct	2.8906	2.8966	0.1749	0.8197	0.9946	1.0419	6.59	17
Total indirect	0.0000	0.7680	0.1501	0.1856	0.3357	0.3658	6.66	17
Total induced	0.2026	0.2376	0.0823	0.0486	0.1309	0.1473	4.39	11
Total	3.0932	3.8969	0.4072	1.0539	1.4611	1.5550	17.63	45

[1] Final Demand
[2] Total Industry Output
[3] Employee Compensation Income
[4] Property Income
[5] Total Income
[6] Total Value Added
[7] Employment
[8] Population
* in numbers

Table 5.2 sums all total effects which appear in the state Minnesota as a result of building the farrow to finish unit in

Redwood county.

Table 5.2 All total effects 1200 sow unit Minnesota ($MM 1991)

Effects	FD	TIO	ECI	PI	TI	TVA	E*	P*
Total direct	2.8906	2.8966	0.1758	0.8187	0.9946	1.0419	6.59	13
Total indirect	0.0000	0.8622	0.1961	0.2102	0.4062	0.4553	9.23	19
Total induced	0.4958	0.6841	0.2072	0.1489	0.3562	0.4060	9.77	20
Total	3.3864	4.4369	0.5792	1.1778	1.7569	1.9030	25.69	52

* in numbers

Notice that the direct ECI and PI figures from Redwood county and Minnesota differ slightly. This is due to the fact that the multipliers are estimated respectively on county averages and state averages. This is also the reason why the change in population (P) is not the same for the direct effects.

Also, one should be reminded that especially on state level the Type III multipliers involve a slight underestimation. This underestimation is less on county level (Maki, 1992).

Figure 5.1 and Figure 5.2 shows which part of the increase of the economic figures in Minnesota state is caused by the changes in the economic figures in Redwood county.

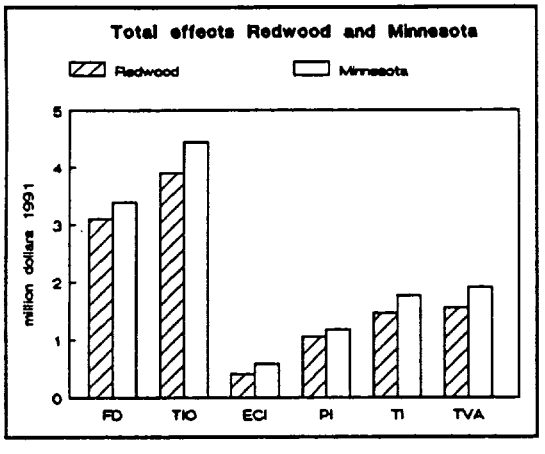

Figure 5.1 Total effects Redwood county and Minnesota state

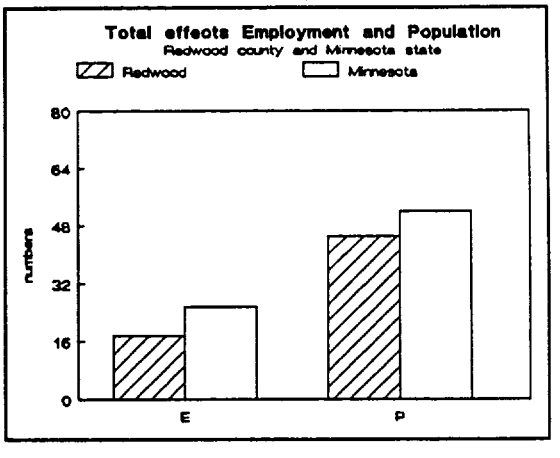

Figure 5.2 Total effects Employment and Population Redwood county and Minnesota state

Recalling the assumptions of IMPLAN and the justifications, the following conclusions can be derived: Building the 1200 sow unit in Redwood county will cause an increase in all the

mentioned economic figures (FD, TIO, ECI, PI, TI, TVA, E and P), for the economy of Redwood county and the economy of the state Minnesota.

Because this results are only a part of the issues involved with the building of this unit, this conclusions can only be used as additional information to the county commissioners and environmental officers, to make their decision of allowing the building of this 1200 sow unit.

To make a complete analysis (cost-benefit), also issues as ground-water and/or surface-water contamination, declining prices of surrounding real estate, nuisance from odors etc., should be taken into account. Due to time restrictions and high costs, issues like these could not be estimated in this project.

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Appendix A The Redwood county economy before construction of a large hog operation, 1985

	Industry	Base Year Final Demand (MM$)	Base Year TIO (MM$)	Employee Comp Income (MM$)	Property Income (MM$)	Total PoW Income (MM$)	Total Value Added (MM$)	Employment Number of Jobs)
1	DAIRY FARM PRODUCTS	9.8200	10.0491	.4864	5.3178	5.8042	5.9170	239.
2	POULTRY AND EGGS	9.3629	9.8421	.2066	2.2142	2.4208	2.4730	90.
3	RANCH FED CATTLE	5.9748	8.9853	.1398	1.5014	1.6412	1.7511	57.
4	RANGE FED CATTLE	.0052	.4710	.0057	.0762	.0819	.0876	4.
5	CATTLE FEEDLOTS	13.5256	14.0882	.2169	2.2904	2.5072	2.6780	102.
6	SHEEP, LAMBS AND GOATS	.4974	.5944	.0062	.0967	.1028	.1098	5.
7	HOGS, PIGS AND SWINE	30.4693	36.1868	.5739	6.1091	6.6830	7.1381	213.
8	OTHER MEAT ANIMAL PRODUCT	.2969	.4544	.0063	.0752	.0816	.0871	3.
9	MISCELLANEOUS LIVESTOCK	.2679	.6707	.0158	.1704	.1862	.1905	7.
11	FOOD GRAINS	9.8272	10.1666	.3084	3.3992	3.7076	3.8703	143.
12	FEED GRAINS	13.7310	15.8454	.3433	3.8872	4.2305	4.6346	146.
13	HAY AND PASTURE	.7342	1.0936	.0213	.2502	.2715	.2997	10.
18	VEGETABLES	3.8923	4.0425	.1791	1.9797	2.1588	2.1962	136.
19	SUGAR CROPS	.8927	.9298	.0418	.4643	.5061	.5163	33.
20	MISCELLANEOUS CROPS	.4264	.4592	.0137	.1524	.1661	.1682	9.
21	OIL BEARING CROPS	17.8310	18.8420	.6174	7.0461	7.6635	8.1764	218.
23	GREENHOUSE AND NURSERY PR	.1759	.3803	.0111	.1319	.1430	.1480	7.
24	FORESTRY PRODUCTS	.3724	.3724	.0090	.1220	.1310	.1486	7.
26	AGRICULTURAL, FORESTRY, F	.0163	1.4987	.4870	.1471	.6341	.6760	56.
66	NEW RESIDENTIAL STRUCTURE	6.1710	6.1710	1.4150	.8964	2.3114	2.3619	70.
67	NEW INDUSTRIAL AND COMMER	10.3608	10.3608	2.8900	1.7449	4.6349	4.7051	146.
68	NEW UTILITY STRUCTURES	1.7694	1.7694	.5310	.3381	.8691	.8832	27.
69	NEW HIGHWAYS AND STREETS	1.9303	1.9303	.4810	.2679	.7489	.7684	22.
70	NEW FARM STRUCTURES	.6067	.6067	.1730	.0970	.2700	.2723	8.
72	NEW GOVERNMENT FACILITIES	.8124	.8124	.2520	.1280	.3800	.3898	12.
73	MAINTENANCE AND REPAIR, R	1.1381	1.4807	.3100	.2191	.5291	.5537	15.
74	MAINTENANCE AND REPAIR OT	2.3463	3.8939	1.0740	.8392	1.9132	1.9606	55.
75	MAINTENANCE AND REPAIR OI	.0000	.0001	.0330	-.0330	.0000	.0000	0.
103	PREPARED FEEDS, N.E.C	4.8224	4.9022	.3450	.3295	.6745	.6914	13.
164	MILLWORK	.6701	1.0805	.2900	.0736	.3636	.3731	10.
168	PREFABRICATED WOOD BUILDI	.8391	.8409	.2110	.0521	.2631	.2667	10.
172	WOOD PRODUCTS, N.E.C	.4303	.5874	.1790	.0676	.2466	.2521	9.
200	NEWSPAPERS	.4072	1.2091	.4180	.1896	.6076	.6230	19.
205	COMMERCIAL PRINTING	.1555	.2869	.0810	.0589	.1399	.1435	4.
267	CONCRETE BLOCK AND BRICK	.3188	.3285	.0070	.1191	.1261	.1424	4.
268	CONCRETE PRODUCTS, N.E.C	.2572	.2580	.1830	-.0673	.1157	.1263	4.
269	READY-MIXED CONCRETE	.4220	.4296	.0070	.1442	.1512	.1643	4.
279	NONMETALLIC MINERAL PRODU	.0486	.0496	.0170	-.0017	.0153	.0170	1.
332	FARM MACHINERY AND EQUIPM	3.7392	4.7500	1.2250	.8853	2.1103	2.1429	58.
361	MACHINERY, EXCEPT ELECTRI	3.3583	3.4009	1.6770	.2140	1.8910	1.9428	58.
362	ELECTRONIC COMPUTING EQUI	62.1398	80.1612	21.4140	1.6524	23.0664	23.6440	618.
412	TRAVEL TRAILERS AND CAMPE	.8767	.8848	.1850	.0467	.2317	.2349	10.
413	MOBILE HOMES	2.6527	2.6529	.6600	.3630	1.0230	1.0341	48.
419	SURGICAL AND MEDICAL INST	6.3695	6.6482	2.2860	1.4193	3.7053	3.7583	80.
447	LOCAL, INTERURBAN PASSENG	1.0914	1.4377	.5220	.3342	.8562	.8695	45.
448	MOTOR FREIGHT TRANSPORT A	4.4560	8.2496	2.7860	2.6274	5.4134	5.7232	134.
454	COMMUNICATIONS, EXCEPT RA	2.1238	3.7811	1.1750	1.2313	2.4063	2.8275	35.
455	RADIO AND TV BROADCASTING	.3209	2.8381	.8220	.7231	1.5451	1.6081	31.
456	ELECTRIC SERVICES	.9111	2.0903	.3310	.7492	1.0802	1.2313	9.
457	GAS PRODUCTION AND DISTRI	1.9307	3.5622	.2870	.5827	.8697	1.0226	10.
459	SANITARY SERVICES AND STE	.1567	.4977	.1630	.1658	.3288	.3556	4.
461	OTHER WHOLESALE TRADE	14.9685	28.2863	12.4260	4.6625	17.0885	20.4956	446.
462	RECREATIONAL RELATED RETA	.1583	.1635	.0260	.0620	.0880	.0993	5.
463	OTHER RETAIL TRADE	23.2409	25.6995	10.2230	3.9564	14.1794	15.9606	692.
464	BANKING	8.6625	12.7996	4.2960	2.2763	6.5723	6.8937	200.
465	CREDIT AGENCIES	1.4025	2.7809	2.7220	-.2367	2.4853	2.6382	104.
466	SECURITY AND COMMODITY BR	.0926	.0937	.0230	.0311	.0541	.0558	1.
467	INSURANCE CARRIERS	.0619	.0815	.0210	.0050	.0260	.0305	1.
468	INSURANCE AGENTS AND BROK	1.1391	1.1854	.4150	.2972	.7122	.7453	31.
469	OWNER-OCCUPIED DWELLINGS	3.5996	3.5996	.0000	2.2530	2.2530	2.6962	0.
470	REAL ESTATE	2.0987	4.7501	.2090	3.0147	3.2237	4.0549	37.
471	HOTELS AND LODGING PLACES	.1305	.3065	.1080	.0567	.1647	.1841	10.
472	LAUNDRY, CLEANING AND SHO	.4911	.6165	.1710	.2329	.4039	.4083	25.
473	FUNERAL SERVICE AND CREMA	1.1447	1.1741	.1600	.3765	.5365	.5503	20.
474	PORTRAIT AND PHOTOGRAPHIC	.4336	.4376	.1610	.1210	.2820	.2874	25.
476	WATCH, CLOCK, JEWELRY AND	.1937	.1937	.0670	.0655	.1325	.1342	9.
477	BEAUTY AND BARBER SHOPS	.7813	.7813	.3160	.3539	.6699	.6754	51.
478	MISCELLANEOUS REPAIR SHOP	.0124	.3801	.0990	.1319	.2309	.2461	12.
479	SERVICES TO BUILDINGS	.2265	.3703	.2470	.0204	.2674	.2833	30.
480	PERSONNEL SUPPLY SERVICES	.0137	.0588	.0470	.0024	.0494	.0496	4.
482	MANAGEMENT AND CONSULTING	.0247	.1453	.0890	.0059	.0949	.0953	3.
484	EQUIPMENT REPAIR AND LEAS	.0210	.1776	.0820	.0241	.1061	.1210	3.
485	PHOTOFINISHING, COMMERCIA	.0635	.1273	.0850	-.0029	.0821	.0881	3.
486	OTHER BUSINESS SERVICES	.0624	.2440	.1230	.0337	.1567	.1606	7.
488	LEGAL SERVICES	5.0973	8.0634	3.2520	2.9134	6.1654	6.1759	128.
489	ENGINEERING, ARCHITECTURA	.0239	.4122	.2040	.0495	.2535	.2614	9.
490	ACCOUNTING, AUDITING AND	.3945	1.7543	.7340	.3717	1.1057	1.1101	56.
491	EATING AND DRINKING PLACE	8.9076	11.5265	2.6780	1.1879	3.8659	5.6704	343.
493	AUTOMOBILE REPAIR AND SER	2.4572	3.9338	.7120	1.0756	1.7876	1.8790	54.
495	MOTION PICTURES	.1098	.2989	.0730	.0242	.0972	.1058	7.
498	BOWLING ALLEYS AND POOL H	.3343	.3343	.1380	.0082	.1462	.1558	19.
501	MEMBERSHIP SPORTS AND REC	.4568	.4883	.1760	-.0046	.1714	.1760	17.
503	DOCTORS AND DENTISTS	4.3577	4.3590	1.9690	1.0721	3.0411	3.0632	70.

505 NURSING AND PROTECTIVE CA	7.4888	7.4888	5.0590	-.2495	4.8095	4.8636	325.
506 OTHER MEDICAL AND HEALTH	.7625	1.1163	.8560	-.1386	.7174	.7211	19.
507 ELEMENTARY AND SECONDARY	.9356	.9356	.3890	.0676	.4566	.4566	31.
511 LABOR AND CIVIC ORGANIZAT	1.0071	1.0071	.7040	-.2233	.4807	.4807	38.
512 RELIGIOUS ORGANIZATIONS	1.1300	1.1300	.4720	.1828	.6548	.6578	48.
513 OTHER NONPROFIT ORGANIZAT	.0426	.0500	.0100	.0163	.0263	.0263	1.
514 RESIDENTIAL CARE	6.2544	6.2544	3.2930	.3649	3.6579	3.6579	214.
515 SOCIAL SERVICES, N.E.C.	5.3008	5.3050	3.2720	.2109	3.4829	3.4843	236.
516 U.S. POSTAL SERVICE	.3312	1.3731	.9520	-.1086	.8434	.8434	30.
525 GOVERNMENT INDUSTRY	45.2098	45.2098	25.1720	20.0378	45.2098	45.2098	985.
527 HOUSEHOLD INDUSTRY	.6508	.6508	.3640	.2868	.6508	.6508	61.
Total	392.0287	479.0702	128.7145	96.7779	225.4925	238.9596	7468.
Population = 18900.							

Appendix B The Minnesota state economy before construction of a large hog operation, 1985

	Industry	Base Year Final Demand (MM$)	Base Year TIO (MM$)	Employee Comp Income (MM$)	Property Income (MM$)	Total PoW Income (MM$)	Total Value Added (MM$)	Employment Number of Jobs)
1	DAIRY FARM PRODUCTS	625.9182	1575.2720	81.3866	828.4668	909.8534	927.5296	37389.
2	POULTRY AND EGGS	148.4323	781.7648	17.4197	174.8662	192.2858	196.4315	7156.
3	RANCH FED CATTLE	130.6723	644.3031	10.7677	106.9172	117.6849	125.5662	4062.
4	RANGE FED CATTLE	.6345	52.8470	.8372	8.3498	9.1869	9.8316	425.
5	CATTLE FEEDLOTS	140.6777	642.5985	10.4480	103.9124	114.3604	122.1486	4674.
6	SHEEP, LAMBS AND GOATS	.4696	28.8904	.4567	4.5419	4.9986	5.3390	239.
7	HOGS, PIGS AND SWINE	762.4937	1299.4370	21.9247	218.0561	239.9808	256.3240	7661.
8	OTHER MEAT ANIMAL PRODUCT	4.2645	63.4770	1.0410	10.3531	11.3941	12.1701	442.
9	MISCELLANEOUS LIVESTOCK	16.4703	39.9380	1.0048	10.0824	11.0872	11.3423	404.
11	FOOD GRAINS	361.7258	398.1599	12.9010	132.3025	145.2035	151.5761	5599.
12	FEED GRAINS	1049.2510	1328.6340	30.7076	324.0213	354.7289	388.6120	12231.
13	HAY AND PASTURE	58.7769	106.3292	2.2813	24.1206	26.4018	29.1439	941.
16	FRUITS	9.8563	12.1899	.7680	7.5842	8.3522	8.4308	702.
18	VEGETABLES	120.2700	162.6208	7.6729	79.1724	86.8454	88.3478	5455.
19	SUGAR CROPS	82.7311	153.5798	7.4054	76.1861	83.5915	85.2796	5496.
20	MISCELLANEOUS CROPS	9.6114	23.2596	.7378	7.6763	8.4141	8.5199	462.
21	OIL BEARING CROPS	317.2269	550.8270	19.2164	204.8170	224.0334	239.0273	6385.
22	FOREST PRODUCTS	3.6141	4.6667	.1897	1.9699	2.1596	2.2009	75.
23	GREENHOUSE AND NURSERY PR	24.6753	45.5359	1.5003	15.6176	17.1179	17.7151	844.
24	FORESTRY PRODUCTS	52.6259	52.8222	1.4433	17.1413	18.5846	21.0813	993.
25	COMMERCIAL FISHING	3.1035	6.4048	.3962	.7781	1.1743	1.2777	530.
26	AGRICULTURAL, FORESTRY, F	2.6786	88.1242	29.3154	7.9701	37.2854	39.7475	3293.
27	LANDSCAPE AND HORTICULTUR	150.9752	238.3922	116.2347	32.0005	148.2352	156.9712	8827.
28	IRON ORES	1625.6390	1626.6090	237.2568	355.8185	593.0753	707.8829	7453.
32	GOLD ORES	11.7030	13.1038	4.9498	-2.2423	2.7075	4.3517	139.
35	METAL MINING SERVICES	.0862	.5826	.3462	-.1340	.2122	.2934	7.
38	METAL ORES, NOT ELSWHERE	.5484	.6788	.3142	-.1374	.1768	.2740	5.
40	BITUMINOUS AND LIGNITE MI	2.8413	5.7286	2.1868	.5635	2.7503	2.7503	44.
41	NATURAL GAS	1.3218	15.7983	1.9546	3.6931	5.6476	6.9453	310.
42	CRUDE PETROLEUM	1.2184	36.1425	4.3640	8.2455	12.6094	15.5068	726.
44	DIMENSION STONE	3.1348	3.2702	.9149	.7631	1.6780	1.7694	58.
45	CRUSHED AND BROKEN LIMEST	34.3001	35.5618	13.5084	7.8850	21.3934	22.4904	367.
46	CRUSHED AND BROKEN GRANIT	9.2833	9.6295	2.9676	2.4603	5.4279	5.7228	90.
47	CRUSHED AND BROKEN STONE,	7.6112	8.4767	3.0922	1.9261	5.0183	5.2769	86.
48	CONSTRUCTION SAND AND GRA	62.3807	65.0909	25.5671	11.8321	37.3992	40.2889	635.
49	INDUSTRIAL SAND	26.6103	27.7930	9.8934	4.8650	14.7584	16.0110	253.
50	BENTONITE	1.0359	1.2428	.3419	.2276	.5695	.5966	13.
58	MISC. NONMETALLIC MINERAL	5.6481	5.8242	2.1250	.9995	3.1245	3.3442	82.
66	NEW RESIDENTIAL STRUCTURE	1701.0510	1701.0510	414.9433	222.1999	637.1432	651.0753	19296.
67	NEW INDUSTRIAL AND COMMER	2840.2530	2840.2530	846.5253	424.0620	1270.5870	1289.8200	40024.
68	NEW UTILITY STRUCTURES	478.6216	478.6216	156.0813	79.0185	235.0998	238.9011	7304.
69	NEW HIGHWAYS AND STREETS	553.6569	553.6569	140.9464	73.8636	214.8100	220.4011	6310.
70	NEW FARM STRUCTURES	172.2367	172.2367	50.8133	25.8385	76.6518	77.2884	2271.
72	NEW GOVERNMENT FACILITIES	236.5469	236.5469	73.9850	36.6630	110.6481	113.5046	3494.
73	MAINTENANCE AND REPAIR, R	.2119	421.5585	90.9478	59.6955	150.6432	157.6419	4271.
74	MAINTENANCE AND REPAIR OT	468.9053	1058.5140	314.8436	205.2487	520.0923	532.9523	14951.
75	MAINTENANCE AND REPAIR OI	24.7875	36.6853	9.5843	7.3994	16.9838	16.9838	477.
77	AMMUNITION, EXCEPT FOR SM	507.1926	540.0734	246.0938	12.1732	258.2670	260.9686	6135.
79	SMALL ARMS	1.1574	1.1806	.3952	.0626	.4578	.5348	22.
80	SMALL ARMS AMMUNITION	121.2310	128.6599	50.2391	1.4421	51.6812	61.9695	1225.
81	OTHER ORDNANCE AND ACCESS	267.2378	275.1476	151.6598	15.0172	166.6770	167.1509	3448.
82	MEAT PACKING PLANTS	1273.9250	1577.9440	167.9399	2.0906	170.0305	175.3015	6295.
83	SAUSAGES AND OTHER PREPAR	132.3192	151.9848	22.6048	8.5361	31.1410	31.8256	851.
84	POULTRY DRESSING PLANTS	558.5590	661.6819	84.1000	21.9335	106.0334	108.6595	4190.
85	POULTRY AND EGG PROCESSIN	277.6305	288.8553	34.0893	7.6278	41.7171	43.1193	2028.
86	CREAMERY BUTTER	172.1673	189.7785	8.8299	-.1843	8.6456	9.1895	355.
87	CHEESE, NATURAL AND PROCE	964.6667	1162.9110	86.9341	35.2011	122.1351	125.5787	3104.
88	CONDENSED AND EVAPORATED	412.2991	494.8678	49.2863	64.9360	114.2223	115.9415	1255.
89	ICE CREAM AND FROZEN DESS	45.1385	58.2936	9.8219	4.0408	13.8626	14.2716	402.
90	FLUID MILK	317.3339	470.4185	61.1733	58.7168	119.8901	121.8854	1928.
91	CANNED AND CURED SEA FOOD	10.5922	10.7726	1.8310	1.2824	3.1135	3.1668	52.
93	CANNED FRUITS AND VEGETAB	240.1248	244.3053	44.1956	23.8322	68.0278	69.6637	1197.
94	DEHYDRATED FOOD PRODUCTS	9.8700	9.9607	1.6404	1.1360	2.7764	2.8458	59.
95	PICKLES, SAUCES, AND SALA	40.5175	43.0013	5.0265	4.2890	9.3155	9.5643	175.
96	FRESH OR FROZEN PACKAGED	36.3039	37.3903	5.6975	2.0507	7.7483	7.8811	133.
97	FROZEN FRUITS, JUICES AND	186.2146	188.3946	32.4746	8.5920	41.0666	42.4314	932.
98	FROZEN SPECIALTIES	279.1909	284.6510	49.1422	27.4051	76.5474	78.4636	2053.
99	FLOUR AND OTHER GRAIN MIL	363.9296	372.3062	38.6545	47.6270	86.2814	88.4613	1076.
100	CEREAL PREPARATIONS	151.2828	152.7361	25.4818	40.2453	65.7271	66.6330	873.
101	BLENDED AND PREPARED FLOU	6.6713	6.8201	.9309	.6946	1.6255	1.6631	34.
102	DOG, CAT, AND OTHER PET F	81.0987	82.2273	9.9060	18.7096	28.6156	29.1663	420.
103	PREPARED FEEDS, N.E.C	467.6333	525.2864	38.0145	34.2563	72.2708	74.0889	1393.
104	RICE MILLING	15.4113	15.6934	1.6436	1.4922	3.1358	3.2641	87.
105	WET CORN MILLING	.6896	.9802	.1704	.0310	.2014	.2113	6.
106	BREAD, CAKE, AND RELATED	171.7904	258.1118	81.6042	30.5713	112.1755	113.5484	3073.
107	COOKIES AND CRACKERS	13.1393	14.2200	3.6514	2.6050	6.2563	6.3515	137.
108	SUGAR	294.4056	335.3437	42.7601	17.4198	60.1799	62.8842	1353.
109	CONFECTIONERY PRODUCTS	221.1738	240.2645	39.1362	25.8409	64.9771	66.8161	1364.
110	CHOCOLATE AND COCOA PRODU	2.0608	2.2107	.2471	.3872	.6344	.6442	8.
111	CHEWING GUM	1.4429	1.4774	.2706	.3837	.6542	.6637	9.
112	MALT LIQUORS	217.5540	225.5888	29.9630	15.0906	45.0535	84.4128	723.
113	MALT	181.3360	183.7088	15.7053	13.5621	29.2674	31.3630	403.
114	WINES, BRANDY, AND BRANDY	3.3222	3.7590	.4016	.3930	.7945	1.5394	10.

115	DISTILLED LIQUOR, EXCEPT	5.6961	6.7468	.4122	.7184	1.1306	5.5745	10.
116	BOTTLED AND CANNED SOFT D	357.8950	377.4780	74.2865	17.6617	91.9482	98.5943	2737.
117	FLAVORING EXTRACTS AND SY	85.7603	87.9915	13.4008	29.3420	42.7427	43.3503	361.
119	SOYBEAN OIL MILLS	163.6519	344.2789	7.7554	8.2042	15.9596	16.8236	270.
120	VEGETABLE OIL MILLS, N.E.	76.6918	95.0901	6.4413	-.0694	6.3718	6.7010	214.
121	ANIMAL AND MARINE FATS AN	44.3968	88.5535	11.2875	16.6205	27.9080	28.3587	390.
122	ROASTED COFFEE	90.8472	131.5557	6.4644	12.1722	18.6366	18.8877	198.
123	SHORTENING AND COOKING OI	143.6672	185.9724	14.0463	6.7160	20.7622	21.4901	412.
124	MANUFACTURED ICE	5.1017	5.8574	1.9460	.5461	2.4921	2.8576	58.
125	MACARONI AND SPAGHETTI	60.2807	61.6463	12.2931	10.4447	22.7378	23.1005	367.
126	FOOD PREPARATIONS, N.E.C	158.8506	202.0608	33.9766	34.0293	68.0058	69.2354	1299.
131	BROADWOVEN FABRIC MILLS A	52.0809	68.6831	13.4083	3.5085	16.9167	17.6854	513.
132	NARROW FABRIC MILLS	.0606	.8084	.2077	.1099	.3176	.3300	7.
133	YARN MILLS AND FINISHING	16.4862	23.3437	4.6995	1.4660	6.1655	6.5166	181.
135	FLOOR COVERINGS	1.3431	1.3616	.2088	.0969	.3056	.3240	7.
138	PADDING AND UPHOLSTERY FI	4.0936	4.1483	.9853	.1243	1.1096	1.2199	49.
139	PROCESSED TEXTILE WASTE	12.1311	12.2750	2.6234	.2058	2.8292	2.9371	127.
140	COATED FABRICS, NOT RUBBE	13.9231	14.3838	3.1305	.2301	3.3607	3.5272	138.
142	CORDAGE AND TWINE	3.3700	3.4321	.8873	.0413	.9285	1.0119	45.
147	KNIT OUTERWEAR MILLS	35.2974	38.0492	9.6760	5.5639	15.2398	15.3960	666.
149	KNITTING MILLS, N.E.C	4.6949	5.6330	1.4487	.3144	1.7630	1.7784	77.
150	KNIT FABRIC MILLS	14.3761	24.3135	4.6931	.9407	5.6338	5.7440	229.
151	APPAREL MADE FROM PURCHAS	86.6796	91.8946	26.9241	5.5824	32.5065	32.6703	2509.
152	CURTAINS AND DRAPERIES	14.0094	19.2706	4.0679	.5668	4.6347	4.6764	509.
153	HOUSEFURNISHINGS, N.E.C	3.9271	5.1373	.8958	.1236	1.0194	1.0299	86.
154	TEXTILE BAGS	2.7579	7.5378	1.8236	.3335	2.1571	2.1756	117.
155	CANVAS PRODUCTS	5.9364	11.2503	2.3977	.6703	3.0680	3.0947	329.
156	PLEATING AND STITCHING	5.9417	6.5416	1.2697	.3426	1.6122	1.6231	153.
157	AUTOMOTIVE AND APPAREL TR	.3675	6.2446	1.3102	.3702	1.6803	1.6884	140.
158	SCHIFFI MACHINE EMBROIDER	.5446	.7395	.2077	.0268	.2345	.2355	22.
159	FABRICATED TEXTILE PRODUC	9.1679	14.8205	3.3372	.8928	4.2299	4.2627	323.
160	LOGGING CAMPS AND LOGGING	12.3853	70.4664	13.7598	8.1473	21.9071	22.0038	1119.
161	SAWMILLS AND PLANING MILL	2.8054	43.3962	10.6090	1.8283	12.4373	12.6300	944.
162	HARDWOOD DIMENSION AND FL	.4742	8.6291	3.0378	.2167	3.2546	3.3262	174.
163	SPECIAL PRODUCT SAWMILLS,	.5070	2.6780	.8915	.0700	.9615	.9746	54.
164	MILLWORK	587.7439	710.9012	205.2894	33.9066	239.1960	245.4344	6579.
165	WOOD KITCHEN CABINETS	78.6504	116.3885	47.0280	4.4288	51.4567	52.1151	1531.
166	VENEER AND PLYWOOD	.1825	5.4748	1.5839	.3520	1.9358	1.9628	52.
167	STRUCTURAL WOOD MEMBERS,	19.1826	36.9848	9.9603	2.3362	12.2964	12.6324	412.
168	PREFABRICATED WOOD BUILDI	37.1882	37.4093	8.9889	2.7136	11.7025	11.8619	445.
169	WOOD PRESERVING	8.3542	22.1036	4.7176	1.5666	6.2842	6.4058	182.
170	WOOD PALLETS AND SKIDS	.3843	8.5958	2.3391	.4014	2.7405	2.8112	193.
171	PARTICLEBOARD	46.1368	62.4087	17.6047	6.1007	23.7054	24.4256	591.
172	WOOD PRODUCTS, N.E.C	47.4505	95.2207	31.0441	8.9230	39.9671	40.8582	1459.
173	WOOD CONTAINERS	3.7228	10.0812	4.4236	-.9867	3.4368	3.5299	213.
174	WOOD HOUSEHOLD FURNITURE	16.0199	16.3357	4.9391	1.1149	6.0541	6.2191	438.
175	HOUSEHOLD FURNITURE, N.E.	1.4890	1.7190	.5443	.0305	.5748	.5936	31.
176	WOOD TV AND RADIO CABINET	3.5740	4.8069	1.6510	.1040	1.7550	1.7932	103.
177	UPHOLSTERED HOUSEHOLD FUR	.8518	.8612	.2695	.0341	.3035	.3099	16.
178	METAL HOUSEHOLD FURNITURE	14.9750	16.3138	4.5866	.8171	5.4037	5.5040	268.
179	MATTRESSES AND BEDSPRINGS	15.8886	16.0276	3.8133	.5131	4.3263	4.4697	250.
180	WOOD OFFICE FURNITURE	15.9361	16.1659	4.8444	2.1606	7.0050	7.1331	268.
181	METAL OFFICE FURNITURE	31.8671	32.1018	10.8710	5.2346	16.1056	16.4469	433.
182	PUBLIC BUILDING FURNITURE	51.4356	57.1945	19.0047	4.4170	23.4217	23.9351	760.
183	WOOD PARTITIONS AND FIXTU	48.9559	57.3633	21.2905	5.1601	26.4506	26.7798	777.
184	METAL PARTITIONS AND FIXT	74.7568	77.2904	24.4752	10.0586	34.5338	35.1099	935.
185	BLINDS, SHADES, AND DRAPE	5.1868	5.2316	1.4113	.7557	2.1671	2.1909	72.
186	FURNITURE AND FIXTURES, N	27.4757	28.2448	8.9367	4.2208	13.1575	13.5504	447.
188	PAPER MILLS, EXCEPT BUILD	1956.8190	1966.1600	507.7943	164.1563	671.9506	696.1776	10347.
189	PAPERBOARD MILLS	272.2661	275.4720	67.2851	27.1645	94.4496	97.7560	1595.
190	ENVELOPES	224.5880	226.1089	70.3294	22.3524	92.6818	94.1552	2512.
191	SANITARY PAPER PRODUCTS	6.2692	6.2913	1.0652	1.1718	2.2370	2.2632	27.
192	BUILDING PAPER AND BOARD	16.4210	16.6133	4.8156	.8680	5.6836	5.9773	124.
193	PAPER COATING AND GLAZING	610.9186	657.4288	159.2029	104.5277	263.7307	269.1276	4154.
194	BAGS, EXCEPT TEXTILE	135.9341	137.7417	30.3784	9.3432	39.7216	40.5335	1096.
195	DIE-CUT PAPER AND BOARD	535.4395	546.5306	122.0816	108.8246	230.9062	233.8186	3620.
196	PRESSED AND MOLDED PULP G	3.6871	3.6975	1.1823	.6431	1.8254	1.8852	28.
197	STATIONERY PRODUCTS	40.9371	41.4527	9.0581	2.3427	11.4007	11.6188	649.
198	CONVERTED PAPER PRODUCTS,	17.4038	17.6259	3.8921	1.9327	5.8248	6.0510	200.
199	PAPERBOARD CONTAINERS AND	628.9271	1123.6460	317.0771	152.3446	469.4217	479.7009	8002.
200	NEWSPAPERS	268.7402	574.3583	212.3676	76.2488	288.6165	295.9376	9025.
201	PERIODICALS	274.4886	435.3872	89.8879	29.6826	119.5706	122.1666	3290.
202	BOOK PUBLISHING	576.0071	606.4694	134.0248	83.1854	217.2102	222.2161	4310.
203	BOOK PRINTING	3.4379	5.4505	1.7905	.8609	2.6514	2.6975	82.
204	MISCELLANEOUS PUBLISHING	45.6748	66.8618	27.6505	14.0203	41.6708	42.1133	956.
205	COMMERCIAL PRINTING	866.4026	1420.6960	479.8092	212.7635	692.5728	710.6243	19808.
206	LITHOGRAPHIC PLATEMAKING	17.1940	37.1367	20.2381	3.9587	24.1968	24.4813	394.
207	MANIFOLD BUSINESS FORMS	64.0438	83.4387	21.9913	18.0293	40.0206	40.5894	798.
208	BLANKBOOKS AND LOOSELEAF	46.8870	55.5932	22.7732	11.2912	34.0644	34.5973	838.
209	GREETING CARD PUBLISHING	5.7037	5.8592	1.6830	1.1912	2.8742	2.9469	62.
210	ENGRAVING AND PLATE PRINT	13.7439	17.3605	7.9961	3.3739	11.3700	11.6374	215.
211	BOOKBINDING AND RELATED W	6.3907	15.1677	6.6807	2.1743	8.8550	8.9217	607.
212	TYPESETTING	26.8646	53.6122	29.0713	10.7796	39.8509	40.2442	1050.
213	PHOTOENGRAVING	.4810	1.0940	.5880	.0992	.6872	.6990	11.
215	INDUSTRIAL INORGANIC, ORG	6.3293	40.9295	7.0492	4.1802	11.2295	11.5976	222.
216	NITROGENOUS AND PHOSPHATI	2.2991	23.0832	2.4030	4.0381	6.4411	6.6293	97.
217	FERTILIZERS, MIXING ONLY	2.9353	29.8654	2.8760	1.4385	4.3144	4.5315	165.
218	AGRICULTURAL CHEMICALS, N	7.9700	21.2462	2.6405	4.0742	6.7147	6.8999	107.
219	GUM AND WOOD CHEMICALS	3.6338	6.9647	1.5008	.5216	2.0224	2.1514	64.
220	ADHESIVES AND SEALANTS	2.6504	24.9353	4.2521	2.8677	7.1198	7.3054	134.

221	EXPLOSIVES	12.0419	15.2409	4.6132	1.7380	6.3513	6.4931	146.
222	PRINTING INK	1.7955	59.8206	12.0055	5.8688	17.8743	18.2977	351.
224	CHEMICAL PREPARATIONS, N.	179.8988	332.2047	59.1986	30.7291	89.9277	94.6276	1472.
225	PLASTICS MATERIALS AND RE	32.7149	170.3423	30.1750	3.9609	34.1359	35.8498	1015.
226	SYNTHETIC RUBBER	1.2716	10.3083	1.5179	.1034	1.6213	1.6770	73.
229	DRUGS	42.4701	69.3618	19.8141	7.4377	27.2518	28.0456	747.
230	SOAP AND OTHER DETERGENTS	141.3935	176.2301	29.8075	23.1051	52.9126	53.9083	927.
231	POLISHES AND SANITATION G	51.2625	64.7338	10.2884	11.0379	21.3263	21.6561	378.
232	SURFACE ACTIVE AGENTS	7.3577	18.6183	5.2214	.3927	5.6141	5.7256	185.
233	TOILET PREPARATIONS	279.3130	299.1292	54.0378	78.6584	132.6962	134.3224	1767.
234	PAINTS AND ALLIED PRODUCT	90.3149	93.8721	22.0105	8.2768	30.2873	31.0293	671.
235	PETROLEUM REFINING	447.5507	1038.0140	30.4636	54.0030	84.4666	160.7399	759.
236	LUBRICATING OILS AND GREA	52.5393	154.4064	12.0012	32.7902	44.7913	60.8820	330.
237	PETROLEUM AND COAL PRODUC	4.6451	6.7113	.3600	1.5393	1.8993	1.9543	8.
238	PAVING MIXTURES AND BLOCK	3.9360	53.9759	6.6008	13.4725	20.0734	20.5443	139.
239	ASPHALT FELTS AND COATING	3.4622	79.6575	8.6939	20.6677	29.3615	29.9852	375.
240	TIRES AND INNER TUBES	6.3508	6.4560	1.8917	.2911	2.1829	2.4321	68.
243	FABRICATED RUBBER PRODUCT	75.6358	76.9848	27.3960	-.4016	26.9943	27.2829	1074.
244	MISCELLANEOUS PLASTICS PR	914.7124	933.5934	248.4021	98.1977	346.5998	350.1215	10326.
245	RUBBER AND PLASTICS HOSE	15.1996	15.5235	5.6198	.1617	5.7815	5.8609	218.
246	LEATHER TANNING AND FINIS	41.9918	58.0844	13.7138	12.4046	26.1185	26.3927	574.
248	SHOES, EXCEPT RUBBER	61.9975	62.7713	26.5768	-.2782	26.2986	26.6315	1136.
250	LEATHER GLOVES AND MITTEN	5.4497	5.8542	1.7351	-.0311	1.7039	1.7408	97.
254	LEATHER GOODS, N.E.C	4.1485	7.2483	2.1772	.3467	2.5239	2.6300	94.
255	GLASS AND GLASS PRODUCTS,	18.5755	63.3192	17.8585	7.4490	25.3075	27.3730	961.
256	GLASS CONTAINERS	.5893	27.8393	9.0155	3.1085	12.1240	12.9652	367.
257	CEMENT, HYDRAULIC	1.4678	1.4718	.3046	.3003	.6050	.6986	12.
258	BRICK AND STRUCTURAL CLAY	4.7663	4.7722	1.3165	1.1060	2.4225	2.6826	56.
259	CERAMIC WALL AND FLOOR TI	.7161	.7181	.2354	.1211	.3565	.4033	9.
264	FINE EARTHENWARE FOOD UTE	.2304	.2326	.0458	.0205	.0663	.0701	11.
265	PORCELAIN ELECTRICAL SUPP	.2818	.3001	.0618	.0239	.0857	.0922	12.
266	POTTERY PRODUCTS, N.E.C	1.7200	1.7519	.3494	.1427	.4921	.5369	68.
267	CONCRETE BLOCK AND BRICK	27.6493	27.7880	8.8292	1.8373	10.6664	12.0493	338.
268	CONCRETE PRODUCTS, N.E.C	69.6508	70.1768	24.9354	6.5304	31.4658	34.3474	1088.
269	READY-MIXED CONCRETE	116.6623	117.9330	32.8442	8.6634	41.5075	45.0953	1098.
272	CUT STONE AND STONE PRODU	86.2652	88.1974	27.1138	12.1060	39.2198	42.3043	1305.
273	ABRASIVE PRODUCTS	307.8117	320.9435	84.0753	57.0972	141.1725	148.8438	3158.
275	GASKETS, PACKING AND SEAL	18.8857	19.1089	5.4696	2.4639	7.9334	8.3977	344.
276	MINERALS, GROUND OR TREAT	3.0431	3.1062	.6157	.4499	1.0656	1.1648	33.
277	MINERAL WOOL	61.1983	63.6562	15.4758	16.4136	31.8894	33.7179	639.
279	NONMETALLIC MINERAL PRODU	1.0986	1.1294	.2226	.1263	.3489	.3872	23.
280	BLAST FURNACES AND STEEL	35.5820	55.8543	14.3488	5.6629	20.0117	21.3386	396.
281	ELECTROMETALLURGICAL PROD	1.9125	2.0732	.4165	.1868	.6033	.6774	10.
282	STEEL WIRE AND RELATED PR	41.4833	58.7891	12.4368	8.6598	21.0966	22.1256	476.
283	COLD FINISHING OF STEEL S	1.7477	2.7926	.4186	.2948	.7134	.7495	11.
284	STEEL PIPE AND TUBES	44.9402	70.0218	14.0346	7.4306	21.4651	22.5766	400.
285	IRON AND STEEL FOUNDRIES	95.9278	97.2330	34.8989	19.4596	54.3585	57.0151	1294.
286	IRON AND STEEL FORGINGS	5.1390	6.2903	1.6297	1.1320	2.7617	2.8357	64.
287	METAL HEAT TREATING	26.4470	30.1281	9.0049	8.5531	17.5580	18.1802	360.
288	PRIMARY METAL PRODUCTS, N	6.1173	7.4355	1.4050	.8290	2.2340	2.3856	56.
292	PRIMARY ALUMINUM	.8294	.9225	.2620	.0342	.2963	.3275	6.
293	PRIMARY NONFERROUS METALS	.9417	1.0175	.2588	-.0364	.2225	.2440	9.
294	SECONDARY NONFERROUS META	24.3958	25.6548	4.1712	.1400	4.3112	4.5630	159.
295	COPPER ROLLING AND DRAWIN	1.0113	1.1740	.2556	-.0255	.2302	.2451	10.
296	ALUMINUM ROLLING AND DRAW	23.1404	26.0127	4.9200	-.5396	4.3804	4.6973	192.
297	NONFERROUS ROLLING AND DR	7.9498	8.6235	1.5328	-.1765	1.3563	1.4601	62.
299	ALUMINUM CASTINGS	129.9487	134.1522	62.4418	-3.6386	58.8033	60.9229	2191.
300	BRASS, BRONZE, AND COPPER	8.9994	9.3577	4.2830	-.3279	3.9551	4.1463	176.
301	NONFERROUS CASTINGS, N.E.	9.5377	9.8362	4.4609	-.2545	4.2064	4.3547	179.
303	METAL CANS	242.7664	298.5325	51.2822	66.7706	118.0528	119.8304	1227.
304	METAL BARRELS, DRUMS AND	6.5031	7.6499	1.6254	1.6310	3.2564	3.3288	41.
306	PLUMBING FIXTURE FITTINGS	11.9408	12.3954	3.1188	1.9727	5.0915	5.2084	160.
307	HEATING EQUIPMENT, EXCEPT	28.4607	29.5599	9.0879	3.6057	12.6936	12.9963	306.
308	FABRICATED STRUCTURAL MET	120.2325	123.5580	39.5089	10.5869	50.0959	52.4492	1265.
309	METAL DOORS, SASH, AND TR	75.0971	77.9619	22.4163	9.9565	32.3728	33.1987	741.
310	FABRICATED PLATE WORK (BO	126.4644	131.6052	45.0542	17.1257	62.1799	63.7639	1372.
311	SHEET METAL WORK	221.5984	227.7480	63.7169	17.3615	81.0784	82.7437	2446.
312	ARCHITECTURAL METAL WORK	24.4047	25.0842	8.8057	2.6547	11.4604	11.8097	307.
313	PREFABRICATED METAL BUILD	5.0760	5.2866	1.1695	.4276	1.5971	1.6452	55.
314	MISCELLANEOUS METAL WORK	48.4710	50.4065	12.0258	2.7272	14.7530	15.4148	435.
315	SCREW MACHINE PRODUCTS AN	90.2210	120.7830	44.3267	18.2292	62.5559	63.6668	1443.
316	AUTOMOTIVE STAMPINGS	24.7531	35.8417	10.3033	2.4428	12.7461	13.1123	393.
318	METAL STAMPINGS, N.E.C.	223.6761	329.6051	101.8582	46.8510	148.7093	151.1406	3962.
319	CUTLERY	7.0949	7.6801	2.4595	1.4781	3.9375	4.0022	104.
320	HAND AND EDGE TOOLS, N.E.	166.6434	182.6601	66.4318	43.4726	109.9044	111.6298	2417.
321	HAND SAWS AND SAW BLADES	.8360	1.1728	.4112	.2427	.6538	.6621	17.
322	HARDWARE, N.E.C.	53.4677	69.1981	22.7156	9.3598	32.0754	32.5799	1228.
323	PLATING AND POLISHING	88.8696	110.8591	48.1964	18.6895	66.8859	67.8496	1899.
324	METAL COATING AND ALLIED	67.2745	82.1206	26.5289	8.6587	35.1876	36.0350	1134.
325	MISCELLANEOUS FABRICATED	54.8961	79.4170	25.9217	12.9617	38.8833	39.7017	1010.
326	STEEL SPRINGS, EXCEPT WIR	10.2598	11.4794	3.7483	1.7247	5.4730	5.6241	109.
327	PIPE, VALVES, AND PIPE FI	155.4259	187.9774	57.1129	38.3669	95.4798	97.6307	1811.
328	METAL FOIL AND LEAF	18.1240	21.6986	4.6856	1.7630	6.4486	6.5958	123.
329	FABRICATED METAL PRODUCTS	75.8106	93.9845	30.6787	13.0175	43.6963	44.8586	923.
330	STEAM ENGINES AND TURBINE	8.4784	17.4262	5.8850	4.2713	10.1563	10.3277	152.
331	INTERNAL COMBUSTION ENGIN	5.9335	20.4116	5.5719	3.3552	8.9271	9.1490	158.
332	FARM MACHINERY AND EQUIPM	214.3663	273.0178	69.1354	52.1577	121.2931	123.1688	3334.
333	LAWN AND GARDEN EQUIPMENT	50.0712	55.0167	11.6880	9.4621	21.1501	21.5684	439.
334	CONSTRUCTION MACHINERY AN	325.8759	353.0761	102.6977	41.6649	144.3626	147.5572	3821.
335	MINING MACHINERY, EXCEPT	1.0056	1.1014	.3590	.2255	.5845	.5935	11.

336	OIL FIELD MACHINERY	5.6835	5.7575	1.9354	1.3717	3.3071	3.4469	64.
337	ELEVATORS AND MOVING STAI	23.5746	34.3829	12.0459	1.8622	13.9082	14.5229	397.
338	CONVEYORS AND CONVEYING E	52.8588	61.9897	23.6871	2.3371	26.0242	26.5602	782.
339	HOISTS, CRANES, AND MONOR	11.1429	14.1948	5.3951	1.1968	6.5918	6.6939	182.
340	INDUSTRIAL TRUCKS AND TRA	53.0150	58.1626	20.7057	-.7244	19.9813	20.5281	717.
341	MACHINE TOOLS, METAL CUTT	68.0414	87.0369	41.0002	9.4918	50.4920	51.3964	1208.
342	MACHINE TOOLS, METAL FORM	.7496	3.0357	1.2154	.2476	1.4629	1.4911	56.
343	SPECIAL DIES AND TOOLS AN	116.5846	207.9026	107.7932	27.3749	135.1681	136.5186	3329.
344	POWER DRIVEN HAND TOOLS	.3914	.6760	.2034	.1544	.3579	.3616	10.
345	ROLLING MILL MACHINERY	.3984	.5336	.2098	.0516	.2615	.2667	10.
346	METALWORKING MACHINERY, N	35.6777	41.5547	16.9243	5.3993	22.3236	23.2271	618.
347	FOOD PRODUCTS MACHINERY	38.1449	45.2631	18.9939	7.0971	26.0910	26.5622	588.
348	TEXTILE MACHINERY	3.9545	4.7080	2.0696	.1380	2.2076	2.2693	78.
349	WOODWORKING MACHINERY	36.3498	39.2752	12.9523	3.5854	16.5377	16.7852	427.
350	PAPER INDUSTRIES MACHINER	1.9169	5.0649	2.0994	.2890	2.3884	2.4390	78.
351	PRINTING TRADES MACHINERY	5.7778	10.1368	4.2734	1.3117	5.5851	5.6780	101.
352	SPECIAL INDUSTRY MACHINER	102.5816	112.4300	48.6268	14.8626	63.4893	64.9026	1297.
353	PUMPS AND COMPRESSORS	292.5021	300.6460	104.8842	32.7492	137.6333	140.0820	3287.
355	BLOWERS AND FANS	58.6933	60.2167	21.5471	3.5954	25.1426	25.7094	768.
356	INDUSTRIAL PATTERNS	10.5336	10.5766	5.9382	.6693	6.6075	6.6648	182.
357	POWER TRANSMISSION EQUIPM	77.9391	80.7820	34.0319	8.9632	42.9951	43.5971	1106.
358	INDUSTRIAL FURNACES AND O	61.9965	62.6181	24.5595	7.5104	32.0699	32.7601	800.
359	GENERAL INDUSTRIAL MACHIN	125.0312	127.9731	50.4919	7.7837	58.2756	59.1851	1638.
360	CARBURETORS, PISTONS, RIN	25.6954	27.8659	13.8567	2.0644	15.9211	16.1441	449.
361	MACHINERY, EXCEPT ELECTRI	570.6202	577.3422	272.0081	49.0086	321.0167	329.8170	9846.
362	ELECTRONIC COMPUTING EQUI	4703.7960	6056.6250	1755.2500	-12.4579	1742.7920	1786.4320	46693.
363	CALCULATING AND ACCOUNTIN	1.6084	1.7223	.4239	-.0044	.4195	.4456	12.
364	SCALES AND BALANCES	47.5690	50.2507	12.6955	-.0974	12.5981	12.9954	404.
365	TYPEWRITERS AND OFFICE MA	47.4148	54.2719	14.4180	-.1118	14.3062	14.7707	402.
366	AUTOMATIC MERCHANDISING M	28.8209	30.7315	9.4916	2.1246	11.6162	11.9054	317.
367	COMMERCIAL LAUNDRY EQUIPM	3.4450	4.8367	1.4987	.1807	1.6794	1.7181	51.
368	REFRIGERATION AND HEATING	312.0330	449.4892	121.4933	55.4382	176.9315	181.0759	3787.
369	MEASURING AND DISPENSING	12.3774	13.4488	4.3458	1.7255	6.0714	6.1815	157.
370	SERVICE INDUSTRY MACHINES	284.9805	322.2982	102.5220	39.4213	141.9433	144.3882	2498.
371	INSTRUMENTS TO MEASURE EL	210.9525	244.1646	101.7452	48.5307	150.2759	152.3334	3027.
372	TRANSFORMERS	16.6545	17.4389	5.1565	1.7202	6.8766	7.0554	307.
373	SWITCHGEAR AND SWITCHBOAR	23.0318	31.6414	10.1765	5.2725	15.4490	15.6524	622.
374	MOTORS AND GENERATORS	218.1955	299.7082	110.4551	49.8270	160.2821	162.4605	3726.
375	INDUSTRIAL CONTROLS	5.6106	45.6788	17.7871	7.8418	25.6289	26.1010	581.
376	WELDING APPARATUS, ELECTR	.4300	.7927	.2620	.0638	.3259	.3302	8.
377	CARBON AND GRAPHITE PRODU	2.5630	4.1884	1.4188	.7720	2.1908	2.2520	48.
378	ELECTRICAL INDUSTRIAL APP	20.3024	23.7066	8.7652	2.0490	10.8142	11.0628	315.
379	HOUSEHOLD COOKING EQUIPME	82.9028	83.9946	19.5233	5.9177	25.4410	26.1570	716.
380	HOUSEHOLD REFRIGERATORS A	75.1522	77.2284	19.0908	3.7565	22.8473	23.3100	675.
382	ELECTRIC HOUSEWARES AND F	1.1448	1.1687	.2769	.2104	.4874	.4941	10.
384	SEWING MACHINES	4.4040	4.4487	1.6787	.0506	1.7293	1.7678	57.
387	LIGHTING FIXTURES AND EQU	39.1468	40.1349	11.9021	6.9776	18.8798	19.1447	395.
388	WIRING DEVICES	94.9187	99.9082	33.2905	18.0600	51.3506	52.0754	1029.
389	RADIO AND TV RECEIVING SE	21.8974	23.4666	5.9329	-.5892	5.3437	5.4947	160.
390	PHONOGRAPH RECORDS AND TA	10.3991	11.0303	2.6288	-.2605	2.3683	2.4319	147.
391	TELEPHONE AND TELEGRAPH A	35.7171	53.7391	11.6443	-1.2225	10.4219	11.0994	792.
392	RADIO AND TV COMMUNICATIO	482.5168	534.3126	206.1215	-20.2384	185.8831	189.7724	6302.
394	SEMICONDUCTORS AND RELATE	9.9376	39.6513	24.0407	-13.2932	10.7475	11.3818	608.
395	ELECTRONIC COMPONENTS, N.	116.8417	497.6130	164.4790	-91.0784	73.4006	77.9666	8281.
396	STORAGE BATTERIES	14.0655	24.4078	5.6901	3.8504	9.5405	9.9445	175.
397	PRIMARY BATTERIES, DRY AN	14.9060	19.4164	5.0830	3.1588	8.2418	8.3917	173.
398	X-RAY APPARATUS AND TUBES	184.9989	211.3196	59.7694	44.4298	104.1992	105.9042	1821.
399	ENGINE ELECTRICAL EQUIPME	2.7680	6.3553	1.7650	.9584	2.7234	2.7776	115.
400	ELECTRICAL EQUIPMENT, N.E	30.6190	38.9225	11.1043	3.1710	14.2753	14.7145	482.
401	TRUCK AND BUS BODIES	66.9307	68.6087	19.9740	10.2188	30.1928	36.0625	438.
402	TRUCK TRAILERS	42.4100	43.0671	9.7036	1.2347	10.9383	18.3340	214.
403	MOTOR VEHICLES	756.2693	775.4172	105.5308	65.9669	171.4977	192.0199	2110.
404	MOTOR VEHICLE PARTS AND A	78.0670	124.6141	32.0869	12.6965	44.7834	46.4900	1280.
405	AIRCRAFT	6.8431	6.9409	2.2773	.7524	3.0297	3.0509	70.
406	AIRCRAFT AND MISSILE ENGI	3.5360	6.4349	2.2645	.7652	3.0297	3.0498	70.
407	AIRCRAFT AND MISSILE EQUI	37.7633	38.9587	15.4853	4.2263	19.7116	19.8459	468.
408	SHIP BUILDING AND REPAIRI	2.3049	2.3260	.9118	.1909	1.1027	1.1117	54.
409	BOAT BUILDING AND REPAIRI	100.6928	100.7895	25.5629	13.7605	39.3234	39.4365	1504.
410	RAILROAD EQUIPMENT	15.0140	15.7157	3.7877	1.6885	5.4763	5.5028	205.
411	MOTORCYCLES, BICYCLES, AN	1.8724	1.9203	.2887	.1052	.3939	.3958	37.
412	TRAVEL TRAILERS AND CAMPE	17.6428	17.8449	4.1073	.5651	4.6724	4.7381	202.
413	MOBILE HOMES	43.0092	43.0094	11.4516	5.1336	16.5851	16.7651	778.
415	TRANSPORTATION EQUIPMENT,	69.7319	70.5975	16.3567	3.5184	19.8751	20.1373	754.
416	ENGINEERING AND SCIENTIFI	60.0680	62.9263	28.9756	7.0346	36.0102	36.5473	856.
417	MECHANICAL MEASURING DEVI	504.0239	543.1312	247.3188	58.2642	305.5829	309.8252	7177.
418	AUTOMATIC TEMPERATURE CON	344.6873	384.4079	174.0090	37.7442	211.7532	214.6063	4584.
419	SURGICAL AND MEDICAL INST	127.8333	165.9304	63.8436	28.6358	92.4793	93.8021	1997.
420	SURGICAL APPLIANCES AND S	292.5714	355.7981	118.1369	57.3039	175.4408	178.3339	4945.
421	DENTAL EQUIPMENT AND SUPP	3.4362	8.0246	2.8621	.5946	3.4567	3.5024	98.
422	WATCHES, CLOCKS, AND PART	5.9815	6.2403	1.8683	.3769	2.2452	2.3266	77.
423	OPTICAL INSTRUMENTS AND L	52.6581	66.1836	26.7888	-.1200	26.6688	27.1399	1043.
424	OPHTHALMIC GOODS	53.3828	58.5136	24.0428	-.1571	23.8857	24.3817	1012.
425	PHOTOGRAPHIC EQUIPMENT AN	192.5422	287.6774	74.5070	37.0068	111.5138	114.6151	2439.
426	JEWELRY, PRECIOUS METAL	23.2496	23.4216	5.5846	2.3414	7.9261	8.0612	255.
427	JEWELERS MATERIALS AND LA	2.0832	2.0989	.3494	.4962	.8456	.8480	16.
429	COSTUME JEWELERY	21.6327	21.8562	7.1526	3.2318	10.3843	10.5141	513.
430	MUSICAL INSTRUMENTS	.4638	.4662	.1385	.0334	.1719	.1761	14.
431	GAMES, TOYS, AND CHILDREN	41.7316	42.0860	11.6859	5.2544	16.9403	17.3799	664.
432	DOLLS	13.9701	14.3612	3.2700	2.1079	5.3780	5.4644	342.
433	SPORTING AND ATHLETIC GOO	78.9042	79.7127	22.9393	9.0197	31.9589	34.7662	1225.

434	PENS AND MECHANICAL PENCI	7.6134	8.2085	2.3316	1.0653	3.3970	3.4797	116.
436	MARKING DEVICES	17.9837	19.0387	7.5254	.5692	8.0946	8.3491	333.
437	CARBON PAPER AND INKED RI	10.5461	11.2878	2.5873	1.0615	3.6488	3.7230	117.
438	ARTIFICIAL TREES AND FLOW	11.4173	11.9154	3.2829	1.6994	4.9824	5.1332	210.
439	BUTTONS	.7296	.7575	.2375	.0208	.2583	.2618	27.
440	NEEDLES, PINS, AND FASTEN	.7367	.7598	.2354	.1142	.3496	.3571	16.
441	BROOMS AND BRUSHES	14.6137	15.4660	5.2992	1.5828	6.8820	7.1202	228.
443	BURIAL CASKETS AND VAULTS	5.0142	5.5180	1.8310	.2436	2.0746	2.1602	77.
444	SIGNS AND ADVERTISING DIS	78.1781	108.9377	41.5765	10.9374	52.5139	53.9408	2065.
445	MANUFACTURING INDUSTRIES,	60.8710	65.3254	19.8577	6.3575	26.2153	29.5652	1214.
446	RAILROADS AND RELATED SER	327.3812	758.5796	384.9534	46.3953	431.3487	447.9501	8732.
447	LOCAL, INTERURBAN PASSENG	176.4266	249.7227	95.6920	53.0233	148.7153	151.0215	7816.
448	MOTOR FREIGHT TRANSPORT A	1041.2640	2147.3630	775.0174	634.0870	1409.1040	1489.7390	34880.
449	WATER TRANSPORTATION	85.1545	219.4538	36.4605	23.4699	59.9304	64.5355	1315.
450	AIR TRANSPORTATION	1280.7020	1717.0320	567.1429	205.1205	772.2634	835.0376	14541.
451	PIPE LINES, EXCEPT NATURA	40.0435	70.3928	8.2997	29.1571	37.4568	39.6313	176.
452	TRANSPORTATION SERVICES	62.2836	102.3956	44.3331	16.4432	60.7763	62.8242	2084.
453	ARRANGEMENT OF PASSENGER	74.7573	140.2317	61.6430	34.6697	96.3127	97.8330	3911.
454	COMMUNICATIONS, EXCEPT RA	795.4728	1523.4620	508.2992	461.2231	969.5223	1139.2220	14102.
455	RADIO AND TV BROADCASTING	119.9342	444.8922	130.8305	111.3731	242.2037	252.0845	4859.
456	ELECTRIC SERVICES	1072.9150	2814.0960	455.5418	998.6936	1454.2350	1657.6290	12116.
457	GAS PRODUCTION AND DISTRI	320.2959	885.0438	76.9622	139.1158	216.0779	254.0737	2485.
458	WATER SUPPLY AND SEWERAGE	1.1645	1.6129	.2663	.4853	.7516	.8624	16.
459	SANITARY SERVICES AND STE	22.9483	84.7299	24.7522	31.2180	55.9703	60.5431	681.
460	RECREATIONAL RELATED WHOL	63.2298	85.8670	41.0555	11.8922	52.9477	63.4954	1242.
461	OTHER WHOLESALE TRADE	3985.9370	7288.5560	3413.1350	990.0754	4403.2100	5281.1260	114921.
462	RECREATIONAL RELATED RETA	224.3629	231.5099	95.1967	29.4656	124.6622	140.6278	7081.
463	OTHER RETAIL TRADE	7218.9620	7933.6350	3356.5170	1020.7850	4377.3020	4927.1760	213626.
464	BANKING	467.2739	1476.6460	547.8998	210.3259	758.2257	795.2996	23073.
465	CREDIT AGENCIES	142.6082	619.3097	562.4979	-9.0202	553.4777	587.5181	23161.
466	SECURITY AND COMMODITY BR	779.7162	820.5856	400.2621	73.6532	473.9153	488.4208	8760.
467	INSURANCE CARRIERS	1838.6650	2397.1580	845.2153	-79.6887	765.5266	897.0399	29417.
468	INSURANCE AGENTS AND BROK	212.8412	727.6824	269.6712	167.5061	437.1772	457.5466	19030.
469	OWNER-OCCUPIED DWELLINGS	4111.2000	4111.2000	.0000	2075.6140	2075.6140	3079.4050	0.
470	REAL ESTATE	3804.2040	7710.0670	338.3506	5012.0220	5350.3730	6581.5930	54807.
471	HOTELS AND LODGING PLACES	390.0305	720.6637	280.1086	107.1793	387.2879	432.8193	23510.
472	LAUNDRY, CLEANING AND SHO	248.8230	327.2278	104.3592	110.0388	214.3980	216.7135	13270.
473	FUNERAL SERVICE AND CREMA	158.2161	162.2773	36.1505	38.0018	74.1523	76.0645	2764.
474	PORTRAIT AND PHOTOGRAPHIC	199.7283	201.9662	59.6202	70.5467	130.1669	132.6571	11538.
475	ELECTRICAL REPAIR SERVICE	46.1253	90.2967	25.3242	28.0601	53.3843	53.7743	2735.
476	WATCH, CLOCK, JEWELRY AND	18.4278	18.4278	5.9329	6.6782	12.6112	12.7695	856.
477	BEAUTY AND BARBER SHOPS	296.1818	296.1817	122.9419	131.0000	253.9420	256.0346	19333.
478	MISCELLANEOUS REPAIR SHOP	9.6034	215.5403	62.5569	68.3927	130.9496	139.5353	6805.
479	SERVICES TO BUILDINGS	91.2330	182.2685	91.6304	40.0007	131.6311	139.4311	14766.
480	PERSONNEL SUPPLY SERVICES	47.1117	291.3178	180.3755	64.2380	244.6135	245.4765	19810.
481	COMPUTER AND DATA PROCESS	72.4673	627.8970	282.9516	155.3379	438.2895	443.5724	11040.
482	MANAGEMENT AND CONSULTING	182.7625	697.6467	318.3799	137.3160	455.6959	457.4154	14406.
483	DETECTIVE AND PROTECTIVE	8.0044	94.7781	52.4059	18.9595	71.3655	71.6028	5941.
484	EQUIPMENT REPAIR AND LEAS	23.8333	233.8350	78.1808	61.5047	139.6855	159.2796	3950.
485	PHOTOFINISHING, COMMERCIA	105.3448	230.6058	93.4253	55.2717	148.6970	159.5027	5432.
486	OTHER BUSINESS SERVICES	103.8096	492.9120	213.4946	103.0267	316.5214	324.3725	14143.
487	ADVERTISING	73.5180	306.8320	136.4205	69.1318	205.5524	209.4192	5565.
488	LEGAL SERVICES	307.9580	1053.4790	452.0299	353.4713	805.5012	806.8806	16723.
489	ENGINEERING, ARCHITECTURA	58.5163	791.4504	334.8472	151.9740	486.8212	501.9700	17280.
490	ACCOUNTING, AUDITING AND	121.8256	551.8099	227.6889	120.1166	347.8055	349.1814	17615.
491	EATING AND DRINKING PLACE	2855.3470	3676.7960	919.3344	313.8425	1233.1770	1808.7680	109412.
492	AUTOMOBILE RENTAL AND LEA	112.6011	271.8263	49.8453	68.8780	118.7233	134.3121	2979.
493	AUTOMOBILE REPAIR AND SER	605.6204	1027.8100	219.7385	247.3265	467.0651	490.9264	14109.
494	AUTOMOBILE PARKING AND CA	163.6306	181.9303	35.8300	50.9593	86.7894	92.7385	4694.
495	MOTION PICTURES	58.2378	140.7148	34.6007	11.1416	45.7423	49.7921	3295.
496	DANCE HALLS, STUDIOS AND	8.7924	8.9283	2.5234	1.4108	3.9342	4.3622	721.
497	THEATRICAL PRODUCERS, BAN	42.7014	146.3534	44.2362	16.1363	60.3725	60.4756	3846.
498	BOWLING ALLEYS AND POOL H	84.3677	84.3677	25.2625	11.6285	36.8909	39.3250	4795.
499	COMMERCIAL SPORTS EXCEPT	55.6480	64.2859	45.4675	-1.8335	43.6341	49.4900	717.
500	RACING AND TRACK OPERATIO	22.4600	27.2255	6.8894	10.1593	17.0487	26.2885	115.
501	MEMBERSHIP SPORTS AND REC	193.4972	205.1129	69.3548	2.6404	71.9952	73.9410	7141.
502	AMUSEMENT AND RECREATION	121.3025	121.6810	41.8640	18.5544	60.4184	66.1890	6195.
503	DOCTORS AND DENTISTS	1574.2070	1596.1370	873.7368	239.8260	1113.5630	1121.6740	25632.
504	HOSPITALS	2003.4460	2003.4460	993.5068	109.7983	1103.3050	1103.4630	47838.
505	NURSING AND PROTECTIVE CA	941.3312	941.3312	524.5801	79.9622	604.5423	611.3438	40852.
506	OTHER MEDICAL AND HEALTH	1099.8310	1252.0280	624.7372	179.9736	804.7108	808.7938	21311.
507	ELEMENTARY AND SECONDARY	222.6703	222.6703	100.9496	7.7247	108.6744	108.6744	7378.
508	COLLEGES, UNIVERSITIES, S	402.2039	430.7612	234.2109	17.9219	252.1328	252.1328	19806.
509	OTHER EDUCATIONAL SERVICE	81.6428	82.1166	41.3496	5.0061	46.3557	50.2295	2165.
510	BUSINESS ASSOCIATIONS	90.6217	117.8950	49.4661	-1.7717	47.6944	48.3372	1444.
511	LABOR AND CIVIC ORGANIZAT	266.0001	266.0001	125.0713	1.8908	126.9620	126.9620	10036.
512	RELIGIOUS ORGANIZATIONS	324.8976	324.8976	186.0368	2.2334	188.2702	189.1508	13802.
513	OTHER NONPROFIT ORGANIZAT	148.0544	163.4466	84.5345	1.2779	85.8124	85.8124	3268.
514	RESIDENTIAL CARE	295.6645	295.6645	170.3470	2.5752	172.9222	172.9222	10116.
515	SOCIAL SERVICES, N.E.C.	531.0637	535.2177	346.4158	4.9684	351.3842	351.5286	23810.
516	U.S. POSTAL SERVICE	159.1047	632.2487	471.6874	-83.3545	388.3329	388.3329	13814.
517	FEDERAL ELECTRIC UTILITIE	.6961	1.8481	.2631	-.0465	.2166	.2166	5.
518	OTHER FEDERAL GOVERNMENT	17.1795	31.6647	6.7659	-1.1956	5.5703	5.5703	281.
519	LOCAL GOVERNMENT PASSENGE	59.9862	83.4508	103.5070	-97.4532	6.0538	6.0538	3772.
520	STATE AND LOCAL ELECTRIC	61.6144	161.4474	28.3099	14.7213	43.0311	43.0311	1191.
521	OTHER STATE AND LOCAL GOV	375.1325	550.1385	180.1390	43.9951	224.1341	224.1341	7097.
525	GOVERNMENT INDUSTRY	10560.4900	10560.4900	6296.4530	4264.0350	10560.4900	10560.4900	230085.
527	HOUSEHOLD INDUSTRY	155.2309	155.2309	92.5530	62.6780	155.2309	155.2309	14550.
	Total	102676.3000	140759.1000	43350.6800	27384.3000	70734.9800	76935.7500	2086325.

Population = 4191300.