The
Clark County Economy
Regional Input/Output Model

by
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The Clark County Economy a Regional Input/Output Model

Executive Summary:

This study and the model constructed or developed to accomplish it are based on 1996 secondary data, and personal interviews with numerous businesses, government officials, residents and visitors to Clark County. The base model was re-estimated using the newer IMPLAN software and incorporating the data from state and local sources.

Results indicate that the affected of a major reduction in grazing will be primarily in the livestock sector and these supplying feed to livestock. If alternative feed sources were low cost, the affects would be less dramatic. Part of the affect would be in neighboring counties which are home base to two thirds of livestock producers using Clark County public range.

The second scenario relates to establishing a motel, restaurant and gas station along I-15. In this case the increases in demand because of visitors spending would be allocated over several sectors. The employment gains would also be in several sectors. This model permits local officials to evaluate alternative policy proposals for their affects on Clark County

Introduction

The Idaho Cooperative Extension System , Agricultural Economics and Rural Sociology Department at the request of the Clark County Commissioners, conducted an economic study in Clark County Idaho. The purpose of this study was to develop a complete description of the Clark County economy and predict the impacts on employment and value added (income) from potential policy changes. To make these predictions, the researchers developed an input/output model. This report summarizes the results of the study by describing the employment, value added, and industry output for each sector of the economy for 1996. Furthermore, the predictions of the model under two different scenarios are reported. In the case of the predictions, the description of the changes include the increase or decrease relative to the baseline and the new levels of employment, value added, and total industry output.

The first part of the report describes Clark County's economic base. The researchers have divided the economy into five industry sectors and a government sector to discuss the importance of the different sectors in terms of their exports, employment, value added, and industry output (gross sales). Aggregations of sectors have been made to avoid disclosing data from any individual business.

The second section of the report is an impact analysis of two potential policy changes on the resource base of Clark County. While the first section is a description of the actual economy, the second section is a prediction of the potential impacts of policy changes. The impact information for each scenario is presented as changes in employment and value added. In addition, pie charts are used to display the allocation of employment relative to value added.

Descriptive Analysis of Clark County's Economic Base

The first part of this paper is a detailed analysis of the economic structure of the region. The wealth of a region can be defined as a function of its total resources and the ability of the community to use them in a sustainable manner to regenerate income. The measure of total county income used in this report is value added, which is the sum of proprietor income, employee compensation, other property type income, and indirect business taxes. Income is derived from businesses converting resources to salable commodities for customers outside the region, attracting customers or new businesses into the region to purchase goods and services, and obtaining government transfers.

The concept of economic base defines the link between resources a community possesses and regional income generation through flows of income from outside the region to inside. The economy can be divided into two parts, its economic base and it's non-basic sectors. The industry components of the economic base are aggregated major groupings by type of product. In addition, to the industry classifications are government sectors, state and local and federal, and exogenous investment. The economic base produces the exports from the region and provides the income and the tax revenues necessary for the rest of the economy. The non-basic sectors provide goods and services as inputs into production of the basic sector and as purchases for the residents.

From the above information on the links in the economy, one can visualize the county economy as a system of circular flows within the county and between the county and the larger region. The county generates income through the export base (sales to those outside the county) and transfers from outside the region (state and federal payments as well as passive income). Businesses that produce goods and services for export purchase inputs locally and non-locally from what are called the non-basic sectors. These non-base sectors also purchase from the non-basic sectors and import what they cannot purchase locally. Residents contribute to the cycle by buying locally and importing what they cannot purchase locally.

Thus businesses that produce exports, businesses that service the exports businesses and residents all contribute to the local economy. A brief description of the basic and non-basic sectors in Clark County is provided in table one below.

Economic Growth

Economic growth in Clark County was evaluated using population, employment, total personal income, and individual income. In order to compare with Idaho, population, employment and income were converted to indices with 1969 as the base year (i.e., 1969=100). To account for the effects of inflation and allow comparison of data between years, all dollar amounts have been deflated to 1992 dollars.

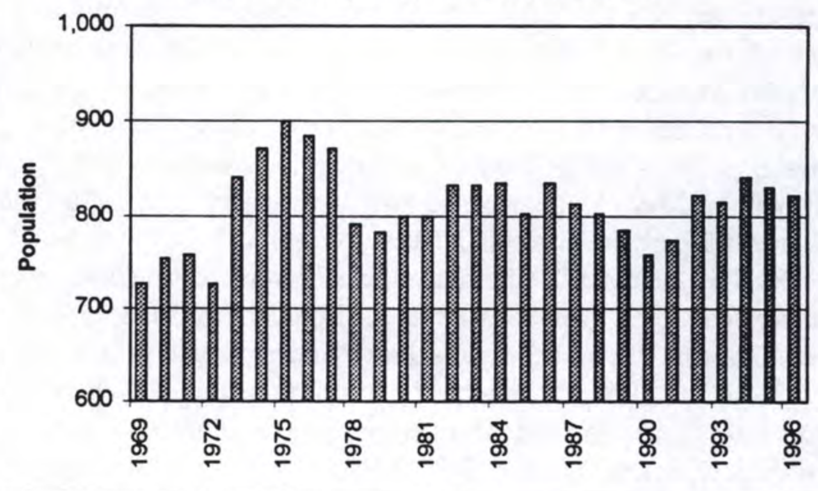
Population

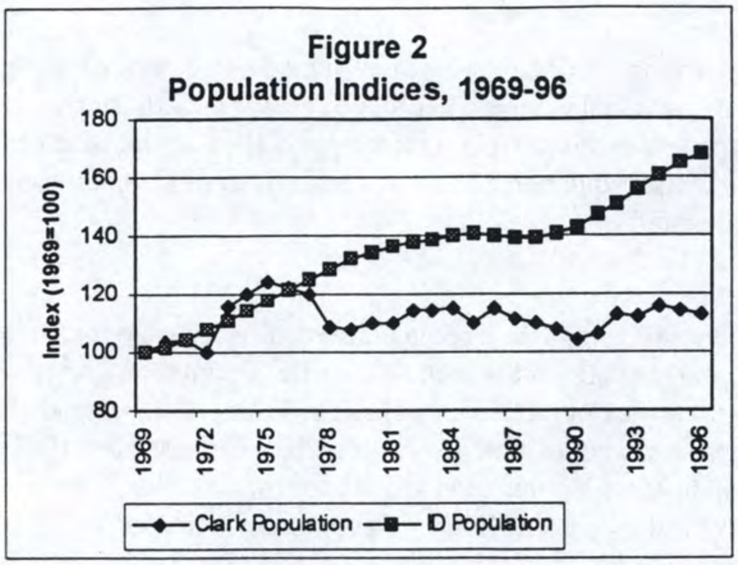
Retaining economic growth in a community requires a stable, or growing, population to work and consume, and thus support economic growth. Population growth is a reflection of a community's ability to attract and retain individuals as both producers and consumers. The following figures summarize population growth for Clark County from 1969 to 1996 and compare it through indices with population growth for the State of Idaho.

- Between 1969 to 1996, Clark County's population increased by 11.34 percent (727 to 820), while Idaho's population grew by 40.48 percent.

- Idaho's population has been steadily increasing, and was at a lag during the late 80's. Clark County's population has increased, but has not been a constant rate. Clark's population spiked three times in the last thee decades. Each population surge occurred during the middle of each decade, the largest being in 1975.

Figure 1
Clark County Population, 1969-96





Employment

Closely associated with changes in population are changes in employment. Traditionally, it has been assumed that population growth follows employment growth. However, more recently it has been suggested that in some cases, such as when quality of life considerations are involved, employment growth may actually follow population growth. The following graphs summarize employment growth for Clark County, from 1969 to 1996, and compare it with Idaho. The graph labeled *Changes in Clark County Employment, 1969-96* indicates the change in employment by sector for Clark County between 1969 and 1996. *Clark County Employment by Type, 1969-96* compares the trend in Wage and Salary jobs with that for Non-Farm Self-Employed jobs.

- Employment in Clark County rose 45.84% between 1969 to 1996 (488 to 901). Idaho's growth rate is 9 percent larger than Clark County's.
- Since 1988, Clark County's employment has been increasing at an average rate of 4.33 percent per year. This growth rate was 3.62 percent for Idaho.
- Between 1969 and 1996, wage and salary jobs were much greater than non-farm self-employed jobs. In 1969, the number of non-farm self-employed jobs was 18 percent of wage and salary jobs. In 1996, this number decreased to 6 percent.
- In 1969 the job/person ratio was 0.6713. In comparison 1996 was 1.0988, where the number of jobs exceeded the population. This is mainly because of the potato processing plant located in the southern part of the county.

Figure 3
Clark County Employment, 1969-96

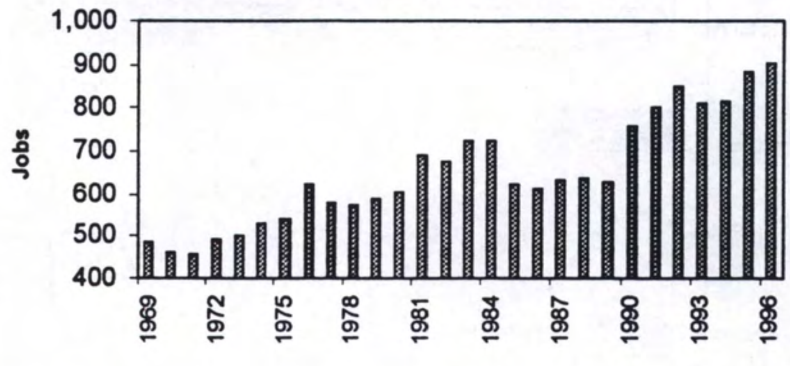
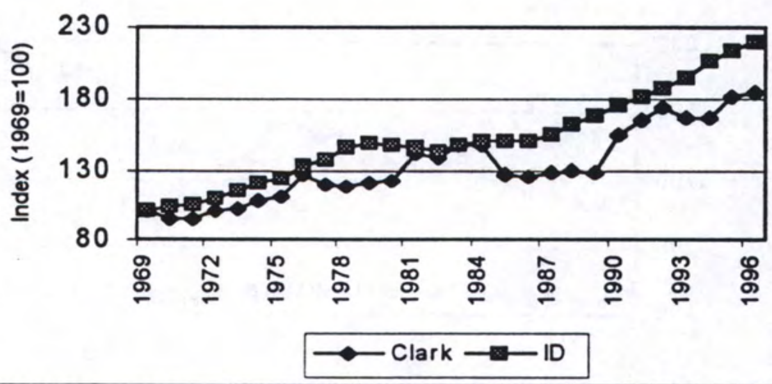


Figure 4
Employment Indices, 1969-96



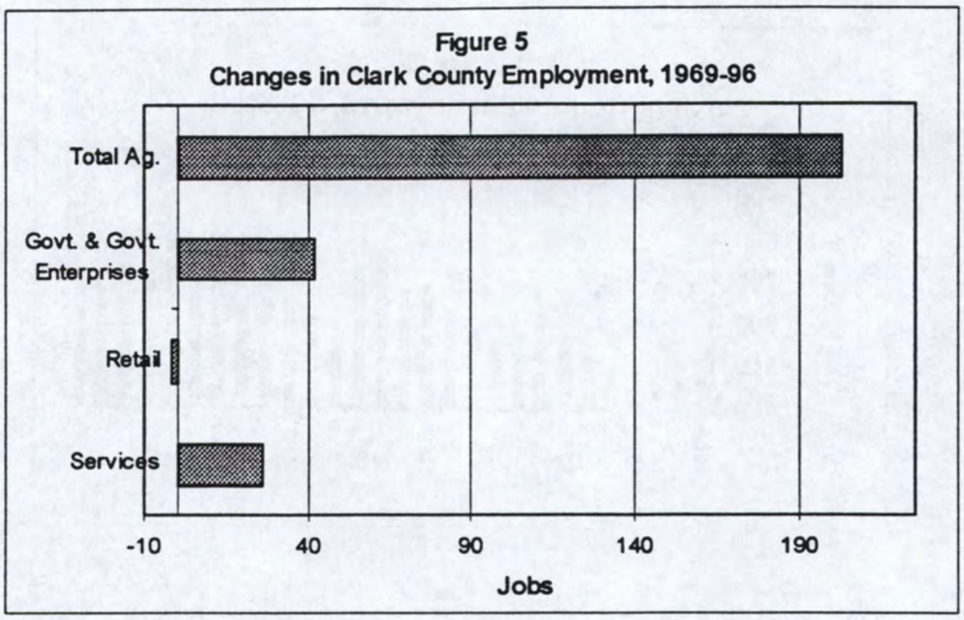


Figure 5
Changes in Clark County Employment, 1969-96
Total Ag.
Govt. & Govt. Enterprises
Retail
Services
-10
40
90
140
190
Jobs

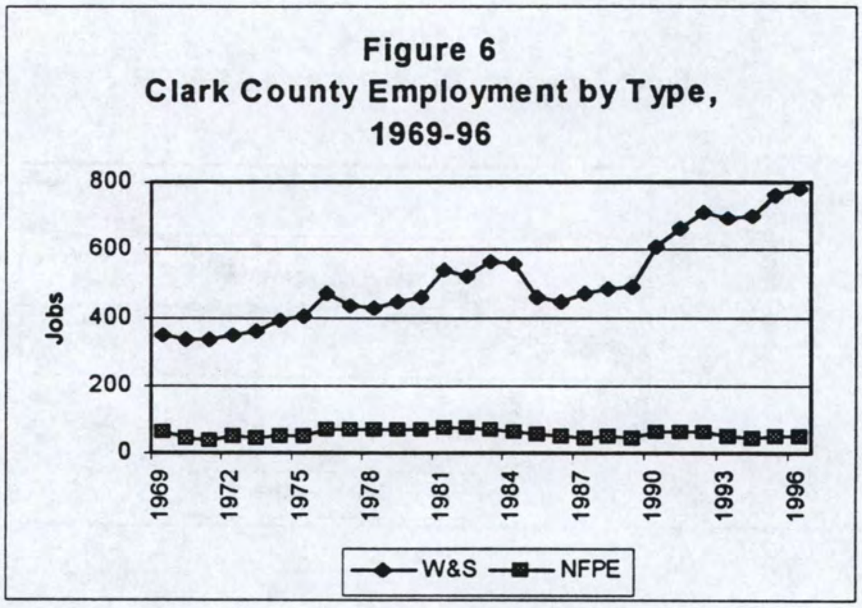


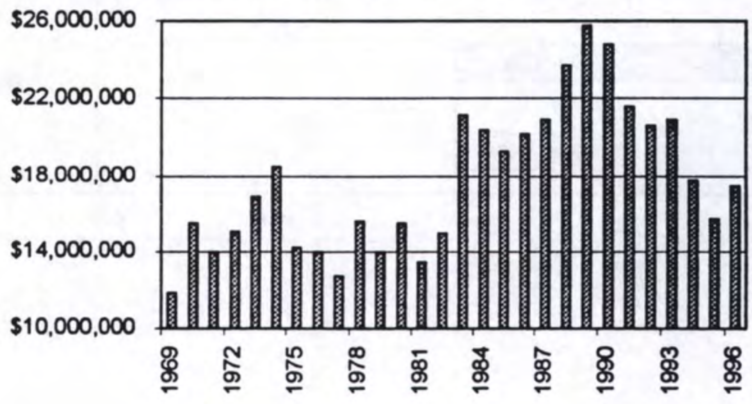
Figure 6
Clark County Employment by Type, 1969-96
800
600
400
200
0
Jobs
1969
1972
1975
1978
1981
1984
1987
1990
1993
1996
W&S
NFPE

Total Personal Income

The following graphs describe personal income in Clark County. Personal income can be used as a method to estimate a community's economic growth. The two graphs labeled *Clark County Personal Income, 1969-96 (Fig. 7)* and *Total Personal Income Indices, 1969-96 (Fig. 8)* summarize Clark County's income growth for the 1969 to 1996 time period, and compare it to that of the state of Idaho. *Change in Clark County Income, 1969-96 (Fig. 9)* shows the change in source of personal income by sector for Clark County. Net earnings and transfer payments are compared in *Clark County Income by Type, 1969-96 (Fig.* 10). All dollar amounts used have been deflated to 1992 dollars.

- Clark County personal income increased 68 percent from 1969 and 1996 ($11,886,662 to $17,463,025). However, in 1989 personal income rose as high as $25.7 million.
- The state of Idaho's total personal income has more than doubled since 1969, while Clark County's has increase 47%, in the same time period.
- Transfer payments make up 12% of Clark's earnings.

Figure 7
Clark County Personal Income, 1969-96



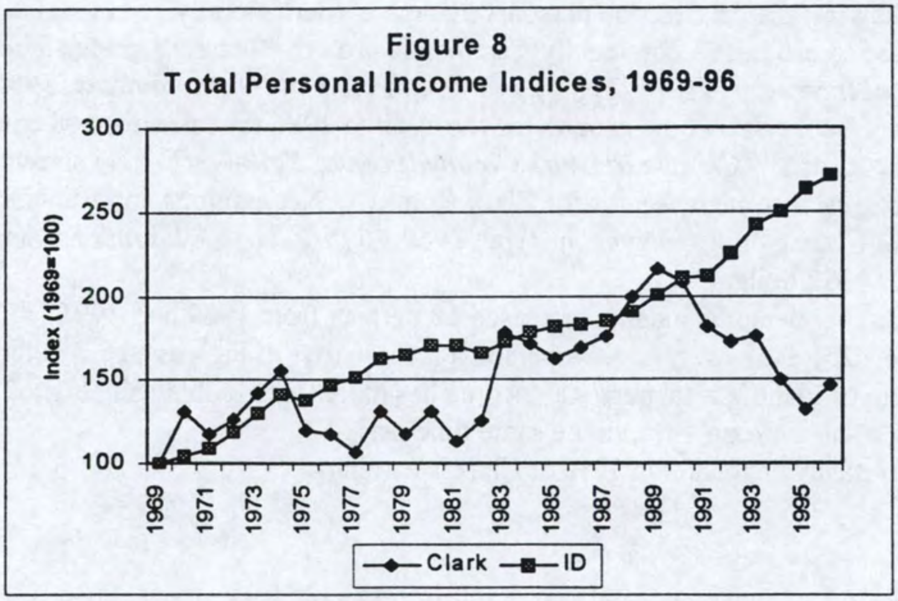


Figure 8
Total Personal Income Indices, 1969-96
Index (1969=100)
300
250
200
150
100
1969
1971
1973
1975
1977
1979
1981
1983
1985
1987
1989
1991
1993
1995
Clark
ID

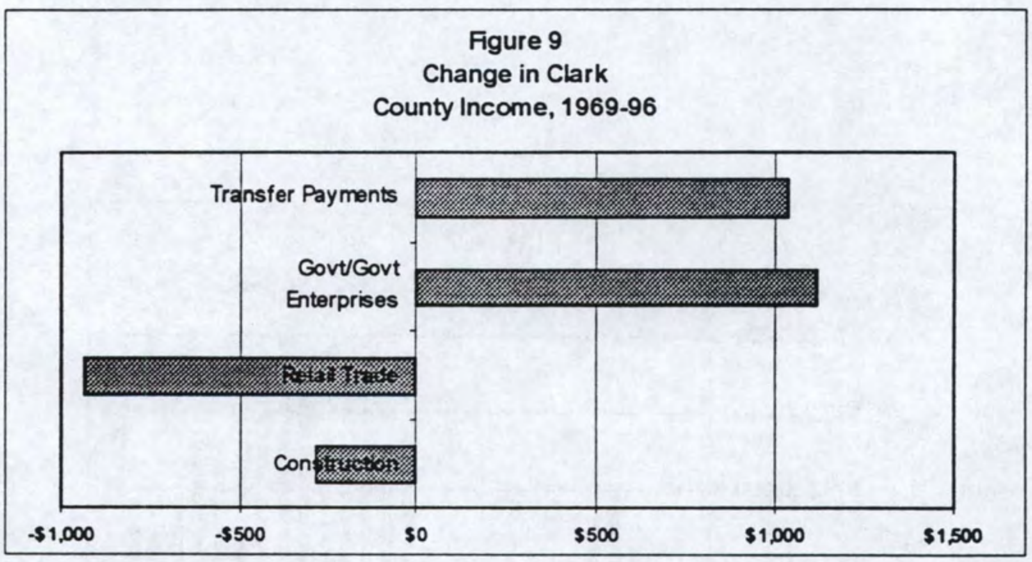
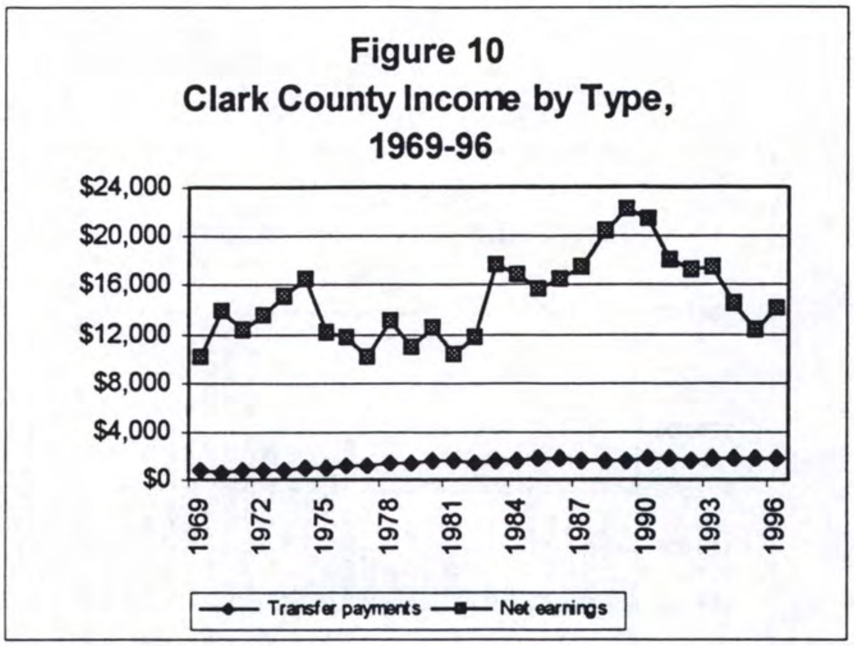


Figure 9
Change in Clark
County Income, 1969-96
Transfer Payments
Govt/Govt
Enterprises
Retail Trade
Construction
-$1,000
-$500
$0
$500
$1,000
$1,500



Individual Per Capita Income

Individual income is used as a scale to measure the economic well-being of a specific area, and the people who reside there. These numbers were adjusted for inflation and have varied. Per capita income and average earnings per job were used to measure individual income.

Per capita personal income can be used as an indicator of the quality of consumer markets, and shows the economic well-being of all county residents. Per capita personal income is defined as the total county income divided by the population of the county. The figures labeled *Clark County Per Capita Income, 1969-96 (Fig. 11)* and *Per Capita Income, 1969-96 (Fig. 12)*.

- Per capita income in Clark County was $16,351 in 1969, and increased 23 percent to $21,297 in 1996. Idaho had a per capita income increase of 61 percent during the same time period to $18,025.
- Between 1969-96 per capita income in Clark County has averaged 40 percent of Idaho's per capita income.
- In 1997 Clark's per capita personal income was ranked 8th in the state. In 1987 Clark was ranked 1st in the state.

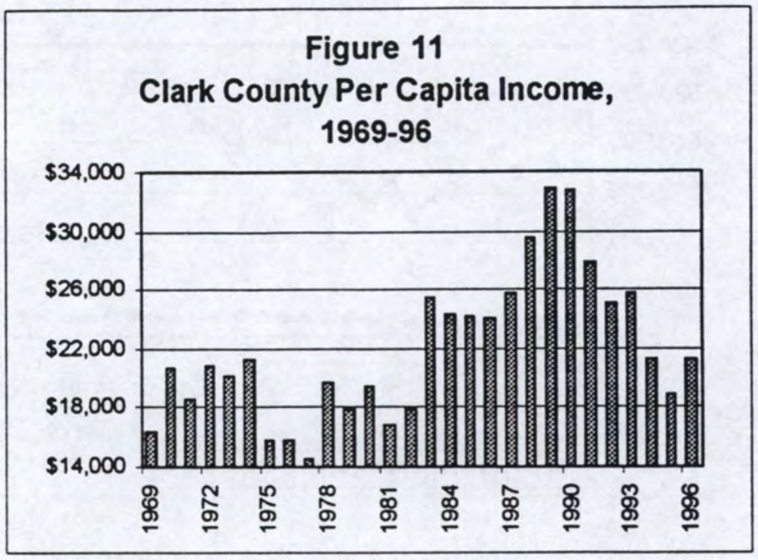


Figure 11
Clark County Per Capita Income, 1969-96
$34,000
$30,000
$26,000
$22,000
$18,000
$14,000
1969
1972
1975
1978
1981
1984
1987
1990
1993
1996

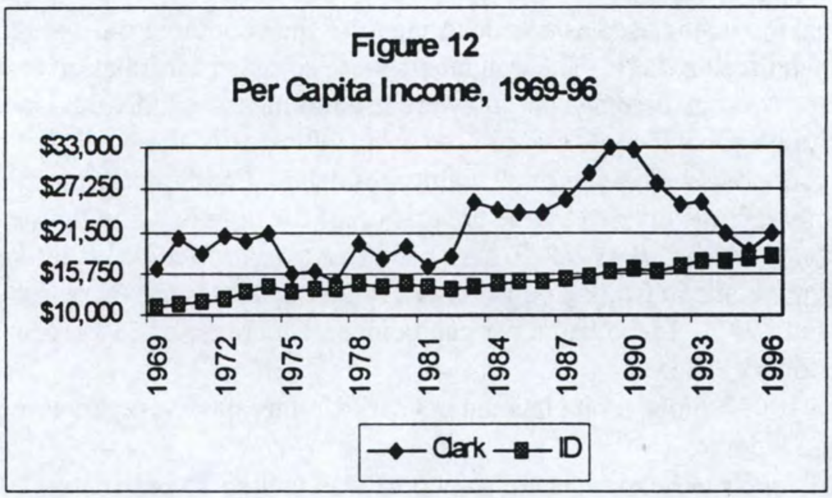


Figure 12
Per Capita Income, 1969-96
$33,000
$27,250
$21,500
$15,750
$10,000
1969
1972
1975
1978
1981
1984
1987
1990
1993
1996
Clark
ID

Average Earnings Per Job

Average earnings per job is estimated by dividing total earnings by total employment (Fig. 13). While per capita income considers the entire population, inflation adjusted average earnings per job focuses on the economic well-being of the community's workforce. The following figures summarize average real earnings per job for Clark County from 1969-96 and compare it to the state of Idaho (Fig. 14).

- Between 1969-96 average earnings per job for Clark County have varied dramatically. The last three years shown, average earnings per job have been approximately at or below Idaho's, which were down from the 1989 peak of $37,635.
- Between 1969 and 1996, average earnings per job for Clark County averaged 17 percent higher than Idaho's average earnings per job. In 1996 the average earnings per job was $20,935.

Figure 13
Clark County Average Earnings Per Job, 1969-96

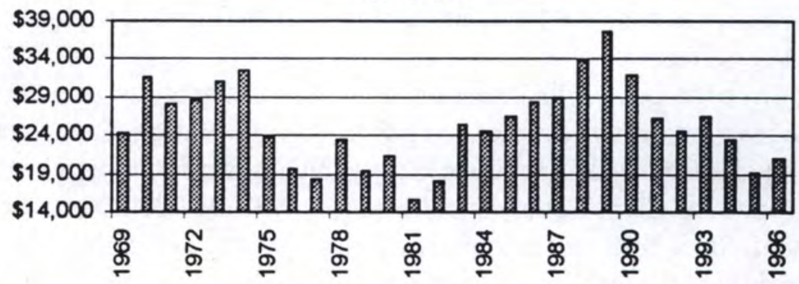
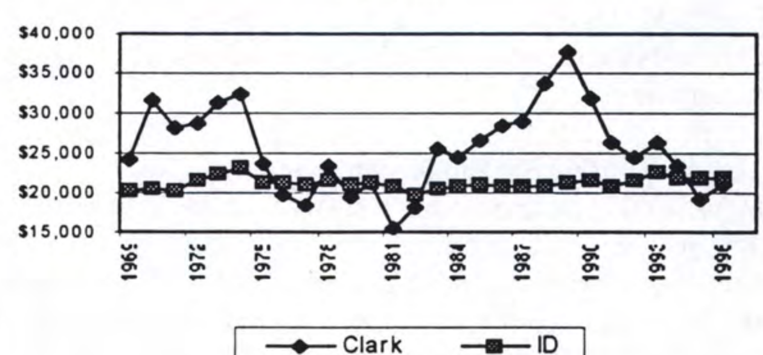


Figure 14
Average Earnings Per Job, 1969-96



The Clark County Input/Output Model

Regional models can be categorized as nonstructural or structural (Treyz, 1993). Nonstructural models lack economic behavioral structure and thus base regional changes upon trends, such as historical shift-share, employment, tax revenues and expenditures which are used to predict future changes. Naïve time series forecasts versus multiple simultaneous equations bracket the spectrum of nonstructural models. The second type of regional model, structural models, are behavioral. The structural model predicts agent behavior as the effect or impact response from a specific stimulus. Advantages of structural models for policy analysis is that the policy change is first specified and the structural model then estimates the impacts on the various agents in the economy. To address impacts on all agents in the economy, structural models require economic structure and behavioral mechanisms for each agent. The model of choice for regional impact analysis is regional Input/Output (I/O).

The precursor to regional I/O models were simplified Keynesian framework accounts that developed a single multiplier from an economic base. The more complex the intersector linkages, complex interactions between agents and need for sectoral multipliers, the greater the advantages I/O has for impact analysis (Davis). As the applicability of Leontief's national I/O structure to a regional scale was recognized, survey based regional I/O models were constructed. The availability of non-survey based I/O models, in particular IMPLAN (Taylor et al) have proliferated use of regional I/O modeling.

In addition to the general limitations of I/O in impact analysis, non-survey based I/O models have the inherent drawbacks stemming from the use of secondary or national data combined with an identical algorithm to estimate an I/O model for every county in the US. The I/O model developed for Clark County starts with the IMPLAN data base. The county model generated by IMPLAN is then modified extensively with a combination of survey, Idaho ES-202, direct surveys and Idaho Extension data sources. The analysis portion of the IMPLAN program was not used. The multipliers and subsequent impact analysis were accomplished with a spreadsheet, which is available with this bulletin.

This report first details the account system and multiplier calculations used for the Clark County regional economy. Following the theory portion of the bulletin, the specifics of the modifcations of the IMPLAN data with other data sources is outlined. The combined theory and data description provides the user of the Clark County I/O model the necessary tools to use the model for impact analysis.

Input/Output: An Accounting System for an Economy

Input/Output (I/O) comprises both a system of economic accounts for a region as well as a tool for economic analysis and forecasting. Input/Output is first a method of social accounting. The accounts of an I/O are displayed in matrix form as the transactions-among-sectors table, (Table 6 Appendix A) which depicts the economic structure and interdependencies among industries and agencies of the Clark County economy. The table shows customers for each industry and the input needs are for each industry. The focus of input/output analysis is the cumulative interdependent nature of expansion or contraction of an economy. By accounting for each industry's direct purchases or sales we can then ascertain the indirect impact of each industry. A social account is an empirical framework resulting from a theoretical structure which sets forth relationships between various aspects of a social entity. An account refers to the framework itself and/or the values within that framework.

Users of the Input/Output (I/O) technique require a knowledge of the definitions of the I/O accounts and then an understanding of how the accounts are used to model the economic interdependencies in an economy. This section provides a summary of the I/O accounts and compares and relates them to regional income and product accounts.

Rules of I/O Accounting Systems

As with any accounting system, I/O accounts are governed by a set of rules that allows a uniform interpretation of the accounting system. Production, distribution, and consumption are described in an I/O table by the volume of transactions that take place over a period of time. Thus, the units accounted for by I/O tables are gross dollar flows from one sector or account to another over a defined time period. The rules for I/O accounts are the focus of the sections.

Stock Versus Flow –A flow is the economic goods moving among markets over a set period of time. Stock amounts (capital, land, inventory etc.) are not reflected in the usual I/O model. However, if during the accounting period expenditures are made for stock purchases (e.g., purchases of inventory) or stocks are used up (e.g., depreciation), the purchases or expenditures of stocks are considered flows to or from respective stock accounts during that time period. This concept is analogous to an accountants financial statements, i.e., an income statement as opposed to a net worth statement or balance sheet. The I/O model is similar to the income statement in that it shows incomes and outlays over a given period (i.e., fiscal year). Whereas, the balance sheet shows liabilities and assets which are stocks at one given point in time.

I/O Margins -- The purpose of the I/O accounting stance is to represent real production, distribution and consumption activity and to exclude transactions which represent only asset transfers. Asset transfers such as sales of real estate, stocks or bonds or insurance and debits to demand deposits at banks are excluded. Thus, the finance, insurance, and real estate sector (FIRE) of the I/O model consists only of the commissions and other costs related to the sales, storage, or other services provided by those industries. The trade sector does not usually add further processing to the goods as do the other industries in the processing quadrant of the I/O table. For this reason, it is often argued that trade can be treated like transport costs. Thus, if such costs are "assumed" to be paid by the buyer rather than the seller, a certain portion of any purchase from the trade industries (anywhere from 15 to 25 percent) is shown as a payment to trade and the remainder is shown as flowing directly to the sector which would have supplied the goods to the trade sector. Because the Clark County model uses trade margins, the user is warned that the total sales shown for the wholesale and retail trade sectors are not total sales but rather margined sales.

Model Time Period -- Because a flow can only occur over a time period, the unit of time accounted for in an I/O model must be explicitly defined. For the Clark County Economy model the base year is the calendar year, 1996. Besides defining the accounting period in which flows are measured, the time period is a reference or base period for measuring real dollar economic activity. All subsequent projections and technologies must be measured using the I/O model compilation date as the base year. For example, if crop revenues were projected to increase over a ten year period, but this was simply inflation or loss of purchasing power of the dollar from the base year of 1993, then no real demand increase should be made for the I/O model. All final demand changes introduced to create I/O forecasts should be expressed in base year dollars through the use of appropriate price indices. Inflation in the total value of final demand does not represent real changes in physical output and should not be measured as impacts.

Double Entry Accounting -- Double entry accounting in the I/O framework means that for every purchase there is also the exact amount of corresponding sales, the outputs of one industry are the inputs to all the others including exports. Because profit and saving are included with other purchases, total spending is defined to equal total receipts for each industry in the processing quadrant.

Sector and Industry Delineation -- The formats of I/O accounts vary according to the application and limitations of the research. Industries are delineated to balance concerns and constraints over: 1) data availability and confidentially for a regional economy with the sector often being a single firm, 2) useful number and definition of sectors, 3) desire to estimate the impacts for those directly impacted industries, 4) reduction in aggregation error, and 5) level of aggregation used on accounts to display the impacts. Industry aggregations, as defined for the Clark economy, are the self explanatory headings listed later in the paper.

Transactions Table

Spending flows among sectors in the Input/Output (I/O) framework are displayed as a table or matrix (Appendix I). The matrix format of the accounts is a convention to allow the second function of I/O, that of an analytical model, to be accomplished. An I/O table of gross flows (transactions among sectors) can be broken down into the four quadrants shown: Quadrant (1) contains the intermediate processing transactions matrix. It contians the columns of final demands, the rows of primary inputs to processing, and the rows of primary inputs to final demands. Quadrant (2) contains final demands. Quadrants (3) and (4) together are referred to as final payments.

	Purchasing Industries & Agencies	
Selling Industries and Agencies	**QUADRANT 1** Intermediate Processing *(Interdependent variables)*	**QUADRANT 2** Final Demands *(Independent variables)*
	QUADRANT 3 Final Payments *(Dependent variables)*	**QUADRANT 4**

Schematic of an I/O transactions table, showing the four quadrants of accounts

Quadrant 1 - Intermediate Processing Transactions -- This quadrant constitutes the bulk of the I/O table. To maintain a double entry accounting framework, the n number of purchasing (column headings) sectors are the same n number of producing (row headings) sectors. Thus, quadrant 1 is a square n by n matrix, where n is the number of intermediate processing industries in the local economy. The intermediate processing quadrant only contains industries that purchase inputs to combine, transform, or use them in production. End users of inputs, such as governments or exports are excluded from the first quadrant. By convention, columns of an I/O transactions table are the purchasing sectors and rows are the producing or supply sectors. As with standard matrix notation, an entry in the transactions among sectors table is denoted as the i^{th} row and the j^{th} column. To maintain equality of row sums and column sums, rows exist for profit and saving as well as spending.

Quadrant 2 - Final Demands--This quadrant accounts for the exogenous demand for goods and services made upon local production capabilities. The final demand spending represents sales which are not inputs to local processors but include all other sales. For example, exports could be for final use outside the local economy, final use inside the study area by tourists, or intermediate inputs to processors located outside the study area. Because final demand is exogenously determined, it is in effect the driving force for the economy. According to the I/O model framework, if the spending in quadrant 2 were to disappear, i.e., go to zero, the local economy would also disappear. By "exogenous," we mean that purchases of these goods and services are either made by sectors located outside the study area or factors which influence changes in these demands are outside the control of local business or personal spending decisions.

Quadrant 3 - Primary Inputs (final payments sector)--This quadrant accounts for the purchases of inputs from industries outside the local economy and for other money flows which do not re-circulate in the Clark County economy. Primary inputs are termed leakages because they are the flow of money out of the local economy to taxes, savings, or imports if local industries are unable to produce needed inputs. It also excludes proprietors income if businesses are owned by non-resident persons or corporations. The more self-sufficient a local economy is, the smaller these purchases of primary inputs will be and the more an economy will depend upon its own industry.

Quadrant 4 - Primary Inputs to Final Demands (final payments sector)-- The fourth quadrant records the primary inputs purchased directly by the sectors of final demand. Entries in this quadrant are not necessary to construct multipliers for impact analysis and are thus omitted from the regional accounts.

The I/O Accounting Identity

The double entry accounting identity can now be demonstrated with the definitions provided by the four quadrants of the I/O matrix. To do this, we can use figure below which shows the four quadrants with notation for the highly aggregated accounts within each quadrant.

$$\left[\begin{array}{cc|ccc|c} z_{11} & z_{12} & c_1 & g_1 & e_1 & X_1 \\ z_{21} & z_{22} & c_2 & g_2 & e_2 & X_2 \\ \hline l_1 & l_2 & l_c & l_g & l_e & L \\ t_1 & t_2 & t_c & t_g & t_e & T \\ v_1 & v_2 & v_c & v_g & v_e & V \\ m_1 & m_2 & m_c & m_g & m_e & M \\ \hline X_1 & X_2 & C & G & E & X \end{array}\right]$$

The accounting identity is obtained by summing down all the columns and across all the rows.

Gross outlay by the i[th] industry, X_i, is obtained by summing down the i[th] column. Correspondingly, total gross outlay by all sectors in the economy is obtained from summing the column totals:

$$X = (X_1 + X_2 + X_3 + \ldots + X_n) + C + G + E,$$

where, C is consumption, G is government, and E is exports. Thus, total outlay is the sum of all column totals of interindustry spending plus the sum of household consumption, state and federal government, exports.

Gross output by the i[th] industry, X_i, is obtained by summing across the i[th] row. Correspondingly, total gross output by all sectors in the study area is obtained by summing row totals:

$$X = (X_1 + X_2 + X_3 + \ldots + X_n) + H + T + D + R + M,$$

where; H is household wages, T is taxes, D is depreciation, R is rents, and M is imports. Thus, total output is the sum of the row totals of interindustry spending plus the sum of wages paid to households, taxes, depreciation, rents, and imports.

We can equate the two parts of the identity using the definition inherent in our I/O double entry accounting principle, total outlay is defined to equal total output and therefore:

$$(X_1 + X_2 + X_3 + \ldots + X_n) + C + G + E = X = (X_1 + X_2 + X_3 + \ldots + X_n) + H + T + D + R + M.$$

This gives the desired result of final product measured in terms of final payments to factors equaling final product measured by final demand:

$$H + T + D + R + M \equiv C + G + E.$$

The identity holds only for the total of all final payment and final demand sectors not for each sector individually.

For the i^{th} industry, output equilibrium can be expressed as:

$$X_i = (z_{i1} + \ldots + z_{ij} + \ldots + z_{\epsilon}) + (C_i + G_i + I_i + E_i + L_i).$$

Each sector of the economy is in equilibrium when the sum of the processing sectors demands plus the sum of the final demands for that same sector equal its total gross output. With a single industry (row of the intermediate processing section of the transactions table) the sum of the interindustry flows for the i^{th} industry ($z_{i1} + \ldots + z_{ij} + \ldots + z_{in}$) instead of the aggregate for all industries ($X_1 + X_2 + X_3 + \ldots + X_n$) and also the final demands for the i^{th} industry instead of the aggregate final demands.

To put all n industries into one equation we can use matrix algebra. To simplify notation, let Z stand for the intermediate processing matrix (quadrant 1) and Y stand for the final demands matrix (Quadrant 2). The accounting equation for output can now be written as,

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

where U is a column vector of ones whose function is to provide conformation of matrices for addition and which results in the summation to column vectors of the matrices which it follows. Again, this is the statement in matrix form, that total output of the local economy is composed of intermediate processing transactions and final demands which includes all sectors of the economy.

I/O as an Analytical Tool

The underlying theory that transforms the I/O accounting framework into an economic model for a local economy is the interpretation of the spending flow accounts vis a vis local industry production functions. The I/O accounts are recast into a model of regional economic behavior, a general equilibrium model of regional production and consumption, by substituting linear production and expenditure functions into the accounting identity. To view the I/O accounts on the basis of production functions let us first define a production function and then set forth the assumptions that make the interpretation possible.

The Production Relation Assumptions of I/O Models

A production function defines the engineering/technical or physical relationship between inputs and outputs for a firm or for an industry. I/O accounts are assumed to contain information reflecting production functions of industries in the study area. No one argues that outputs are not a direct result or function of inputs i.e., the existence of a production function. The exact nature of the form of this relationship is a matter for empirical testing. In the I/O model, however, the implied production relationship is a consequence of the simplified accounting system that is necessary to capture complex economic activity in a linear model. Transformation from accounts to general equilibrium requires the assumption of linear production process which in turn exacts a rigid interpretation of the impact analysis with multipliers, specifically the most important limitations are: 1) Constant production coefficients; which bars scale economies, externalities, technological change, relative price changes, and changes in trading patterns or the production recipe; (2) Output is homogeneous no joint or substitute products; (3) Supply and demand functions are fixed price; whereby producers in one sector react to changes in demands from other sectors by changing output rather than changing prices and resource or inputs supplies and thus supplies are unconstraint with fixed prices with efficient resource that bars resource unemployment.

The production function in I/O is of a type where input budget shares remain in a fixed proportion to each other. Changes in relative prices of inputs results in offsetting substitution among inputs so that spending shares remain constant among inputs (unitary elasticity of substitution). Thus, the spending by a given industry is defined as fixed percentages down a column of the transactions matrix,

$$a_{ij} = \frac{z_{ij}}{X_j} ;$$

where each a_{ij} is the direct input coefficient showing direct input requirements for each dollar of output found by dividing the payment flow to each input supply sector (z_{ij}) by the purchasing industry's column total (X_j). With each sector's direct input coefficient defined as $a_{ij} = z_{ij}/X_j$., the n by n matrix of direct input coefficients is;

$$A = Z\hat{X}^{-1}. \qquad (7)$$

where Z are the intermediate processing flows and $\hat{X}$ is a matrix with the total output vector on the main diagonal and zero's elsewhere. The direct input coefficients, also called the technical coefficients, are the fixed relationship between any sector's flow of output measured in dollars and inputs measured in dollars. A direct input coefficient tells us the direct requirements as a fraction or percent of total spending by an industry. A direct input coefficient is the cents worth of inputs each industry needs to produce a dollar's worth of output. The direct input coefficients, which include an allocation to retained earnings and imports, must sum to unity. Since I/O models measure spending, not with physical input data, and the fixed direct input coefficients refer not to physical input quantities but rather to the dollar spending on inputs by the industries in the model.

The direct input coefficients are the share of the spending or income allotted to each input. The I/O model assumes that if spending on all locally supplied inputs and saving or profit, and depreciation, and taxes and imports increase proportionately then total sales of output will increase by that same proportion. This is a long run adjustment which satisfies the definition of a change of scale but it refers to spending on inputs and sales revenue from outputs not to physical units as in a production function. The I/O spending relationships are consistent with constant returns to scale but are not strictly limited to that assumption if the I/O flows are measured as spending rather than physical output. The constancy of the spending distributions down each industry column is thus a critical requirement for the I/O technique to provide accurate impact forecasts.

I/O Output Equilibrium

The accounting and the production facets of I/O can now be combined into a model of regional economic behavior. The I/O accounts are recast into a model of regional economic behavior, a general equilibrium model of regional production and consumption, by substituting linear production and expenditure functions into the accounting identity. Rearranging the terms for each sector's direct input coefficient ($a_{ij} = z_{ij}/X_j$) shows the i^{th} sector's purchases from sector j in terms of the production relationship; i.e. $z_{ij} = (a_{ij})(X_j)$. For the i^{th} industry, the sum of sales to intermediate processing industry demands plus the sales to final demands (total gross output) equals total gross spending and saving (total gross input):

$$X_i = z_{ij} + ... z_{i,n} + c_{in} + y_i = z_{ij} + ... z_{i,n} + l_{in} + p_i = X_i \tag{8}$$

where X_i are industry spending and saving which equal industry sales, the z_{ij}*'s* and households the c_{ij} column *lij* row are simultaneously endogenous intermediate processing flows from sector i to other domestic sectors, y_i are the exogenous final demands (government *g*, and exports *e*) while p_i are the endogenous (recursive) final payments or the primary inputs of the economy (taxes *t*, value added *v*, and imports *m*). In matrix form, the Z matrix is substituted into the accounting balance equation;

$$X \equiv ZU + YU. \tag{9}$$

Substituting the direct input requirement coefficients into the accounting equations reduces the n^2 simultaneously determined unknowns *(Z)* to the n accounting balance equations to express an output equilibrium for a regional economy. Final payments, such as imports, are endogenous since they supply inputs in proportion to sector output, but not simultaneous since they do not respond by demanding more inputs from the region's economy. Thus, the substitution of direct input coefficients into the accounting identity reduces the number of unknowns to be equal with the number of balance equations. When solved for output, the equilibrium condition states that exogenous non-negative final demands are fulfilled by regional production:

$$X = AX + YU \tag{10}$$

We can further solve the equation for final demands by isolating the final demand vector:

$$\begin{aligned}(Y)X-(A)(X) &= (Y)(U),\\ (I-A)(X) &= (Y)(U).\end{aligned} \tag{11}$$

where I is the identity matrix with ones on the diagonal and zero's elsewhere and U is a column vector of ones.

Solving equation (11) uniquely for regional output X as determined by final demands yields an equilibrium statement for regional production and consumption:

$$X = (I-A)^{-1}(Y)(U): \quad \textbf{(12)}$$

where I is the diagonal identity matrix. This output equilibrium, the *Leontief Inverse*, shows the amount of output from each of the sectors necessary to supply the exogenously determined final demands. Final demands can exist at any given positive level and local production is assumed to be able to fulfill those demands -- thus the output of the economy is backward linked to exports in the backward linked demand driven I/O model. Further, input supply (imports and other inputs) to the regional production are thus assumed to be unrestricted and at the prices fixed at current levels. This output equilibrium shows the amount of output from each of the sectors necessary to supply the exogenously determined final demands. Final demands can exist at any given positive level and local production is assumed to be able to fulfill those demands.

The *Leontief Inverse* matrix shows the "total requirements" per dollar of exports by the industry named at the head of the column. Total requirements are composed of the direct and indirect requirements. And when households (row *l* and column *c*) are included as a dependent sector, then the total requirements are said to also include "induced" requirements. Each entry in the inverse matrix is an interdependency coefficient. Each coefficient in the *Leontief Inverse* or final-demand-to-output multiplier matrix, b_{ij} represents the direct and indirect requirements of sector i per unit of final demand sold by sector j;

$$\beta_{ij} = \Delta x_i \ / \ \Delta y_j \quad \textbf{(13)}$$

and is composed of the direct plus indirect change in total output in sector i resulting from a unit change in final demand j. Column sums of the Leontief inverse are similarly interpreted as the effects of change in sales to final demand upon the entire economy. By setting the level of final demands at any level (including the current level) we can now obtain the gross local economic activity (direct, indirect, and induced) in each sector that goes to supplying that level of demand can be obtained. The immediate impacts computed in the direct input coefficients table are followed by even longer term effects which can be found by calculating "total requirements". Successive rounds of production and demand arise because suppliers need local inputs to make and sell their outputs. Total requirements are much larger than the direct requirements, shown by the direct input coefficients, because the total requirements incorporate all of the cumulative effects of each industry supplying each other industry to reach a new equilibrium of the economy while the direct input coefficients only show the initial round of resources use.

Conceptually, the processing sectors of the regional economy move toward a stable equilibrium where sales equal receipts in each industry. Receipts are perturbed when final demands such as exports or government purchases from industry change. Changes in final demand set off a series of transactions as each industry responds to either direct or indirect changes in their demands. An example of direct change in demand would occur if agricultural exports increased, while an example of an indirect demand change could be the response of farms to increase output and in so doing they purchase more fuel, fertilizer, machinery, labor and similar inputs thereby creating an indirect demand for the output of other sectors in the economy. When the other sectors find their demand rising they too will buy more inputs and thus the original export change ripples throughout the economy. These reverberations gradually wane as a portion of each round of spending leaks out to saving, taxes, and imports. The greater the leakage the faster the effects die out and the smaller the multiplier.

Final Demand Multipliers

The final demand multiplier (sometimes called the business multiplier), for any sector i, is the sum of the direct and indirect (and induced if the model is closed with respect to households) requirements from all sectors of the local economy needed to sustain one additional dollar of output to final demand by sector i. Because each element of $(I-A)^{-1}$, b_{ij} measures the total stimulus, direct and indirect (and induced), to the ith gross output when the jth final demand changes by one unit, the output multiplier ($\Sigma_i b_{ij}$) measures the total effect on gross output of all sectors when final demand for the jth sector changes by unity and all other final demands are zero. The magnitude of the multiplier indicates the amount of demand stimulus that sector of the economy will create when it makes added sales to final demand. Each entry in a column of the Leontief inverse shows the total production requirements from the sector at the left when the sector at the column head increases sales to final demand by one dollar. Sectors with large output multipliers have relatively small leakages in their direct and/or indirect purchases. In other words, *a large multiplier means that the sector directly and indirectly purchases a larger proportion of its inputs from within the local economy instead of importing.* Comparing multipliers for similar sectors across different area's I/O models provides a measure of the self sufficiency of a local economy. The regions with larger multipliers often have greater development in the stages of intermediate production.

Table 1. Final Demand Multipliers for Clark County

Sectors	Type I Multiplier	Type II Multiplier
	$Δ TGO/$Δ FD	$Δ TGO/$Δ FD
Livestock	1.53	1.68
Grains	1.29	1.34
Hay Production & Processing	1.44	1.46
Potatoes Production & Processing	1.19	1.22
Agricultural Services	1.02	1.14
Const., Maint. & Mining	1.07	1.14
Transportation & Communications	1.08	1.13
Wholesale & Retail Trade	1.05	1.19
Gas Stations	1.04	1.25
Eating & Drinking	1.07	1.24
FIRE	1.03	1.06
Hotels and Lodging	1.13	1.26
Services	1.06	1.13

Output Multipliers

Whereas the conventional I/O model equilibrium is demand driven i.e. the multiplier measures a change output as determined by change in exports. Output of the industry becomes the driving force or the determinant of regional output of the economy. Formally, the output to output equilibrium for the economy is expressed as:

$$X = (I-\tilde{A})^{-1}X$$
$$where: (I-\tilde{A})^{-1} = (I-A)^{-1}\ (\hat{\alpha})^{-1} \tag{14}$$

Computationally the output equilibrium is obtained by dividing the Leontief inverse by the on diagonal elements of the Leontief inverse. To make output the driving force for the economy, the conventional Leontief inverse is normalized or standardized by the direct and indirect output of that respective sector (i.e. the on diagonal elements of the Leontief Inverse). Or computationally, in terms of the final demand multiplier of the conventional Leontief inverse, the output-to-output multiplier, is:

$$\hat{\beta}_{ij} = \beta_{ij}/\beta_{jj} = \frac{[\Delta X_i/\Delta Y_j]}{[\Delta X_j/\Delta Y_j]} = \Delta X_i/\Delta X_j \tag{15}$$

Alternatively the multiplier can be expressed as:

$$\Delta X_i = \hat{\beta}_{ij}\ \Delta X_j \tag{16}$$

An alternative to the final demand multiplier, the demand driven output multiplier arises and is thus derived for use when the impact to the economy can only be expressed in terms of changes in industry output. The output multiplier is particularly useful when estimating the impact of the presence or absence of an industry in an economy. Setting the final demands to zero and applying the final demand multiplier to the change to estimate the impact of an industry leaving or the portion of the industrial output that is sold to other industries within the economy. In effect, the total impact of the industry presence in the economy is not accurately assessed because impact is understated by the impact of internal regional consumption.

Table 2. Output Multipliers for Clark County.

Sector	Type I Multiplier	Type II Multiplier
	$Δ TIO/$Δ TIO	$Δ TIO/ $Δ TIO
Livestock	1.19	1.30
Grains	1.21	1.25
Hay Production & Processing	1.03	1.05
Potatoes Production & Processing	1.18	1.21
Agricultural Services	1.02	1.13
Const., Maint. & Mining	1.06	1.13
Transportation & Communications	1.04	1.09
Wholesale & Retail Trade	1.05	1.19
Gas Stations	1.04	1.25
Eating & Drinking	1.06	1.23
FIRE	1.02	1.05
Hotels and Lodging	1.13	1.26
Services	1.03	1.09

Primary Input Multipliers

Multipliers are not limited to measuring output impacts but can also be expressed for inputs or production factors; final payments or primary input and resources (water and employment). Primary input and resource multipliers are calculated and interpreted in an identical fashion. Primary input and resource multipliers assess direct and indirect (and induced) payments to the primary inputs or resource use resulting from a change in final demands of the economy. The difference is that resource multipliers are denominated in physical quantities (e.g., gallons of water, jobs) instead of economic units (dollars). Being in physical units, resource multiplier data must thus be obtained outside the I/O accounting framework. Two primary input multipliers (Earnings Table 3 and Value Added Table 5) and the employment multiplier (Table 4) were calculated for the Clark County Economy.

Primary input multipliers are used to examine the direct and indirect (also induced if the model is closed with respect to households) payments to any of the Primary Input sectors when final demands for the economy change. Again, the assumption is that primary inputs are used in constant proportion to output. Begin with the equilibrium condition derived earlier: $X = (I - A)^{-1}Y$. Define a matrix of primary input coefficients, V, exactly as the direct input coefficients were calculated:

$$V = P\hat{X}^{-1}$$

The primary input multiplier can be interpreted as a linear transform of the direct and indirect impact i.e., the I-A inverse using the primary input coefficient matrix where V is a m by n matrix of primary input coefficients, P is the vector of gross primary inputs or final payments (quadrant 3), m is the number of rows of primary inputs, n is the number of rows or columns in the transactions matrix (quadrant 1). Premultiply both sides of the original equilibrium condition for X by the definition of the primary input coefficients:

$$P\hat{X}^{-1}X = V(I-A)^{-1}Y, \quad or \quad P = V(I-A)^{-1}Y \ \because \ \hat{X}^{-1}X = I$$

Each element of the matrix $V(I - A)^{-1}$ is the direct and indirect increase in payments to the ith primary input when final demand for the jth sector increases by one dollar. The multiplier for all sectors is the column sum of the elements of the matrix $V(I - A)^{-1}$. *Primary input multipliers are always less than or equal to one as opposed to output multipliers which are always greater than or equal to one* (not recognized in the conversion to millions).

Two primary input multipliers, earnings and value added, were calculated for the Clark County economy (Table 3 and 5). Earnings are defined as payments to household (salaries and wages) plus proprietors income. The inclusion of proprietors income into earnings was necessary because farming income is paid to the farm owner in lieu of a wage. Likewise with many small businesses that dominate Clark County's economy. To the extent that proprietors income is paid to proprietors residing outside the region the earnings multiplier is decreased. Value added is the amount remaining after payments to intermediate suppliers. Value added is the sum of earnings, taxes plus, other income (dividends profits and rents). Since value added includes earnings the direct value added and the multiplier will exceed the earnings values. Both the earnings and value added are expressed in millions for ease of interpretation.

Often times the economic impact to an economy is not expressed as a change in exports but rather as a change in the payment to the primary input. A common example would be the direct impact of a firm being expressed as an increase in payroll, as opposed to an increase in exports. To aid in the use of impact analysis with multipliers we can express the impact as being driven by the primary input, either earnings or value added. But it is important to remember that the underlying driving force in the economy remains exports. There are two component parts to the income multiplier: the primary input multiplier for household income, $h(I-A)^{-1}$ and the average (marginal) propensity to consume for households (ie., the direct input coefficients for the household row):

$$h = H\hat{X}^{-1}$$

where H is the gross income paid to households. To calculate the income multiplier the primary input multiplier is divided by the marginal propensity to consume:

$$earnings\ multiplier \ = h(I-A)^{-1}\hat{h}^{-1}$$

Simplistically, this multiplier shows how an initial change in household sales is multiplied or increased in the economy (directly and indirectly) to create the total change in household income in the economy. More precisely the household earnings multiplier shows how much the economy must expand in order that income to households could expand by one dollar. The type II earnings multiplier is the direct, indirect, and induced change in household income i.e., $(I-A)^{-1}$ is calculated for a closed economy with households included in the transactions matrix. Type II income multipliers are used to examine total (direct, indirect and induced) household income changes when an initial impact in household income is expected to occur. For example if a new plant locates in the local economy and the payroll for this new plant is known, then the total (direct, indirect, and induced) income increase for all households can be estimated with an earnings multiplier.

Table 3. Earnings Multipliers for Clark County.

Sectors	Direct[1] Earnings	Type I	Type II
	\$Earnings/\$ Output	Δ\$Earnings /Δ\$ FD	Δ\$Earnings /Δ\$ FD
Livestock	0.1063	0.1466	0.1548
Grains	0.0309	0.0472	0.0500
Hay Production & Processing	0.0138	0.0506	0.0519
Potatoes Production & Processing	0.0163	0.0536	0.0552
Agricultural Services	0.1093	0.1115	0.1179
Const., Maint. & Mining	0.0617	0.0680	0.0719
Transportation & Communications	0.0428	0.0324	0.0351
Wholesale & Retail Trade	0.1364	0.0485	0.0566
Gas Stations	0.2082	0.1401	0.1523
Eating & Drinking	0.1708	0.2150	0.2252
FIRE	0.0278	0.1745	0.1762
Hotels and Lodging	0.1221	0.0421	0.0496
Services	0.0585	0.1281	0.1317

Employment Multipliers

The employment multiplier is computed in an analogous manner to the primary input multipliers but measures the total change in physical amount of resource use resulting from a change in final demands. A second employment multiplier is computed analogous to the income multiplier, where the total change in physical resource use results from an initial change in the physical amount of the resource itself. Both multipliers measure changes in physical units (e.g., gallons of water, jobs) instead of economic units (dollars). The first step is the computation of

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[1]Expressed in millions.

direct resource input coefficients in terms of physical units of resource use per dollar of gross output for each sector of the economy. As an example let us look at employment in the economy. A technical resource input coefficient for employment is:

$$\Omega_w = W\hat{X}^{-1},$$

where W is the average annual monthly employment in physical units for each industry of the economy or the total physical resource use (jobs) in each industry of the economy when computing resource coefficients. An agricultural example of a water resource coefficient would be estimated by total water used growing potatoes divided by the total value of potato production. Linear resource coefficient imply labor use will be used in constant proportion to output, with no efficiency change. This technical resource coefficient implies that in the subsequent multipliers that physical resource use will be in constant proportions, no change in efficiency of labor is permitted.

To obtain the primary input or resource multiplier, both sides of the Leontief equilibrium condition (Eq. 6) are multiplied by the definition of the primary input or resource coefficients:

$$W\hat{X}^{-1}X = \Omega_w(I-A)^{-1}Y, \quad or \quad W = \Omega_w(I-A)^{-1}Y \quad \because \quad \hat{X}^{-1}X = I \tag{22}$$

Each element of the matrix $W(I - A)^{-1}$ is the direct, indirect, and induced increase payments to the primary input (or direct, indirect, and induced physical amount of resource use) in the i^{th} sector when final demand for the j^{th} sector increases by one dollar. Thus, a primary input or resource multiplier is a linear transform of the direct, indirect, and induced impacts measured by the *Leontief Inverse*. This multiplier says that a change in final demand will cause a total (direct and indirect) change in physical resource use throughout the economy.

The employment multiplier states that a change in final demand will result in a backward linked change (direct, indirect, and induced) in the physical amount of labor used throughout the economy. The labor multiplier is a proration or linear transform of the total labor requirements (direct, indirect, and induced) impacts measured by the *Leontief Inverse* matrix. The total physical amount of labor use is thus proportional to the economic ripple effect (direct, indirect, and induced economic transactions) in the economy and attached to every sale or purchase in the economy is the labor that was used to produce those goods or services. An element in the employment adjusted *Leontief Inverse* is a total labor requirement coefficient;

$$\beta_{ij}^{w} = \Delta W_i \; / \; \Delta y_j \tag{23}$$

where each coefficient, b^w_{ij} is composed of the direct, indirect, plus induced change in labor use in sector i resulting from a unit change in final demand j. Column sums are thus the change in employment across the entire economy resulting from a change in final demand. Alternatively, an entry or column sum of the inverse matrix can be pictured as a measure of labor interdependency in the economy. Successive rounds of production and demand arise because suppliers need production inputs, which require labor to produce, to make and sell their outputs which are then inputs for other industries. Total requirements are much larger than the direct requirements shown by the direct input coefficients because the total requirements incorporate all of the cumulative effects of each industry supplying each other industry to reach a new equilibrium of the economy while the direct input coefficients only show the initial round or direct labor use.

The multiplier formulation does not change *Leontief Inverse* backward linked mechanism whereby final demands are set at any given positive level and local production is assumed to be able to fulfill those demands. The processing sectors must always move toward a stable equilibrium where sales equal receipts in each industry. Receipts can be disturbed when final demands such as exports by an industry change. By setting the level of final demands at any level (including the current level) total resource use (direct, indirect, and induced) in each sector is needed to produce that level of demand. Direct input coefficients (eq. 8) are the immediate impacts, followed by even longer term indirect and induced effects calculated in the total resource requirements. To meet those demands, labor supply, imports and other inputs to the regional production are assumed to be available without restriction at current prices.

To calculate the second employment multiplier, the first employment multiplier is divided by the technical resource input coefficient. The second employment multiplier is:

$$\Omega_w (I-A)^{-1} \hat{w}^{-1}$$

Simplistically, this multiplier shows how an initial added labor input is multiplied or increased in the economy (directly and indirectly) to create the total change in labor usage in the economy. More precisely, the multiplier shows how much the economy must expand, expressed in terms of total labor use, in order that the given sector can use up the added labor made available to it. The contrast in the two resource multipliers is that the first multiplier is created by changes in final demands while the second type of multiplier in driven by a change in physical units of the resource itself. The second multiplier implicitly assumes that excess final demand exists for the sector receiving the added increment of labor. A type I resource multiplier is the direct and indirect change in resource use i.e., $(I-A)^{-1}$ is calculated for an open economy without households in the transactions matrix. The type II resource multiplier is the direct, indirect, and induced change in resource i.e., $(I-A)^{-1}$ is calculated for a closed economy with households include in the transactions matrix. The second type of resource multipliers are used to examine total (direct, indirect and induced) physical resource changes when a new demand for the resource is created in an economy. For example, if a new plant locates in the local economy and labor usage for this new plant is known, then the total (direct, indirect, and induced) employment increase for entire economy can be estimated with the second type of resource multiplier. Presumably the plant is going to export its output, if not then the multiplier overstates labor requirements.

Table 4. Employment Multipliers for Clark County.

Sectors	Direct Employment	Final Demand Type I	Final Demand Type II	Employ Multiplier Type I	Employ Multiplier Type II
	Jobs/mil$	ΔJobs/Δ mil$FD	ΔJobs/Δ mil$FD	ΔJobs /ΔJobs	ΔJobs /ΔJobs
Livestock	8.74	14.38	15.99	1.65	1.83
Grains	15.10	20.17	20.72	1.34	1.37
Hay Production & Processing	3.33	15.42	15.68	4.63	4.71
Potatoes Production & Processing	7.15	20.50	20.81	2.87	2.91
Agricultural Services	35.61	36.25	37.51	1.02	1.05
Const., Maint. & Mining	28.82	30.65	31.42	1.06	1.09
Transportation & Communications	5.09	6.89	7.43	1.35	1.46
Wholesale & Retail Trade	29.21	6.43	8.02	0.22	0.27
Gas Stations	45.23	30.34	32.73	0.67	0.72
Eating & Drinking	39.68	47.14	49.15	1.19	1.24
FIRE	7.04	40.77	41.10	5.79	5.84
Hotels and Lodging	41.93	11.42	12.90	0.27	0.31
Services	11.51	44.03	44.74	3.83	3.89

Clark County I/O Data

Through input/output (I/O) modeling, exogenous shocks to an economy and estimated impacts to industry output, income and employment can be derived. There are many widely used and published secondary I/O models on the market today including IMPLAN and RIMS II. Often with these models, national average make tables are used that do not represent the local agricultural industries and agricultural sectors are overly aggregated. Using crop and livestock cost and return estimates, the I/O model can be expanded and localized to investigate impacts to specific agricultural industries. Using enterprise budgets, each production cost is allocated to the I/O industry where purchased. If more than one budget exists for a region, weigh or average the costs and returns by the acreage or unit of output of each commodity for a regional account. By using margining techniques and regional purchase coefficients the I/O accounts are converted to producer prices and purged of all imports. The commodity accounts can now be expanded by multiplying value of production estimates by the technical coefficients derived from the cost and return estimates. Following these procedures yields an industry by commodity matrix which includes regional production practices, not national. This also gives the researcher the opportunity to disaggregate and broaden the scope of the model.

Given that survey-based models are time consuming and expensive; and conversion of a national model through secondary procedures unreliable, the hybrid-type county level input/output provides the best solution. There are several hybrid-type approaches. Among the most promising is the "mongrel model" or the mixed survey/non-survey model suggested by

Jensen (1980). Jensen suggested a two-step approach for development of a "mongrel model". First, a non-survey input/output model is developed from a microcomputer program such as IMPLAN. The second step involves the insertion of superior data obtained from surveys, other primary sources, or reliable secondary sources. There is a substitution of superior data into the model and appropriate techniques are employed to balance the regional models.

The emergence of controversial public land management decisions, surface and groundwater regulation, agricultural production regulations, and environmental concerns have created a need for a method to localize I/O models. This localization of I/O models more accurately defines agricultural sectors pertinent to a region. Instead of including all of agriculture in one economic sector or a few broad sectors, numerous agricultural sectors can be used.

Many crops grown in the United States are grown strictly in certain regions and are aggregated with other industries in the secondary impact models. These crops, however small in importance nationally, may have large impacts in their respective production area. Most secondary I/O models have economic sectors that may produce aggregation errors. Morimoto (1970) investigated aggregation errors in I/O models. For example, the Clark County, Idaho economy relies heavily on agricultural production as an economic base with potatoes being the largest. In the secondary I/O models there is one sector called Potato Production and Processing. However, when deriving impacts, the sector where the impacts occur should be disaggregated such as a specific "potato production" and "potato processing."

The estimation errors encountered with the secondary I/O models do not necessarily arise from errant agricultural production functions or technology. The problems arise from the aggregation of those agricultural sectors. Burchell, et al. (1998) stated that even when county technology varies widely from the nation's average for one or more industries, model accuracy might not be significantly affected due to inter-county trade. These errors in technology are reduced through the use of regional purchase coefficients (RPC's) and margining techniques discussed later.

This paper integrates crop or livestock cost and return estimates into a framework suitable for use in a "mongrel" type I/O model using IMPLAN as a base. By studying agricultural enterprises as individual economic sectors, with expenditure patterns different from national averages and in a less aggregate format, the researcher gains the ability to more accurately estimate the impacts these agricultural sectors have on local and regional economies.

Clark County Industry Aggregations

Livestock:

The livestock sector is mainly comprised of cow/calf operations. There are a limited number of sheep operations also. The factor that effects this sector greatly is that persons living in neighboring counties own many of the livestock operations using Clark County grazing. Based on our survey data, that proportion of proprietor's income was moved to the import sector because those payments would leave the county.

Grains:

The grain sector is comprised primarily of spring wheat production. There is very limited acreage of barley and oats. The grain is produced using irrigation. Production is then exported from the county.

Hay production and Processing:

This sector is a combination of alfalfa production, native grass hay production and the alfalfa packing facility. The majority of hay is high quality fine stemmed alfalfa produced under irrigation. Alfalfa is grown in rotation with other crops. Generally after 3 years of alfalfa, the sod is plowed up and potatoes are produced on that land. Hay is exported directly to the dairy consumption areas of Idaho as well as being compressed for shipment to other parts of the nation. This extra value is added in the county through the packing facility in Dubois. The packing shed also imports alfalfa from neighboring counties, packs it and then exports it from the county. Owners of the alfalfa hay-packing shed reside in neighboring counties so proprietor's income was adjusted to reflect this.

Potatoes and Potato processing:

Potato production and processing are combined into one sector. Geographically, the principal potato packing facility for the county's potato production is located in neighboring county to the south, Jefferson. In addition, a dehydrated potato processing plant is located immediately north of the county line in Clark County. This requires some adjustments to the model. First, all the potato production is exported from the county. Second, all of the potatoes processed in the dehydration plant are imported to the county. The potato packing shed and the dehydrated potato processing plant are owned by the same persons. Potatoes in Clark County are shipped to the out of county packing shed. Potatoes not of adequate quality to ship as fresh pack are then exported to the Clark County dehydrated processing plant. Therefore, almost all of the feedstock for the dehydration plant is imported. Because of nearness to the county line, the majority of the labor for operating the dehydration plant commutes from Jefferson County. This takes their spending out of the county and reduces the effects on the local retail trade sector.

Agricultural, Forestry and Fishery:

This is a relatively small sector in the county. Most agricultural services are purchased from neighboring counties. The northern and northeast section of the county does contain timber. The majority of it is under management of the Forest Service with some BLM and Idaho Department of Lands management. The majority of forest management services are purchased from suppliers outside the county.

Construction, Maintenance and Nonmetallic minerals:

This sector includes all the new utility, farm structures, government facilities, highways and streets as well as their maintenance and repair. Also included in this sector is nonmetallic mining that occurs in the county. This includes mining and processing of gravel and rock, opals and calc for animal feed.

Transportation and Communications:

There are four systems for transportation and communication in Clark County. A railroad line runs through the county form south to north connecting with a terminal in Montana. Load is picked up in Dubois and at the processing plant on the southern corridor of the county. An interstate highway traverses the county from north to south. Some local traveling exists. Microwave communications towers are also present in the county. Phone communication is the other component of in-county communication.

Wholesale and Retail Trade:

This sector involves a number of small firms supplying special niche markets. There are limited locations where personal items and groceries can be purchased. The only contribution of this sector to the Clark economy is wages paid and local services purchased, such as utilities.

Gas Stations:

There are service stations located in all parts of the county. Because of I-15 being a major corridor for traffic from Alberta and Montana to SW United States, increases in traffic provide the potential for additional commercial opportunities.

Eating and Drinking:

There are eating and drinking establishments in every community in the county. These range from simple fast food locals to those with more extensive menus. All employ local labor and are locally owned so proprietors' incomes remain within the county. Supplies for these businesses must be imported to the county.

FIRE (Finance, Insurance, and Real Estate):

There are financial services available in the county as well as insurance and real estate agents. These are small offices connected to larger national firms.

Hotels and Lodging Places:

The are a number of small locations locally owned which provide lodging services. These are maintained with local hires or family labor.

Services:

All type of services are needed to operate local businesses. The majority must be imported from larger communities outside the county. In some instances, persons delivering the services do reside in the county. However in most situations, person's commute into the county to deliver needed services.

Proprietary Income:

Proprietary income is the return to owners' efforts for operating a business. This becomes large in profitable times and can become zero in difficult times. The actual residential location is important because that is where the income is attributed. In the case of a number of businesses in Clark County, the owners reside outside the county resulting in their proprietary income being classified as nonresidential.

Other Property Income:
Includes corporate income, corporate transfer payments, interest and rental income.

Indirect Business Taxes:
Covers sales, excise, and value added taxes as well as customers duties. These are taxes paid during normal operation of industry. Other types of taxes such as income and property are paid out of income, therefore exogenous tot he I/O model.

Households:
The consumers which purchase goods and services created by the economy. They are also the recipients of wages which create the purchasing power.

Federal Government Nondefense:
Sales are goods or services that have been produced or stockpiled by non-defense governmental units. Purchases are expenditures for goods and services to provide federal government services.

State/Local Government Defenses:
Sales are goods or services that have been produced or stockpiled by defense governmental units. Purchases are expenditures for goods and services to provide federal government services.

State/Local Government- Non-education:
Sales are non-education goods and services produced or stockpiled and sold. Purchases are expenditures for goods and services required to provide government services or goods.

State and Local Government- Education:
Sales are education goods and services produced or stockpiled and sold. Purchases are expenditures for goods and services required to provide government services or goods.

Enterprises/Corporations:
Organizations which produce goods or services for government or private entities.

Capital/Inventory:
Capital goods purchased for formation of private capital. Inventory is the value of goods not dispersed or purchases which are additions to inventory.

Exports:
Commodities or services sold outside the region being analyzed or to non-residents visiting the region.

We use five basic steps to create I/O accounts from crop or livestock cost and return estimates: (1) gathering control (output) total and cost and return estimates pertinent to the study region, (2) converting from purchaser prices to producer prices using retail trade margin procedures, (3) allocating cost and return accounts to I/O sectors, (4) purging imports with IMPLAN regional purchase coefficients, and (5) updating a secondary model make matrix. IMPLAN was used as a basis for modeling in this discussion. The IMPLAN software helps to alleviate the costs of obtaining primary data and can be easily updated with primary data such as cost and return estimates, ES202 data and BEA numbers. Also, with the IMPLAN program and software, data transfers easily into spreadsheet format for model and program construction. After deciding which agricultural sectors will be included in the I/O model, and how they will be aggregated, control totals must be gathered for those commodities. Control totals are merely values of production, employment, and income generated from each commodity. The values of production can be found using state agricultural statistics or the Department of Commerce's Census of Agriculture. These published values are based on statewide numbers and can be broken down to a county or regional values based on acreage in the county or production of that commodity within the county. The employment and income values are available from the Bureau of Economic Analysis' Regional Economic Information System (REIS). They publish employment and income numbers for agricultural production in an aggregate format, so they must be proportioned based on employment in the cost and return estimates, ES202 state-level employment data, relative commodity output, or other methods available to the researcher. Next, cost and return estimates must be constructed for each of the agricultural sectors that control totals were compiled for. The cost and return estimate is the cornerstone of an accurate and precise I/O account. The more detailed the cost and return estimates are the better the production function for the I/O sector will be. If more than one enterprise budget exists for a given commodity then the various costs and returns should be weighted by the amount of acreage of that crop in the study area. For example, if two cow-calf enterprise budgets exist for the same size of operation, one with a federal grazing lease and another without, weight the numbers in each budget is weighed by the number of head relevant to each. Next, sum the various production items from the cost and returns to arrive at a localized and weighted production function for cow-calf operations in the region. For the sake of simplicity, transform the cost and return estimates into a single vector of production purchases and gross returns for the enterprise.

Converting from Producer to Purchaser Prices

To make the model more precise, the retail trade sectors need to be converted from producer prices to purchaser prices. The producer price is the price paid for a commodity at the factory door. The purchaser price is the price paid for a commodity at a retail outlet which includes transportation costs, wholesale mark-up, retail mark-up, and producer price (Minnesota IMPLAN Group, 1997). The cost and return estimates contain purchaser prices for most of the purchased inputs and therefore all purchases from the retail sector need to be margined. A margin is the portion of a commodity's value going to each appropriate handler such as the transportation cost, wholesaler mark-up and retail mark-up. There are different types of margins included with the IMPLAN software: household, government, and investment. The margins used in IMPLAN come from the United States Department of Commerce Summary Tape Files but there are other sources that may better represent rural retail businesses such as Financial Studies of the Small Business by Financial Research Associates that is published yearly, or "Annual Statement Studies" by Robert Morris Associates. Once the margin source is chosen, they must be applied to each of the retail purchases made in the budget by multiplying the margins and the budget costs. Margining will make the I/O model more accurate in terms of the impact farm or ranch trade has on local retail businesses. In the case of Clark County, Idaho, we know that the only margin that is not an import for the production of potatoes, wheat and alfalfa is the retail margin; all transportation and wholesale margins are imported. For areas where it is unclear whether or not the transportation and wholesale sectors exist, IMPLAN margins or the best method available should be used to convert from producer prices and allocate costs to their respective sectors (Willis and Holland, 1997).

Allocating Cost and Return Accounts to I/O Sectors

The sectors included in the aggregated Clark County I/O model and margined to their corresponding I/O account. These model sectors for Clark County are part of a hybrid IMPLAN I/O model built for Clark County.

When allocating costs to I/O accounts some of the cost and return items may be "lumped" together and need to be separated into two or three different accounts. However, more detailed cost and return estimates will likely have most cost items separated. Remember that if using IMPLAN as the modeling software don't forget the value-added accounts, employee compensation, indirect business taxes, proprietor income, and other property type income. These numbers can be derived from ratios between IMPLAN and your employment, income and output totals for each given sector. Notice that the new I/O accounts vector adds to the same amount as the value of production. This happens because the I/O model must balance so that purchases equal sales. Updates can be made with the simple insertion of new values of production for each model sector.

Purging Imports and Direct Requirement Calculation

The idea of I/O modeling is to capture impacts to local economies. This allows for the true regional interaction of the alfalfa hay sector with the other sectors of the economy within the model as explained by Coupal and Holland (1995). Import purging is done through the use of regional purchase coefficients (RPC's). RPC's represent the proportion of the total local demand met by local production and attempts to account for "cross hauling" of goods (MIG, Inc., 1997.) The RPC's are generated by the IMPLAN software and may be exported for use outside of the software framework. To purge the imports from an account, each item in the vector of margined costs is multiplied by the RPC generated for that industry. This process will not change the total output or value of production for the I/O account, all that is done is a transformation of the vector into local purchases and imports of all other commodities and services. Some imports were already derived when margining the retail trade sectors. If better data than IMPLAN is available for estimating regional purchases, that data may be used instead and either entered into the IMPLAN software directly or used outside of the software.

With the imports now purged from the I/O account, the technical coefficients for the new agricultural sector can be derived. Dividing the vector of now margined and import purged costs by the value of production results in a vector of technical coefficients. Once the direct requirement vector (or matrix with all sectors in the I/O model) is constructed, all that is needed for updating the I/O model, if all production functions remain unchanged, is the output (value of production for agricultural sectors), income, and employment estimates. These estimates of output can be multiplied through the direct requirement matrix and re-balanced to create an updated model.

I/O Model Application

I/O models can be used to show economic impacts from governmental policy, business introduction and other potential changes in a local or regional economy. To derive economic impacts from a change or "shock" to an economy we must first decide whether it is a change to final demand or to output. Final demand changes are changes in purchases of goods and services for final consumption such as purchases made by the federal government or households. These purchases may be food, computers, houses, buildings or any other good or service. Output changes are sales or value of production (agricultural commodities) from a given industry. These sales can be anything ranging from alfalfa hay and cattle to gold and electronic parts or sales to region visitors.

Base:

As shown in the base figure, agriculture and agricultural processing comprise 51 percent of Clark County's output and employment. Government which includes schools, local government, state government and federal government, is the second largest with 32 percent of the output. It employs 12% of the labor. Public employees receive above county average wages.

Figure 15. Industry Output for Clark County, Idaho.

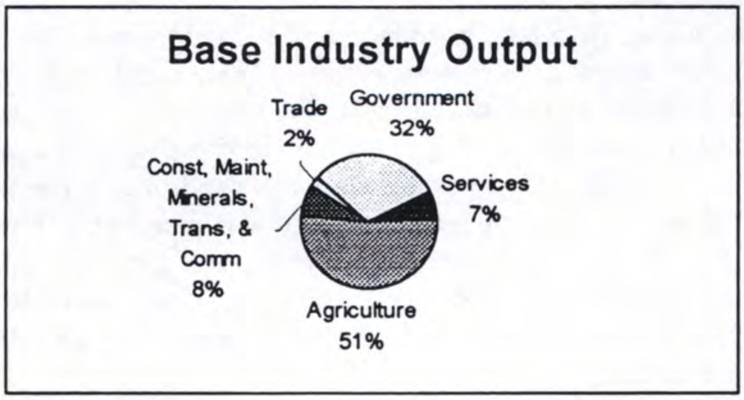
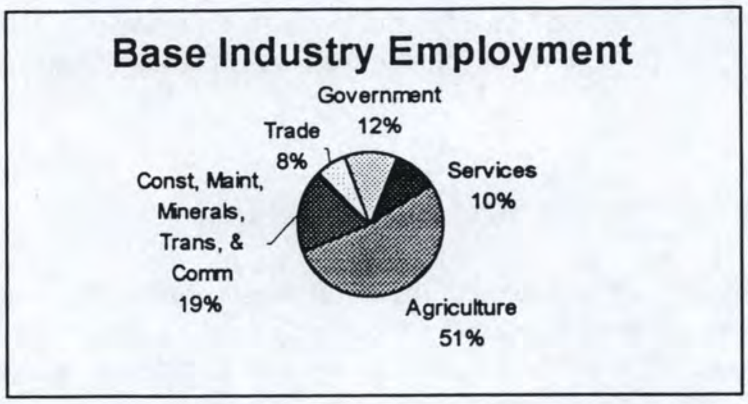


Figure 16. Base Industry Employment for Clark County, Idaho.



At the request of the Clark County Commissioners, two scenarios a reduction in grazing on public lands and construction of a new motel and restaurant were used to demonstrate the capabilities of the model.

Scenario: Reduction of Grazing on Public Lands

Livestock have historically been an important part of Clark County's economy. In the current economy with modern irrigation systems, crop production, (grain, potatoes and alfalfa) dominate Clark county's agriculture. This scenario, requested by the Clark County Commissioners, evaluates the in county effect of reducing the Animal Unit Months (AUMs) available for grazing on public lands by sixty percent. The total amount of livestock would not be expected to decline by that amount because of the possibility of purchasing hay, using additional crop aftermath some private land grazing.

Cattle grazing on public land are from both in-county ranchers and those living in neighboring counties using Clark County forage in the summer months. There are about 102,000 AUMs (58 thousand from Forest Service and 44 thousand from BLM) available from public land in the county. Reducing permitted public land grazing for cattle and sheep by 60% would leave 41,000 AUMs available to graze. Assuming the 1/3 of the cattle that reside year around in the county receive a proportionate share of the grazing reduction there would be 13,653 fewer AUMs available for resident cattle. If the cattle depend on that public land grazing for 4 months, numbers would need to be reduced by 3,400 head. With a 60% calf crop, that would result in 2,040 fewer calves being sold. Valuing the calves at $575 per head would result in $1,173,000 decline in exports from the livestock sector.

Because two thirds of the livestock that graze in Clark County are only resident for part of the year and because their owners reside outside the county, the proprietor's income from production is attributed to the county of owner residence. The calving expenses, and purchases of additional

feed occur at or near the home ranch. The labor required for these high demand periods also is hired from the out of county area. They would have very little economic effect on Clark County. The cattle that migrate into the county take the weight gained and its value with them when the leave in the fall leaving little to the local economy.
The decrease in exports of livestock from Clark county would be $1,173,000.

Effect of 61,000 AUM Decrease in Clark County

Sectors	Livestock Type II	Direct Impacts	Indirect Livestock 60% decrease
Livestock	1.2881	($1,173,000)($1,	
Grains	0.0051		($5,947)
Hay Production & Processing	0.2019		($236,784)
Potatoes Production &	0.0000		($0)
Agricultural, Forestry, Fishery	0.0007		($808)
Const., Maint. & Nonmetallic	0.0139		($16,266)
Transportation & Communication	0.0103		($12,037)
Wholesale & Retail Trade	0.0019		($2,239)
Gas Stations	0.0002		($177)
Eating & Drinking	0.0000		($11)
FIRE	0.0008		($984)
Hotels and Lodging Places	0.0000		($30)
Services	0.0103		($12,039)
Households Res	0.1421		($166,671)
Total	1.6751	($1,173,000)	($1,964,899)

In spite of the reduction in livestock numbers, and because of the contributions of potatoes, alfalfa, and wheat, agriculture is still very important to Clark County's economy.

Figure 17. Industry Output with 60% decrease in AUM's for Clark County, Idaho.

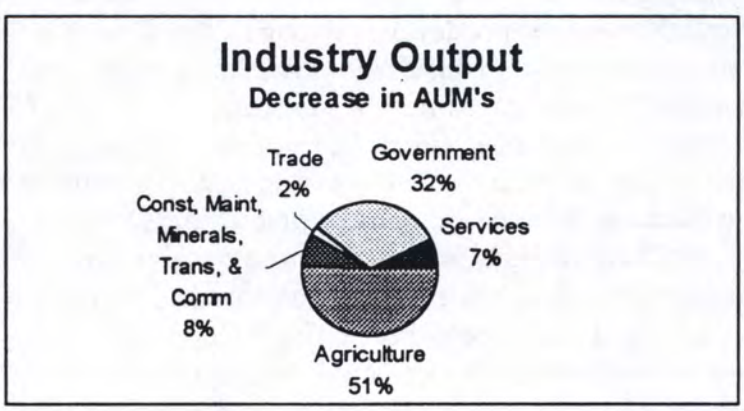
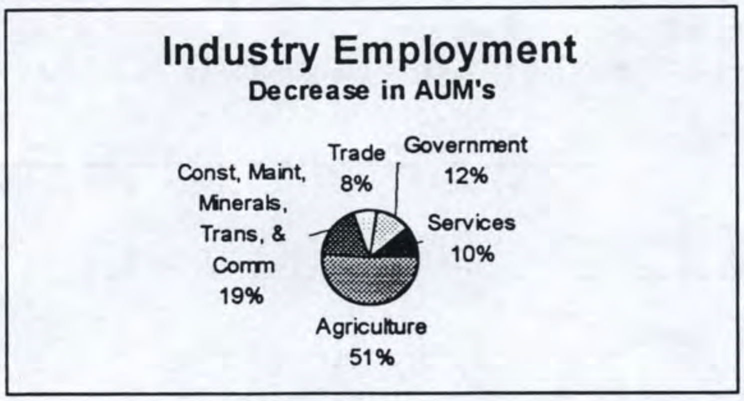


Figure 18. Industry Employment with 60 % decrease in AUM's for Clark County, Idaho



Summary

The direct effect of the loss of 61,000 AUMs on public lands was a reduction in livestock numbers and cattle and calves sold. This caused a direct effect of $1,173,000 less exports. The linkages to other sectors resulted in $1.5 million decrease in the livestock sector, $237,000 decrease in the alfalfa production and marketing sector, $16,000 reduction in the construction, and maintenance and non metalic mining sectors. The total expected effect on output for the Clark county economy, due to a grazing reduction, would be a $1.9 million decrease. The majority, 87%, of the impact would be absorbed by the livestock sector. The remaining reduction would be distributed across other sectors of the economy.

Scenario: Adding a Motel and Restaurant

A second scenario considers tourism development. Tourism can be a number of things including campers, hunters, snowmobilers, ranch experiences, fishermen, other outdoor experiences or just people passing through who stop for a few days or a few hours. In this case a number of area residents suggested that increased promotion of the area for its recreational value would help to stimulate the county's economy. The Idaho Transportation Department has determined that an annual average of over 2,000 vehicles per day pass through Clark County on Interstate 15 during 1997, in addition to the vehicle traffic on other highways in the county. Promoting tourism and providing tourist amenities that encouraged travelers to spend more time in Clark County would allow the county economy to realize an economic benefit from traffic passing through the area.

To increase the volume of trade, the county would need to encourage traffic to stop in the area. This scenario involves the development of a hotel/motel truck stop with a restaurant. The new motel, restaurant and truck stop would be a draw, by providing highway traffic with an option to driving the additional hour or more to reach Dillon, Montana or Idaho Falls, Idaho for tourist services. The hotel/motel would attract people preferring to stay in smaller towns. These people are also quite likely to spend some money at a local store, restaurant, and gas stations. Therefore, it is assumed that development of the new businesses would not decrease trade of the existing motel, restaurants, or gas stations, but would, in fact, increase the number of customers frequenting those businesses.

The new hotel/motel is assumed to have 30 rooms, with an average year-round occupancy rate of 40% per night. At a minimum of $40 per room per night, the total annual gross sales from this motel is assumed to be $175,200. In addition to the new motel, the existing businesses volume is expected to expand by 10% to accommodate a larger sales volume.

With the increased flow of traffic into the area, the volume of business to the gas stations would also increase. Existing gas stations would expand their sales volume by about 10%. The new truck stop would have a sales volume of about one-half of the existing volume of two other gas stations combined. The 10% increase would be $46,430 plus sales of the new station of $232,150 for a total increase of gasoline sales of $278,580.

As a full service restaurant with extensive breakfast, lunch, and dinner menus, the new restaurant would be expected to have a larger volume of sales than existing area restaurants. It is assumed that a year-round average of 150 persons are served per day. At an average price of $6.00 per meal, the estimated gross sales for the restaurant would be $328,500 per year. This estimate would be even higher if the restaurant menu featured a regional specialty item and/or lounge services, and if entertainment were offered on weekends. The existing restaurants would also be expected to expand their sales volume by 10% as tourist traffic increased in the area.

The net effect on Clark county's economy is expected to be increases of exports as follows. Gas station sales increase 10% or $46,430, plus $232,150 new sales for a total of $278,580.. Eating and drinking increase 10% or $52,926 plus new sales of $175,200 for a total of $228,126 Hotel and lodging increase 10% or $16,693 plus new sales of $328,500 for a total of $345,193. The total expected increase in exports would be $851,899.

The increase in tourism will increase employment and output for the service sector. It would be a step in the direction of diversifying the Clark County Economy.

Figure 19. Industry Output with 10% increase in tourism for Clark County, Idaho.

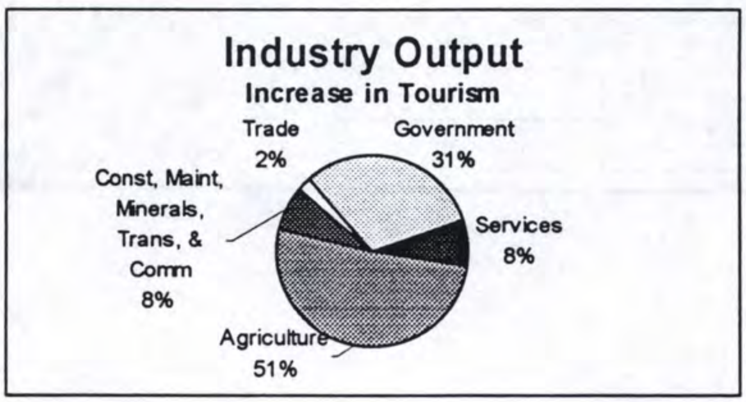
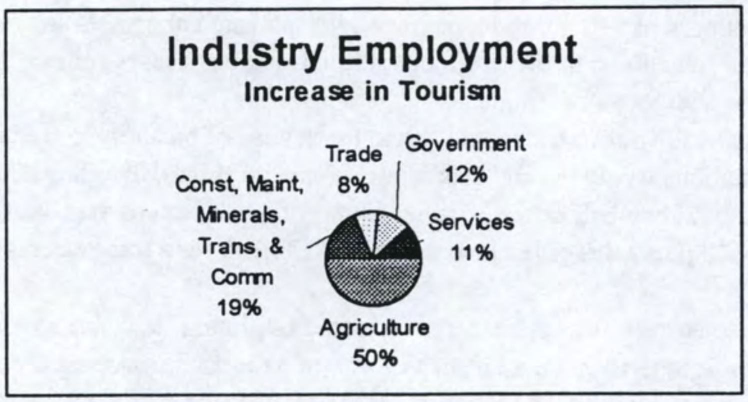


Figure 20. Industry Employment with 10% increase in tourism for Clark County, Idaho.



Scenario 2. Impact of Motel/Restaurant Addition to Clark County.

Clark County, Idaho 1996 I/O Type II Multiplier	Direct Impacts		Gas Stations	Gas Stations with 10% increase	Eating & Drinking	Eating & Drinking with 10% increase	Hotels and Lodging Places	Hotels and Lodging with 10% increase
Livestock	Gas Stations	$278,580	0.000030	$8	0.0002	$56	0.0001	$23
Grains	Eat & Drinking	$228,126	0.000000	$0	0.0000	$0	0.0000	$0
Hay Production & Processing	Hotel & Lodgie	$345,193	0.000005	$1	0.0000	$9	0.0000	$4
Potatoes Production & Processing			0.000000	$0	0.0020	$449	0.0000	$0
Agricultural, Forestry, Fishery Services			0.000000	$0	0.0000	$4	0.0000	$0
Const., Maint. & Nonmetallic Minerals			0.004086	$1,138	0.0059	$1,354	0.0217	$7,502
Transportation & Communication			0.004704	$1,310	0.0044	$1,004	0.0124	$4,291
Wholesale & Retail Trade			0.001868	$520	0.0153	$3,490	0.0042	$1,457
Gas Stations			1.000681	$278,770	0.0005	$117	0.0009	$302
Eating & Drinking			0.000012	$3	1.0065	$229,616	0.0000	$15
FIRE			0.007396	$2,060	0.0073	$1,672	0.0298	$10,292
Hotels and Lodging Places			0.002098	$584	0.0000	$7	1.0052	$347,003
Services			0.015517	$4,323	0.0241	$5,495	0.0578	$19,951
Households Res			0.210398	$58,613	0.1764	$40,233	0.1296	$44,742
Total			1.246794	$347,332	1.242762	$283,506	1.261847	$435,581

Table 1. Clark County I/O Gross Transactions. Appendix A

Clark County, Idaho 1996 I/O Gross Transactions	Livestock	Grains	Hay Production & Processing	Potatoes Production & Processing	Agricultural Services	Const., Maint. & Mining	Transportation & Communications	Wholesale & Retail Trade	Gas Stations	Eating & Drinking	FIRE	Hotels and Lodging	Services
Livestock	1,228,173	0	0	0	0	0	0	20,000	0	0	0	0	0
Grains	20,246	222,600	0	0	0	56	0	0	0	0	0	0	9
Hay Production & Processing	615,153	0	4,800,000	0	0	0	0	0	0	0	0	0	0
Potatoes Production & Processing	0	0	0	139,918	0	0	0	0	0	1,028	0	0	0
Agricultural Services	743	19,026	40,539	219,553	153	0	0	0	0	0	0	0	0
Const., Maint. & Mining	54,348	62,147	47,294	148,457	1,151	38,392	29,244	4,287	1,675	2,764	1,066	3,345	93,130
Transportation & Communication	33,913	283,749	114,941	337,089	675	24,129	85,359	10,616	2,036	2,082	4,724	1,914	15,489
Wholesale & Retail Trade	0	139,003	118,177	210,771	1,650	99,948	3,725	0	810	7,948	270	612	9,081
Gas Stations	0	0	4,457	18,702	6	37,753	237	996	300	239	79	118	874
Eating & Drinking	0	0	0	24,726	128	0	373	0	0	3,425	0	0	2,982
FIRE	1,224	27,026	28,769	917,659	758	25,737	10,281	11,082	3,326	3,657	15,167	4,846	12,964
Hotels and Lodging Places	0	0	0	0	0	179	3,559	0	956	0	1,981	855	2,778
Services	32,625	153,580	128,532	2,127,710	1,921	137,856	34,964	26,859	6,795	11,900	26,168	9,116	122,091
Households Res	583,556	108,616	231,565	373,437	30,695	346,595	92,594	219,390	96,653	90,410	47,410	20,385	254,365
Other Property Income	27,143	1,100,000	1,309,897	2,793,164	23,585	648,909	508,121	120,481	57,765	32,374	283,569	11,790	136,259
Indirect Business Taxes	41,248	297,518	246,952	451,354	7,763	97,383	101,356	267,883	73,995	29,040	24,212	5,723	16,058
Households NonRes	145,889	434,462	732,217	1,505,141	122,780	1,386,382	370,377	545,983	120,508	65,865	252,991	13,346	593,518
Federal Gov Non Defense/Non Military	28	2	16,679	225	0	155	43	99	1	4	573	1	184
Federal Gov Defense/ Military	0	0	0	0	0	0	0	0	0	0	0	0	0
State/Local Govt NonEducation	24,931	2,450	39,145	35,459	80	16,198	4,043	2,795	758	1,290	2,112	739	9,473
State/Local Govt Education	0	0	0	0	0	0	0	0	0	0	0	0	0
Enterprises (Corporations)	0	0	0	0	0	0	0	0	0	0	0	0	0
Capital/Inventory	0	0	0	0	4	10	1	1	0	1	0	0	208
imports	2,682,838	659,999	8,966,150	13,624,638	89,453	2,760,995	916,766	378,476	98,714	277,234	1,044,179	94,142	3,075,335
column total	5,492,058	3,510,178	16,825,314	22,928,003	280,802	5,620,677	2,161,043	1,608,948	464,292	529,261	1,704,501	166,932	4,344,798
row total	5,492,059	3,510,175	16,825,315	22,928,008	280,801	5,620,678	2,161,040	1,608,946	464,294	529,262	1,704,500	166,930	4,344,800
diff row & col	(1)	3	(1)	(5)	1	(1)	3	2	(2)	(1)	1	2	(2)
Employment	48	53	77	276	10	162	11	47	21	21	12	7	50

Table 1. Clark County I/O Gross Transactions. Appendix A (Cont)

Clark County, Idaho 1996 I/O Gross Transactions	Services	Proprietary Income	Other Property Income	Indirect Business Taxes	Households	Federal Gov Non Defense/Non Military	Federal Gov Defense/ Military	State/Local Govt NonEducation	State/Local Govt Education	Enterprises (Corporations)	Capital/Inventory	exports	row total
Livestock	0	0	0	0	9,444	0	0	164	143	0	6,294	4,227,841	5,492,059
Grains	9	0	0	0	39,573	0	0	81	420	0	266,670	2,960,520	3,510,175
Hay Production & Processing	0	0	0	0	0	0	0	0	0	0	0	11,410,162	16,825,315
Potatoes Production & Processing	0	0	0	0	48,902	0	0	1,108	767	0	15,015	22,721,270	22,928,008
Agricultural Services	0	0	0	0	241	0	0	0	0	0	0	546	280,801
Const., Maint. & Mining	93,130	0	0	0	87	12,512	0	636,054	27,959	0	1,711,061	2,745,705	5,620,678
Transportation & Communication	15,489	0	0	0	259,468	1,326	0	15,696	15,876	0	24,674	927,284	2,161,040
Wholesale & Retail Trade	9,081	0	0	0	746,844	5,327	0	12,816	5,904	0	41,389	204,671	1,608,946
Gas Stations	874	0	0	0	392,064	1	0	513	0	0	7,937	18	464,294
Eating & Drinking	2,982	0	0	0	484,988	617	0	10,276	0	0	1	1,746	529,262
FIRE	12,964	0	0	0	330,504	729	0	16,022	6	0	0	294,743	1,704,500
Hotels and Lodging Places	2,778	0	0	0	69,001	110	0	9,079	3	0	0	78,429	166,930
Services	122,091	0	0	0	749,817	6,262	0	63,609	40,688	0	1,902	662,405	4,344,800
Households Res	254,365	0	0	0	0	0	0	0	0	0	0	0	2,495,671
Other Property Income	136,259	0	0	0	0	175,070	80,254	208,183	0	0	(11,431)	144,069	7,649,202
Indirect Business Taxes	16,058	0	0	0	0	0	0	0	0	0	0	0	1,660,485
Households NonRes	593,518	1,633,611	1,316,376	0	8,503,881	2,384,593	119,110	1,742,279	1,150,840	513,202	2,492,067	1,289,852	27,435,270
Federal Gov Non Defense/Non Military	184	477,570	(77,183)	344,024	2,854,275	1,669,684	780,716	108	80	558,680	7,885,774	35,576	14,547,298
Federal Gov Defense/ Military	0	0	0	0	0	980,080	80,254	0	0	0	0	0	1,060,334
State/Local Govt NonEducation	9,473	0	70,793	1,316,460	2,258,763	8,914,439	0	215,616	882	17,537	285	47,924	12,982,172
State/Local Govt Education	0	0	0	0	0	0	0	1,689,995	0	0	0	0	1,689,995
Enterprises (Corporations)	0	0	2,832,161	0	0	0	0	0	0	0	0	0	2,832,161
Capital/Inventory	208	0	661,210	0	2,050,103	74	0	7,255,375	1,463	1,742,742	1,886,765	9,197,484	22,795,441
imports	3,075,335	384,491	2,845,846	0	8,637,314	396,474	0	1,105,198	444,963	0	8,467,039	135,521	57,085,765
column total	4,344,798	2,495,672	7,649,203	1,660,484	27,435,269	14,547,298	1,060,334	12,982,172	1,689,994	2,832,161	22,795,442	57,085,766	
row total	4,344,800	2,495,671	7,649,202	1,660,485	27,435,270	14,547,298	1,060,334	12,982,172	1,689,995	2,832,161	22,795,441	57,085,765	
diff row & col	(2)	1	1	(1)	(1)	0	0	0	(1)	0	1	1	
Employment	50					53			55				

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