University of Idaho
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Idaho Fiscal Project

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IDAHO FISCAL PROJECT (9/13/99)

Introduction

Why did we do the project?

The past two decades have brought considerable change to Idaho. Population has grown to over 1.2 million persons. The commodity sectors (agriculture, forestry and mining) which are major providers of income and employment, have not grown as quickly as the recreation and electronic manufacturing. The Director of the Idaho Department of Agriculture and the Dean of the University of Idaho College of Agriculture thought more information was needed on how economic activity effected Idaho's fiscal situation. Idaho's economy has become more diversified in the past two decades. The technology of merchandising has changed resulting in larger stores serving more persons. Electronic and mail order commerce often by-pass traditional revenue collection systems. All these factors are putting pressure on local and state governmental units and the resources available to provide the needs and wants of various sectors of the public.

The is a tremendous amount of interest among decision makers in Idaho about the linkages among the economic sectors of the Idaho's economy because different policy decisions will effect groups differently. There is also considerable interest in the forward and backward linkages with a given sector basic assumption in these concerns is that the more locally provided resources used, the stronger will be the local economy. The will be more jobs and the pay levels will be higher. The second assumption is that a strong local economy will generate the funds needed by the public sector. These funds can then be used to provide needed public services and to create a positive environment for business to function.

This project was undertaken because of the continual concern about the contributions and demands on the Idaho Fiscal System. It is designed to assist public decision makers answer alternative questions about "Where should we invest the limited resources available to us? If additional resources are needed, where should they be gathered? What effect will different alternatives have on different sectors of Idaho's economy. The linkages become extremely important because some create and expand employment in Idaho's economy while others contract the same factors.

Specific Project Objectives:

1. Identify Government Revenues and Expenditures;
   - State, local, and federal
   - Link service to revenue

2. Analyze tax and expenditure policies:
   - rural - urban basis
   - economic / industry basis
   - Government programs.

Current Situation in Idaho

Note:
For the purpose of this fiscal project Idaho has been divided into rural and urban areas. Urban Idaho is defined as Ada and Canyon counties, and rural Idaho includes the remaining 42 counties.

ECONOMIC GROWTH

Economic growth in the rural, and urban areas of Idaho were 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 adjusted 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 rural and urban Idaho from 1969 to 1997 and compare it through indices with population growth for the State of Idaho.

- Between 1969 to 1997, rural Idaho's population increased by 35 percent and urban Idaho's population increased 55 percent. Total state population growth was 42 percent in the same period.
- Idaho's total population has been steadily increasing, but lagged during the late 80's. Rural Idaho's population actually declined in late 1980's (Fig 1), while urban Idaho's continued to increase, but at a slower rate (Fig 2).
- The urban areas in Idaho are growing at a much faster rate than rural Idaho and the state as a whole. Since 1988 there has been sharp increase in the urban population (Fig 3).
- In 1997 rural Idaho made up 68 percent of the Idaho population.

Figure 1
Rural Idaho Population, 1969-97

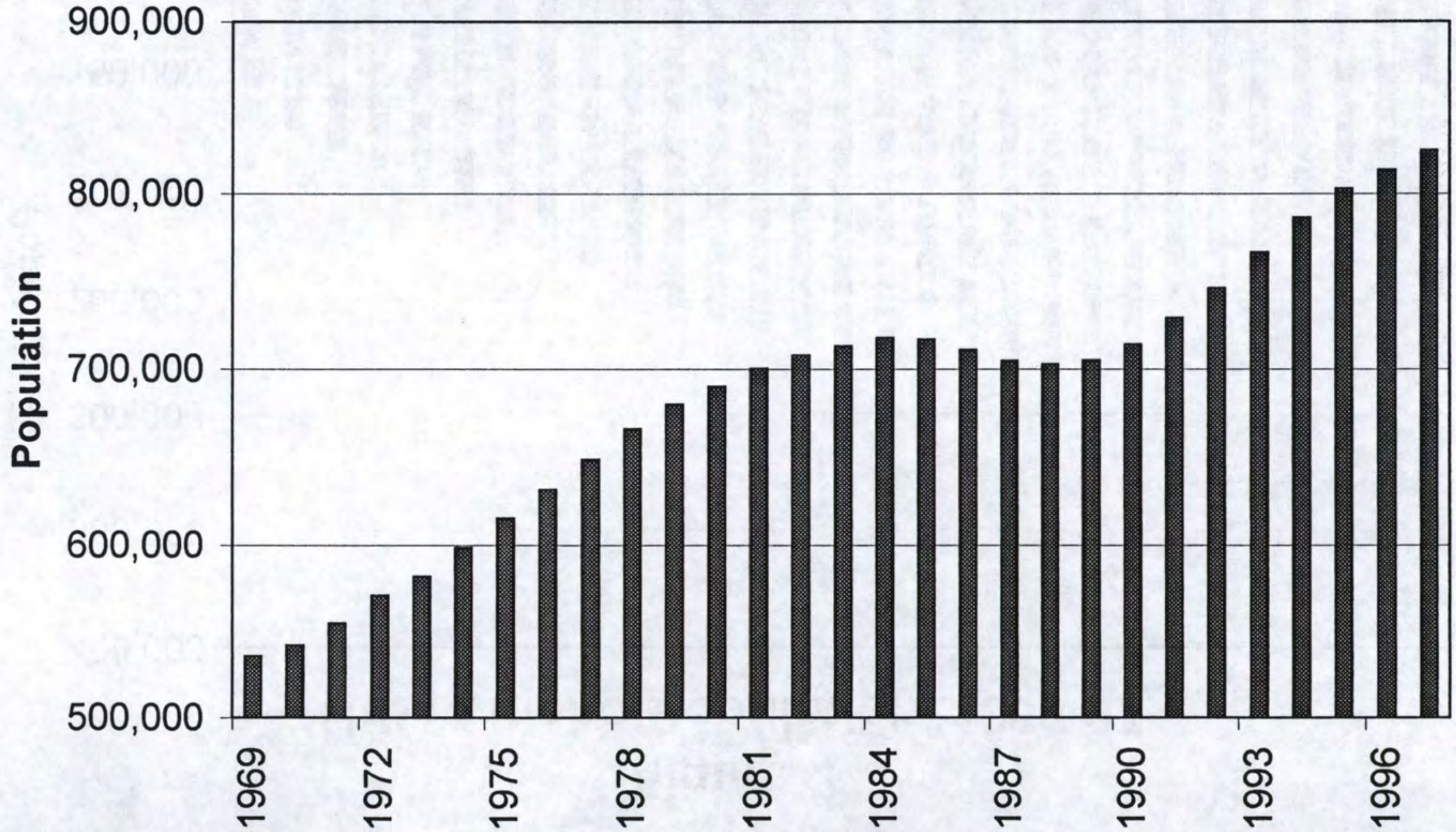


Figure 2
Urban Idaho Population, 1969-97

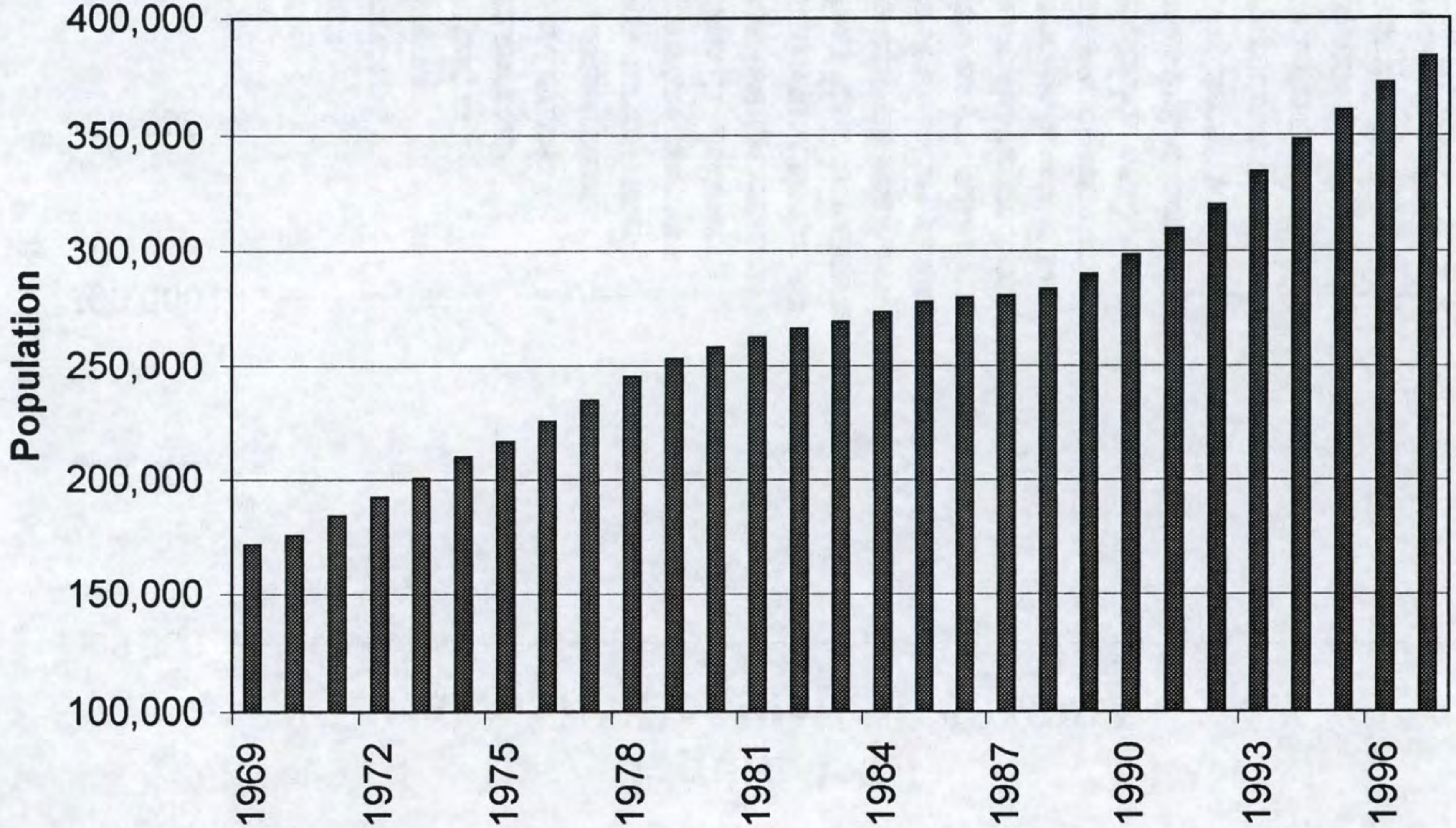
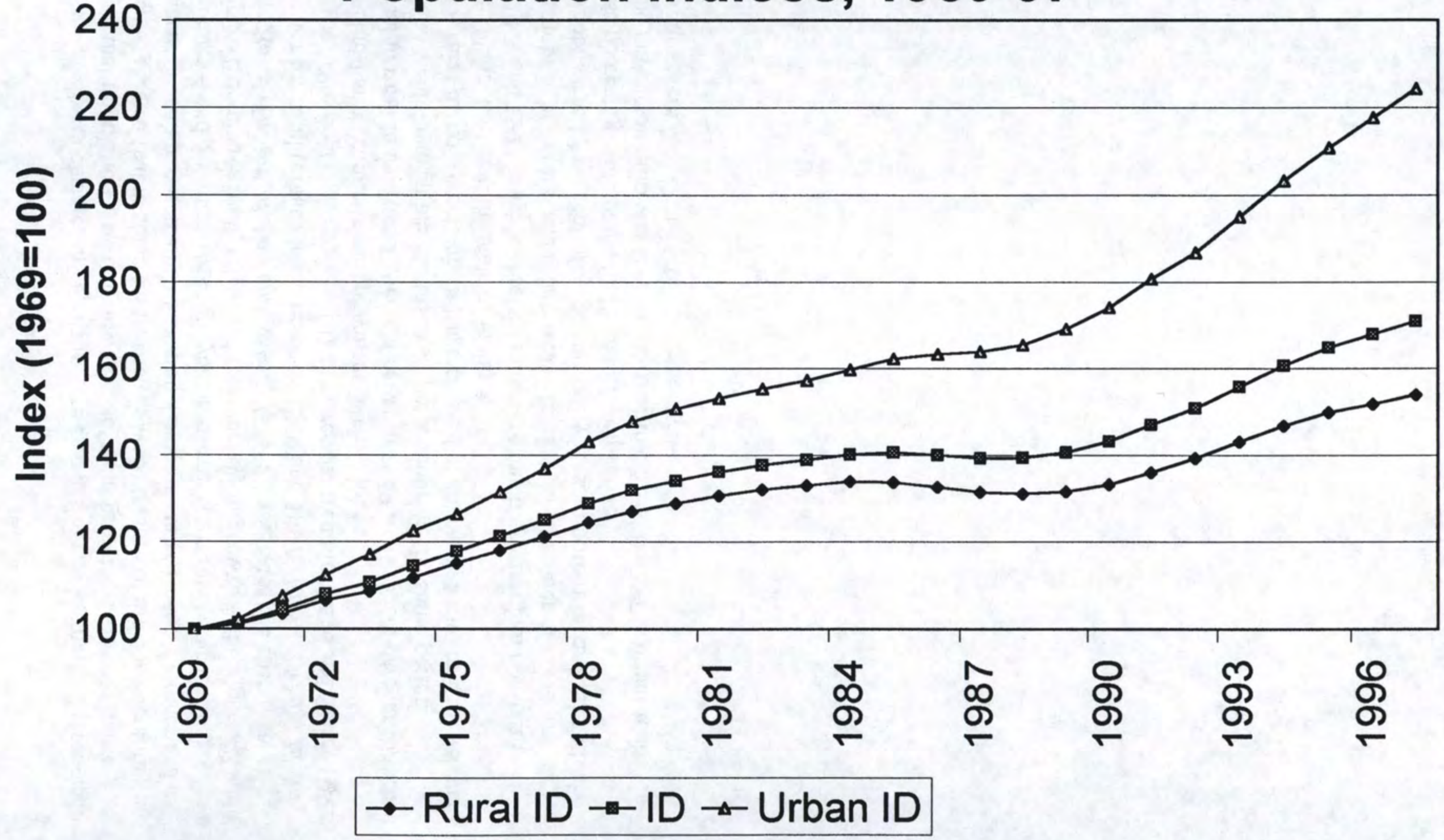


Figure 3
Population Indices, 1969-97



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 (Taylor, Fletcher and Moline, 1996). Figures 4 and 5 summarize employment growth for rural and urban Idaho, from 1969 to 1997. Figure 6 compares rural, urban and total Idaho job growth. The Figures 7 and 8 labeled *Changes in Rural (Urban) Idaho Employment, 1969-97,* indicates the change in employment by sector for rural (urban) Idaho between 1969 and 1997. *Rural (Urban) Idaho Employment by Type, 1969-97* (Figures 9 and 10)compares the trend in Wage and Salary (W&S) jobs with that for Non-Farm Proprietors Employment (NFPE) jobs.

- Employment in rural Idaho rose 51 percent between 1969 to 1997, 32 percent for urban Idaho. Idaho's employment has increased 44 percent during the same period.
- Since 1987, rural Idaho's employment has increased at an average rate of 3.09 percent per year, urban Idaho 4.89, and the state of Idaho 3.70.
- Between 1969 and 1997, wage and salary jobs were much greater than non-farm proprietors jobs in both rural and urban areas. In 1969, the number of non-farm proprietor jobs were 18 percent of wage and salary jobs, in both rural and urban Idaho. In 1997, these percentages increased to 28 and 23, respectively.
- In 1969 the job/person ratio was 0.4365 for rural Idaho and 0.4757 in urban Idaho. In 1997 the ratios were 0.5547 and 0.6705, respectively.

Figure 4
Rural Idaho Employment, 1969-97

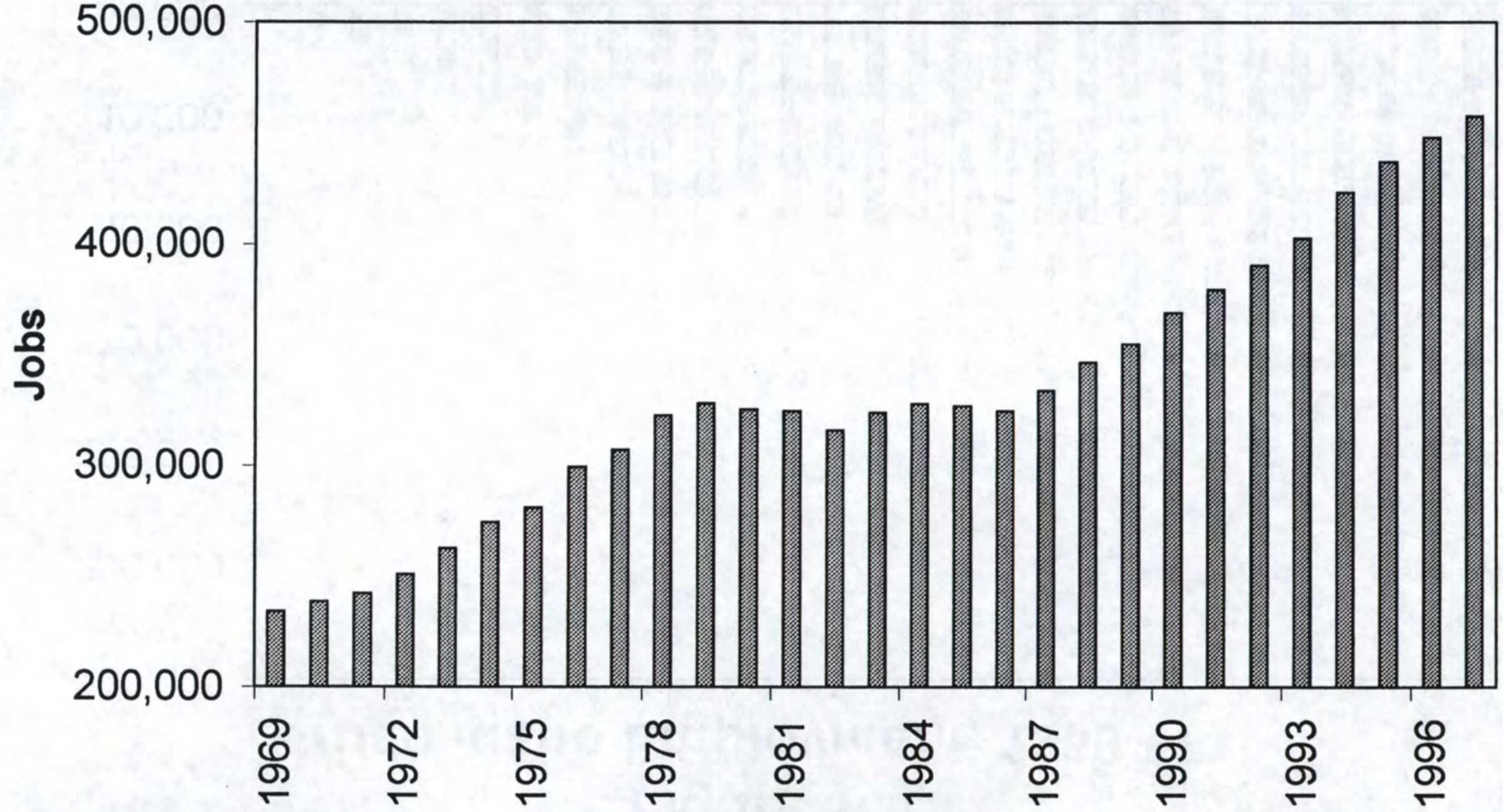


Figure 5
Urban Idaho Employment, 1969-97

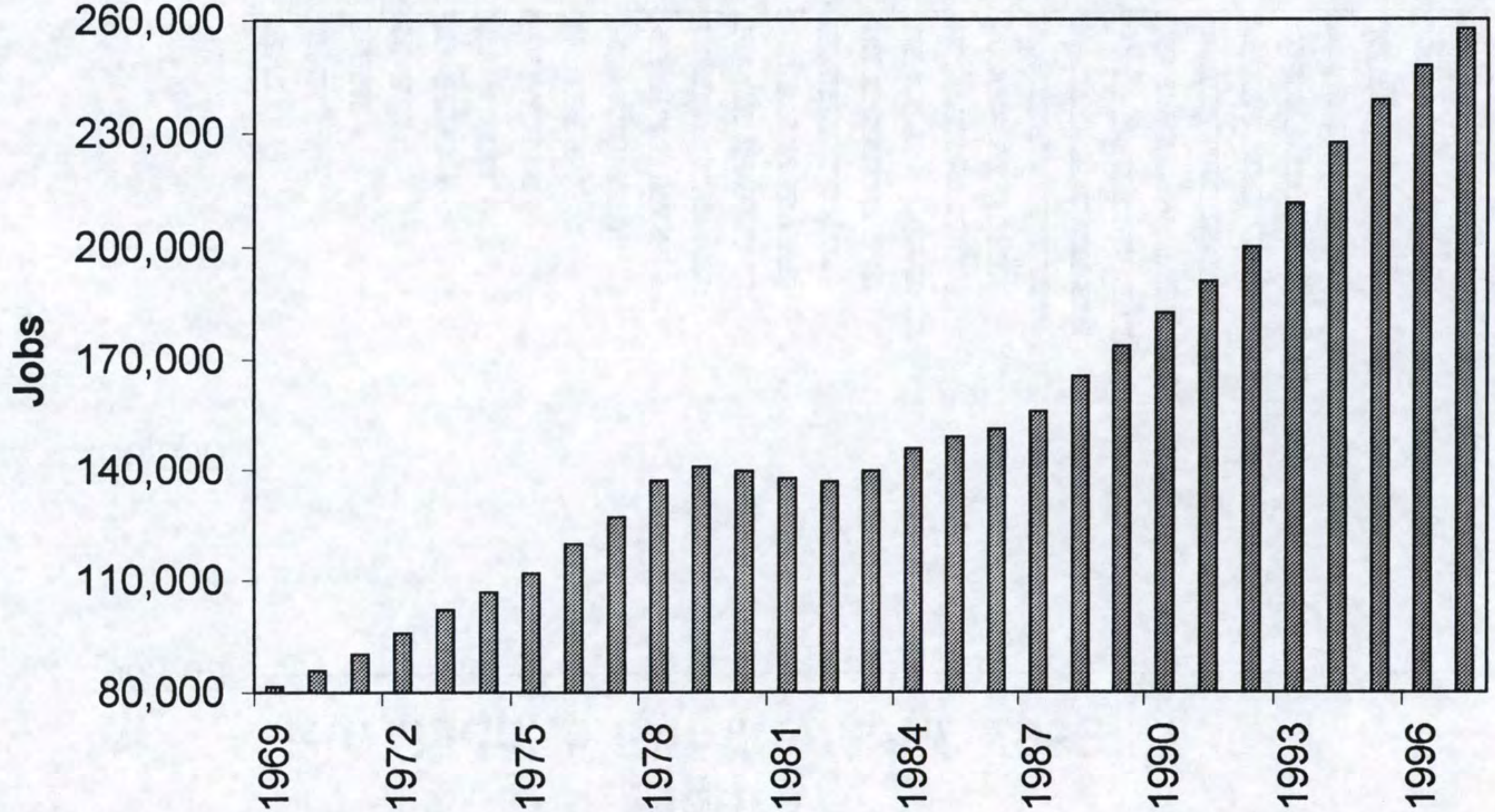
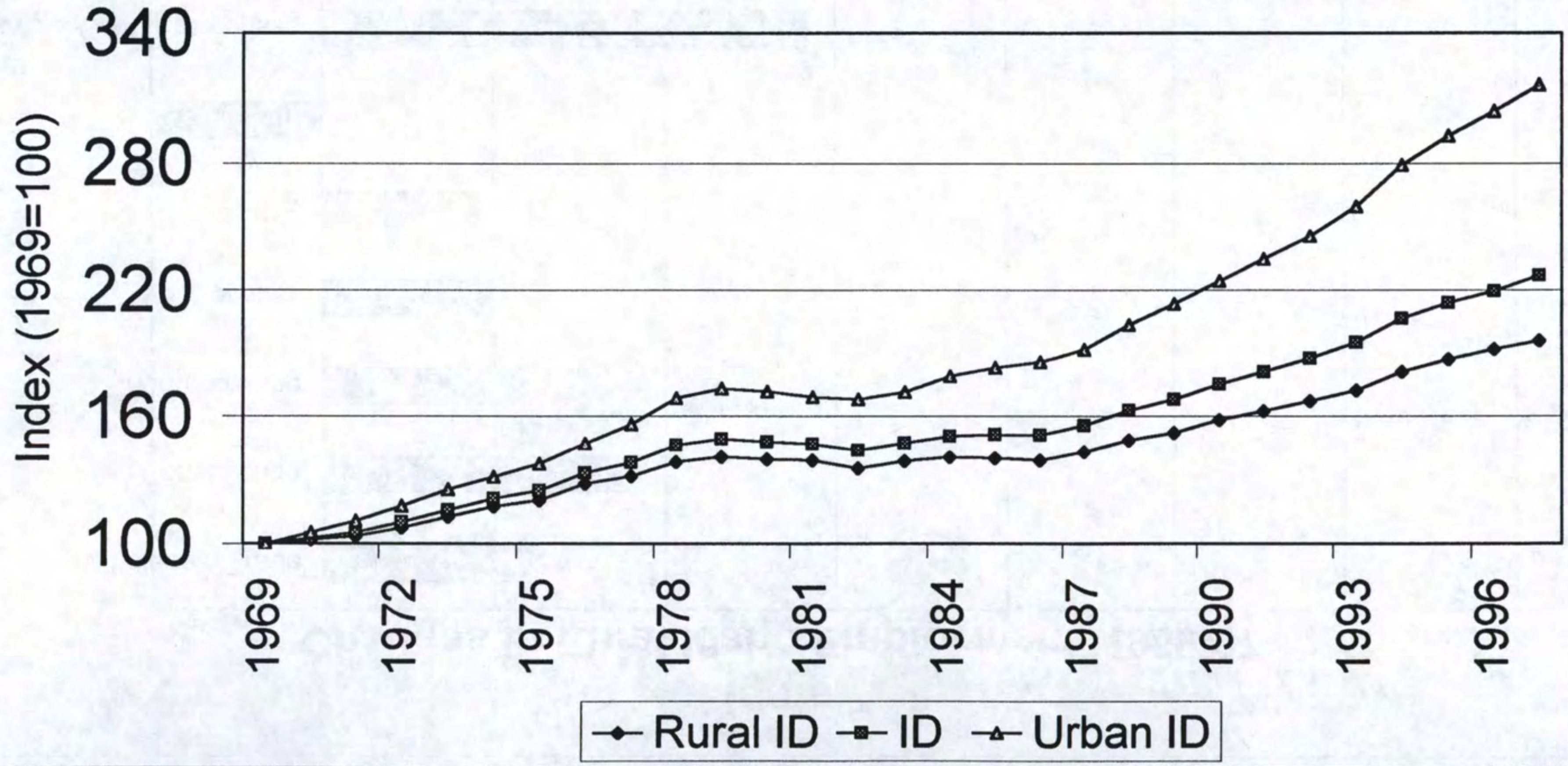


Figure 6
Employment Indices, 1969-96



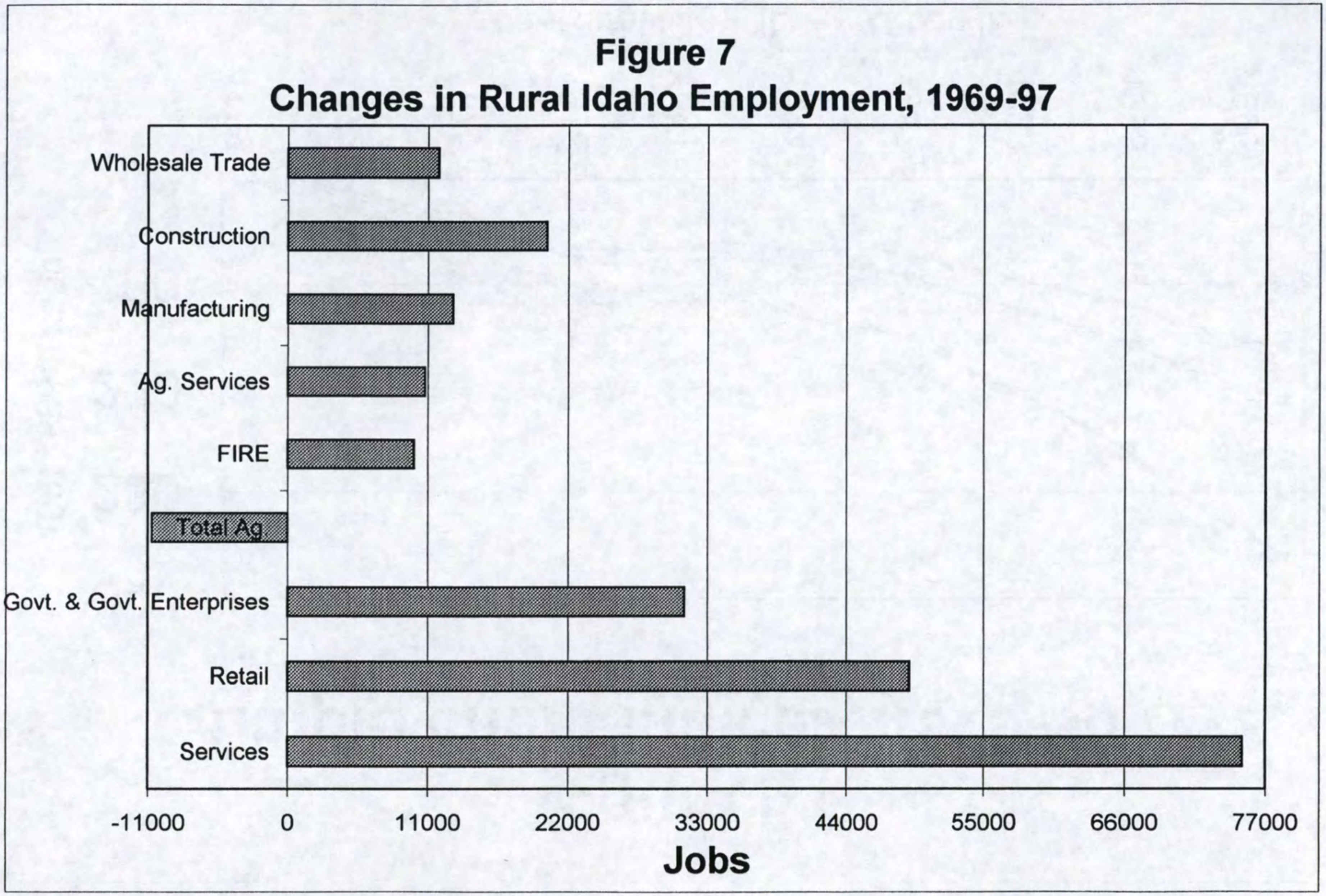


Figure 7
Changes in Rural Idaho Employment, 1969-97
Wholesale Trade
Construction
Manufacturing
Ag. Services
FIRE
Total Ag.
Govt. & Govt. Enterprises
Retail
Services
-11000
0
11000
22000
33000
44000
55000
66000
77000
Jobs

Figure 8
Changes in Urban Idaho Employment, 1969-97

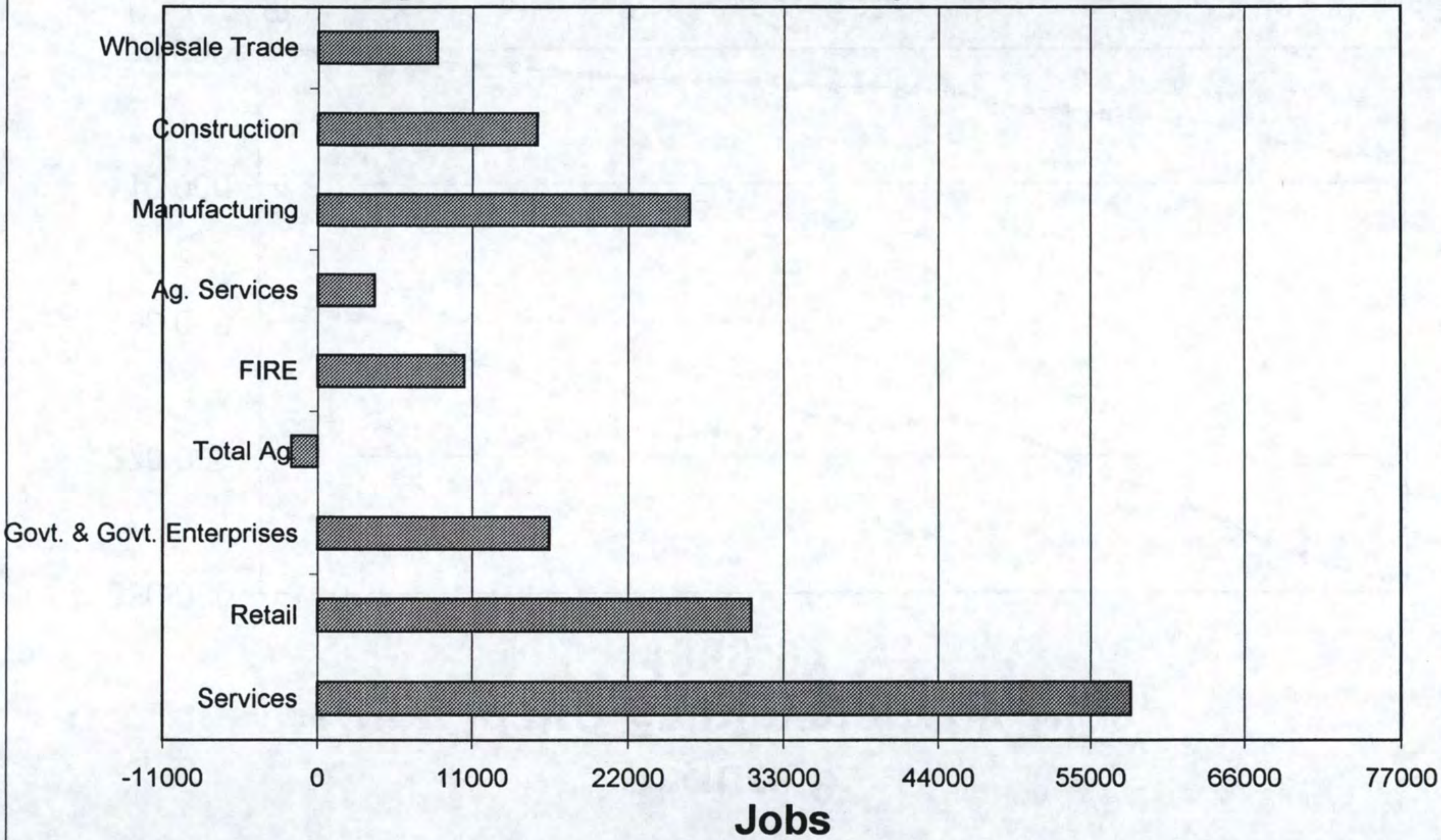
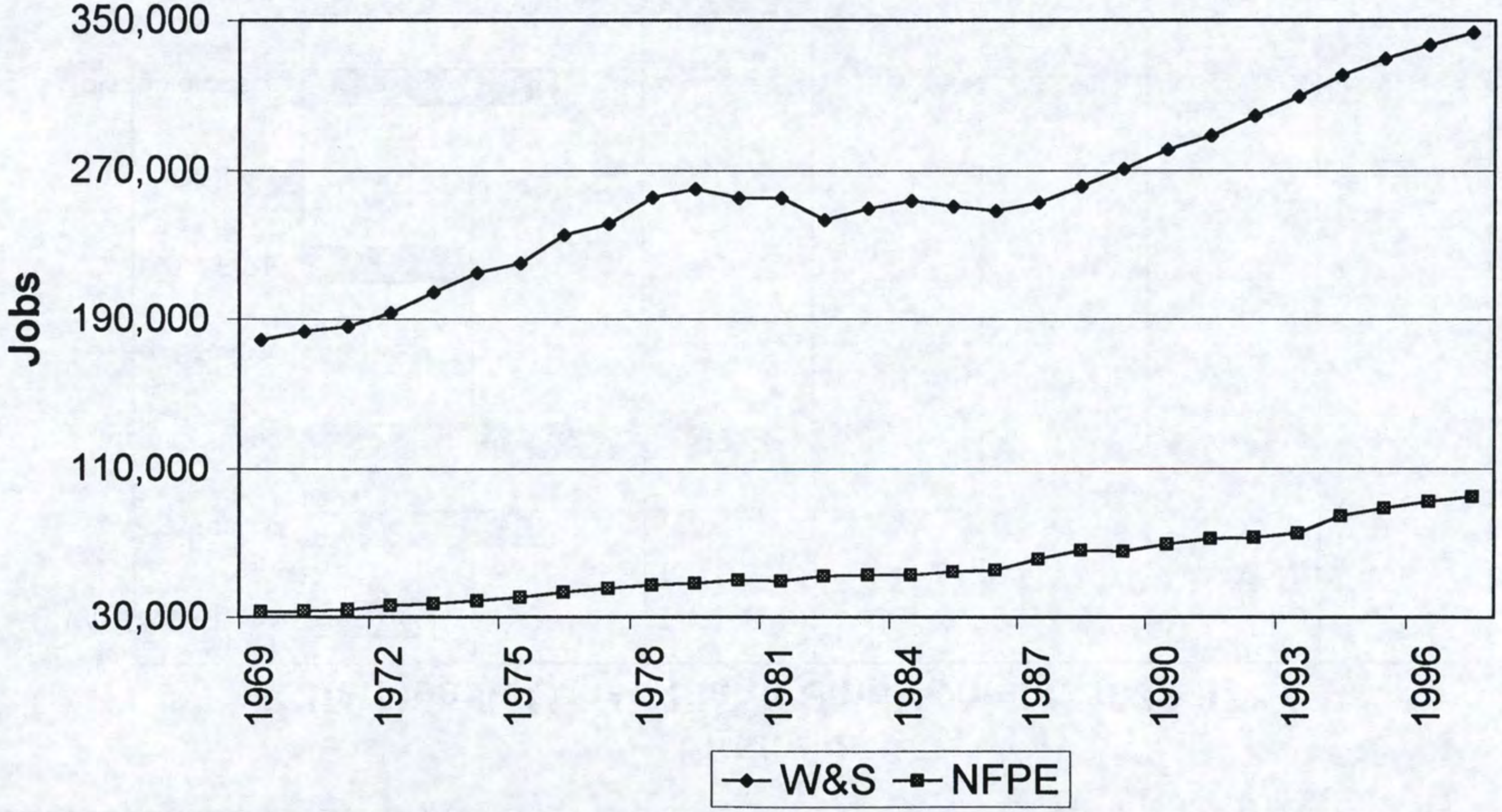


Figure 9
Rural Idaho Employment by Type, 1969-97



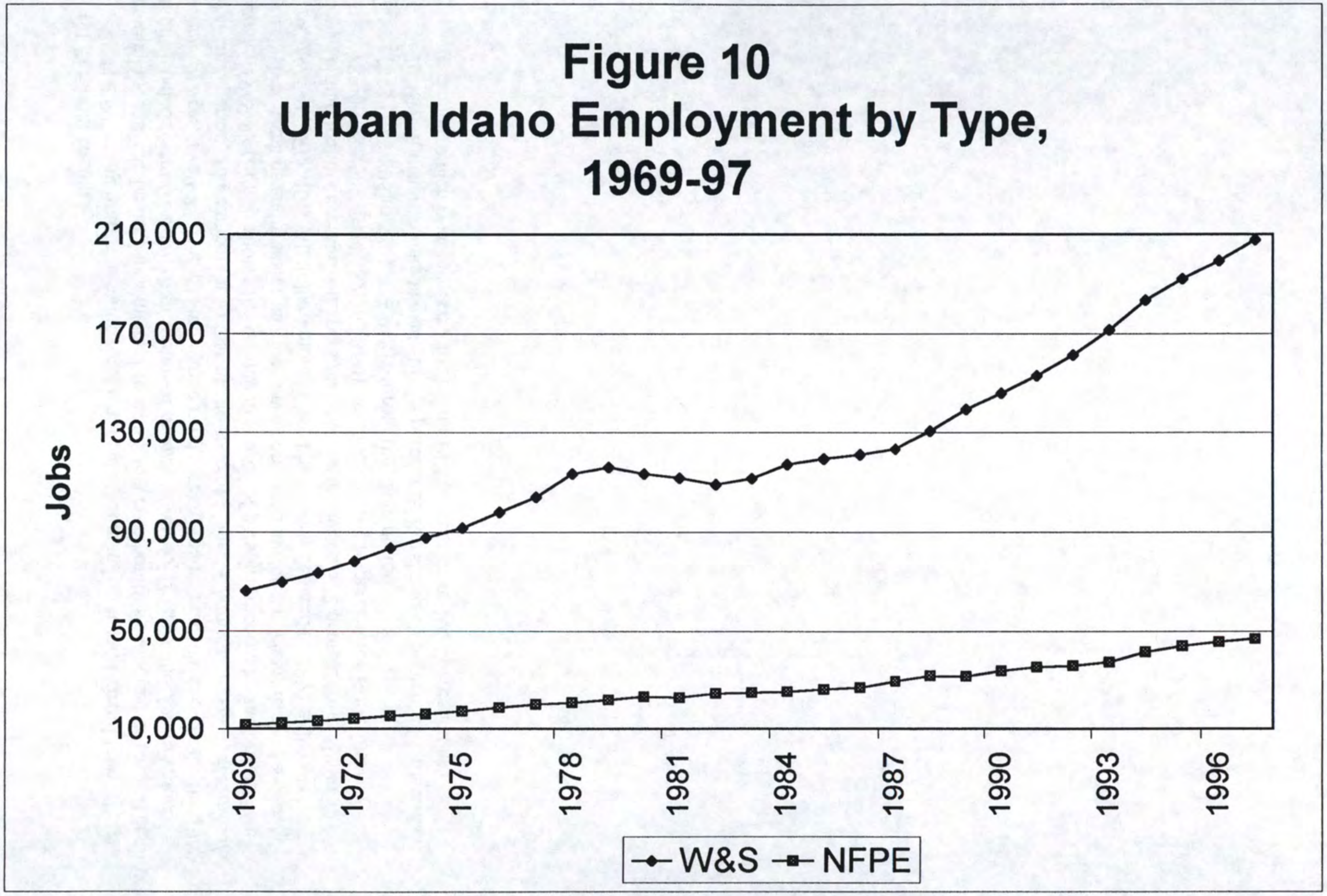


Figure 10
Urban Idaho Employment by Type,
1969-97
Jobs
210,000
170,000
130,000
90,000
50,000
10,000
1969
1972
1975
1978
1981
1984
1987
1990
1993
1996
W&S
NFPE

Total Personal Income

The following graphs describe total personal income in Rural and Urban Idaho. Total personal income can be used as a method to estimate a community's economic growth. The three graphs labeled *Rural (Urban) Total Personal Income, 1969-97 (Fig. 7)* and *Total Personal Income Indices, 1969-97 (Fig. 8)* summarize rural (urban) Idaho's income growth for the 1969 to 1997 time period, and compare it to that of the state of Idaho. *Change in Rural (Urban) Idaho Income, 1969-97 (Fig. 9)* shows the change in source of personal income by sector for these areas. Net earnings and transfer payments are compared in *Rural (Urban) Idaho Income by Type, 1969-97 (Fig.* 10). All dollar amounts used have been deflated to 1992 dollars.

- Urban Idaho's average total personal income increased 392 percent from 1969 to 1997 ($1,067,82,087 to $4,182,383,360); and increased 234 percent for Rural Idaho ($137,343,805 to $321,438,012), during the same period.
- In 1997 transfer payments made up 29 percent of Rural and 18 percent of Urban Idaho's earnings, which is an increased for both of 12 percent from 1969 percentages.

Figure 11
Rural Idaho Avg. Total Personal Income, 1969-97

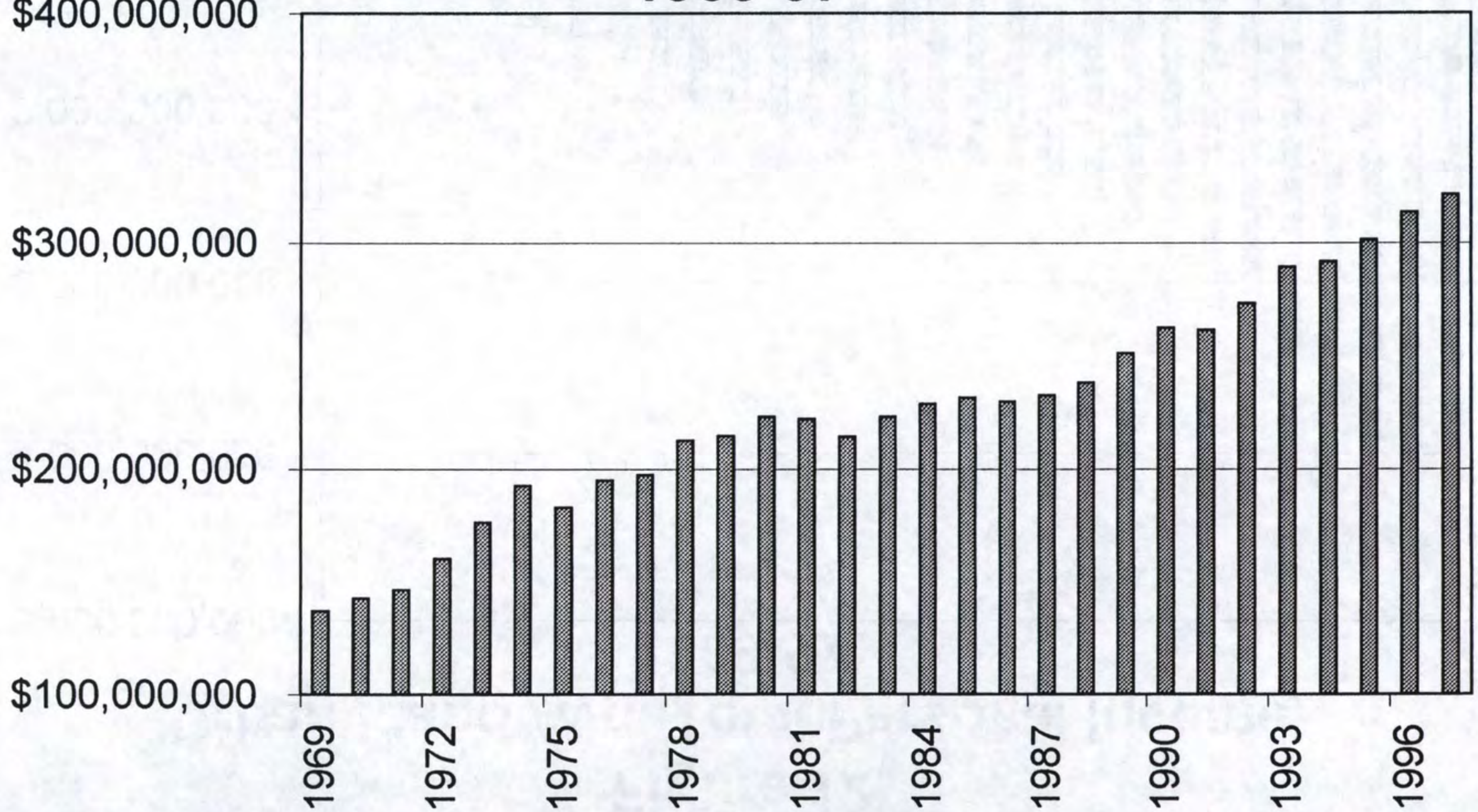


Figure 12
Urban Idaho Avg. Total Personal Income, 1969-97

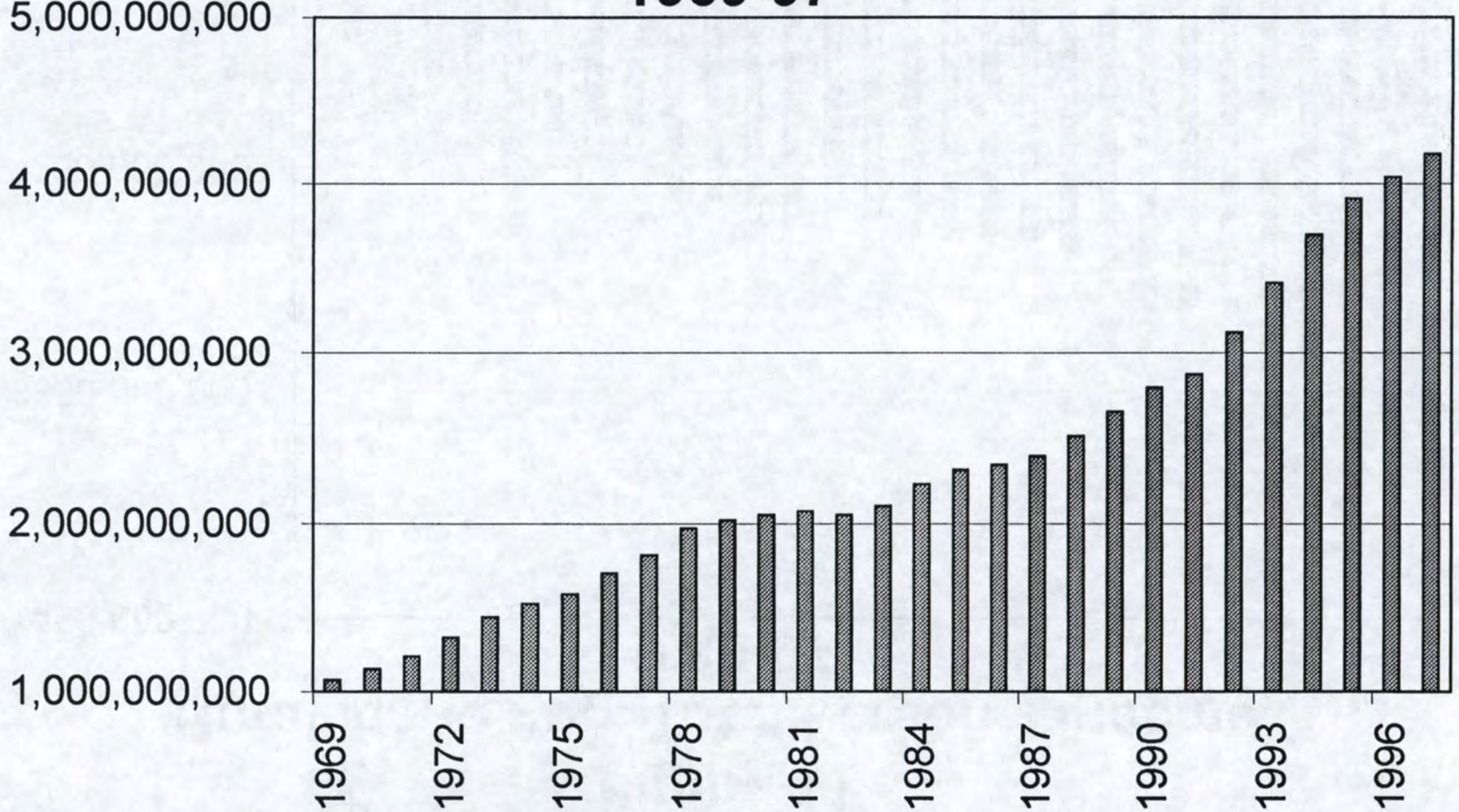
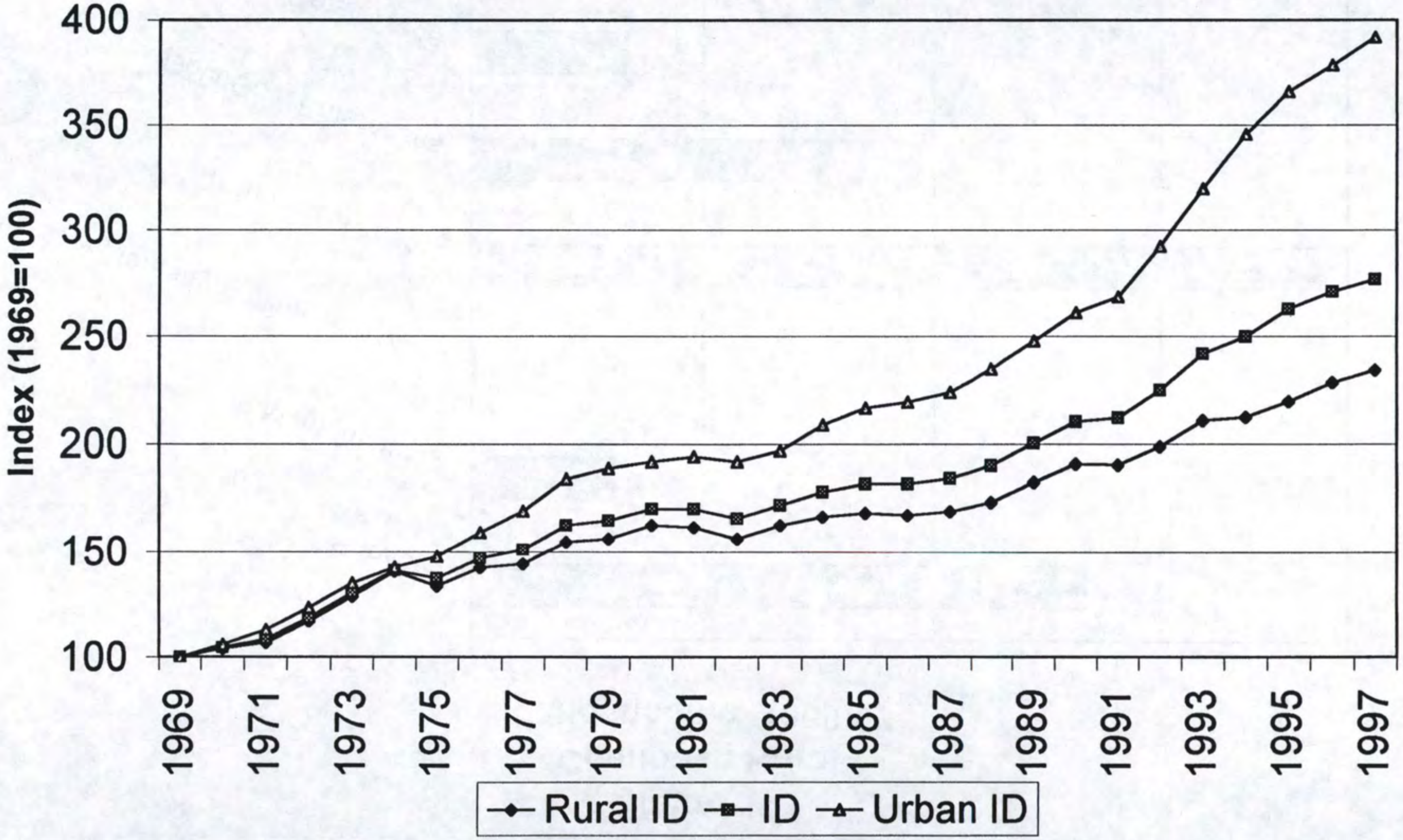


Figure 13
Total Personal Income Indices, 1969-97



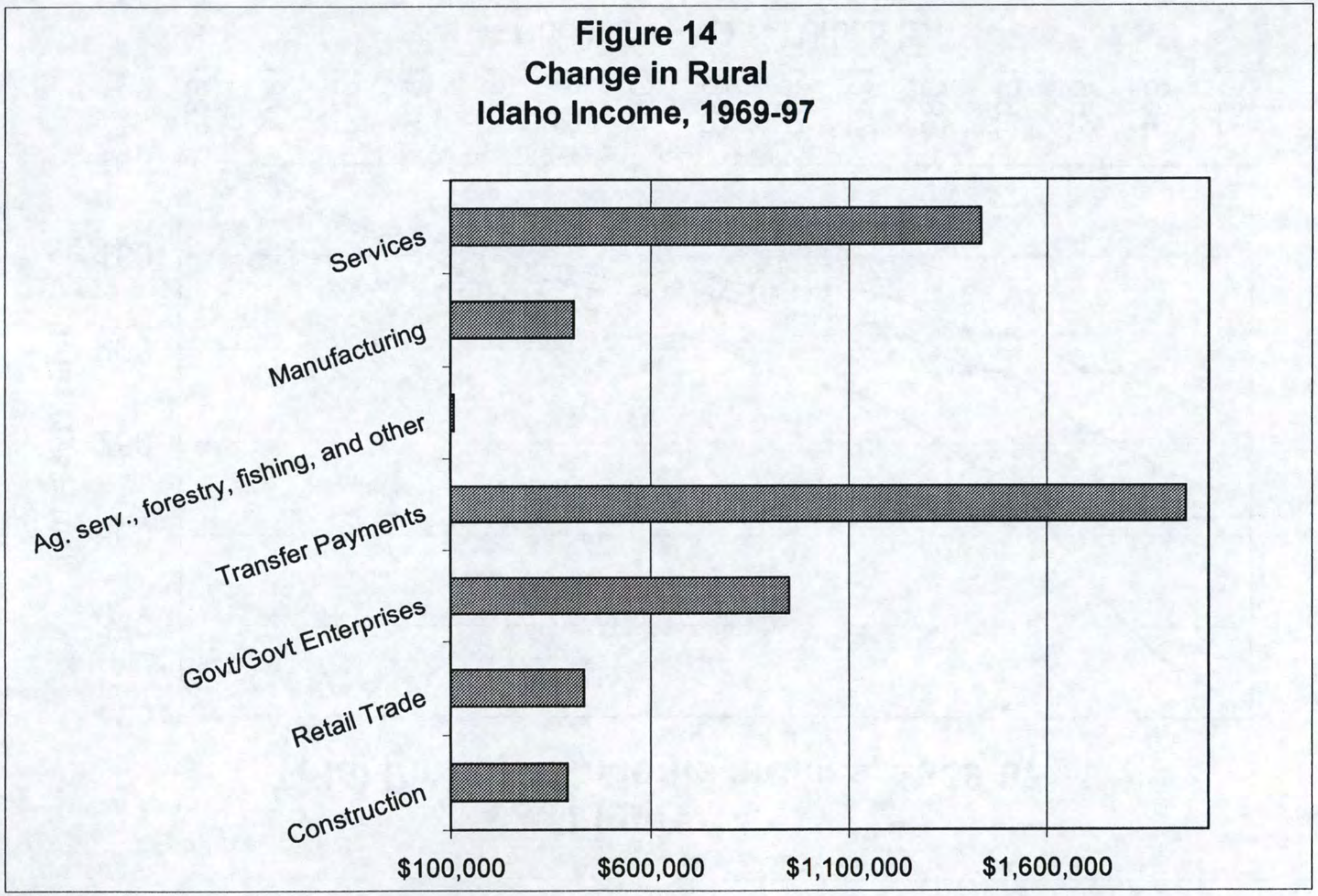


Figure 14
Change in Rural
Idaho Income, 1969-97
Services
Manufacturing
Ag. serv., forestry, fishing, and other
Transfer Payments
Govt/Govt Enterprises
Retail Trade
Construction
$100,000
$600,000
$1,100,000
$1,600,000

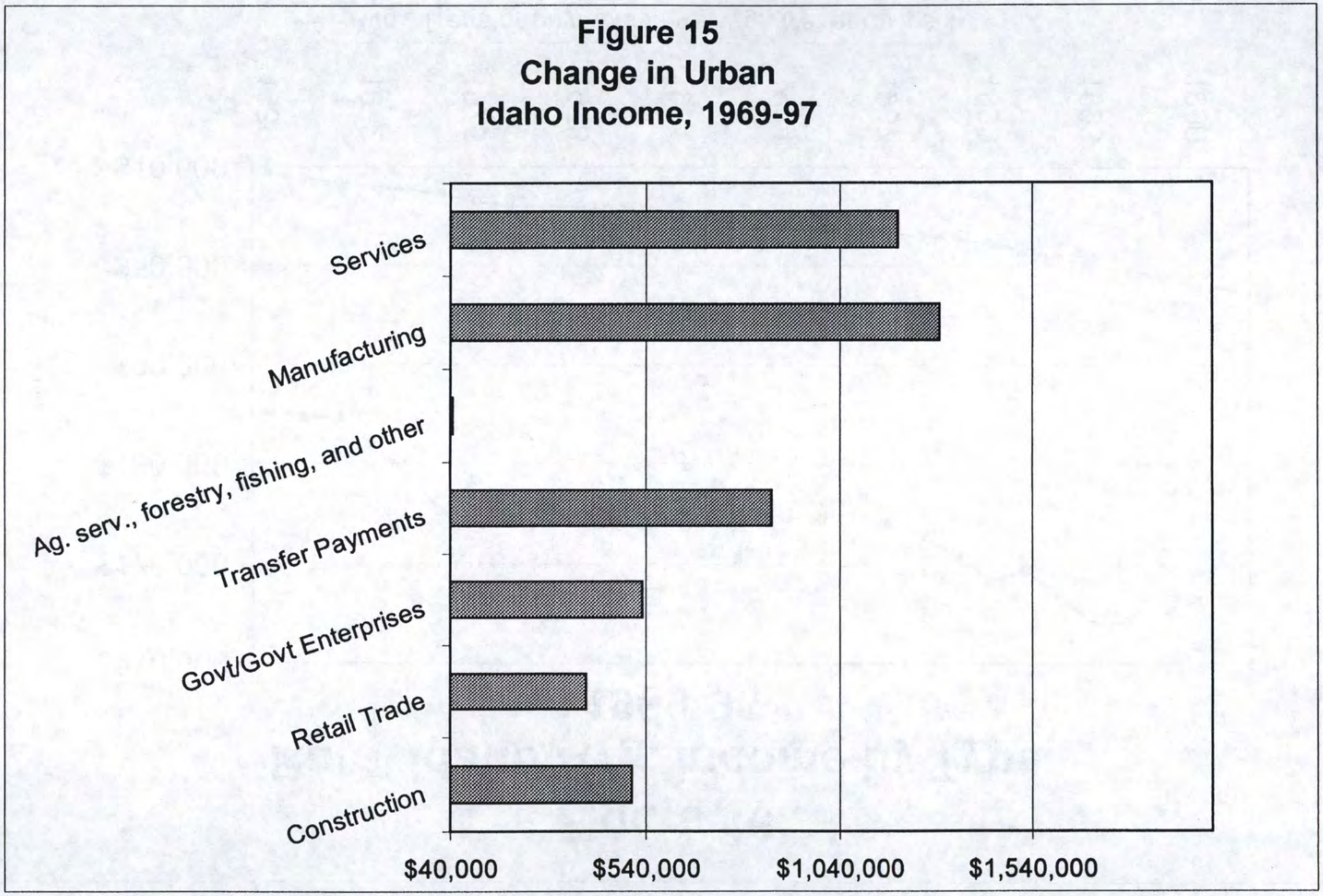


Figure 15
Change in Urban
Idaho Income, 1969-97
Services
Manufacturing
Ag. serv., forestry, fishing, and other
Transfer Payments
Govt/Govt Enterprises
Retail Trade
Construction
$40,000
$540,000
$1,040,000
$1,540,000

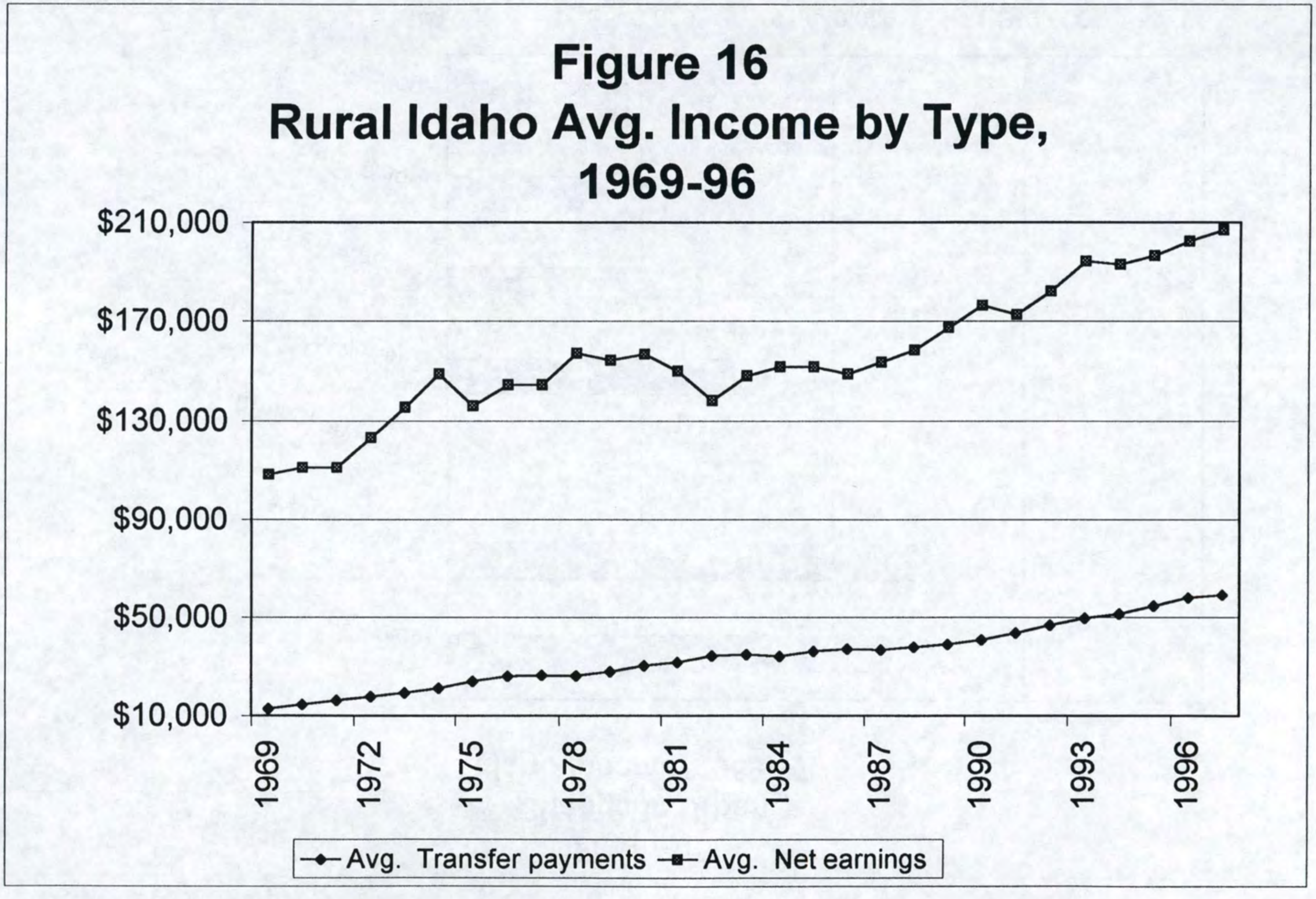
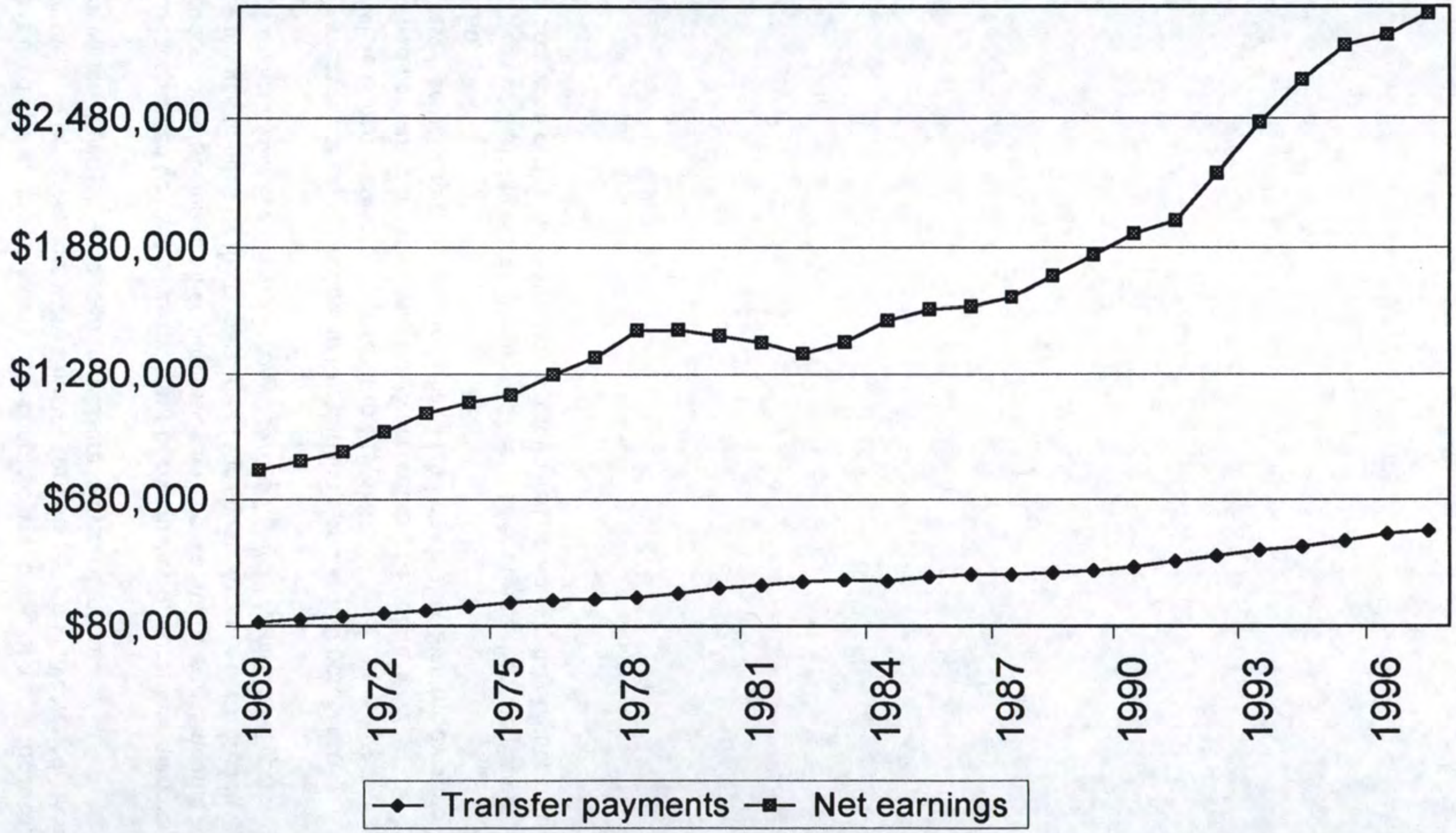


Figure 16
Rural Idaho Avg. Income by Type, 1969-96
$210,000
$170,000
$130,000
$90,000
$50,000
$10,000
1969
1972
1975
1978
1981
1984
1987
1990
1993
1996
Avg. Transfer payments
Avg. Net earnings

Figure 17
Urban Idaho Income by Type, 1969-97



Individual Income

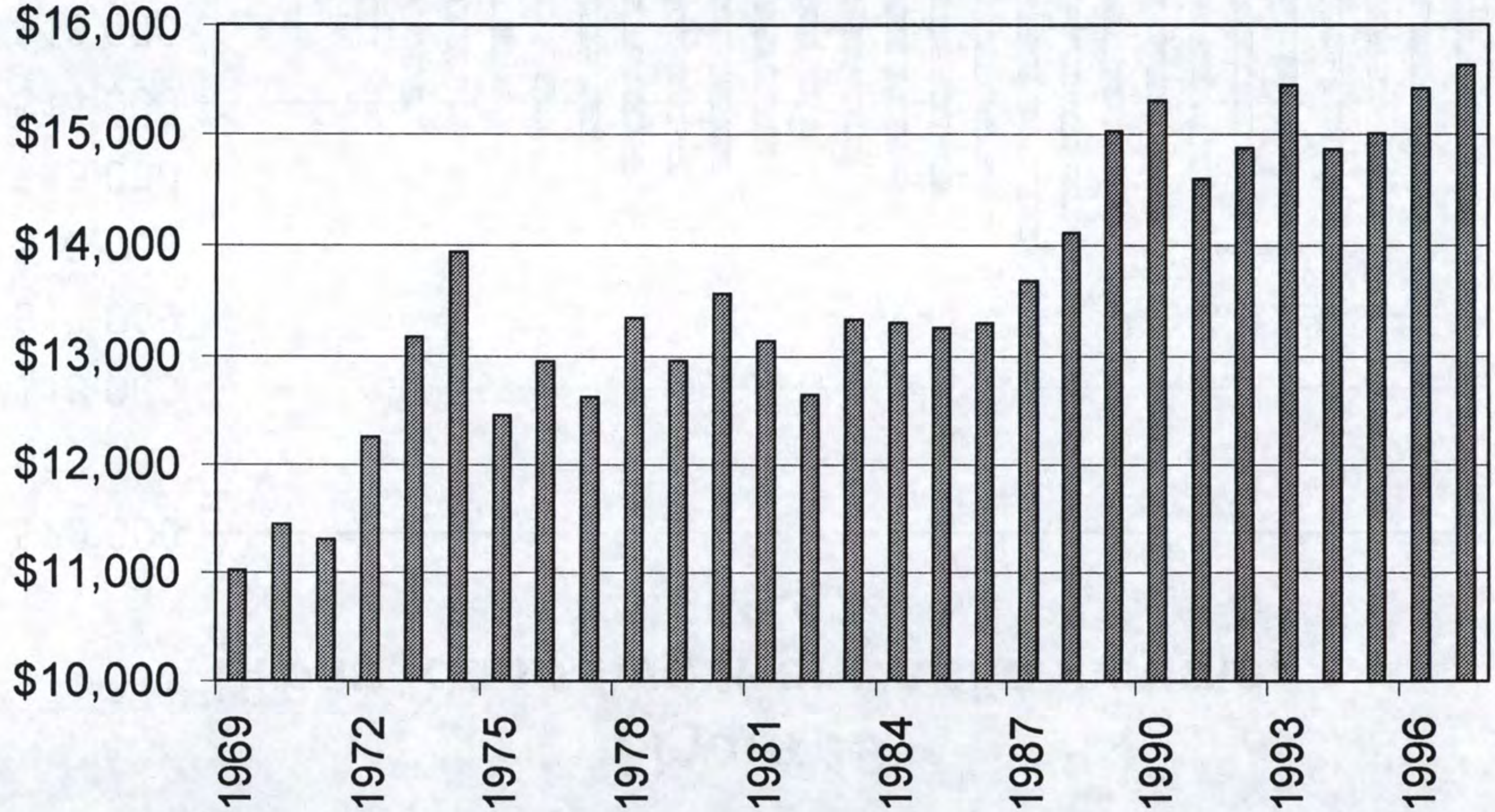
Individual income is used as a scale to measure the economic well-being of a specific area, and the people who reside there. These numbers were adjusted for inflation and have varied. Per capita income and average earnings per job were used to measure individual income.

Per Capita Income

Per capita personal income can be used as an indicator of the quality of consumer markets, and shows the average 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 and are illustrated in the figures labeled *Rural (Urban) Idaho Per Capita Income, 1969-97 (Fig. 11)* and *Per Capita Income, 1969-97 (Fig. 12).*

- Between 1969-97, average per capita income in Rural Idaho increased 30 percent to $15,629 in 1997, while Urban increased 40 percent to $19,888.
- The state of Idaho had per capita income increase 38 percent to $18,088 in 1997.
- Between 1969-97 average per capita income in Urban Idaho was higher than the average for the state of Idaho.
- Rural Idaho's average per capita personal income has been lower during the time period 1969-97, with the exception of the early 70's when it followed or was slightly higher than the state of Idaho.

Figure 18
Rural Idaho Avg. Per Capita Income, 1969-97



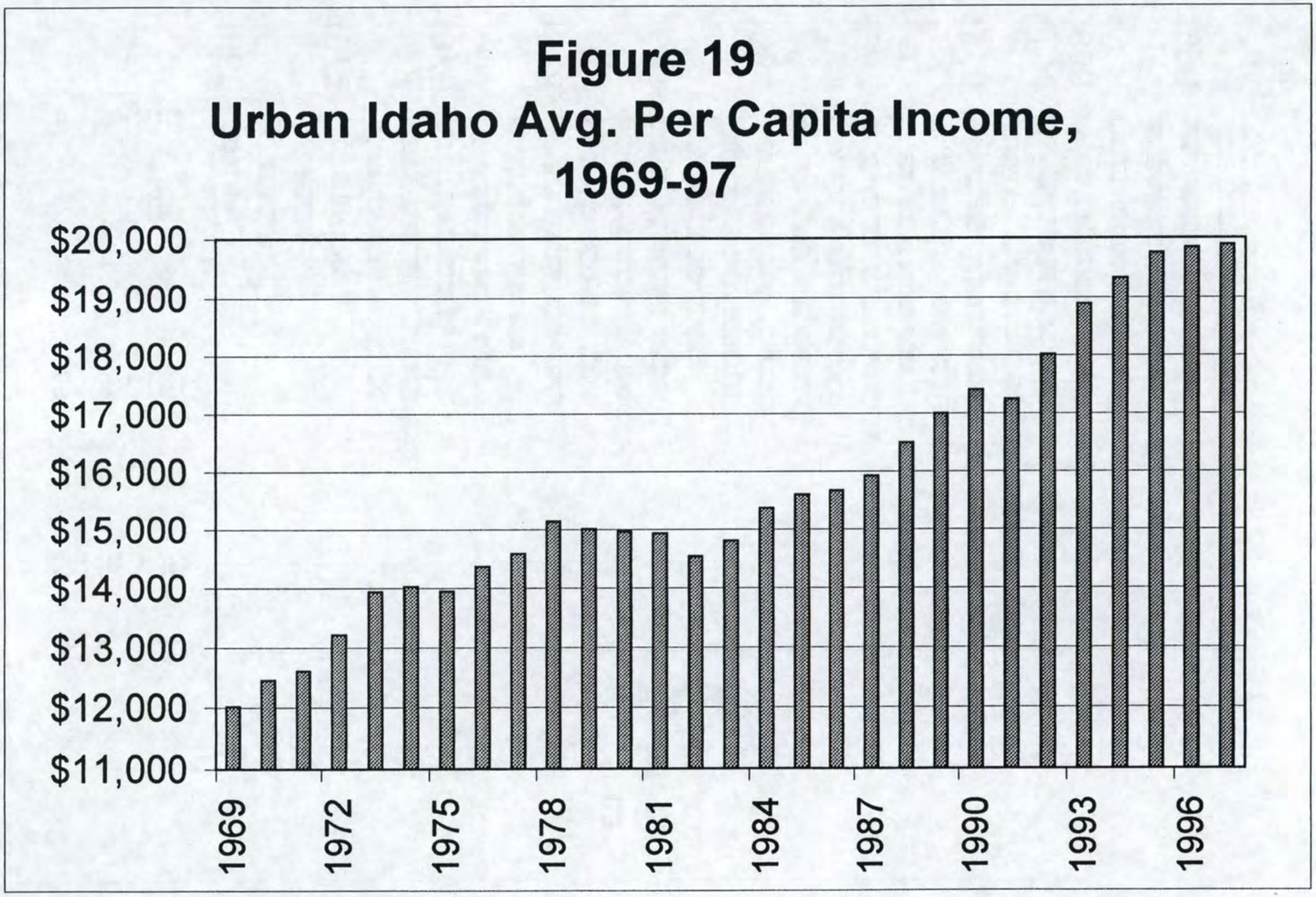
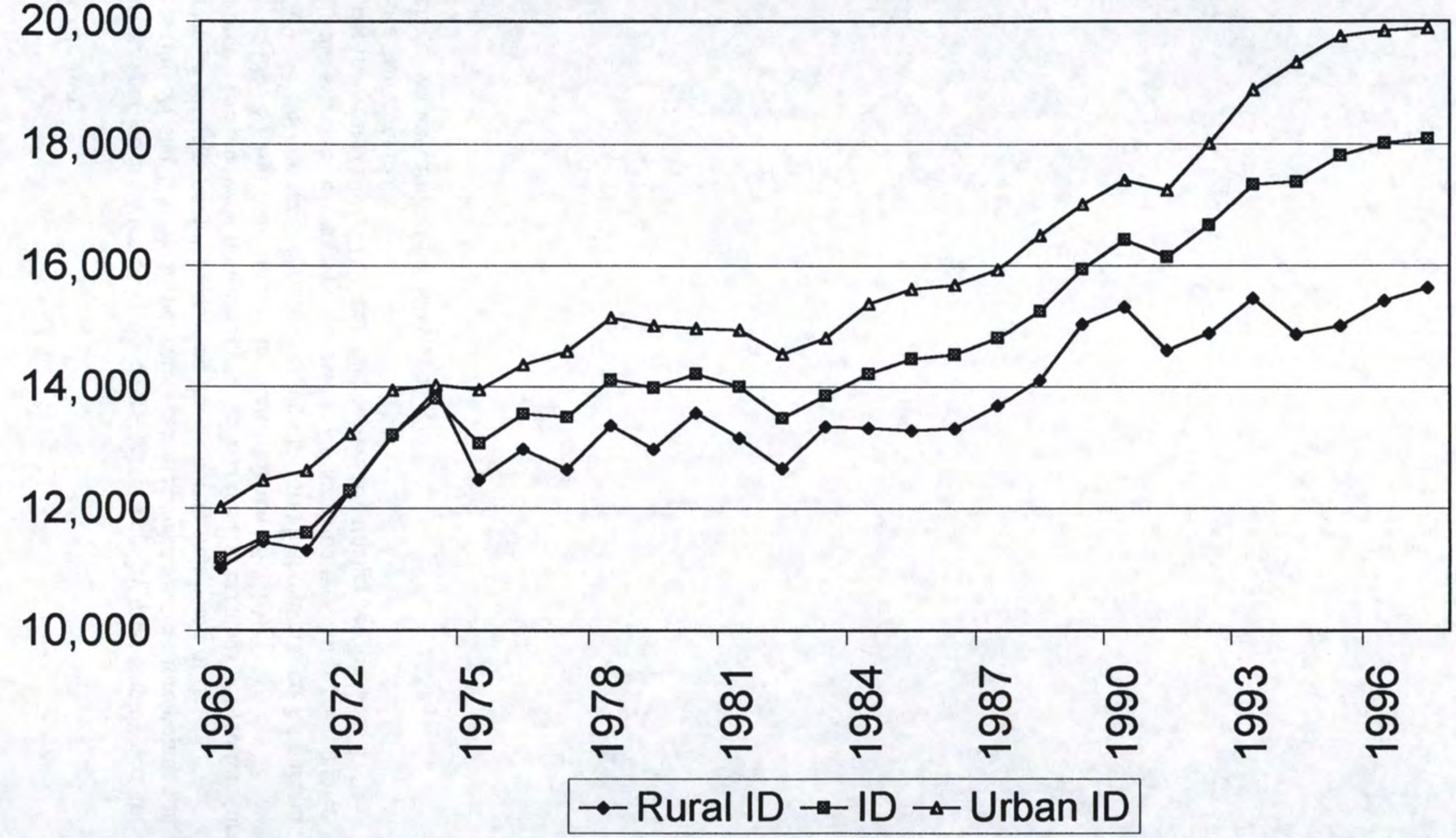


Figure 19
Urban Idaho Avg. Per Capita Income,
1969-97
$20,000
$19,000
$18,000
$17,000
$16,000
$15,000
$14,000
$13,000
$12,000
$11,000
1969
1972
1975
1978
1981
1984
1987
1990
1993
1996

Figure 20
Avg. Per Capita Personal Income, 1969-97



Average Earnings Per Job

Average earnings per job is estimated by dividing total earnings by total employment for rural and urban areas (Fig. 21 and 22). 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 Rural and Urban Idaho from 1969-97 and compare it to the state of Idaho (Fig. 14).

- Between 1969 and 1997, average earnings per job for Rural Idaho averaged 7.4 percent lower than Idaho's average earnings per job, while Urban Idaho was 2.0 percent higher.
- During the last five years (1993-97), urban Idaho average earnings per job were 21 percent higher than rural Idaho.
- In 1997 Idaho's average earnings per job was $21,714.

Figure 21
Rural Idaho Avg. Earnings Per Job, 1969-97

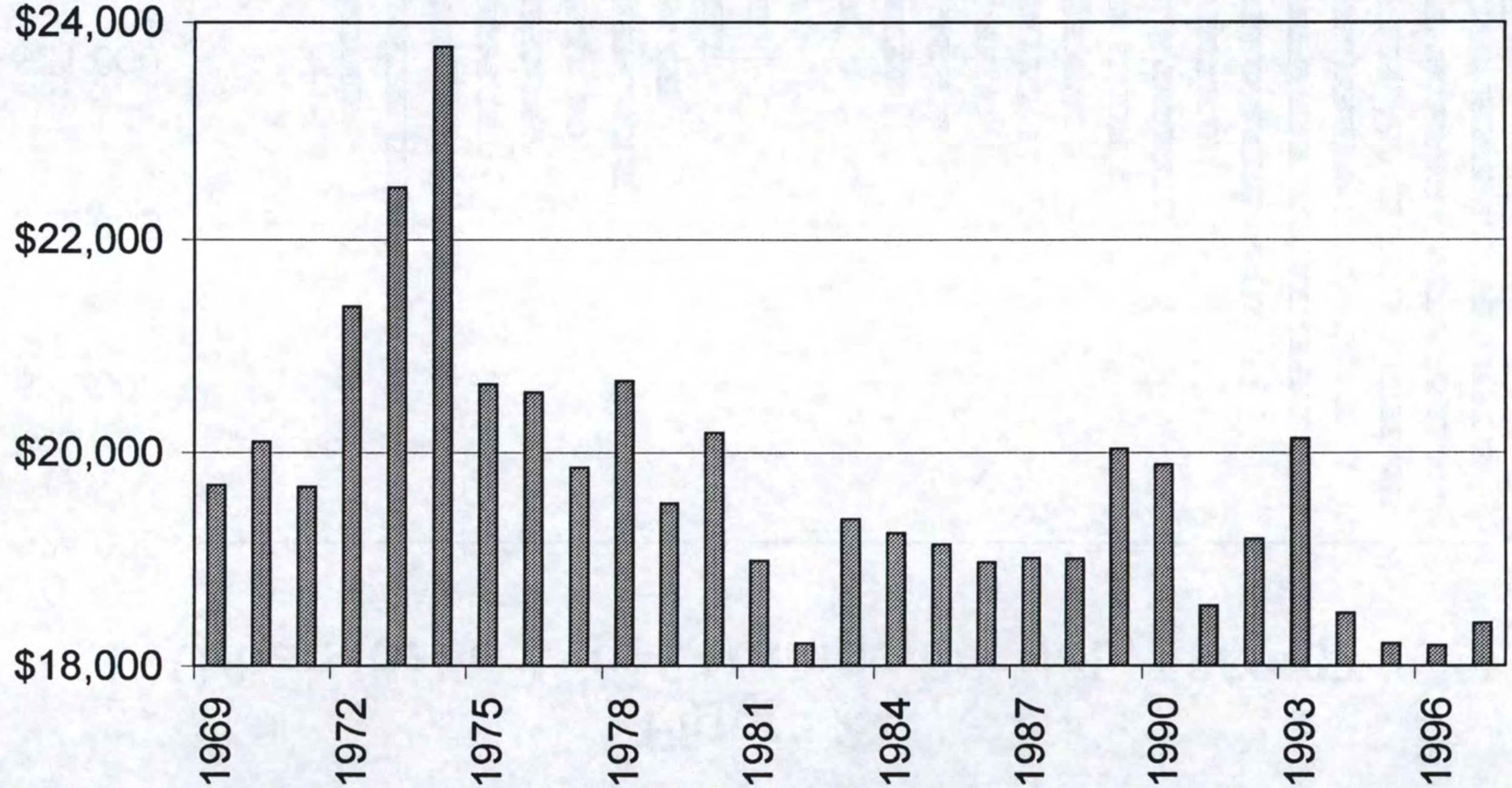


Figure 22
Urban Idaho Avg. Earnings Per Job, 1969-97

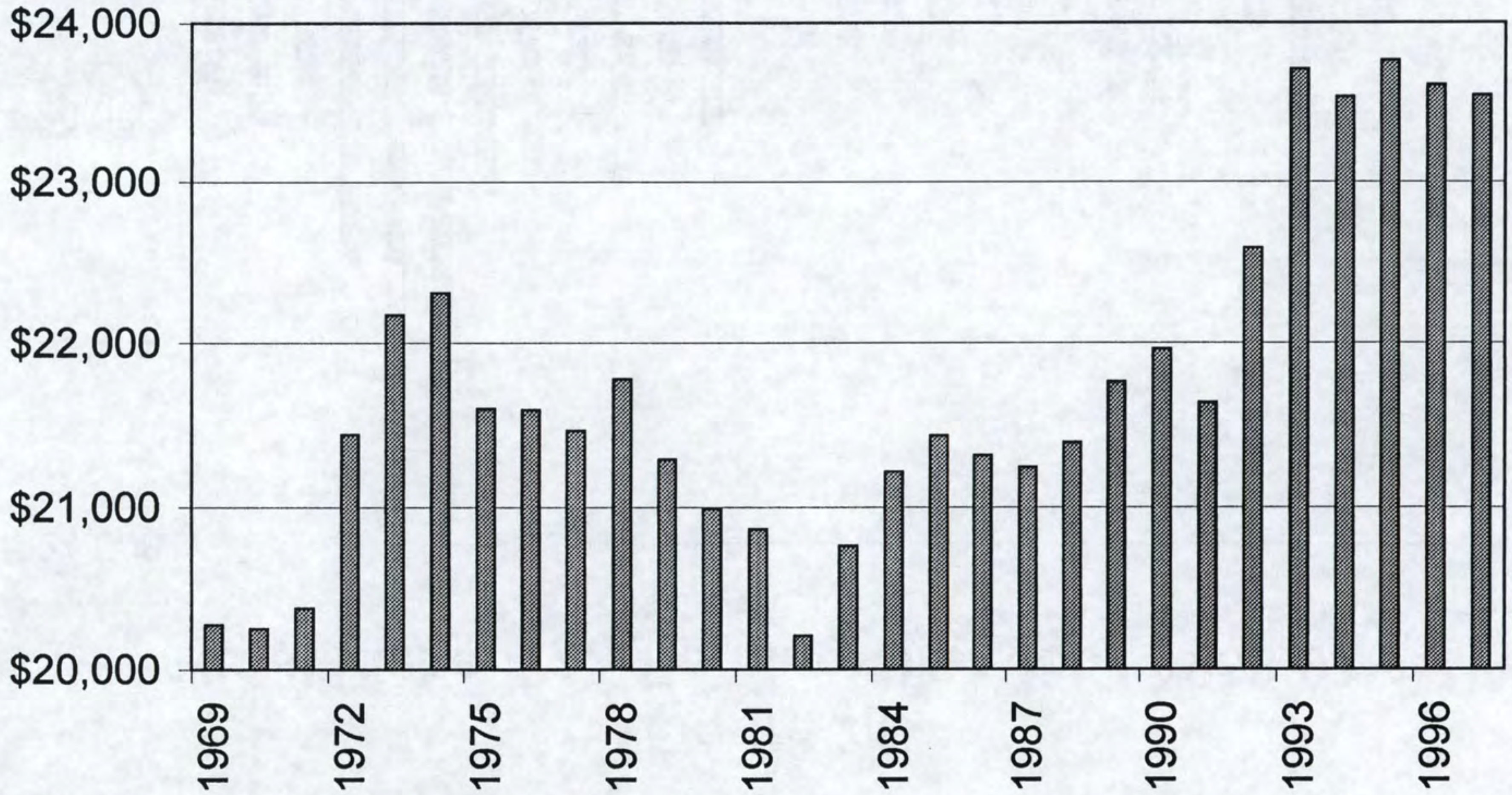
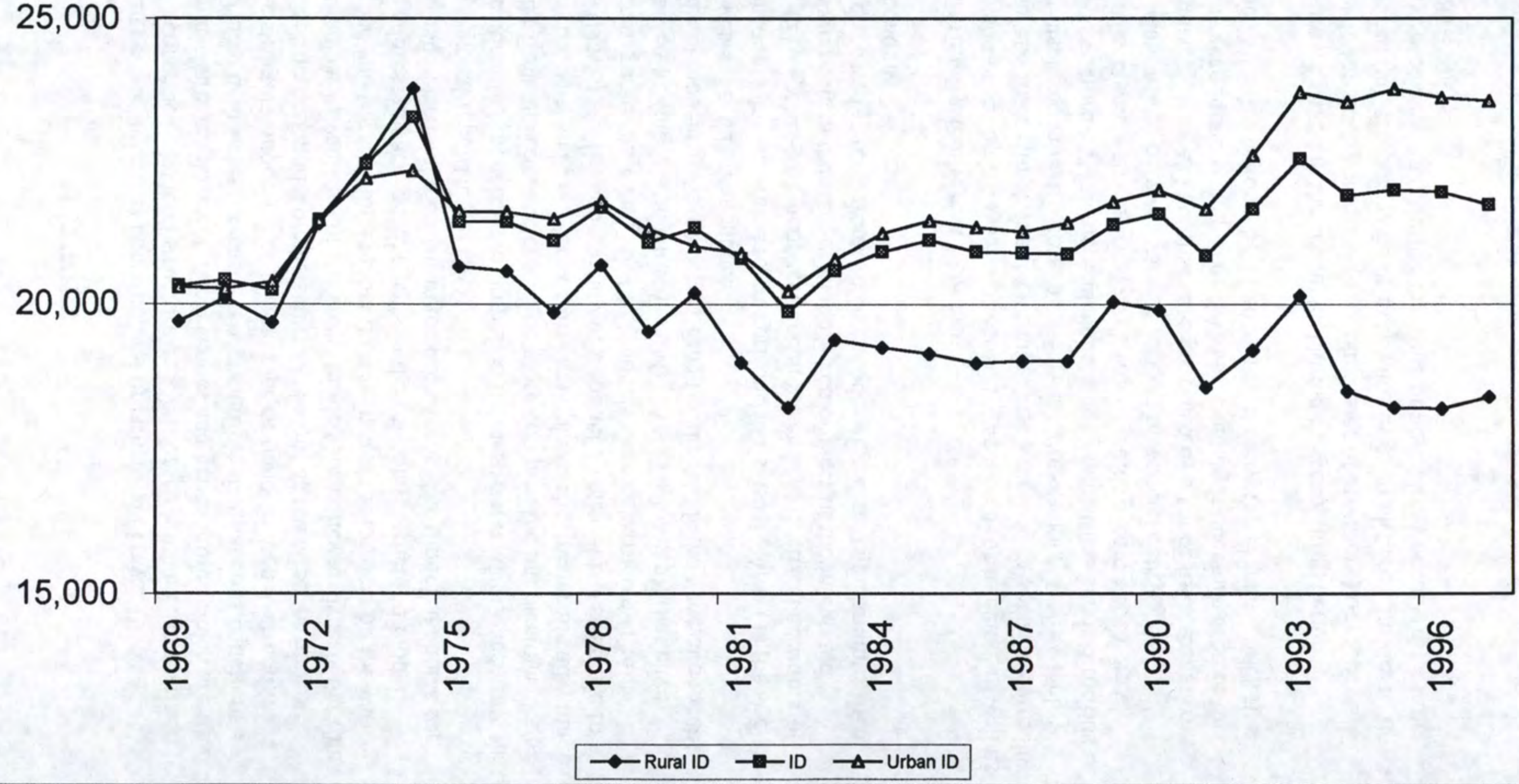


Figure 23
Average Earnings Per Job, 1969-97



METHODS

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 mechanism 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) that have proliferated use of regional I/O modeling. At the heart of the fiscal SAM is the general concept of I/O accounts and regional general equilibrium models.

Three systems of accounts are integrated to comprise Idaho's fiscal SAM: (1) the social accounting matrix (SAM), (2) a spatial core-periphery accounts, and (3) the fiscal accounts of state, local and federal governments in the state of Idaho. Each of facet of the integrated accounting system will be discussed in turn, from which a model of general equilibrium is then developed for the Idaho economy.

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 which depicts the economic structure and interdependencies among industries, and institutions of the Idaho economy. A social account is an empirical framework resulting from a theoretical structure which sets forth relationships between various aspects of a social entity.

As with any accounting system, I/O accounts are governed by a set of rules that allows a uniform interpretation of the accounting system. The SAM accounting framework used in this study was adapted from the IMPLAN regional SAM accounts. Briefly, the principal rules that guide accounting are:

- Flows, not stocks, are measured in the accounts. 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. Flows occur over a time period, for this study 1996.

- I/O accounts measure real production, distribution and consumption transactions and exclude asset transfer. Thus, finance, and trade industries account for only commissions or trade margin -- wholesale and retail trade sales are margined sales.

Spending flows among sectors in the I/O framework are displayed as a table or matrix. 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 in Figure 1: quadrant (1) intermediate processing transactions matrix, (2) final demands, (3) primary inputs to processing, and (4) primary inputs to final demands.

	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**

Figure 1 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. 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. Final demand are exogenously determined sales, the driving force for the economy.

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 Idaho economy. Primary inputs are 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.

Quadrant 4 - Primary Inputs to Final Demands -- The fourth quadrant records the primary inputs purchased directly by the sectors of final demand.

SAM Accounting Framework

SAM accounts detail the flow of income to households and other institutions, missing from I/O accounts. SAM accounts extend the detailed interindustry transfers to households, institutions, and enterprises. In SAM accounts the transfers or linkages between household incomes and household expenditures are detailed and the linkages between government revenues sources and government expenditures are detailed. Added to the interindustry accounts of the I/O model are expanded accounts for factors, enterprises, and institutions of the Idaho economy. The IMPLAN SAM accounting framework is shown in Figure 2.

	Industry	*Factors*	*Institutions*	*Enterprises*	*Capital*	*Trade*	*Total*
Industry	Interindustry		Consumption		Consumption	Exports	**Industry Outlay**
Factors	Value Added					Exports	**Factor Outlay**
Institutions	Sales	Transfers	Transfers	Transfers		Exports	**Institution Outlay**
Enterprises							**Enterprise Outlay**
Capital					Transfers	Exports	**Capital Outlay**
Trade	Imports	Factor Trade	Imports		Transfers	Exports	**Trade Outlay**
Total	**Industry Outlay**	**Factor Outlay**	**Institution Outlay**	**Enterprise Outlay**	**Capital Outlay**	**Trade Outlay**	

Fiscal

A *Fiscal Social Accounting Matrix* (i.e. fiscal SAM) was created to illustrate the linkages between government sector and the economy of Idaho by industry. The starting point of the fiscal accounting framework was an IMPLAN SAM model which was reorganized to fit Idaho's unique tax and expenditure system. We collected tax and expenditure data for all levels in Idaho, local, state, and federal and carefully compared that data to IMPLAN's database, updating it where necessary. A Comparison is made between the fiscal accounts of our model versus IMPLAN in **Figure 3**.

Figure 3

Fiscal Sam Model (Rural)	Fiscal Sam -- IMPLAN
Property Tax Education	Federal Government NonDefense
Property Tax Non Education	Federal Government Defense
Sales Tax	State/Local Govt NonEducation
Other Taxes	State/Local Govt Education
State Corporate Tax	Indirect Business Taxes
State Income Tax	Federal Government - Military
Total State	Federal Government - Non-Military
Local Government	
K-12/Community Colleges	
Universities	
Federal Corporate Tax	
Total Federal	
Federal Military	

Tax Collection and Payments

The following taxes were individually broken-out of the IMPLAN accounting framework so that they could be considered separately in the model. The rows represent which industry, agency or group paying the taxes and the corresponding columns represent which industry, group, or agency who is collecting the taxes and where the money is spent. Each row in the fiscal SAM has a corresponding column.

Local Property Tax

Property tax was allocated to the rural and urban regions of our model. It also was divided into education support and noneducation collections since it is reported separately by taxing district. For example, the model reports for the rural region, $21.3 million in noneducation sales taxes collected from agriculture, $8 million collected from ag. processing, $38.4 million from manufacturing, $27.4 million from services, $27.4 million from the trade sector, and finally

$151.7 million from households. For education, the model reports for the rural region $19.2 million collected from agriculture, $7.1 million collected from ag. processing, $34.5 million from manufacturing, $24.6 million from services, $24.6 million from the trade sector, and finally $129.8 million from households. A similar breakdown is found in the urban region of the model.

State Sales Tax

Sales taxes were distributed according to the urban-rural geographic division of our model. This was based on reported county sales tax receipts. Sales taxes were then distributed by industry. Sales taxes are levied against the consumer (other than purchases by businesses which are largely exempt) but collected by the firms selling the products which raises an issue of tax incidence. Who is really paying the tax-- the consumer, the business collecting the tax, or both? For the purposes of this analysis, it is assumed the incidence is squarely on the business collecting the tax. This allows for the calculation of a tax multiplier in the fiscal Sam model. For example, the model reports for the rural region, $16.4 million collected from agriculture, $2.1 million collected from ag. processing, $6.7 million from manufacturing, $253 million from services, and finally $285.1 million from the trade sector. Sales taxes were allocated according to each industry's proportion of sales in the input/output model. A similar breakdown was conducted for the urban sector of the state economy.

State Corporate Tax

State corporate taxes were distributed according to the urban-rural geographic division of our model. It was distributed by industry. This was based on the proportional wage and salary earning generated by each industry. For example, the model reports in the rural region, $6.9 million collected from agriculture, $2.5 million collected from ag. processing, $20.5 million from manufacturing, $21.8 million from services, and finally $12.9 million from the trade sector. A similar breakdown occurs in the urban region of the state.

All Other State Taxes

All other taxes were distributed according to the urban-rural geographic division of our model. This included all excise taxes collected in the state and was also a category for reconciling model data with the data collected from various sources in the state. The taxes were distributed by industry. This was based on the proportional sales generated by each industry in the model. For example, the model reports in the rural region, $24.3 million collected from agriculture, $3.1 million collected from ag. processing, $6.7 million from manufacturing, $253.2 million from services, and finally $285.1 million from the trade sector. A similar breakdown occurs in the urban region of the state.

Federal Corporate Tax

Federal corporate taxes were distributed according to the urban-rural geographic division of our model. It was distributed by industry. This was based on the proportional wage and salary earning generated by each industry. For example, the model reports in the rural region, $45.7 million collected from agriculture, $16.7 million collected from ag. Processing, $136 million from manufacturing, $144.3 million from services, and finally $85.4 million from the trade sector. A similar breakdown occurs in the urban region of the state.

Other Federal Taxes

Other federal taxes such as federal personal income taxes were not broken out of the IMPLAN fiscal SAM because federal spending and taxation are exogenous--that is out of the control of the state. Federal spending and tax decisions are made in Washington DC.

Government Spending

Government spending is broken out into total state, local government, K-12/community colleges, and universities. Spending is divided into the urban and rural sectors of the Idaho economy in this model. Each row represents the revenues received and each column represents where the spending occurs.

Total State

For example, the row illustrating total state spending in the rural region identifies where revenues originate for all state spending as can be seen in **Table 1** (Note: blank non-entry categories are not included here). The total state category includes all revenue sources of state government in Idaho, including the funneling of funds through federal, state, and local programs. For example, Idaho collected $21.9 million from agriculture in the rural region and $1.9 million in the urban region. It also collected $385.5 million in sales taxes in the rural region of Idaho and $237 million in the urban region. **Table 2** illustrates the column entries of where the funds are spent. The largest category of expenditures is wages and salaries (under the households category) at $1.3 billion in the region and $631 million in the urban region. The total sources and uses of funds are $3.1 billion in the rural region and $1.54 million in the urban region.

Table 1: Total State –Row Categories and Sources of Funds

	Rural	Urban
Agriculture	$ 21,848,264	$ 1,853,760
Ag Processing	$ 16,174,433	$ 5,971,163
Manufacturing	$ 48,576,160	$ 24,698,581
Services	$ 101,903,374	$ 40,261,606
Trade	$ 25,172,382	$ 10,087,674
Sales Tax	$ 385,487,869	$ 237,034,535
Other Taxes	$ 369,424,424	$ 309,685,985
State Corporate Income Taxes	$ 64,655,617	$ 45,139,470
State Income Taxes	$ 410,000,000	$ 252,000,000
Other Property Income	$ 33,133,675	$ 10,349,338
Households (Wages and Salaries)	$ 875,787,662	$ 361,412,456
K-12/Community Colleges	$ 3,264,456	$ 879,087
Universities	$ 1,075,422	$ 227,235
Total Federal	$ 350,657,766	$ 195,545,426
Federal Military	$ 305,370	$ 190,442
Capital	$ 349,944,745	$ 1,280,830
Inventory	$ 523,897	$ 177,919
Exports	$ 36,416,281	$ 39,755,457
Total	$ 3,094,351,796	$1,536,550,961

Table 2: Total State–Column Categories

	Rural	Urban
Agriculture	$ 1,927,460	$ 340,243
Ag Processing	$ 4,883,211	$ 1,569,002
Manufacturing	$ 459,257,346	$ 193,304,048
Services	$ 155,411,605	$ 61,455,594
Trade	$ 31,255,433	$ 12,406,249
Other Property Income	$ 155,263,657	$ 74,630,196
Households (Wages and Salaries)	$ 1,300,448,676	$ 631,116,601
Local Government	$ 114,643,352	$ 56,892,974
K-12/Community Colleges	$ 502,736,365	$ 241,757,294
Universities	$ 164,630,196	$ 66,724,071
Total Federal	$ 65,868	$ 27,474
Capital	$ 94,130	$ 152,587,402
Inventory	$ 13,747,385	$ 1,537,970
Imports	$ 189,987,113	$ 42,201,841
Total	$ 3,094,351,796	$ 1,536,550,961

Local Government

The sources and uses of funds for local government can be seen below for the rural region of the state. The rows in the model reflect the sources of funds and the column is the uses of funds as illustrated in **Table 3**. Noneducation property tax contributed $274.3 million in revenues for local government, for example in the rural regions and $152.4 million in the urban regions. Wages and salaries were the largest single expenditure under the column entry at $296.1 million in the rural region and $136 million in the urban region (under the heading of households).

Table 3: Local Government

Sources of Funds	Rural Row Entries	Urban Row Entries
Property Tax Non Education	$ 274,293,801	$ 152,436,523
Total State	$ 114,643,352	$ 56,892,974
Total Federal	$ 54,571,035	$ 17,350,991
Total	$ 443,508,188	$ 226,680,488

Uses of Funds	Rural Column Entries	Urban Column Entries
Agriculture	$ 298,463	$ 63,776
Ag Processing	$ 756,155	$ 294,097
Manufacturing	$ 71,115,030	$ 36,233,280
Services	$ 22,990,514	$ 11,083,396
Trade	$ 4,839,838	$ 2,325,451
Households (Wages and Salaries)	$ 296,104,913	$ 136,008,292
Imports	$ 47,403,275	$ 40,672,196
Total	$ 443,508,188	$ 226,680,488

K-12 Education/Vocational Education

Table 4 illustrates K-12 and vocational education. The row entries are the sources of funds and the column entries are the uses of funds. State funding is the most important source of funding at $502.7 million in the rural region and $241.8 million in the urban region. Wages and salaries (households) represent the most important uses of funds at $611.1 million in the rural region and $307.1 million in the urban region. The total sources and uses of funds equal $807.1 million in the rural region of the state and $395 million in the urban region..

Table 4: Education K-12/Community Colleges

Sources of Funds	Rural Row Entries	Urban Row Entries
Property Tax- Education	$ 239,896,388	$ 134,049,791
Total State	$ 502,736,365	$ 241,757,294
Total Federal	$ 64,485,974	$ 19,182,376
Exports	$ 48	$ 23
Total	$ 807,118,776	$ 394,989,485

Uses of Funds	Rural Column Entries	Urban Column Entries
Agriculture	$ 860,818	$ 181,112
Ag Processing	$ 4,331,229	$ 1,617,918
Manufacturing	$ 58,076,255	$ 28,228,131
Services	$ 66,773,683	$ 30,401,147
Trade	$ 8,467,235	$ 3,871,109
Households (Salaries and Wages)	$ 611,100,475	$ 307,047,551
Total State	$ 3,264,456	$ 879,087
Total Federal	$ 18,499	$ 4,972
Capital	$ 35,842	$ 24
Inventory	$ 1,515,390	$ 198,602
Imports	$ 52,674,894	$ 22,559,896
Total	$ 807,118,776	$ 394,989,550

University Spending

Table 5 illustrates university spending in the rural regions which include the University of Idaho, Idaho State University, and Lewis-Clark State College. These expenditures do not include enterprise spending, which constitute a large part of university spending. The largest source of funds was from the State of Idaho at $164.6 million for the rural region and $66.7 million for the urban region. The largest use of funds was salary and wages (households) at $201.3 million for the rural region and $79.4 million for the urban region.

Table 6: University Expenditures

Sources of Funds	Rural Row Entries	Urban Row Entries
Total State	$ 164,630,196	$ 66,724,071
Federal	$ 101,261,898	$ 35,376,643
Total	$ 265,892,094	$ 102,100,714

Uses of Funds	Rural Column Entries	Urban Row Entries
Agriculture	$ 283,583	$ 46,816
Ag Processing	$ 1,426,853	$ 418,215
Manufacturing	$ 19,132,273	$ 7,296,680
Services	$ 21,997,499	$ 7,858,382
Trade	$ 2,789,392	$ 1,000,642
Households (Salaries and Wages)	$ 201,317,067	$ 79,368,617
Total State	$ 1,075,422	$ 227,235
Total Federal	$ 6,094	$ 1,285
Capital	$ 11,808	$ 6
Inventory	$ 499,221	$ 51,337
Imports	$ 17,352,883	$ 5,831,500
Total	$ 265,892,094	$ 102,100,714

Data Problems

There are several data problems in constructing a Fiscal SAM for Idaho. The budgets of Idaho taxing districts are not collected and in a systemic and timely way using identical reporting and accounting procedures. Particular difficulties arise from sewer, water, and garbage collection enterprises, which often constitute a large portion of local budgets. Some of these enterprises are public while others are private firms under contract. Of particular importance are the budgets of city and county governments in Idaho. As a result of these problems, local expenditures and taxes are under reported in this analysis.

What is a tax? What is an expenditure? This may seem relatively simple but it is actually quite complicated. Income, sales, and property taxes are clearly taxes. What about sewer, water, garbage fees, impact fees, and other types of "user fees"? Problems arose in examining almost every local, state, and federal budget. The University of Idaho budget, for example, ranges from approximately $90 million to $259 million depending on which "enterprises" you decide to include. K-12 schools also had many of the same problems with school lunch fees and activity fees. How do you classify the Idaho lottery? A tax or user fee? State enterprises such as the lottery and state liquor stores posed problems for our analysis. Revenues for both were used in state and educational budgets. The problem is both one of classification and magnitude. It is the magnitude of many of these budgets that pose the biggest problem for our analysis.

Many programs are jointly funded by the state and federal government. Some programs have federal, state, and local components. These programs have to be disaggregated by funding source, by function, and geographically. This poses serious problems in our analysis. Sales taxes in Idaho are collected by firm first --- then collected by the county where they are reported. Thus firms with multiple sites tend to report their sales tax collections in the county of their headquarters (usually Boise). Thus Ada County's sales tax collections are overstated while the rest of the state is under-collected. It would be helpful if each firm were to break down sales taxes by county of sales.

Federal personal income taxes are not (at the time of this study) reported by county. New technology may be available in the future to the Idaho State Tax Commission which would allow a county breakdown--but it was not available to this study.

State personal income taxes are reported by county. They are not reported by industry, however (The federal personal income taxes are not available by county either). It would be very useful to know tax collection by occupation. For example, the ability to identify the collective personal income tax payments of agricultural workers would be helpful in this analysis.

Federal and state corporate taxes pose serious classification problems. Corporations are disaggregated by industry and location. Yet taxes will tend to be reported in the county of the corporate headquarters with all of a firms operations and industries added together. Corporate classifications by major sources of income and geographic location would greatly improve the linking of revenue generation to fiscal expenditure for governmental units.

Core-Periphery I/O Models

The state economy of Idaho is very clearly divided between rural and urban economy. The urban economy of Idaho, Canyon and Ada county (Boise Metro Area), acts as the core to provide services and trade throughout the Idaho. The periphery economy, all other counties in Idaho, supplies some raw products to the core for further processing. The pattern of raw material imports into the core and periphery purchases of trade and services from the core is typical of other western states (Hughes and Holland)

	Purchasing Industries		
Selling Industries	**SAM** *Core*	*Core to Periphery* *Transactions*	Final Demands *Core*
	Periphery to Core *Transactions*	**SAM** *Periphery*	Final Demands *Periphery*
	Final Payments *Core*	Final Payments *Periphery*	**SAM** *core periphery*

Figure 3 Schematic of core-periphery fiscal SAM transactions table.

Core-periphery model are a special case of inter-regional I/O. The two regions of the inter-regional I/O are the core and the periphery. As with the I/O model, spending flows among sectors in the core-periphery I/O are displayed as a matrix. An Core-periphery inter-regional I/O matrix of four quadrants of gross flows as shown in Figure 3: the SAM, including the intermediate processing transactions matrix of the core; the intermediate processing transactions matrix of the periphery that are purchased or imported from the core, the SAM; including the intermediate processing transactions matrix of the core that are purchased or imported from the periphery; the SAM, including the intermediate processing transactions matrix of the periphery; final demands are bifurcated for the core and periphery, and primary inputs are bifurcated for the core and periphery, and the interregional SAM accounts.

The purchases by the core from the periphery are mainly raw agricultural produce (sugar beets and hay) to which further value is added by core industries. These flows were estimated using a supply-demand pool approach - any needed supply was assumed to be supplied by the closest source in the periphery. These flows were minimal.

Trade and services are the principle flows that the core supplies to periphery. Boise shopping and Boise lawyers are examples that come to mind. These flows were estimated by a simple gravity model. The gravity model assumes that the closer rural people live to Boise the more likely they are to shop in Boise. A person in living in the Idaho Panhandle was assumed to buy nothing from Boise. These flows are substantial, which gives credence to the argument that rural Idaho spends money in Boise that generates employment and taxes in Boise even though the money was earned in rural Idaho.

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 1 which shows the four quadrants with notation for the highly aggregated accounts within each quadrant. The

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

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:

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

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 ith industry, X_i, is obtained by summing across the ith 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:

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

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

The Production Relation of I/O Models

In the I/O model 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 fixed proportion input budget shares. 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,

$$a_{ij} = \frac{z_{ij}}{X_j} \; ; \qquad \textbf{(5)}$$

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;

$$A = Z\hat{X}^{-1}. \qquad \textbf{(6)}$$

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.

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):

$$X_i = z_{ij} + ... z_{i,n} + c_{in} + y_i = z_{ij} + ... z_{i,n} + l_{in} + p_i = X_i \quad \textbf{(7)}$$

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;

$$X \equiv ZU + YU. \quad \textbf{(8)}$$

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 state that exogenous non-negative final demands are fulfilled by regional production:

$$X = AX + YU \quad \textbf{(9)}$$

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

$$X = (I-A)^{-1}(Y)(U): \quad \textbf{(10)}$$

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.

The *Leontief Inverse* matrix shows the total (direct and indirect) requirements per dollar of exports of ith industry. 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;

$$\beta_{ij} = \Delta x_i \, / \, \Delta y_j \quad \textbf{(11)}$$

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. 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.

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.

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. 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.

Primary Input Multipliers

Multipliers are not limited to measuring output impacts but can also be expressed for final payments or primary inputs. Primary input assess direct and indirect (and induced) payments to the primary inputs or resource use resulting from a change in final demands of the 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 for a change in final demands. Assuming that primary inputs are used in constant proportion to output primary input coefficients can be defined:

$$V = P\hat{X}^{-1} \qquad \textbf{(12)}$$

The primary input multiplier is obtained by multiply the original equilibrium condition by the definition of the primary input coefficients:

$$P\hat{X}^{-1}X = V(I-A)^{-1}Y, \quad or \quad P = V(I-A)^{-1}Y \quad \because \quad \hat{X}^{-1}X = I \ \textbf{(13)}$$

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). 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 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). The primary input multiplier is a means to measure the direct and indirect change in the respective primary input (as driven by a change in final demands) without having to assume that primary input in endogenous.

The primary inputs of interest in the Fiscal SAM are the various urban and rural tax multipliers-- Property taxes for education, property taxes not for education, sales taxes, other taxes, and state corporate and income taxes. Similar to the SAM multipliers, a change in final demands for the one of the industrial sectors of the economy can be traced to changes in the various tax levies of Idaho. In contrast to the SAM multipliers, the government sectors of the economy are no longer endogenous, but final demands. Government, local or state, can increase or decrease its functions independent of the industrial activity of the economy and the tax burden of those actions can then be traced through Idaho's rural and urban economy.

SAM Output Equilibrium

To construct a SAM multiplier similar to the I/O Type II multiplier the When solved for output, the equilibrium condition state that exogenous non-negative final demands are fulfilled by regional production:

$$X = AX + YU \qquad \textbf{(14)}$$

Solving equation (11) uniquely for regional output

Since the SAM includes a comprehensive accounting of the circular flow of income over the standard I/O the restrictive assumption of fixed coefficient production and consumption extend to all endogenous SAM accounts. Following the notation format of Holland and Wyeth, the matrix of SAM direct coefficients is defined as:

$$S = \begin{bmatrix} A & 0 & C \\ V & 0 & 0 \\ 0 & Y & H \end{bmatrix} \begin{matrix} \textit{Activities} \\ \textit{Value Added} \\ \textit{Endogenous Institutions} \end{matrix}$$

where: S is the SAM direct coefficients, A is the matrix of interindustry technical coefficients, V is matrix of value added coefficients, c is the matrix of expenditure coefficients, and H is the matrix institutional and household distribution coefficients. The equilibrium condition for the economy can be written as:

$$\begin{bmatrix} X \\ V \\ Y \end{bmatrix} = S \begin{bmatrix} X \\ V \\ Y \end{bmatrix} + \begin{bmatrix} E_x \\ E_v \\ E_y \end{bmatrix}$$

where: X is a vector of industry gross output, V is the vector of total value added, Y is the vector of household incomes, E_x is the vector of exogenous commodity demands, E_v is the vector of exogenous value added, and E_y is the vector of exogenous household incomes. When the vector of regional industry supply, value added, and household income are uniquely solved for the familiar Leontief inverse for a SAM solution emerges:

$$\begin{bmatrix} X \\ V \\ Y \end{bmatrix} = (I - S)^{-1} \begin{bmatrix} E_x \\ E_v \\ E_y \end{bmatrix}$$

Each entry in the SAM inverse can be interpreted similarly to the Type II Leontief inverse for the I/O; each entry measures the direct plus indirect change in the output of the i^{th} industry or endogenous institution for an exogenous sales change of the j^{th} industry or institution. The direct portion of the multiplier is interpreted in identical fashion as the I/O model because the direct or technical coefficients are calculated the same. In the I/O model the indirect portion of the multiplier measures the circular flows that household wages and salaries feedback into interindustry transactions. The indirect portion in a SAM measures the indirect flows between households and institutions as well as the feedback into interindustry transactions. This results from the fact that the matrix V of value added coefficients is included in the inverse.

Results

Core-Periphery Fiscal Sam Multipliers

The Core-Periphery Fiscal Sam Model is closed to both government spending sectors of the economy and to the tax collection sectors of the economy. A second version of the model was created, keeping the model open to all of the governmental and taxation sectors. Closing the model to government spending and tax revenues changing both the relative size of the final demand multipliers and their rank within the model.

The average final demand multiplier for the open model is 2.97 versus 3.81 in the closed model. The closed fiscal SAM multipliers are relatively high as compared to traditional type-II IMPLAN multipliers. Further, the relative ranking of multipliers within the model changes. For the open model (to governmental sectors), the largest final demand multiplier (3.42) is in proprietary income. For the closed fiscal SAM model, retail trade has the largest multiplier (4.18). These differences in both the magnitude of the multipliers and their relative position within the model has important policy implications. Reported fiscal SAM final demand multipliers are also high in other studies (See Kilkenny and Failde, 1998).

The same comparison can be made in the governmental spending and tax and revenue accounts. Here the differences are even more striking. In the first set of columns, the model is open to the all of the government and revenue categories. In the second set of columns, the closed fiscal sam multipliers are reported. The fiscal SAM multipliers average 4.68 versus 1.68 in the open model. Again, the relative positions of the sectors change as well. The largest multiplier is state income tax at 5.29 in the closed model versus state corporate tax at 2.25 in the open model. The relatively large multipliers in the closed fiscal SAM may limit their usefulness.

	Industry	**SAM Multipliers**	**Type I**	**Type II**
Rural	Agriculture	3.50	1.63	2.78
	Ag Processing	3.65	1.90	2.94
	Manufacturing	4.02	1.83	3.24
	Services	3.87	1.57	2.98
	Trade	4.18	1.40	2.88
	Households	3.32		2.54
	Proprietary Income	4.16		3.42
	Property Tax Education	5.21		
	Property Tax Non Education	5.12		
	Sales Tax	5.30		
	Other Taxes	3.77		
	State Corporate Tax	5.30		
	State Income Tax	5.30		
	Total State	4.30		
	Local Government	4.12		
	K-12/Community Colleges	4.21		
	Universities	4.21		
Urban	Agriculture	3.50	1.57	2.66
	Ag Processing	3.15	1.74	2.60
	Manufacturing	3.75	1.79	3.16
	Services	3.30	1.43	2.64
	Trade	3.72	1.31	2.65
	Households	2.97		2.39
	Proprietary Income	3.79		3.25
	Property Tax Education	4.89		
	Property Tax Non Education	4.58		
	Sales Tax	4.77		
	Other Taxes	3.55		
	State Corporate Tax	4.77		
	State Income Tax	4.77		
	Total State	3.77		
	Local Government	3.58		
	K-12/Community Colleges	3.89		
	Universities	3.89		

Core-Periphery Fiscal Sam Spatial Linkages

Idaho's Core-Periphery Fiscal SAM model tracked in two categories of linkages: Inter-industry (agriculture, agricultural processing, trade, services, and manufacturing), and governmental transactions (state, local, and federal). Each of these categories has spacial dimensions, which was one of the more interesting analyses conducted. The core was defined in the model as the two most urban counties in the state: Ada and Canyon counties. The remaining counties in the state were counted as rural. Approximately $29 billion (59%) in output (sales) were produced from the rural regions and $20 billion (41%) from the urban region. The core has only 32% of the Idaho's population but generates 41% of total output. Commuting patterns of the core and periphery were nearly equal: Out-commuters from the core generated $100 million a year while out-commuters from the periphery generated $95 million. Purchases between the two regions were very unequal. The core purchased approximately $42 million of goods from the periphery, mostly in the form of inputs to agricultural processing. The rural region purchased $1.5 billion from the core – mostly in the retail trade sector and service sector (mall shoppers, services, etc).

The governmental sector also had spatial linkages. Total governmental expenditures at all levels (federal, state, and local) in the rural region is $3 billion (67%) versus $1.5 billion (33%) in the urban region. Tax revenues collected from all sources was $3.2 billion. Total governmental expenditures ($4.5 billion) exceed tax revenues in the state ($3.2 billion) which is common in many rural states. The rural region paid $1.9 billion in taxes (60%) while the urban region paid $1.3 billion (40%) in taxes. The urban region paid 40% of the taxes but received only 33% of the governmental expenditures (a point not lost on urban politicians). There are three important caveats with this analysis: 1) Idaho's governmental and tax data is of relatively poor quality–making these numerical estimates problematic. Firms with multiple locations, for example, only have to report total sales taxes and are not required to break-down the data spatially. Local governmental tax and expenditure is virtually non-existent. There is no consistent reporting of local budgets in the state. 2) A second important caveat is the linkages between the two regions. A large amount of urban sales, for example, are from individuals and firms in rural regions. 3) A third caveat is the rural nature of Idaho. Idaho is geographically one of the nation's largest states with a relatively small population. The rural regions may have special needs that are more costly than in the urban region.

Potato Chips Versus Computer Chips

The fiscal SAM multipliers illustrate three dimensions: spacial linkages, inter-industry linkages, and governmental linkages. Idaho historically has been a rural agricultural state Beginning in the late 1980s, Idaho became one of the fastest growing states in the U.S. Much of this growth occurred in the urban region spurred by growth in manufacturing, trade, and services. An interesting illustration of the fiscal-SAM model's capacity is to compare the impacts and related linkages of a change of a major industry in the rural and urban regions: 1) A one dollar increase in potato exports from rural agriculture and 2) A one dollar increase in urban manufacturing (semiconductors). In rural agriculture, for example, every dollar increase in final demand (i.e., rural potato exports) leads to a $3.50 increase in output state-wide. In contrast, a one dollar increase in urban manufacturing leads to a $3.75 increase in output state-wide. In terms of the fiscal effects, a one dollar increase in rural potato exports will create 11.3 cents in taxes in the rural region and 1.9 cents in the urban region; for a total of 13.2 cents (these include all taxes, property tax education and non education, sales taxes, other taxes, state corporate tax, and state income tax). In contrast, a one dollar increase in urban manufacturing exports will increase tax revenues in the urban sector of 11.6 cents and only .2 cents in the rural region, for a total of 11.8 cents. This result is interesting. While the total impacts are greater for a one dollar increase in urban manufacturing versus rural agriculture ($3.75 versus $3.50), the tax collections are greater if rural agriculture expands over urban manufacturing (13.2 cents versus 11.3 cents). A similar pattern exists for total state spending. A one dollar increase in potato exports (rural agriculture) will lead to an 13.3 cent increase in total state spending versus 11.7 cents for a one dollar increase in manufacturing exports.

Other linkages can be illustrated by the fiscal SAM model as well. A one dollar increase in rural agriculture exports leads to a $1.0663 increase in rural agriculture, 28.51 cents increase in rural services, and 20.63 cents in rural proprietary income. That same one dollar increase in rural agriculture will increase 0.19 cents in the *urban* agricultural processing sector, which illustrates the spacial dimension of the model. Canyon County, for example, has a large agricultural processing sector, which is unexpected in a county that is largely urban. That same one dollar of exports in rural agriculture, leads to a increase of 10.71 cents in the *urban* household sector. This illustrates how changes in rural exports leads to changes in urban household spending. The total impact on the urban region across all economic sectors from that one dollar of rural agricultural spending is 41.18 cents.

A one dollar increase in urban manufacturing will increase *rural* manufacturing 0.586 cents. That same one dollar will lead to of 2.9 cents in the rural household sector. The total impact on the rural region across all economic sectors from that one dollar increase in urban manufacturing is 6.2 cents. Note the contrast here. The linkages are much stronger from the rural to *urban* regions than vice versa. Economic changes in the rural regions have a much larger impact on the urban region than does economic changes in the rural region upon the urban areas

Industry	Rural Agriculture	Urban Manufacturing
Agriculture	1.0663	0.0007
Ag Processing	0.0393	0.0006
Manufacturing	0.2851	0.0059
Services	0.4627	0.0129
Trade	0.1535	0.0045
Proprietary Income	0.2063	0.0017
Property Tax Education	0.0136	0.0003
Property Tax Non Education	0.0153	0.0003
Sales Tax	0.0206	0.0004
Other Taxes	0.0306	0.0007
State Corporate Tax	0.0044	0.0001
State Income Tax	0.0281	0.0003

Industry	Rural Agriculture	Urban Manufacturing
Households	0.5893	0.0300
Total State	0.1152	0.0029
Local Government	0.0196	0.0005
K-12/Community Colleges	0.0323	0.0008
Universities	0.0061	0.0002
Agriculture	0.0005	0.0059
Ag Processing	0.0019	0.0142
Manufacturing	0.0377	1.6668
Services	0.1656	0.5479
Trade	0.0384	0.2160
Proprietary Income	0.0161	0.1314
Property Tax Education	0.0014	0.0126
Property Tax Non Education	0.0016	0.0144
Sales Tax	0.0041	0.0202
Other Taxes	0.0084	0.0366
State Corporate Tax	0.0005	0.0060
State Income Tax	0.0030	0.0265
Households	0.1071	0.8222
Total State	0.0180	0.1137
Local Government	0.0023	0.0186
K-12/Community Colleges	0.0043	0.0305
Universities	0.0008	0.0049
TOTAL	3.5002	3.7509

The Core-periphery fiscal SAM model has wide application. It can be used to track inter-industry linkages, spacial linkages, and governmental linkages — all at the same time. This analysis can be used to trace the expansion of an industry's exports that is located in one region of the state, for example, to the inter-industry linkages in all regions of the state (i.e., both the core and periphery). The fiscal impacts of the expansion will be estimated at the same time, again in all regions of the state (core and periphery). The fiscal aspects of the model have three separate dimensions: local, state, and federal. This model can be used to tract these linkages between each layer of government in both the core and periphery. Potentially, the model could be utilized to forecast governmental and tax expenditures based on various economic growth scenarios.

Alternative Scenarios for Testing the Idaho Fiscal Project: Revised (9/13/99)

1. **Continued Expansion of the Idaho Dairy Industry:**
One of the questions raised is "what would be the effect of continued expansion of the Idaho dairy industry? If cheese-processing plants are added, more milk will be required. More milk requires cows, which in turn require more forage and grain, water and space for manure disposal. There are clearly a number of potential economic effects.

Given the current rate of expansion of Idaho's dairy industry, the following scenario is proposed for evaluation. The response to the four questions is included below.

Urban area (Ada and Canyon Counties)

- No increasing in dairy cow numbers in urban area.
- No increase in dairy product processing.

Rural area (Rest of Idaho)

- Increase in the number of cows and the quantity of milk produced by 25% or 4 million pounds per day.
- 4,000,000 million pounds X 365days = 1,460,000,000 pounds annually.
- Ten pounds of milk condense to 1 pound of cheese. The cheese produced from 4 million pounds of milk would be 400,000 pounds per day. The average cheese sale price last year was $1.43 per pound. (400,000 lbs. X $1.43/lb. = $572,000 value of cheese per day and 365days X $572,000 = $ 208,780,000/ year)

Increasing the processing of dairy products would be expected to add $209 million to total exports of dairy products. The multipliers are shown on Table I-1. A summary of the impacts and their distribution is shown in Table I-2

State impact on output is 4.5 times the initial impact which is expected to be $934,902,788. For each additional dollar of exports, the rural effect is 3.79, dairy processing industry output is $492 million. Income, wages, and salaries are $79 million and tax revenues of all types is $25 million.

The urban impact of the change in cheese exports from rural Idaho is $74 million increase in output, $18 million increase in income wages and salaries and $6 million increase in taxes of all types. The increase in urban area because of the increase in rural cheese manufacture results in a $143 million additional economic activity.

Table I-1 Technical Coefficients for 25% Increase in Cheese Production in Rural Idaho			
Idaho 1996 Multipliers	Sectors	Rural Ag Processing	Ag Processing with 25% Increase
Rural	Agriculture	0.1594	33,273,290
	Ag Processing	1.0754	224,523,084
	Manufacturing	0.3672	76,669,920
	Services	0.5399	112,722,365
	Trade	0.2155	45,002,406
	Proprietary Income	0.1006	21,003,843
	Other Property Income	0.2802	58,492,430
	Property Tax Education	0.0131	2,734,264
	Property Tax Non Education	0.0149	3,104,367
	Sales Tax	0.0214	4,473,917
	Other Taxes	0.0318	6,644,065
	State Corporate Tax	0.0040	844,388
	State Income Tax	0.0330	6,885,045
	Households	0.7379	154,049,320
	Total State	0.1327	27,696,794
	Local Government	0.0198	4,130,512
	K-12/Community Colleges	0.0346	7,234,136
	Universities	0.0071	1,473,565
Urban	Agriculture	0.0009	180,610
	Ag Processing	0.0032	671,017
	Manufacturing	0.0573	11,956,347
	Services	0.2236	46,688,514
	Trade	0.0705	14,721,034
	Proprietary Income	0.0229	4,788,211
	Other Property Income	0.06120	12,785,821
	Property Tax Education	0.0023	485,892
	Property Tax Non Education	0.0026	543,503
	Sales Tax	0.0064	1,337,700
	Other Taxes	0.0130	2,713,029
	State Corporate Tax	0.0008	170,330
	State Income Tax	0.0043	905,398
	Households	0.1805	37,676,001
	Total State	0.0282	5,891,375
	Local Government	0.0036	761,639
	K-12/Community Colleges	0.0068	1,412,827
	Universities	0.0012	255,830

Table I-2 Regional & State Totals for 25% Increase Cheese Production in Rural Idaho			
	Direct Impacts	Total Impacts	Total Multiplier Impact
Annual Dollars Increase	208,780,000		
State Total		930,201,793	4.48
Rural Total		790,957,711	3.79
Urban Total		143,945,077	0.69
Rural Impact			
Industry Output		492,191,065	2.36
Income, Wages & Salaries		79,496,273	0.38
Tax Revenues		24,686,045	0.12
Urban Impact			
Industry Output		74,217,522	0.36
Income, Wages & Salaries		17,574,032	0.08
Tax Revenues		6,155,851	0.03

2. **Low Commodity Price Effect:** (Revised 9/8/99)

Show the effect of the decline in farm gate potato prices in 1998-99 and how that carries through the remaining sectors of the Idaho economy. Potato acreage planted remained constant 413,000 at acres in 1996 and 1998.

- The farm gate receipts were $694,214,000/ year in our 1996 data base and $544,635,000 in 1998.
- That is a reduction in proprietors' income of $149,579,000.

The decline in potato prices would be expected to reduce proprietors' income to producers. Proprietor's income is the management fee which farmers receive for running the operation. The production cost would remain the same because the same number of acres are planted with the same level of inputs. The short-term effect is a continuation of the same level of input use. Long term, the proprietors' income would be down and capitol purchases would be expected to decrease. Producers are living on and accelerating their depreciation. This has the same effect on the economy as if potato exports would suddenly decline. Total Idaho economic activity would decrease almost $700 million. Total tax revenue would be expected to decrease $20 million in rural areas and $3.5 million in urban areas. Total decline in tax revenue for Idaho would be expected to be $23.3 million. The decline in exports would decrease Idaho income tax collections from agriculture by $4.7 million from rural region and $500,000 from urban region.

Table II-1 Technical Coefficients for Decrease in Potato Prices			
Idaho, 1996	Sectors	Rural Agriculture Scenario 2 Type II Ag. Multipliers	With Decrease
Rural	Agriculture	1.0687	(160,303,106)
	Ag Processing	0.0449	(6,731,886)
	Manufacturing	0.3403	(51,047,218)
	Services	0.5832	(87,478,405)
	Trade	0.1955	(29,322,697)
	Proprietary Income	0.2220	(33,293,532)
	Other Property Income	0.4199	(62,989,885)
	Property Tax Education	0.0163	(2,451,553)
	Property Tax Non Education	0.0185	(2,780,436)
	Sales Tax	0.0247	(3,710,485)
	Other Taxes	0.0367	(5,510,318)
	State Corporate Tax	0.0049	(734,585)
	State Income Tax	0.0312	(4,684,536)
	Households	0.8705	(130,581,419)
	Total State	0.1454	(21,815,939)
	Local Government	0.0239	(3,588,699)
	K-12/Community Colleges	0.0400	(5,995,967)
	Universities	0.0077	(1,160,683)
Urban	Agriculture	0.0007	(103,281)
	Ag Processing	0.0025	(378,427)
	Manufacturing	0.0472	(7,078,047)
	Services	0.1954	(29,304,089)
	Trade	0.0459	(6,891,022)
	Proprietary Income	0.0192	(2,879,951)
	Other Property Income	0.0517	(7,751,168)
	Property Tax Education	0.0019	(277,570)
	Property Tax Non Education	0.0021	(311,180)
	Sales Tax	0.0049	(734,686)
	Other Taxes	0.0100	(1,497,443)
	State Corporate Tax	0.0007	(98,397)
	State Income Tax	0.0036	(533,324)
	Households	0.1465	(21,972,736)
	Total State	0.0223	(3,343,583)
	Local Government	0.0029	(434,981)
	K-12/Community Colleges	0.0054	(803,641)
	Universities	0.0010	(145,194)

Table II-2 Regional & State Totals for Decrease in Potato Prices			
	Direct Impacts	Total Impacts	Total Multiplier Impact
Annual Dollars Decrease	(150,000,000)		
State Total		(698,720,068)	4.66
Rural Total		(614,181,348)	4.09
Urban Total		(84,538,720)	0.56
Rural Impact			
Industry Output		(334,883,312)	2.23
Income, Wages & Salaries		(96,283,418)	0.64
Tax Revenues		(19,871,911)	0.13
Urban Impact			
Industry Output		(43,754,865)	0.29
Income, Wages & Salaries		(10,631,119)	0.07
Tax Revenues		(3,452,600)	0.02

3. **Effect on Idaho State Sales Tax Revenues of eliminating all Exemptions**:

Show the effect eliminating all sales tax exemptions and then reducing Idaho sales tax rate to 2.5% (50 percent). What would the effect be on total state revenues? Can this be evaluated in the model that we currently have?

Table III-1 Effect on Idaho State Sales Tax Revenues of Eliminating all Exemptions
If a value-added tax were adopted instead of the current sales tax, the rate would be 1.3% assuming no exemptions. If a sales tax were adopted on retail trade and services with no exceptions, the rate would be 2.5% to create the same revenue that Idaho is now receiving.

Sales by Industry	Rural	Urban	Total
Agriculture	$3,337,847,010	$443,095,437	$3,780,942,446
Ag Processing	$2,639,970,739	$1,588,506,896	$4,228,477,635
Manufacturing	$8,949,313,929	$7,922,713,710	$16,872,027,639
Services	$10,591,169,835	$7,404,722,962	$17,995,892,797
Trade	$3,791,360,548	$2,632,191,684	$6,423,552,232
Total	$29,309,662,062	$19,991,230,688	$49,300,892,750

Sales Taxes			
Urban	$385,487,869		
Rural	$237,034,535		
Total	$622,522,404		

Value-Added Tax	1.3%		
Sales tax on Retail Trade and Services	2.5%		

4. **Estimate the Contribution of Each Sector's Contribution to State Revenues:**

Show the contribution of the individual sectors to Idaho's revenues and expenditures. From an investment point of view, is the Legislator placing funds where they will bring about improvements in the economy and generate revenues for use by the public sector? Stated differently, "How much does agriculture contribute to Idaho's economy versus what does it receive of state funds?" Agriculture has several benefits which other businesses do not have including choice among accrual or cash basis accounting and loss carry back rules.

Contribution of each industry to local and state tax revenues is important. Each of these contributions can be portrayed in terms of multipliers. For example, each dollar of agriculture exports from the rural region there is approximately $1.07 of production that rural agriculture generates (Table IV-1 Row 1, Column 1). There is also $0.19 increase in sales by urban services (Table IV-1, Column 1, Row 22). Notice that rural agriculture creates demands for services in the urban core (Boise). A similar interpretation to trade flows are tax multipliers. They show that for each dollar of exports there is 3 cents increase in state income tax generated from rural sources. The effect on urban income and sales tax are minimal. For each dollar of exports from rural agriculture, slightly over 15 cents in generated directly and indirectly in tax revenues (Table IV-2, Column 1, Row 16). Four cents is directly paid by agriculture while 11 cent is indirectly stimulated by agriculture.

In the case of urban region manufacturing, each $1 of exports generates an additional 70 cents in other manufacturing in the urban area and 3 cents are generated in Idaho income taxes and 2 cents in sales taxes. For each dollar of manufacturing exports, slightly over 12 cents in total tax revenue is generated. Of that, urban manufacturers directly pay 2 cents while manufacturing indirectly stimulates almost 11 cents.

Table IV-1 Multiplier Coefficients Showing Contributions to Idaho Impacts		Rural					Urban				
Region	Sectors	Agriculture	Ag Processing	Manufacturing	Services	Trade	Agriculture	Ag Processing	Manufacturing	Services	Trade
Rural	Agriculture	1.0687	0.1594	0.0140	0.0113	0.0144	0.0082	0.0294	0.0008	0.0006	0.0010
	Ag Processing	0.0449	1.0754	0.0219	0.0222	0.0337	0.0008	0.0022	0.0007	0.0004	0.0006
	Manufacturing	0.3403	0.3672	1.6736	0.3611	0.3361	0.0072	0.0187	0.0069	0.0041	0.0057
	Services	0.5832	0.5399	0.6372	1.7330	0.6942	0.0145	0.0367	0.0153	0.0090	0.0126
	Trade	0.1955	0.2155	0.2434	0.1845	1.2069	0.0050	0.0126	0.0053	0.0031	0.0044
	Proprietary Income	0.2220	0.1006	0.1791	0.1688	0.1464	0.0030	0.0087	0.0020	0.0012	0.0017
	Other Property Income	0.4199	0.2802	0.2843	0.3793	0.2832	0.0059	0.0171	0.0043	0.0026	0.0036
	Property Tax Education	0.0163	0.0131	0.0166	0.0141	0.0189	0.0004	0.0009	0.0004	0.0002	0.0003
	Property Tax Non Education	0.0185	0.0149	0.0189	0.0162	0.0215	0.0004	0.0011	0.0004	0.0002	0.0003
	Sales Tax	0.0247	0.0214	0.0235	0.0375	0.0726	0.0005	0.0014	0.0005	0.0003	0.0004
	Other Taxes	0.0367	0.0318	0.0349	0.0557	0.1077	0.0008	0.0021	0.0008	0.0005	0.0006
	State Corporate Tax	0.0049	0.0040	0.0060	0.0051	0.0064	0.0001	0.0002	0.0001	0.0000	0.0001
	State Income Tax	0.0312	0.0330	0.0362	0.0323	0.0320	0.0005	0.0014	0.0004	0.0002	0.0003
	Households	0.8705	0.7378	0.9889	1.0502	1.1388	0.0303	0.0726	0.0355	0.0208	0.0291
	Total State	0.1454	0.1327	0.1548	0.1840	0.2539	0.0034	0.0087	0.0035	0.0020	0.0029
	Local Government	0.0239	0.0198	0.0246	0.0230	0.0309	0.0005	0.0014	0.0005	0.0003	0.0004
	K-12/Community Colleges	0.0400	0.0346	0.0418	0.0440	0.0602	0.0009	0.0023	0.0009	0.0005	0.0008
	Universities	0.0077	0.0071	0.0082	0.0098	0.0135	0.0002	0.0005	0.0002	0.0001	0.0002
Urban	Agriculture	0.0007	0.0008	0.0005	0.0007	0.0006	1.0435	0.0953	0.0065	0.0046	0.0063
	Ag Processing	0.0025	0.0031	0.0018	0.0024	0.0022	0.0388	1.0614	0.0167	0.0159	0.0254
	Manufacturing	0.0456	0.0553	0.0316	0.0490	0.0416	0.3855	0.3702	1.6982	0.3479	0.3265
	Services	0.1933	0.2211	0.1228	0.2241	0.1824	0.5970	0.4951	0.6137	1.6727	0.6463
	Trade	0.0453	0.0697	0.0433	0.0368	0.0355	0.2023	0.2044	0.2395	0.1700	1.1950
	Proprietary Income	0.0189	0.0226	0.0128	0.0211	0.0175	0.2508	0.0811	.1390	0.1517	0.1182
	Other Property Income	0.0508	0.0602	0.0340	0.0570	0.0471	0.3701	0.2383	0.3033	0.4147	0.2906
	Property Tax Education	0.0018	0.0023	0.0013	0.0019	0.0016	0.0157	0.0109	0.0141	0.0124	0.0173
	Property Tax Non Education	0.0020	0.0025	0.0015	0.0021	0.0018	0.0205	0.0126	0.0160	0.0140	0.0190
	Sales Tax	0.0048	0.0063	0.0037	0.0049	0.0042	0.0230	0.0191	0.0222	0.0319	0.0628
	Other Taxes	0.0099	0.0128	0.0075	0.0101	0.0087	0.0409	0.0350	0.0407	0.0659	0.1242
	State Corporate Tax	0.0006	0.0008	0.0005	0.0007	0.0006	0.0056	0.0038	0.0063	0.0048	0.0059
	State Income Tax	0.0000	0.0000	0.0000	0.0000	0.0000	0.0866	0.0343	0.0280	0.0269	0.0270
	Households	0.1424	0.1755	0.1015	0.1460	0.1283	0.8598	0.6446	0.9821	0.9770	1.0852
	Total State	0.0184	0.0235	0.0137	0.0190	0.0164	0.1828	0.1122	0.1272	0.1529	0.2259
	Local Government	0.0027	0.0034	0.0020	0.0028	0.0024	0.0273	0.0167	0.0207	0.0196	0.0274
	K-12/Community Colleges	0.0047	0.0060	0.0035	0.0048	0.0042	0.0445	0.0286	0.0341	0.0365	0.0528
	Universities	0.0008	0.0010	0.0006	0.0008	0.0007	0.0079	0.0049	0.0055	0.0066	0.0098

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