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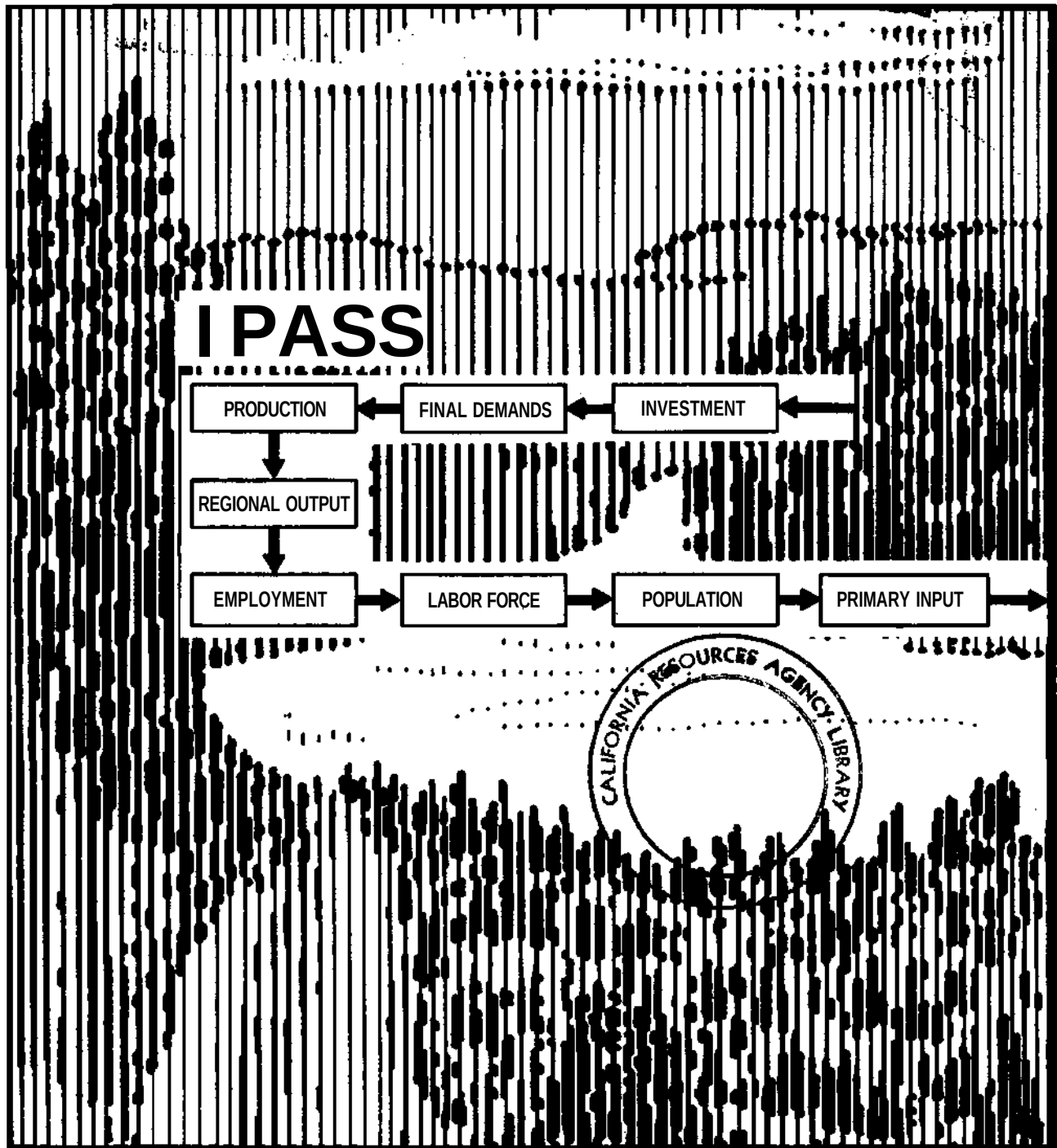
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IPASS: An Interactive Policy Analysis Simulation System

Doug Olson, Con Schallau, and Wilbur Maki



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Abstract

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This paper describes an interactive policy analysis simulation system (IPASS) that can be used to analyze the long-term economic and demographic effects of alternative forest resource management policies. The IPASS model is a dynamic analytical tool that forecasts growth and development of an economy. It allows the user to introduce changes in selected parameters based on different assumptions about socioeconomic variables. The user can analyze the impact those changes would have on the economy by comparing results of the alternative situation with the original forecast. The program is interactive, and the user needs no previous experience in programming or model building. IPASS has potential use in applied research as well as policy analysis.

Keywords: Economic impact, economic theory (-forest management, resource management, Resources Planning Act (RPA), computer programs/programming.

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Introduction

The management of the Nation's public lands can have a major impact on the economic vitality of the rural West. During the past two decades, for example, nearly half the softwood sawtimber produced in the West came from State and Federal forest lands. Much of the livestock industry west of the 100th meridian is dependent on public grazing permits on lands managed by the U.S. Department of the Interior, Bureau of Land Management, and the U.S. Department of Agriculture, Forest Service. Because National Forests are an important source of goods and services, the Forest Service land management planning process must identify the economic effects of policy changes that might affect dependent communities and their residents.

The Leontief input-output model (I/O) has been used to analyze the direct and indirect effects of alternative National Forest land management policies. An interactive software system, called IMPLAN, was developed by the Forest Service to assist analysts in the construction of I/O models for local areas. This paper describes a dynamic interactive policy analysis simulation system (IPASS) that incorporates the I/O model but enables users to introduce more realism into impact analyses.

IPASS is described in enough detail that readers can decide whether the computational system may be useful to them. The paper also (1) discusses the standard regional input-output (I/O) model, one component of IPASS (fig. 1), (2) compares the static I/O model with the dynamic IPASS simulation model, (3) covers the recursive system of IPASS subroutines, and (4) provides examples to demonstrate the analytical capability of IPASS. An appendix contains a list of parameters and how they can be modified.

IPASS

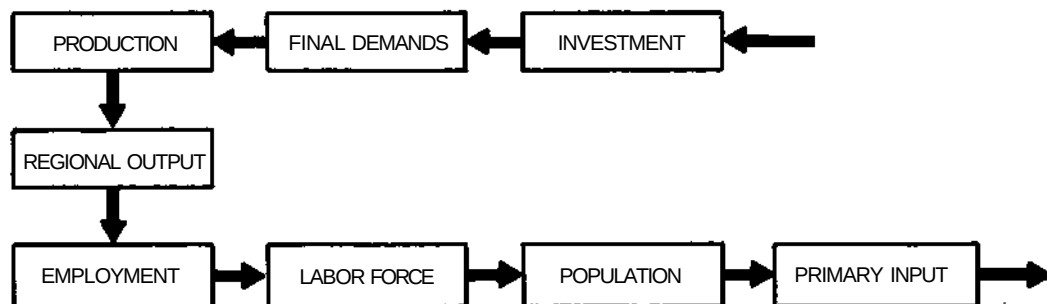


Figure 1.-Fundamental components of the IPASS simulation model. The production module is derived from the ordinary input-output model and is represented here as the Leontief inverse. The remaining modules perform recursively with the production module to form a dynamic regional I/O simulation model.

Input-Output Model

An economy, whether it is local, state, regional, or national, is a complex interaction of many activities: production, consumption, investment, distribution, financing, and others. Manufacturers purchase raw materials, finished goods and services, and labor from suppliers within the local economy or they import these requirements from outside. Similarly, they ship products to users within the economy or export to customers outside the local area. Trade and service sectors provide goods and services to local residents and business establishments. Likewise, various units of local, State, and Federal governments provide a wide range of essential services. Exports provide new dollars for the economy while imports “leak” funds outside the area. An I/O model is an accounting system showing economic transactions between local business, households, and governments, as well as transactions between public and private entities located elsewhere. Although an I/O model provides only a static view of activities, it is a convenient device for characterizing and analyzing complex local, regional, and national economies.

Basic Elements of an Input-Output Model

An input-output model comprises four basic elements: (1) interindustry transactions, which show the purchases of individual local industries from one another, (2) final demands, which are all purchases by sectors other than the local producing industries, (3) primary input purchases and the corresponding income payments to their owners; namely, households, businesses, and government agencies, and (4) individual industry purchases from input-supplying industries outside the area (imports). Direct plus indirect coefficients are derived from these four basic elements. To illustrate the purpose of each element, we will use data from an I/O study of Douglas County, Oregon, by Darr and Fight (1974).

Transaction Table Describes Flow of Products From Local Producers

The table of interindustry transactions is an economist’s “vision” of the flow of products from local producers to local users (table 1). This compressed view of the 31-sector model by Darr and Fight is aggregated into 3 sectors: wood products, trade and services, and other local industries. Each sector, which together comprise the “endogenous sector,” purchases from and produces goods and services for the others. In 1970, firms comprising the wood products sector purchased \$23.0 million worth of goods from each other, \$23.6 million from the trade and services sector, and \$39.4 million from other local industries. Coincidentally, firms within the wood products sector sold \$23.0 to each other, \$0.2 million to the trade and services sector, and \$6.2 million to other local industries. Together, sales to and purchases from local industries (that is, endogenous transactions) comprise “intermediate transactions.”

For small economies like Douglas County, most sales are to nonlocal sectors, or “exogenous markets.” Such transactions are termed “final demand,” and are represented by a variety of categories such as purchases by households and government, net inventory accumulation, investments, and exports. The wood products sector exported \$225.6 million worth of its product to nonlocal users. Similarly, the wood products sector in Douglas County relied on the primary input of their input (\$169.0 million worth of goods and services). Primary input was in the form of imported products, payments for wages and salaries to households, government services, entrepreneurial skills, and depreciation.

Table 1--Interindustry transactions for Douglas County, Oregon, 1970

(In millions of dollars)

Disbursing sector	Purchasing sector			Final demand	Total output
	Wood products	Trade and services	Other local industries		
Local:					
Wood products	23.0	0.2	6.2	225.6	255.0
Trade and services	23.6	15.7	17.2	166.7	223.2
Other local industries	39.4	11.4	21.4	113.8	186.0
Total	86.0	27.3	44.8	506.1	664.2
Primary input	169.0	195.9	141.2	29.9	536.0
Total input	255.0	223.2	186.0	536.0	1,200.2

Source: Darr and Fight (1974).

The total input column in table 1 indicates total purchases by a local sector from producers inside and outside the local economy. Row totals (total output) are total sales by local sectors to markets inside and outside the local economy. The sum of row totals equals the sum of column totals. This grand total represents Douglas County's gross output of goods and services.

Direct Coefficient Matrix Shows Importance of Local Purchases

The interindustry transaction table is used to determine the amplifying effect of a change in final demand for a sector's products on the gross output of the local economy. This effect is commonly referred to as the I/O multiplier. The size of the multiplier effect for a particular sector is a function of the interdependency between that sector and other local sectors. Final demand is composed of consumer expenditures, private investment, government spending, and exports (shipments to buyers in other regions or abroad). An increase in any or all of these components will increase local income, but a portion of the increase in income will leak out of the local economy in the form of taxes, imports, and savings. The remainder recirculates in the local economy and the process is repeated until there is no more income to spend.

The more an industry purchases from local producers over outside producers, the greater the multiplier effect. To see how this works, consider **two** hypothetical communities: community "A" and community "B." Presume there are no taxes and nobody saves any income. But presume that for every dollar spent on purchases by community A, \$.60 worth is for imported goods and services.

This \$.60 represents leakage because it will not recirculate in the local economy. Community B imports \$.50 worth of goods and services for every dollar spent on purchases. Is the multiplier effect for community B greater or less than that for A? To answer, we can calculate the multiplier:

Multiplier = 1/leakage fraction;
 1.667 = 1/.60 for community A,
 2.000 = 1/.50 for community B.

So for community A, the multiplier is 1.6667; for community B, 2.0000. This means that a \$1 increase in, say, exports by community B will increase local income by \$2, while an increase of \$1 in exports by community A would increase income by only \$1.67. Because expenditures for imports are not recirculated locally, imports represent leakage from the local economic system. The greater the leakage, the smaller the multiplier effect.

Direct coefficients show the proportion of a sector's total expenditures by source. As illustrated in table 2, the wood products sector purchased a larger proportion of its input from local sectors than did trade and services, and other local industries. Purchases from local sectors account for about one-third of the total expenditures by the wood products sector for goods and services. Trade and services relied on local sectors for only about 12 percent of its input, while other local industries purchased about one-fourth of its needed input from local sectors.

Direct and Indirect Coefficients Matrix Provides Fundamental Answers

The I/O model used in IPASS is a "demand-pull" model. That is, the common question addressed by its user is, "How much is the gross output of goods and services of an economy influenced by a change in final demand?" To answer, the user must have a matrix of direct and indirect coefficients, or "demand" multipliers. These are derived from the relationship:

[Gross output] = [intermediate or local purchases] + [final purchases].

The relationship can be represented mathematically:

$$[X] = [A][X] + [Y]; \quad (1)$$

where:

[X] = a vector of total gross sector output (from table 1),
 [Y] = vector of final demands for sector goods and services (from table 1), and
 [A] = a matrix of direct coefficients (from table 2).

Table 2--Direct coefficient matrix showing proportion of total expenditures by sector, Douglas County, Oregon, 1970

Local disbursing sector	Local purchasing sector		
	Wood products	Trade and services	Other local industries
Wood products	0.0903	0.0009	0.0334
Trade and services	.0924	.0703	.0927
Other local industries	.1543	.0511	.1151
Total purchases	.3370	.1223	.2412
Primary input	.6630	.8777	.7588
Total input	1.0000	1.0000	1.0000

Equation (1) must be rearranged when used in making predictions so that it represents a relationship between gross output and final demands:

$$[X] - [A][X] = [Y]; \quad (2)$$

and the equivalent form:

$$[X] [I - A] = [Y]; \quad (3)$$

where [I] is an identity matrix; that is, 1's on the diagonal in the matrix and 0's elsewhere.

The final step is to invert the $[I - A]$ matrix (see table 3). This step yields the demand multipliers for predicting the effects of a change in final demand on gross output. Thus, forecasted gross output depends on the interindustry structure of the local economy, represented by demand multipliers, and its final demands.

Interindustry purchases are derived simply by multiplying each sector's direct input requirements by its total purchases, which are exactly equal to its gross output:

$$[\text{Gross output}] = [\text{final demand multipliers}] [\text{final demands}].$$

Table 3--Direct and indirect coefficient matrix showing change in sales associated with a \$1-change in sales to final demand, Douglas County, Oregon, 1970

Purchasing sector	Disbursing sector		
	Wood products	Trade and services	Other local industries
Wood products	1.10672	0.00328	0.04213
Trade and services	.12999	1.08235	.11826
Other local industries	.20055	.06322	1.14432
Total	1.43726	1.14885	1.30471

This relationship is derived directly from equation (3) by rearranging the output-related variables:

$$[X] = [I - A]^{-1} [Y]. \quad (4)$$

The $[I - A]^{-1}$ matrix is commonly referred to as the "Leontief inverse." The column totals in table 3 represent the sector demand multipliers and show the change in sector output associated with a dollar change in sales to final (exogenous) demand. For example, if final demand for Douglas County wood products were to increase \$500,000, total county output would increase \$718,630 (the product of \$500,000 and 1.43726). The Trade and Services sector has the smallest demand multiplier (1.14885) of the three sectors, attributed to a greater reliance on imports and primary inputs.

Leontief Inverse Links I/O and IPASS Models

The I/O model is a powerful economic tool. Nevertheless, it has several inherent features that limit its ability to forecast future events. The I/O model does not allow for time--the multiplier effects are assumed to take place within a given period of time, typically 1 year. The model provides no way to forecast changes in one final demand. Finally, the I/O model does not account for changes or constraints in investment, labor force, or population.

The IPASS model was designed to overcome the limitations in the I/O model. IPASS incorporates the industry demand multipliers, the Leontief inverse matrix, as its production module (fig. 2).

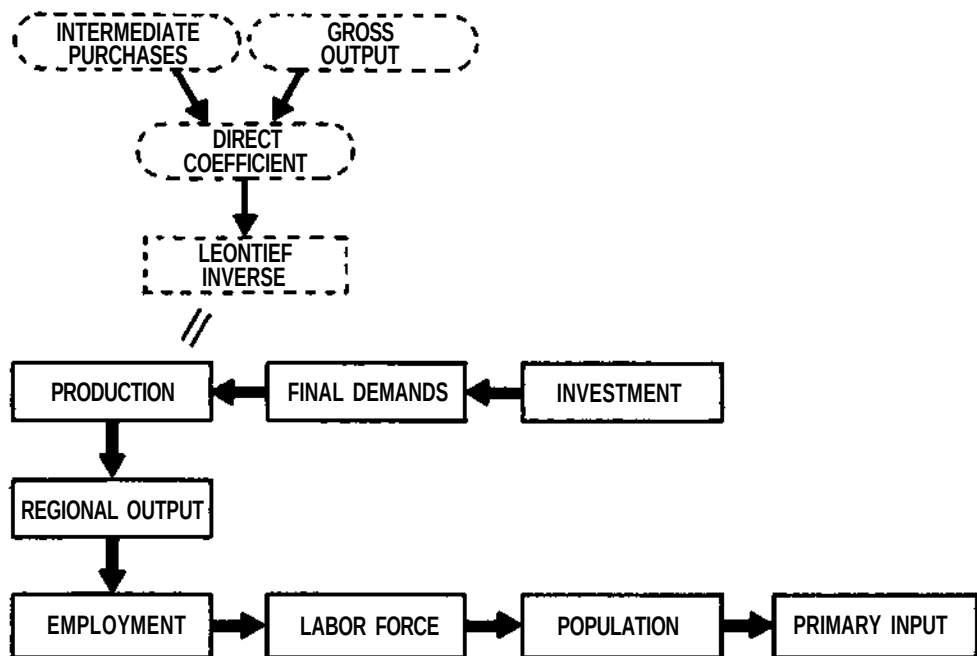


Figure 2.-Relationship between IPASS and the conventional I/O model. The Leontief inverse matrix $[I - A]^{-1}$ is the IPASS production module.

Synopsis of the IPASS Model

IPASS is a dynamic simulation model capable of forecasting a number of basic socioeconomic indicators (for example, population, employment, earnings, and investment) on an annual basis. Over 60 algorithms are used to calculate and project socioeconomic variables. The model proceeds step by step to derive sequentially related parameters. Hence, it is recursive: annual output derived from calculations becomes input for another annual iteration.

The IPASS model requires comprehensive data on the economic and social situation for the initial year. This data base includes statistics on employment, population, earnings, productivity, and output; annual rates of change for a large number of variables such as birth rates; and hours worked per week. Using the data base and historical rates of change, IPASS will simulate the growth and development of an economy for a specified interval of time. Such a forecast is called a "baseline analysis" and serves to calibrate forecasts based on alternative, nonhistorical assumptions. The user can, for example, create an alternative situation by changing one or more parameters in the data base for any year during the specified time period. An alternative situation might incorporate an increase in investment, or a combination of a change in population growth and increased worker productivity, for example. Changing a parameter would have an "impact" on the economy. The extent of the impact can be determined by comparing results of the alternative forecast to the baseline analysis. This "impact analysis" is an important quantitative tool for policy analysts, planners, researchers, and educators.

Using IPASS

Users need not know how the various components of **IPASS** work to conduct an impact analysis. Rather, users merely respond to a series of direct questions regarding their preferences for particular data outputs and related data inputs. Data outputs are the indicators of regional growth and change: population, employment, and income. Data inputs are the: (1) initial socioeconomic conditions, represented by the data outputs; and (2) relationships among these variables, or parameters, that represent the interindustry structure of the local economy.

To demonstrate the use of **IPASS**, we will give two examples based on data for Douglas County, Oregon. The first example will be a baseline analysis, which shows how the Douglas County economy would have performed had historical trends persisted during the forecast period. The second example will be an impact analysis, which compares the baseline performance with a forecast that reflects changes in several user-specified parameters.

Example 1: Baseline Analysis

The **IPASS** program prints a series of questions to which the user responds. In our example, question, data, and technical comments from **IPASS** are in capital letters; responses from the user are in lower case boldface.

Activate program

Assume you are logged onto the Cyber computer at Oregon State University and want to obtain the **IPASS** program. You must key the following commands:

```
attach,ipass  
/ipass
```

These commands activate the **IPASS** program in interactive mode. Immediately **IPASS** asks which region you want to analyze by displaying:

```
(1) WELCOME TO IPASS  
    UPDATE 17-JAN-84 -- VERSION 3.4  
    WHAT REGION DO YOU WANT TO SIMULATE?  
    TYPE IN THE NUMBER WHICH REPRESENTS THAT REGION.  
      1 ... MINNESOTA (1970)  
      2 ... DOUGLAS COUNTY, OREGON (1972)  
      3 ... ALASKA (1977)  
      4 ... S.E. ALASKA (1977)  
     25 ... OTHERS  
    ?
```

After answering an **IPASS** question, the user must press either the "return" or "enter" key to complete a response. **IPASS** can wait for about 10 minutes for your complete response; further idle time will cause the computer to disconnect you.

Since we want to simulate the Douglas County economy, a "2" is the appropriate response:

```
2  
THE REGION IS DOUGLAS CNTY, OREGON
```

Note that IPASS verifies your choice, “The region is Douglas Cnty, Oregon.
Caution: Select the desired region carefully because once the “return” key has been pressed, the only way to correct an error is to start the simulation over. Appendix D provides advice on ways to avoid this type of error and similar kinds of errors.

Specify format

(2) DOES YOUR TERMINAL PRINT 80 OR 132 CHARACTERS PER LINE?
TYPE [80 OR 132]

? **132**
132

The 132-character format is preferable because IPASS prints wide tables of data, but the same information can be provided in 80-character format. Again, note that IPASS verifies your response.

(3) WHICH **ANNUAL** SUMMARY TABLE DO YOU WANT TO FOLLOW?
TYPE **ONE** NUMBER [0-6]

? **6**
6

IPASS can generate a large amount of information based on annual statistics, not all of which is needed to gauge the performance of the economy being simulated. Annual summary tables display totals of key indicators, which give the user a view of the region’s economic performance. Depending on the user’s main interest, one of the six annual summary tables may be selected. A description and example of each table is shown in appendix A. The user’s choices are:

- 0 = no table
- 1 = market indicators
- 2 = final demand indicators
- 3 = investment indicators
- 4 = occupational employment
- 5 = labor force indicators
- 6 = general economic indicators.

For example, we are interested in a general overview of the performance of Douglas County’s economy, so we have selected annual summary table 6.

Summary tables provide only gross totals. But additional information regarding individual sectors, occupation, and age classes could be obtained by responding with a “yes” to the next question:

(4) DO YOU WANT TO **SEE** THE 1972 DATA TABLES?
[YES OR NO]

? no
N

For the baseline analysis, we forgo the additional information. In example 2, however, we will explore this question in more detail.

**Taking the
first opportunity
to edit data base**

(5) DO YOU WANT **TO** MODIFY THE ORIGINAL DATA BASE?
[YES OR NO]
? no
N

If part of the data provided by the computer files does not fit the user's needs, the user can change parameters rather than create an entire data base.

To keep the modified data base, the user may simulate 0 years (answer "0" to question 7) and create a permanent file containing the data base with the user's changes by answering "yes" to question 14.

Responding "yes" to question 5 puts the user into the parameter change routine discussed in example 2, question 11.

The next question is for the more experienced user who wants to introduce change in **IPASS's** basic computational procedures. (These procedures will be published in another manual.)

(6) DO YOU WANT **TO** USE OPTIONAL IPASS PROGRAMMING?
[YES OR NO]
? no
N

**Tell IPASS when
to stop simulation**

(7) HOW MANY YEARS DO YOU WANT TO SIMULATE?
? 3
3

For this example, we need a minimum of 3 years to simulate the impact of the change that will be introduced in example 2. With a shorter time period, baseline trends could wash out the inputs of the change resulting from a parameter change.

(8) HOW FREQUENTLY DO YOU WANT TO VIEW DATA TABLES?
? 0
0

Question 4 gave us an opportunity to view the original (1972) data tables. The user may now request opportunities to view the data tables during the simulation. Possible user responses to question 8 are:

- 0 = No opportunity to see data tables during simulation.
- 1 = Opportunity to view tables for each year of simulation.
- 2 = Opportunity to view tables every other year of simulation (for example, years 2,4,6..).
- 3 = Opportunity to view tables every third year of simulation (for example, years 3,6,9..).
- n = Opportunity to view tables every n^{th} year of simulation (for example, years n,2n,3n..).

No matter what the response is to question 8, the user will have a chance to view the data tables after the final year of simulation. For our baseline analysis, we do not need to see the data tables during the simulation, so our response is "0."

(9) HOW FREQUENTLY DO YOU WANT TO MODIFY THE SIMULATION?

? 0
0

Users can indicate how frequently they want to modify parameters during the simulation. Possible responses are shown below. Note that all opportunities allow users to modify parameters for the 1st year of the simulation.

- 0 = Opportunity to modify only the 1st year of simulation.
- 1 = Opportunity to modify each year of simulation.
- 2 = Opportunity to modify the 1st, 3rd, and every other year thereafter.
- 3 = Opportunity to modify the 1st, 4th, and every 3rd year thereafter.
- n = Opportunity to modify the 1st, n + 1, and every nth year thereafter.

For our example, we respond with a "0."

SUMMARY TABLE OF GENERAL ECONOMIC INDICATORS,
DOUGLAS CNTY, OREGON 1972-1975.

YEAR	POPULATION (THOU)	EMPLOYMENT (THOU)	UNEMPLOYED (THOU)	GROSS OUTPUT (MILL)	EXPORT (MILL)	PCE (MILL)	EARNINGS PER PERSON (NO.)	LOCAL DEMAND (MILL)	LABOR FORCE RATE (PCT)	TOTAL LABOR FORCE (THOU)
1972	81.	25.6	5.1	703.	309.0	180.3	2028.	217.6	54.061	30.708

**IPASS prints
data requested**

Above is the annual summary table of general economic indicators requested by the user's response to question 3. PCE stands for personal consumption expenditures, or total annual expenditures by members of households. Local demand is the quantity of finished goods and services purchased by users within the local economy and excludes exported goods and services. The labor force rate is the percentage of residents over 16 years old who are gainfully employed or are seeking employment.

(10) DO YOU WANT TO MODIFY THE 1973 SIMULATION?

[YES OR NO]
? no
N

For the baseline analysis, we do not want to change the parameters. In example 2 we will introduce a change.

(11) DO YOU WANT TO MODIFY "SPECIAL" INVESTMENT PARAMETERS FOR 1973?

[YES OR NO]
? no
N

(12) DO YOU WANT TO MODIFY "SPECIAL" FINAL DEMAND PARAMETERS FOR 1973?

[YES OR NO]
? no
N

For the baseline analysis, we do not want to change special parameters. The special parameters are discussed in example 2.

**Final year
of simulation concludes**

SUMMARY TABLE OF GENERAL ECONOMIC INDICATORS,
DOUGLAS CNTY, OREGON 1973-1975.

YEAR	POPULATION	EMPLOYMENT	UNEMPLOYED	GROSS OUTPUT	EXPORT	PCE	EARNINGS PER PERSON	LOCAL DEMAND	LABOR FORCE RATE	TOTAL LABOR FORCE
	(THOU)	(THOU)	(THOU)	(MILL)	(MILL)	(MILL)	(NO.)	(MILL)	(PCT)	(THOU)
1973	81.	26.6	4.7	740.	323.3	177.8	2099.	232.4	54.141	31.316
PCT	.6	4.0	-8.2	5.3	4.6	-1.4	3.5	6.8	.1	2.0
1974	82.	27.5	4.4	775.	351.5	177.8	2157.	231.6	54.322	31.988
PCT	.8	3.4	-5.4	4.8	8.7	.0	2.8	-.3	.3	2.1
1975	82.	27.9	4.8	793.	370.7	178.4	2176.	225.8	54.657	32.604
PCT	.7	1.3	8.0	2.3	5.5	.3	.9	-2.5	.6	2.2
PCTB	2.13	8.96	-6.21	12.77	19.97	-1.09	7.27	3.73	1.10	6.44
APCB	.71	2.90	-2.11	4.09	6.26	-.37	2.37	1.23	.37	2.10

PCT ...PERCENTAGE CHANGE RELATIVE TO PREVIOUS YEAR

PCTB ...PERCENTAGE CHANGE RELATIVE TO BASE YEAR

APCB ...ANNUAL PERCENTAGE CHANGE RELATIVE TO BASE YEAR

(13) YEAR 1975 HAS BEEN REACHED.
DO YOU WANT TO SEE THE NEW DATA TABLES?
[YES OR NO]
? no
N

To keep the baseline projection simple, we will forgo having **IPASS** print out detailed data.

**Saving projections
for later analysis**

(14) SAVE 1975 DATA BASE FOR FUTURE USE?
? no
N

The user may want to use the data base from the final year of simulation in a later analysis. By saving the data base at this time, the user may continue the simulation without having to recreate the 1975 data base. We have no need to save the data base for our example, so we answer "no."

**For those who
want more**

(15) CONTINUE SIMULATION?
? no
N
IT HAS BEEN A PLEASURE TO WORK WITH YOU.
HAVE A NICE DAY.

We answer "no" because we have completed the baseline analysis. If we had answered "yes," **IPASS** would have started over, beginning with question 6, using the data projected for 1975 rather than the original 1972 data base.

Example 2: Impact Analysis

Periodically, a firm must replace equipment to maintain production levels. Some equipment may simply wear out, whereas other equipment becomes outmoded. Furthermore, investment in equipment is needed to increase production. But what would happen to employment, gross regional output, and population if owners did not reinvest? Such a situation might prevail in Douglas County, Oregon, where dwindling timber supplies discourage investment in the lumber and wood products sectors. We will simulate this hypothetical situation using the 1972 Douglas County data base. By comparing the results with the baseline analysis conducted in example 1, we can assess the economic impact of constraining investment. All relevant questions and discussion from example 1 are repeated here for the user's convenience.

The IPASS program prints a series of questions to which the user responds. In our example, questions, data, and technical comments from IPASS are in capital letters; responses from the user are in lower case boldface.

Activate program

Assume you are logged onto the Cyber computer at Oregon State University and want to obtain the IPASS program. You must key the following commands:

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These commands activate the IPASS program in interactive mode. Immediately IPASS asks which region you want to analyze:

```
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    WHAT REGION DO YOU WANT TO SIMULATE?  
    TYPE THE NUMBER WHICH REPRESENTS THAT REGION.  
      1 ... MINNESOTA (1970)  
      2 ... DOUGLAS COUNTY, OREGON (1972)  
      3 ... ALASKA (1977)  
      4 ... S.E. ALASKA (1977)  
     25 ... OTHERS  
    ?
```

After answering an IPASS question, the user must press either the "return" or "enter" key to complete a response. IPASS will wait for about 10 minutes for your complete response; further idle time will cause the computer to disconnect you.

Since we want to simulate the Douglas County economy, a "2" is the appropriate response:

```
2  
THE REGION IS DOUGLAS CNTY, OREGON
```

Note that IPASS verifies your choice, "The region is Douglas Cnty, Oregon." Caution: select the desired region carefully because once the "return" key has been pressed, the only way to correct an error is to start the simulation over. Appendix D provides advice on ways to avoid this type of error and similar kinds of errors.

Specify format

(2) DOES YOUR TERMINAL PRINT 80 OR 132 CHARACTERS PER LINE?
TYPE [80 OR 132]
? 132
132

The 132-character format is preferable because IPASS prints wide tables of data, but the same information can be provided in 80-character format. Again, note that IPASS verifies your response.

(3) WHICH ANNUAL SUMMARY TABLE DO YOU WANT TO FOLLOW?
TYPE ONE NUMBER [0-6]
? 6
6

IPASS can generate a large amount of information based on annual statistics, not all of which is needed to gauge the performance of the economy being simulated. Annual summary tables display totals of key indicators, which give the user a view of the region's economic performance. Depending on the user's main interest, one of the six annual summary tables may be selected. A description and example of each table is shown in appendix A. The user's choices are:

- 0 = no table
- 1 = market indicators
- 2 = final demand indicators
- 3** = investment indicators
- 4** = occupational employment
- 5 = labor force indicators
- 6 = general economic indicators.

As we did in example 1, we request table 6. By comparing table 6 from the two analyses, we can determine impacts of our hypothetical situation—restricting investment in the lumber and wood products sectors.

Request data tables

The summary tables merely provide gross totals. To analyze investment trends in a particular sector, we will need more information than gross totals. More information would also be needed in analyses of population, occupational employment, and exports. Additional information can be obtained by responding with a “yes” to the next IPASS question:

(4) DO YOU WANT TO SEE THE 1972 DATA TABLES?
[YES OR NO]
? **yes**
Y

(5) WHAT TABLES DO YOU WANT TO SEE?
TYPE NUMBERS [1-8]
? **1,3**
1,3

We have the choice of any or all of the following tables. A description and example of each is in appendix A.

- 1 = export market indicators
- 2 = intermediate and final demand indicators
- 3 = investment and capital stock indicators
- 4 = intermediate purchases, imports, and value-added indicators
- 5 = output, earnings, and employee compensation
- 6 = employment and unemployment
- 7 = total population and labor force indicators
- 8 = productivity indicators.

We have selected data tables 1 and 3. Data table 1 will permit us to trace the effects of investment changes in the wood products sector on other local industries. Data table 3 will identify specific investment changes by sector.

TABLE 1. EXPORT MARKET INDICATORS OF SPECIFIED SECTORS,
DOUGLAS CNTY. OREGON, 1972.

		GROSS OUTPUT		ACTUAL MARKET SHARE			POTENTIAL MARKET SHARE	
SECTOR		UNITED STATES	TOTAL REGION	REGIONAL EXPORT	PERCENT		EXPORTS	PERCENT OF U.S. GROSS OUTPUT
NO.	TITLE				GROSS OUTPUT	ANNUAL CHANGE		
		(THOU)	(THOU)	(THOU)	(PERCENT)	(PERCENT)	(THOU)	(PERCENT)
1	LOGGING	3447545.	41795.	18906.	.5484	.0000	19582.	.5680
2	SAWMILLS	4493815.	43215.	40908.	.9103	.0000	40908.	.9103
3	PLYVENEER	2329338.	137520.	131562.	5.6480	.0000	138785.	5.9581
4	FIBER PROD	26360411.	41794.	41876.	.1589	.0000	42308.	.1605
5	FISHING	4777643.	4202.	236.	.0049	.0000	270.	.0056
6	CROPS	31339156.	3505.	3206.	.0102	.0000	3334.	.0106
	LIVESTOCK	36537238.	5488.	4324.	.0118	.0000	4324.	.0118
8	MANUFACTUR	413504121.	48406.	42023.	.0102	.0000	42686.	.0103
9	LOGGING	8290052.	3826.	1907.	.0230	.0000	2144.	.0259
10	EATERIES	43882706.	9279.	657.	.0015	.0000	1398.	.0032
11	SERV STA	6295169.	20104.	3946.	.0627	.0000	5097.	.0810
12	CAR DEALER	14688960.	44693.	1327.	.0090	.0000	4034.	.0275
13	CON. TRAN. U	159188514.	25502.	438.	.0003	.0000	2740.	.0017
14	PROF SERV	84429033.	11832.	-354.	-.0004	.0000	1318.	.0016
15	FINANCIAL	31574623.	26270.	2161.	.0068	.0000	2846.	.0090
16	CONSTRUCT	146778672.	26610.	-1169.	-.0008	.0000	1399.	.0010
17	TRADE	149693686.	85934.	207.	.0001	.0000	6945.	.0046
18	RET SERV	197744310.	29321.	6411.	.0032	.0000	8179.	.0041
19	USFS SALES	10000.	17182.	6139.	61.3927	.0000	6139.	61.3927
20	BLM SALES	10000.	17405.	1873.	18.7274	.0000	1884.	18.8390
21	USFS APPRO	0.	9690.	0.	.0000	.0000	0.	.0000
22	BLM APPRO	0.	1713.	0.	.0000	.0000	0.	.0000
23	CNTY GOVT	2000.	33193.	1782.	89.0871	.0000	1782.	89.0871
24	CITY GOVT	1000.	4272.	665.	66.5073	.0000	665.	66.5073
25	ADMIN GOVT	100000.	10292.	0.	.0000	.0000	0.	.0000
	TOTAL	1365477992.	703102.	309032.	.0000	.0000	338768.	.0000

Interpret data table I

There are 25 sectors in the Douglas County model. Gross output of the United States is the total for only those U.S. sectors that exist in Douglas County. U.S. gross output for sectors 19-25 are not generally available in other data sources, so numbers were "created" to satisfy model requirements. Negative values under "regional exports" result because sector capacity could not meet local demands; hence, negative values can be considered imports. When these values become highly negative, the user may consider modifying the Leontief inverse to more accurately represent the higher level of imports.

The difference between potential market share and actual market share is that actual market share reflects constraints on sector output by physical capacity and/or insufficient staffing. These constraints are relieved through investment in production equipment and by bringing in workers from the outside (in-migration).

Because 1972 is the initial year, there is no annual change in actual market share.

TABLE 3. INVESTMENT AND CAPITAL STOCK INDICATORS OF SPECIFIED SECTORS,
DOUGLAS CNTY, OREGON, 1972.

SECTOR		PRODUCTION			POLLUTION ABATEMENT			CAPITAL STOCK		
NO.	NAME	EXPANSION	REPLACE WENT	TOTAL	EXPANSION	REPLACE MENT	TOTAL	PRODUCTION	POLLUTION ABATEMENT	TOTAL
		(THOU)	(THOU)	(THOU)	(THOU)	(THOU)	(THOU)	(THOU)	(THOU)	(THOU)
1	LOGGING	0.	882.	882.	0.	0.	0.	16127.0	.0	16127.0
2	SAMMILLS	0.	1390.	1390.	0.	0.	0.	29500.0	.0	29500.0
3	PLYVENEER	102.	2282.	2384.	6.	123.	129.	48094.0	2591.0	50685.0
4	FIBER PROD	0.	1588.	1588.	0.	86.	86.	35360.0	1905.0	37265.0
5	FISHING	0.	94.	94.	0.	0.	0.	3665.0	.0	3665.0
6	CROPS	0.	0.	0.	0.	0.	0.	3834.0	.0	3834.0
7	LIVESTOCK	0.	0.	0.	0.	0.	0.	4921.0	.0	4921.0
8	HANUFACTUR	0.	3.	3.	0.	0.	0.	21014.0	1132.0	22146.0
9	LODGING	0.	0.	0.	0.	0.	0.	1521.0	.0	1521.0
10	EATERIES	0.	0.	0.	0.	0.	0.	5261.0	.0	5261.0
11	SERV STA	0.	1.	1.	0.	0.	0.	8002.0	.0	8002.0
12	CAR DEALER	0.	183.	183.	0.	0.	0.	17793.0	.0	17793.0
13	COM, TRAN, U	1795.	1.	1796.	4.	0.	4.	34821.0	77.0	34898.0
14	PROF SERV	67.	0.	67.	0.	0.	0.	4707.0	.0	4707.0
15	FINANCIAL	0.	0.	0.	0.	0.	0.	10490.0	.0	10490.0
16	CONSTRUCT	863.	1.	864.	0.	0.	0.	24336.0	.0	24336.0
17	TRADE	0.	2.	2.	0.	0.	0.	60340.0	.0	60340.0
18	RET SERV	0.	0.	0.	0.	0.	0.	11682.0	.0	11682.0
19	USFS SALES	0.	0.	0.	0.	0.	0.	18000.0	.0	18000.0
20	BLH SALES	0.	0.	0.	0.	0.	0.	18000.0	.0	18000.0
21	USFS APPRO	0.	0.	0.	0.	0.	0.	.0	.0	.0
22	BLH APPRO	0.	0.	0.	0.	0.	0.	.0	.0	.0
23	CNTY GOVT	0.	0.	0.	0.	0.	0.	.0	.0	.0
24	CITY GOVT	0.	0.	0.	0.	0.	0.	.0	.0	.0
25	ADMIN GOVT	0.	0.	0.	0.	0.	0.	.0	.0	.0
	TOTAL	2027.	6427.	9254.	10.	209.	219.	376668.0	5705.0	382373.0

interpret data table 3

Note the following identity:

$$S_t = S_{t-1} + EI_t + RI_t - D_t$$

where:

S_t = capital stock in year "t,"

S_{t-1} = capital stock in year "t-1,"

EI_t = expansion investment in year "t,"

RI_t = replacement investment in year "t," and

D_t = depreciation in year "t."

Investment for production expansion is triggered when demand is greater than physical capacity (indicated by potential exports being greater than actual exports in data table 1). When depreciation occurs, productive capacity declines. If capacity falls below demand, investment is triggered to replace depreciated equipment. Capital stock is composed of "production" and "pollution abatement" equipment. If a sector can meet demands with available capital stock (S_{t-1}) for its products, there will be no investment. Also, there will be no investment if a sector has no cash to finance the investment. Finally, zeros may appear in under investment columns if amounts are less than \$50.

Taking the first
opportunity to edit
data base

(6) DO YOU WANT TO MODIFY THE ORIGINAL DATA BASE?

[YES OR NO]

? no

N

If part of the data provided by the computer files does not fit the user's needs, the user can change parameters rather than create an entire data base. To keep this modified data base, the user may simulate 0 years (answer "0" to question 7) and create a permanent file containing the data base with the user's changes by answering "yes" to question 14.

Responding "yes" to question 6 puts the user into the parameter change routine as discussed in question 11 of example 2.

The next question is for the more experienced user who wants to introduce change in IPASS's basic computational procedures. (These procedures will be published in another manual.) We respond with "no."

(7) DO YOU WANT TO USE OPTIONAL IPASS PROGRAMMING?
[YES OR NO]
? no
N

**Tell IPASS when
to stop simulation**

(8) HOW MANY YEARS DO YOU WANT TO SIMULATE?
? 3
3

As with the baseline analysis, we request a 3-year simulation.

(9) HOW FREQUENTLY DO YOU WANT TO VIEW DATA TABLES?
? 1
1

Question 4 gave us an opportunity to view the original (1972) data tables. The user may now request opportunities to view the data tables during the simulation. Possible user responses to question 9 are:

- 0 = No opportunity to see data tables during simulation.
- 1 = Opportunity to view tables for each year of simulation.
- 2 = Opportunity to view tables every other year of simulation (for example, years 3,6,9...).
- 3 = Opportunity to view tables every third year of simulation (for example, years 3,6,9...).
- n = Opportunity to view tables every nth year of simulation (for example, years n,2n,3n...).

No matter what the response is to question 9, the user will have a chance to view the data tables after the final year of simulation.

We respond with a "1" because we want to see the data table for each year.

(10) HOW FREQUENTLY DO YOU WANT TO MODIFY THE SIMULATION?
? 0
0

Users can indicate how frequently they want to modify parameters during the simulation. Possible responses are shown below. Note that all opportunities allow the user to modify parameters for the 1st year of the simulation.

- 0 = Opportunity to modify only the 1st year of simulation.
- 1 = Opportunity to modify each year of simulation.
- 2 = Opportunity to modify the 1st, 3d, and every other year thereafter.
- 3 = Opportunity to modify the 1st, 4th, and every 3d year thereafter.
- n = Opportunity to modify the 1st, $n + 1$, and every nth year thereafter.

Our modifications of the investment limits will be permanent; that is, until we modify again, they will remain zero. In this example, we will have no further need to modify parameters.

IPASS prints data requested

SUMMARY TABLE OF GENERAL ECONOMIC INDICATORS,
DOUGLAS CNTY, OREGON 1972-1975.

YEAR	POPULATION (THOU)	EMPLOYMENT (THOU)	UNEMPLOYED (THOU)	GROSS OUTPUT (MILL)	EXPORT (MILL)	PCE (MILL)	EARNINGS PER PERSON (NO.)	LOCAL DEMAND (MILL)	LABOR FORCE RATE (PCT)	TOTAL LABOR FORCE (THOU)
1972	81.	25.6	5.1	703.	309.0	180.3	2028.	217.6	54.061	30.708

Above is the annual summary table of general economic indicators requested by the user's response to question 3. PCE stands for personal consumption expenditures, or total annual expenditures by members of households. Local demand is the quantity of finished goods and services purchased by users within the local economy and excludes exported goods and services. The labor force rate is the percentage of residents over 16 years old who are gainfully employed or are seeking employment.

Modifying the baseline analysis

A fundamental strength of IPASS is its flexibility; the user may change any or all of the 120 parameters in the data base. All parameters are listed in appendix C, table 5.

In example 2, we will change investment parameters. During the sequence of calculations for 1 year of simulation, the user has three opportunities to modify parameters (fig. 3). Changes to some investment and final demand parameters (identified as "special" parameters in table 5, appendix C) must be introduced after the simulation year commences. Changes in the remaining parameters must be introduced before the simulation year begins.

(11) DO YOU WANT TO MODIFY THE 1973 SIMULATION?
[YES OR NO]
? yes
Y

(12) WHAT PARAMETERS DO YOU WANT TO MODIFY?
TYPE UP TO TEN NUMBERS [1-120]
? 15,16
15,16

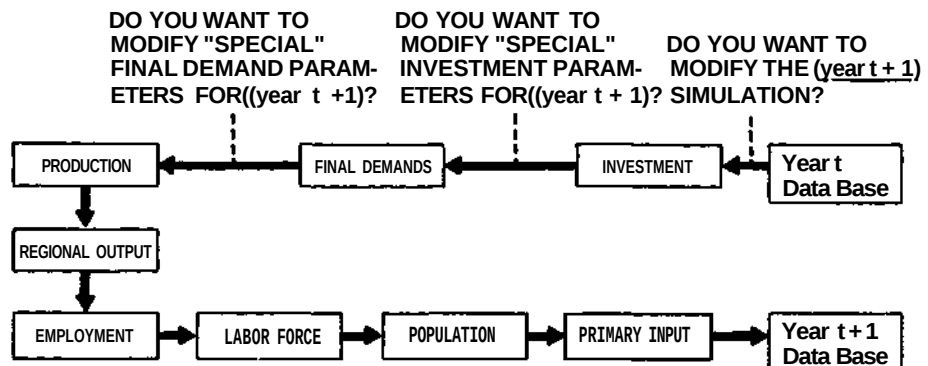


Figure 3.—Opportunities for changing parameters in the IPASS sequence.

We want to modify the baseline analysis to reflect the decision not to invest made by the wood products sector. To change the level of investment by the wood products sector, we must modify two parameters: leverage ratio, and liquidity preference ratio. The leverage ratio reflects the sector's ability to generate capital. Liquidity preference ratio expresses the sector's willingness to borrow. Both parameters must be set equal to zero to reflect no investments. Looking down the parameter list (table 5, appendix C), we find "leverage ratio" (parameter 15) and "liquidity preference ratio" (parameter 16). Neither are "special" parameters.

(13) HOW DO YOU WANT TO MODIFY
 15: LEVERAGE RATIO
 ?

Our response is a 4-part code that sets up the modification:

(1) Type of parameter modification: Specifies the types of modification. Table 4, appendix B, provides a list of types. In our example, we want to replace current values for the "leverage ratio," so we select type "2."

(2) Sector affected: Identifies the sector for which modifications are to be made. Data table 1 (page 15), lists the sectors of the Douglas County model. We want to change the leverage ratio for the four wood products sectors (logging, sawmills, veneer and plywood, and fiber products). The user can only identify one element at a time, however, so we will start with sector 1, "logging."

(3) Vector or matrix change: Indicates the dimension of the parameter being changed. If the change involves a matrix, code the number of the column in which the modification is being made. Figure 5, appendix B, illustrates a vector and matrix. The list of parameters (table 5, appendix C) will help users determine the dimensions of the parameter they want to change. In our example, the modification involves a vector, so we code "1."

(4) New value: States the modification. We want to indicate no investment, so our new value is "0."

A complete response for the logging sector is:

Type (replacement) Parameter is a vector (one column)
 Sector 1 (logging) Replacement value
 2,1,1,0
 2,1,1,0
 SECTOR 1, 1 WAS ... 13.00000 IS .00000
 ?

IPASS provides another prompt ("?"), signifying that the user can continue to modify parameter 15 for other sectors. In our example, three additional responses are required to change current leverage ratios to zero for sawmills (sector 2), plywood and veneer (sector 3), and fiber products (sector 4).

2,2,1,0
 2,2,1,0
 SECTOR 2, 1 WAS ... 13.00000 IS00000
 ? 2,3,1,0
 2,3,1,0
 SECTOR 3, 1 WAS ... 13.00000 IS00000
 ? 2,4,1,0
 2,4,1,0
 SECTOR 4, 1 WAS ... 13.00000 IS00000
 ? 0
 0

We are now finished modifying this parameter, so we respond with parameter option "0."

(14) HOW DO YOU WANT TO MODIFY
 16: LIQUIDITY PREFERENCE RATIO

IPASS automatically proceeds to parameter 16, the second parameter we want to change (see question 12). As with parameter 15, the values are changed to zero:

? 2,1,1,0 0
 2,1,1,0
 SECTOR 1, 1 WAS50000 IS00000
 ? 2,2,1,0 0
 2,2,1,0
 SECTOR 2, 1 WAS50000 IS00000
 ? 2,3,1,0 0
 2,3,1,0
 SECTOR 3, 1 WAS50000 IS00000
 ? 2,4,1,0 0
 2,4,1,0
 SECTOR 4, 1 WAS50000 IS00000
 ? 0
 0

(15) DO YOU WANT TO MAKE ANY OTHER PARAMETER MODIFICATIONS?
 [YES OR NO]
 ? no
 N

In question 12, **IPASS** limited the user to 10 parameter changes (this saves memory space). **IPASS** will now accomodate more parameter changes if needed. Because we **do** not want to modify any other parameters, we say "no."

(16) DO YOU WANT TO MODIFY "SPECIAL" INVESTMENT PARAMETERS
 FOR 1973?
 [YES OR NO]
 ? no
 N

(17) DO YOU WANT TO MODIFY "SPECIAL" FINAL DEMAND PARAMETERS
 FOR 1973?
 [YES OR NO]
 ? no
 N

Earlier we assumed the wood products sectors would not invest during the entire simulation period. Had we wanted to single out a particular year for modifying investment, however, we would do it now using the procedure for changing parameters outlined in appendix B.

**First year
 of simulation concludes**

All calculations for the first year of the simulation have been completed when **IPASS** automatically displays the annual summary table for 1973. The **PCT** row is the percentage change relative to the previous year.

 SUMMARY TABLE OF GENERAL ECONOMIC INDICATORS,
 DOUGLAS CNTY, OREGON 1973-1975.

YEAR	POPULATION (THOU)	EMPLOYMENT (THOU)	UNEMPLOYED (THOU)	GROSS OUTPUT (MILL)	EXPORT (MILL)	PCE (MILL)	EARNINGS PER PERSON (NO.)	LOCAL DEMAND (MILL)	LABOR FORCE RATE (PCT)	TOTAL LABOR FORCE (THOU)
1973	81.	25.8	5.5	713.	308.4	177.8	2022.	228.8	54.149	31.307
PCT	.6	.7	8.3	1.4	-.2	-1.4	-.3	5.1	.2	2.0

IPASS now gives us an opportunity to view the 1973 data tables. We may want to trace the effects of investment changes in the wood products sectors on the output of other sectors, so we respond with a "yes."

(18) **DO** YOU WANT TO SEE THE 1973 DATA TABLES?
 [YES OR NO]
 ? yes
 Y

(19) WHAT TABLES DO YOU WANT TO SEE?
 TYPE NUMBERS [1-8]
 ? 1,3
 1,3

We have asked for data table 1 to trace the impact of the changes to investment on the Douglas County economy.

TABLE 1 EXPORT MARKET INDICATORS OF SPECIFIED SECTORS,
DOUGLAS CNTY. OREGON, 1973.

		GROSS OUTPUT		ACTUAL MARKET SHARE		POTENTIAL MARKET SHARE	
SECTOR		UNITED STATES	TOTAL REGION	REGIONAL EXPORT	PERCENT OF U.S. GROSS OUTPUT	ANNUAL CHANGE	PERCENT OF U.S. GROSS OUTPUT
NO.	TITLE						
		(THOU)	(THOU)	(THOU)	(PERCENT)	(PERCENT)	(THOU)
1	LOGGING	3593035.	38987.	16078.	.4475	-21.2169	20428.
2	SAWMILLS	4576447.	42577.	39565.	.8645	-5.0291	41626.
3	PLY&VENEER	2441635.	130612.	123897.	5.0743	-14.8335	146382.
4	FIBER PROD	27246912.	39778.	39492.	.1449	-9.6930	43731.
5	FISHING	4954301.	4217.	166.	.0033	-40.7330	280.
6	CROPS	32599930.	3638.	3329.	.0102	-4.0298	3468.
7	LIVESTOCK	37149931.	5677.	4381.	.0118	-.3608	4397.
8	MANUFACTUR	427499995.	49391.	41433.	.0097	-6.1136	44320.
9	LOGGING	8448508.	4064.	2153.	.0255	-1.4517	2193.
10	EATERIES	44780371.	9925.	1427.	.0032	.0000	1427.
11	SERV STA	6581121.	21342.	5154.	.0783	-3.2629	5328.
12	CAR DEALER	15366606.	47682.	3218.	.0209	-23.7451	4225.
13	COM,TRAN,U	165293871.	28104.	2613.	.0016	-8.1441	2882.
14	PROF SERV	86907025.	13577.	1481.	.0017	9.1727	1788.
15	FINANCIAL	32733222.	26815.	2755.	.0084	-6.6187	2983.
16	CONSTRUCT	148044935.	29772.	2055.	-.0014	-1.4468	1534.
17	TRADE	15801154.	93393.	4966.	.0032	-30.8484	7918.
18	RET SERV	205764819.	31429.	8163.	.0040	-4.0887	8555.
19	USFS SALES	10000.	16619.	6073.	60.7329	-1.0746	6139.
20	BLM SALES	10000.	16522.	1623.	16.2300	-13.8489	1884.
21	USFS APPRO	0.	9745.	0.	.0000	.0000	0.
22	BLM APPRO	0.	1723.	0.	.0000	.0000	0.
23	CNTY GOVT	2000.	33005.	1782.	89.0871	.0000	1782.
24	CITY GOVT	1000.	4334.	665.	66.5073	.0000	665.
25	ADMIN GOVT	100000.	10237.	0.	.0000	.0000	0.
	TOTAL	1410117218.	713166.	308360.	.0000	.0000	353934.

The percentage annual change in U.S. gross output shows mostly negative values in data table 4 even though regional exports for 1973 are higher than those in 1972. The negative annual change resulted from U.S. gross output growing at even a faster rate than regional exports grew.

TABLE 3 INVESTMENT AND CAPITAL STOCK INDICATORS OF SPECIFIED SECTORS,
DOUGLAS CNTY. OREGON, 1973.

		PRODUCTION			POLLUTION ABATEMENT			CAPITAL STOCK		
SECTOR		EXPANSION	REPLACE	TOTAL	EXPANSION	REPLACE	TOTAL	PRODUCTION	POLLUTION	TOTAL
NO.	NAME		MENT			MENT			ABATEMENT	
		(THOU)	(THOU)	(THOU)	(THOU)	(THOU)	(THOU)	(THOU)	(THOU)	(THOU)
1	LOGGING	0.	0.	0.	0.	0.	0.	15158.9	.0	15158.9
2	SAWMILLS	0.	0.	0.	0.	0.	0.	27996.0	.0	27996.0
3	PLY&VENEER	0.	0.	0.	0.	0.	0.	45682.2	2461.1	48143.2
4	FIBER PROD	0.	0.	0.	0.	0.	0.	33654.6	1813.1	35467.8
5	FISHING	75.	105.	180.	0.	0.	0.	3740.0	.0	3740.0
6	CROPS	115.	0.	115.	0.	0.	0.	3148.9	.0	3148.9
7	LIVESTOCK	0.	0.	0.	0.	0.	0.	4921.0	.0	4921.0
8	MANUFACTUR	416.	3.	418.	22.	0.	23.	21429.6	1154.4	22584.0
9	LOGGING	95.	0.	95.	0.	0.	0.	1615.5	.0	1615.5
10	EATERIES	421.	0.	421.	0.	0.	0.	5881.8	.0	5881.8
11	SERV STA	532.	1.	533.	0.	0.	0.	8533.6	.0	8533.7
12	CAR DEALER	1254.	194.	1448.	0.	0.	0.	19046.8	.0	19046.8
13	COM,TRAN,U	3840.	1.	3841.	9.	0.	9.	38660.9	85.5	38746.4
14	PROF SERV	694.	0.	694.	0.	0.	0.	5401.0	.0	5401.0
15	FINANCIAL	461.	0.	461.	0.	0.	0.	10950.7	.0	10950.7
16	CONSTRUCT	2989.	1.	2988.	0.	0.	0.	27323.8	.0	27323.8
17	TRADE	5322.	2.	5323.	0.	0.	0.	65661.6	.0	65661.6
18	RET SERV	840.	0.	840.	0.	0.	0.	12522.1	.0	12522.1
19	USFS SALES	0.	0.	0.	0.	0.	0.	18000.0	.0	18000.0
20	BLM SALES	0.	0.	0.	0.	0.	0.	18000.0	.0	18000.0
21	USFS APPRO	0.	0.	0.	0.	0.	0.	.0	.0	.0
22	BLM APPRO	0.	0.	0.	0.	0.	0.	.0	.0	.0
23	CNTY GOVT	0.	0.	0.	0.	0.	0.	.0	.0	.0
24	CITY GOVT	0.	0.	0.	0.	0.	0.	.0	.0	.0
25	ADMIN GOVT	0.	0.	0.	0.	0.	0.	.0	.0	.0
	TOTAL	17050.	308.	17358.	31.	0.	31.	387129.0	5614.1	392643.1

Data table 3 verifies with zeros that the four wood products sectors did not invest in production or pollution abatement in 1973.

**Second year
of simulation concludes**

IPASS will automatically provide the summary table:

SUMMARY TABLE OF GENERAL ECONOMIC INDICATORS,
DOUGLAS CNTY, OREGON 1974-1975.

YEAR	POPULATION (THOU)	EMPLOYMENT (THOU)	UNEMPLOYED (THOU)	GROSS OUTPUT (HILL)	EXPORT (HILL)	PCE (MILL)	EARNINGS PER PERSON (NO.)	LOCAL DEMAND (MILL)	LABOR FORCE RATE (PCT)	TOTAL LABOR FORCE (THOU)
1974	02.	25.4	6.5	708.	313.3	178.0	1978.	222.5	54.370	31.936
PCT	.6	-1.4	17.8	-.7	1.6	.1	-2.2	-2.7	.4	2.0

Notice that 1974 gross output has dropped below 1973 levels. For that matter, nearly all indicators, except unemployment and exports, are below 1973 levels. The elimination of investment in the wood products sectors has perversely affected the local economy through its reduction in capital formation, reduction in capacity, and associated interindustry effects. The seemingly contradictory increase in exports is the result of the decline in local demand. The decline has freed capacity to supply outside demand.

We will again look at data tables 1 and 3:

(20) DO YOU WANT TO SEE THE 1974 DATA TABLES?

[YES OR NO]

? yes

Y

(21) WHAT TABLES DO YOU WANT TO SEE?

TYPE NUMBERS [1-8]

? 1,3

1,3

TABLE I. EXPORT MARKET INDICATORS OF SPECIFIED SECTORS,
DOUGLAS CNTY, OREGON, 1974.

		GROSS OUTPUT		ACTUAL MARKET SHARE		POTENTIAL W E T SHARE	
SECTOR		UNITED STATES	TOTAL REGION	REGIONAL EXPORT	PERCENT OF U.S. GROSS OUTPUT	ANNUAL CHANGE	PERCENT OF U.S. GROSS OUTPUT
NO.	TITLE	(THOU)	(THOU)	(THOU)	(PERCENT)	(PERCENT)	(THOU)
1	LOGGING	3744665.	36338.	15377.	.4106	-27.7755	21311.
2	SAWMILLS	4660599.	40311.	37825.	.8116	-10.7710	42357.
3	PLYVENEER	2559347.	124052.	119301.	4.6614	-22.2463	154394.
4	FIBER PROD	28163225.	37860.	38953.	.1351	-15.8163	45282.
5	FISHING	9137491.	4526.	219.	.0043	-24.5481	230.
6	CROPS	33911425.	3781.	3448.	.0102	-4.4240	3608.
7	LIVESTOCK	37772898.	5720.	4378.	.0116	-2.0755	4471.
8	MANUFACTUR	441969587.	52565.	44241.	.0100	-3.4476	46817.
9	LODGING	8609993.	4186.	2204.	.0256	-1.3615	2243.
10	EATERIES	45696398.	9904.	1456.	.0032	.0000	1456.
11	SERV STA	6880062.	21700.	5485.	.0797	-1.5303	5570.
12	CAR DEALER	16075513.	48655.	4315.	.0268	-2.3661	4424.
13	COM, TRAN, U	171633387.	28369.	3007.	.0018	.4784	3032.
14	PROF SERV	89457746.	13955.	1841.	.0021	.0257	2426.
15	FINANCIAL	33934335.	26747.	3042.	.0090	-1.6371	3126.
16	CONSTRUCT	151346188.	30616.	1682.	.0011	8.0060	1682.
17	TRADE	160518340.	96580.	8852.	.0055	7.9610	9026.
18	RET SERV	214110640.	32087.	8701.	.0041	-2.2561	8948.
19	USFS SALES	10000.	15979.	5969.	59.6914	-2.7711	6139.
20	BLH SALES	10000.	15595.	1495.	14.9513	-20.6363	1884.
21	USFS APPRO	0.	9801.	0.	.0000	.0000	0.
22	BLM APPRO	0.	1733.	0.	.0000	.0000	0.
23	CNTY GOVT	2000.	32657.	1782.	89.0871	.0000	1782.
24	CITY GOVT	1000.	4341.	665.	66.5073	.0000	665.
25	ADMIN GOVT	100000.	10280.	0.	.0000	.0000	0.
	TOTAL	1456304840.	708459.	313338.	.0000	.0000	370053.

TABLE 3. INVESTMENT AND CAPITAL STOCK INDICATORS OF SPECIFIED SECTORS.
DOUGLAS CNTY. OREGON, 1974.

SECTOR NO.	NAME	PRODUCTION			POLLUTION ABATEMENT			CAPITAL STOCK		
		EXPANSION	REPLACE MENT	TOTAL	EXPANSION	REPLACE MENT	TOTAL	PRODUCTION	POLLUTION ABATEMENT	TOTAL
		(THOU)	(THOU)	(THOU)	(THOU)	(THOU)	(THOU)	(THOU)	(THOU)	(THOU)
1	LOGGING	0.	0.	0.	0.	0.	0.	14255.8	0.	14255.8
2	SAWMILLS	0.	0.	0.	0.	0.	0.	28514.2	0.	28514.2
3	PLYVENEER	0.	0.	0.	0.	0.	0.	43381.5	2337.7	45729.1
4	FIBER PROD	0.	0.	0.	0.	0.	0.	32031.5	1725.7	33757.2
5	FISHING	235.	105.	340.	0.	0.	0.	3974.9	0.	3974.9
6	CROPS	123.	0.	124.	0.	0.	0.	3272.3	0.	3272.3
7	LIVESTOCK	33.	0.	33.	0.	0.	0.	4954.0	0.	4954.0
8	MANUFACTUR	1376.	3.	1379.	74.	0.	74.	22895.8	1228.5	24834.3
9	LOGGING	17.	0.	17.	0.	0.	0.	1632.5	0.	1632.5
10	EATERIES	0.	0.	0.	0.	0.	0.	5681.8	0.	5681.8
11	SERV STA	168.	1.	168.	0.	0.	0.	8781.2	0.	8781.2
12	CAR DEALER	753.	297.	959.	0.	0.	0.	19799.3	0.	19799.3
13	COM, TRAN, U	956.	1.	957.	2.	0.	2.	39616.9	87.6	39704.5
14	PROF SERV	151.	0.	151.	0.	0.	0.	5552.1	0.	5552.1
15	FINANCIAL	298.	0.	299.	0.	0.	0.	11249.1	0.	11249.1
16	CONSTRUCT	4495.	1.	4496.	0.	0.	0.	31819.3	0.	31819.3
17	TRAUE	3014.	2.	3016.	0.	0.	0.	68675.1	0.	68675.1
18	RET SERV	282.	0.	282.	0.	0.	0.	12803.9	0.	12803.9
19	USFS SALES	0.	0.	0.	0.	0.	0.	18000.0	0.	18000.0
20	BLM SALES	0.	0.	0.	0.	0.	0.	18000.0	0.	18000.0
21	USFS APPRO	0.	0.	0.	0.	0.	0.	0.	0.	0.
22	BLM APPRO	0.	0.	0.	0.	0.	0.	0.	0.	0.
23	CNTY GOVT	0.	0.	0.	0.	0.	0.	0.	0.	0.
24	CITY GOVT	0.	0.	0.	0.	0.	0.	0.	0.	0.
25	ADMIN GOVT	0.	0.	0.	0.	0.	0.	0.	0.	0.
	TOTAL	11907.	322.	12222.	76.	0.	76.	392731.1	5379.5	398110.7

Data table 3 verifies that the four wood products sectors did not invest during 1974.

**Final year
of simulation concludes**

SUMMARY TABLE OF GENERAL ECONOMIC INDICATORS,
DOUGLAS CNTY, OREGON 1975-1975.

YEAR	POPULATION	EMPLOYMENT	UNEMPLOYED	GROSS OUTPUT	EXPORT	PCE	EARNINGS PER PERSON	LOCAL DEMAND	LABOR FORCE RATE	TOTAL LABOR FORCE
	(THOU)	(THOU)	(THOU)	(MILL)	(MILL)	(MILL)	(NO.)	(MILL)	(PCT)	(THOU)
1975	82.	24.8	7.7	694.	309.1	179.2	1916.	217.2	54.674	32.567
PCT	.6	-2.3	18.6	-2.0	-1.4	.7	-3.1	-2.4	.6	2.0
PCTB	1.76	-2.99	51.37	-1.29	.01	-.63	-5.53	-.20	1.13	6.05
APCB	.58	-1.01	14.82	-.43	.00	-.21	-1.88	-.07	.38	1.98

PCT ...PERCENTAGE CHANGE RELATIVE TO PREVIOUS YEAR
PCTB ...PERCENTAGE CHANGE RELATIVE TO BASE YEAR
APCB ...ANNUAL PERCENTAGE CHANGE RELATIVE TO BASE YEAR

The final year of simulation (1975) has been completed. Note that the final summary table includes two additional percentage changes: percentage change relative to base year and annual percentage change relative to the base year.

We will look at data table 1 again to trace the impact of the changes of investment on the Douglas County economy. Data table 3 verifies that the four wood products sectors did not invest in 1975.

(22) YEAR 1975 HAS BEEN REACHED
DO YOU WANT TO SEE THE NEW GATA TABLES?
[YES OR NO]
? yes
Y

(23) WHAT TABLES DO YOU WANT TO SEE?
TYPE NUMBERS [1-8]
? 1,3
1,3

TABLE 1. EXPORT MARKET INDICATORS OF SPECIFIED SECTORS.
DOUGLAS CNTY, OREGON, 1975.

SECTOR	GROSS OUTPUT		ACTUAL MARKET SHARE			POTENTIAL W E T SHARE	
	UNITED STATES	TOTAL REGION	REGIONAL EXPORT	PERCENT OF U.S. GROSS OUTPUT	ANNUAL CHANGE	EXPORTS	PERCENT OF U.S. GROSS OUTPUT
NO. TITLE	(THOU)	(THOU)	(THOU)	(PERCENT)	(PERCENT)	(THOU)	(PERCENT)
1 LOGGING	3902693.	33822.	13948.	.3574	-37.1996	22232.	.5697
2 SAWMILLS	4746298.	38157.	35961.	.7577	-16.6337	43100.	.9081
3 PLVIVENEER	2682733.	117818.	113269.	4.2222	-30.0105	162845.	6.0701
4 FIBER PROD	29110355.	36034.	36217.	.1244	-22.4840	46722.	.1605
5 FISHING	5327459.	4749.	281.	.0055	-3.1812	301.	.0056
6 CROPS	35275682.	3942.	3604.	.0102	-3.9738	3753.	.0106
7 LIVESTOCK	38406312.	5838.	4538.	.0118	-.1622	4546.	.0118
8 WUFACTUR	456928932.	54406.	47710.	.0104	.2854	47778.	.0105
9 LODGING	8774564.	4148.	2236.	.0255	-2.1575	2294.	.0261
10 EATERIES	46631163.	9874.	1485.	.0032	.0000	1485.	.0032
11 SERV STA	7192582.	21892.	5717.	.0795	-1.6329	5823.	.0810
12 CAR DEALER	16817125.	48255.	4633.	.0275	.1015	4633.	.0275
13 COM,TRAN,U	178216042.	28173.	3161.	.0018	.4147	3190.	.0018
14 PROF SERV	92083331.	14625.	2451.	.0019	-1.8423	3231.	.0036
15 FINANCIAL	35179522.	26583.	3180.	.0090	-2.5921	3277.	.0093
16 CONSTRUCT	153682974.	28320.	1845.	.0012	8.0060	1845.	.0012
17 TRADE	166220754.	96348.	16236.	.0962	9.5128	16236.	.0962
18 RET SERV	222794968.	32569.	9097.	.0041	-2.2929	9359.	.0042
19 USFS SALES	10000.	15287.	5787.	57.8727	-5.7335	6139.	61.3927
20 ELH SALES	10000.	14622.	1281.	12.8091	-32.0877	1884.	18.8390
21 USFS APPRO	0.	9859.	0.	.0000	.0000	0.	.0000
22 BLH APPRO	0.	1743.	0.	.0000	.0000	0.	.0000
23 CNTY GOVT	2000.	32250.	1782.	89.8871	.0000	1782.	89.8871
24 CITY GOVT	1000.	4324.	665.	66.5073	.0000	665.	66.5073
25 ADMIN GOVT	100000.	18343.	0.	.0000	.0000	0.	.0000
TOTAL	1504096484.	694002.	309075.	.0000	.0000	387234.	.0000

TABLE 3. INVESTMENT AND CAPITAL STOCK INDICATORS OF SPECIFIED SECTORS.
DOUGLAS CNTY, OREGON, 1975.

SECTOR	PRODUCTION			POLLUTION ABATEMENT			CAPITAL STOCK		
	EXPANSION	REPLACE	TOTAL	EXPANSION	REPLACE	TOTAL	PRODUCTION	ABATEMENT	TOTAL
NO. NAME	(THOU)	(THOU)	(THOU)	(THOU)	(THOU)	(THOU)	(THOU)	(THOU)	(THOU)
1 LOGGING	0.	0.	0.	0.	0.	0.	13414.1	.0	13414.1
2 SAWMILLS	0.	0.	0.	0.	0.	0.	25111.2	.0	25111.2
3 PLVIVENEER	0.	0.	0.	0.	0.	0.	41215.9	2220.4	43436.3
4 FIBER PROD	0.	0.	0.	0.	0.	0.	30486.7	1642.5	32129.2
5 FISHING	150.	113.	263.	0.	0.	0.	4124.9	.0	4124.9
6 CROPS	140.	0.	140.	0.	0.	0.	3411.9	.0	3411.9
7 LIVESTOCK	106.	0.	107.	0.	0.	0.	5060.2	.0	5060.2
8 HANUFACTUR	884.	3.	887.	48.	0.	48.	23689.9	1276.1	24966.1
9 LODGING	16.	0.	16.	0.	0.	0.	1648.7	.0	1648.7
10 EATERIES	0.	0.	0.	0.	0.	0.	5681.8	.0	5681.8
11 SERV STA	109.	1.	109.	0.	0.	0.	8809.7	.0	8809.7
12 CAR DEALER	194.	212.	406.	0.	0.	0.	19993.4	.0	19993.5
13 COM,TRAN,U	173.	1.	175.	0.	0.	0.	39790.3	88.0	39878.3
14 PROF SERV	268.	0.	269.	0.	0.	0.	5820.4	.0	5820.4
15 FINANCIAL	169.	0.	169.	0.	0.	0.	11417.8	.0	11417.9
16 CONSTRUCT	0.	1.	1.	0.	0.	0.	31819.3	.0	31819.3
17 TRADE	503.	2.	505.	0.	0.	0.	69177.7	.0	69177.7
18 RET SLRV	211.	0.	211.	0.	0.	0.	13014.4	.0	13014.4
19 USFS SALES	0.	0.	0.	0.	0.	0.	18000.0	.0	18000.0
20 ELM SALES	0.	0.	0.	0.	0.	0.	18000.0	.0	18000.0
21 USFS APPRO	0.	0.	0.	0.	0.	0.	.0	.0	.0
22 ELH APPRO	0.	0.	0.	0.	0.	0.	.0	.0	.0
23 CNTY GOVT	0.	0.	0.	0.	0.	0.	.0	.0	.0
24 CITY GOVT	0.	0.	0.	0.	0.	0.	.0	.0	.0
25 ADMIN GOVT	0.	0.	0.	0.	0.	0.	.0	.0	.0
TOTAL	2923.	335.	3257.	48.	0.	48.	389688.5	5227.1	394915.6

***Saving projections
for later analysis***

Because there is no investment to replace depreciation, the value of capital stock for the wood products sectors, as expected, has noticeably declined during the years 1972 to 1975. Correspondingly, as the output capacity of these four sectors have declined, so has gross output (values excerpted from data tables 1 and 3):

Sector	Capital Stock		Gross Output	
	1972	1975	1972	1975
	(\$1000)		(\$1000)	
Logging	16,127.0	13,414.1	41,795	33,822
Sawmills	29,500.0	25,111.2	43,215	38,157
Plywood				
and veneer	48,094.0	41,215.9	137,520	117,818
Fiber products	35,360.0	30,486.7	41,794	36,034
Total	129,081.0	110,227.9	264,324	225,833

(24) SAVE 1975 DATA BASE FOR FUTURE USE?

? **yes**
Y

Suppose we have a need to simulate 1975-78 at a later time. By responding "yes" to this question, we would not have to recreate the 1975 data base. The 1975 data base will be stored in the computer memory under whatever name we give in response to the following question:

(25) UNDER WHAT FILE NAME DO YOU WANT TO SAVE THE DATA?

? **dc1975**

THE NEW DATA BASE HAS BEEN SAVED UNDER THE NAME
DC1975

PURGE IT WHEN YOU **NO** LONGER NEED IT BY TYPING
PURGE,DC1975

Note: The name given the data file cannot begin with a number or be longer than seven characters.

***For those who
want more***

(26) CONTINUE SIMULATION?

? **no**
N

IT HAS BEEN A PLEASURE TO WORK WITH YOU.
HAVE A NICE DAY.

We answer "no" because we are finished. Had we answered "yes," **IPASS** would have "started over" using the projected 1975 Douglas County data base rather than the 1972 data.

Comparing Data From Analyses

We have made two, 3-year economic simulations using the **1972** Douglas County, Oregon, data base. The first analysis was a baseline analysis: **IPASS** derived all projections internally using only the data from the **1972** data base. For the second analysis we started with the **1972** data base, but asked, "What if the four wood products sectors in Douglas County chose not to invest?" The impact of this situation over the period **1973-75** can now be estimated by comparing the **two** analyses. The following tabulation compares gross regional output of the wood products sectors from the "baseline analysis" to that of the "no investment" analysis. **All** other factors in the two simulations remain equal; hence, any differences are attributable to the lack of investment (no expansion or maintenance of capital equipment) by the four wood products sectors.

Gross Regional Output

<u>Year</u>	<u>Baseline analysis</u>	<u>"No investment" analysis</u>	<u>Difference</u>
<i>. . . . (Millions of dollars) - - -</i>			
1972	703	703	-0
1973	740	713	-27
1974	775	708	-67
1975	793	694	-99
Totals	2,959	2,767	-193

The hypothetical lack of investment by the wood products sectors would cause an overall loss of **\$193** million of gross regional output over **3** years.

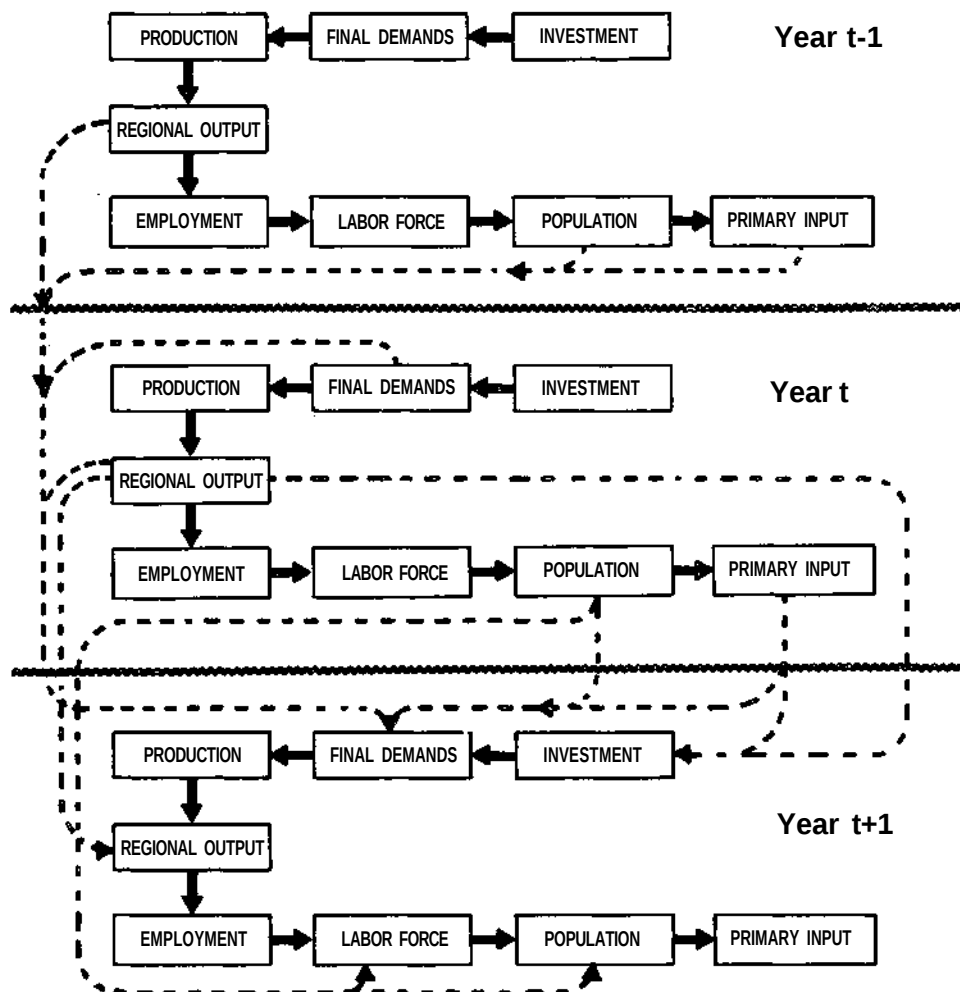
What would happen if the companies have a change of heart and begin investing again in **1975**? How would the construction of a new pulpmill in **1974** affect the Douglas County economy? What would happen to the Douglas County economy in a national housing boom? What will the Douglas County economy look like in **1983**? These kind of questions and many others are easily simulated using the **IPASS** model.

Basic IPASS Logic

To fully understand the usefulness of the **IPASS** model and, in particular, what impacts can be examined, the user must understand the fundamental logic. The computations (called algorithms) involved can be roughly separated into eight main groupings or "modules." These interrelated modules are investment, final demands, production, regional output, employment, labor force, population, and primary input (see fig. 2). Socioeconomic projections derived from a particular module are input used for subsequent calculations. This is a basic characteristic of the model's dynamic nature: next year's projections are based on this and previous years' output. Figure 4 shows the intertemporal relationships in the **IPASS** simulation model.

The following discussion describes the data (input) required and calculated estimates (output) associated with each module.

Figure 4.-IPASS is a dynamic, recursive system. Estimates for the current year t are influenced by transactions from previous years and preceding steps in the current year. For example, the level of investment for year t is a function of regional output and primary input for year $t-1$.



Investment Module

Algorithms composing the investment module determine the amount of investments needed to either replace depreciated capacity or to expand capacity. In addition, the investment module calculates accumulated business income and the extent of depreciated but not replaced capacity, or capital stocks.

The calculations of this module play an important role in determining the extent to which an economy can respond to increases in demand for its products. The standard (static) I/O model assumes a certain and instantaneous increase in the output of goods and services if final demand increases. But an economy's ability to increase output depends on available capacity. Prospective increases in demand may require more capacity than is currently available—that is, the impact of a change in final demand may require additional investment and, therefore, time. The extent to which an increase in final demand can be accommodated depends on the availability of investment funds to (1) maintain existing capacity, and, if necessary (2) expand existing capacity. The amount of investment funds available to maintain and/or add to capacity is a function of current and accumulated business income. Conceivably, output could decrease although final demands increase. If funds available are not sufficient to replace depreciated capital stocks, past output levels cannot be maintained.

Final Demands Module

Final demands are represented by the Y variable in the Leontief I/O model ($[X] = [I-A]^{-1} [Y]$). The user of an ordinary I/O model “externally” specifies changes in final demand and observes the impact on an economy’s gross output. IPASS will allow the same kinds of nonprogramed changes and, in addition, has the ability to generate changes in final demand internally. For example, the investment module triggers changes in the “gross private capital formation” (GPCF) component of final demand. Likewise, personal consumption expenditures (PCE) are internally motivated by population changes. Eventually, a government module, not yet available, will provide for changes in government—Federal, State and local services.

The seven components of final demand and how they relate to one another are as follows:

1. Gross private capital formation (GPCF) represents purchases of locally produced capital stock items resulting from new investment. GPCF provides new equipment or facilities for use in the production process. The data base for each study area contains a unique investment matrix. The investment matrix translates the investment by sector into purchases from capital stock producing sectors for GPCF. Total GPCF will rarely equal total investment, particularly for small areas, since a significant portion of investment will be spent on imported capital goods.

2. Personal consumption expenditures (PCE) are purchases by household members of products for personal consumption. PCE will increase as population and total disposable income per worker increases. An income elasticity of demand, which is sector-specific, applies to increases (or decreases) in total disposable income. Consequently, income growth will cause a different change in PCE for different sectors.

3. Change in business inventory, if positive, represents an accumulation of inventory items; a negative change signifies a depletion of inventory. The change in business inventory for the current year is determined by multiplying an inventory accumulation rate by the difference in area output for the 2 previous years.

4 and 5. **State government expenditures and federal government expenditures** are local expenditures. In its present form, IPASS assumes that government expenditures are proportional to local population. Thus, an increase (or decrease) in population will cause a proportional increase (or decrease) in government expenditures. Negative government expenditures will occur when sale of government surplus exceeds government purchases of goods for a given sector.

6. Exports are goods and services purchased from local producers by nonlocal users. The amount of exports is dependent on U.S. gross output and the region’s market share of the nation’s output of goods and services. IPASS will accommodate various assumptions regarding regional market share. A constant share would mean that as the U.S. economy grew, regional growth would follow proportionately, all other things being equal. On the other hand, an increasing market share would mean the demand for area goods and services will grow at a faster rate than the U.S. economy. Of course, it works both ways: the regional market share and/or the U.S. gross output may decrease, precipitating a decrease in regional exports.

7. User-specified final demand allows the user to introduce changes in final demand by sector. The other final demands are determined internally by IPASS computations, but only the user can change the user-specified final demands (see example 2, question 16). This special component will help the user avoid analytical errors because change in final demand is uniquely identified. To monitor the potential impact of any change in user-specified final demand, the user should answer “yes” to the IPASS question, “WOULD YOU LIKE TO VIEW THE CHANGE IN GROSS OUTPUT RESULTING FROM USER-SPECIFIED FINAL DEMANDS”?

Production Module

The production module is a Leontief inverse $[I-A]^{-1}$ for the local area being analyzed. Summing all final demands from the final demands module and performing the conventional Leontief calculation yields the regional output required to meet all intermediate (internal) and external demands. This “regional output demanded” is not the actual output for the region, but rather the maximum potential output for all goods and services. There may be constraints on producers that do not allow them to meet these demands. Actual regional output is estimated by the regional output module.

Regional Output Module

The main purpose of the regional output module is to predict the actual regional output for each sector based on regional output demanded and the regional output constraints; i.e., capital stock and/or employment.

Capital stock is adjusted upward by the amount of expansion investment or downward by the amount of depreciation that was not replaced. Output capacity is then determined by multiplying total capital stock by a output/capital stock ratio. If output capacity exceeds output demanded, then there is no binding constraint. Alternately, if demand exceeds capacity, then not all demands can be met. In such instances, IPASS assumes that all intermediate (interindustry) and local final demands are met before products and services are exported to users outside the local areas.

If the available labor force, by occupation, is insufficient to meet demands, then exports must be further reduced to reflect the constraint on output capacity.

Employment Module

Employee productivity parameters (for example, output per hour and hours worked per year) are updated.

Employment by sector is a function of sector output and output per worker. The output-per-worker ratio is affected by several factors: output per hour, hours worked per week, and weeks worked per year.

Unemployment exists when labor supply exceeds demand after accounting for all migration and commuting.

Labor Force Module

Demand for labor by occupation as well as the area's supply of labor is calculated by the labor force module.

The occupational matrix converts employment by sector to labor force demanded by occupation.

The available labor force represents the product of labor force participation rates by sex and age and the resident population. This labor force is then classified into the various occupations by labor force/occupation ratios.

When labor supply exceeds demand for an occupation, part of the excess supply will commute to a **job** outside the area and part will migrate away. Conversely, when demand exceeds supply for a particular occupation, more workers will commute from residences outside of the area and some may migrate into the area.

If a labor output constraint is introduced (that is, if labor supplied is less than labor demanded), the employment module will allocate the available labor and will adjust regional output downward.

Population Module

Population is affected by migration of labor and cohort movements such as the movement of college students and retirees. The population module also determines births and mortality, and ages the population 1 year for each year of simulation.

Primary Input Module

Value added, indirect business taxes and imports are determined by the primary input module. Direct coefficients, such as those shown in table 2, are multiplied by estimated regional outputs.

Earnings by sector are the products of earnings per worker and total sector employment. Earnings are subtracted from value added to determine business income. Indirect and income taxes are subtracted from business income to obtain net business income. Total personal income is the sum of earnings by wage earners, proprietor income, transfer payments, and unemployment compensation.

Finally, **depreciation/output** ratios are used to calculate actual depreciation. Actual depreciation tends to be less than the "book value" depreciation reported by industries.

Literature Cited

Darr, David R.; Fight, Roger D. Douglas County, Oregon: potential economic impacts of a changing timber resource base. Res. Pap. **PNW-179**. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Forest and Range Experiment Station; 1974. 41 p.

Appendix A: How to Obtain IPASS Socioeconomic Data

Data Tables

There are four ways the user can view the analytical results of IPASS: data tables, annual summary tables, parameters, and optional outputs.

Values of socioeconomic indicators for the current year of simulation are displayed in eight data tables. Each indicator is broken down by sector, occupation, or age class. The user has the opportunity to view data tables when IPASS asks:

DO YOU WANT TO SEE THE (year) DATA TABLES?
[YES OR NO]

If the user responds “yes,” IPASS will then ask:

WHAT TABLES DO YOU WANT TO SEE?
TYPE NUMBERS [1-8]

The user can then key in the number(s) corresponding to the table(s) desired. The choices are:

- 1** = Export market indicators. Compares a region's actual and potential market share of the U.S. gross outputs by sector.
- 2** = Intermediate and final demand indicators. Describes five final demand components (all components except exports, which are given in data table 1) plus sales to local industries (intermediate sales) by sector.
- 3** = Investment and capital stock indicators. Describes current investment levels in production and pollution abatement by sector. Also provides estimates of capital stock
- 4** = Intermediate purchases, imports, and value added indicators. Describes imports, earnings (wages paid to employees), other value added (taxes paid and business income), and intermediate purchases by sector.
- 5** = Output, earnings, and employee compensation per worker. Describes by sector.
- 6** = Employment and unemployment. Describes by sector and occupation.
- 7** = Total population and labor force indicators. Describes population, labor force, and labor force participation rates by sex and by age class.
- 8** = Productivity indicators. Describes employment, average hours worked per week and per year, weeks worked per year, and output produced by all workers, by sector.

An example of each of these tables follows.

TABLE 1. EXPORT MARKET INDICATORS OF SPECIFIED SECTORS,
DOUGLAS CNTY, OREGON, 1972.

SECTOR NO. TITLE	GROSS OUTPUT		ACTUAL MARKET SHARE			POTENTIAL MARKET SHARE	
	UNITED STATES	TOTAL REGION	REGIONAL EXPORT	PERCENT OF U.S. GROSS OUTPUT	ANNUAL CHANGE	EXPORTS	PERCENT OF U.S. GROSS OUTPUT
	(THOU)	(THOU)	(THOU)	(PERCENT)	(PERCENT)	(THOU)	(PERCENT)
1 LOGGING	3447545.	41 796.	18934.	.5492	.0000	19562.	.5680
2 SWILLS	4493815.	43196.	40908.	.9103	.0000	40907.	.9103
3 PLY&VENEER	2329338.	131520.	131601.	5.6497	.0000	138784.	5.9581
4 FIBER PROD	26360411.	41794.	41896.	.1589	.0000	42177.	.1600
5 FISHING	4777643.	4210.	243.	.0051	.0000	268.	.0056
6 CROPS	31339156.	3505.	3214.	.0103	.0000	3322.	.0106
7 LIVESTOCK	36537236.	5464.	4311.	.0118	.0000	4311.	.0118
8 MANUFACTUR	413504121.	48412.	42084.	.0102	.0000	42591.	.0103
9 LODGING	8290052.	3826.	1924.	.0232	.0000	2147.	.0259
10 EATERIES	43882706.	9279.	732.	.0017	.0000	1404.	.0032
11 SERV STA	6295169.	20106.	4065.	.0646	.0000	5099.	.0810
12 CAR DEALER	14688960.	44697.	1674.	.0114	.0000	4039.	.0275
13 COM, TRAN, U	159188514.	25543.	613.	.0004	.0000	2706.	.0017
14 PROF SERV	84429033.	11834.	-252.	-.0003	.0000	1351.	.0016
15 FINANCIAL	31574623.	26270.	2236.	.0071	.0000	2842.	.0090
16 CONSTRUCT	146778672.	26580.	-1061.	-.0007	.0000	1321.	.0009
17 TRADE	149693686.	85942.	854.	.0006	.0000	6886.	.0046
18 RET SERV	197744310.	29327.	6573.	.0033	.0000	8108.	.0041
19 USFS SALES	10000.	17180.	6139.	61.3927	.0000	6139.	61.3927
20 BLM SALES	10000.	17464.	1874.	18.7412	.0000	1884.	18.8399
21 USFS APPRO	0.	9595.	0.	.0000	.0000	0.	.0000
22 BLM APPRO	0.	1696.	0.	.0000	.0000	0.	.0000
23 CNTY MVT	2000.	33015.	1782.	89.6871	.0000	1782.	89.6873
24 CITY GOVT	1000.	4253.	665.	66.5073	.0000	665.	.0000
25 ADMIN GOVT	100000.	18194.	0.	.0000	.0000	0.	.0000
TOTAL	1365477992.	702697.	311010.	.0000	.0000	338315.	.0000

TABLE 2. INTERMEDIATE AND FINAL DEMAND INDICATORS OF SPECIFIED SECTORS,
DOUGLAS CNTY, OREGON, 1972.

SECTOR NO. NAME	FINAL LOCAL DEMAND						
	INTERMEDIATE SALES	PERSONAL CONSUMPTION EXPENDITURES	GROSS PRIVATE CAPITAL FORMATION	INVENTORY CHANGE	STATE AND LOCAL	FEDERAL	TOTAL
	(THOU)	(THOU)	(THOU)	(THOU)	(THOU)	(THOU)	(THOU)
1 LOGGING	22837.	35.	0.	-233.	83.	139.	24.
2 SAWMILLS	2100.	265.	0.	-353.	103.	174.	189.
3 PLY&VENEER	5303.	114.	0.	-104.	2.	4.	616.
4 FIBER PROD	4.	0.	0.	-107.	0.	0.	-107.
5 FISHING	3937.	31.	0.	-2.	0.	0.	29.
6 CROPS	79.	144.	0.	29.	15.	25.	212.
7 LIVESTOCK	1045.	144.	0.	-37.	0.	0.	108.
8 MANUFACTUR	4928.	798.	674.	-176.	38.	64.	1399.
9 LODGING	60.	1558.	0.	-13.	111.	186.	1842.
10 EATERIES	51.	8527.	0.	-46.	6.	9.	8495.
11 SERV STA	3876.	12060.	0.	-5.	41.	69.	12165.
12 CAR DEALER	9971.	32316.	0.	-220.	357.	599.	33053.
13 COM, TRAN, U	10151.	10936.	143.	10.	1378.	2312.	14778.
14 PROF SERV	1383.	9939.	0.	-1.	285.	479.	10763.
15 FINANCIAL	16451.	6844.	0.	-1.	277.	464.	7584.
16 CONSTRUCT	14051.	6250.	2267.	-21.	1604.	2690.	12789.
17 TRADE	20336.	64165.	766.	-1198.	360.	638.	64752.
18 RET SERV	7108.	14383.	0.	-36.	515.	863.	15645.
19 USFS SALES	10990.	51.	0.	0.	0.	0.	51.
20 BLM SALES	15578.	12.	0.	0.	0.	0.	12.
21 USFS APPRO	0.	0.	0.	0.	0.	9595.	9595.
22 BLM APPRO	0.	0.	0.	0.	0.	1696.	1696.
23 CNTY GOVT	13299.	7894.	0.	0.	3750.	6290.	17934.
24 CITY GOVT	1693.	1737.	0.	0.	59.	99.	1895.
25 ADMIN GOVT	0.	0.	0.	0.	0.	0.	0.
TOTAL	166032.	178724.	3852.	-2514.	9005.	26394.	215461.

TABLE 3. INVESTMENT AND CAPITAL STOCK INDICATORS OF SPECIFIED SECTORS,
DOUGLAS CNTY, OREGON, 1972.

SECTOR NO.	NAME	PRODUCTION			POLLUTION ABATEMENT			CAPITAL STOCK		
		EXPANSION	REPLACE MENT	TOTAL	EXPANSION	REPLACE MENT	TOTAL	PRODUCTION	POLLUTION ABATEMENT	TOTAL
		(THOU)	(THOU)	(THOU)	(THOU)	(THOU)	(THOU)	(THOU)	(THOU)	(THOU)
1	LOGGING	0.	879.	879.	0.	0.	0.	16127.0	.0	16127.0
2	SAWMILLS	0.	1387.	1387.	0.	0.	0.	29500.0		
3	PLYVENEER	102.	2277.	2379.	5.	123.	128.	48094.0	2590.0	89604.0
4	FIBER PROD	0.	1580.	1580.	0.	85.	85.	35360.0	1905.0	37265.0
5	FISHING	0.	93.	93.	0.	0.	0.	3665.0	.0	3665.0
6	CROPS	0.	0.	0.	0.	0.	0.	3034.0	.0	3034.0
7	LIVESTOCK	0.	0.	0.	0.	0.	0.	4921.0	.0	4921.0
8	MANUFACTUR	0.	3.	3.	0.	0.	0.	21014.0	1132.0	22146.0
9	LODGING	0.	0.	0.	0.	0.	0.	1521.0	.0	1521.0
10	EATERIES	0.	0.	0.	0.	0.	0.	5261.0	.0	5261.0
11	SERV STA	0.	1.	1.	0.	0.	0.	8002.0	.0	8002.0
12	CAR DEALER	0.	183.	183.	0.	0.	0.	17193.0	.0	17193.0
13	COM, TRAN, U	1839.	1.	1840.	4.	0.	4.	34865.0	77.0	34942.0
14	PROF SERV	67.	0.	67.	0.	0.	0.	4707.0	.0	4707.0
15	FINANCIAL	0.	0.	0.	0.	0.	0.	10490.0	.0	10490.0
16	CONSTRUCT	832.	1.	833.	0.	0.	0.	24305.0	.0	24305.0
17	TRADE	0.	2.	2.	0.	0.	0.	60340.0	.0	60340.0
18	RET SERV	0.	0.	0.	0.	0.	0.	11682.0	.0	11682.0
19	USFS SALES	0.	0.	0.	0.	0.	0.	18000.0	.0	18000.0
20	BLM SALES	0.	0.	0.	0.	0.	0.	18000.0	.0	18000.0
21	USFS APPRO	0.	0.	0.	0.	0.	0.	.0	.0	.0
22	BLM APPRO	0.	0.	0.	0.	0.	0.	.0	.0	.0
23	CNTY GOVT	0.	0.	0.	0.	0.	0.	.0	.0	.0
24	CITY GOVT	0.	0.	0.	0.	0.	0.	.0	.0	.0
25	ADMIN GOVT	0.	0.	0.	0.	0.	0.	.0	.0	.0
	TOTAL	2840.	6407.	9247.	9.	208.	217.	376681.0	5704.0	382385.0

TABLE 4. INTERMEDIATE PURCHASES, IMPORTS, AND VALUE ADDED INDICATORS OF SPECIFIED SECTORS,
DOUGLAS CNTY, OREGON, 1972.

SECTOR NO.	NAME	INTERMEDIATE PURCHASES	VALUE ADDED			IMPORTS
			EARNINGS	OTHER	TOTAL	
		(THOU)	(THOU)	(THOU)	(THOU)	(THOU)
1	LOGGING	16694.	11921.	3986.	15907.	9194.
2	SAWMILLS	30161.	9456.	3567.	13023.	13.
3	PLYVENEER	38475.	38134.	10120.	48254.	50791.
4	FIBER PROD	3899.	4495.	982.	5477.	32418.
5	FISHING	1432.	1645.	200.	1645.	933.
6	CROPS	3046.	235.	130.	365.	94.
7	LIVESTOCK	3993.	708.	605.	1313.	158.
8	MANUFACTUR	7592.	8220.	3474.	11694.	29125.
9	LODGING	3001.	509.	296.	805.	21.
10	EATERIES	2940.	2696.	840.	3536.	2803.
11	SERV STA	2380.	2498.	412.	2910.	14816.
12	CAR DEALER	2836.	5056.	793.	5849.	36013.
13	COM, TRAN, U	2333.	7106.	4196.	11302.	11909.
14	PROF SERV	1896.	6196.	1610.	7806.	2132.
15	FINANCIAL	1525.	2641.	766.	3407.	21337.
16	CONSTRUCT	7873.	5750.	1673.	7423.	11283.
17	TRADE	12011.	12974.	3375.	16349.	57582.
18	RET SERV	2084.	7349.	1259.	8608.	18635.
19	USFS SALES	5404.	0.	10489.	10489.	1288.
20	BLM SALES	5053.	0.	11991.	11991.	420.
21	USFS APPRO	2485.	4844.	0.	4844.	2266.
22	BLM APPRO	118.	1261.	1.	1262.	317.
23	CNTY GOVT	7646.	18614.	1676.	20290.	5079.
24	CITY GOVT	937.	1029.	401.	1430.	1886.
25	ADMIN GOVT	0.	10194.	0.	10194.	0.
	TOTAL	165811.	163531.	62842.	226373.	310513.

TABLE 5. OUTPUT, EARNINGS, AND EMPLOYEE COMPENSATION PER WORKER FOR SPECIFIED SECTORS,
DOUGLAS CNTY, OREGON, 1972.

SECTOR		OUTPUT PER WORKER		EARNINGS PER WORKER		EMPLOYEE COMPENSATION PER WORKER	
NO.	NAME	TOTAL	ANNUAL CHANGE	TOTAL	ANNUAL CHANGE	TOTAL	ANNUAL CHANGE
		(DOLLAR)	(PCT)	(DOLLAR)	(PCT)	(DOLLAR)	(PCT)
1	LOGGING	14240.	.0	4062.	.0	4062.	.0
2	SAWMILLS	22916.	.0	5016.	.0	5016.	.0
3	PLYVENEER	39013.	.0	10818.	.0	10818.	.0
4	FIBER PROD	70479.	.0	7580.	.0	7580.	.0
5	FISHING	15886.	.0	6208.	.0	6208.	.0
6	CROPS	4971.	.0	333.	.0	333.	.0
7	LIVESTOCK	13558.	.0	1757.	.0	1757.	.0
8	MANUFACTUR	30640.	.0	5203.	.0	5203.	.0
9	LOGGING	8038.	.0	1069.	.0	1069.	.0
10	EATERIES	8218.	.0	2388.	.0	2388.	.0
11	SERV STA	47087.	.0	5850.	.0	5850.	.0
12	CAR DEALER	78831.	.0	8917.	.0	8917.	.0
13	COM, TRAN, U	25265.	.0	7029.	.0	7029.	.0
14	PROF SERV	14556.	.0	7621.	.0	7621.	.0
15	FINANCIAL	84741.	.0	8519.	.0	8519.	.0
16	CONSTRUCT	25387.	.0	5492.	.0	5492.	.0
17	TRADE	45763.	.0	6908.	.0	6908.	.0
18	RET P R V	28937.	.0	7226.	.0	7226.	.0
19	USFS SALES	0.	.0	0.	.0	0.	.0
20	BLM SALES	0.	.0	0.	.0	0.	.0
21	USFS APPRO	20904.	.0	10553.	.0	10553.	.0
22	BLM APPRO	12117.	.0	9007.	.0	9007.	.0
23	CNTY GOVT	10667.	.0	6014.	.0	6014.	.0
24	CITY GOVT	24872.	.0	6018.	.0	6018.	.0
25	ADMIN GOVT	8982.	.0	8981.	.0	8981.	.0
	AVERAGE	26131.	.0	63%	.0	6396.	.0

TABLE 6. EMPLOYMENT AND UNEMPLOYMENT IN SPECIFIED SECTORS, BY OCCUPATION,
DOUGLAS CNTY, OREGON, 1972.

SECTOR		PROFES	MANA-	SALES	CLER-	CRAFTS	OPERA-	NOFARM	SER-	FARM	TOTAL
NO.	NAME	SIGNAL	GERIAL	WORKER	ICAL		TIVES	NOMINE	VICE		
		(NO.)	(NO.)	(NO.)	(NO.)	(NO.)	(NO.)	(NO.)	(NO.)	(NO.)	(NO.)
1	LOGGING	56.	106.	1.	61.	920.	487.	39.	1264.	0.	2935.
2	SAWMILLS	48.	56.	8.	88.	400.	579.	75.	631.	0.	1885.
3	PLYVENEER	100.	122.	24.	178.	647.	1442.	106.	906.	0.	3525.
4	FIBER PROD	56.	19.	0.	47.	208.	168.	15.	80.	0.	593.
5	FISHING	23.	44.	0.	7.	4.	15.	14.	158.	0.	265.
6	CROPS	0.	52.	0.	0.	80.	0.	0.	0.	572.	705.
7	LIVESTOCK	0.	30.	0.	0.	46.	0.	0.	0.	327.	403.
8	MANUFACTUR	81.	100.	63.	157.	451.	532.	17.	179.	0.	1580.
9	LOGGING	2.	45.	2.	53.	12.	12.	349.	2.	0.	476.
10	EATERIES	5.	45.	3.	27.	7.	2.	1039.	0.	0.	1129.
11	SERV STA	3.	55.	70.	43.	104.	127.	4.	19.	0.	427.
12	CAR DEALER	5.	73.	93.	58.	138.	169.	6.	26.	0.	567.
13	COM, TRAN, U	73.	93.	18.	234.	177.	340.	10.	66.	0.	1011.
14	PROF SERV	272.	40.	1.	182.	16.	8.	293.	1.	0.	813.
15	FINANCIAL	3.	66.	69.	159.	4.	0.	8.	2.	0.	310.
16	CONSTRUCT	6.	126.	10.	86.	562.	96.	9.	153.	0.	1017.
17	TRADE	17.	154.	333.	284.	120.	177.	706.	86.	0.	1878.
18	RET SERV	118.	92.	30.	153.	105.	77.	381.	62.	0.	1017.
19	USFS SALES	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
20	BLM SALES	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
21	USFS APPRO	190.	31.	0.	165.	31.	7.	23.	13.	0.	459.
22	BLM APPRO	58.	9.	0.	50.	9.	2.	7.	4.	0.	140.
23	CITY GOVT	1279.	199.	5.	616.	171.	116.	580.	125.	4.	3095.
24	CITY GOVT	71.	11.	0.	34.	9.	6.	32.	7.	0.	171.
25	ADMIN GOVT	458.	99.	2.	373.	67.	21.	76.	39.	0.	1135.
	TOTAL	2924.	1669.	734.	3055.	4290.	4382.	3790.	3819.	904.	25566.
	UNEMPLOYMENT	418.	534.	733.	402.	267.	1220.	145.	280.	93.	4092.

TABLE 7. TOTAL POPULATION AND LABOR FORCE INDICATORS OF SPECIFIED AGE CLASS,
DOUGLAS CNTY, OREGON, 1972.

AGE GROUP		POPULATION		LABOR FORCE		PARTICIPATION RATE	
NO.	YEARS	MALE	FEMALE	MALE	FEMALE	MALE	FEMALE
		(NO.)	(NO.)	(NO.)	(NO.)	(PCT)	(PCT)
1	1- 4	2363.	2261.				
2	5- 9	3327.	3272.				
3	10-11	1788.	1624.				
4	12-13	1770.	1737.				
5	14-15	1767.	1694.				
6	16-17	1842.	1745.	558.	347.	30.27	19.89
7	18-19	1786.	1671.	1219.	663.	68.27	39.68
8	20-24	2624.	2926.	2330.	1202.	88.81	41.06
9	25-29	2246.	2583.	2140.	996.	95.26	38.57
10	30-34	2323.	2478.	2213.	956.	95.26	38.57
11	35-44	4489.	4597.	4127.	2190.	91.94	47.65
12	45-54	4641.	4570.	3811.	1881.	82.12	41.16
13	55-59	2160.	2069.	1749.	843.	80.98	40.73
14	60-64	1893.	1827.	1488.	727.	78.62	39.79
15	65+	344.	330.	69.	29.	19.94	8.93
	TOTAL	35363.	35384.	19705.	9834.	55.72	27.79

TABLE 8. PRODUCTIVITY INDICATORS OF SPECIFIED SECTORS,
DOUGLAS CNTY. OREGON, 1972.

SECTOR		TOTAL HOURS PER YEAR			OUTPUT PER WORKER		TOTAL OUTPUT
NO.	NAME	EMPLOYMENT	HOURS WORKED PER WEEK	WEEKS WORKED PER YEAR	PER WORKER	ALL WORKERS	
		(NO.)	(NO.)	(NO.)	(NO.)	(THOU)	(THOU)
1	LOGGING	2935.	23.05	52.00	1198.7	3518.2	41796.
2	SAMMILLS	1885.	44.48	52.00	2313.2	4360.3	43196.
3	PLY&VENEER	3525.	39.74	52.00	2066.6	7284.9	137520.
4	FIBER PROD	593.	40.70	52.00	2116.5	1255.1	41794.
5	FISHING	265.	44.36	52.00	2307.0	611.3	4210.
6	CROPS	705.	25.66	52.00	1334.3	940.7	3505.
7	LIVESTOCK	403.	22.78	52.00	1184.4	477.3	5464.
8	MANUFACTUR	1580.	34.34	52.00	1785.9	2821.7	48412.
9	LODGING	476.	41.00	52.00	2132.2	1014.9	3826.
10	EATERIES	1129.	18.77	52.00	976.3	1102.2	9279.
11	SERV STA	427.	39.80	52.00	2069.6	883.7	20106.
12	CAR DEALER	567.	39.52	52.00	2055.1	1165.2	44697.
13	COM,TRAN,U	1011.	35.60	52.00	1851.0	1871.4	25543.
14	PROF SERV	813.	41.16	52.00	2140.4	1740.2	11834.
15	FINANCIAL	310.	36.73	52.00	1909.9	592.1	26580.
16	CONSTRUCT	1047.	37.99	52.00	1975.3	2068.1	25307.
17	TRADE	1878.	35.67	52.00	1854.7	3483.1	85942.
18	RET SERV	1017.	40.67	52.00	2114.7	2150.7	29327.
19	USFS SALES	0.	.00	52.00	.0	.0	17180.
20	BLM SALES	0.	.00	52.00	.0	.0	17464.
21	USFS APPRO	459.	40.00	52.00	2080.0	954.7	9595.
22	BLM APPRO	140.	40.00	52.00	2080.0	291.2	1696.
23	CNTY GOVT	3095.	40.00	52.00	2080.0	6437.6	33015.
24	CITY GOVT	171.	40.00	52.00	2080.0	355.7	4253.
25	ADMIN GOVT	1135.	40.00	52.00	2080.0	2360.8	10194.

Annual Summary Tables

Annual summary tables provide indicator totals and annual percentage changes for each indicator. **IPASS** asks the user to select a table:

WHICH ANNUAL SUMMARY TABLE DO YOU WANT TO FOLLOW?
TYPE **ONE** NUMBER [0-6]

Although there are six different tables available, only one may be printed during each simulation. The user keys the number corresponding to the table desired:

- 0** = No table. When a summary is not needed for a particular analysis.
- 1** = Market indicators. Compares the region's actual, potential, and constrained outputs. Also gives **U.S.** gross outputs and the region's market share of that output.
- 2** = Final demand indicators. Displays totals for each component of final demand.

- 3 = Investment indicators. Displays totals for current replacement and expansion investment for production stock and pollution abatement equipment, as well as value of existing capital stock.
- 4 = Total employment by occupation. Displays totals for all sectors.
- 5 = Labor force indicators. Displays population totals by sex, number of in- and out-migrating workers, number of in- and out-commuting workers, and total labor force over 16 years old.
- 6 = Select economic indicators. Includes a broad spectrum of indicator totals- population, employment, unemployment, gross output, exports, personal consumption expenditures, average earnings per person, local final demands (all final demands excluding exports), and labor force rate (as a percentage of all persons over 16 years old).

Values in each table are annual values. A new table title is printed for each year of data if there is intervening output. An example of each table follows.

Annual summary table 1:

SUMMARY TABLE OF SELECTED MARKET INDICATORS, DOUGLAS CNTY, OREGON 1973-1973.							
YEAR	U.S. GROSS OUTPUT	REGIONAL GROSS OUTPUT			LABOR CONSTRAINT	EXPORTS	
		ACTUAL	POTENTIAL	CAPACITY		U.S. ALLOCATION	REGION
	(MILL)	(MILL)	(MILL)	(MILL)	(MILL)	(MILL)	(MILL)
1973	1410.	686.	755.	693.	686.	353.	301.
PCT	3.3	-2.4	2.5	-2.0	-2.4	4.5	-3.3
PCTB	3.27	-2.36	2.53	-2.02	-2.36	4.48	-3.32
APCB	3.27	-2.36	2.53	-2.02	-2.36	4.48	-3.32

PCT ...PERCENTAGE CHANGE RELATIVE TO PREVIOUS YEAR
PCTB ...PERCENTAGE CHANGE RELATIVE TO BASE YEAR
APCB ...ANNUAL PERCENTAGE CHANGE RELATIVE TO BASE YEAR

Annual summary table 2:

SUMMARY TABLE OF SELECTED FINAL DEMAND INDICATORS, DOUGLAS CNTY, OREGON 1973-1973.							
YEAR	PERSONAL CONSUMPTION EXPENDITURE	GROSS PRIVATE CAPITAL FORMATION	BUSINESS INVENTORY CHANGE	EXPORTS	GOVERNMENT		TOTAL
					STATE AND LOCAL	FEDERAL	
	(THOU)	(THOU)	(THOU)	(THOU)	(THOU)	(THOU)	(THOU)
1973	173.	0.	6.	301.	9.	26.	514.
PCT	-3.4	-100.0	-1	-3.3	-1.3	-1.3	-2.3
PCTB	-3.37	-100.00	-1	-3.32	-1.32	-1.32	-2.21
APCB	-3.37	.00	-1	-3.32	-1.32	-1.32	-2.27

PCT ...PERCENTAGE CHANGE RELATIVE TO PREVIOUS YEAR
PCTB ...PERCENTAGE CHANGE RELATIVE TO BASE YEAR
APCB ...ANNUAL PERCENTAGE CHANGE RELATIVE TO BASE YEAR

Annual summary table 3:

SUMMARY TABLE OF SELECTED INVESTMENT INDICATORS, DOUGLAS CNTY, OREGON 1973-1973.							
YEAR	PRODUCTION		POLLUTION ABATEMENT		CAPITAL STOCKS		TOTAL
	EXPANSION	REPLACEMENT	EXPANSION	REPLACEMENT	PRODUCTION	POLLUTION ABATEMENT	
	(THOU)	(THOU)	(THOU)	(HILL)	(HILL)	(HILL)	(MILL)
1973	0.	0.	0.	0.	370.	5.	375.
PCT	-100.0	-100.0	-100.0	-100.0	-1.8	-3.9	-1.9
PCTB	-100.00	-100.00	-100.00	-100.00	-1.83	-3.89	-1.86
APCB	-100.00	-100.00	-100.00	-100.00	-1.83	-3.89	-1.86

PCT ...PERCENTAGE CHANGE RELATIVE TO PREVIOUS YEAR
PCTB ...PERCENTAGE CHANGE RELATIVE TO BASE YEAR
APCB ...ANNUAL PERCENTAGE CHANGE RELATIVE TO BASE YEAR

Annual summary table 4:

SUMMARY TABLE OF TOTAL EMPLOYMENT BY OCCUPATION,
DOUGLAS CNTY, OREGON 1973-1973.

YEAR	PROFES SIONAL	MANA- GERIAL	SALES WORKER	CLER- ICAL	CRAFTS	OPERA- TIVES	NOFARM NOMINE	SER- VICE	FARM	TOTAL
1973	2867.	1631.	723.	2999.	4118.	4195.	3781.	3610.	874.	24798.
PCT	-2.0	-2.2	-1.6	-1.8	-4.0	-4.3	-.2	-5.4	-3.3	-3.0
PCTB	-1.96	-2.20	-1.56	-1.84	-4.01	-4.26	-.24	-5.44	-3.32	-3.00
APCB	-1.96	-2.20	-1.56	-1.84	-4.01	-4.26	-.24	-5.44	-3.32	-3.00

PCT ...PERCENTAGE CHANGE RELATIVE TO PREVIOUS YEAR
PCTB ...PERCENTAGE CHANGE RELATIVE TO BASE YEAR
APCB ...ANNUAL PERCENTAGE CHANGE RELATIVE TO BASE YEAR

Annual summary table 5:

SUMMARY TABLE OF SELECTED LABOR FORCE INDICATORS,
DOUGLAS CNTY, OREGON 1973-1973.

YEAR	POPULATION		MIGRATION		COMMUTING		TOTAL LABOR FORCE
	MALE	FEMALE	IN	OUT	IN	OUT	
1973	39555.	39272.	0.	188.	0.	0.	29980.
PCT	.7	.3	-1	-88.5	-1	-1	1.1
PCTB	.70	.26	-1	-88.49	-1	-1	1.09
APCB	.70	.26	-1	-88.49	-1	-1	1.09

PCT ...PERCENTAGE CHANGE RELATIVE TO PREVIOUS YEAR
PCTB ...PERCENTAGE CHANGE RELATIVE TO BASE YEAR
APCB ...ANNUAL PERCENTAGE CHANGE RELATIVE TO BASE YEAR

Annual summary table 6:

SUMMARY TABLE OF GENERAL ECONOMIC INDICATORS,
DOUGLAS CNTY, OREGON 1973-1973.

YEAR	POPULATION	EMPLOYMENT	UNEMPLOYED	GROSS OUTPUT	EXPORT	PCE	EARNINGS PER PERSON	LOCAL UEMANO	LABOR FORCE RATE	TOTAL LABOR FORCE
	(THOU)	(THOU)	(THOU)	(MILL)	(HILL)	(HILL)	(NO.)	(HILL)	(PCT)	(THOU)
1973	79.	24.8	5.2	686.	300.7	172.7	2007.	213.8	53.494	29.980
PCT	.5	-3.0	26.6	-2.4	-3.3	-3.4	-8.7	-.8	-.7	1.1
PCTB	.48	-3.00	26.63	-2.36	-3.32	-3.37	-3.72	-.77	-.69	1.09
APCB	.48	-3.00	26.63	-2.36	-3.32	-3.37	-3.72	-.77	-.69	1.09

PCT ...PERCENTAGE CHANGE RELATIVE TO PREVIOUS YEAR
PCTB ...PERCENTAGE CHANGE RELATIVE TO BASE YEAR
APCB ...ANNUAL PERCENTAGE CHANGE RELATIVE TO BASE YEAR

Parameters

The values for each parameter in the model can be viewed when IPASS asks:

WOULD YOU LIKE TO MODIFY (year) PARAMETERS?

If the user responds "yes," IPASS will ask:

WHAT PARAMETERS WOULD YOU LIKE TO MODIFY?

The user then keys the number corresponding to the parameter. A complete list of parameters is in appendix C, table 5. For each parameter specified, IPASS will ask:

HOW WOULD YOU LIKE TO MODIFY (parameter)?

Keying an "8" will command IPASS to print the values for each parameter specified. Appendix B discusses the parameter change routine.

In the following example we will look at the parameter called employment by sector (#55 in table 5).

DO YOU WANT TO MODIFY THE 1973 SIMULATION?
 [YES OR NO]
 ? **yes**
 Y

WHAT PARAMETERS DO YOU WANT TO MODIFY?
 TYPE UP TO TEN NUMBERS [1-120]
 ? 55
55

HOW DO YOU WANT TO MODIFY
 55: EMPLOYMENT BY SECTOR
 ? **8**

8
 CURRENT PARAMETER PRINTOUT

1 LOGGING	2935.00000
2 SAWMILLS	1885.00000
3 PLY&VENEER	3525.00000
4 FIBER PROD	593.00000
5 FISHING	265.00000
6 CROPS	705.00000
7 LIVESTOCK	403.00000
8 MANUFACTUR	1580.00000
9 LODGING	476.00000
10 EATERIES	1129.00000
11 SERV STA	427.00000
12 CAR DEALER	567.00000
13 COM,TRAN,U	1011.00000
14 PROF SERV	813.00000
15 FINANCIAL	310.00000
16 CONSTRUCT	1047.00000
17 TRADE	1878.00000
18 RET SERV	1017.00000
19 USFS SALES	.00000
20 BLM SALES	.00000
21 USFS APPRO	459.00000
22 BLM APPRO	140.00000
23 CNTY GOVT	3095.00000
24 CITY GOVT	171.00000
25 ADMIN GOVT	1135.00000

THE TOTAL IS ... **25566.00000**

Optional Output

Some **IPASS** output is more specialized and is intended to allow a programmer to find and correct errors in the model. Should the user want to see any optional output, he or she would respond with a "yes" to the following question:

DO YOU WANT TO USE OPTIONAL IPASS PROGRAMMING?

The user may select different options. A discussion and an example for each follows.

1. DO YOU WANT TO SEE CALCULATIONS
FOR THE CONVERSION OF INVESTMENT TO GPCF?

The calculations transforming capital investment by sector into final demand purchases of capital goods from producing sectors are:

I	J	INVMAT	X	AINV	= GPCF(PARTIAL)
2	6	.00009		0.	0.
2	13	.00007		0.	0.
8	1	.05740		0.	0.
8	2	.05740		0.	0.
8	3	.05740		0.	0.
8	4	.03360		0.	0.
8	5	.00371		0.	0.
8	8	.06782		0.	0.
8	9	.00140		0.	0.
8	10	.00145		0.	0.
8	11	.01275		0.	0.
8	12	.00791		0.	0.
8	13	.00192		0.	0.
8	14	.00402		0.	0.
8	15	.00033		0.	0.
8	16	.40621		0.	0.
•	•	o		o	•
•	•	o		o	•
•	•	o		o	•
17	1	.09109		0.	0.
17	2	.09109		0.	0.
17	3	.09109		0.	0.
17	4	.07698		0.	0.
17	5	.11073		0.	0.
17	6	.08710		0.	0.
17	7	.29003		0.	0.
17	8	.06444		0.	0.
17	9	.05081		0.	0.
17	10	.12800		0.	0.
17	11	.09997		0.	0.
17	12	.10880		0.	0.
17	13	.03092		0.	0.
17	14	.08378		0.	0.
17	15	.10827		0.	0.
17	16	.13216		0.	0.
17	17	.08578		0.	0.
17	18	.02984		0.	0.
18	5	.00015		0.	0.
18	6	.00007		0.	0.
18	7	.00048		0.	0.
18	18	.00950		0.	0.

where:

I = the sector investing,

J = the sector producing capital goods,

INVMAT_{ji} = the percentage of the total investment by sector **i** purchased from sector **j**,

GPCF = the running total of capital items bought from sector **j** by each purchasing sector **i**. The total is the final demand gross private capital formation (GPCF). The equation is:

$$GPCF_j = \sum_{i=1}^{NIS} INVMAT_{ji} \times AINV_i$$

for each sector **j**, summing from 1 to the number of sectors (NIS), and

AINV_i = the total investment for **i**.

2. DO YOU WANT TO PRINT OUT COMPONENTS OF THE PCE CALCULATIONS?

Personal consumption expenditures (PCE) and parameters used to determine PCE for each sector are printed as follows:

SEC	PCE1	PCE	PT	P I	ELASIN	PIT	DIT	PCESUBT	PCET
1	35.	35.	.98678	.97802	.00000	163531.	140637.	35.	163153.
2	265.	261.	.98678	.97802	.00000	163531.	140637.	296.	163153.
3	714.	705.	.98678	.97802	.00000	163531.	140637.	1001.	163153.
4	0.	0.	.98678	.97802	.00000	163531.	140637.	1001.	163153.
5	31.	30.	.98678	.97802	.00000	163531.	140637.	1031.	163153.
6	144.	141.	.98678	.97802	.30000	163531.	140637.	1172.	163153.
7	144.	142.	.98678	.97802	.05000	163531.	140637.	1315.	163153.
8	798.	782.	.98678	.97802	.35000	163531.	140637.	2096.	163153.
9	1558.	1486.	.98678	.97802	1.50000	163531.	140637.	3583.	163153.
10	8527.	8133.	.98678	.97802	1.50000	163531.	140637.	11716.	163153.
11	12060.	11728.	.98678	.97802	.65000	163531.	140637.	23444.	163153.
12	32316.	31534.	.98678	.97802	.50000	163531.	140637.	54978.	163153.
13	10936.	10447.	.98678	.97802	1.43000	163531.	140637.	65425.	163153.
14	9939.	9596.	.98678	.97802	.97000	163531.	140637.	75021.	163153.
15	6844.	6569.	.98678	.97802	1.22500	163531.	140637.	81590.	163153.
16	6250.	6167.	.98678	.97802	.00000	163531.	140637.	87757.	163153.
17	64165.	61412.	.98678	.97802	1.35000	163531.	140637.	149169.	163153.
18	14303.	13957.	.98678	.97802	.50000	163531.	140637.	163126.	163153.
19	51.	50.	.98678	.97802	.00000	163531.	140637.	163177.	163153.
20	12.	12.	.98678	.97802	.00000	163531.	140637.	163189.	163153.
21	0.	0.	.98678	.97802	.00000	163531.	140637.	163189.	163153.
22	0.	0.	.98678	.97802	.00000	163531.	140637.	163189.	163153.
23	7894.	7790.	.98678	.97802	.00000	163531.	140637.	170978.	163153.
24	1737.	1714.	.98678	.97802	.00000	163531.	140637.	172692.	163153.

where:

SEC = sector number,

PCE1 = personal consumption expenditures PCE for the previous iteration (year),

PCE = personal consumption expenditures for the current year,

PT = ratio of last year's total population to that of the previous year,

PI = ratio of last year's total disposable income per worker to that of the previous year,

ELASIN = the income elasticity of demand,

PIT = total personal income,

DIT = total disposable income,

PCESUBT = personal consumption expenditures for local goods, and

PCET = total personal consumption expenditure.

3. DO YOU WANT TO VIEW THE CHANGE IN GROSS OUTPUT RESULTING FROM "USER-SPECIFIED FINAL DEMANDS"?

The user may introduce a change in final demand through the "special" parameter called user-specified final demand. By responding "yes" to this question, the user may see the change in gross output associated with the user-specified final demand using traditional I/O analysis; for example, the Leontief demand multipliers. In this example, a user-specified final demand of \$1,000 in sector 1 resulted in a change of regional output by local sectors of **\$1,478.299**. In the simulation model, this change in regional output will be subject to labor constraints and output capacities.

DIRECT AND INDUCED OUTPUT RESULTING
FROM USER SPECIFIED FINAL DEMAND
SECTOR OUTPUT

1	1029.21 2
2	3.425
3	8.476
4	.002
5	1.868
6	.027
7	.321
8	22.996
9	.034
10	.041
11	28.990
12	110.876
13	42.045
14	5.704
15	49.545
16	10.629
17	38.578
18	15.841
19	11.651
20	61.236
21	0.000
22	0.000
23	35.676
24	1.125
25	0.000
TOTAL =	1478.299

4. DO YOU WANT TO SEE THE LEONTIEF INVERSE CALCULATIONS
THAT DETERMINE GROSS OUTPUT DEMANDED?

Output demanded is calculated using the Leontief matrix equation:

$$X = [I-A]^{-1} Y$$

where:

Y = FD (total final demands),

$[I-A]^{-1}$ = LEMAT (the Leontief inverse), and

X = XD (gross regional output demanded).

This option prints the value for these variables as well as the running total for gross regional output demanded:

$$XD_i = \sum_{j=1}^{24} LEMAT_{ij} \times FD_j$$

The following example shows the XD calculation for sector 3 (i.e., i=3).

FOR WHAT SECTOR DO YOU WANT TO CHECK THE
LEONTIEF INVERSE CALCULATION?

TYPE THE SECTOR NUMBER

? 3

3

	I	3	LEMAT	FD(J)	XD(SUMMED)
	3	1	.00847574	21147.	179.
	3	2	.02398027	42565.	1200.
	3	3	.02326856	148021.	152666.
	3	4	.00025677	43897.	152677.
	3	5	.00025502	310.	152677.
	3	6	.00032231	3681.	152678.
	3	7	.00096332	4584.	152683.
	3	8	.00013266	45617.	152689.
	3	9	.00064549	3993.	152691.
	3	10	.00014086	9639.	152693.
	3	11	.00001098	17197.	152693.
	3	12	.00000547	37755.	152693.
	3	13	.00001185	17075.	152693.
	3	14	.00003662	12184.	152694.
	3	15	.00006864	10281.	152694.
	3	16	.00035165	11957.	152699.
	3	17	.00111440	72274.	152779.
	3	18	.00002452	23855.	152780.
	3	19	.11687999	6190.	153503.
	3	20	.11887123	1896.	153728.
	3	21	.00227672	9468.	153750.
	3	22	.00196513	1674.	153753.
	3	23	.00008635	19479.	153755.
	3	24	.00009719	2535.	153755.

DO YOU WANT TO LOOK AT ANY OTHER SECTOR?

[YES OK NO]

? no

N

5. DO YOU WANT TO SEE A COMPARISON OF ACTUAL OUTPUT
AND OUTPUT DEMANDED BY SECTOR?

Regional output is constrained by both production capacity and shortage of labor. This option provides a comparison of (1) the estimated regional output based on the production constraint and, (2) the estimated regional output, constrained by both production and labor. The first tabulation provides regional gross outputs (XD) as required by final demands, regional output capacity (XS), and the adjusted gross output (X). 'Adjustment' is the difference between the output for which there was demand as determined by final demand, and the actual regional output constraints placed on the producing sectors.

SEC	X	XD	XS	ADJUSTMENT
1	38990.	45431.	39362.	6441.
2	42584.	44802.	42616.	2218.
3	130612.	153755.	130625.	23143.
4	39778.	43901.	39778.	4123.
5	4063.	4456.	4113.	393.
6	3504.	3766.	3505.	262.
7	5644.	5684.	5685.	41.
8	48393.	50959.	48460.	2565.
9	3826.	4056.	3826.	230.
10	9278.	9692.	9278.	414.
11	20086.	21322.	20129.	1236.
12	44145.	48438.	44274.	4293.
13	25490.	27999.	25632.	2508.
14	11829.	13663.	11841.	1834.
15	25819.	27830.	26389.	2011.
16	26122.	27555.	26650.	1433.
17	85805.	93976.	86044.	8171.
18	29306.	31445.	29389.	2139.
19	16618.	18327.	18000.	1709.
20	16525.	18939.	18000.	2414.
21	9468.	9468.	9468.	0.
22	1674.	1674.	1674.	0.
23	32295.	33826.	33826.	1531.
24	4195.	4375.	4375.	180.
TOT	686115.	755406.	693008.	

The second tabulation provides readjusted regional gross outputs (X) as constrained by available labor output (XL). XHOLD is equal to X from the first tabulation:

SEC	X	XHOLD	XL	ADJUSTMENT
1	38990.	38990.	38990.	0.
2	42584.	42584.	42584.	0.
3	130612.	130612.	130612.	0.
4	39778.	39778.	39778.	0.
5	4063.	4063.	4063.	0.
6	3504.	3504.	3504.	0.
7	5644.	5644.	5644.	0.
8	48393.	48393.	48393.	0.
9	3826.	3826.	3826.	0.
10	9278.	9278.	9278.	0.
11	20086.	20086.	20086.	0.
12	44145.	44145.	44145.	0.
13	25490.	25490.	25490.	0.
14	11829.	11829.	11529.	0.
15	25819.	25819.	25819.	0.
16	26122.	26122.	26122.	0.
17	85805.	85805.	85805.	0.
18	29306.	29306.	29306.	0.
19	16618.	16618.	16618.	0.
20	16525.	16525.	16525.	0.
21	9468.	9468.	9468.	0.
22	1674.	1674.	1674.	0.
23	32295.	32295.	32295.	0.
24	4195.	4195.	4195.	0.
TOT	686115.	686115.	686115.	

where:

SEC = sector number;

X = adjusted regional output;

XD = gross regional output demanded by final demand;

XS = output capacity of the region's capital stock;

ADJUSTMENT = XD minus X in the first tabulation,

= XHOLD minus X in the second tabulation;

XHOLD = adjusted regional output constrained by production; and

XL = the portion of XHOLD for which labor is available—that is, the maximum output as constrained by labor.

6. DO YOU WANT TO SEE THE OCCUPATIONAL EMPLOYMENT DATA?

Data are provided on employment, commuting, and migration for each occupation:

	PROFES SIONAL	MANA- GERIAL	SALES WORKER	CLER- ICAL	CRAFTS	OPERA- TIVES	NOFARM NOMINE	SER- VICE	FARM
EMPLOYS	3384.	2230.	1486.	3501.	4615.	5673.	3984.	4150.	1009.
EMPLOYD	2867.	1631.	723.	2999.	4118.	4195.	3781.	3610.	874.
ACTEMP	2867.	1631.	723.	2999.	4118.	4195.	3781.	3610.	874.
COMIN	0.	0.	0.	0.	0.	0.	0.	0.	0.
COMOUT	0.	0.	0.	0.	0.	0.	0.	0.	0.
OTMIGOC	5.	6.	8.	5.	5.	15.	2.	5.	1.
INMICOC	0.	0.	0.	0.	0.	0.	0.	0.	0.
LBFOCUR	.112719	.074177	.049299	.116603	.153767	.188720	.132833	.138255	.033626

where:

- EMPLOYS = number of workers available by occupation,
- EMPLOYD = number of workers demanded by sector by occupation,
- ACTEMP = estimated number of workers employed by occupation,
- COMIN = number of workers commuting in,
- COMOUT = number of workers commuting out,
- OTMIGOC = number of workers migrating out,
- INMIGOC = number of workers migrating in, and
- LBFOCUR = percentage distribution of labor force to each occupation.

7. DO YOU WANT TO SEE POPULATION AND MIGRATION DATA BY ONE-YEAR AGE CLASSES?

Data are provided on population and number of persons migrating in and out. Data are categorized by sex and 1-year age classes from age 1 to 66 and above:

I	POPM	INMIGM	OUTMIGM	POPF	INMIGF	OUTMIGF
1	644.2	.0	.0	606.6	.0	.0
2	642.2	.0	.0	604.7	.0	.0
3	546.6	.0	.0	516.0	.0	.0
4	590.4	.0	.0	573.8	.0	.0
5	573.5	.0	.0	557.9	.0	.0
6	535.6	.0	2.2	586.7	.0	2.0
7	598.5	.0	2.2	609.8	.0	2.0
8	565.5	.0	2.2	602.8	.0	2.0
9	804.4	.0	2.2	717.8	.0	2.0
10	810.4	.0	2.2	743.8	.0	2.0
11	902.3	.0	2.0	815.8	.0	2.0
12	880.5	.0	2.0	803.8	.0	2.0
13	854.5	.0	2.0	853.8	.0	2.0
14	910.5	.0	2.0	878.8	.0	2.0
15	860.5	.0	2.0	846.8	.0	2.0
16	901.5	.0	2.3	842.5	.0	2.5
17	924.8	.0	2.3	860.9	.0	2.5
18	908.9	.0	2.3	877.9	.0	2.5
19	891.9	.0	2.3	838.9	.0	2.5
20	814.8	.0	2.3	776.2	.0	2.5
21	771.1	.0	3.3	776.9	.0	3.3
22	639.4	.0	3.3	597.2	.0	3.3
23	411.9	.0	3.3	539.3	.0	3.3
24	370.0	.0	3.3	491.3	.0	3.3
25	410.9	.0	3.3	503.3	.0	3.3
26	431.6	.0	1.7	517.5	.0	1.8
27	433.6	.0	1.7	519.8	.0	1.8
28	444.6	.0	1.7	530.8	.0	1.8
29	471.5	.0	1.7	508.8	.0	1.8
30	471.5	.0	1.7	508.8	.0	1.8
31	471.5	.0	1.4	507.8	.0	1.3
32	470.9	.0	1.4	508.3	.0	1.3
33	473.9	.0	1.4	512.3	.0	1.3
34	447.9	.0	1.4	470.3	.0	1.3
35	447.9	.0	1.4	470.3	.0	1.3
36	447.9	.0	1.1	470.3	.0	1.1
37	446.4	.0	1.1	469.1	.0	1.1
38	447.4	.0	1.1	470.1	.0	1.1
39	436.4	.0	1.1	452.1	.0	1.1
40	436.4	.0	1.1	452.1	.0	1.1
41	436.4	.0	1.1	451.1	.0	1.0
42	436.4	.0	1.1	451.2	.0	1.0
43	435.4	.0	1.1	452.2	.0	1.0
44	470.3	.0	1.1	455.2	.0	1.0
45	470.3	.0	1.1	455.2	.0	1.0
46	470.3	.0	.8	455.2	.0	.8
47	467.3	.0	.8	454.2	.0	.8
48	467.3	.0	.8	453.2	.0	.8
49	459.3	.0	.8	465.2	.0	.8
50	459.3	.0	.8	465.2	.0	.8
51	459.3	.0	.8	465.2	.0	.8
52	458.3	.0	.8	464.2	.0	.8
53	458.3	.0	.8	464.2	.0	.8
54	448.4	.0	.8	428.3	.0	.8
55	448.4	.0	.8	428.3	.0	.8
56	448.4	.0	.6	427.3	.0	.6
57	443.3	.0	.6	425.3	.0	.6
58	440.3	.0	.6	425.3	.0	.6
59	393.3	.0	.6	385.7	.0	.6
60	393.3	.0	.6	384.7	.0	.6
61	393.3	.0	.6	384.7	.0	.6
62	392.3	.0	.6	384.7	.0	.6
63	392.3	.0	.6	384.7	.0	.6
64	337.5	.0	.6	325.3	.0	.6
65	336.5	.0	.6	326.3	.0	.6
66	3912.1	.0	4.5	4099.0	.0	6.0

where:

POPM = population of males,

INMIGM = number of males migrating in,

OUTMIGM = number of males migrating out,

POPF = population of females,

INMIGF = number of females migrating in,

OUTMIGF = number of females migrating out.

8. DO YOU WANT TO PRINT OUT COMPONENTS OF BUSINESS INCOME CALCULATIONS?

Statistics on business income and depreciation are provided for each sector:

SEC	X	VALUEAD	BUSINC	NBUSINC(I)	ACNETBI	CADEPR	CADEPA
1	42756.	16273.	4379.	2473.	2059.	990.	0.
2	44710.	13479.	3741.	2141.	1365.	1556.	0.
3	144832.	50820.	11318.	4705.	-885.	2540.	137.
4	42062.	5512.	1089.	951.	-3289.	1716.	92.
5	4172.	1828.	219.	153.	-27.	104.	0.
6	3617.	377.	144.	130.	213.	0.	0.
7	5666.	1362.	666.	583.	1435.	0.	0.
8	49139.	11870.	3674.	859.	1266.	3.	0.
9	4015.	844.	298.	203.	510.	0.	0.
10	9589.	3654.	808.	370.	898.	0.	0.
11	21186.	3067.	443.	84.	-305.	1.	0.
12	47403.	6203.	857.	276.	-1001.	206.	0.
13	28010.	12393.	4726.	1910.	-1170.	1.	0.
14	13419.	8851.	1781.	114.	-208.	0.	0.
15	27192.	3527.	786.	86.	-133.	0b	0.
16	29659.	0283.	1740.	781.	-1061.	1.	0.
17	92305.	17560.	3805.	1161.	-2662.	2.	0.
18	31076.	9122.	1370.	615.	692.	0.	0.
19	17620.	10757.	10757.	0.	0.	0.	0.
20	17714.	12163.	12163.	0.	0.	0.	0.
21	9463.	4778.	3.	3.	1.	0.	0.
22	1673.	1245.	4.	4.	3.	0.	0.
23	33191.	20398.	1684.	-1.	1.	0.	0.
24	4320.	1453.	407.	7.	22.	0.	0.
25	10060.	10060.	-2.	-2.	0.	0b	0.

where:

SEC = sector number;

X = regional output;

VALUEAD = value added, excluding imports;

BUSINC = business income (equal to value added minus employee earnings);

NBUSINC = net business income (equal to business income minus indirect taxes);

ACNETBI = accumulated net business income (equal to the sum of net business incomes minus depreciation over time);

CADEPR = depreciation of production capital; and

CADEPA = depreciation of pollution abatement equipment.

9. DO YOU WANT TO SEE WHICH SECTORS NEEDED TO
BORROW OR FREEZE EARNINGS TO REMAIN VIABLE?

If the user responds "yes," IPASS will print the following statement for each sector that did not make enough profit to pay taxes and its employees:

SECTOR 11, SERV STA NEEDED TO BORROW \$ 12111.55 AND
100 PERCENT OF ITS DEPRECIATION ALLOWANCE TO PAY WAGES
AND BUSINESS TAXES.

Appendix B: How To Modify Parameters

A parameter is any set of values in the data base; sometimes it can be a single value. The user is given an opportunity to modify parameters when IPASS asks:

DO YOU WANT TO MODIFY THE (year+1) SIMULATION?

If the user responds "yes," another question will follow:

WHAT PARAMETERS DO YOU WANT TO MODIFY?

A list of parameters appears in table 5, appendix C. The user should key the number corresponding to the parameter(s) to be modified (for example; "15,16"). After the user presses the "return" key, IPASS will ask:

HOW DO YOU WANT TO MODIFY

#: (parameter name)

The user may modify a single value within the parameter, all values, or simply view the values within the parameter and make no modification. Also, if the simulation must be aborted, the user can stop it at this time.

There are nine types of modification:

- 1** = Add a value to an existing, individual value within the parameter
- 2** = Replace the value of an existing, individual
- 3** = Change the value of an existing, individual value by percentage
- 4** = Add a value to an existing total for all values within a parameter
- 5** = Replace the existing total for all values
- 6** = Change the existing total for all values by a percentage
- 7** = Stop the simulation
- 8** = Display the values of the parameter
- 0** = No modification.

To specify the type of modification to be made and new values, the user responds with a 3- or 4-part code. Table 4, appendix B, explains the response code for each type of modification.

When keying the code, the user must also identify the dimension of the parameter being modified: scalar, vector, or matrix. A scalar contains only one row and one column, a single value. A vector contains one column of values in multiple rows. A matrix contains multiple columns of values in multiple rows. Figure 5 shows an example of each dimension. The user can determine the dimension of the parameter he or she is modifying by consulting the characteristics of IPASS parameters listed in table 5, appendix C.

IPASS also allows the user to modify "special parameters" during the simulation:

DO YOU WANT TO MODIFY "SPECIAL" INVESTMENT PARAMETERS FOR
(year+1)?

DO YOU WANT TO MODIFY "SPECIAL" FINAL DEMAND PARAMETERS FOR
(year+1)?

If the user responds "yes" to either question, IPASS will immediately print a list of the special parameters. IPASS then asks:

WHAT PARAMETERS DO YOU WANT TO MODIFY?

The user then keys the number from the list that corresponds to the desired parameter. IPASS then asks:

HOW DO YOU WANT TO MODIFY

#: (parameter name)

To specify the type of modification to be made and new values, the user responds with the appropriate 3- or 4-part code explained in table 4.

When the user completes modification of a parameter, he or she will enter "0," signifying no more modifications.

A Scalar

The single-value parameter is in row 1, column 1.

Male-Female Birth Ratio

.515000

B Vector

The parameter circled is in row 6, column 1.

-----SECTOR-----

NO.	NAME	EMPLOYMENT
		(NO.)
1	LOGGING	2935.
2	SAWMILLS	1885.
3	PLYBENEER	3525.
4	FIBER PROD	593.
5	FISHING	265.
6	CROPS	705.
7	LIVESTXK	403.
8	MANUFACTUR	1580.
9	LODGING	476.
10	EATERIES	1129.
11	SERV STA	427.
12	CAR DEALER	567.
13	COM,TRAN,U	1011.
14	PROF SERV	813.
15	FINANCIAL	310.
16	CONSTRUCT	1047.
17	TRADE	1878.
18	RET SERV	1017.
19	USFS SALES	0.
20	BLM SALES	0.
21	USFS APPRO	459.
22	BLM APPRO	140.
23	CNTY GOVT	3095.
24	CITY GOVT	171.
25	ADMIN GOVT	1135.

C. The parameter circled is in row 4, column 3.

Annual Rate of Change
in Labor Force Participation
Rate by Males

Age Class	1970-79	1980-84	1985-89	1990+
1-13	0.000000	0.000000	0.000000	0.000000
14-15	0.000000	0.000000	0.000000	0.000000
16-17	.006237	.005650	.005650	.005650
18-19	.008717	.000547	.000547	.000547
20-24	-.001622	.002548	.002548	.002548
25-29	-.002288	-.000105	-.000105	-.000105
30-34	-.002288	-.000105	-.000105	-.000105
35-44	-.002487	-.000522	-.000522	-.000522
45-54	-.004710	-.001743	-.001743	-.001743
55-59	-.011666	-.005996	-.005996	-.005996
60-64	-.026130	-.014735	-.014735	-.014735
65+	-.041339	-.025202	-.025202	-.025202

Figure 5.-Parameter modifications may involve a scalar (A), vector (B), or matrix (C). A scalar has one row and one column, a vector has multiple rows and one column, and a matrix has multiple rows and multiple columns.

Table 4--How to modify parameters during IPASS simulation

Code and type of modification	User response code	IPASS display after user response
Either indicate how <u>individual</u> values of parameters are to be modified:		
1 = <u>Add</u> a value Z (Z may be negative).	1,X,Y,Z [RETURN] (1 is the code for this type of modification, X is the row in which the parameter appears, Y is the column in which the parameter appears, and Z is the amount to be added.)	SECTOR XX,XX WAS XXX.XX IS XXX.XX ? (The question mark signifies that IPASS is ready for another modification of the same parameter. To end modification, see response code 0.)
2 = <u>Replace</u> the value.	2,X,Y,Z [Return] (2 is the code for this type of modification, X is the row in which the parameter appears, Y is the column in which the parameter appears, and Z is the replacement value.)	SECTOR XX,XX WAS XXX.XX IS XXX.XX ?
3 = <u>Change</u> by a percentage.	3,X,Y,Z [Return] (3 is the code for this type of modification, X is the row in which the parameter appears, Y is the column in which the parameter appears, and Z is the percentage change.)	SECTOR XXX,XX WAS XXX.XX IS XXX.XX ?
Or indicate how the total of a parameter is to be changed (IPASS distributes the appropriate proportion to all values within the parameter):		
4 = <u>Increase</u> the total amount Z. (Each value within the parameter will be increased by: $\frac{V_{xy}}{\sum V_{xy}} \cdot Z$ where V_{xy} is the value of the parameter element X in column Y before the change, and $\sum V_{xy}$ is the sum of all X elements in column Y before the change.)	4,Y,Z [Return] (4 is the code for this type of modification, Y is the column in which the parameter appears, and Z is the amount to be added to the total.)	SECTOR 1,XX WAS XXX.XX IS XXX.XX SECTOR 2, M WAS XXX.XX IS XXX.XX SECTOR XX,XX WAS XXX.XX IS XXX.XX THE TOTAL WAS XXX.XX IS XXX.XX ?

Table 4-- How to modify parameters during IPASS simulation--Continued

Code and type of modification	User response code	IPASS display after user response
5 = Replace the total with value Z. (Each value within the parameter will be changed by: $\frac{V_{xy}}{\Sigma V_{xy}} * Z$ where V_{xy} is the value of the parameter element X in column Y before the change, and ΣV_{xy} is the sum of all X elements in column Y before the change.)	5,Y,Z [Return] (5 is the code for this type of modification, Y is the column in which the parameter appears, and Z is the replacement valued.)	SECTOR 1,XX WAS XXX.XX IS XXX.XX SECTOR 2 ,XX WAS XXX.XX IS XXX.XX SECTOR XX,XX WAS XXX.XX IS XXX.XX THE TOTAL WAS XXX.XX IS XXX.XX ?
6 = Change the total by a percentage. (Each value within the parameter will also changed by percentage Z.)	6,Y,Z [RETURN] (6 is the code for this type of modification, Y is the column in which the parameter appears, and Z is the percentage change.)	SECTOR 1,XX WAS XXX.XX IS XXX.XX SECTOR 2,XX WAS XXX.XX IS XXX.XX SECTOR XX,XX WAS XXX.XX IS XXX.XX THE TOTAL WAS XXX.XX IS XXX.XX ?
7 = Stop the IPASS simulations. (To start a new simulation, the user must begin with "attach, ipass.")	7 [Return] (7 is the code for this type of modification.)	XX.XXX CP SECONDS EXECUTION TIME / (To log off the computer, the user must key "bye".)
8 = Display all elements of the parameter.	8 [Return] (8 is the code for this type of modification.)	1. (sector name) XXX.XX 2. (sector name) XXX.XX XX. (sector name) XXX.XX THE TOTAL IS XXX.XX
0 = End modification of the parameter. (IPASS will then display the next parameter user indicated as wanting to modify.)	0 [Return] (0 is the code for this type of modification.)	HOW DO YOU WANT To MODIFY XX: <u>(parameter name)</u> ? (If this is the last parameter user indicated as wanting to modify, IPASS will ask: DO YOU WANT To MAKE ANY OTHER PARAMETER MODIFICATIONS?

Appendix C: List of Parameters

Table 5 lists all parameters the user may modify in an IPASS simulation. It also lists characteristics of each parameter: unit of measure, number of rows and columns, and others. The user must know these characteristics when coding modifications to the parameters.

The parameters have been grouped into eight categories: market, investment, final demand, value added, employment, labor force, and production. The number preceding each parameter is the code the user must key when specifying what parameters to modify.

Most parameters are expressed in dollars or number (for example, the number of employees). The dimension of a parameter (number of rows and columns) usually relates to the number of sectors, time periods, or occupations. "Special" parameters are designated in table 5. Parameters that are ratios or annual rates of change are also noted. These parameters will not have units of measure.

Rate-of-change parameters are as follows:

$$a_{t+1} = a_t (1+c);$$

where:

a_{t+1} = the parameter for the year being simulated,

a_t = the parameter for the current year, and

c = IPASS annual rate-of-change parameter.

Table 5--Parameters used in IPASS simulation

Parameter number and name	Characteristics of parameter					
	Unit of measure	No. of rows	No. of columns	Special parameters	Ratio	Annual rate of change
Market parameters:						
1. National gross output	\$1,000	NIS 1/	1			
2. Regional exports	\$1,000	NIS	1	X		
3. National growth rate		NIS	2/5			X
4. Regional market share		NIS	1		X	
5. Rate of change in regional market share		NIS	1			X
Investment parameters:						
6. Replacement investment, production	\$1,000	NIS	1	X		
7. Expansion investment, production	\$1,000	NIS	1	X		
8. Replacement investment, pollution abatement	\$1,000	NIS	1	X		
9. Expansion investment, pollution abatement	\$1,000	NIS	1	X		
10. Production capital	\$1,000	NIS	1			
11. Pollution abatement capital	\$1,000	NIS	1			
12. Production capital/output ratio		NIS	1		X	
13. Pollution abatement capital/output ratio		NIS	1		X	
14. Rate of change for capital/output ratio		NIS	1			X
15. Leverage ratio		NIS	1		X	
16. Liquidity preference		NIS	1		X	
17. Investment matrix		NIS	NIS		X	

See footnotes at end of table.

Table 5--Parameters used in IPASS simulation--Continued

Parameter number and name		Characteristics of parameter				Annual rate of change
		Unit of measure	No. of rows	No. of columns	Special parameters	
Final demand parameters:						
18.	Business inventory change (net)	\$1,000	NIS	1	X	
19.	Gross private capital formation (GPCF)	\$1,000	NIS	1	X	
20.	Personal consumption expenditures (PCE)	\$1,000	NIS	1	X	
21.	Total PCE	\$1,000	1	1		
22.	Total PCE (previous year)	\$1,000	1	1		
23.	State and local government purchases	\$1,000	NIS	1	X	
24.	Federal Government purchases	\$1,000	NIS	1	X	
25.	User-specified final demand	\$1,000	NIS	1	X	
26.	Total final demand by sector	\$1,000	NIS	1		
27.	Rate of change for user-specified final demand		NIS	1		X
28.	Rate of change for State and local government purchases ²¹					
29.	Rate of change for Federal Government purchases ³¹					
30.	Business inventory/output ratio		NIS	1		X
31.	Income elasticity of demand coefficient		NIS	1		X
Value added parameters:						
32.	Value added/output ratio		NIS	1		X
33.	Earnings	\$1,000	NIS	1		
34.	Earnings per worker	Dollars	NIS	1		
35.	Rate of change in earnings per worker		NIS	2/5		X
36.	Employee compensation ³¹					
37.	Employee compensation per worker ³¹					
38.	Rate of change in compensation per worker ³¹					
39.	Indirect business tax rate		NIS	1		X
40.	Federal business tax rate		NIS	1		X
41.	Net business income	\$1,000	NIS	1		
42.	Accumulate net business income	\$1,000	NIS	1		
43.	Rate of change in indirect tax rate		NIS	1		X
44.	Regional imports	\$1,000	NIS	1		
45.	Regional import rate		NIS	1		X
46.	Capital depreciation rate, production		NIS	1		X
47.	Capital depreciation rate, pollution abatement		NIS	1		X
48.	Total personal income	\$1,000	1	1		
49.	Total personal income (previous year)	\$1,000	1	1		
50.	Personal income/earnings ratio		1	1		X
51.	Unemployment compensation rate		1	1		X
52.	Transfer payments rate		1	1		X
53.	Proprietary income rate		1	1		X
54.	PCE/savings ratio		1	1		X

See footnotes at end of table.

Table 5--Parameters used in IPASS simulation--Continued

Parameter number and name		Characteristics of parameter				Annual rate of change
		Unit of measure	No. of rows	No. of columns	Special parameters	
Employment parameters:						
55.	Employment by sector	No.	NIS	1		
56.	Total employment	No.	1	1		
57.	Total employment (previous year)	No.	1	1		
58.	Output per worker		NIS	1		X
59.	Output per hour worked		NIS	1		X
60.	Rate of change in output per hour worked		NIS	2/5		X
61.	Hours worked per week		NIS	1	X	
62.	Rate of change in hours worked per week		NIS	1		X
63.	Hours worked per year		NIS	1		X
64.	Weeks worked per year		NIS	1		X
65.	Rate of change in weeks worked per year		NIS	1		X
66.	Employment supplied by occupation	No.	NOC ^{2/}	1		
67.	Employment demanded by occupation	No.	NOC	1		
68.	Unemployment by occupation	No.	NOC	1		
69.	Total unemployment	No.		1	1	
70.	Other State and local government employment	No.		1		
71.	Other State and local government employment/PCE ratio		1	1		X
72.	Rate of change in other State and local government employment/PCE ratio		1	1		X
73.	Other Federal civilian government employment	No.	1	1		
74.	Other Federal civilian government employment/population ratio		1	1		X
75.	Rate of change in other federal civilian employment/population ratio		1	1		X
76.	Federal military employment	No.	1	1		
77.	Other government final demand distribution		1	2/5		X
78.	Industry occupation matrix		NIS	NOC		X
Labor force parameters:						
79.	Total labor force	No.	1	1		
80.	Labor force distribution by occupation		NOC	1		X
81.	Labor force by age group	No.		9/12	1	
82.	Labor force participation rate (male)		9/ 12	1		X
83.	Rate of change in labor force participation rate (male)		9/ 12	1/4		X
84.	Labor force participation rate (female)		9/ 12	1		X
85.	Rate of change in labor force participation rate (female)		9/ 12	1/4		X
Population Parameters:						
86.	Population by age (male)	No.	9/ 66	1		
87.	Population by age (female)	No.	9/ 66	1		
88.	Total population	No.	1	1		
89.	Total population (previous year)	No.	1	1		
90.	Fertility rate by age (female)	9/	9/ 66	1		X

See footnotes at end of table.

Table 5--Parameters used in IPASS simulation--Continued

Parameter number and name	Unit of measure	Characteristics of parameter				Annual rate of change
		No. of rows	No. of columns	Special parameters	Ratio	
91. Rate of change in fertility rate		9/ 66	7/ 4			X
92. Male/female birth ratio		1	1		X	
93. Death rate by age (male)		9/ 66	1		X	
94. Death rate by age (female)		9/ 66	1		X	
95. National migration distribution by age and sex		9/ 66	10/2		X	
96. Rate of change in national migration distribution		9/ 66	10/2		X	
97. National employee dependent rate		1	1		X	
98. Rate of change in national employee dependent rate		1	1		X	
99. Regional migration distribution by age and sex		9/ 66	10/2		X	
100. Rate of change in regional migration distribution		9/ 66	10/2			X
101. Regional employee dependent rate		1	1		X	
102. Rate of change in regional employee dependent rate		1	1			X
103. Immigration/local employment deficit ratio by occupation		NOC	1		X	
104. Out-migration/unemployment ratio by occupation		NOC	1		X	
105. Immigration by occupation	No.	NOC	1			
106. Out-migration by occupation	No.	NOC	1			
107. In-commuting	No.	NOC	1			
108. In-commuting in/local employment deficit ratio		NOC	1		X	
109. Rate of change in in-commuting/local employment deficit ratio		NOC	1			X
110. Out-commuting	No.	NOC	1			
111. Out-commuting/unemployment ratio		NOC	1		X	
112. Rate of change in out-commuting/unemployment ratio		NOC	1			X
113. Cohort movement rate by age (male)		9/ 66	1		X	
114. Cohort movement rate by age (female)		9/ 66	1		X	

See footnotes at end of table.

Table 5--Parameters used in IPASS simulation--Continued

		Characteristics of parameter				
		Unit of measure	No. of rows	No. of columns	Special parameters	Ratio
Parameter number and name						Annual rate of change
Production parameters:						
115.	Gross regional output (current year)	\$1,000	NIS	1		
116.	Gross regional output (previous year)	\$1,000	NIS	1		
117.	Output required by final demands	\$1,000	NIS	1		
118.	Output constraint by capital stocks	\$1,000	NIS	1		
119.	Output constraint by labor	\$1,000	NIS	1		
120.	Leontief (inverse) matrix		NIS	NIS		X

^{1/} NIS = number of sectors in the regional model, including "administrative government."

^{2/} Each column represents a different period of time during the simulation: column 1 = 1970-79, column 2 = 1980-84, column 3 = 1985-89, column 4 = 1990-94, column 5 = 1995-99.

^{3/} Not currently used in IPASS.

^{4/} NOC = number of occupations defined in the analysis.

^{5/} Column 1 = State and local government; column 2 = Federal Government.

^{6/} Each row represents an age group: row 1 = 1-13 years, row 2 = 14-15 years, row 3 = 16-17 years, row 4 = 18-19 years, row 5 = 20-24 years, row 6 = 25-29 years, row 7 = 30-34 years, row 8 = 35-44 years, row 9 = 45-54 years, row 10 = 55-59 years, row 11 = 60-64 years, row 12 = 65 years and older.

^{7/} Each column represents a different period of time: column 1 = 1970-74, column 2 = 1975-79, column 3 = 1980-84, column 4 = 1985-99.

^{8/} Each row represents an age: one row for each year from 0-64, and the last row for age 65 years and older.

^{9/} Number of births per 1,000 women.

^{10/} column 1 = males, column 2 = females.

Appendix D: Using the OSU Cyber Computer

This appendix will help users not familiar with the Cyber computer at Oregon State University. The appendix contains these procedure guides:

- Procedure Guide 1. Logging onto the OSU computer.
- Procedure Guide 2. Obtaining IPASS stored in computer memory.
- Procedure Guide 3. Obtaining IPASS stored on magnetic tape.
- Procedure Guide 4. Interacting with the IPASS program.
- Procedure Guide 5. Deleting improper instructions.
- Procedure Guide 6. Logging off the OSU computer.

Procedure Guide 1. Logging onto the OSU computer.

The user must have a terminal with either a telephone or a "hard wire" link and an account with the OSU computer center. Each account is given a user number, a password, an account number, and a project name. The project name is often the same as the user number.

Step	Instructions	Input	Function	Display
1	Turn on power for terminal (switch usually located at rear of terminal).			Red light on keyboard.
2	Check to see that terminal is set to communicate with the computer.		Line/Local	
3	Check transmission speed. It should be set to 300 baud. If the terminal is "hard wired" (that is, directly connected with the computer), then skip to step 7.		300/100	
4	Turn on power for phone coupler (power switch usually located in front)			Red light.
5	Dial computer by phone: (503) 754-3781.			If busy signal, try again. If high pitch, go to step 6.
6	Place receiver in coupler receptacle.			PORT XXXXC
7	Key name of system.	NOS	Return	(date) (time) NOS 2.0 OSU 552.6
8	Key carriage return.		Return	FAMILY:
9	Key user number.	COHA2C (for example)	Return	PASSWORD
10	Key password.	DOSCH (for example)	Return	TERMINAL:XX, TTY /
You should now be logged onto the computer. Go to procedure guide 2.				

Procedure Guide 2. Obtaining IPASS stored in computer memory.

Step	Instructions	Input	Function	Display
1	Perform steps 1-10 in procedure guide 1.			
2	Clear all local files from memory. ^{1/}	CLEAR	Return	XX FILES PROCESSED /
3	Access IPASS program.	ATTACH,IPASS	Return	/ or IPASS NCTT FOUND
4	If “/,” execute program. Go to procedure guide 4. If “IPASS NCTT FOUND,” the program is not in computer memory. Go to procedure guide 3.	IPASS	Return	WELCOME TO IPASS (..etc.)

^{1/} If your local files are not permanent, you must save them before this step.

Procedure Guide 3. Obtaining IPASS stored on magnetic tape.

IPASS program is stored on a magnetic tape shelved at the OSU computer center. A procedure file instructs the computer operator to mount the tape and copy the necessary files onto the computer memory.

Step	Instructions	Input	Function	Display
1	Access the IPASS procedure file from storage on Olson's and Schallau's account.	GET,PFILE/ UN = BHCQ2C	Return	/ or FILE NOT FOUND!!
2 ^{2/}	Use procedure file to obtain IPASS files. Go to procedure guide 4.	BEGIN,IPASS, PFILE	Return	REVERT.IPASS FILES ARE AVAILABLE.

^{1/} If “FILE NCTT FOUND” is displayed, contact one of the authors of this user manual: Doug Olson (503)757-4901; Con Schallau (503)757-4413; or Wilbur Maki (612)376-3433.

^{2/} This step may require 2-15 minutes to complete, depending on the number of users logged onto the Cyber computer.

Procedure Guide 4. Interacting with the IPASS program.

Step	Instructions	input	Function	Display
1	Proceed with interactive program. program.	(Follow directives in this manual: example 1, example 2, appendixes A-C.)		
2	To exit program before completing all program steps ("bail out"):1/ interrupt IPASS program, then exit program mode.	(Any alphanumeric character)2/	Break Return	*INTERRUPTED* *TERMINATED* /

1/ If you interrupt the program while a table is being printed, some information from the table may be lost.

2/ If you decide not to bail out after pressing "break," simply press "return" without keying any alphanumeric character. IPASS will resume.

Procedure Guide 5. Deleting improper instructions.

step	Instructions	Input	Function	Display
<u>Before pressing "Return" (in control mode or program mode):</u>				
Method 1--				
1	Backspace over mistake.		Backspace	
2	Key correct input and rekey remainder of response.	(Correct response)	Return	/
Method 2--				
1	Delete entire line.		Esc	*DEL
2	Key correct input.	(Correct input)	Return	
<u>After pressing "return" (in program mode):</u>				
1	Interrupt IPASS program.		Break	*INTERRUPTED*
2	Exit program mode.	(Any alphanumeric character)	Return	*TERMINATED* /
3	Initiate IPASS program.	IPASS	Return	WELCOMETO IPASS(...etc.)

Procedure Guide 6. Logging off the OSU computer.

Step	Instructions	Input	Function	Display
<u>When user is in program mode:^{1/}</u>				
1	Interrupt IPASS program.		Break	*INTERRUPTED*
2	Exit program mode.	(Any alpha-numeric character)	Return	*TERMINATED* /
3	Protect computer from unauthorized use.	BYE	Return	
4	Replace phone and turn off power supply to coupler (if phone was used for connection), and turn off power supply to the terminal.			

When user is not in program mode:

- 1 Perform steps 3-4 above.

^{1/} If you are finished with **IPASS** and do not intend to use the program until the next day or longer, purge the **IPASS** file. If you do not purge, **IPASS** will be stored in computer memory as a permanent file. The cost of storing a permanent file is greater than the cost of shelving and retrieving **IPASS** from the magnetic tape. To purge, input " **PURGE,IPASS,IPDCO72,IPMNS70,IPAKS77,IPSEA77**[Return] ."

Appendix E: Batch Mode

Although the interactive mode of **IPASS** is user friendly and convenient, it is also slow. To speed up the simulation, particularly when analyzing a number of different circumstances, the less tedious batch mode should be used. For batch mode, the user creates an input file that will respond to all questions posed by **IPASS**. When the **IPASS** program is initiated, it will then read answers from the input file rather than wait for the user to key a response; Figure 6 illustrates an input file; the responses are those we used in the baseline analysis (example 1).

Creating an input file requires using the **XEDIT** routine of the OSU computer. An **XEDIT** User's Guide can be purchased from the Milne Computer Center, Oregon State University, Corvallis, OR 97331.

To perform an **IPASS** analysis in batch mode, the user must first create the input file. The flow chart at the end of this appendix will guide the user in building the list of responses for the file. Then "attach" **IPASS** by keying:

IPASS,ifn,ofn [Return] ;

where:

ifn = the input file name, and
ofn = the output file name.

```

2
132
6
no
no
no
3
0
0
no
no
no
no
no
no

```

Figure 6.--Example of an input file for IPASS batch mode.

When “ofn” is left blank, the terminal will immediately begin printing IPASS questions and reading answers from the input file. The simulation will proceed as directed by the input file. When the user designates an output file, IPASS prints all questions and results into that file. Shortly, IPASS responds with “XX.XX CPU SECONDS,” indicating a successful run. To see the IPASS output, the user can print the output file on either the terminal or one of the high speed printers at the OSU computer center.

To print IPASS output at the terminal, key:

REWIND,ofn [RETURN]

COPY,ofn [RETURN].

To print output at the OSU computer center, key:

REWIND,ofn [RETURN]

TITLE,rfn,DC=LP.(user's last name). [RETURN]

COPYSBF,ofn,rfn [RETURN]

ROUTE,rfn [RETURN]

ofn = the output file name, and

rfn = the name of the file to be routed.

The “TITLE” statement prints the user's last name in large block letters so the clerk at the computer center can identify the user's output.

Flow Chart. Questions asked by IPASS, version 3.4.

Questions asked by IPASS are shown in capital letters; user responses are in quotation marks following "if" statements.

1. WHAT REGION DO YOU WANT **TO** SIMULATE?

If "25" (other) _____ *FILE NAME?

2. DOES YOUR TERMINAL PRINT 80 OR 132 CHARACTERS PER LINE?

3. WHICH ANNUAL SUMMARY TABLE DO YOU WANT **TO** FOLLOW?

4. DO YOU WANT **TO** SEE THE (year) DATA TABLES?

If "yes" → WHAT TABLES DO YOU WANT TO SEE?

If "no" →

5. DO YOU WANT **TO** MODIFY THE ORIGINAL DATA BASE?

If "yes" → A. WHAT PARAMETERS DO YOU WANT TO MODIFY?

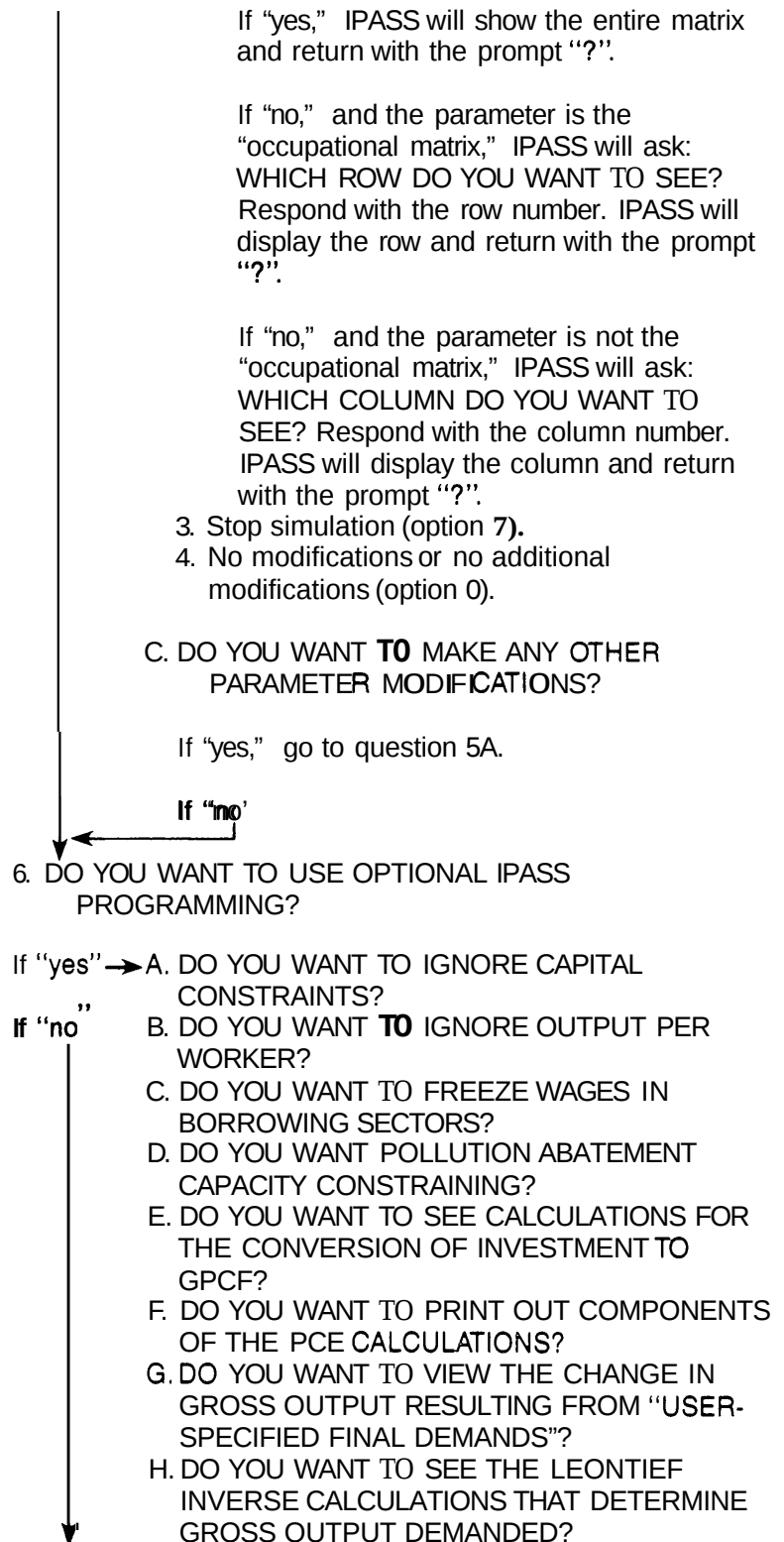
If "no" →

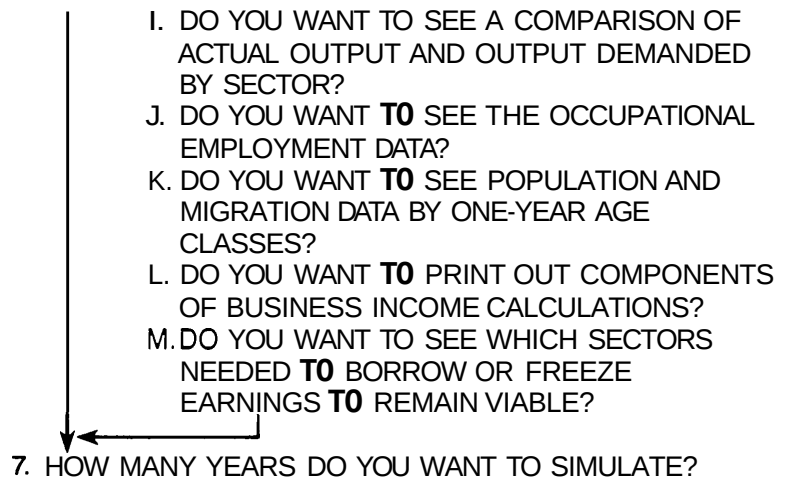
Select parameters from table 5, appendix C. For each parameter you designate, IPASS will ask question 5B. If you designate no parameters, the program skips to question 5C.

B. HOW DO YOU WANT **TO** MODIFY (parameter)?

There are nine optional responses that fall into four classes:

1. Modify parameter (options 1-6, listed in appendix B). IPASS will perform the modification and return with the prompt "?". You must respond to this prompt, using one of the nine options.
2. View parameter (option 8).
 - a. If the parameter is a scalar or vector, IPASS will display its values and return with the prompt "?".
 - b. If the parameter is a matrix, IPASS will ask: DO YOU WANT **TO** SEE THE ENTIRE MATRIX?





If "0," go to question 15.

8. HOW FREQUENTLY DO YOU WANT TO VIEW DATA TABLES?

9. HOW FREQUENTLY DO YOU WANT TO MODIFY THE SIMULATION?

Simulation begins (or continues). IPASS returns to this point at the end of each year of simulation. Questions 10, 11, and 12 are asked at the first year of simulation and at other years specified in the response to question 9. Question 15 is asked at time intervals specified in response to question 8.

Annual summary table is printed.

If year specified to modify

10. DO YOU WANT **T0** MODIFY THE (year+ 1) SIMULATION?

If "yes" → A. WHAT PARAMETERS DO YOU WANT **T0** MODIFY?

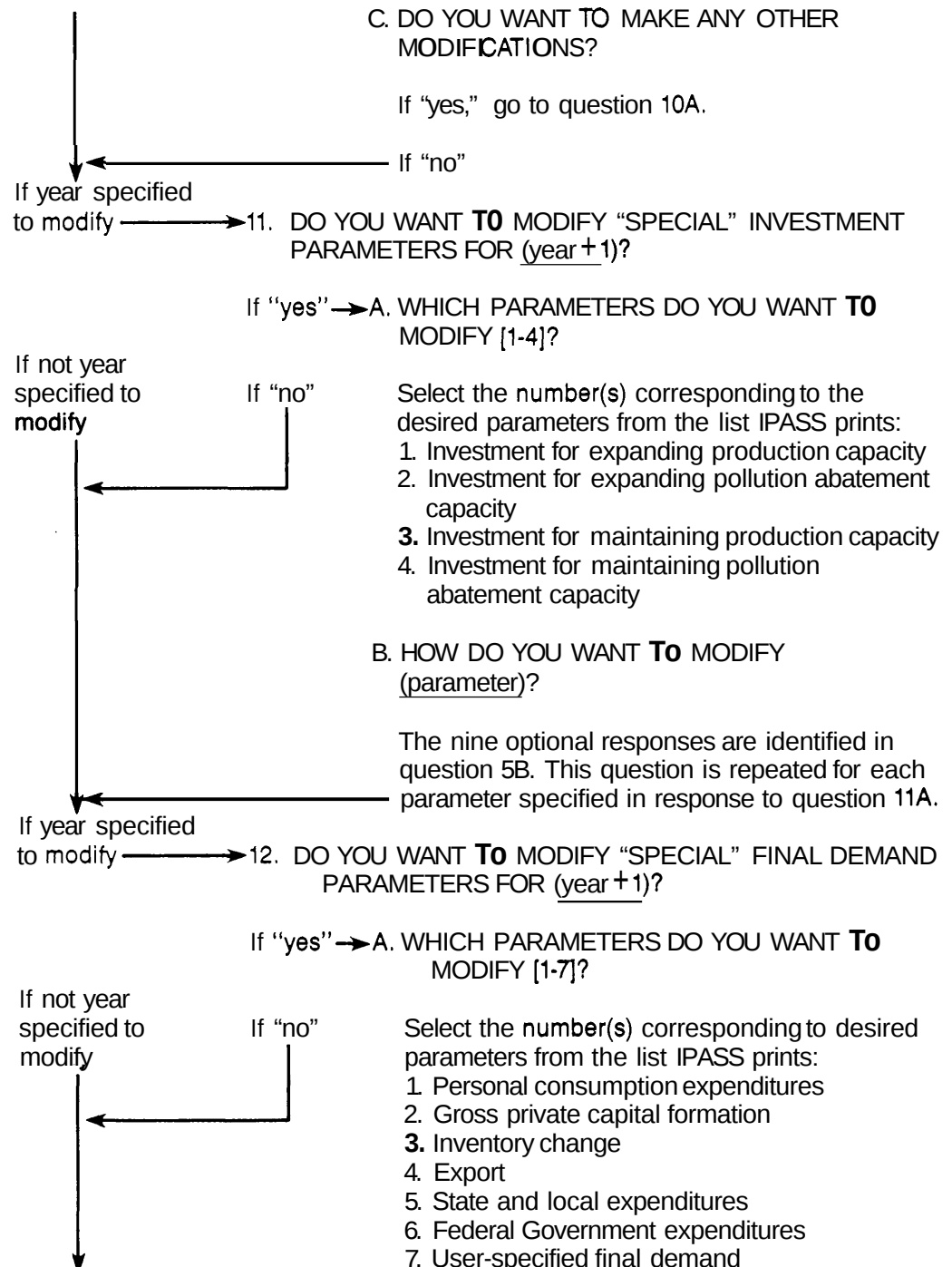
If not year specified to modify

If "no"

Select parameters from table 5, appendix C. For each parameter selected, IPASS will ask question 10B. If you designate no parameters or when the designated parameters are complete, IPASS skips to question 10C.

B. HOW DO YOU WANT **T0** MODIFY (parameter)?

The nine optional responses are identified in question 5B.



The nine optional responses are identified in question 5B. This question is repeated for each parameter specified in response to question 12A.



16. DO YOU WANT TO SEE THE NEW DATA TABLES?

If "yes," —————> WHAT TABLES DO YOU WANT **TO** SEE?

If "no"



17. SAVE (year) DATA BASE FOR FUTURE USE?

If "yes" —————> UNDER WHAT FILE NAME DO YOU WANT
TO SAVE THE DATA?

If "no"



18. CONTINUE SIMULATION?

If "yes," go to question 6.

If "no," simulation ends.

Olson, Doug; Schallau, Con; Maki, Wilbur. IPASS: an interactive policy analysis simulation system. Gen. Tech. Rep. **PNW-170**. Portland, OR: **U.S.** Department of Agriculture, Forest Service, Pacific Northwest Forest and Range Experiment Station; 1984. 70 p.

This paper describes an interactive policy analysis simulation system (IPASS) that can be used to analyze the long-term economic and demographic effects of alternative forest resource management policies. The IPASS model is a dynamic analytical tool that forecasts growth and development of an economy. It allows the user to introduce changes in selected parameters based on different assumptions about socioeconomic variables. The user can analyze the impact those changes would have on the economy by comparing results of the alternative situation with the original forecast. The program is interactive, and the user needs no previous experience in programming or model building. IPASS has potential use in applied research as well as policy analysis.

Keywords: Economic impact, economic theory (-forest management, resource management, Resources Planning Act (RPA), computer programs/programming.

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