A MICROPOLITAN ECONOMIC DEVELOPMENT SIMULATION MODEL

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Submitted to the Faculty of the Graduate College
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in partial fulfillment of the requirements
for the Degree of
DOCTOR OF PHILOSOPHY
May, 1978

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SIMULATION MODEL

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PREFACE

This study is concerned with the economic development of rural regions. A dynamic simulation model was developed with the primary objective of evaluating a number of alternative development strategies in three rural regions in Oklahoma.

I wish to express my appreciation to my major adviser, Dr. Luther Tweeten, for his patience, guidance, and assistance in this and other studies during my time at Oklahoma State University. I also acknowledge the valuable assistance of the other members of my committee, Dr. James Nelson, Dr. Michael Salkin, and Dr. Michael Edgmand, in the preparation of the final manuscript.

I thank James Chang for his assistance while I was trying to learn DYNAMO, Ginny Gann for her prompt and accurate handling of the large amount of keypunching necessary, and Linda Howard and Sandi Ireland for their special assistance with respect to thesis format and duplicating procedures.

A special thanks to my parents, Jess and Elvie Smith, for their substantial encouragement and financial support through my years in graduate school.

My greatest dept is to my wife, Marilyn, who contributed not only a great amount of emotional and financial support but also many, many hours of her time and expertise typing and revising the preliminary drafts as well as the final copy.

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CHAPTER I

INTRODUCTION

During the last 20 years, many rural communities experienced difficulty in maintaining viability. The structure of the small rural community underwent drastic changes as these communities contended with outmigration, decreases in local employment, an inadequate tax base for supporting local services, the loss of trained manpower, and increasing dependency rates. As technological advances freed labor from agriculture, fewer youth could find local employment in their home community. The decrease in the number of local jobs coupled with immobility of persons with lower incomes and education levels have held down wages in rural areas. Low wages discouraged the better trained youth from returning to their home communities--the result is a severe "brain drain" from many rural areas to more wealthy urban areas. As local population, income, and spending declined, the community lost the scale economies required to provide adequate schools and other services at low cost, the tax revenue necessary to support community services, and the reinvestment of local funds in local businesses. These conditions discouraged investment in rural areas, causing local economies to further stagnate. Inflow of investment to rural communities did not replace jobs lost in the economic base comprised mainly of natural resource oriented industries such as farming, mining, and lumbering.

The market mechanism sometimes gives rise to geographic pockets of chronic economic distress because of imperfect information about wage rates and job openings, immobility of labor, and labor union power in urban areas (providing an artificial barrier to wage and price flexibility and restricting the migration of labor from rural areas). At the same time, the movement of people to urban areas from rural areas has exerted damaging pressure on the urban environment, decreasing the desirability of outmigration as a solution to the problems of the rural areas. Outmigration has contributed to urban congestion with resulting slums, crime, and pollution.

Many people wish to preserve the small town because they view it as a desirable "way of life." Some wish to maintain rural communities so that they will have the option of returning to a small city or town. Others seek to reduce economic disparities between rural communities and other places to promote economic efficiency and equity. If the income gap between rural and urban is to be narrowed, attention must be paid to more jobs and investment in depressed areas.

In recent years, new demographic trends are apparent in rural areas. The number of nonfarm rural residents is increasing rapidly. Many new nonfarm rural residents are elderly people without school age children. Other new residents are commuters with only a fleeting attachment to the community and alleviation of its problems. In many instances, rural communities near population centers are growing. But extensive rural areas have been bypassed despite overall growth in rural population, and economic deprivation continues to be a major problem in a large number of rural communities.

Comprehensive, long-range plans can help depressed communities maintain or regain their economic vitality. Sound investment can create jobs, decrease unemployment and underemployment, increase income, and strengthen the tax base for services. Rural policy makers can benefit from information on the level and combinations of various programs that promote economic progress. Planning can help the community cope with structural changes and maintain its ability to provide infrastructure and services to its residents. In this study a dynamic simulation model of a regional economy is used to generate alternative paths of economic development for three rural areas.

Rural Development

Economic growth of rural areas involves the enhancement of the economic well-being of the people in the area. Rural development in general concerns the overall well-being of the residents of rural areas. Tweeten (21, p. 3) states that "economists usually define economic growth in theory as an increase in the well-being of people and in practice as an increase in income." Since income is more easily measured than the other ingredients of the well-being of people, it is the most common measure of economic growth. Because development funds are limited, one consideration in formulating a growth strategy is cost-effectiveness in use of public funds to raise the income of low income people (20).

Federal, state, and local rural development efforts have focused on several goals for rural development. Various programs in a development strategy aim not only at increasing income but also at such

factors as employment, job information, labor mobility, training, and education that influence the well-being of rural people.

Economists have drawn from a number of theories in their efforts to determine how and why economic growth does or does not take place in rural communities. First, a community or region must contain the basic ingredients necessary for economic development if any economic growth is to take place. Tweeten (21) categorizes the ingredients of economic growth into three groups: natural resources, institutions, and attitudes of people. These ingredients influence the saving, investment, and efficiency of the regional economy, which in turn influence the capacity of the economy for human and material capital accumulation which is the essence of economic growth. Such a scheme of economic development points to the need for saving and the efficient investment of the saving. Some of the most prominent theories or models used to explain why some regions experience economic growth are location theory, export base theory, income-expenditure models, and neo-classical theory. As the model in this study was developed equation by equation, the content of these theories was utilized to determine the appropriate variables to include.

Location theory attempts to explain the geographic distribution of economic activity and helps to determine what variables most influence the location of specific firms (1) (10). Location theory suggests that firms examine production, transportation, and marketing costs and then locate plants where these costs are minimized. The viable firms, the ones that survive, tend to be the plants that locate where profit is greatest (21). Therefore, location theory emphasizes the factors influencing a firm's decision on where to locate.

Export base theory implies that increased exports are the cause of regional economic growth. This theory suggests that primary industries which export their output to other regions are the most important ingredient of economic growth of a region, and that demand for exports determines regional income. Income-expenditure models also stress the dominance of demand in the economic progress of a region. Neo-classical economic theory suggests that capital investment will be attracted to the region where the rate of return is greatest and labor will be attracted to the region with high wages.

Neo-classical theory suggests that factor proportions and factor productivity will most influence the growth of a region. As factor productivity increases, the income of the region is increased; and when factors are efficiently allocated among regions (returns to factors equal in all regions), national income is maximized. Other theories such as central place theory, growth center theory, and growth pole theory are related to neo-classical theory but heavily stress agglomeration economies growing out of external and internal economies of scale, availability of business credit, and other supportive public and private services, especially as found in larger cities (22).

The federal government has been involved in rural development for at least four decades starting with the New Deal and the creation of the Rural Electrification Administration, the Soil Conservation Service, and the Civilian Conservation Corps. The Eisenhower Administration recognized the problems of the rural poor and set up the Rural Development Program, which had only a nominal impact (20). With the 1960's came a new awareness of the rural problems and new initiatives in the form of some ambitious rural development programs. The federal

government has committed itself to the support of rural development through the numerous development bills introduced in the last ten years and the rapid expansion of many of these programs (22). The intentions are evident and the funds are available, but problems of program inefficiency and organization remain. The various programs must be coordinated if efficiency is to be attained and conflicts minimized in meeting program goals with limited resources.

Objectives

The overall objective of this study is to develop a dynamic economic simulation model that is sufficiently general to model the economic activity of contrasting (in the sense of economic well-being and attitudes toward development) rural regions (substate, multi-county areas), yet sufficiently detailed and rigorous to delineate and analyze the relevant socio-economic relationships that must be considered in examining the potential for economic development of a region. The model contains many variables to represent reality, but at the same time it must be simple enough to operationalize and to isolate the most crucial variables. The study examines the impact of alternative economic development policies on the economy of the region. The specific objectives are to:

1. Plot the time path of crucial regional economic and demographic variables, including how the path is altered by the changing of certain policy variables;

2. Develop a number of feasible alternative long-range plans of economic development that could be followed by each of the regions and utilized by the relevant decision makers;

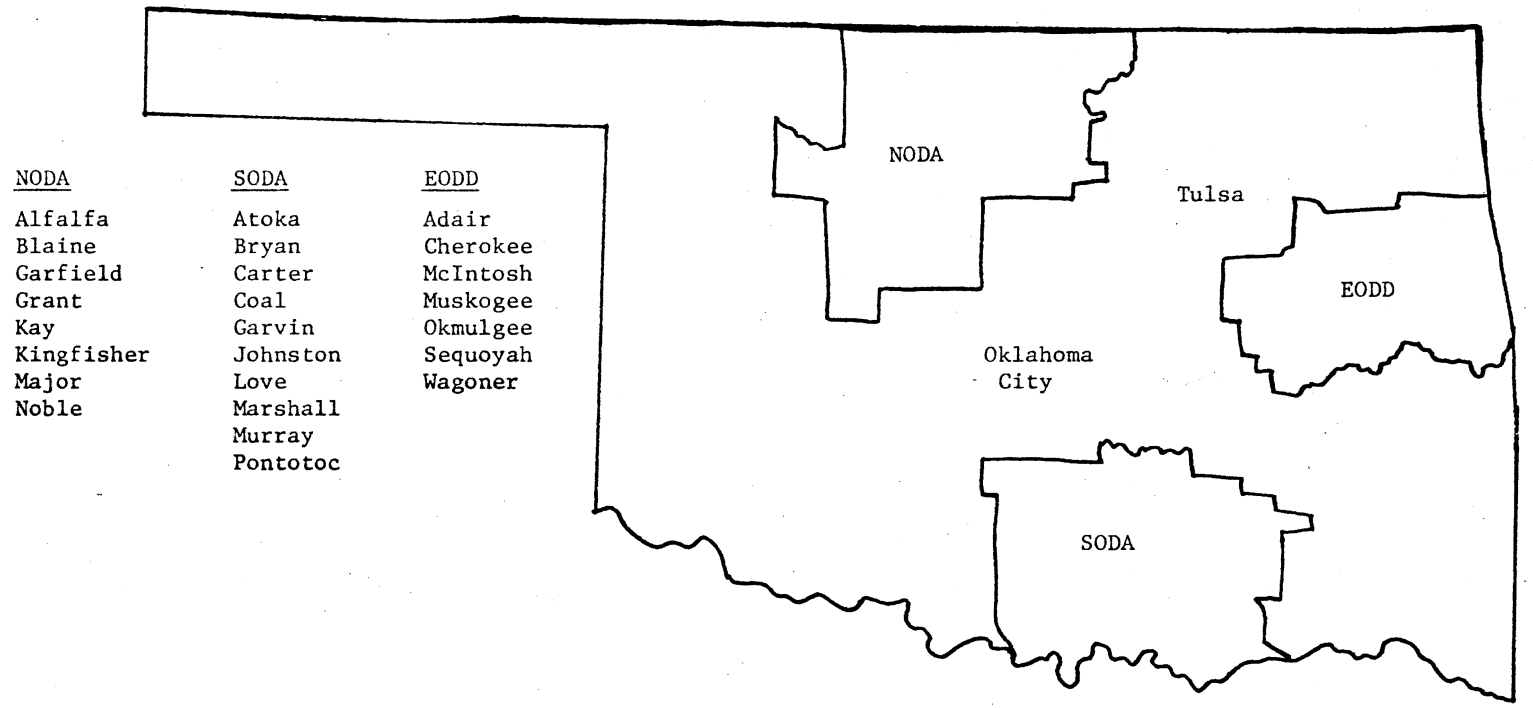
3. Set bounds on certain crucial variables and utilize an adaptive process to keep them within their bounds (design the adaptive process to simulate the annual adjustments that would become necessary during the application of a particular long-range plan); and

4. Calculate several measures of success that decision makers can use to assist them in choosing strategies that most nearly fulfill the goals of their region.

The above primary objectives will be supplemented by intermediate objectives that must be considered to build a simulation model.

Study Area

Figure 1 shows the counties in each of the three regions included in the study. The three regions are designated EDA (Economic Development Administration) substate planning districts of Oklahoma: Northern Oklahoma Development Association (NODA), Southern Oklahoma Development Association (SODA), and Eastern Oklahoma Development District (EODD). These three regions were chosen because of the broad range of rural economic conditions which they represent. The multi-county development district was chosen as the planning unit because it is economically feasible to undertake certain types of development endeavors in sparsely populated areas only at such a level of aggregation.



NODA	SODA	EODD
Alfalfa	Atoka	Adair
Blaine	Bryan	Cherokee
Garfield	Carter	McIntosh
Grant	Coal	Muskogee
Kay	Garvin	Okmulgee
Kingfisher	Johnston	Sequoyah
Major	Love	Wagoner
Noble	Marshall	
	Murray	
	Pontotoc	

Figure 1. Study Area

CHAPTER II

MODEL DEVELOPMENT

Rural development economists can help policy makers solve economic problems in rural areas by identifying possible strategies and projecting the consequences of the strategies. In this study a simulation model of a rural regional economy is used to generate alternative paths of economic development for the rural regions considered.

Simulation

Simulation is a process of indirect experimentation involving the testing of alternative courses of action before they are adopted (8). Indirect experimentation enables the decision maker to evaluate the probable outcome of a given decision without changing the system itself. It provides a means for making quantitative information available to the decision maker without disturbing the operation of the system under his control. Through simulation, a researcher can consider a great range of operating policies at relatively low cost and time. Simulation allows more flexibility in the evaluation of rural development programs than do input-output models or standard optimizing models such as linear programming (3).

In general the construction of a simulation model involves the application of logical reasoning to a scale model of selected real-world phenomena (3). The use of a computerized simulation model makes

it possible to efficiently observe the time path of critical dynamic variables and examine their reaction to postulated changes in the instrumental or policy variables.

The following steps were followed in the development of the simulation model in this study:

1. Define problem.
2. Choose study area.
3. Develop general objectives.
4. Choose the appropriate research tool.
5. Determine the most relevant variables.
6. Outline the functional relationships in flow chart form.
7. Develop the implicit functional relationships into equation form.
8. Construct the computer version of the model in equation form.
9. Validate model.
10. Determine strategies to be studied.
11. Build adaptive process into model.
12. Test alternative strategies.

Related Studies

In an earlier study, Nelson (15) constructed a simulation model of a micropolitan region in Oklahoma. The model developed in this study benefitted from Nelson's "first generation" model. The goal of the current study is to improve upon and validate the Nelson study while building a model that is broader in scope and more macro oriented. While Nelson's model is well adapted to classroom or extension

teaching, this model is very useful in generating many alternative development plans under a wide range of conditions.

Edwards (4) developed a simulation model and, along with DePass, has been extending and refining the model since about 1970. The primary objective of the Edwards and DePass studies has been to examine links between rural and urban economies (5). In a 1975 publication, Edwards and DePass (6) reported the simulation of a large number of possible alternative paths of development for rural and urban regions in the United States. Their work has little to say about the economic behavior of rural regions which are not under the strong influence of a nearby metropolitan region.

Eddleman and Tyner (10) adapted a macroeconomic simulation model of a national economy to a regional accounts framework. The primary focus was on the agricultural sector of the region. Their model evaluated supply and demand factors influencing production by setting production targets and regional development strategy for future periods. The model was designed to simulate a region's growth over a previous time period and to project future levels of employment, income, and regional balance of payments based on target levels of production and alternative governmental investment and subsidy programs.

The staff of the National Bureau of Economic Research has for the last 15 years been involved in constructing, refining, and implementing an urban simulation model. The NBER Urban Simulation Model (14) is a complex model with certain segments of the model being very detailed; e.g. the model has an elaborate housing market segment.

The Urban Institute (11) has supported a team of social scientists developing a socioeconomic simulation model. The Institute coordinated

the skills of several researchers as various segments of the model were built.

Spiegelman, Baum, and Talbert (19) were among the first to recognize the need for a tool in planning underdeveloped areas. They used linear programming to analyze problems similar to those examined in this study. Much can be learned from an examination of the logical development of the model. The Spiegelman model was structured to determine the economic feasibility of investment to develop any particular area. A simulation model can study a broader range of alternatives in a dynamic framework.

Two other studies will briefly be discussed because they are regional simulation models constructed with logic followed in this study and using the same computer simulation language--DYNAMO (16). These two models were developed by Forrester (9) and Hamilton, et al. (12).

Forrester approached problems of urban areas in his model much as this study approaches problems of rural areas. Forrester emphasized a few of what he considered the major urban problems--primarily underemployment and slum housing. He concluded that simulation is the only tool capable of handling a problem so complex as the study of a dynamic regional economy. Forrester (9, p. 2) considered it necessary to organize "the growth and goal-seeking process of the system into a computer model."

A group of utility companies in the Susquehanna River Basin supported a study by Hamilton, et al. (12) that developed a regional simulation model designed to gain a better understanding of regional problems--especially water-related problems. The model was organized

by sectors--demographic, employment, and water. The study emphasized the water sector with the objective of developing a model that could be used for river-basin planning of water quality and quantity. The model assumed that export industry employment is an important driving force in the regional economy. The demographic and employment sectors were very useful guides to formulation of the model in this study. The basic demographic equations were taken out of the Hamilton model, but the variables contained in the individual equations are quite different in some cases.

Model Description

The model is designed to supply decision makers with the likely effect of various types of public investment policies on regional income and/or employment. This includes investments such as those supporting migration, job creation, training, education, welfare, birth control, public works, and other investments in infrastructure. The flow chart in Figure 2 gives the general structure of the model.

This flow chart highlights the many linkages that must be dealt with quantitatively in the model. A simulation model cannot include equations for every possible linkage, and hard choices must be made. Table I lists in implicit functional form the basic relationships which are modeled.

Most variables in the model are economic and demographic elements that are easily recognized. Three special variables which need to be discussed are SKLVL, REGATRC, and UNDEMP. SKLVL, the regional skill index, is the average of an overall educational level index and of an overall training level index. The overall educational level index is a

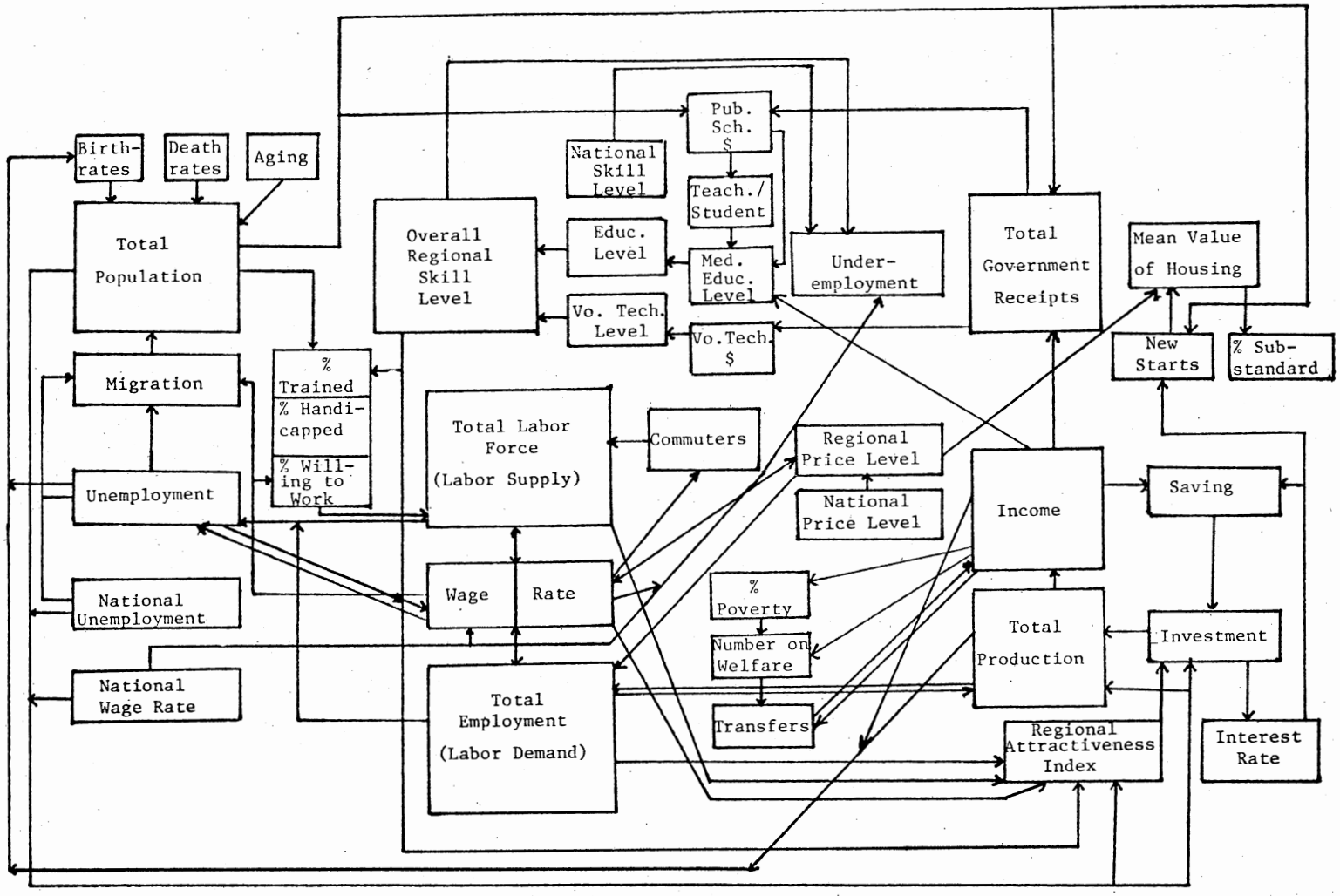


Figure 2. Flow Chart

TABLE I

SOME IMPORTANT RELATIONSHIPS IN THE REGIONAL SIMULATION MODEL*

Demographic Sector
- Total population = Sum of all age groups
- Population of each age group = f (Birthrate, Migrations, Aging, Deaths)
  - Birthrates = f (Unemployment, Income, Family planning funds)
  - Migrations = f (Unemployment, Wage rate, Migration encouragement funds)
  - Deaths = f (Trend)

Labor Force (Labor Supply)
- Total labor force = Sum of labor force in each age group + Commuters
- Labor force of each age group = f (Percent handicapped, percent trained, percent willing to work)
- Skill levels
  - Overall regional skill level = Average of education and training indices
  - Overall education index = Weighted average of age group education indices
  - Overall training index = Weighted average of age group training indices
  - Education index for each age group = f (Median education level)
  - Training index for each age group = f (Vocational training levels)
  - Age group skill level = Average of education and training indices for that age group
  - Overall national skill level = Exogenous
  - Percent labor = f (Income, Education, Percent manufacturing employment)
  - Percent management = f (Percent labor, Percent professional)
  - Percent professional = f (Income, Education)

Employment (Labor Demand)
- Total employment = Sum of employment in all the sectors
- Government sector employment = f (Government production change, Wage rate, Military employment)
- Agriculture sector employment = f (Agricultural prices change, Wage rate)
- Service sector employment = f (Per capita income change, Population)
- Manufacturing sector employment = f (Wage rate)
- Trade sector employment = f (Wage rate, Trade production change)
- Mining sector employment = f (Mining production change, Oil and gas reserves)

Unemployment = ((Total labor force)-(Total employment))/((Total labor force)-(Commuters))

TABLE I (Continued)

National Unemployment = Exogenous

National Wage Rate = Exogenous

Regional Wage Rate = f (Unemployment change, Exogenous factor)

Underemployment = f (Regional skill level, National skill level, Regional wage rate, National wage rate)

Regional Attractiveness Index = Average of skill, wage rate, labor density, other costs, and pollution ratios
- Skill level ratio = (Regional skill level/National skill level)
- Wage rate ratio = (National wage rate/Regional wage rate)
- Labor density ratio = (Regional labor density/National labor density)
- Other costs ratio = (National other costs index/Regional other costs index)
- Pollution ratio = Average of (National population density/Regional population density) and (National percent manufacturing employment/Regional percent manufacturing employment)

Production and Income
- Total investment = Internal investment + External investment + Government investment - Depreciation
- Internal investment = Business investment (Income change, profit rate) + Private investment (Income change, Savings rate)
- External investment = f (Attractiveness index, Interest rate)
- Government investment = Endogenous (Population, Unemployment, Regional taxes) + Exogenous (Attractiveness index, Injection funds)
- Depreciation = f (Total investment change)
- Total production = Sum of production in sectors
- Government sector production = f (Population, Government investment, Government employment)
- Agriculture sector production = f (Agriculture employment, Agricultural price index change, Weather)
- Service sector production = f (Manufacturing employment, Internal investment)
- Manufacturing sector production = f (Manufacturing employment, Internal investment)
- Trade sector production = f (Population, Income change)
- Mining sector production = f (Oil price, Reserves)
- Total income = Production + Positive transfers
- Per capita income = (Total income/Population)
- Per capita disposable income = Per capita income - Personal taxes
- Positive transfers = f (Social security payments, Percent over 65, Farm payments)
- Percent poverty = f (Unemployment, Per capita income)

TABLE I (Continued)

Number on welfare = f (Percent poverty, Percent over 65, Unemployment, Welfare payments change)
Consumption = f (Per capita disposable income, Savings rate)

Regional Price Index = f (Wage rate change, Exogenous factor)

National Price Index = Exogenous

Training and Education
Public school expenditures = f (Number of students, Teacher/Student ratio, Public school plant maintenance level, Surplus or deficit previous period, Public school policy variable funds)
Regional public school costs = Expenditures - Federal and state support
School budget equation (for surplus or deficit) = School tax receipts - Regional costs + General education policy funds
Federal and state support = f (Number of students)
Teacher/Student ratio = f (Regional school revenue, Education funds (Policy variable))
Median years education = f (Income change, Teacher/Student ratio, General education funds)
Regional school revenue = School tax receipts + Federal and state support
Vocational training = f (Training expenditures above maintenance)

Housing
Total assessed value of housing = f (Market value)
Market value of housing = f (Depreciation, New starts, Regional price level)
Mean value of housing units = (Market value/Units)
Housing density = (Units/Area)
Percent substandard housing = f (Mean value)
New starts = f (Income change, Population, Interest rate)
Total number of units = f (New starts, Number out of use)

Taxes
Total regional government receipts = Sales tax receipts + School tax receipts + Other property tax receipts + Miscellaneous receipts + Federal and State funds
Sales tax receipts = f (Trade sector production change, Population, Average sales tax rate)
School tax receipts = f (Assessed value of school tax property, Rate)
Other property tax receipts = f (Assessed values, Rates)
Miscellaneous receipts = f (Income change, Population, Trend)
Federal and State funds = f (Population, Percent poverty)
Personal taxes = f (Total taxes, Income tax rate)

TABLE I (Continued)

Total regional government expenditures = f (Service sector production, Public school expenditures)

*This table does not contain all the equations in the model nor all variables in the equations. See Appendix B for complete model.

weighted average of educational levels for various age groups. The overall training level index is a weighted average of vocational training indices for the age groups. All the indices contained in the skill level index were derived by determining deviations from a national initial value of 1.0. Beginning values for the educational indices were established using regional and national median education levels, while the vocational training indices were established using per capita regional and national spending in training. REGATRC, the regional attractiveness index, measures the desirability of the region simulated for investment, especially from investors outside the region. As shown in Table I, REGATRC is an average of five indices measuring the various components influencing the attractiveness of the region to prospective firms or investors. These five indices use regional and national variables to get ratios showing relative skill levels, wage rates, labor density, pollution, and other costs. SKLVL and REGATRC are crucial components of the simulation model, as each was used in several equations. UNDEMP, underemployment, on the other hand is derived simply as an indicator of the level of underemployment in the model and does not affect any other part of the model. UNDEMP will be discussed later.

An important conceptual element that runs through the model is the ratio of regional variables to corresponding national variables. Many "relative" measures were applied throughout the model to represent the direction of movement of some factor across the regional boundary. Regional labor costs compared to national labor costs, for example, are judged to be an important consideration in a firm's evaluation of alternative sites for location of a labor intensive manufacturing

plant. This relative concept is a direct tie to neo-classical economic theory. In this country, labor and capital tend to move in directions predicted by neo-classical economic theory. Stimulants may be needed to make the economy respond to out-of-balance ratios.

In the conception and construction of a regional economic simulation model designed to study the effects of alternative strategies and to examine the growth potential of a region, an important factor to consider is the capacity of the region's public service facilities. It is crucial to know whether or not excess capacity exists, for example, in the public school structure. If the public school systems of a region are operating with excess capacity, the region can absorb population increases that come from certain development efforts with a low level of additional public costs for public schooling. This can also be true for other public services such as health service, fire service, and police protection. Excess capacity variables were included in several equations.

An adaptive process was used to partially control the behavior of certain important variables (such as unemployment, migration, etc.). The adaptive process was in effect during the simulation of each of the long-range development strategies. The decision maker can choose the most preferred long-range strategy, knowing what annual short-run expenditures will be required. The short-run adjustments are made by the adaptive or bounding process which is built into the model to keep the bounded variables within acceptable bounds. Each period, each of these variables is checked against its upper or lower limit. If a variable is above or below its limit, one or more policy variables are brought into effect to correct the problem over a period of time. More

details of this adaptive process are presented in the next chapter. The long-range plans allocated a fixed amount of total public funds in various combinations among four primary policy functions--industrialization, welfare, education, and training. Thirty long-range strategies were selected and simulated.

Ten policy variables were employed in the development of the long-range strategies and in the adaptive process. A few other policy variables are available in the model. The policy variables utilized in allocating public funds in the long-range development plans were industrialization (to create jobs), direct welfare payments, education spending, and vocational training programs. Additional policy variables were used in the adaptive process.

Several measures of success of the alternative strategies were calculated and are presented in the results. Besides total regional income, per capita income, and unemployment; net regional income (total regional income less total additional development funds spent) and net per capita income were also derived. Two other measures of success are given which can be even more helpful in evaluating the success of the strategies for the complete 15 years: the percent poverty accumulated shows how successful a particular strategy has been at alleviating poverty, and the ratio of accumulated discounted income to discounted public costs provides an indication of the efficiency (cost effectiveness) of the alternative development plans. A discount rate of six percent was used.

DYNAMO

The computer simulation package DYNAMO (16) was selected because

of the cost efficiency and convenience it affords for programming and running the model. DYNAMO is a compiler for translating and running continuous models (2) which was developed at M.I.T. for simulating dynamic feedback models of business, economic, and social systems. DYNAMO is problem-oriented so that the researcher can focus his attention on building a useful model rather than being distracted by his model's elegance. There are several specific advantages of DYNAMO:

1. easily understood model statements,
2. thorough error checking and easily understood error remarks,
3. simplified initial value requirements,
4. equations which can be placed in any order (DYNAMO will reorder the equations for computational purposes.),
5. output easily specified for tables and graphs,
6. easy-to-change constants for reruns (Many runs can be made at once by specifying multiple values of constants.).

The complete computer model as developed in this study using DYNAMO is displayed in Appendix B.

CHAPTER III

MODEL APPLICATION

Once relevant conceptual relationships have been outlined, the next step in formulation of a simulation model is to specify the coefficients (the magnitude and direction of the relationships) for the equations. Essential initial values, constants, and exogenous variables must be specified and decisions must be made concerning how policy variables are to be combined to generate solutions for alternative strategies. This chapter includes a discussion of data requirements for the model and how the required data were secured. Also included are sections on validation, the adaptive mechanism developed for the model, and the alternative allocations of public funds chosen as possible long-range development strategies for each of the three regions.

Data Requirements

The regional economic simulation model developed in this study has extensive data requirements. Numerous coefficients are necessary to quantify the relationships represented by the equations in the model. These coefficients were secured from a broad range of sources including studies by the author and by other researchers. Studies by Nelson (15), Edwards and Depass (4), Hamilton (12), and Haveman (13) were used to

obtain some of the coefficients, as well as establish ranges for others. These ranges were helpful in sensitivity analysis.

The variables and the equations which specified the relationships between the variables were selected based upon established theoretical relationships. The coefficients that quantified the relationships between the selected variables and the dependent variable in the equation were taken from regression analysis and related empirical work when possible, but were also obtained through consultation with knowledgeable persons working in economic development or persons living in the study area who could provide reasonable judgments of the direction and magnitude of some of the relationships modeled. Sensitivity analysis was used when a priori information could be obtained indicating at least the relevant range of the expected reaction of one variable or several variables to another variable. When the direction of the causal relationship was obvious but no documentation for the magnitude was available, the equation was included and the dependent variable in the equation and other variables influenced in the model were examined over time with alternative coefficient sizes. In some cases, past history of the regional variables would indicate how sensitive the regional economy was to certain shocks and give an indication of how it would react in the future.

Two studies by Smith and Tweeten (17) (18) provided necessary data. One of the studies used data collected by a survey of rural residents in the same three regions modeled by the present simulation model. The survey of attitudes indicates goals of each region, the socio-economic problems that residents perceive, and what type of development they would support for the region. More will be said

about the attitudes study in Chapter IV as the various strategies are discussed and associated with the attitudes or goals of the region. The results of the attitudes survey are given in Table XXVIII in Appendix C.

For some equations essential to the model, neither the coefficients from other studies nor the data to estimate the necessary coefficients were available. The equation coefficients which would be applied to the model in the cases of several of the common economic relationships would normally be taken from other studies done outside the regions and would be the same for each region modeled. Since the direction of influence (sign) is usually known and accepted, it seems to be appropriate to apply the same coefficient across all the regions while closely monitoring its possible impact on the model. Such a method was used for the coefficients of a few equations that were obviously necessary. The model can continually be improved as coefficients for these equations are improved.

In addition to the necessary coefficients which measure "change," an important data requirement for a continuous dynamic model as used in this study is the initial or beginning value for each differential equation in the model. The primary need for initial values is in the "level" equations (designated by an "L" in column one before the equation in Appendix B showing the computer model). The level equations, as they are referred to in the computer package DYNAMO (16), relate a quantity to the time rate of change for that quantity. The form of the level equation is:

current quantity = previous time period quantity + change

where the change is usually elapsed time (always one year in the model) times the rate of change. Every level equation in the model requires an initial or beginning value to build from (initial value equations have an "N" in column one before the equation). To be sure that various totals and accounts "add up" for the beginning time period of the model run, other equations for which all the quantities were current required beginning values. These latter equations are called auxiliary equations (designated by an "A" in the first column).

Two final types of input used in the simulation model are constants (a "C" in column one) and tables (a "T" in column one). The table equation is used to input values of exogenous variables and trends. (For further notes on the type of data needed for specific variables see the listing of the computer model in Appendix B.)

As discussed in the last chapter, county data were aggregated to the regional level (regions corresponding with economic development districts). County-level data are available only from a limited number of sources, but these sources were adequate for the economic and demographic data necessary for the initial values, constants, and tables discussed above.

Validation

Model validation was performed by starting the model with 1960 data and running it for 10 years to simulate values for 1970. The simulated 1970 values were then compared with the observed data for 1970 to determine how well the simulated and observed values of crucial variables compared. It was necessary to incorporate unusual shocks into the model at various times during the 10 years, 1960-1970, to

contribute the influence of unexpected, unpredicted changes exogenous to the simulation model. The validation experiments indicated that the model was quite accurate in simulating the movement of most of the socio-economic variables examined. Data for some of the variables were available for the years 1970 through 1976 and even for 1977 in a few cases. This post-1970 information was used to fine-tune the model (to increase its power to register responses to changes).

The validation process improved the accuracy of the model in additional ways, such as helping to establish ranges for some of the variables to be used in the sensitivity analysis experiments. The stability of the model, especially the demographic sector, was also enhanced somewhat during the validation steps.

Long-Range Development Strategies

Thirty different long-range development strategies are given in Table II. This table lists thirty different allocations of fixed expenditures to four policy variables--INDUST (industrialization), WLFPYMT (welfare), EDFNDS (education), and TRSPD (training). These strategies, selected to provide the decision maker with a broad range of long-range development alternatives for the three regional economies, include the extremes and several relevant combinations between these extremes. The next chapter shows results of several of these strategies for each region.

Adaptive Process

An adaptive process, designed to simulate the yearly adjustments that would be made by local governments or planning committees in

TABLE II

SIMULATION RUNS--ALTERNATIVE ALLOCATIONS OF LONG-RANGE DEVELOPMENT FUNDS*

Strategy Number	INDUST[a]	WLFPYMT[b]	EDFNDS[c]	TRSPD[d]
1	.500	.500	0	0
2	.400	.200	.200	.200
3	.250	.250	.250	.250
4	0	.750	.125	.125
5	1.000	0	0	0
6	.250	.750	0	0
7	.750	.250	0	0
8	.750	0	.125	.125
9	0	.500	.500	0
10	.500	0	.500	0
11	.500	0	0	.500
12	0	.500	0	.500
13	.500	.200	.100	.200
14	.500	.200	.200	.100
15	.900	.100	0	0
16	.900	0	.100	0
17	.900	0	0	.100
18	.250	.500	.250	0
19	.250	.500	0	.250
20	0	0	.500	.500
21	.100	.500	.200	.200
22	.500	.100	.200	.200
23	.700	.100	.100	.100
24	.700	.300	0	0
25	.750	0	.250	0
26	.750	0	0	.250
27	0	.400	.500	.100
28	.400	0	.500	.100
29	.200	.200	.100	.500
30	.400	.400	.100	.100

[a]Proportion of total long-range funds spent in industrialization.

[b]Proportion of total long-range funds spent in welfare.

[c]Proportion of total long-range funds spent in education.

[d]Proportion of total long-range funds spent in vocational training.

*The funds allocated by the proportions given in this table are over and above both (1) the funds already being spent for these functions and (2) the funds spent in the adaptive process.

response to certain crucial economic and demographic variables reaching some critical level, was in effect for all of the strategies simulated. These short-run annual adjustments require additional public funds above the costs of the long-range development plans.

Regional decision makers can search the various alternative allocations of development funds for the strategy that satisfies some objective such as maximization of income, maximization of an efficiency measure (such as cost-effectiveness), or minimization of percent in poverty. Built into the model is an adaptive process which attempts to keep certain key economic and demographic indicators within selected limits.

A fixed amount of public spending was allocated among four different primary policy variables in thirty different ways (Table II) to generate the thirty strategies. These long-range planning expenditures were separate from the funds spent in the adaptive process (the annual correction adjustments). Each period, each bounded variable is checked against its limit. If the variable is above or below its limit, one or more policy variables are brought into effect to correct at least part of the problem. The amount spent in this annual adjustment process is subtracted from income to get net regional income and net per capita income (two of the measures of success calculated).

More specifically, a fixed amount of public funds was allocated to be spent in thirty different ways among four primary policy variables each year over the fifteen-year period of the simulation runs. The four policy variables were industrialization, welfare, education, and vocational training. In addition to these various long-range plans, the model contained an adaptive or bounding process which was designed

to simulate the annual adjustments that would be made by decision makers in the region to keep certain other important variables within selected limits. These bounded variables were kept in their bounds by the automatic application of ten policy variables (six in addition to the four primary policy variables used in generating the thirty long-range strategies). This adaptive process is outlined in Table III.

The bounding of the selected variables can be illustrated with an example. UNEMP, percent unemployment, has an upper limit placed on it. If unemployment goes above the limit, funds to create enough jobs for 25 percent of the unemployed above the UNEMP limit will be allocated to INDUST, industrialization. Some of the bounded variables have limits set at different levels for different policy variables to come into effect, and in some cases two policy variables come into effect at a single limit.

In an economic development framework such as in this study, it can be useful to examine various strategies since the particular objective may very well be too narrow. If the economic development goals of a region were known with certainty, an objective function could be quantified and built into the model. Some knowledge of regional goals, such as was obtained through the attitudes survey mentioned earlier, can narrow down the number of strategies which need to be examined in this type of study.

To adapt the model to a particular group of decision makers, the decision makers could be allowed to specify the bounds used in the adaptive process. To go another step, the decision makers could also decide the magnitude of the annual adjustments (the desired level of intervention). To complete this application, the decision maker could

TABLE III

ADAPTIVE PROCESS

A. Upper or lower bounds are placed on the following variables:

UNEMP	= percent unemployment
PSBSTBH	= percent substandard housing
PRCPI	= per capita capital investment, 1,000's of dollars
MNEDL	= median school year attained, persons over 25
POP	= total regional population
SKLVL	= skill level index
PCWLF	= percent on welfare
TTLMGS	= total net migration
LABOR	= percent working force classified as labor
REGATRC	= regional attractiveness index
TCHSTD	= teacher/student ratio
SCHBDGT	= public school budget balance equation, revenues minus expenditures
GVTBDGT	= local government budget balance equation, revenues minus expenditures

B. If, during any year of the simulation period, one of the above variables exceeds its bounds, the problem will be at least partially corrected with one or more of the following policy variables:

INDUST	= industrialization, creation of jobs
WLFPYMT	= direct welfare payments
EDFNDS	= spending for educational programs
TRSPD	= spending for vocational training programs
MGENCG	= funds to encourage migration
LNSUB	= loan subsidy funds used to lower interest rate to prospective new home builders
EXGINJ	= government injection variable
FMLPL	= family planning funds, lower birth rates
GLEDUC	= general education funds, used to correct a deficit in public school spending, especially after large capital expenditures
TSFNDS	= education funds, primarily designed to increase the teacher/student ratio

The annual expenditure is taken from total regional income to derive net regional income and then net per capita income.

choose a measure(s) of success to compare outcomes of the various alternatives.

CHAPTER IV

RESULTS

Simulation can generate outcomes of a large number of possible development strategies. This chapter reports as many strategies as deemed feasible, given space and time limitations.

A total fixed expenditure per year was allocated in various ways among four different policy variables to generate relevant alternative long-range development plans and to determine how the alternative long-range strategies would affect the overall development of the region. After other total long-range expenditures were tried, it was decided that twenty-five dollars per person would be allocated to the four policy variables in the long-range development plans (over and above current expenditures in these policy functions). Three other per capita levels of total additional long-range funds were tried: forty, fifty, and a declining level over time from fifty to twenty-five dollars. The same strategies optimized the various measures of success in almost all cases regardless of the level of funding. Because public funds are limited, because the strategies acted much the same over the different levels of public spending, and because the spending at the twenty-five dollars per person level was the most efficient (increase in income per additional development funds spent), the twenty-five dollars per person level was chosen. There are restrictions as to how this total can be allocated among the four

variables as well as limits on how much can be spent on other policy variables in the model. Determining what was actually spent requires examination of the actual policy variable since the adaptive process also allocates funds to these four variables (as well as six others). The amount spent in the correction of bounded variables is restricted by the limit set on each of the policy variables. The amount actually spent on each policy variable was, for some of the strategies, consistently less than what was allocated to it by the correction process in the bounding procedure. In the tables later in this chapter, four variables are listed which show the amount of additional funds allocated and the amount actually spent. The total amount allocated to a policy variable is the total portion of the fixed long-range funds designated for that policy variable and the short-run funds allocated to that policy variable in the adaptive process. The long-range funds are a per capita amount, while the short-run funds depend upon the amount by which a bounded variable exceeds its limit. There is an upper limit on how much can be spent in each of the 10 policy functions, and the limits come into effect quite often, especially for the four primary policy variables. PFA denotes the total public funds allocated in a particular year in a region (long-range spending and annual adjustments). PFS is total funds actually spent, LRPFA is total annual funds committed to the long-range development of the region, and TOBND is the total amount allocated by the bounding process in the model. If all the policy variables are funded to their maximum, about fifteen to twenty million dollars in addition to the 1968-70 levels will be spent (depending on total population). There was a significant amount of variation among strategies as to how much was allocated to

the adaptive process in the model, although the upper limits on the policy variables came into effect to allow somewhat less variation in the amount actually spent.

The most successful strategies were those which allocated a large portion of the long-range development funds to industrialization for creating jobs. In almost all cases, an industrialization strategy had the most favorable value for the various measures of success. Strategies weighted toward industrialization were the most successful in increasing net regional income (NREGY) and net per capita income (NPI). Using NREGY or NPI as criterion, the top five strategies in each region allocated at least 75 percent of the long-range funds to industrialization. When NREGY and NPI are used as criterion to select the best strategy, they yield very similar results. In the discussion of the results, only NREGY will be mentioned in most cases. NPI will be used only when some special movement in NPI warrants its discussion. In a few extreme cases, such as when large levels of migration are involved, NREGY and NPI will move somewhat differently.

The strategy which did the least to increase NREGY was strategy 9 (50 percent welfare and 50 percent education). Two other similar strategies were almost as unsuccessful in increasing incomes: strategy 4 (75 percent welfare, 12.5 percent education, and 12.5 percent training) and strategy 27 (40 percent welfare, 50 percent education, and 10 percent training).

The strategies emphasizing industrialization were also most effective in minimizing poverty. The 100 percent industrialization strategy yielded the lowest accumulated level of percent in poverty (POVACML, another measure of success) for the 15 years, while other

high industrialization allocations mixed with some welfare funds were also quite effective in keeping percent in poverty at a low level. The welfare allocations resulted in significant reductions in percent in poverty only in the first few years. Any substantial amount of funds spent in training and especially in education were ineffective as poverty reducing measures. This is highlighted by the fact that the strategy most ineffective in poverty reduction was strategy 20 (50 percent education and 50 percent training).

Strategy 10 (50 percent industrialization and 50 percent education) was the most efficient strategy in increasing income (maximum value of DSYDSPF--ratio of discounted accumulated income to discounted accumulated public costs). Another strategy which yielded a consistently high level of DSYDSPF was strategy 11 (50 percent industrialization and 50 percent training). If the efficiency of income-increasing efforts is an important component of the regional decision makers' objective function, then a mixture of 50 percent industrialization and 50 percent education and/or training appears to be an appropriate use of development funds.

Because of the desire to compare strategies across regions, the same strategies are presented for each of the three regions. Strategies 5, 10, 15, and 17 will be discussed as examples of long-range plans that are "successful" according to the different measures of success. Several other outstanding strategies for each region are given in Appendix D. Along with the discussion of the successful strategies, two unsuccessful strategies will be discussed (strategies 9 and 20) and several other unsuccessful strategies will be mentioned. For each region, a base run is presented with policy variables set at

the approximate level at which they were funded during the late 1960's (just prior to the beginning of the simulation time period). Table IV is a list of the variables and their definitions which appear in the tabular results. Other important variables not defined in Table II or Table IV are defined in Table XXVII in Appendix A.

Policy makers for each region could examine the results with distinct regional goals in mind and therefore different objectives or sets of objectives (which may or may not correspond with any of the success measures calculated for each run). With an objective in mind, the policy maker can search the strategies for an optimal solution. Several different objectives will be stressed as the results are discussed in the remainder of this chapter. Any one single objective (as measured by the four measures of success) is probably too narrow to be used exclusively. Policy makers will also likely be interested in the paths over time and final values of several other crucial socio-economic indicators as presented in Tables V-XXV.

The results discussed are in real dollars. The necessary equations are in the model to incorporate fully the effect of inflation on the development of the economy if so desired.

SODA Results

Strategies presented and discussed for the SODA (Southern Oklahoma Development Association) region include 5, 15, 17, 9, 20, and 10 (see Table III for a listing of strategies). SODA is a predominantly rural 10-county region in South-Central Oklahoma with no large cities. Ardmore (21,000) and Ada (15,000) are the two largest cities. Only 4 of the 10 counties had more than 20,000 population in 1970. The

TABLE IV

DEFINITIONS OF VARIABLES GIVEN IN RESULTS--TABLES V-XXV

Variable	Definition
REGY	= Total regional income
NREGY	= Net regional income
PI	= Per capita income
NPI	= Net per capita income
POVACML	= Percent poverty accumulated
DSYDSPF	= Ratio of discounted accumulated income to discounted accumulated public costs
UNEMP	= Percent unemployment
UNDMPCG	= Percent change in underemployment
POP	= Total population
TTLMGS	= Net migrations
COMMTR	= Number of commuters in labor force
PFS	= Additional public funds spent for development
PFA	= Additional public funds allocated for development
LRPFA	= Total long-range public funds allocated
TOBND	= Total public funds allocated in the bounding process
TLF	= Total labor force
TEMPL	= Total employment
AVWG	= Average wage rate
SKLVL	= Skill level index
REGATRC	= Regional attractiveness index
PLINDX	= Pollution index
MNEDL	= Median school years completed, persons over 25

region has been characterized by low income, low educational level, and relatively high unemployment.

Table V lists some results of a low intervention strategy to be used as a base of comparison with other strategies. The policy variables were funded at a level which depended on the level of funding in these policy functions in the last few years before the start of the simulation runs (1970). The results of the base run indicate that, with no additional development efforts, the economic conditions and trends in SODA would remain about the same for five or six years. After five or six years, without new commitments to long-range and annual development plans, the socio-economic conditions in SODA began to lose ground. An examination of the key socio-economic indicators in year 15 shows the base strategy as having lower total regional income (REGY), per capita income (PI), total population (POP), skill level index (SKLVL), regional attractiveness index (REGATRC), and median education level (MNEDL) than any of the strategies in which additional development funds were spent. REGY and PI for the base run were compared with net regional income (NREGY) and net per capita income (NPI) for the development strategies. The percent poverty accumulated (POVACML) in the base run was higher than in most of the other strategies, but in a few cases more people were classified as being in poverty in strategies in which development efforts were undertaken than in the low intervention base run. Total net migration (TTLMGS) was negative throughout the base run, while all the other strategies showed positive net migration, some as early as the second year (100 percent industrialization) and at least by the eleventh year (50 percent welfare and 50 percent education). Finally, unemployment (UNEMP)

TABLE V

BASE RUN--SODA[a]

Year	REGY[b]	PI	POVACML	UNEMP	UNDMPCG	POP[c]	TTLMGS	AVWG	SKLVL	REGATRC	PLINDX	MNEDL
0	350.4	2136	.26	.055	-.108	164.00	-235	2.08	.859	1.065	1.801	10.10
1	361.1	2204	.59	.058	.018	163.85	-268	2.11	.859	1.076	1.808	10.14
2	375.3	2293	.92	.061	-.100	163.70	-300	2.21	.758	1.039	1.816	10.20
3	384.4	2351	1.25	.051	-.002	163.56	-331	2.27	.755	1.035	1.823	10.28
4	385.2	2357	1.57	.054	-.043	163.45	-357	2.40	.758	1.025	1.830	10.33
5	394.0	2412	1.89	.062	-.031	163.38	-381	2.51	.760	1.006	1.837	10.34
6	397.4	2434	2.21	.070	-.029	163.27	-406	2.63	.760	.995	1.839	10.38
7	393.5	2412	2.53	.079	-.028	163.14	-431	2.75	.763	.981	1.841	10.40
8	389.5	2390	2.85	.087	-.028	162.96	-458	2.88	.765	.974	1.843	10.38
9	385.4	2369	3.17	.096	-.032	163.70	-486	3.02	.765	.956	1.846	10.36
10	381.7	2351	3.49	.107	-.030	162.37	-515	3.16	.764	.947	1.850	10.34
11	377.9	2333	3.82	.117	-.030	161.95	-543	3.31	.764	.938	1.853	10.33
12	374.2	2318	4.15	.127	-.029	161.46	-572	3.46	.764	.926	1.857	10.31
13	370.6	2304	4.48	.137	-.031	160.88	-601	3.62	.763	.914	1.861	10.30
14	367.0	2291	4.81	.147	-.031	160.21	-630	3.80	.763	.903	1.866	10.29
15	363.2	2278	5.15	.157	-.031	159.47	-659	3.98	.764	.893	1.872	10.27

[a]No additional long-range development funds were allocated to the policy variables. Policy variables funded at a level depending on the amount spent in each policy function during the last part of the 1960's.

[b]Millions of dollars.

[c]Thousands.

reached a high level by the fifteenth year. The results of the base run indicate that after about seven or eight years an extreme unemployment problem would begin to appear and grow gradually worse if additional development efforts were not initiated.

Six different long-range development strategies for SODA will be discussed in the rest of this section. The discussion of strategies 5, 15, 17, 9, 20, and 10 will be organized around the four measures of success calculated (NREGY, NPI, POVACML, and DSYDSPF). The discussion of the results for NODA and EODD will be organized in the same manner so that less explanation will be necessary for the other two regions.

The high industrialization strategies 5, 15, and 17 (see Tables VI, VII, and VIII respectively) yielded the highest values for net regional income (NREGY) and net per capita income (NPI), and the lowest values for percent poverty accumulated (POVACML). These three strategies had similar values for the three measures of success given above, but in each case strategy 5 (100 percent industrialization) showed slightly better results. Strategy 5 also had the lowest level of unemployment (UNEMP) for all the strategies for each year of the simulation. Of the three industrialization strategies, strategy 5 also had the highest regional attractiveness index (REGATRC) and the largest increase in population (POP). The results of strategy 15 (90 percent industrialization and 10 percent welfare) were much the same as the results of strategy 5 with only a few noticeable differences caused by the 10 percent shift of funds from industrialization to welfare. This shift of funds had the most impact on unemployment. Unemployment in strategy 5 was consistently lower throughout the simulation run than for strategy 15. Strategy 17 (90 percent industrialization and 10

TABLE VI

STRATEGY 5--SODA*

Year	REGY[a]	NREGY[a]	PI	NPI	POVACML	DSYDSPF	UNEMP	UNDMPCG	POP[b]	TTLMGS	COMMTR
0	350.9	346.0	2139	2110	.26	71.7	.055	-.108	164.00	-235	5347
1	362.3	356.9	2211	2178	.59	69.0	.053	.018	163.85	-104	5167
2	377.8	372.6	2306	2274	.92	69.9	.051	-.086	163.86	32	5021
3	388.6	383.2	2368	2335	1.25	70.5	.038	.004	164.07	177	4951
4	391.5	385.8	2380	2345	1.57	70.1	.035	-.024	164.51	330	4823
5	402.4	396.6	2436	2401	1.88	70.0	.035	-.006	165.18	425	4749
6	409.2	403.4	2465	2431	2.20	70.2	.035	-.007	165.98	506	4650
7	409.4	403.5	2453	2418	2.51	70.2	.036	-.003	166.90	588	4545
8	409.6	403.7	2439	2404	2.82	70.2	.035	-.004	167.91	669	4436
9	410.3	404.4	2428	2393	3.14	70.2	.036	-.007	168.99	734	4324
10	411.5	405.6	2418	2384	3.45	70.2	.037	-.006	170.14	759	4214
11	412.9	406.8	2411	2375	3.76	70.0	.039	-.005	171.30	783	4103
12	414.9	408.4	2406	2368	4.08	69.7	.039	-.004	172.48	807	3989
13	417.4	410.7	2404	2365	4.39	69.2	.040	-.005	173.67	831	3876
14	420.3	413.3	2403	2363	4.71	68.7	.041	-.006	174.88	855	3764
15	423.5	416.3	2405	2364	5.02	68.3	.041	-.006	176.10	880	3655

*Strategy number 5 for SODA--100% industrialization.

TABLE VI (Continued)

Year	PFS[c]	PFA[c]	LRPFA[c]	TOBND[c]	TLF[b]	TEMPL[b]	AVWG	SKLVL	REGATRC	PLINDX	MNEDL
0	4893	4100	4100	0	89.98	85.31	2.08	.859	1.065	1.801	10.10
1	5459	4663	4100	563	90.15	85.62	2.11	.859	1.076	1.802	10.16
2	5256	4459	4096	362	90.35	85.99	2.20	.775	1.043	1.802	10.34
3	5375	4575	4096	478	89.57	86.33	2.25	.774	1.040	1.802	10.50
4	5713	4911	4102	809	89.82	86.84	2.35	.778	1.035	1.800	10.63
5	5769	4971	4113	858	90.29	87.30	2.43	.786	1.022	1.796	10.71
6	5756	4972	4130	843	90.87	87.87	2.50	.789	1.018	1.787	10.83
7	5805	5010	4150	861	91.58	88.46	2.57	.795	1.011	1.777	10.93
8	5868	5057	4172	884	92.18	89.08	2.64	.800	1.011	1.767	10.99
9	5849	5035	4198	837	92.88	89.73	2.72	.803	1.000	1.756	11.04
10	5841	5025	4225	800	93.76	90.43	2.79	.806	.998	1.746	11.10
11	6109	5290	4253	1037	94.65	91.17	2.86	.810	.996	1.734	11.17
12	6472	5651	4282	1369	95.55	91.95	2.94	.813	.991	1.723	11.24
13	6776	5953	4312	1641	96.47	92.77	3.01	.818	.986	1.712	11.33
14	7007	6182	4342	1840	97.41	93.61	3.09	.823	.982	1.700	11.43
15	7173	6345	4372	1973	98.37	94.49	3.17	.828	.978	1.689	11.53

[a]Millions of dollars.

[b]Thousands.

[c]Thousands of dollars.

TABLE VII

STRATEGY 15--SODA*

Year	REGY[a]	NREGY[a]	PI	NPI	POVACML	DSYDSPF	UNEMP	UNDMPCG	POP[b]	TTLMGS	COMMTR
0	351.3	346.4	2142	2112	.26	71.8	.055	-.108	164.00	-235	5347
1	362.7	357.2	2213	2180	.59	69.0	.054	.018	163.85	-121	5167
2	378.1	372.8	2308	2276	.92	70.0	.052	-.086	163.85	-1	5021
3	388.7	383.3	2370	2337	1.25	70.5	.040	.003	164.02	126	4951
4	391.4	385.7	2381	2346	1.57	70.2	.037	-.026	164.40	261	4826
5	402.0	396.3	2437	2402	1.88	70.1	.038	-.008	165.01	381	4757
6	408.6	402.9	2465	2430	2.20	70.2	.038	-.007	165.75	452	4663
7	408.3	402.5	2451	2416	2.51	70.2	.040	-.004	166.60	524	4561
8	408.3	402.5	2437	2402	2.83	70.2	.040	-.005	167.53	595	4453
9	408.8	402.9	2426	2391	3.14	70.2	.041	-.008	168.52	666	4345
10	409.7	403.9	2416	2382	3.45	70.2	.043	-.007	169.57	728	4239
11	410.9	404.9	2407	2372	3.77	70.0	.045	-.006	170.68	749	4132
12	412.5	406.1	2401	2364	4.08	69.7	.046	-.005	171.79	770	4022
13	414.7	408.0	2398	2359	4.40	69.3	.048	-.007	172.92	790	3914
14	417.2	410.2	2397	2357	4.72	68.8	.049	-.007	174.05	810	3808
15	419.9	412.8	2397	2356	5.03	68.3	.050	-.007	175.20	830	3704

*Strategy number 15 for SODA--90% industrialization and 10% welfare.

TABLE VII (Continued)

Year	PFS[c]	PFA[c]	LRPFA[c]	TOBND[c]	TLF[b]	TEMPL[b]	AVWG	SKLVL	REGATRC	PLINDX	MNEDL
0	4893	4100	4100	0	89.98	85.31	2.08	.859	1.065	1.801	10.10
1	5459	4663	4100	563	90.15	85.58	2.11	.859	1.076	1.803	10.16
2	5252	4455	4096	358	90.34	85.90	2.20	.775	1.043	1.804	10.34
3	5374	4574	4096	478	89.53	86.18	2.25	.774	1.040	1.804	10.51
4	5711	4909	4101	808	89.76	86.60	2.36	.778	1.034	1.803	10.63
5	5765	4968	4110	858	90.20	86.97	2.44	.786	1.021	1.800	10.71
6	5750	4968	4125	842	90.78	87.47	2.50	.789	1.016	1.791	10.83
7	5798	5005	4144	861	91.47	87.99	2.58	.795	1.009	1.782	10.93
8	5861	5050	4165	885	92.04	88.53	2.66	.800	1.010	1.773	10.98
9	5840	5026	4188	838	92.72	89.11	2.73	.803	.998	1.764	11.04
10	5834	5017	4213	804	93.57	89.72	2.81	.806	.996	1.754	11.10
11	6030	5211	4239	972	94.44	90.38	2.88	.810	.994	1.743	11.16
12	6385	5564	4267	1297	95.32	91.08	2.96	.813	.988	1.732	11.24
13	6697	5874	4295	1579	96.20	91.80	3.04	.817	.983	1.722	11.32
14	6938	6112	4323	1789	97.12	92.55	3.12	.822	.978	1.711	11.42
15	7109	6281	4351	1930	98.05	93.32	3.21	.828	.974	1.701	11.53

[a]Millions of dollars.

[b]Thousands.

[c]Thousands of dollars.

TABLE VIII

STRATEGY 17--SODA*

Year	REGY[a]	NREGY[a]	PI	NPI	POVACML	DSYDSPF	UNEMP	UNDMPCG	POP[b]	TTLMGS	COMMTR
0	350.6	346.0	2139	2110	.26	71.7	.055	-.108	164.00	-235	5347
1	350.9	356.8	2211	2177	.59	69.0	.054	.018	163.85	-121	5167
2	377.6	372.4	2305	2273	.92	69.9	.052	-.052	163.84	-1	5021
3	388.2	383.0	2367	2335	1.25	70.8	.048	-.013	164.02	126	4951
4	392.1	386.5	2385	2351	1.57	70.6	.047	-.022	164.40	260	4856
5	400.9	395.2	2430	2396	1.89	70.6	.046	-.011	164.97	378	4774
6	407.9	402.2	2462	2428	2.20	70.7	.045	-.010	165.68	449	4678
7	407.8	402.1	2449	2415	2.52	70.8	.046	-.007	166.49	519	4576
8	407.8	402.0	2436	2402	2.83	70.8	.046	-.007	167.40	589	4471
9	408.2	402.4	2424	2390	3.15	70.8	.046	-.010	168.36	659	4364
10	409.1	403.3	2415	2381	3.46	70.8	.048	-.008	169.39	723	4258
11	410.2	404.3	2406	2372	3.78	70.7	.049	-.007	170.48	744	4152
12	411.8	405.5	2400	2364	4.09	70.4	.050	-.007	171.57	764	4044
13	413.9	407.3	2397	2359	4.41	69.9	.051	-.008	172.67	784	3937
14	416.3	409.5	2396	2356	4.73	69.5	.052	-.008	173.79	804	3832
15	419.0	412.0	2396	2355	5.04	69.0	.053	-.008	174.91	824	3730

*Strategy number 17 for SODA--90% industrialization and 10% training.

TABLE VIII (Continued)

Year	PFS[c]	PFA[c]	LRPFA[c]	TOBND[c]	TLF[b]	TEMPL[b]	AVWG	SKLVL	REGATRC	PLINDX	MNEDL
0	4893	4100	4100	0	89.98	85.31	2.08	.859	1.065	1.801	10.10
1	5459	4663	4100	563	90.15	85.58	2.11	.859	1.076	1.803	10.16
2	5256	4459	4096	362	90.34	85.90	2.20	.827	1.053	1.804	10.33
3	5271	4471	4096	375	90.26	86.17	2.28	.826	1.046	1.804	10.50
4	5607	4804	4100	704	90.56	86.55	2.37	.827	1.043	1.803	10.63
5	5675	4870	4110	760	90.90	86.95	2.44	.829	1.028	1.800	10.71
6	5688	4881	4124	757	91.37	87.44	2.52	.828	1.023	1.792	10.83
7	5733	4924	4142	781	91.97	87.96	2.59	.830	1.015	1.783	10.92
8	5787	4976	4162	813	92.53	88.50	2.66	.833	1.015	1.774	10.98
9	5773	4959	4185	774	93.14	89.07	2.74	.833	1.003	1.765	11.04
10	5771	4955	4209	746	93.94	89.68	2.82	.834	1.001	1.755	11.10
11	5924	5106	4235	871	94.78	90.33	2.89	.836	.998	1.744	11.16
12	6282	5461	4262	1199	95.62	91.02	2.97	.838	.992	1.734	11.24
13	6605	5781	4289	1492	96.48	91.73	3.05	.841	.986	1.723	11.32
14	6856	6030	4317	1713	97.37	92.47	3.13	.845	.981	1.713	11.42
15	7035	6207	4345	1863	98.28	93.23	3.22	.850	.977	1.703	11.53

[a]Millions of dollars.

[b]Thousands.

[c]Thousands of dollars.

percent training) yielded much the same results as 5 and 15 except that underemployment decreased by more and the skill level (SKLVL) and the efficiency ratio (DSYDSPF) were slightly higher. These three strategies with heavy industrialization spending resulted in the most favorable levels of NREGY, NPI, and POVACML; and the results were quite similar with only a few differences--differences which would be expected from the slightly different allocations of development funds. Another similar allocation, strategy 16 (90 percent industrialization and 10 percent education), increased income slightly less than the three already mentioned and did not produce any results which warranted its inclusion in the tables in the text. The other strategies which had a strong impact on income were 7 (75 percent industrialization and 25 percent welfare) and 26 (75 percent industrialization and 25 percent training). Also, strategies 7 (75 percent industrialization and 25 percent welfare) and 24 (70 percent industrialization and 30 percent welfare) had almost as strong an impact on poverty as 5, 15, and 17 already discussed.

The results of strategy 9 (50 percent welfare and 50 percent education) are given in Table IX. In each of the three regions, strategy 9 was the least successful income-increasing development plan. Under strategy 9 in SODA, net regional income (NREGY) was only 7 percent higher in year 15 than at the beginning of the simulation time period. NREGY in year 15 for strategy 9 was about 12 percent less than in year 15 for the income maximizing strategy 5. This development plan was also not as successful in reducing poverty nor keeping unemployment at a reasonable level (unemployment reached 10 percent in year nine) as the high industrialization strategies. The strategy 9 allocation

TABLE IX

STRATEGY 9--SODA*

Year	REGY[a]	NREGY[a]	PI	NPI	POVACML	DSYDSPF	UNEMP	UNDMPCG	POP[b]	TTLMGS	COMMTR
0	352.9	349.2	2152	2129	.26	94.3	.055	-.108	164.00	-235	5347
1	363.8	359.8	2220	2196	.59	92.2	.058	.018	163.85	-268	5167
2	378.1	374.0	2309	2285	.92	92.8	.061	-.084	163.70	-300	5021
3	387.3	383.1	2368	2342	1.25	92.7	.055	-.006	163.57	-331	4958
4	388.5	384.0	2377	2349	1.57	91.4	.059	-.038	163.46	-358	4858
5	396.6	392.1	2428	2400	1.89	90.7	.068	-.026	163.37	-383	4826
6	400.3	395.8	2452	2424	2.21	90.5	.078	-.028	163.24	-408	4785
7	396.4	391.9	2431	2403	2.53	90.2	.089	-.025	163.08	-435	4748
8	392.3	385.8	2408	2369	2.85	86.5	.098	-.027	162.86	-463	4716
9	388.6	379.6	2390	2335	3.17	80.3	.106	-.031	162.56	-410	4694
10	385.8	376.9	2378	2323	3.49	76.0	.113	-.029	162.24	-272	4684
11	383.4	374.5	2366	2312	3.82	72.7	.120	-.026	162.02	-134	4682
12	381.5	372.7	2356	2302	4.15	70.2	.125	-.022	161.90	4	4683
13	380.2	371.4	2349	2294	4.48	68.1	.129	-.020	161.89	142	4687
14	379.6	370.7	2343	2289	4.81	66.5	.133	-.018	161.98	261	4697
15	379.4	370.6	2340	2285	5.14	65.1	.136	-.017	162.17	318	4711

*Strategy number 9 for SODA--50% welfare and 50% education.

TABLE IX (Continued)

Year	PFS[c]	PFA[c]	LRPFA[c]	TOBND[c]	TLF[b]	TEMPL[b]	AVWG	SKLVL	REGATRC	PLINDX	MNEDL
0	3741	4100	4100	0	89.98	85.31	2.08	.859	1.065	1.801	10.10
1	4034	4663	4100	563	90.15	85.21	2.11	.859	1.076	1.808	10.30
2	4027	4386	4096	290	90.25	85.08	2.21	.784	1.044	1.816	10.57
3	4194	4552	4093	460	89.38	84.77	2.28	.788	1.040	1.823	10.86
4	4509	4866	4089	777	89.48	84.47	2.41	.799	1.032	1.830	11.12
5	4545	4902	4086	815	89.75	83.97	2.52	.814	1.015	1.837	11.34
6	4512	4873	4084	789	90.09	83.47	2.65	.825	1.006	1.839	11.59
7	4520	4875	4081	794	90.51	82.92	2.77	.838	.993	1.842	11.82
8	6450	6805	4077	2728	90.78	82.33	2.90	.850	.989	1.844	12.00
9	8941	10773	4072	6701	91.09	81.91	3.04	.860	.972	1.845	12.18
10	8893	14794	4064	10730	91.58	81.74	3.19	.870	.964	1.842	12.37
11	8852	18387	4056	14331	92.13	81.67	3.33	.879	.957	1.838	12.56
12	8843	21739	4051	17689	92.72	81.73	3.47	.890	.948	1.834	12.75
13	8834	24573	4048	20526	93.35	81.90	3.61	.900	.940	1.829	12.95
14	8831	26984	4047	22937	94.05	82.18	3.74	.911	.933	1.823	13.14
15	8832	29048	4050	24998	94.79	82.56	3.88	.922	.928	1.818	13.34

[a]Millions of dollars.

[b]Thousands.

[c]Thousands of dollars.

caused a long-run decrease in population to the lowest level of any of the 30 strategies. Population decreased slightly (about 1.5 percent in total) over the first 10 years and then started leveling off. A few indicators such as the skill level index (SKLVL) and the median education level (MNEDL) did show improvement--the type of improvements which could be expected from such a combination of public spending. Strategies 27 (40 percent welfare, 50 percent education, and 10 percent training) and 4 (75 percent welfare, 12.5 percent education, and 12.5 percent training) were also ineffective in increasing regional incomes.

Table X gives the results of strategy 20 (50 percent education and 50 percent training). This education and training allocation had the highest level of percent poverty accumulated (POVACML) of any of the combinations tried. Most policy makers probably would not expect such an allocation to alleviate poverty. This strategy was associated with only a small increase in income over the first few years and a marked rise in unemployment. Such an unusual concentration of development funds in education and training may cause a region to appear more attractive to industry. This strategy yielded relatively high values for the skill level index (SKLVL), the regional attractiveness index (REGATRC), and the median education level (MNEDL). The net inmigration figure was relatively high for a strategy with such a high unemployment rate. Other combinations of public funds which were unsuccessful in alleviating poverty were strategies 27 (40 percent welfare, 50 percent education, and 10 percent training), 21 (10 percent industrialization, 50 percent welfare, 20 percent education, and 20 percent training), and 12 (50 percent welfare and 50 percent training).

TABLE X

STRATEGY 20--SODA*

Year	REGY[a]	NREGY[a]	PI	NPI	POVACML	DSYDSPF	UNEMP	UNDMPCG	POP[b]	TTLMGS	COMMTR
0	350.9	348.2	2139	2124	.26	134.1	.055	-.108	164.00	-235	5347
1	361.6	358.7	2207	2189	.59	129.1	.058	.018	163.85	-268	5167
2	375.8	372.9	2296	2278	.92	129.2	.061	-.015	163.70	-300	5021
3	385.1	382.1	2354	2336	1.25	129.6	.071	-.025	163.55	-331	4958
4	388.4	385.1	2376	2356	1.57	127.5	.081	-.023	163.43	-360	4916
5	393.5	390.1	2410	2389	1.89	125.2	.089	-.026	163.28	-388	4870
6	397.8	392.3	2439	2406	2.22	114.7	.099	-.031	163.08	-411	4831
7	394.5	386.7	2423	2375	2.54	101.1	.107	-.031	162.83	-349	4801
8	391.4	383.5	2407	2358	2.86	92.6	.112	-.031	162.63	-212	4778
9	388.7	380.9	2392	2344	3.19	86.8	.116	-.031	162.51	-75	4761
10	386.6	378.8	2379	2331	3.52	82.6	.121	-.026	162.50	64	4747
11	385.1	377.3	2368	2321	3.84	79.5	.124	-.022	162.59	203	4731
12	384.3	376.6	2361	2313	4.17	77.0	.127	-.018	162.80	300	4714
13	384.2	376.5	2356	2308	4.50	75.0	.129	-.018	163.09	358	4696
14	384.6	376.9	2354	2306	4.84	73.4	.130	-.019	163.42	416	4683
15	385.4	377.6	2353	2305	5.17	72.0	.132	-.019	163.79	473	4677

*Strategy number 20 for SODA--50% education and 50% training.

TABLE X (Continued)

Year	PFS[c]	PFA[c]	LRPFA[c]	TOBND[c]	TLF[b]	TEMPL[b]	AVWG	SKLVL	REGATRC	PLINDX	MNEDL
0	2616	4100	4100	0	89.98	85.31	2.08	.859	1.065	1.801	10.10
1	2909	4663	4100	563	90.15	85.21	2.11	.859	1.076	1.808	10.29
2	2903	4386	4096	290	90.25	85.07	2.21	.883	1.064	1.816	10.56
3	2939	4420	4092	327	90.81	84.76	2.32	.908	1.057	1.823	10.85
4	3265	4744	4089	655	91.32	84.36	2.43	.933	1.055	1.831	11.11
5	3458	4936	4086	850	91.67	83.90	2.55	.953	1.039	1.838	11.34
6	5489	6966	4082	2884	92.01	83.40	2.68	.968	1.030	1.840	11.57
7	7831	11119	4077	7042	92.39	83.06	2.81	.982	1.018	1.840	11.81
8	7858	14853	4071	10782	92.74	82.92	2.94	.994	1.013	1.837	11.99
9	7818	17481	4066	13416	93.14	82.89	3.07	1.002	.996	1.833	12.18
10	7779	19809	4063	15746	93.72	82.97	3.20	1.008	.990	1.829	12.37
11	7748	22370	4062	18307	94.33	83.18	3.32	1.013	.984	1.823	12.56
12	7749	24418	4065	20353	94.98	83.52	3.43	1.017	.976	1.816	12.76
13	7753	25890	4070	21820	95.65	83.93	3.55	1.021	.968	1.810	12.95
14	7761	26997	4077	22919	96.31	84.38	3.68	1.025	.961	1.803	13.15
15	7771	27918	4085	23832	96.99	84.85	3.80	1.029	.955	1.797	13.35

[a]Millions of dollars.

[b]Thousands.

[c]Thousands of dollars.

Another measure of success calculated for each run was DSYDSPF (the ratio of accumulated discounted income to accumulated discounted public costs). Strategies 10 (50 percent industrialization and 50 percent education, Table XI) and 11 (50 percent industrialization and 50 percent training) had the highest values of this efficiency ratio, with strategy 10 the higher of the two. Under the long-range development plan of strategy 10, SODA showed signs of strong economic health--especially during the first 10 years. This strategy required extremely low levels of annual public spending to keep the selected variables within specified limits in the annual adaptive process. Early increases in income and low public costs combined to yield a high efficiency ratio (a high value of DSYDSPF). The particular level of industrialization in this strategy seemed to be adequate to keep total employment in line with the total labor force for the first seven to nine years of the simulation run. Strategy 10 would likely be even more cost effective if the industrialization funds were increased annually beginning at about year seven (when the unemployment rate started to climb). Strategy 11 yielded a slightly lower value for DSYDSPF but with somewhat more favorable values for income and unemployment in year 15.

On the other hand, strategies which spread the long-range development funds over three or even four of the primary policy functions and/or spent heavily on welfare, education, and training without much on industrialization were the most inefficient strategies. Strategy 21 (10 percent industrialization, 50 percent welfare, 20 percent education, and 20 percent training) had the lowest efficiency ratio (DSYDSPF) of

TABLE XI

STRATEGY 10--SODA*

Year	REGY[a]	NREGY[a]	PI	NPI	POVACML	DSYDSPF	UNEMP	UNDMPCG	POP[b]	TTLMGS	COMMTR
0	350.9	347.1	2139	2117	.26	93.8	.055	-.108	164.00	-235	5347
1	362.0	357.9	2209	2184	.59	91.7	.056	.018	163.85	-186	5167
2	376.8	372.8	2301	2276	.92	92.3	.056	-.082	163.78	-134	5021
3	386.8	382.6	2361	2336	1.25	92.3	.047	.000	163.81	-78	4954
4	389.0	384.5	2372	2345	1.57	91.1	.049	-.029	163.97	-16	4843
5	398.4	393.8	2425	2398	1.89	90.5	.054	-.015	164.26	51	4790
6	403.7	399.2	2453	2425	2.21	90.3	.059	-.015	164.61	118	4721
7	401.9	397.4	2435	2408	2.52	90.1	.065	-.010	165.05	186	4648
8	400.2	395.6	2417	2390	2.84	89.9	.069	-.009	165.54	254	4570
9	399.0	394.5	2402	2375	3.16	89.8	.074	-.012	166.08	321	4491
10	398.4	393.9	2390	2364	3.48	89.7	.080	-.009	166.65	356	4413
11	398.1	393.6	2380	2354	3.80	89.7	.085	-.009	167.23	383	4332
12	398.2	392.7	2373	2340	4.12	88.4	.089	-.009	167.81	409	4252
13	398.9	392.2	2369	2329	4.44	86.3	.092	-.011	168.39	457	4176
14	400.1	392.7	2367	2324	4.77	84.1	.095	-.013	169.00	526	4105
15	401.6	394.0	2367	2322	5.09	82.2	.097	-.014	169.65	591	4040

*Strategy number 10 for SODA--50% industrialization and 50% education.

TABLE XI (Continued)

Year	PFS[c]	PFA[c]	LRPFA[c]	TOBND[c]	TLF[b]	TEMPL[b]	AVWG	SKLVL	REGATRC	PLINDX	MNEDL
0	3741	4100	4100	0	89.98	85.31	2.08	.859	1.065	1.801	10.10
1	4034	4663	4100	563	90.15	85.41	2.11	.859	1.076	1.805	10.29
2	4027	4386	4096	290	90.30	85.53	2.21	.783	1.044	1.809	10.56
3	4198	4556	4094	462	89.55	85.55	2.27	.787	1.041	1.812	10.86
4	4518	4877	4095	782	89.77	85.64	2.38	.798	1.035	1.815	11.12
5	4557	4917	4099	818	90.19	85.62	2.48	.814	1.021	1.816	11.33
6	4533	4896	4106	789	90.74	85.68	2.57	.825	1.015	1.812	11.59
7	4544	4909	4115	793	91.40	85.77	2.67	.838	1.007	1.808	11.82
8	4562	4929	4126	803	91.96	85.90	2.76	.850	1.006	1.803	12.01
9	4510	4880	4139	742	92.61	86.10	2.85	.860	.995	1.798	12.20
10	4486	4860	4152	708	93.43	86.35	2.94	.870	.993	1.792	12.39
11	4469	4847	4166	681	94.26	86.64	3.03	.881	.990	1.786	12.59
12	5576	5958	4181	1777	95.06	86.96	3.13	.891	.985	1.780	12.79
13	6734	7209	4195	3013	95.87	87.40	3.23	.902	.979	1.773	12.99
14	7370	8796	4210	4586	96.69	87.94	3.33	.914	.973	1.764	13.19
15	7554	10013	4225	5788	97.53	88.51	3.45	.925	.969	1.756	13.40

[a]Millions of dollars.

[b]Thousands.

[c]Thousands of dollars.

all 30 strategies. Strategies 19, 12, 3, and 4 (see Table III for the combinations of funds) also had low values for DSYDSPF.

To complete this discussion for SODA, a brief review of strategies most successful in alleviating specific problems or strengthening specific components in the regional economy of SODA is presented. All three of the heavy industrialization allocations (strategies 5, 15, and 17) reduced unemployment some the first few years and kept it at a reasonable level throughout the designated planning horizon of 15 years. Strategy 20 (50 percent education and 50 percent training) reduced underemployment more and had a higher skill level index after the 15 years than any of the other strategies. Strategy 5 had the highest value for the regional attractiveness index, while strategy 9 (50 percent welfare and 50 percent education) had the highest (and most favorable) pollution ratio. Strategy 10 (50 percent industrialization and 50 percent education), followed closely by the other strategies in which education was funded at its maximum of 50 percent, had the highest median education level at the end of 15 years (13.4 years of schooling).

The results from the simulation runs made for the other two regions--NODA (Northern Oklahoma Development Association) and EODD (Eastern Oklahoma Development District)--point to conclusions similar to those for SODA. For this reason, the discussion of the results for NODA and EODD will be brief.

NODA Results

Six different development strategies (in addition to the base strategy) are discussed for the NODA (Northern Oklahoma Development

Association) region. Just as for SODA, results of the base run and strategies 5, 15, 17, 9, 20, and 10 are presented (Tables XII-XVIII) and discussed.

NODA is an eight-county region in North-Central Oklahoma. It is primarily a rural region with only two cities over 10,000--Enid (48,000) and Ponca City (26,000). All of the counties are sparsely populated with less than 15 persons per square mile, and three of the counties have 8 persons or less per square mile. The economic base of this relatively high income region is agriculture and petroleum production and related industries. The region has experienced relatively low unemployment due to prosperity in the region and heavy outmigration over the last 20 years.

In contrast to EODD and SODA, there are no severe economic problems in NODA. The application of the model to NODA is important--it enables testing the model under a broader range of economic conditions and regional needs. Overall, the funds allocated to the economic development of NODA did not improve the economic health of the region as much as in the other two regions. Several of the socio-demographic variables were improved significantly for certain strategies, but at the same time unemployment reached relatively high levels in a number of runs. For cost effectiveness in interregional use of development funds, lower per capita expenditure of funds would take place in NODA than in other regions. In addition to less need in NODA, less excess capacity is available to absorb the demands of the population increases which are caused by heavy spending in, for example, industrialization. Policy makers might conclude from an examination of the beginning conditions in NODA and the tabular results on the next

few pages that the best development plan for a region such as NODA would be one of preventing stagnation. Of course development decisions depend in part on the goals of each region.

The results of the base run for NODA are given in Table XII. In the base run no additional long-range development funds were allocated and the policy variables were funded at a very low level or zero, depending on whether there was funding in these programs during the beginning year (1970) of the simulation run. This base run is used to compare with the runs in which additional development funds were spent to determine how successful the long-run regional economic development efforts of the alternative strategies would be. While each of the development strategies made some improvements, the base run showed little overall progress in the economic development of the region. As indicated earlier, public funds spent in development efforts in NODA had less of an impact than in SODA or EODD. For example, the maximum increase in net regional income (NREGY) in NODA was 18 percent, while SODA and EODD had maximum increases in NREGY of 21 percent and 35 percent respectively (strategy 5).

NREGY increased the first six years in the base run before starting to decline for the rest of the run. In the fifteenth year NREGY was 2.5 percent lower than in any of the other strategies and almost 13 percent less than for the maximum level under strategy 5. Unemployment (UNEMP) stayed fairly low for the first few years but started rising rapidly during years five through seven. Total population (POP) stayed almost constant until years eight and nine, when it started to drop due to outmigration and lower birthrates caused by the economic stagnation in the region. POP fell to a lower level in

TABLE XII

BASE RUN--NODA[a]

Year	REGY[b]	PI	POVACML	UNEMP	UNDMPCG	POP[c]	TTLMGS	AVWG	SKLVL	REGATRC	PLINDX	MNEDL
0	493.3	3069	.16	.045	-.040	160.72	-134	2.56	.946	1.002	1.960	12.00
1	509.5	3171	.49	.054	.008	160.67	-199	2.62	.946	1.009	1.968	12.06
2	529.8	3299	.82	.057	-.066	160.58	-263	2.72	.851	.978	1.976	12.14
3	536.9	3346	1.15	.047	.002	160.48	-324	2.78	.849	.975	1.985	12.23
4	542.8	3384	1.47	.048	-.038	160.39	-381	2.94	.851	.968	1.993	12.27
5	553.0	3449	1.79	.053	-.029	160.32	-433	3.08	.852	.952	2.001	12.30
6	551.4	3442	2.12	.060	-.027	160.21	-484	3.23	.853	.943	2.005	12.35
7	546.9	3416	2.43	.067	-.027	160.07	-533	3.38	.856	.930	2.008	12.34
8	542.2	3392	2.76	.075	-.029	159.86	-582	3.54	.856	.925	2.012	12.32
9	537.9	3371	3.08	.084	-.030	159.54	-629	3.71	.855	.909	2.017	12.31
10	533.7	3353	3.40	.095	-.028	159.14	-676	3.89	.854	.902	2.022	12.29
11	529.4	3337	3.73	.105	-.029	158.64	-720	4.07	.854	.894	2.027	12.28
12	525.6	3325	4.06	.116	-.029	158.05	-763	4.26	.853	.884	2.033	12.27
13	521.7	3315	4.39	.126	-.030	157.37	-804	4.47	.853	.874	2.040	12.26
14	517.7	3306	4.72	.137	-.030	156.60	-843	4.68	.853	.864	2.047	12.26
15	513.6	3298	5.06	.148	-.031	155.75	-879	4.91	.853	.856	2.056	12.25

[a]No additional long-range development funds were allocated to the policy variables. Policy variables funded at a level depending on the amount spent in each policy function during the last part of the 1960's.

[b]Millions of dollars.

[c]Thousands.

year 15 than for any of the 30 development plans. Total net migration (TTLMGS) became more negative (net outmigration) throughout the 15 years. All the strategies in which development funds were spent turned the migration trend around no later than year 15. Strategy 5 showed positive inmigration by year 2, while the other extreme was strategy 9 which showed net outmigration until year 15. Again, as in SODA, the skill level index (SKLVL), the regional attractiveness index (REGATRC), and the median education level (MNEDL) were all lower in the base run than in any of the strategies in which additional development funds were allocated and spent. It will be noted in the discussion of the various strategies that development funds were especially effective in increasing variables such as SKLVL and MNEDL in NODA.

As was true with the simulation runs for SODA, strategies with heavy allocations of industrial funds to create jobs had the most favorable impact on income and poverty. Strategies 5 (100 percent industrialization--Table XIII), 15 (90 percent industrialization and 10 percent welfare--Table XIV), and 17 (90 percent industrialization and 10 percent training--Table XV) had the highest income (NREGY and NPI) and the lowest percent poverty accumulated (POVACML). More specifically, strategy 5 resulted in the highest income and the lowest POVACML after 15 years while keeping unemployment (UNEMP) at a very low level. This 100 percent industrialization strategy also had a good efficiency ratio (DSYDSPF). Strategies 15 and 17 had less inmigration. Underemployment decreased by more and the skill index increased by more with the application of strategy 17 than with 5 or 15. Other combinations with a heavy proportion of long-run funds in

TABLE XIII

STRATEGY 5--NODA*

Year	REGY[a]	NREGY[a]	PI	NPI	POVACML	DSYDSPF	UNEMP	UNDMPCG	POP[b]	TTLMGS	COMMTR
0	493.7	489.0	3072	3043	.16	105.4	.045	-.040	160.72	-134	3142
1	511.3	505.7	3182	3147	.49	98.0	.049	.008	160.67	-45	3097
2	533.5	528.0	3319	3285	.82	97.3	.048	-.056	160.73	48	3083
3	543.0	538.1	3374	3343	1.15	100.0	.035	.009	160.96	150	3092
4	551.8	546.7	3419	3387	1.47	101.3	.032	-.024	161.39	260	3077
5	564.7	559.5	3486	3454	1.79	102.3	.032	-.012	162.02	326	3103
6	567.1	561.8	3484	3452	2.11	103.0	.033	-.011	162.75	382	3117
7	567.1	561.7	3466	3433	2.42	103.3	.034	-.009	163.60	440	3130
8	567.4	561.9	3449	3416	2.74	103.2	.034	-.011	164.50	499	3142
9	568.6	563.0	3437	3403	3.05	103.0	.037	-.012	165.45	559	3157
10	570.3	564.5	3426	3391	3.37	102.7	.041	-.010	166.46	621	3175
11	572.4	566.4	3417	3381	3.69	102.3	.044	-.010	167.53	652	3192
12	575.2	569.2	3412	3376	4.00	101.8	.047	-.010	168.61	667	3211
13	578.5	572.3	3409	3372	4.32	101.4	.050	-.011	169.69	682	3235
14	582.0	575.6	3408	3370	4.64	100.9	.054	-.012	170.79	697	3262
15	585.7	579.1	3407	3369	4.96	100.3	.057	-.012	171.89	712	3295

*Strategy number 5 for NODA--100% industrialization.

TABLE XIII (Continued)

Year	PFS[c]	PFA[c]	LRPFA[c]	TOBND[c]	TLF[b]	TEMPL[b]	AVWG	SKLVL	REGATRC	PLINDX	MNEDL
0	4684	4018	4018	0	93.68	89.59	2.56	.946	1.002	1.960	12.00
1	5596	5338	4018	1320	94.50	89.98	2.62	.946	1.009	1.962	12.07
2	5555	4886	4017	869	94.78	90.38	2.71	.867	.981	1.963	12.37
3	4949	4279	4018	261	94.00	90.80	2.77	.872	.980	1.964	12.65
4	5153	4481	4024	457	94.23	91.29	2.90	.882	.976	1.963	12.76
5	5202	4529	4035	495	94.65	91.73	3.01	.889	.963	1.960	12.87
6	5240	4566	4050	516	95.27	92.27	3.11	.892	.958	1.952	12.99
7	5380	4704	4069	635	95.91	92.79	3.22	.898	.950	1.943	13.06
8	5512	4835	4090	745	96.51	93.32	3.32	.901	.949	1.934	13.12
9	5647	4968	4113	856	97.37	93.87	3.43	.904	.938	1.924	13.18
10	5791	5111	4136	974	98.33	94.46	3.54	.907	.935	1.914	13.24
11	5932	5250	4162	1089	99.31	95.08	3.65	.910	.931	1.903	13.31
12	6074	5391	4188	1203	100.31	95.73	3.76	.913	.925	1.891	13.37
13	6214	5529	4215	1314	101.34	96.40	3.88	.916	.918	1.880	13.44
14	6353	5668	4242	1425	102.40	97.08	4.00	.920	.913	1.870	13.51
15	6558	5871	4270	1601	103.47	97.78	4.13	.924	.908	1.859	13.58

[a]Millions of dollars.

[b]Thousands.

[c]Thousands of dollars.

TABLE XIV

STRATEGY 15--NODA*

Year	REGY[a]	NREGY[a]	PI	NPI	POVACML	DSYDSPF	UNEMP	UNDMPCG	POP[b]	TTLMGS	COMMTR
0	494.1	489.4	3074	3045	.16	105.5	.045	-.040	160.72	-134	3142
1	511.6	506.0	3184	3149	.49	98.0	.050	.008	160.67	-60	3097
2	533.6	528.1	3320	3286	.82	97.5	.049	-.056	160.71	17	3083
3	542.9	538.0	3374	3343	1.15	100.2	.036	.008	160.91	102	3092
4	551.5	546.3	3419	3387	1.47	101.4	.034	-.025	161.29	196	3078
5	564.1	558.9	3485	3453	1.79	102.4	.034	-.014	161.85	284	3106
6	566.1	560.9	3483	3451	2.11	103.1	.036	-.011	162.54	331	3124
7	565.6	560.2	3463	3430	2.42	103.3	.037	-.009	163.32	380	3138
8	565.7	560.1	3446	3412	2.74	103.2	.038	-.011	164.14	429	3152
9	566.6	560.9	3433	3399	3.05	102.9	.042	-.013	165.01	479	3169
10	567.9	562.1	3423	3388	3.37	102.5	.046	-.010	165.92	531	3189
11	569.7	563.7	3414	3378	3.69	102.0	.049	-.011	166.87	584	3210
12	572.2	566.0	3409	3372	4.01	101.5	.053	-.011	167.86	631	3233
13	575.1	568.8	3405	3368	4.33	101.0	.057	-.012	168.88	642	3260
14	578.2	571.8	3403	3365	4.65	100.4	.060	-.013	169.91	654	3293
15	581.5	575.0	3402	3364	4.97	99.9	.064	-.013	170.94	666	3331

*Strategy number 15 for NODA--90% industrialization and 10% welfare.

TABLE XIV (Continued)

Year	PFS[c]	PFA[c]	LRPFA[c]	TOBND[c]	TLF[b]	TEMPL[b]	AVWG	SKLVL	REGATRC	PLINDX	MNEDL
0	4684	4018	4018	0	93.68	89.59	2.56	.946	1.002	1.960	12.00
1	5596	5338	4018	1320	94.50	89.94	2.62	.946	1.009	1.963	12.07
2	5531	4862	4017	846	94.77	90.29	2.71	.867	.981	1.965	12.37
3	4948	4278	4018	260	93.96	90.65	2.78	.872	.980	1.966	12.64
4	5151	4480	4023	457	94.17	91.06	2.91	.882	.976	1.966	12.76
5	5200	4527	4032	495	94.55	91.42	3.02	.888	.963	1.964	12.86
6	5241	4566	4046	520	95.16	91.88	3.12	.892	.958	1.957	12.99
7	5393	4717	4063	654	95.78	92.33	3.23	.898	.950	1.949	13.06
8	5530	4853	4083	770	96.36	92.80	3.33	.901	.948	1.940	13.12
9	5675	4996	4104	892	97.19	93.28	3.45	.903	.937	1.931	13.18
10	5828	5148	4125	1023	98.11	93.78	3.56	.906	.934	1.923	13.24
11	5978	5297	4148	1149	99.05	94.32	3.67	.909	.930	1.912	13.30
12	6130	5447	4172	1275	100.01	94.88	3.78	.913	.924	1.902	13.37
13	6279	5595	4196	1399	101.01	95.46	3.90	.916	.917	1.892	13.43
14	6430	5744	4222	1522	102.02	96.05	4.03	.920	.911	1.881	13.50
15	6557	5964	4248	1717	103.05	96.66	4.16	.923	.906	1.871	13.57

[a]Millions of dollars.

[b]Thousands.

[c]Thousands of dollars.

TABLE XV

STRATEGY 17--NODA*

Year	REGY[a]	NREGY[a]	PI	NPI	POVACML	DSYDSPF	UNEMP	UNDMPCG	POP[b]	TTLMGS	COMMTR
0	493.7	489.0	3072	3043	.16	105.4	.045	-.040	160.72	-134	3142
1	511.1	505.5	3181	3146	.49	97.9	.050	.008	160.67	-60	3097
2	533.2	527.6	3318	3283	.82	97.3	.049	-.031	160.71	17	3083
3	542.5	537.7	3372	3341	1.15	100.4	.043	-.006	160.91	102	3092
4	552.5	547.5	3426	3394	1.47	102.0	.042	-.021	161.29	195	3097
5	562.9	557.7	3478	3447	1.79	103.1	.041	-.016	161.82	282	3119
6	565.4	560.2	3480	3448	2.11	103.9	.042	-.013	162.48	328	3136
7	565.0	559.7	3461	3429	2.43	104.2	.042	-.012	163.23	376	3151
8	565.1	559.7	3445	3412	2.74	104.1	.043	-.013	164.04	425	3166
9	566.0	560.4	3433	3399	3.06	103.9	.046	-.014	164.88	474	3185
10	567.3	561.5	3422	3387	3.38	103.5	.050	-.012	165.77	525	3206
11	569.0	563.1	3414	3378	3.70	103.0	.053	-.012	166.70	577	3228
12	571.5	565.5	3409	3372	4.02	102.5	.056	-.012	167.67	626	3253
13	574.4	568.1	3405	3368	4.34	101.9	.060	-.013	168.67	635	3282
14	577.4	571.1	3403	3366	4.66	101.3	.063	-.013	169.68	649	3317
15	580.7	574.2	3402	3364	4.98	100.8	.067	-.014	170.70	660	3357

*Strategy number 17 for NODA--90% industrialization and 10% training.

TABLE XV (Continued)

Year	PFS[c]	PFA[c]	LRPFA[c]	TOBND[c]	TLF[b]	TEMPL[b]	AVWG	SKLVL	REGATRC	PLINDX	MNEDL
0	4684	4018	4018	0	93.68	89.59	2.56	.946	1.002	1.960	12.00
1	5596	5338	4018	1320	94.50	89.94	2.62	.946	1.009	1.963	12.07
2	5555	4886	4017	869	94.77	90.29	2.71	.916	.991	1.965	12.36
3	4852	4182	4018	164	94.61	90.64	2.80	.922	.987	1.966	12.64
4	5052	4381	4023	358	94.89	91.02	2.92	.929	.984	1.966	12.76
5	5106	4433	4032	401	95.21	91.40	3.03	.930	.970	1.964	12.87
6	5159	4485	4045	439	95.73	91.86	3.13	.931	.964	1.957	12.99
7	5313	4637	4062	575	96.26	92.31	3.24	.932	.955	1.949	13.06
8	5457	4780	4081	699	96.82	92.77	3.35	.933	.954	1.941	13.12
9	5606	4927	4101	826	97.59	93.24	3.46	.933	.942	1.932	13.18
10	5760	5080	4122	958	98.47	93.75	3.57	.934	.938	1.924	13.24
11	5912	5231	4144	1087	99.37	94.28	3.68	.935	.934	1.914	13.30
12	6064	5381	4167	1214	100.31	94.83	3.80	.937	.927	1.904	13.37
13	6214	5530	4192	1338	101.27	95.40	3.92	.940	.920	1.893	13.44
14	6364	5679	4217	1462	102.27	95.99	4.04	.942	.914	1.883	13.51
15	6500	5894	4242	1652	103.28	96.59	4.17	.945	.909	1.873	13.58

[a]Millions of dollars.

[b]Thousands.

[c]Thousands of dollars.

industrialization also increased income significantly (i.e. strategies 16, 7, and 24).

Strategy 9 (50 percent welfare and 50 percent education--Table XVI) was again the most unsuccessful combination of public funds for increasing income. NREGY under strategy 9 was only 2.5 percent greater in year 15 than NREGY in the base run and almost 10 percent less than in the maximum income strategy. Total population (POP) decreased until year 15, when total net migration became positive (TTLMGS). While this strategy had little positive effect on income, the large education expenditure did increase the skill level index and the median education level to relatively high levels. Welfare-dominated strategies 4, 6, and 27 also had little impact on regional income.

The results of strategy 20 (50 percent education and 50 percent training--Table XVII) are presented because this allocation was the least successful at reducing poverty in NODA. Like strategy 9 discussed in the last paragraph, about the only positive results of this allocation were the high skill level index and median education level.

The other measure of success which was calculated for each strategy was the efficiency ratio, DSYDSPF (ratio of discounted accumulated income to discounted accumulated public costs). The long-range development plan which maximized this ratio after 15 years was strategy 10 (50 percent industrialization and 50 percent education--Table XVIII). As in SODA, this development plan required very low levels of funding for annual adjustments; particularly in the first half of the simulation period as income increased at a rapid pace. This strategy should be closely examined by regional policy makers

TABLE XVI

STRATEGY 9--NODA*

Year	REGY[a]	NREGY[a]	PI	NPI	POVACML	DSYDSPF	UNEMP	UNDMPCG	POP[b]	TTLMGS	COMMTR
0	495.7	492.1	3084	3062	.16	138.5	.045	-.040	160.72	-134	3142
1	512.1	508.5	3187	3165	.49	140.6	.054	.008	160.67	-199	3097
2	532.4	528.6	3315	3292	.82	140.8	.057	-.054	160.58	-263	3083
3	539.7	535.9	3363	3339	1.15	140.9	.050	-.001	160.48	-324	3095
4	546.3	542.3	3406	3381	1.47	140.0	.052	-.034	160.40	-381	3094
5	555.6	551.5	3466	3440	1.79	139.6	.058	-.025	160.32	-434	3139
6	554.3	550.1	3460	3434	2.11	138.7	.067	-.027	160.19	-485	3184
7	549.9	545.6	3436	3409	2.43	137.4	.076	-.025	160.02	-535	3237
8	545.3	539.4	3413	3376	2.76	131.6	.085	-.028	159.77	-585	3298
9	541.7	533.1	3398	3344	3.08	121.5	.094	-.030	159.41	-577	3372
10	539.2	530.0	3391	3333	3.40	113.3	.102	-.028	159.02	-487	3460
11	537.5	528.2	3388	3329	3.73	107.1	.109	-.027	158.66	-375	3561
12	536.6	527.3	3388	3329	4.06	102.5	.115	-.025	158.39	-262	3676
13	536.1	526.8	3389	3330	4.39	98.8	.121	-.024	158.20	-146	3807
14	536.1	526.8	3391	3332	4.72	95.9	.127	-.022	158.11	-29	3954
15	536.7	527.4	3394	3336	5.06	93.5	.132	-.021	158.11	72	4121

*Strategy number 9 for NODA--50% welfare and 50% education.

TABLE XVI (Continued)

Year	PFS[c]	PFA[c]	LRPFA[c]	TOBND[c]	TLF[b]	TEMPL[b]	AVWG	SKLVL	REGATRC	PLINDX	MNEDL
0	3579	4018	4018	0	93.68	89.59	2.56	.946	1.002	1.960	12.00
1	3587	5338	4018	1320	94.50	89.59	2.62	.946	1.009	1.968	12.22
2	3767	4769	4017	752	94.68	89.49	2.72	.876	.983	1.976	12.51
3	3818	4256	4015	242	93.79	89.29	2.80	.880	.980	1.985	12.81
4	4014	4452	4012	440	93.77	89.02	2.95	.891	.975	1.993	13.06
5	4047	4485	4010	475	93.88	88.57	3.10	.905	.961	2.002	13.30
6	4171	4608	4008	601	94.20	88.11	3.25	.917	.954	2.005	13.56
7	4341	4778	4005	773	94.49	87.56	3.40	.930	.943	2.009	13.76
8	5911	6347	4001	2347	94.70	86.95	3.57	.940	.939	2.013	13.95
9	8563	9723	3994	5729	95.08	86.44	3.74	.949	.925	2.016	14.14
10	9230	14371	3985	10386	95.52	86.15	3.92	.959	.919	2.016	14.34
11	9329	18495	3975	14520	96.03	85.96	4.11	.969	.913	2.015	14.54
12	9313	22461	3967	18494	96.58	85.87	4.29	.979	.905	2.012	14.75
13	9301	26177	3960	22217	97.18	85.86	4.48	.990	.897	2.010	14.95
14	9292	29653	3955	25698	97.85	85.95	4.67	1.001	.891	2.007	15.16
15	9289	32990	3953	29037	98.60	86.12	4.86	1.012	.886	2.003	15.37

[a]Millions of dollars.

[b]Thousands.

[c]Thousands of dollars.

TABLE XVII

STRATEGY 20--NODA*

Year	REGY[a]	NREGY[a]	PI	NPI	POVACML	DSYDSPF	UNEMP	UNDMPCG	POP[b]	TTLMGS	COMMTR
0	493.7	491.2	3072	3056	.16	199.5	.045	-.040	160.72	-134	3142
1	509.9	507.5	3174	3158	.49	202.5	.054	.008	160.67	-199	3097
2	530.2	527.6	3302	3285	.82	201.5	.057	-.004	160.57	-263	3083
3	537.5	535.0	3350	3334	1.15	203.3	.063	-.020	160.47	-324	3095
4	546.9	544.2	3410	3393	1.47	202.2	.070	-.023	160.38	-383	3129
5	552.5	549.6	3448	3430	1.80	200.4	.077	-.026	160.24	-438	3169
6	551.9	547.2	3448	3419	2.12	184.7	.086	-.028	160.06	-489	3218
7	548.2	540.9	3430	3384	2.44	160.3	.092	-.029	159.82	-474	3278
8	545.1	537.4	3416	3368	2.77	143.9	.098	-.031	159.56	-381	3347
9	543.0	535.1	3407	3358	3.10	132.6	.103	-.030	159.36	-273	3428
10	541.4	533.3	3400	3349	3.42	124.3	.109	-.026	159.23	-163	3519
11	540.5	532.3	3395	3344	3.75	118.0	.114	-.024	159.19	-51	3618
12	540.6	532.4	3395	3343	4.08	113.2	.118	-.022	159.24	65	3726
13	541.4	533.2	3397	3345	4.41	109.3	.122	-.021	159.39	133	3847
14	542.6	534.4	3400	3348	4.75	106.3	.126	-.021	159.59	180	3980
15	544.3	536.0	3405	3353	5.08	103.8	.129	-.021	159.83	227	4129

*Strategy number 20 for NODA--50% education and 50% training.

TABLE XVII (Continued)

Year	PFS[c]	PFA[c]	LRPFA[c]	TOBND[c]	TLF[b]	TEMPL[b]	AVWG	SKLVL	REGATRC	PLINDX	MNEDL
0	2475	4018	4018	0	93.68	89.59	2.56	.946	1.002	1.960	12.00
1	2479	5338	4018	1320	94.50	89.58	2.62	.946	1.009	1.968	12.21
2	2658	4886	4017	869	94.68	89.48	2.72	.969	1.002	1.976	12.50
3	2567	4108	4014	94	95.05	89.28	2.85	.994	.998	1.985	12.80
4	2772	4313	4012	301	95.41	88.93	2.99	1.018	.997	1.994	13.05
5	2899	4439	4009	429	95.63	88.52	3.13	1.037	.983	2.002	13.31
6	4640	6178	4006	2172	95.98	88.05	3.29	1.053	.977	2.006	13.54
7	7290	9746	4002	5744	96.23	87.65	3.45	1.067	.967	2.008	13.75
8	7753	13264	3996	9269	96.54	87.44	3.61	1.077	.963	2.007	13.95
9	7930	15993	3989	12004	96.99	87.32	3.78	1.085	.948	2.005	14.15
10	8103	19007	3984	15023	97.55	87.29	3.95	1.092	.942	2.003	14.35
11	8243	22325	3981	18344	98.14	87.36	4.11	1.097	.937	1.999	14.55
12	8241	25300	3980	21320	98.78	87.52	4.28	1.102	.929	1.994	14.75
13	8244	27950	3981	23969	99.48	87.78	4.44	1.107	.921	1.989	14.96
14	8252	30407	3985	26423	100.21	88.09	4.61	1.111	.914	1.984	15.17
15	8262	32724	3990	28734	100.96	88.42	4.78	1.116	.909	1.979	15.38

[a]Millions of dollars.

[b]Thousands.

[c]Thousands of dollars.

TABLE XVIII

STRATEGY 10--NODA*

Year	REGY[a]	NREGY[a]	PI	NPI	POVACML	DSYDSPF	UNEMP	UNDMPCG	POP[b]	TTLMGS	COMMTR
0	493.7	490.1	3072	3050	.16	137.9	.045	-.040	160.72	-134	3142
1	510.6	507.0	3178	3156	.49	140.1	.052	.008	160.67	-122	3097
2	531.9	528.1	3311	3287	.82	140.4	.052	-.053	160.65	-108	3083
3	540.3	536.4	3362	3338	1.15	140.7	.043	.003	160.71	-88	3093
4	548.1	544.0	3407	3382	1.47	139.8	.043	-.028	160.88	-62	3087
5	559.0	554.9	3469	3444	1.79	139.5	.046	-.017	161.15	-30	3121
6	559.7	555.5	3466	3440	2.11	139.0	.051	-.017	161.47	5	3151
7	557.6	553.3	3445	3419	2.43	138.1	.057	-.014	161.86	42	3184
8	555.6	551.2	3424	3397	2.75	136.9	.061	-.015	162.26	81	3218
9	554.5	550.0	3409	3381	3.07	135.6	.068	-.016	162.68	121	3256
10	554.0	549.3	3396	3368	3.39	134.2	.075	-.013	163.12	163	3299
11	554.0	547.8	3387	3349	3.71	130.4	.082	-.013	163.56	185	3345
12	555.1	547.7	3385	3339	4.04	125.3	.087	-.013	164.01	223	3395
13	557.2	549.6	3388	3342	4.36	121.2	.091	-.016	164.47	273	3454
14	559.6	552.0	3392	3346	4.69	117.8	.095	-.017	164.96	324	3523
15	562.1	554.5	3396	3350	5.02	115.1	.100	-.017	165.50	376	3603

*Strategy number 10 for NODA--50% industrialization and 50% education.

TABLE XVIII (Continued)

Year	PFS[c]	PFA[c]	LRPFA[c]	TOBND[c]	TLF[b]	TEMPL[b]	AVWG	SKLVL	REGATRC	PLINDX	MNEDL
0	3579	4018	4018	0	93.68	89.59	2.56	.946	1.002	1.960	12.00
1	3587	5338	4018	1320	94.50	89.78	2.62	.946	1.009	1.965	12.21
2	3766	4886	4017	869	94.73	89.93	2.71	.875	.983	1.970	12.50
3	3822	4261	4016	245	93.96	90.04	2.79	.880	.980	1.975	12.81
4	4020	4459	4018	441	94.08	90.14	2.93	.891	.977	1.978	13.06
5	4057	4498	4022	476	94.35	90.14	3.05	.905	.963	1.981	13.30
6	4124	4567	4029	538	94.90	90.20	3.18	.917	.958	1.978	13.56
7	4272	4716	4037	679	95.46	90.23	3.31	.930	.950	1.974	13.77
8	4407	4855	4046	808	95.99	90.29	3.43	.940	.949	1.971	13.96
9	4546	4996	4057	939	96.74	90.37	3.56	.950	.937	1.967	14.16
10	4688	5142	4067	1075	97.59	90.50	3.69	.960	.935	1.963	14.35
11	6120	6577	4078	2499	98.47	90.67	3.82	.970	.932	1.958	14.56
12	7449	8885	4089	4796	99.34	90.99	3.95	.981	.926	1.952	14.76
13	7542	11562	4100	7462	100.22	91.40	4.10	.991	.920	1.944	14.97
14	7563	13838	4112	9727	101.13	91.82	4.25	1.003	.914	1.937	15.19
15	7586	16186	4124	12062	102.05	92.26	4.41	1.014	.910	1.929	15.40

[a]Millions of dollars.

[b]Thousands.

[c]Thousands of dollars.

because, along with its cost efficiency, it left the regional economy in fairly good shape after 15 years. This strategy was especially outstanding for the first eight years as income increased, accumulated poverty stayed low, and most of the other socio-economic indicators were quite favorable. Unemployment (UNEMP) also stayed low until about year eight, when it began to increase above what would probably be acceptable in NODA.

As in SODA, the most inefficient (lowest value of DSYDSPF) method for increasing income in NODA was strategy 21 (10 percent industrialization, 50 percent welfare, 20 percent education, and 20 percent training). Other inefficient strategies were 4, 19, and 3.

Now for a brief discussion designed to identify the strategies discussed for NODA which would most nearly satisfy other specific objectives such as lowering unemployment or underemployment, increasing the skill level or the regional unattractiveness index, alleviating pollution, or improving the median education level. The industrialization strategies kept unemployment low, while the otherwise unsuccessful strategies 9 and 20 reduced underemployment by the greatest amount. The industrialization allocation of long-range funds which had the most favorable impact on underemployment was strategy 17. Strategy 20 yielded the highest final level (year 15) of the skill index, and strategy 10 had the highest final value of the regional attractiveness index. Strategy 9 had the most favorable pollution index. Of course one would expect the heavy allocations of industrialization spending to have an unfavorable influence on the pollution index. Strategy 10 (50 percent industrialization and 50 percent education) had the highest (most favorable) pollution index for the more successful

income-increasing strategies. Strategy 10 also produced the maximum median education level, MNEDL.

In all of the strategies for NODA, much more was spent in the bounding process than would be expected for an economy that is initially quite sound. Again this points to the lack of success (relative to SODA and EODD) of the simulated development efforts in NODA above those already underway. The various strategies showed only a narrow scope of improvement; in many of the strategies the education and skill levels were the only variables showing significant improvement. These less successful results were likely brought about by the application of less necessary development funds to an economy that was slower to adjust than regions with non-agriculturally based economies needing development.

EODD Results

The discussion for the EODD (Eastern Oklahoma Development District) region will be brief since the discussions for SODA and NODA should have prepared the reader to digest the results of the simulation runs given in the tables. The base run along with the same development strategies are given for EODD. The results for EODD are presented in Tables XIX-XXV.

EODD, a seven-county region in Eastern Oklahoma, was more in need of economic development than either of the other two regions. EODD is less rural than either SODA or NODA (65 percent more persons per square mile than SODA and about 70 percent more persons per square mile than NODA). It is the only one of the three regions which increased in population between 1960 and 1970 and the only region with net

inmigration. During the 1960's, 1,500 persons (net) came into the region on the average each year. This influx of people would not appear to be due to favorable internal economic conditions, but to the location of the region. The region joins the east edge of the Tulsa SMSA. The eastward growth of Tulsa along the Arkansas River system and around the Port of Catoosa is probably one reason for the movement of persons into the region. The population of EODD has a lower median age, a higher birthrate, and a lower death rate than either of the other regions. EODD has the lowest initial education level and the highest initial unemployment, as well as the lowest initial income level. There is evidence of a need for increased economic development efforts in EODD.

EODD was the region with the poorest initial economic conditions and the region that responded most to economic development efforts. Strategy 5, which maximized regional income, increased regional income by almost 35 percent over the simulation period.

As in the other two regions, economic conditions under the base strategy deteriorated somewhat over the simulation period. In general, the EODD base strategy maintained the status quo better than the base strategies in the other two regions. This is due to the poor initial conditions in the region. Total regional income (REGY) increased almost every year in the base strategy with a total increase of about 11 percent. The base strategy yielded only slightly more accumulated percent poverty (POVACML) than did several of the development strategies. Without increased expenditures of development funds, unemployment (UNEMP) became critical in EODD. UNEMP began to increase the first year and reached 10 percent in year seven. Total employment

TABLE XIX

BASE RUN--EODD[a]

Year	REGY[b]	PI	POVACML	UNEMP	UNDMPCG	POP[c]	TTLMGS	AVWG	SKLVL	REGATRC	PLINDX	MNEDL
0	310.6	1624	.29	.072	-.121	191.22	117	2.18	.849	1.068	1.214	9.90
1	320.4	1664	.62	.078	.048	192.54	113	2.18	.850	1.088	1.212	9.93
2	324.6	1675	.95	.081	-.083	193.81	109	2.25	.742	1.048	1.212	9.98
3	328.2	1682	1.28	.071	.016	195.09	109	2.28	.739	1.048	1.211	9.99
4	327.6	1668	1.61	.075	-.029	196.37	114	2.38	.737	1.044	1.210	10.00
5	331.1	1675	1.94	.086	-.013	197.68	121	2.47	.737	1.024	1.209	9.98
6	330.5	1661	2.27	.095	-.009	198.97	126	2.55	.736	1.018	1.205	9.99
7	330.8	1652	2.60	.104	-.010	200.20	130	2.63	.737	1.007	1.201	9.97
8	331.8	1647	2.93	.113	-.012	201.38	131	2.71	.737	1.008	1.198	9.96
9	332.9	1644	3.27	.122	-.013	202.49	129	2.80	.737	.991	1.194	9.95
10	334.3	1643	3.60	.130	-.013	203.54	125	2.90	.737	.987	1.191	9.95
11	335.9	1642	3.94	.138	-.015	204.54	119	2.99	.738	.983	1.187	9.94
12	337.8	1644	4.28	.145	-.015	205.47	112	3.10	.738	.973	1.184	9.94
13	339.6	1646	4.62	.153	-.017	206.35	104	3.21	.739	.963	1.181	9.94
14	341.5	1649	4.96	.160	-.018	207.17	94	3.32	.740	.955	1.178	9.94
15	343.5	1652	5.31	.166	-.019	207.94	84	3.44	.741	.947	1.175	9.94

[a]No additional long-range development funds were allocated to the policy variables. Policy variables funded at a level depending on the amount spent in each policy function during the last part of the 1960's

[b]Millions of dollars.

[c]Thousands.

remained almost constant, while the total labor force increased .5 to 1.0 percent per year because of the increased total population. Total net migration was positive (net inmigration) throughout the base run simulation but was low compared to most of the development strategies (down to only 84 persons in year 15). The median education level was another example of the lack of progress under the low intervention strategy (in which none of the policy variables were increased above their 1970 level).

Again the industrialization strategies maximized income (NREGY) and minimized percent poverty accumulated over the 15-year simulation period (POVACML). Strategies 5 (100 percent industrialization--Table XX), 15 (90 percent industrialization and 10 percent welfare--Table XXI), and 17 (90 percent industrialization and 10 percent training--Table XXII), all with heavy long-range industrialization allocations, produced the highest values of NREGY and lowest values of POVACML. All three also had high values for the efficiency variable, DSYDSPF. Strategy 5 lowered unemployment (UNEMP) almost immediately (down from an initial value of 7.2 percent to 5.5 percent in year four), and kept it low. Strategies 15 and 17 lowered UNEMP some, but not always below its initial level (15 was some better than 17). Most of the other results were quite similar for these strategies. Population (POP) increased at a rate of about 1 percent per year and a large portion of the increase was due to the heavy inmigration (TTLMGS). The regional attractiveness index (REGATRC) was fairly high for all three strategies, while the skill index (SKLVL) and the median education level (MNEDL) were lower than for most of the other strategies. Of course the 10 percent training allocation in strategy 17 resulted in a

TABLE XX

STRATEGY 5--EODD*

Year	REGY[a]	NREGY[a]	PI	NPI	POVACML	DSYDSPF	UNEMP	UNDMPCG	POP[b]	TTLMGS	COMMTR
0	311.2	305.5	1627	1598	.29	54.9	.072	-.121	191.22	117	6617
1	322.2	314.7	1673	1635	.62	48.3	.073	.048	192.54	344	6421
2	328.3	320.8	1692	1653	.95	46.7	.071	-.067	194.04	586	6200
3	334.3	326.6	1707	1668	1.28	45.8	.057	.034	195.82	751	6079
4	336.8	328.7	1703	1662	1.61	44.9	.055	-.004	197.80	900	5875
5	343.9	335.9	1720	1679	1.93	44.6	.059	.015	199.99	1054	5747
6	347.8	339.9	1719	1680	2.25	44.5	.062	.016	202.34	1115	5584
7	353.0	345.1	1724	1686	2.58	44.6	.065	.018	204.74	1166	5405
8	359.0	351.1	1733	1695	2.90	44.6	.065	.016	207.18	1218	5215
9	365.8	357.9	1745	1707	3.22	44.7	.066	.015	209.65	1269	5019
10	373.2	365.2	1759	1721	3.55	44.9	.065	.016	212.17	1322	4818
11	381.2	372.9	1775	1736	3.87	44.9	.063	.016	214.75	1368	4611
12	390.1	381.3	1794	1754	4.19	44.9	.061	.017	217.39	1397	4401
13	399.6	390.5	1816	1774	4.51	44.8	.058	.016	220.06	1414	4189
14	409.7	400.2	1839	1797	4.83	44.8	.055	.014	222.77	1432	3977
15	420.2	410.6	1863	1821	5.15	44.7	.052	.013	225.50	1449	3769

*Strategy number 5 for EODD--100% industrialization.

TABLE XX (Continued)

Year	PFS[c]	PFA[c]	LRPFA[c]	TOBND[c]	TLF[b]	TEMPL[b]	AVWG	SKLVL	REGATRC	PLINDX	MNEDL
0	5671	4780	4780	0	101.00	94.23	2.18	.849	1.068	1.214	9.90
1	7476	8249	4780	3469	101.75	94.76	2.18	.850	1.087	1.208	9.95
2	7525	8048	4813	3235	102.53	95.72	2.24	.759	1.053	1.203	10.24
3	7775	7079	4851	2228	102.12	96.67	2.25	.765	1.057	1.197	10.49
4	8127	7184	4896	2289	103.20	97.81	2.33	.775	1.061	1.191	10.74
5	8017	7062	4945	2117	104.72	98.86	2.38	.791	1.050	1.184	10.96
6	7908	6952	5000	1952	106.30	100.03	2.42	.803	1.053	1.174	11.16
7	7870	6915	5059	1856	107.89	101.27	2.46	.814	1.050	1.163	11.32
8	7950	6986	5119	1868	109.39	102.59	2.49	.823	1.061	1.153	11.45
9	7942	6976	5179	1796	110.95	104.00	2.53	.830	1.053	1.143	11.58
10	7970	7001	5241	1759	112.48	105.49	2.56	.837	1.061	1.133	11.70
11	8349	7378	5304	2073	114.01	107.08	2.59	.845	1.067	1.123	11.83
12	8775	7801	5369	2432	115.54	108.75	2.62	.852	1.069	1.113	11.96
13	9121	8143	5435	2709	117.07	110.47	2.65	.860	1.070	1.103	12.08
14	9409	8429	5502	2927	118.60	112.24	2.68	.867	1.073	1.093	12.21
15	9645	8662	5569	3092	120.13	114.04	2.71	.875	1.078	1.083	12.34

[a]Millions of dollars.

[b]Thousands.

[c]Thousands of dollars.

TABLE XXI

STRATEGY 15--EODD

Year	REGY[a]	NREGY[a]	PI	NPI	POVACML	DSYDSPF	UNEMP	UNDMPCG	POP[b]	TTLMGS	COMMTR
0	311.6	306.0	1630	1600	.29	54.9	.072	-.121	191.22	117	6617
1	322.6	315.1	1675	1637	.62	48.4	.074	.048	192.54	321	6421
2	328.6	321.0	1693	1655	.95	46.8	.072	-.067	194.02	538	6200
3	334.3	326.6	1708	1668	1.28	45.8	.058	.032	195.75	712	6081
4	336.6	328.5	1703	1662	1.61	45.0	.058	-.005	197.69	846	5881
5	343.3	335.3	1718	1678	1.93	44.6	.062	.015	199.82	986	5755
6	347.0	339.1	1717	1678	2.25	44.5	.066	.015	202.09	1090	5593
7	351.8	344.0	1721	1682	2.58	44.6	.069	.016	204.44	1137	5417
8	357.5	349.6	1729	1690	2.90	44.6	.070	.015	206.83	1184	5231
9	363.9	356.0	1739	1701	3.23	44.7	.071	.013	209.24	1230	5039
10	370.9	363.0	1752	1715	3.55	44.8	.071	.014	211.70	1278	4843
11	378.5	370.2	1767	1728	3.88	44.9	.070	.014	214.20	1326	4641
12	386.9	378.2	1785	1745	4.20	44.9	.069	.015	216.75	1376	4437
13	395.9	386.9	1805	1764	4.52	44.8	.067	.015	219.37	1409	4231
14	405.5	396.2	1826	1784	4.84	44.7	.065	.014	222.03	1427	4023
15	415.6	406.1	1850	1807	5.16	44.7	.062	.013	224.72	1444	3817

*Strategy number 15 for EODD--90% industrialization and 10% welfare.

TABLE XXI (Continued)

Year	PFS[c]	PFA[c]	LRPFA[c]	TOBND[c]	TLF[b]	TEMPL[b]	AVWG	SKLVL	REGATRC	PLINDX	MNEDL
0	5671	4780	4780	0	101.00	94.23	2.18	.849	1.068	1.214	9.90
1	7476	8249	4780	3469	101.75	94.71	2.18	.850	1.087	1.209	9.96
2	7525	8017	4813	3203	102.51	95.61	2.24	.759	1.053	1.204	10.24
3	7774	7073	4851	2222	102.08	96.48	2.26	.765	1.057	1.199	10.49
4	8119	7177	4894	2283	103.15	97.55	2.33	.775	1.060	1.193	10.74
5	8010	7055	4942	2112	104.66	98.52	2.38	.791	1.049	1.186	10.96
6	7903	6945	4995	1949	106.22	99.61	2.43	.803	1.052	1.176	11.16
7	7866	6908	5052	1856	107.80	100.75	2.47	.814	1.049	1.166	11.31
8	7949	6985	5111	1874	109.28	101.98	2.50	.822	1.059	1.157	11.44
9	7940	6974	5171	1803	110.81	103.29	2.54	.830	1.051	1.147	11.57
10	7953	6984	5231	1753	112.33	104.68	2.58	.837	1.058	1.138	11.70
11	8301	7329	5292	2037	113.84	106.15	2.61	.844	1.063	1.128	11.82
12	8679	7704	5355	2349	115.36	107.70	2.65	.852	1.064	1.118	11.95
13	9019	8041	5419	2622	116.89	109.32	2.68	.859	1.065	1.108	12.08
14	9307	8326	5484	2842	118.42	111.01	2.71	.867	1.068	1.098	12.21
15	9546	8563	5551	3012	119.95	112.74	2.74	.875	1.073	1.089	12.34

[a]Millions of dollars.

[b]Thousands.

[c]Thousands of dollars.

TABLE XXII

STRATEGY 17--EODD*

Year	REGY[a]	NREGY[a]	PI	NPI	POVACML	DSYDSPF	UNEMP	UNDMPCG	POP[b]	TTLMGS	COMMTR
0	311.2	305.5	1627	1598	.29	54.9	.072	-.121	191.22	117	6617
1	322.1	314.6	1673	1634	.62	48.3	.074	.048	192.54	321	6421
2	328.0	320.5	1691	1652	.95	46.7	.072	-.029	194.02	538	6200
3	333.8	326.2	1705	1666	1.28	45.9	.068	.013	195.75	712	6081
4	337.1	329.1	1705	1665	1.61	45.2	.069	.002	197.68	845	5923
5	342.1	334.2	1712	1673	1.93	44.9	.071	.011	199.77	982	5778
6	346.2	338.4	1714	1675	2.26	44.8	.073	.012	201.99	1086	5613
7	351.2	343.4	1719	1681	2.58	44.8	.076	.012	204.30	1133	5438
8	356.9	348.9	1727	1689	2.91	44.8	.077	.013	206.65	1179	5255
9	363.2	355.3	1737	1700	3.24	44.9	.077	.012	209.03	1224	5065
10	370.1	362.2	1750	1713	3.56	45.0	.077	.012	211.45	1271	4869
11	377.6	369.4	1765	1727	3.89	45.1	.076	.012	213.91	1319	4670
12	385.9	377.3	1783	1743	4.21	45.1	.074	.013	216.44	1367	4467
13	394.8	385.9	1803	1762	4.53	45.0	.072	.013	219.02	1407	4263
14	404.3	395.1	1824	1783	4.86	45.0	.069	.013	221.65	1424	4057
15	414.4	404.9	1847	1805	5.18	44.9	.067	.012	224.31	1441	3851

*Strategy number 17 for EODD--90% industrialization and 10% training.

TABLE XXII (Continued)

Year	PFS[c]	PFA[c]	LRPFA[c]	TOBND[c]	TLF[b]	TEMPL[b]	AVWG	SKLVL	REGATRC	PLINDX	MNEDL
0	5671	4780	4780	0	101.00	94.23	2.18	.849	1.068	1.214	9.90
1	7476	8249	4780	3469	101.75	94.71	2.18	.850	1.087	1.209	9.95
2	7525	8048	4813	3235	102.51	95.61	2.24	.818	1.064	1.204	10.24
3	7656	6962	4850	2111	103.08	96.48	2.28	.824	1.064	1.199	10.49
4	8008	7065	4894	2172	104.24	97.48	2.34	.830	1.070	1.193	10.74
5	7906	6951	4942	2009	105.61	98.49	2.39	.839	1.057	1.186	10.96
6	7814	6857	4994	1862	107.02	99.58	2.43	.847	1.060	1.177	11.16
7	7819	6858	5050	1808	108.50	100.72	2.48	.854	1.056	1.167	11.31
8	7913	6950	5108	1842	109.95	101.94	2.51	.860	1.065	1.157	11.44
9	7921	6954	5166	1788	111.42	103.24	2.55	.865	1.057	1.148	11.57
10	7944	6975	5226	1750	112.89	104.61	2.59	.871	1.063	1.138	11.70
11	8244	7273	5286	1987	114.36	106.07	2.62	.877	1.068	1.129	11.82
12	8620	7645	5348	2298	115.85	107.60	2.66	.883	1.069	1.119	11.95
13	8937	7959	5411	2549	117.35	109.21	2.69	.890	1.069	1.109	12.08
14	9230	8250	5475	2775	118.87	110.89	2.72	.897	1.072	1.099	12.21
15	9474	8491	5541	2950	120.37	112.61	2.76	.904	1.076	1.090	12.34

[a]Millions of dollars.

[b]Thousands.

[c]Thousands of dollars.

slightly more favorable value for SKLVL than in strategies 5 or 15. Underemployment showed a general increase in all the heavy industrialization strategies, but increased less in strategy 17 throughout the 15 years than in the other two industrialization strategies. Strategy 16 (90 percent industrialization and 10 percent education) also yielded favorable income and poverty figures (similar to 15 and 17), with the 10 percent education allocation causing a higher value for MNEDL. Strategy 16 is one of the additional strategies given in Appendix D.

Strategy 9 (50 percent welfare and 50 percent education--Table XXIII) increased income by the smallest amount, over the 15-year period, of any of the strategies. This strategy showed significant increases in income the first few years but little long-run improvement. The efficiency ratio (DSYDSPF) was therefore quite high for the first few years. This strategy would probably never be considered as a long-range development plan, but it is given here for policy makers to examine as an extreme type strategy (possibly as an emergency short-run solution).

Strategy 20 (50 percent education and 50 percent training--Table XXIV) was the most unsuccessful in reducing percent in poverty (POVACML). The results were what could be expected from this type of development plan. The only bright spots were the skill level index (SKLVL), the regional attractiveness index (REGATRC), and the median education level (MNEDL).

Again strategy 10 (50 percent industrialization and 50 percent education--Table XXV) had the highest value for the efficiency measure of success, DSYDSPF. As in SODA and NODA, this strategy required very little spending through the bounding process, particularly in the

TABLE XXIII

STRATEGY 9--EODD*

Year	REGY[a]	NREGY[a]	PI	NPI	POVACML	DSYDSPF	UNEMP	UNDMPCG	POP[b]	TTLMGS	COMMTR
0	313.5	309.2	1640	1617	.29	72.1	.072	-.121	191.22	117	6617
1	323.7	318.6	1681	1655	.62	67.6	.078	.048	192.54	113	6421
2	328.0	322.9	1692	1666	.95	66.5	.081	-.065	193.82	109	6200
3	331.7	326.4	1700	1673	1.28	65.4	.075	.013	195.10	109	6094
4	331.6	325.9	1689	1660	1.61	64.0	.081	-.022	196.38	113	5939
5	334.5	328.7	1692	1663	1.93	62.9	.093	-.006	197.68	119	5863
6	334.1	326.1	1679	1639	2.26	59.2	.105	-.006	198.93	123	5762
7	335.0	323.5	1674	1617	2.59	53.6	.114	-.006	200.12	241	5655
8	337.4	325.8	1675	1618	2.93	49.8	.119	-.006	201.35	503	5549
9	340.8	329.2	1681	1623	3.26	47.2	.124	-.002	202.79	709	5442
10	344.9	333.3	1688	1630	3.60	45.4	.127	.003	204.39	842	5323
11	350.0	338.3	1698	1641	3.93	43.9	.129	.001	206.10	976	5194
12	356.1	344.3	1713	1656	4.27	42.8	.130	.001	207.93	1073	5065
13	362.6	350.5	1728	1670	4.61	41.9	.131	.000	209.85	1113	4937
14	369.7	357.1	1745	1686	4.94	41.1	.131	.000	211.80	1155	4809
15	377.3	364.4	1765	1705	5.28	40.4	.131	.000	213.78	1197	4681

*Strategy number 9 for EODD--50% welfare and 50% education.

TABLE XXIII (Continued)

Year	PFS[c]	PFA[c]	LRPFA[c]	TOBND[c]	TLF[b]	TEMPL[b]	AVWG	SKLVL	REGATRC	PLINDX	MNEDL
0	4351	4780	4780	0	101.00	94.23	2.18	.849	1.068	1.214	9.90
1	5086	8249	4780	3469	101.75	94.29	2.18	.850	1.088	1.212	10.13
2	5118	7572	4813	2758	102.40	94.63	2.25	.770	1.054	1.212	10.41
3	5323	6717	4846	1871	101.91	94.75	2.29	.776	1.053	1.211	10.66
4	5700	6813	4878	1935	102.78	94.89	2.39	.785	1.052	1.210	10.90
5	5834	6689	4909	1779	104.02	94.87	2.48	.800	1.035	1.209	11.12
6	8037	8696	4942	3754	105.28	94.87	2.56	.812	1.031	1.205	11.36
7	11454	14335	4973	9362	106.53	95.07	2.65	.826	1.022	1.200	11.58
8	11585	19990	5003	14987	107.79	95.63	2.73	.838	1.025	1.192	11.81
9	11615	23395	5034	18362	109.22	96.39	2.81	.851	1.012	1.184	12.05
10	11671	26514	5070	21444	110.68	97.34	2.88	.865	1.015	1.175	12.29
11	11721	28681	5110	23571	112.12	98.38	2.95	.879	1.017	1.166	12.55
12	11820	30144	5153	24992	113.59	99.50	3.02	.894	1.014	1.157	12.81
13	12153	31520	5198	26322	115.08	100.69	3.10	.909	1.010	1.148	13.07
14	12525	32691	5246	27444	116.58	101.94	3.17	.924	1.009	1.139	13.34
15	12837	33475	5295	28180	118.09	103.25	3.25	.940	1.009	1.130	13.62

[a]Millions of dollars.

[b]Thousands.

[c]Thousands of dollars.

TABLE XXIV

STRATEGY 20--EODD*

Year	REGY[a]	NREGY[a]	PI	NPI	POVACML	DSYDSPF	UNEMP	UNDMPCG	POP[b]	TTLMGS	COMMTR
0	311.2	308.1	1627	1611	.29	101.8	.072	-.121	191.22	117	6617
1	321.1	317.3	1668	1648	.62	92.6	.078	.048	192.54	113	6421
2	325.3	321.5	1678	1659	.95	90.1	.081	.014	193.81	109	6200
3	329.0	325.1	1686	1667	1.28	88.7	.094	-.008	195.09	109	6094
4	330.8	324.3	1685	1652	1.61	78.0	.107	-.002	196.35	109	6021
5	331.4	321.5	1677	1628	1.94	65.4	.116	-.003	197.56	230	5924
6	333.1	323.2	1675	1625	2.27	58.6	.123	-.005	198.81	484	5827
7	335.9	325.8	1677	1627	2.61	54.3	.128	.000	200.26	693	5725
8	339.3	329.1	1681	1630	2.95	51.4	.132	.004	201.88	825	5608
9	343.7	333.4	1688	1638	3.28	49.3	.134	.002	203.60	957	5477
10	349.1	338.8	1700	1649	3.62	47.7	.136	.001	205.42	1060	5343
11	355.2	344.8	1713	1663	3.96	46.6	.137	-.001	207.34	1099	5207
12	361.8	351.3	1729	1679	4.30	45.6	.137	.000	209.29	1139	5070
13	368.8	358.0	1746	1694	4.63	44.9	.136	-.001	211.27	1179	4930
14	376.3	365.1	1764	1712	4.97	44.2	.135	-.001	213.29	1221	4790
15	384.3	372.8	1784	1731	5.30	43.5	.134	-.001	215.36	1264	4649

*Strategy number 20 for EODD--50% education and 50% training.

TABLE XXIV (Continued)

Year	PFS[c]	PFA[c]	LRPFA[c]	TOBND[c]	TLF[b]	TEMPL[b]	AVWG	SKLVL	REGATRC	PLINDX	MNEDL
0	3056	4780	4780	0	101.00	94.23	2.18	.849	1.068	1.214	9.90
1	3790	8249	4780	3469	101.75	94.28	2.18	.850	1.088	1.212	10.11
2	3814	7730	4813	2916	102.40	94.62	2.25	.886	1.077	1.212	10.39
3	3892	6629	4845	1784	103.90	94.73	2.34	.916	1.074	1.211	10.64
4	6549	9013	4877	4136	105.33	94.75	2.43	.942	1.080	1.210	10.88
5	9822	15360	4909	10451	106.71	95.01	2.51	.965	1.063	1.208	11.11
6	9928	21085	4939	16146	108.09	95.56	2.59	.985	1.062	1.200	11.34
7	10068	25102	4970	20132	109.58	96.27	2.67	1.003	1.055	1.192	11.57
8	10231	28911	5007	23905	111.11	97.17	2.73	1.018	1.062	1.183	11.81
9	10289	31694	5047	26647	112.58	98.18	2.80	1.032	1.051	1.174	12.06
10	10342	33522	5090	28433	114.04	99.26	2.86	1.045	1.054	1.166	12.31
11	10387	34822	5136	29686	115.50	100.42	2.93	1.057	1.056	1.156	12.57
12	10482	35744	5183	30561	116.96	101.65	3.00	1.068	1.053	1.147	12.83
13	10789	36380	5232	31148	118.40	102.94	3.06	1.078	1.050	1.138	13.10
14	11154	36701	5282	31419	119.86	104.29	3.13	1.088	1.048	1.129	13.38
15	11468	36653	5332	31320	121.32	105.70	3.20	1.098	1.048	1.120	13.65

[a]Millions of dollars.

[b]Thousands.

[c]Thousands of dollars.

TABLE XXV

STRATEGY 10--EODD*

Year	REGY[a]	NREGY[a]	PI	NPI	POVACML	DSYDSPF	UNEMP	UNDMPCG	POP[b]	TTLMGS	COMMTR
0	311.2	306.8	1627	1604	.29	71.5	.072	-.121	191.22	117	6617
1	321.6	316.5	1670	1644	.62	67.2	.076	.048	192.54	229	6421
2	326.8	321.7	1685	1659	.95	66.1	.076	-.063	193.93	347	6200
3	331.6	326.3	1697	1670	1.28	65.1	.067	.022	195.45	476	6086
4	333.0	327.3	1689	1660	1.61	63.8	.070	-.010	197.12	616	5910
5	338.0	332.2	1699	1669	1.93	62.8	.077	.011	198.97	713	5799
6	340.2	334.2	1693	1664	2.26	62.0	.083	.012	200.89	793	5649
7	343.6	337.6	1694	1664	2.59	61.5	.088	.013	202.86	873	5486
8	347.9	340.9	1698	1664	2.92	60.2	.093	.011	204.87	952	5317
9	352.9	344.7	1706	1666	3.25	58.2	.096	.009	206.93	1054	5145
10	358.8	349.6	1716	1672	3.58	56.3	.098	.009	209.07	1120	4972
11	365.4	355.9	1730	1685	3.91	54.6	.099	.008	211.25	1164	4798
12	372.8	362.9	1746	1700	4.24	53.3	.100	.008	213.47	1209	4623
13	380.6	370.4	1764	1717	4.57	52.1	.100	.008	215.73	1254	4449
14	389.0	378.6	1784	1736	4.90	51.1	.099	.008	218.04	1301	4274
15	398.0	387.3	1806	1757	5.22	50.2	.098	.008	220.40	1349	4099

*Strategy number 10 for EODD--50% industrialization and 50% education.

TABLE XXV (Continued)

Year	PFS[c]	PFA[c]	LRPFA[c]	TOBND[c]	TLF[b]	TEMPL[b]	AVWG	SKLVL	REGATRC	PLINDX	MNEDL
0	4351	4780	4780	0	101.00	94.23	2.18	.849	1.068	1.214	9.90
1	5086	8249	4780	3469	101.75	94.52	2.18	.850	1.088	1.210	10.11
2	5118	7730	4813	2916	102.46	95.17	2.24	.769	1.054	1.207	10.40
3	5327	6747	4848	1899	102.12	95.70	2.28	.775	1.056	1.204	10.65
4	5719	6852	4886	1966	103.14	96.38	2.36	.785	1.058	1.200	10.89
5	5863	6731	4928	1803	104.59	97.02	2.41	.800	1.046	1.196	11.12
6	5933	6598	4974	1624	106.06	97.77	2.46	.812	1.048	1.188	11.37
7	6041	6482	5022	1460	107.55	98.55	2.51	.826	1.044	1.180	11.60
8	6994	7447	5072	2376	109.00	99.39	2.56	.839	1.053	1.173	11.84
9	8268	8734	5122	3612	110.52	100.36	2.61	.853	1.044	1.164	12.09
10	9181	10231	5173	5057	112.05	101.51	2.67	.867	1.049	1.155	12.34
11	9476	11548	5227	6321	113.59	102.78	2.72	.882	1.053	1.145	12.60
12	9849	12498	5281	7217	115.16	104.13	2.77	.898	1.053	1.136	12.87
13	10189	13127	5337	7790	116.75	105.55	2.83	.913	1.052	1.126	13.15
14	10474	13449	5393	8056	118.34	107.03	2.88	.929	1.052	1.116	13.43
15	10704	13435	5451	7984	119.96	108.58	2.93	.946	1.056	1.107	13.71

[a]Millions of dollars.

[b]Thousands.

[c]Thousands of dollars.

earlier years. This would be an attractive alternative for a region that is willing to make a long-run commitment to development but does not wish to be burdened with having to make large annual adjustments. Strategies 25 (75 percent industrialization and 25 percent education) and 16 (90 percent industrialization and 10 percent education) were the second and third most efficient income-increasing strategies. Allocations which combined industrialization funds with education funds increased income and at the same time seemed to do a better job of keeping the selected variables within their bounds (in the adaptive process). A strategy which spread long-range development funds over all four policy functions, strategy 21 (10 percent industrialization, 50 percent welfare, 20 percent education, and 20 percent training), was the most inefficient strategy according to the efficiency ratio, DSYDSPF.

In general the results for EODD were much the same as for SODA and NODA. The primary difference was that all the development plans had a larger relative impact on EODD as income and other socio-economic variables showed significant improvement. The improvement of economic conditions in EODD caused inmigration to continue at a fairly high level for all the strategies.

Concluding Remarks

The many links in the model between production sectors, employment sectors, age groups, demographic equations, economic indices,

constraints, trends, quality variables, etc. and the proven responsiveness of the model were utilized to study a number of different development strategies for three different regions. The bounding or adaptive process imposed on the model cushioned the shocks caused by large expenditures in one direction as annual adjustments were made in response to problems which the normal automatic stabilizers in a regional economy could not handle--adjustments which need to be made by some economic planning entity. It is worth noting that in most of the strategies which did not allocate new long-range funds to industrialization, the adaptive process was allocating, by the fifteenth year, as much as was allowable (as large an annual adjustment as was allowed to correct the problems) to industrialization.

In the discussion of the results in this chapter an effort was made to discuss the variables which would be of the most interest to rural economic development strategists or policy makers. Space limitations do not allow discussion of all the variables in the model--not even the variables listed in the outline in Table I or even all the variables given in the tables in this chapter; however, two variables which were not fully discussed anywhere earlier in this chapter should be mentioned. First PLINDX is a pollution (or environment) index composed of a population density ratio (national population density/regional population density) and a percent manufacturing ratio (national percent manufacturing employment/regional percent manufacturing employment). PLINDX is designed to be a proxy for pollution levels by measuring the congestion and manufacturing density in the region. The higher the value of PLINDX, the lower the pollution level. As would be expected from such an index, the heavy industrialization

strategies yielded the least favorable pollution levels because of the additional industry and the congestion (caused by the large population increases in the industrialization strategies). NODA had the most favorable (highest) pollution index (2.00 maximum), while EODD had the least favorable (1.13 maximum). SODA had a fairly high pollution index (1.82 maximum). The pollution index, PLINDX, is one component of the regional attractiveness index, REGATRC. REGATRC is a weighted average of several ratios such as PLINDX which attempt to measure how attractive a region is to a prospective firm for relocation or investment. The index is composed of five ratios which compare regional values to national values of factors prospective investors are likely to examine (skill levels, wage rates, labor density, pollution, and other costs). In the model, changes in the attractiveness index influence the level of total new regional investment and therefore production and income. The initial values for REGATRC in SODA and NODA were very close to the same, while REGATRC in EODD started out slightly higher. REGATRC reacted much the same in all the regions to the implementation of the same development strategy.

Another variable mentioned in the results which should be given further explanation is underemployment. The variable given in the tables was UNDMPCG (percent change in underemployment), an index designed to measure underemployment using the national and regional skill levels and wage rates. Underemployment does not affect anything else in the simulation model; it is included only as an economic indicator.

Prior discussions have concentrated on unemployment (UNEMP), and little has been said about total employment (TEMPL), the total labor

force (TLF), or the number of commuters (COMMTR). These latter employment variables were included in the tables, however, since they might be of interest to some decision makers.

One final observation will be made concerning the results. All the results until now have been comparisons of different strategies as they affected the economic development of one region. As an example of another type of comparison, results of one specific strategy (number 5, 100 percent industrialization) are presented for each region in Table XXVI (refer to Table IV for definitions of the variables). Strategy 5 was one of the most successful development plans in all three of the regions. In general, SODA and especially EODD were helped more by strategy 5 than was NODA. It is of interest that the attitudes survey discussed earlier (17) found that the residents of NODA were not as much in favor of industrialization projects as were residents of the other two regions. NODA residents indicated that they saw no great need for the creation of jobs in their region (see Table XXVIII for results of the attitudes survey). Net regional income (NREGY) increased by 35 percent in EODD over the 15-year simulation period and by only 18 percent in NODA and 20 percent in SODA. Unemployment (UNEMP) followed different paths in the three regions, with SODA showing the best results from the heavy allocation of industrialization funds. UNEMP in SODA dropped to a low level and stayed near that level throughout the 15 years. EODD also experienced an improved unemployment rate, but not nearly as significant an improvement as for SODA. In NODA there was less improvement, but strategy 5 did maintain the region's low unemployment rate for most of the simulation period. The median education level (MNEDL) in EODD increased by almost twice as

TABLE XXVI

A COMPARISON OF THE SAME STRATEGY ACROSS THREE REGIONS

Year	NREGY[b]			UNEMP			MNEDL			POP[c]			TEMPL[c]			TOBND[c]		
	SODA	NODA	EODD	SODA	NODA	EODD	SODA	NODA	EODD	SODA	NODA	EODD	SODA	NODA	EODD	SODA	NODA	EODD
0	346.0	489.0	305.5	.055	.045	.072	10.10	12.00	9.90	164.0	160.7	191.2	85.3	89.6	94.2	0	0	0
1	356.9	505.7	314.7	.053	.049	.073	10.16	12.07	9.95	163.9	160.7	192.5	85.6	90.0	94.8	563	1320	3469
2	372.6	528.0	320.8	.051	.048	.071	10.34	12.37	10.24	163.9	160.7	194.0	86.0	90.4	95.7	362	869	3235
3	383.2	538.1	326.6	.038	.035	.057	10.50	12.65	10.49	164.1	161.0	195.8	86.3	90.8	96.7	478	261	2228
4	385.8	546.7	328.7	.035	.032	.055	10.63	12.76	10.74	164.5	161.4	197.8	86.8	91.3	97.8	809	457	2289
5	396.6	559.5	335.9	.035	.032	.059	10.71	12.87	10.96	165.2	162.0	200.0	87.3	91.7	98.9	858	495	2117
6	403.4	561.8	339.9	.035	.033	.062	10.83	12.99	11.16	166.0	162.8	202.3	87.9	92.3	100.0	843	516	1952
7	403.5	561.7	345.1	.036	.034	.065	10.93	13.06	11.32	166.9	163.6	204.7	88.5	92.8	101.3	861	635	1856
8	403.7	561.9	351.1	.035	.034	.065	10.99	13.12	11.45	167.9	164.5	207.2	89.1	93.3	102.6	884	745	1868
9	404.4	563.0	357.9	.036	.037	.066	11.04	13.18	11.58	169.0	165.5	209.7	89.7	93.9	104.0	837	856	1796
10	405.6	564.5	365.2	.037	.041	.065	11.10	13.24	11.70	170.1	166.5	212.2	90.4	94.5	105.5	800	974	1759
11	406.8	566.4	372.9	.039	.044	.063	11.17	13.31	11.83	171.3	167.5	214.8	91.2	95.1	107.1	1037	1089	2073
12	408.4	569.2	381.3	.039	.047	.061	11.24	13.37	11.96	172.5	168.6	217.4	92.0	95.7	108.8	1369	1203	2432
13	410.7	572.3	390.5	.040	.050	.058	11.33	13.44	12.08	173.7	170.0	220.1	92.8	96.4	110.5	1641	1314	2709
14	413.3	575.6	400.2	.041	.054	.055	11.43	13.51	12.21	174.9	170.8	222.8	93.6	97.1	112.2	1840	1425	2927
15	416.3	579.1	410.6	.041	.057	.052	11.53	13.58	12.34	176.1	171.9	225.5	94.5	97.8	114.0	1973	1601	3092

[a]Strategy 5, 100% industrialization. Also see Tables VI, XIII, and XX.

[b]Millions of dollars.

[c]Thousands of persons.

much as in SODA or NODA (percent increase). Population increases were evident in all the runs with large industrialization allocations, primarily as a result of the availability of jobs and the accompanying conditions which resulted in inmigration. The attitudes survey indicated that a majority of the respondents in each of the three regions favored increases in population. Total population (POP) in both SODA and NODA increased by about 7 percent for the 15-year period, while increasing by 18 percent in EODD (over 1 percent annually). Total employment (TEMPL) also increased by more in EODD, which was necessary in order to keep pace with the large population increase. The implementation of this long-range industrial development plan required more annual expenditures of short-run development funds (TOBND) in EODD than in the other two regions--a result of the depressed initial conditions in EODD. Even so, TOBND is not large relative to total regional income, as shown when the development funds spent are taken out of regional income to get NREGY (net regional income). In conclusion, this 100 percent industrialization allocation by some measures was the most successful of the 30 development plans--especially in SODA and EODD, which were in need of jobs as judged by initial economic conditions and attitudes of residents. Strategy 5 was the only long-range plan which created enough jobs to keep unemployment at a fairly low level for EODD. Strategy 5 was also the combination of long-range public funds which minimized POVACML (percent poverty accumulated) for each of the regions at the end of the 15 years.

Comparisons, such as those given above, of a similar strategy across regions could be made to determine how other regions with

different attitudes toward development and different development goals would respond to a particular long-run allocation of development funds.

CHAPTER V

SUMMARY AND CONCLUSIONS

In the first four chapters, the study and the study area were introduced, the model was developed, an explanation was given for its implementation, and the results of the alternative strategies were presented. This chapter includes a brief summary of the study, some notes on the model, an outline of the adaptive process, a few selected highlights of the results, and possible applications and improvements.

Summary of Study

The development of an economic simulation model requires much thought and planning before a single equation is formulated. The researcher must set forth a clear set of objectives and lay out the important relationships in the model in order to gain an insight into the time path of crucial regional variables. Only then can the model be used to analyze the consequences of various alternative policies affecting the region. In this study, a dynamic simulation model of a regional economy was used to generate alternative paths of economic development for three regions in Oklahoma. The overall objective was to develop and implement a dynamic economic simulation model that was sufficiently general to model the economic activity of the three contrasting rural regions, yet sufficiently detailed and rigorous to

delineate and analyze relevant socio-economic relationships which must be considered in examining regional economic growth potential.

The three regions simulated are EDA substate planning districts in Oklahoma: Southern Oklahoma Development Association (SODA), Northern Oklahoma Development Association (NODA), and Eastern Oklahoma Development District (EODD). Figure 1 in the first chapter shows the location of counties in these three regions.

Simulation is a process of indirect experimentation involving the testing of alternative courses of action before they are adopted. Indirect experimentation enables the decision maker to evaluate probable outcomes of a given decision without changing the actual system. It provides a means for making quantitative information available to decision makers without disturbing the current operation of the system--in this case a regional economy. Through the use of simulation, a researcher can consider a wide range of policies at a relatively low cost. The computer simulation package DYNAMO (16) was used to express the mathematical relationships which make up the model. DYNAMO was selected because of the cost efficiency and convenience it affords for programming and running the model. DYANMO is written with the use of easily understood model statements and has complete error checking capabilities. Constants are easily changed, and many runs can be made at once by specifying multiple values of constants, trends, or exogenous variables. The computer model is presented in its entirety in Appendix B.

The model is designed to supply decision makers with the likely effect of the investment of public funds over and above those being spent at the start of the simulation run in job creation, direct

welfare payments, education, training, family planning, migration assistance, and others. The results of strategies with increased funds spent in the policy variables corresponding with the above functions were compared to runs with the policy variables funded near the 1965-1970 level to show how additional development spending would affect the regional economies.

The flow chart in Figure 2 in Chapter II illustrates numerous linkages in the development of a regional economic simulation model. Because of limitations in the graphic illustration, the flow chart does not contain all the linkages expressed in the model, nor does the model express all the interconnections existing in a regional economy. The researcher must choose a set of relevant relationships which is small enough to be manageable but complete enough to predict variables of interest with the desired accuracy. Table I gives important relationships included in the model.

The coefficients and other data required for this study were obtained from related analytical studies, from secondary data sources such as the census, and from other sources. In some cases useful ranges were available for necessary coefficients--ranges which served as starting points or boundaries in the sensitivity experiments.

A form of model validation was used to determine how accurately the model could predict the time path of important economic and demographic variables. The model was started with 1960 data and run for ten years to simulate values for 1970. The validation experiments predicted with a high degree of accuracy the movement of most of the variables examined.

Decision makers were presented results of a number of alternative long-run development strategies. The alternative long-run strategies were made up of 30 different ways of allocating a fixed amount of additional public funds to four different policy variables. The four policy variables were industrialization, welfare, education, and vocational training. The 30 different allocations of the fixed total to these four policy variables were given in Table III in Chapter III. All of these strategies were simulated for each of the regions. An adaptive process operated during all the long-range plans to hold important variables within acceptable bounds. This feature of the model builds in the capability to allow for annual adjustments to extreme values of variables caused by (1) the normal development of the regional economy, (2) shocks exogenous to the regional economy, and (3) stresses put on a regional economy by the various development strategies. Bounds are set on thirteen important socio-economic variables including unemployment, population, and median education. Each period, equations in the computer model check the variables against their allowable bounds. If a variable is out of bounds, an equation automatically allocates funds to the appropriate policy variable to remove some or all of the deviation. This bounding process imposed on the model is designed to simulate the actions of regional planners making annual decisions in response to obvious problems. In most cases the bounding process corrects only about 25 percent of the amount the variable is over or below its limit. The size of this correction could be raised to reflect the actions of a more active planning association with sufficient funds to correct more of the

deviations. The amount spent in the adaptive process subtracted from total regional income gives net per capita income (NPI).

Highlights of Results

Thirty-one 15-year (1970-1985) simulation runs were made for each region. One run was made with the policy variables set near their average for the 1965-1970 period. Then 30 other runs allocated additional development funds to improve the economic conditions of each region. These additional runs represented different ways of allocating a fixed amount of long-range development funds to the four primary policy variables.

The tables in Chapter IV present what was deemed to be the set of variables of most interest to economic planners. In general the most noticeable result was the contrast between the strategies with a heavy industrialization allocation and the strategies with a large welfare allocation. The strategies emphasizing industrialization yielded the highest total regional income, lowest percent in poverty, and an apparently healthy regional economy as evident from an overall examination of the regional socio-economic indicators. In general, the large welfare allocations resulted in raising income and lowering percent in poverty only in the first few years. The welfare strategies allowed deterioration of other important socio-economic variables which increased outmigration, lowered birthrates, etc., causing the region's total population growth rate to be much lower and even negative in a few cases. In the high welfare runs, unemployment, for example, usually reached its upper limit (limit set in bounding process) in the first few years and stayed at or above the limit,

while the adaptive process in the model made annual corrections attempting to keep unemployment under its limit. In the high industrialization strategies, unemployment usually remained low and most other socio-economic variables indicated a healthy region. Total regional income increased significantly for the industrialization strategies and total population increased as people moved into the region because of the improved conditions--primarily the availability of jobs. The industrialization strategies also had the most noticeable impact on poverty as measured by the variable POVACML (percent poverty accumulated).

An examination of the various extreme allocations of development funds points toward several conclusions. It is difficult to accept a single goal such as income maximization, poverty minimization, or cost effectiveness even though the adaptive process broadens the objective function. The need to consider the goals of a region, the type of development efforts which the region's economy can handle, and the interdependence between regions cannot be overemphasized. These are things regional policy makers must keep in mind when formulating development plans. In the attitudes survey mentioned earlier (17), respondents in the respective regions were asked to indicate (1) what they considered to be the most important problems in their area, and (2) how much and what type of development efforts they favored. Residents of each region showed strong support for increasing the population of their local communities. This strong support for the population growth goal (73 percent wanted their communities to grow) suggests support for strategies emphasizing industrialization which would help to retain the existing population and draw people into the

region. Respondents were overwhelmingly (83 percent) in favor of industrial development efforts and many (66 percent) were willing for the community to offer incentives to prospective firms. The pattern of responses was generally similar across the three districts with a few notable differences. The primary difference was that the two districts with higher unemployment rates and lower per capita income levels, SODA and EODD, seemed more aware of a lack of jobs and showed more support for industrialization to create jobs. But the people in more economically healthy NODA were more concerned with unmotivated and untrained workers and they wanted relatively more funds spent for education and training. The results of this preference study show that the goals of people differ among regions (if the goals of a district are formed by people such as those sampled in this survey), and these differences are related to regional economic conditions. Preferences of SODA and EODD residents toward industrialization seem consistent with strategies which the region needs, can absorb, and can respond to.

In 1970 SODA had an unemployment rate of about 5.5 percent with somewhat higher rates in some of the years just prior to 1970. The income level has historically been fairly low in SODA (as compared to NODA and the Oklahoma City and Tulsa districts). In general, the industrialization strategies were the most successful in SODA. More specifically, strategy 5 (100 percent industrialization) was the long-range development plan which had the maximum income in year 15 and minimized accumulated poverty for the 15 years. The most efficient strategies had slightly smaller industrialization allocations combined with some education or training expenditures. Specifically, strategy

10 (50 percent industrialization and 50 percent education) had the highest value of DSYDSPF (ratio of accumulated discounted income to accumulated discounted costs) after 15 years. The strategies with heavy welfare expenditures were relatively successful in the early years with significant increases in income and high values of DSYDSPF, the efficiency measure. The strategies with large welfare allocations would probably be desirable for SODA decision makers only as short-term contingency plans. The maximum increase in net regional income (NREGY) under strategy 5 was 20 percent. Total population decreased in a few strategies but increased by about 7 percent under strategy 5 over the 15 years (from 165,000 to 176,000). Specific strategies with heavy allocations in education or training had significant impacts on specific socio-economic indicators such as the mean education level (MNEDL), the skill index (SKLVL), or the regional attractiveness index (REGATRC). The same strategies had similar relative impacts on the other two regions.

In NODA, where there were no severe economic problems, additional funds allocated to economic development did not improve the economic health of the region as much as in the other two regions. Some progress was apparent, however, especially as indicated by socio-demographic variables such as education and skill levels. A lower per capita expenditure of development funds would likely be more efficient in NODA since the needs and excess public service capacity are less than in the other two regions. Based on simulation results and goals for NODA from the attitudes survey, an acceptable strategy in NODA might be to spread funds more evenly among the three policy functions--industrialization, education, and training. In the survey, NODA

residents indicated a positive preference for population increase, but a sparsely populated region like NODA with little excess public service capacity would need to make some large capital adjustments in public services and infrastructure. There are mechanisms within the model which call forth capital expenditures when needed, but the adjustment takes place only after current capacity is actually exceeded. These needed adjustments must be anticipated and made before the region gets into unmanageable problems as rapid changes occur in response to heavy development expenditures.

EODD (Eastern Oklahoma Development District) had higher unemployment and lower income than SODA and was more in need of economic development than either of the other two regions. EODD was the only one of the three regions to experience a population increase during the 1960's as well as net inmigration. In general, the simulated development efforts were more successful in EODD than in SODA or NODA; NREGY increased by almost 35 percent under strategy 5 (100 percent industrialization). Because of demographic characteristics including age distribution, high initial birthrates, low initial death rates, and migration patterns, the population continued to increase quite rapidly in the simulation runs (especially under the development plans which improved economic conditions the most). The heavy inmigration in EODD may be realistic considering EODD adjoins the Tulsa SMSA. The eastward growth of Tulsa along the Arkansas River system and around the Port of Catoosa also contributes to the influx of people into the region.

Conclusions, Applications, and Improvements

Simulation provides the development economist with a flexible tool with which to examine a large number of development strategies. The preferred strategy depends upon goals of the region as well as technical trade-offs among programs. The attitudes survey used by Smith and Tweeten (17) is one method by which decision makers can identify socio-economic development goals. The findings from the simulation model regarding efficient and effective development programs correspond roughly to the preferences expressed by residents. It appears that the residents do have an understanding of what constitutes effective remedies to development problems.

The model developed in this study was designed to analyze alternative strategies of economic development for three specific development districts. While the characteristics of the three specific development districts conditioned the design of the model, this conditioning was not so severe as to prevent the model from being applied to other problems and other development districts. Of course the model may need modifications and extensions when it is applied under other circumstances.

The model can be adjusted in many ways to fit the needs of the situation. The following is a list of some of these adjustments which could be made to adapt the model to other needs:

(1) change the total fixed amount of public funds allocated to the four primary policy variables in the delineation of the long-range development plans,

(2) change the bounds on the variables that are monitored in the adaptive process (bounds could be set by decision makers in the region),

(3) change the limits on how much can be spent through a particular policy variable or even the amount that can be spent through a policy variable for one specific purpose,

(4) change any of the many exogenous variables and study the impact on the model,

(5) change constants, coefficients, etc., and

(6) change the length of the time period from a year to a quarter or even a month.

In addition to the above suggestions which could be used to extend the usefulness of the model, there are certain things that the researcher has concluded, from final evaluations of the study, which could be done to improve the model. These suggestions could become quite involved and would require a lengthy explanation if they were explained completely. To avoid such a long, detailed discussion of possible improvements on the model, the suggestions will be presented in a list with only a brief explanation for each:

(1) Rely on indicators of poverty and/or underemployment to determine the appropriate total level of spending for a region. This would help to focus funds in regions where they would be best used rather than provide the same per capita spending for all regions.

(2) Movement of people across regional boundaries may be too large to be realistic in some cases; therefore new limits on migration may be necessary. The total labor force and total employment variables may also be too responsive to changes in other variables in the

model, causing large swings in unemployment which may be greater than expected.

(3) Because of conflicts of interest among regions of the sizes in this study, decisions that are made in one region will affect other regions. This interdependence suggests the need for decision-making at higher than the regional level. More relevant to this study, the interdependence emphasizes the need to consider a larger region (possibly several states) with several districts within a region. Each region, as simulated in this study, is dependent on other regions since exogenous variables determined in the other regions do affect the internal workings of the regional economy. It would be useful to simulate regional economies together so that the actual links between the regions would not be necessary. Also, it could improve the accuracy of the simulations to have more comparative type variables (a regional variable compared to the same variable outside the region) than are currently in the model. This would strengthen the connections between regions.

(4) In some of the strategies studied, it was evident that the mix of total funds spent in the long-range development plans needed to the flexible over time. Of course the mix of development funds spent through various alternatives changes over time because of the adaptive process. In some cases, the mix may need to change more by altering the proportions allocated to the primary policy functions.

(5) If the economic development goals of a region could be completely specified and quantified, a multiple objective function could be built into the model to make it an optimizing model. In some cases, it may be best to devise a more complete control process with

less dependence on the direct study of alternatives by the policy makers. Of course policy makers can use any available information concerning goals to reduce the number or relevant alternatives.

(6) An alternative definition of regional development includes the well-being of persons who leave a region. Use of this concept entails counting as income the economic gain of outmigrants. This procedure places greater emphasis on programs of education and training to prepare people for jobs elsewhere.

BIBLIOGRAPHY

1. Alonso, William. "Location Theory." Regional Development and Planning: A Reader. Eds. John Friedmann and William Alonso. Cambridge, Mass.: The M. I. T. Press, 1964, pp. 505-525.

2. Chang, James. "DYNAMO." (Unpublished paper presented in a departmental seminar in Agricultural Economics, March, 1975.) Stillwater, Oklahoma: Oklahoma State University, 1975.

3. Eddleman, B. R. and F. H. Tyner. "A Simulation Model for Forecasting Development of Rural Areas." Quantitative Techniques with Application to Rural Development Research. Eds. Garnett L. Bradford and Fred B. Saunders. Southern Farm Management Research Committee, Farm Foundation, March, 1972, pp. 178-197.

4. Edwards, Clark. "A Simple, Two-Region Simulation of Population, Income, and Employment." Agricultural Economics Research. Washington: Economic Research Service, U. S. Department of Agriculture, Vol. 22, No. 2, April, 1970, pp. 29-36.

5. Edwards, Clark and Rudolph Depass. Rural-Urban Population, Income, and Employment: A Simulation of Alternative Futures. Washington: Economic Research Service, U. S. Department of Agriculture, Report No. 218, December, 1971.

6. Edwards, Clark and Rudolph Depass. Alternative Futures for Nonmetropolitan Population, Income, Employment, and Capital. Washington: Economic Research Service, U. S. Department of Agriculture, Report No. 311, November, 1975.

7. Edwards, Clark. Strategies for Balanced Rural-Urban Growth. Washington: Economic Research Service, U. S. Department of Agriculture, Bulletin No. 392, March, 1976.

8. Fabrycky, W. J. and Paul E. Torgensen. Operations Economy: Industrial Applications of Operations Research. Englewood Cliffs, N. J.: Prentice-Hall, Inc., 1966.

9. Forrester, Jay W. Urban Dynamics. Cambridge, Mass.: The M. I. T. Press, 1970.

10. Friedman, John R. P. "Location Aspects of Economic Development." Land Economics, November, 1956.

11. Guthrie, Harold W. Microanalytic Simulation Modeling for Evaluation of Public Policy. Washington: The Urban Institute, Reprint 105-509-1, 1972.

12. Hamilton, H. R., S. E. Goldstone, J. W. Milliman, A. L. Pugh III, E. B. Roberts and A. Zellner. Systems Simulation for Regional Analysis: An Application to River-Basin Planning. Cambridge: The M. I. T. Press, 1972.

13. Haveman, Robert H. "Benefit-Cost Analysis and Family Planning Programs." Population and Development Review, Vol. 2, No. 1, March, 1976, pp. 37-64.

14. Kain, John F. The NBER Urban Simulation Model and Urban Economics in the 1970's. New York: National Bureau of Economic Research, Annual Report, September, 1971.

15. Nelson, James. "Systems Simulation of Public Policy Strategies for Multicounty District Economic Development." (Unpub. Ph.D. thesis, Oklahoma State University, 1974.)

16. Pugh, Alexander L. DYNAMO II User's Manual. Cambridge, Mass.: The M. I. T. Press, 1972.

17. Smith, Jackie and Luther Tweeten. "Attitudes Toward Rural Development in Three Multicounty Districts in Oklahoma." Journal of the Community Development Society, Vol. 7, No. 2, 1976.

18. Smith, Jackie and Luther Tweeten. "Determinants of Cost-Effectiveness of Public Funds Used to Generate Jobs through Industrial Development Projects: The EDA Experience." (Unpublished paper presented at Southern Agricultural Economics Association meeting, Atlanta, February, 1977.) Stillwater, Oklahoma: Oklahoma State University, 1977.

19. Spiegelman, Robert G., E. L. Baum and L. E. Talbert. A Case Study of Economic Planning in Rural South Central Kentucky. Washington: Resource Development Economics Division, Economic Research Service, U. S. Department of Agriculture, Technical Bulletin No. 1339, March, 1965.

20. Tweeten, Luther. Foundations of Farm Policy. Lincoln: University of Nebraska Press, 1970.

21. Tweeten, Luther. "Elements of Economic Growth in Rural Areas." Research Application in Rural Economic Development and Planning. Ed. Luther Tweeten. Stillwater: Oklahoma State University, Experiment Station Research Report P-665, July, 1972.

22. Tweeten, Luther. Micropolitan Development. Ames: Iowa State University Press, 1976.

23. U. S. Bureau of Census. County and City Data Book, 1962, 1967, and 1972. Washington: U. S. Government Printing Office.

24. U. S. Bureau of Census. County Business Patterns 1970, Oklahoma. Washington: U. S. Government Printing Office, June, 1971.

25. U. S. Bureau of Census. 1970 Census of Housing--Oklahoma. Washington: U. S. Government Printing Office, Part 38, August, 1972.

26. U. S. Bureau of Census. 1970 Census of Population--Oklahoma. Washington: U. S. Government Printing Office, Vol. 1, Part 38, February, 1973.

27. U. S. Bureau of Census. Statistical Abstract of the United States, 1975. Washington: U. S. Government Printing Office, July, 1975.

28. University of Oklahoma. Oklahoma Data Book, 1966. Norman: Bureau of Business Research, 1967.

29. University of Oklahoma. Statistical Abstract of Oklahoma, 1972. Norman: Center for Economic and Management Research, May, 1973.

30. University of Oklahoma. Supplement: Statistical Abstract of Oklahoma, 1972. Norman: Center for Economic and Management Research, January, 1975.

APPENDIXES

APPENDIX A

DEFINITIONS OF VARIABLES IN MODEL

This appendix includes definitions (Table XXVII) of some additional variables that are used in the model but are not given in the results chapter which need to be defined to make the computer model more understandable for the reader.

TABLE XXVII

SOME MORE MODEL VARIABLES DEFINED*

Variable Name	Definition
CHLD	= Children, age 0-12
TN	= Teenagers, age 13-19
YALD	= Young adults, age 20-24
PRM	= Prime agers, age 25-44
MA	= Middle agers, age 45-64
OLD	= Oldsters, over 65
BRTHS	= Births per year
MEN	= Number of men
WOMEN	= Number of women
BRTN	= Teenage birthrate, births per person per year
BRYALD	= Young adults birthrate, births per person per year
BRPRM	= Prime agers birthrate, births per person per year
BRMA	= Middle agers birthrate, births per person per year
MGCHLD	= Children migrating (net)
MGTN	= Teenagers migrating (net)
MGYALD	= Young adults migrating (net)
MGPRM	= Prime agers migrating (net)
MGMA	= Middle agers migrating (net)
MGOLD	= Oldsters migrating (net)
LFTN	= Teenagers in labor force
LFYALD	= Young adults in labor force
LFPRM	= Prime agers in labor force
LFMA	= Middle agers in labor force
LFOLD	= Oldsters in labor force
EDLVL	= Overall education index
TRLVL	= Overall training index
NATSKL	= Overall national skill level
LABOR	= Percent labor type employment
MGMENT	= Percent management employment
PROFSNL	= Percent professional employment
WNWORK	= Number of women working
EMPGVT	= Government sector employment
EMPAG	= Agriculture sector employment
EMPSV	= Service sector employment
EMPMF	= Manufacturing sector employment
EMPTRD	= Trade sector employment
EMPMN	= Mining sector employment
UNDEMP	= Underemployment index
NUNEMP	= National unemployment
NATAVWG	= National wage rate
SKLINDX	= Skill level ratio, retional/national
WGINDX	= Wage rate ratio, national/regional
LDINDX	= Labor density ratio, regional/national
OCINDX	= Other costs ratio, national/regional
PLINDX	= Pollution ratio, national/regional
I	= Total investment, 1000's of dollars

TABLE XXVII (Continued)

Variable Name	Definition
PRCPI	= Per capita capital investment
INTI	= Internal investment, 1000's of dollars
EXTI	= External investment, 1000's of dollars
GVTI	= Government investment, 1000's of dollars
DEPRC	= Capital depreciation, 1000's of dollars
GVTPRD	= Government sector production, 1000's of dollars
AGPRD	= Agriculture sector production, 1000's of dollars
SVPRD	= Service sector production, 1000's of dollars
MFPRD	= Manufacturing sector production, 1000's of dollars
TRDPRD	= Trade sector production, 1000's of dollars
MNPRD	= Mining sector production, 1000's of dollars
AGPRICE	= Agricultural price index
PROIL	= Oil price index
PI	= Per capita income
DPI	= Per capita disposable income
PPOV	= Percent poverty
PMCL	= Percent in middle income range
PAFL	= Percent affluence
NWLF	= Number on welfare
PCWLF	= Percent on welfare
POSTF	= Positive transfers into region, 1000's of dollars
CONS	= Per capita consumption
REGP	= Regional price index
NTPRC	= National price index
EDSPD	= Public school expenditures, 1000's of dollars
PSCOST	= Regional public school costs, 1000's of dollars
SCFUNDS	= Federal and state public school funds to region, 1000's of dollars
TCHSTD	= Teacher/student ratio
SCHREV	= Regional school revenue, 1000's of dollars
VTTRN	= Vocational training level
HSASSD	= Total assessed value of housing
HSMKTV	= Total market value of housing
MNHSNG	= Mean value of housing units
PSBSTBH	= Percent substandard housing
HSDNST	= Housing density, housing units per square mile
HSDEP	= Housing depreciation (net)
NWSTRS	= Number of new housing starts
HOUSES	= Total number of housing units
SLSTX	= Sales tax receipts, 1000's of dollars
TAXSCH	= School tax receipts, 1000's of dollars
OTHTX	= Other property tax receipts, 1000's of dollars
MSCTX	= Miscellaneous local government receipts, 1000's of dollars
FDSTFD	= Federal and state funds to regional local governments, 1000's of dollars
TRCPTS	= Total local government receipts

TABLE XXVII (Continued)

Variable Name	Definition
PERTAX	= Per capita taxes
GVTNEXP	= Total regional government expenditures, 1000's of dollars
INDSTPI	= Thousands of dollars allocated to industrialization to optimize objective function, long-run development
WLFPYPI	= Thousands of do-lars allocated to welfare to optimize objective function, long-run development
EDFNDPI	= Thousands of dollars allocated to education to optimize objective function, long-run development
TRSPDPI	= Thousands of dollars allocated to vocational training to optimize objective function, long-run development
INDUST	= Total thousands of dollars spent in industrialization (policy variable)
WLFPYMT	= Total thousands of dollars spent in welfare (policy variable)
EDFNDS	= Total thousands of dollars spent in education (policy variable)
TRSPD	= Total thousands of dollars spent in vocational training (policy variable)
MGENCG	= Total thousands of dollars spent in migration encouragement
LNSUB	= Total thousands of dollars spent in loan subsidies to increase new starts (policy variables)
EXGINJ	= Total thousands of dollars spent in local government injection spending (policy variable)
FMLPL	= Total thousands of dollars spent in family planning programs (policy variable)
GLEDUC	= Total thousands of dollars spent in region's general education account (policy variable)
TSFNDS	= Total thousands of dollars spent in education, hiring new teachers to raise the teacher/student ratio (policy variable)
INDUNMP	= Thousands of dollars of industrialization funds spent to correct unemployment
INDPWLF	= Thousands of dollars of industrialization funds spent to correct percent welfare
INDTMG	= Thousands of dollars of industrialization funds spent to correct migration

*Most of the variables used in the model are defined on NOTE cards within the computer output (see Appendix B). Also refer to computer model for more complete definitions of variables in this table.

APPENDIX B

COMPUTER SIMULATION MODEL

This appendix presents the computer simulation model including the adaptive mechanism and data for the three regions.

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* REGIONAL ECONOMIC SIMULATION MODEL
NOTE
NOTE   DEMOGRAPHIC     SECTOR
NOTE
A POP.K=CHLD.K+TN.K+YALD.K+PRM.K+MA.K+OLD.K   TOTAL POPULATION IN K
NOTE POP = TOTAL POPULATION
NOTE CHLD= CHILDREN  0-12
NOTE TN  = TEENAGERS 13-19
NOTE YALD = YOUNG ADULTS 20-24
NOTE PRM = PRIME AGERS  25-44
NOTE MA  = MIDDLE AGERS 45-64
NOTE OLD = OLDSTERS     OVER 65
NOTE
L CHLD.K=CHLD.J+(DT)(BRTHS.J+MGCHLD.J-GRCHLD.J-DLTCHLD.J)
N CHLD=CHLDN
NOTE BRTHS =  BIRTHS PER YEAR
NOTE MGCHLD=  CHILDREN MIGRATING (NET) POSITIVE IF MORE COMING IN  PR YR
NOTE GRCHLD=  CHILDREN AGING OUT OF AGE CLASS. PER YEAR
NOTE DLTCHLD= DEATHS(OF CHILDREN) PER YEAR
NOTE
L TN.K=TN.J+(DT)(GRCHLD.J+MGTN.J-GRTN.J-DLTTN.J)
N TN=TNN
NOTE MGTN = TEENAGERS MIGRATING PER YEAR
NOTE GRTN = TEENAGERS AGING OUT OF AGE CLASS. PER YEAR
NOTE DLTTN= DEATHS(OF TN'S) PER YEAR
NOTE
L YALD.K=YALD.J+(DT)(GRTN.J+MGYALD.J-GRYALD.J-DLTYALD.J)
N YALD=YALDN
NOTE MGYALD = YOUNG ADULTS MIGRATING  PER YEAR
NOTE GRYALD = YALD'S  AGING OUT OF AGE CLASS. PER YEAR
NOTE DLTYALD= DEATHS(OF YALD'S)  PER YEAR
NOTE
L PRM.K=PRM.J+(DT)(GRYALD.J+MGPRM.J-GRPRM.J-DLTPRM.J)
N PRM=PRMN
NOTE MGPRM = MIGRATING PRIME AGERS   PER YEAR
NOTE GRPRM = PRM'S AGING OUT OF AGE CLASS. PER YEAR
NOTE DLTPRM= DEATHS(OF PRM'S) PER YEAR
NOTE
L MA.K=MA.J+(DT)(GRPRM.J+MGMA.J-GRMA.J-DLTMA.J)
N MA=MAN
NOTE MGMA =  MIGRATING MIDDLE AGERS   PER YEAR
NOTE GRMA =  MA'S AGING OUT OF AGE CLASS. PER YEAR
NOTE DLTMA= DEATHS(OF MA'S)  PER YEAR
NOTE
L OLD.K=OLD.J+(DT)(GRMA.J+MGOLD.J-DLTOLD.J)
N OLD=OLDN
NOTE MGOLD = MIGRATING OLDSTERS    PER YEAR
NOTE DLTOLD= DEATHS(OF OLDSTERS)  PER YEAR
NOTE
NOTE  BIRTHS
A BRTHS.K=(BRTN.K)(TN.K)+(BRYALD.K)(YALD.K)+(BRPRM.K)(PRM.K)
X    +(BRMA.K)(MA.K)
NOTE
NOTE REMEMBER BRTHS = BIRTHS PER YEAR (LIVE BIRTHS)
NOTE BRTN= BIRTH RATE TEENAGERS     BIRTHS PER PERSON PER YEAR
NOTE BRYALD=BIRTH RATE YOUNG ADULTS BIRTHS PER PERSON PER YEAR
NOTE BRPRM =BIRTH RATE PRIME AGERS  BIRTHS PER PERSON PER YEAR
NOTE BRMA  =BIRTH RATE MIDDLE AGERS BIRTHS PER PERSON PER YEAR
NOTE
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NOTE BIRTH RATES WILL BE DEPENDENT ON UNEMPLOYMENT,INCOME,MONEY
L BRTN.K=BRTN.J+(DT)(BRTNCHG.JK)  BRTNCHG=CHANGE TNAGE BIRTHRATE
N BRTN=BRTNN
R BRTNCHG.KL=(.000005)(PICHG1.K)-(.03)(UNMPCH1.K)-(.000001)(FMLPL.K)+
X (TRTNBR.K)
NOTE FMLPL= FAMILY PLANNING FUNDS $1000'S OF DOLLARS
NOTE TRTNBR=TREND FACTOR IN TNAGE BIRTHS  MOVES MOSTLY WITH EDUCATION
NOTE
A TRTNBR.K=TABLE(TTRTNBR,TIME.K,0,25,5) TREND JUST FOR TEENAGERS
L BRYALD.K=BRYALD.J+DT*BYALDC.JK
N BRYALD=BRYALDN
NOTE  BYALDC=RATE OF CHANGE OF BIRTHRATES FROM CURRENT AND PREVIOUS PERD
R BYALDC.KL=(.00001)(PICHG1.K)-(.1)(UNMPCH1.K)-(.000001)(FMLPL.K)+
X (TRYLDBR.K)
NOTE TRYLDBR = TREND IN YOUNG ADULTS BIRTHRATES
A TRYLDBR.K=TABLE(TTRYLDB,TIME.K,0,25,25)
NOTE
L BRPRM.K=BRPRM.J+DT*BPRMC.JK
N BRPRM=BRPRMN
NOTE  BPRMC=RATE OF CHANGE OF PRM AGE BIRTHRATES
R BPRMC.KL=(.000005)(PICHG1.K)-(.02)(UNMPCH1.K)-(.000001)(FMLPL.K)+
X (TRPBR.K)
NOTE  TRPBR= TREND IN PRM AGE BIRTHRATES
A TRPBR.K=TABLE(TTRPBR,TIME.K,0,25,5)
L BRMA.K=BRMA.J+DT*BRMAC.JK
N BRMA=BRMAN
NOTE BRMAC= RATE OF CHANGE OF MIDDLE AGE BIRTHRATES
R BRMAC.KL=(.000002)(PICHG1.K)-(.01)(UNMPCH1.K)-(.000001)(FMLPL.K)+
X (TRMB.K)
NOTE TRMB= TREND IN MDL AGE BIRTHRATES
A TRMB.K=TABLE(TTRMB,TIME.K,0,25,25)
NOTE MIGRATION            MIGRATIONS PER PERSON PER YEAR
A MGCHL1.K=(MG1.K)(CHLD.K)  MG1=CHLD MIG RATE
A MGCHLD.K=MIN(MGCHL1.K,MXCHLDM.K)  MG CHILDS
A MXCHLDM.K=(PCMG1)(CHLD.K)
C PCMG1=.008
A MGT1.K=(MG1.K)(TN.K)  SAME MG RATE AS CHLD
A MGTN.K=MIN(MGT1.K,MXTNM.K)  ACTUAL MG
A MXTNM.K=(PCMGTN)(TN.K)
C PCMGTN=.008
A MGYAL1.K=(MG3.K)(YALD.K)
A MGYALD.K=MIN(MGYAL1.K,MXYLDM.K)  ACTUAL MG
A MXYLDM.K=(PCMGYLD)(YALD.K)
C PCMGYLD=.007
A MGPR1.K=(MG4.K)(PRM.K)
A MGPRM.K=MIN(MGPR1.K,MXPRMG.K)  ACTUAL
A MXPRMG.K=(PCPRMMG)(PRM.K)
C PCPRMMG=.006
A MGM1.K=(MG5.K)(MA.K)
A MGMA.K=MIN(MGM1.K,MXMAMG.K)
A MXMAMG.K=(PCMAMG)(MA.K)
C PCMAMG=.007
A MGOLD.K=(MG6)(OLD.K)      MGOLD=NUMBER OF OLDSTERS MIGRATING    (NET)
NOTE RATES                                  ANNUALLY       +(IN) -(OUT)
A MG1.K=((MG3.K)(YALD.K)+(MG4.K)(PRM.K)+(MG5.K)(MA.K))/(YALD.K+PRM.K
X +MA.K)
L MG3.K=MG3.J+DT*CHMG3.JK
N MG3=MG3N
R CHMG3.KL=.0002(RLWGRT.K)-(.J03)(RLUNEMP.K)-(.0000001)(MGENCG.K)+
X (TRMSYD.K)+(.1)(INDUST.K)(.000002)
```

```
NOTE  MGENCG=MIG ENCOUAGEMENT FUNDS,TRMGYD TREND YALD MIGRATIONS
A TRMGYD.K=TABLE(TTRMGYD,TIME.K,0,25,25) YALD MG TREND
L MG4.K=MG4.J+DT*CHMG4.JK
N MG4=MG4N
R CHMG4.KL=.0001(RLWGRT.K)-(.001)(RLUNEMP.K)-(.0000001)(MGENCG.K)+
X +(TRMGPR.K)+(.1)(INDUST.K)(.000005)
A TRMGPR.K=TABLE(TTRMGPR,TIME.K,0,25,25) TRND PRIME AGE MIGRATIONS
L MG5.K=MG5.J+DT*CHMG5.JK
N MG5=MG5N
R CHMG5.KL=.0001(RLWGRT.K)-(.001)(RLUNEMP.K)-(.0000001)(MGENCG.K)+
X +(TRMGMA.K)+(.1)(INDUST.K)(.000001)
A TRMGMA.K=TABLE(TTRMGMA,TIME.K,0,25,25) TRND MIDDLE AGE MIGRATIONS
NOTE
A ADLTS.K=MGYALD.K+MGPRM.K+MGMA.K    ADULTS COMING INTO REGION
A TTJOBS.K=(.85)(ADLTS.K)(INCDF)      MGS TAKING JOBS
A MGGVTJ.K=(EMPGVTN/TINTEMP.K)(TTJOBS.K)
A MGAGJ.K=(EMPAGN/TINTEMP.K)(TTJOBS.K)
A MGSVNJ.K=(EMPSVN/TINTEMP.K)(TTJOBS.K)
A MGMFJ.K=(EMPMFN/TINTEMP.K)(TTJOBS.K)
A MGTRDJ.K=(EMPTRDN/TINTEMP.K)(TTJOBS.K)
A MGMNJ.K=(EMPMNN/TINTEMP.K)(TTJOBS.K)
A TINTEMP.K=EMPGVTN+EMPAGN+EMPSVN+EMPMFN+EMPTRDN+EMPMNN
NOTE
NOTE  NEXT THE AGING VARIABLES ARE DEFINED, I.E. THE RATES OF THE
NOTE      MOVEMENTS FROM  AGE CLASS  TO AGE CLASS. THE RATE OF GROWING
NOTE      OUT OF A CLASS. IS THE  POP. OF THE CLASS. DIVIDED BY THE
NOTE      TIME SPAN OF THE  AGE  CLASS. OR TIME SPENT IN THE AGE CLASS.
A GRCHLD.K=(CHLD.K)/(TMASCLD)    TMASCLD=TIME AS CHILD
C TMASCLD=13
NOTE
A GRTN.K=(TN.K)/(TMASTN)  NUMBER OF TEENAGERS MOVING INTO YOUNG ADULTS
C TMASTN=7
A GRYALD.K=(YALD.K)/(TMASYLD)
C TMASYLD=5
NOTE
A GRPRM.K=(PRM.K)/(TMASPRM)
C TMASPRM=20
NOTE
A GRMA.K=(MA.K)/(TMASMA)
C TMASMA=20
NOTE  DEATHS AND DEATHRATES
NOTE  DEATHRATE PER PERSON PER YEAR FOR EACH AGE GROUP TIMES
NOTE  THE NUMBER IN THE AGE CLASS. TO GET NUMBER OF DEATHS PER
NOTE  YEAR FOR EACH AGE CLASS.
NOTE
NOTE
A DLTCHLD.K=(DRATE1.K)(CHLD.K)    DLT'S = DEATHSS
A DLTTN.K=(DRATE2.K)(TN.K)        DRATE'S = DEATH RATES
A DLTYALD.K=(DRATE3.K)(YALD.K)
A DLTPRM.K=(DRATE4.K)(PRM.K)
A DLTMA.K=(DRATE5.K)(MA.K)
NOTE                              DLTOLD CALCULATED AS AGING VARIABLE
A DLTOLD.K=(OLD.K)/(TMASOLD.K)    WITH TMASOLD THE AVERAGE ADDITIONAL
NOTE                              LIFE OF PERSONS REACHING AGE 65, IT IS
NOTE                              A FUNCTION OF A TREND AND INCOME JUST
NOTE                              AS THE DEATHRATES FOR THE OTHER AGES
NOTE
L DRATE1.K=DRATE1.J+DT*CHGDR1.JK
N DRATE1=DRATE1N
R CHGDR1.KL=(TRDR1.K)-(5.0E-7)(PICHG1.K)
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```
A TRDR1.K=TABLE(TTRDR1,TIME.K,0,25,25) TREND CHLD DEATH RATE
L DRATE2.K=DRATE2.J+DT*CHGDR2.JK
N DRATE2=DRATE2N
R CHGDR2.KL=(TRDR2.K)-(1.0E-7)(PICHG1.K)
A TRDR2.K=TABLE(TTRDR2,TIME.K,0,25,25)
L DRATE3.K=DRATE3.J+DT*CHGDR3.JK
N DRATE3=DRATE3N
R CHGDR3.KL=(TRDR3.K)-(3.0E-7)(PICHG1.K)
A TRDR3.K=TABLE(TTRDR3,TIME.K,0,25,25)
A TMASOLD.K=TABLE(TTMASOL,TIME.K,0,25,25) AVERAGE LIFE SPAN AFTER 65
T TTMASOL=13/14
L DRATE4.K=DRATE4.J+DT*CHGDR4.JK
N DRATE4=DRATE4N
R CHGDR4.KL=(TRDR4.K)-(4.0E-7)(PICHG1.K)
A TRDR4.K=TABLE(TTRDR4,TIME.K,0,25,25)
L DRATE5.K=DRATE5.J+DT*CHGDR5.JK
N DRATE5=DRATE5N
R CHGDR5.KL=(TRDR5.K)-(5.0E-7)(PICHG1.K)
A TRDR5.K=TABLE(TTRDR5,TIME.K,0,25,25)
NOTE
NOTE
A WOMEN.K=(PRCWN.K)(POP.K)     WOMEN= NUMBER OF WOMEN;PRCWN=PERCENT WNMEN
A MEN.K=POP.K-WOMEN.K          MEN  = NUMBER OF MEN
A PRCWN.K=TABLE(TPRCWN,TIME.K,0,25,25)
L WNWORK.K=WNWORK.J+DT*CHGWNWK.JK     WOMEN WILLING TO WORK OUTSIDE HOME
N WNWORK=WNWORKN
R CHGWNWK.KL=(TRWNWK.K)-(.001)(PICHG2.K)(.10)(WOMEN.K)-(.10)(BRTHCG2.K)
NOTE TRWNWK= TREND IN WOMEN IN LABOR FORCE
NOTE BRTHCG2= CHG IN NUMBER OF BIRTHS
NOTE (.001)(PICHG2.K)(.10)(WOMEN.K) MEANS THAT FOR EVERY 1000$   CHANGE
NOTE                                IN PERSONAL INCOME 10% LESS(MORE) OF
NOTE                                THE WOMEN OF A REGION WILL ENTER THE
NOTE                                LABOR MARKET
NOTE
A TRWNWK.K=TABLE(TTRWNWK,TIME.K,0,25,25)
NOTE
NOTE
NOTE   LABOR FORCE PARTICIPATION,SKILL LEVELS,UNEMPLOYMENT                    B
NOTE   UNDEREMPLOYMENT,WAGES,                                                 B
NOTE                                                                          B
NOTE   LABOR FORCE PARTICIPATION,  LABOR FORCE SIZE                           B
NOTE                                                                          B
A TLF.K=LFTN.K+LFYALD.K+LFPRM.K+LFMA.K+LFOLD.K+COMMTR.K  TOTALLABORFORCE
NOTE                                                                          B
NOTE TLF=TOTAL LABOR FORCE                                                    B
NOTE COMMTR=COMMUTERS INCLUDED IN LABOR FORCE
NOTE
NOTE   THE  TEENAGE LABOR FORCE                                               B
NOTE                                                                          B
A LFTN.K=TN.K-(HCTN.K+UNTTN.K+LZTN.K)(TN.K)
NOTE
NOTE LFTN =TEENAGE LABOR FORCE
NOTE HCTN =TEENAGERS HANDICAPPED,          (PERCENT)
NOTE UNTTN=UNTRAINED TEENAGERS(PERCENT)
NOTE LZTN =TEENAGERS NOT WILLING TO WORK(PERCENT) OR NOT LOOKING
NOTE                 FOR WORK,INCLUDING DISCOURAGED WORKER FACTOR,
NOTE                 AND LACK OF JOB INFORMATION
A HCTN.K=TABLE(THCTN,TIME.K,0,25,25) TABLE FOR PERCENT HANDICAPPED
NOTE
L UNTTN.K=UNTTN.J+DT*(-.06)(CGTNSK.J)    PERCENT UNTRAINED TEENAGERS
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```
N UNTTN=UNTTNN
A CGTNSK.K=ASKTN.K-(DELAY1(ASKTN.K,1))
NOTE  CGTNSK=CHANGE IN TN SKILL LEVEL
NOTE       CURRENT SKILL LEVEL  MINUS LAST YEARS LEVEL
NOTE
NOTE
L LZTN.K=LZTN.J+DT*((-.02)(PWGRTCG.J)-(0.05)(PCWNWK.J))
N LZTN=LZTNN
N PCWNWK=.01
A LFYALD.K=(YALD.K)-((HCYALD.K+UNTYALD.K+LZYALD.K)(YALD.K))
NOTE PUT CARDS FROM OTHER DECK IN HERE FOR IDENTIFICATION
A HCYALD.K=TABLE(THCYALD,TIME.K,0,25,25)
L UNTYALD.K=UNTYALD.J+DT(-.3)(CGYLDSK.J)
N UNTYALD=UNTYALN
A CGYLDSK.K=ASKYALD.K-(DELAY1(ASKYALD.K,1))
L LZYALD.K=LZYALD.J+DT*((-.04)(PWGRTCG.J)-(.07)(PCWNWK.J))
N LZYALD=LZYALDN
NOTE
A LFPRM.K=(PRM.K)-((HCPRM.K+UNTPRM.K+LZPRM.K)(PRM.K))
A HCPRM.K=TABLE(THCPRM,TIME.K,0,25,25)
L UNTPRM.K=UNTPRM.J+DT(-.004)(CGPRMSK.J)
N UNTPRM=UNTPRMN
A CGPRMSK.K=ASKPRM.K-(DELAY1(ASKPRM.K,1))
L LZPRM.K=LZPRM.J+DT*((-.05)(PWGRTCG.J)-(.1)(PCWNWK.J))
N LZPRM=LZPRMN
A LFMA.K=(MA.K)-((HCMA.K+UNTMA.K+LZMA.K)(MA.K))
A HCMA.K=TABLE(THCMA,TIME.K,0,25,25)
L UNTMA.K=UNTMA.J+DT(-.04)(CGMASK.J)
N UNTMA=UNTMAN
A CGMASK.K=ASKMA.K-(DELAY1(ASKMA.K,1))
L LZMA.K=LZMA.J+DT*((-.04)(PWGRTCG.J)-(.05)(PCWNWK.J))
N LZMA=LZMAN
NOTE
NOTE
A LFOLD.K=(OLD.K)-((HCOLD.K+UNTOLD.K+LZOLD.K)(OLD.K))
A HCOLD.K=TABLE(THCOLD,TIME.K,0,25,25)
L UNTOLD.K=UNTOLD.J+DT(-.01)(CGOLDSK.J)
N UNTOLD=UNTOLDN
A CGOLDSK.K=ASKOLD.K-(DELAY1(ASKOLD.K,1))
L LZOLD.K=LZOLD.J+DT*((-.005)(PWGRTCG.J)-(.01)(PCWNWK.J))
N LZOLD=LZOLDN
NOTE COMMUTERS, NUMBER OF COMMUTERS DEPENDS ON DIFF BETWEEN REG AND NAT
L COMMT1.K=COMMT1.J+DT*((.04)(RLWGRT.J)+(0.5)(PWGRTCG.J))(COMMT1.J)
N COMMT1=COMMTRN
A COMMTR.K=MIN(COMMT1.K,.05*POP.K)
N COMMTR=COMMTRN                              DIFF  $1.00 5 PRC COMMTR
NOTE
NOTE  SKILL LEVELS, TOTAL AND VARIOUS SEGMENTS OF THE LABOR FORCE
A SKLVL.K=((EDLVL.K)+(TRLVL.K))/2   REGIONAL OVERALL SKILL LEVEL
A EDLVL.K=(EDTN.K*TN.K+EDYALD.K*YALD.K+EDPRM.K*PRM.K+EDMA.K*MA.K
X +EDOLD.K*OLD.K)/(TN.K+YALD.K+PRM.K+MA.K+OLD.K) OVERALL EDUC LEVEL
A TRLVL.K=(TRNTN.K*TN.K+TRNYALD.K*YALD.K+TRNPRM.K*PRM.K+TRNMA.K*MA.K
X +TRNOLD.K*OLD.K)/(TN.K+YALD.K+PRM.K+MA.K+OLD.K)
NOTE
NOTE NATIONAL SKILL IS EQUAL TO ONE THE FIRST YEAR, IT WILL INCREASE
NOTE VERY GRADUALLY TO ACCOUNT FOR AN ASSUMED NAT SKILL LEVEL INCREASE
L NATSKL.K=NATSKL.J+DT*(RNDMSKL.J)
N NATSKL=1.0
N RNDMSKL=0
A RNDMSKL.K=NORMRN(0.005,.001)  A MEAN INCREASE/YEAR=.005=.5 PERCENT
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L EDTN.K=EDTN.J+DT*(0.25)(MNEDCG1.J)
N EDTN=EDTNN                          CHG 1YR MNED=25 PRC CHG EDTN
L TRNTN.K=TRNTN.J+DT*(0.50)(VTTRCG1.J)
N TRNTN=TRNTNN
A ASKTN.K=(EDTN.K+TRNTN.K)/2
L EDYALD.K=EDYALD.J+DT*(0.30)(MNEDCG1.J)
N EDYALD=EDYALDN
L TRNYALD.K=TRNYALD.J+DT*(.75)(VTTRCG1.J)
N TRNYALD=TRNYALN
A ASKYALD.K=(EDYALD.K+TRNYALD.K)/2
L EDPRM.K=EDPRM.J+DT*(0.15)(MNEDCG1.J)
N EDPRM=EDPRMN
L TRNPRM.K=TRNPRM.J+DT*(.5)(VTTRCG1.J)
N TRNPRM=TRNPRMN
A ASKPRM.K=(EDPRM.K+TRNPRM.K)/2
A EDMA.K=TABLE(TEDMA,TIME.K,0,25,25)
A TRNMA.K=TABLE(TTRNMA,TIME.K,0,25,5)
A ASKMA.K=(EDMA.K+TRNMA.K)/2
A EDOLD.K=TABLE(TEDOLD,TIME.K,0,25,25)
A TRNOLD.K=TABLE(TTRNOLD,TIME.K,0,25,5)
A ASKOLD.K=(EDOLD.K+TRNOLD.K)/2
NOTE  NOW FOR DEFINITIONS OF SOME OF VARIABLES USED ABOVE
NOTE   SKLVL=REG OVERALL SKILL LEVEL INDEX
NOTE   EDLVL=REG EDUC COMPONENT OF SKILL INDEX
NOTE   TRLVL=REG TRAINING COMPONENT OF SKILL INDEX
NOTE   EDTN,EDYALD,EDPRM,EDMA,EDOLD=EDUC LEVELS FOR AGE GROUPS
NOTE
NOTE  TRNTN,TRNYALD,TRNPRM,TRNMA,TRNOLD=TRAINING LEVELS FOR AGE GROUPS
NOTE  ASKTN,ASKYALD,ASKPRM,ASKMA,ASKOLD=SKILL LEVEL OF EACH AGE GROUP
NOTE                 ASK----IS THE AVERAGE OF ED AND TRN INDEX COMPONENT
NOTE                                                FOR AGE GROUP
NOTE
NOTE      EXPLANATION OF UNITS OF MEASUREMENT FOR SKILL LEVELS
NOTE   SKILL LEVEL UNITS(0 TO 2) WITH 1.0 NT AVG AT START, STRICTLY DEND
NOTE   AS THE PRCNT OF REGIONAL WORKERS WITH MORE(>1),LESS(<1)
NOTE   TRAINING THAN THE NATIONAL AVERAGE FOR THAT AGE GROUP. THE
NOTE   MODEL WILL HAVE GOOD INITIAL VALUES AND SENSITIVITY ANALYSIS
NOTE   WILL BE USED VALIDATE THE RESPONSE COEFFICIENTS. ALSO THE PERCENT
NOTE   CHANGES IN  THE  ED AND TRNING COMPONENTS OF THE SKILL LEVELS ARE
NOTE   DESIGNED TO ACCURATELY REFLECT CORRESPONDING PERCENT. CHANGES IN
NOTE MEDIAN EDUC AND VOCAT TRAINING W.R.T. THEIR NATIONAL LEVELS
NOTE
NOTE  NAT SKLVL INCREASES AWAY FROM INITIAL VALUE OF ONE TO
NOTE   FACILITATE THE COMPARISON OVER THE YEARS TO REG SKL LEVEL
NOTE   VALUES AS THE REG SKLVL ACCNTS FOR ALL INCREASES WHETHER
NOTE   DUE TO PLANNED ACTION OR NOT- THEREFORE THE NAT VALUE
NOTE  WILL INCREASE AWAY FROM ONE AT A RATE THAT WOULD APPROXIMATE
NOTE   THE PROPORTION OF THE REG SKILL LEVEL  CHANGE THAT COULD
NOTE   NOT BE ASSOCIATED WITH SOME VARIABLE INCLUDED IN THE MODEL-
NOTE   GENERALLY A MEAN INCREASE   OF .5 PERCENT INCREASE PER YEAR
NOTE
NOTE PERCENT LABOR,MGTMENT,PROFESSIONAL
L PRCLBR.K=LABOR.J+DT*((0.900)(CGPRMFG.J)-(.0001)(PICHG1.J)
X -(0.10)(MNEDCG1.J)) 1YEAR ED=.10PRCLBR  CHG$1000=CHG .10 PRCLBR
N PRCLBR=LABORN
N LABOR=LABORN
NOTE CGPRMFG=CHG IN PERCENT MFG EMPLOYMENT
NOTE  ABOVE FORM OF LEVEL EQ MAY OR MAY NOT WORK, WATCH IT CLOSELY
L PRCPREL.K=PROFSNL.J+DT*((.0001*PICHG1.J)+(00.10*MNEDCG1.J))
N PRCPREL=PROFSNN
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N PROFSNL=PROFSNN        PERCENT PROFESSIONAL    INITIAL VALUE
L PRCMGMT.K=MGMENT.J
N PRCMGMT=MGMENTN
N MGMENT=MGMENTN
NOTE  NOW TO ADJUST ABOVE PERCENTAGE TO ALWAYS TOTAL ONE
A ADJ1.K=(1.0)/(PRCLBR.K+PRCMGMT.K+PRCPREL.K)
NOTE ADJ1=ADJUSTMENT CONSTANT TO BE USED TO INSURE THAT ABOVE PERCENTS
NOTE       TOTAL TO 1.0
A LABOR.K=(PRCLBR.K)(ADJ1.K)
A MGMENT.K=(PRCMGMT.K)(ADJ1.K)
A PROFSNL.K=(PRCPREL.K)(ADJ1.K)
NOTE
NOTE  PRCLBR,PRCMGMT,PRCPREL=ACTUAL VALES THAT ARE DIRECTLY DEPENDENT
NOTE  ON THE INFLUENCING VARIABLES
NOTE  LABOR,MGMENT,PROFSNL=ADJUSTED VALUES OF PERCENT LABOR,MGMENT,
NOTE  AND PROFESSIONAL,VALUES TO BE PRINTED IN OUTPUT
NOTE
NOTE
NOTE   EMPLOYMENT(LABOR DEMAND)
NOTE                                CHECK TEMPL,K=1,WITH CENSUS DATA,ADD
A TEMPL.K=EMPGVT.K+EMPAG.K+EMPSV.K+EMPMF.K+EMPTRD.K+EMPMN.K     AG EMPLY
NOTE EMPLOYMENT LEVELS FOR THE SECTORS,
L EMPGVT.K=EMPGVT.J+DT*((0.01)(CHGGVP1.J)-(.07)(PWGRTCG.J)(EMPGVT.J)
X +(CGMLEMP.J))+(.01)(INDUST.J)+(MGGVTJ.J)
N EMPGVT=EMPGVTN     CHG GVT PRD OF 50,000 ADDS ONE JOB NEXT YEAR
A CHGGVP1.K=GVTPRD.K-DELAY1(GVTPRD.K,1)  CHG GVT PRD T-1 TO CURRENT
A CGMLEMP.K=TABLE(TCGMLEM,TIME.K,0,25,5) CHG MILITARY EMPLOYMENT
L EMPAG.K=EMPAG.J+DT*((.17)(AGPRCHG.J)-(.15)(PWGRTCG.J))(EMPAG.J)
X +(MGAGJ.J)
N EMPAG=EMPAGN
A AGPRCHG.K=(AGPRICE.K-DELAY1(AGPRICE.K,1))/(DELAY1(AGPRICE.K,1))
NOTE   AGPRCHG=PERCENT CHG IN AG PRICES
L EMPSV.K=EMPSV.J+DT((.00003)(PICHG1.J)+(.000005)(CHGPOP.J))(EMPSV.J)
X +(.01)(INDUST.J)+(MGSVNJ.J) FOR 10 JOBS CREATED IN MF,ONE IN SVGVT,TRD
N EMPSV=EMPSVN
NOTE CHGPOP=CHANGE IN TOTAL POPULATION
NOTE
L EMPMF.K=EMPMF.J+DT*(-.07)(PWGRTCG.J)(EMPMF.J)+(.07)(INDUST.J)
X +(MGMFJ.J)
N EMPMF=EMPMFN        WAGE RT CHANGE OF $1.00    INDUCES 5PRCENT CHG EMP
L EMPTRD.K=EMPTRD.J+DT((-.04)(PWGRTCG.J)(EMPTRD.J)+(.04)(CHGTRD.J))
X +(.01)(INDUST.J)+(MGTRDJ.J)
N EMPTRD=EMPTRDN                    CHG TRD PROD OF$20,000=1 MORE JOB
A CHGTRD.K=TRDPRD.K-(DELAY1(TRDPRD.K,1))  CHG IN TRADE PRODUCTION
L EMPMN.K=EMPMN.J+DT*((-.01)(PWGRTCG.J)+(0.6)(CHGRSRS.J))(EMPMN.J)
X +(MGMNJ.J)
N EMPMN=EMPMNN
A CHGRSRS.K=(MNRRVS.K-(DELAY1(MNRRVS.K,1)))/(DELAY1(MNRRVS.K,1))
NOTE  CHGRSRS=PERCENT CHANGE IN KNOWN OIL,GAS,COAL RESERVES
NOTE  OIL RESERVES BELOW
A MNRRVS.K=TABLE(TMNRRVS,TIME.K,0,25,5) OIL,GAS,COAL RESERVES
NOTE
NOTE  UNEMPLOYMENT (REGIONAL)
NOTE
A UNEMP.K=((TLF.K-TEMPL.K)/(TLF.K-COMMTR.K))    PRCENT UNEMPLOYMENT
NOTE NATIONAL UNEMPLOYMENT GIVEN BELOW IN TABLE,EXOGENOUS
NOTE OF COURSE NAT RT SAME FOR ALL REGIONS,DIFFERENT FOR VALIDATION
NOTE RUN,1960-1970
A NUNEMP.K=TABLE(TNUNEMP,TIME.K,0,25,1) NAT UNEMPLOYMENT RATE
T TNUNEMP=.044/.05/.06/.07/.08/.08/.08/.075/.07/.07/.07/.07/.07/.07/.07/
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X .07/.07/.07/.07/.07/.07/.07/.07/.07/.07/.07
A NATAVWG.K=TABLE(TNTAVWG,TIME.K,0,25,25) NAT WAGE RT
T TNTAVWG=2.92/5.10
NOTE REGIONAL AVERAGE WAGE RATE=AVWG
L AVWG.K=AVWG.J+DT*((-.25)(PCGTLF.J)+(0.20)(CGSKLVL.J)+(PCGTRND.J)
X +(-.5)(UNMPCH1.J))(AVWG.J)-(.0001)(ADLTS.J)
N AVWG=AVWGN
NOTE UNMPCH1 IN AVWG EQUATION ACTS SOMEWHAT AS A BALANCE EQUATION, AS
NOTE     UNEMP UP, AVWG DOWN SO TLF DOWN AND TEMPL UP
A PCGTLF.K=(TLF.K-(DELAY1(TLF.K,1)))/(DELAY1(TLF.K,1))
NOTE PCGTLF=PERCENT CHANGE IN TOTAL LABOR FORCE
NOTE CGSXLVL=CHANGE IN OVERALL SKILL LEVEL
NOTE PCGTRND=PRCNT CHG TREND VARIABLE FOR WAGE RATE-UPWARD TREND
A PCGTRND.K=TABLE(TPCGTRN,TIME.K,0,25,25)
T TPCGTRN=.04/.045
NOTE
NOTE
NOTE NOW FOR A MEASURE OF UNDEREMPLOYMENT
NOTE UNDEMP=UNDEREMPLOYMENT
A UNDEMP.K=(NATAVWG.K-NATSKL.K)/(AVWG.K-SKLVL.K)
NOTE  UNDMPCG=PERCENT CHANGE IN UNDEREMPLOYMENT
A UNDMPCG.K=(UNDEMP.K-DELAY1(UNDEMP.K,1))/(DELAY1(UNDEMP.K,1))
NOTE
NOTE  REGIONAL ATTRACTIVENESS INDEX
NOTE
NOTE
NOTE  REGIONAL ATTRACTIVENESS INDEX,REGATRC,A WEIGHTED AVERAGE OF
NOTE  VARIOUS REG TO NAT RATIOS TO SHOW ATTRACTIVENESS OF REGION TO
NOTE  OUTSIDE INVESTORS,DEFINITIONS AND EXPLANATIONS OF UNIT CAN BE
NOTE  FOUND AT THE END OF THIS SECTION
A REGATRC.K=((SKLINDX.K)+(1.5)(WGINDX.K)+(LDINDX.K)+(OCINDX.K)
X +1.5)(PLINDX.K))/5
N REGATRC=REGATRN
NOTE  REGATRC= OVERALL REG ATTRACTIVENESS INDEX
NOTE  SKLINDX=SKILL LEVEL INDEX(RATIO)
NOTE  WGINDX =WAGE  LEVEL INDEX(RATIO)
NOTE  LDINDX =LABOR DENSITY INDEX(RATIO)
NOTE  OCINDX =OTHER COSTS INDEX(RATIO)
NOTE  PLINDX =POLLUTION INDEX(AVERAGE OF TWO RATIOS)
NOTE
A SKLINDX.K=(SKLVL.K)/(NATSKL.K)   (REG SKL)/(NAT SKL)
NOTE
A WGINDX.K=(NATAVWG.K)/(AVWG.K)    (NAT WG)/(REG WG)
NOTE
A LDINDX.K=(LBDEN.K)/(NLBDEN.K)    (REG LABOR DENSITY)/(NAT LAB DENSITY)
A LBDEN.K=(TLF.K)/(SZREG)
A NLBDEN.K=(NATTLF.K)/(NATSZ)
NOTE
C NATSZ=3541072        AREA IN SQ MILES (NATION)
NOTE
A OCINDX.K=(NOCOSTS.K)/(OCOSTS.K)    OTHER COSTS RATIO,PRIMARILY
NOTE                    (COSTS TO FIRMS LOCATING)        TRANSPORTATION
A NOCOSTS.K=TABLE(TNOCOST,TIME.K,0,25,25) NAT COSTS INDEX,STARTS AT .5
T TNOCOST=.5/.625    1 PERCNT PER YEAR
L OCOSTS.K=OCOSTS.J+DT((.25)(PCGREGP.J)+(OCTRND.J)) OCTRND=OTHER COSTS
N OCOSTS=OCOSTSN                                                  TREND
A OCTRND.K=TABLE(TOCTRND,TIME.K,0,25,25)
NOTE
A PLINDX.K=((NPDS.K/RPDS.K)+(NPCMFG.K/PRCMFG.K))/2
NOTE  ABOVE POLLUTION INDEX IS THE AVERAGE OF TWO RATIOS,NAT POP DENSITY
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NOTE    TO REG POP DENSITY AND PERCENT MFG IN NAT TO PERCENT MFG IN REG
NOTE
A RPDS.K=(PCP.K)/(SZREG)  REG POP DENSITY
A NPDS.K=(NATPOP.K)/(NATSZ)  NAT POP DENSITY
NOTE  PRCMFG DERIVED EARLIER, PERCENT MFG EMPLOYMENT
A NPCMFG.K=TABLE(TNPCMFG,TIME.K,0,25,5) NAT PERCENT MFG EMPLOYMENT
T TNPCMFG=.278/.27/.26/.25/.23/.21
NOTE     SOME NOTES ON THE ATTRACTIVENESS RATIOS,THE INDEX IS
NOTE     THE  AVERAGE OF A GROUP OF  REG TO NAT VARIABLE RATIOS
NOTE     OR NAT TO REG VARIABLE RATIOS,EACH RATIO IS ORDERED SUCH THAT
NOTE     AN INCREASE IN THE RATIO WOULD MAKE THE REGION,RELATIVE TO THE
NOTE     NATION,MORE ATTRACTIVE TO INVESTMENT
NOTE
NOTE     IN REG ATTRACTIVENESS EQUATION FOR REGATRC WEIGHTS WERE CHOSEN
NOTE     ARBITRARILY,IT WAS DECIDED THAT THE WAGE INDEX WOULD BE MORE
NOTE     IMPORTANT TO A PROSPECTIVE FIRM THAN SKLINDX,LDINDX,AND OCINDX
NOTE     BUT THAT THE POLLUTION INDEX,PLINDX,WOULD BE CONSIDERED LESS
NOTE     IMPORTANT THAN SKLINDX,LDINDX,AND OCINDX THEREFORE THE WEIGHTS:
NOTE      1.0(SKLINDX)+1.5(WGINDX)+1.0(LDINDX)+1.0(OCINDX)+.5(PLINDX)
NOTE
NOTE    PRODUCTION AND INCOME
NOTE
NOTE  INVESTMENT EQUATIONS
NOTE
A I.K=INTI.K+EXTI.K+GVTI.K-DEPRC.K      I=TOTAL REGIONAL INVESTMENT IN
NOTE  INTI=INTERNAL INVESTMENT(1000'S OF $)                  PRODUCTIVE
NOTE  EXTI=EXTERNAL INVESTMENT(1000'S OF $)                        GOODS
NOTE  GVTI=GOVERNMENT INVESTMENT(1000'S OF $)
NOTE  DEPRC=ANNUAL DEPRECIATION(1000'S OF $)
NOTE
A INTI.K=BSI.K+PVI.K  INTERNAL INV=BUSINESS+PRIVATE INVESTMENT
NOTE BSI=BUSINESS INVESTMENT
NOTE PVI=PRIVATE INVESTMENT
L BSI.K=BSI.J+DT(PRFRT.J)(CGREGY.J)(IPRF.J)  BUSINESS INVESTMENT
N BSI=BSIN
NOTE PRFRT=REG BUS PROFIT RATE
NOTE CGREGY=CHANGE IN TOTAL REG INCOME
NOTE IPRF=INVESTMENT FROM PROFIT   (PERCENT)
NOTE
L PRFRT.K=PRFRT.J+DT((0.05)(PCGTPRD.J)-(0.10)(PWGRTCG.J)) PROFIT RATE
N PRFRT=PRFRTN
NOTE
L IPRF.K=IPRF.J+DT(.10)(PCGTPRD.J)
N IPRF=IPRFN
NOTE
L PVI.K=PVI.J+DT(SVRT.J)(.001)(PICHG1.J)(POP.J)(ISVNG)  PRIVATE INVESTME
NOTE  .001 TO CONVERT TO 1000'S
N PVI=PVIN
NOTE  SVRT=   SAVINGS RATE
NOTE  PICHG1= CHANGE  IN PERSONAL INCOME
NOTE  ISVNG=  INVESTMENT FROM PRIVATE SAVINGS(CONSTANT)
NOTE
NOTE
L SVRT.K=SVRT.J+DT(0.10)(PPICHG1.J)      SAVINGS RATE
N SVRT=SVRTN
NOTE PPICHG1=PERCENT CHANGE IN PERSONAL INCOME
NOTE
L EXTI.K=EXTI.J+DT(IADJ)(PCGATRC.J)(EXTI.J)  EXTERNAL INVESTMENT
N EXTI=EXTIN
C IADJ=.50    100PECCENT CHANGE IN ATTRACTIVENESS INDEX WILL CAUSE
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NOTE           A 50 PERCENT CHANGE IN EXTERNAL INVESTMENT
NOTE
A GVTI.K=GVTEND.K+GVTEXG.K     GVT INVESTMENT
NOTE
NOTE    GVTEND=ENDOGENOUS GOVT INVESTMENT
NOTE    GVTEXG=EXOGENOUS GOVT INVESTMENT
NOTE
L GVTEND.K=GVTEND.J+DT((0.30)(PCHGPOP.J)+(0.50)(UNMPCH1.J)+
X (0.80)(PCTRCPT.J))(GVTEND.J)
N GVTEND=GVTENDN
L GVTEXG.K=GVTEXG.J+DT*((.5)(PCGATRC.J)(GVTEXG.J)+(EXGINJ.J))
N GVTEXG=GVTEXGN
NOTE PCGATRC=PRCNT CHG REG ATTRACTIVENESS INDEX
NOTE EXGINJ=INJECTION INTO REG ECONOMY,POLICY INVESTMEN VARIABLE
NOTE
NOTE  DEPRECIATION,DEPRC
A DEPRC.K=(PDPC.K)(LYRI.K)
NOTE LYRI=LAST YEAR'S INVESTMENT
A LYRI.K=(DELAY1(I.K,1))
N LYRI=LYRIN
L PDPC.K=PDPC.J+DT(0.05)(PCHGI.J) AS LARGER PERCENT I BECOMES DEPRC CAPT
N PDPC=PDPCN        ANNUAL DEPRECIATION=PDPC PERCENT OF TOTAL INVESTMENT,
A PRCPI.K=(I.K)/(POP.K)  PER CAPITA  INVESTMENT
A PCPRCPI.K=(PRCPI.K-(DELAY1(PRCPI.K,1)))/(DELAY1(PRCPI.K,1))
N PCPRCPI=.01
NOTE  PCPRCPI=PERCENT CHANGE IN PER CAPITA INVESTMENT
NOTE
NOTE  PRODUCTION EQUATIONS, TOTAL AND BY SECTORS
NOTE
A TPRD.K=GVTPRD.K+AGPRD.K+SVPRD.K+MFPRD.K+TRDPRD.K+MNPRD.K TOTAL
NOTE                                                        PRODUCTION
NOTE GVTPRD= GVT SECTOR PRODUCTION,1000'S OF $
NOTE AGPRD = AG  SECTOR PRODUCTION,1000'S OF $
NOTE SVPRD = SERVICE SECTOR    ETC.
NOTE MFPRD = MFGING  SECTOR
NOTE TRDPRD= TRADE   SECTOR
NOTE MNPRD = MINING  SECTOR
NOTE
A GVTPRD.K=(DELAY1(GVTPRD.K,1))+(0.20)(PCHGPOP.K)(DELAY1(GVTPRD.K,1))
X +(.5)(CGGVTI.K)+(6.00)(CGGVTEM.K) GVT PROD,1000'S OF $'S
N GVTPRD=GVTPRDN
NOTE CGGVTI=CHANGE IN GVT INVESTMENT
NOTE CGGVTEM=CHANGE IN GVT EMPLOYMENT
A AGPRD.K=(DELAY1(AGPRD.K,1))+(4.00)(CGAGEMP.K)+((00.40)(DELAY1(AGPRCHG.
X K,1))+(0.250)(WEATHER.K))(DELAY1(AGPRD.K,1)) AG PRODUCTION
N AGPRD=AGPRDN
N AGPRCHG=AGPRCHN
NOTE AGPRCHG=PERCENT CHANGE IN AG PRICES
NOTE WEATHER=PERCENT DEVIATION FROM PREVIOUS YEAR'S WEATHER
NOTE CGAGEMP=CHANGE IN AG EMPLOYMENT
A WEATHER.K=TABLE(TWEATHE,TIME.K,0,25,25)
NOTE
L SVPRD.K=SVPRD.J+DT((0.25)(PPICHG1.J)+(0.25)(PCHGPOP.J))(SVPRD.J)
X +(4.00)(CGSVEMP.J)
A CGSVEMP.K=(EMPSV.K-(DELAY1(EMPSV.K,1)))
N SVPRD=SVPRDN                                  SERVICE PROD,1000'S OF $
NOTE
A MFPRD.K=(DELAY1(MFPRD.K,1))+((0.85)(PCGMFGM.K)+(0.25)(PCGINTI.K))
X *(DELAY1(MFPRD.K,1))     MFG PRODUCTION  1,000'S OF $
N MFPRD=MFPRDN
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A PCGMFGM.K=(EMPMF.K-(DELAY1(EMPMF.K,1)))/(DELAY1(EMPMF.K,1))
A PCGINTI.K=(INTI.K-(DELAY1(INTI.K,1)))/(DELAY1(INTI.K,1))
NOTE  PCGMFGM=PERCENT CHANGE IN MFGING EMPLOYMENT
NOTE  PCGINTI=PERCENT CHANGE IN INTERNAL INVESTMENT
NOTE
L TRDPRD.K=TRDPRD.J+((0.50)(PCHGPOP.J)+(0.30)(PPICHG1.J))
X *(TRDPRD.J)+(4.00)(CGTRDEM.J)
A CGTRDEM.K=(EMPTRD.K-(DELAY1(EMPTRD.K,1)))
NOTE TRDPRD=TRADE PRODUCTION IN 1000'S OF $'S
N TRDPRD=TRDPRDN
N PPICHG1=0.01
NOTE
L MNPRD.K=MNPRD.J+DT((0.50)(PCPROIL.J)+(0.60)(CHGRSRS.J))(MNPRD.J)
X +(5.00)(CGMNEM.J)
A CGMNEM.K=EMPMN.K-(DELAY1(EMPMN.K,1))
N MNPRD=MNPRDN                          MINING PRODUCTION(OIL,GAS,COAL)
A PCPROIL.K=(PROIL.K-(DELAY1(PROIL.K,1)))/(DELAY1(PROIL.K,1))
NOTE  PROIL=PRICE OF OIL, PCPROIL=PERCENT CHANGE IN PRICE OF OIL
NOTE  CHGRSRS=PERCENT CHANGE IN KNOWN OIL,GAS,COAL  RESERVES
NOTE
NOTE  AG PRICES INDEX=AGPRICE       NOT COMPARED TO NAT
L AGPRICE.K=AGPRICE.J+DT((+.50)(PSPTNDX.J)+(XAGPRC.J))(AGPRICE.J)
N AGPRICE=AGPRICN
A XAGPRC.K=TABLE(TXAGPRC,TIME.K,0,25,5) EXOG. AG PRICE INDEX
T TXAGPRC=.05/-.01/.03/.03/.03/.03
NOTE XAGPRC=PRCNT CHG FROM PREVIOUS YEAR
NOTE  OIL PRICE=PROIL
A PROIL.K=TABLE(TPROIL,TIME.K,0,25,5)   OIL PRICE INDEX  1967=100
T TPROIL=106.1/230/235/240/240/240
NOTE
NOTE
NOTE     INCOME
NOTE REGY=TOTAL REG INCOME
A REGY.K=TPRD.K+POSTR.K+((.80)(TPRD.K)+(.50)(POSTR.K))(PCGREGP.K)
X +(WLFPYMT.K)  WLFPYMT=WELFARE PAYMENT 1000'S OF $'S
NOTE REGY=TOTALREG INCOME 1000'S OF DOLLARS
A PI.K=((REGY.K)/(POP.K))*1000.0   PER CAPITA INCOME,PERSONAL INCOME
A FMLYI.K=(PI.K)(FMSZ.K)   FAMILY INCOME
A FMSZ.K=TABLE(TFMSZ,TIME.K,0,25,25) FAMILY SIZE ADAPTED FROM
A DSPI.K=PI.K-PERTAX.K  PERCAPITA DISPOSABLE
NOTE  PERTAX=PERCAPITA TAXES
NOTE
A PSPTNDX.K=TABLE(TSPTNDX,TIME.K,0,25,5) FARM PRICE SUPPORT INDEX
NOTE                    PSPTNDX=PERCENT CHANGE IN AVERAGE PRICE SUPPORT
T TSPTNDX=.02/.01/-.01/0/0/0
NOTE TSPTNDX=SAME FOR ALL THREE REGIONS,EXCEPT VALIDATION TIME PERIOD
L PPOV1.K=PPOV.J+DT((0.75)(UNMPCH1.J)-(0.33)(PPICHG1.J))(PPOV.J)
N PPOV=PPOVN
N PPOV1=.330                    NOT USED,NO NEED TO GIVE DIFF VALUES
L PMCL1.K=PMCL.J
N PMCL=PMCLN
N PMCL1=.330                    NOT USED
L PAFL1.K=PAFL.J+DT(0.25)(PPICHG1.J)(PAFL.J)
N PAFL=PAFLN
N PAFL1=.340                    NOT USED
A ADJINC.K=(1.0)/(PPOV1.K+PMCL1.K+PAFL1.K)  ADJUSTMENT COEF,SUM TO ZERO
A PPOV.K=(ADJINC.K)(PPOV1.K)    PERCENT POVERTY
A PMCL.K=(ADJINC.K)(PMCL1.K)    PERCENT MIDDLE INCOME
A PAFL.K=(ADJINC.K)(PAFL1.K)    PERCENT AFFLUENCE
NOTE
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NOTE
A NWLF.K=((.25)(PPOV.K)+(.50)(UNEMP.K))(POP.K)+(.10)(OLD.K)
X +(.25)(WLFPYMT.K)  EVERY 4000 SPENT ON WELFARE PUTS ONE MORE ON WLFARE
NOTE  NWLF=NUMBER ON WELFARE
A PCWLF.K=NWLF.K/POP.K    PERCENT ON WELFARE
A POSTR.K=(ASCPY.K)(PCSC)(OLD.K)+(FRMPAY.K)+(.50)(PCRLDEN.K)
X (DELAY1(POSTR.K,1))  POSITIVE TRANSFERS INTO REGION,1000'S OF $'S
N POSTR=POSTRN
NOTE  ASCPY=AVERAGE SOCIAL SECURITY PAYMENT
NOTE  PCSC =PERCENT OVER 65 ON SOCIAL SECURITY
NOTE  FRMPAY=FARM PAYMENTS PER YEAR,1000'S OF DOLLARS
NOTE
A RLDENS.K=(RPDS.K/NPDS.K)  REG DENSITY TO NAT DENSITY
A PCRLDEN.K=(RLDENS.K-(DELAY1(RLDENS.K,1)))/(DELAY1(RLDENS.K,1))
NOTE  PCRLDEN=PERCENT CHANGE IN RELATIVE DENSITY RATIO
L ASCPY.K=ASCPY.J+DT(.02)(ASCPY.J)  AVERAGE SOCIAL SECURITY PAYMENT
N ASCPY=ASCPYN                      INCREASES 2PERCENT PER YEAR
C PCSC=.9
NOTE               ,I.E. ALL ON SOCIAL SEC DIVIDED BY TOTAL OLDSTERS
NOTE
A FRMPAY.K=TABHL(TFRMPAY,TIME.K,0,25,1) FARM PAYMENTS,1000'S OF $'S
NOTE  CONSUMPTION  FUNCTION
A CONS.K=(DELAY1(CONS.K,1))+((1.0-SVRT.K)*(CGDPI.K)) CONSUMPTION FUNCTN,
N CONS=CONSN                                          PER CAPITA
NOTE  CGDPI=CHANGE IN DISPOSABLE INCOME
NOTE
NOTE  REG PRICE INDEX=REGP    NAT. PRICE INDEX=1967=100.0
NOTE
L REGP.K=REGP.J+DT((.40)(PWGRTCG.J)+(EXGPRC.J))(REGP.J) REG PRICE INDEX
N REGP=REGPN
A EXGPRC.K=TABHL(TEXGPRC,TIME.K,0,25,5) PRCNT CHG FROM LAST YEAR
T TEXGPRC=.042/.04/.04/.04/.039/.038
NOTE EXGPRC=EXOG PRICE FACTOR,MOVES WITH NAT PRICE INDEX,DIFF=CONSTANT
NOTE PWGRTCG=PERCENT CHANGE IN REG WAGE RATE
NOTE
NOTE NAT PRICE INDEX=NTPRC=100.0 FOR 1967
A NTPRC.K=TABHL(TNTPRC,TIME.K,0,25,1)
T TNTPRC=121.3/123.3/125.3/127/128/132/136/140/145/150/155/161/157/173
X /179/185/190/195/200/205/210/215/220/225/230/235
NOTE
NOTE
NOTE TRAINING AND EDUCATION
NOTE
A EDSPD.K=(DELAY1(EDSPD.K,1))+((.20)(PCSTDS.K)-(0.10)(DELAY1(PCTCST.K,1)
X )+(PSCMNT.K))(DELAY1(EDSPD.K,1))+(DELAY1(SCHBDGT.K,1))(.70) 1000'S $'S
N EDSPD=EDSPDN
NOTE STDS=NUMBER OF PUBLIC SCHOOL STUDENTS,PCSTDS=PERCENT CHANGE
NOTE TCHSTD=TEACHER/STUDENT RATIO,PCTCST=PRCNT CHG TEACH/STD RATIO
NOTE PSCMNT=PUBLIC SCHOOL CAPICITY MNTANCE,INFLATION TO CAPACITY,
NOTE            ACCNTS FOR INFLATION TO CAPACITY,THEN CAP EXPENDITURES
NOTE SCHBDGT=SCHOOL TAX RECEIPTS-REG COSTS
A STDS.K=(.50)(CHLD.K)+(.90)(TN.K)  NUMBER OF PUBLIC SCHOOL STUDENTS
A PCSTDS.K=(STDS.K-(DELAY1(STDS.K,1)))/(DELAY1(STDS.K,1)) PRCNT CHANGE
NOTE  PCSTDS IN EDSPD EQ ACCTS FOR VARIABLE COSTS WHILE PSCMNT
NOTE   ACCTS FOR FIXED COSTS, I.E. CONSTANT TO CAPACITY THEN PROVIDES
NOTE   FOR CAPITAL EXPENDITURES
A PCTCST.K=(TCHSTD.K-(DELAY1(TCHSTD.K,1)))/(DELAY1(TCHSTD.K,1))
NOTE PCTCST=PRCNT CHG IN TEACHER/STUDENT RATIO
NOTE
A PSCMNT.K=CLIP(INFLTN,INFLTN+CPEXPD.K,CPCTY.K,STDS.K)
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N PSCMNT=INFLTN
NOTE  CPEXPD=CAPITAL EXPENDITURES AS NEEDED AFTER NUMBER OF STUDENTS
NOTE            REACHES CAPACITY,AS PERCENT CHANGE IN BUDGET
NOTE  CPCTY=PUBLIC SCHOOL SYSTEMS CAPACITY,NUMBERS OF STUDENTS
NOTE
C INFLTN=.05  PRCNT ANNUAL INFLATION BY WHICH PUBLIC SCHOOL COSTS WILL
NOTE                  INCREASE EVERYTHING ELSE CONSTANT,USED ELSEWHERE
NOTE BY USING CLIP FNCTN PSCMNT=INFLTN IF CPCTY>STDS
NOTE                      AND      =INFLTN+CPEXPD IF CPCTY<STDS
A CPEXPD.K=(.50)(PCSTDS.K)  PRCNT CHG IN CAP EXPEND.
L CPCTY.K=CPCTY.J+DT(.50)(CPEXPD.J)(CPCTY.J) PUBLIC SCHL CAPACITY
NOTE
N CPCTY=CPCTYN
A PSCOST.K=EDSPD.K-SCFUNDS.K   REG PUBLIC SCHOOL COSTS=SPND-FED,STATE AD
A SCHBDGT.K=TAXSCH.K-PSCOST.K  SCHOOL BUDGECT BALANCE EQ,START NEAR 0.0
NOTE  TAXSCH=SCHOOL TAX RECEIPTS,1000'S OF $'S
L SCFUNDS.K=SCFUNDS.J+DT*(SFPS)(PCSTDS.J)(SCFUNDS.J) FED AND STATE AID
N SCFUNDS=SCFUNDN
C SFPS=.75     PRCNT CONTRIBUTION PER CHANGE IN NUMBER OF STUDENTS
NOTE TCHSTD=TEACHER/STUDENT RATIO
L TCHSTD.K=TCHSTD.J+DT*((.05)(PCSCHR.J))(TCHSTD.J)+(.00003)(TSFNDS.J)
N TCHSTD=TCHSTDN
A PCSCHR.K=(SCHREV.K-(DELAY1(SCHREV.K,1)))/(DELAY1(SCHREV.K,1))
NOTE PCSCHR=PERCENT CHG IN REG SCHOOL REVENUE
NOTE  TTSFNDS IN 1000'S OF $'S
A CTSFNDS.K=(TSFNDS.K-(DELAY1(TSFNDS.K,1)))/(DELAY1(TSFNDS.K,1))
NOTE  CTSFNDS=PERCENT CHG IN T/S DIRECTED EXPENDITURES
L MNEDL.K=MNEDL.J+DT*((.2)(PPICHG1.J)+(.20)(CTCHSTD.J))
X *(MNEDL.J)+(.00015)(EDFNDS.J)
N MNEDL=MNEDLN
NOTE  MNEDL=MEAN EDUCATION LEVEL
NOTE CTCHSTD=PERCENT CHG IN  TEACH/STUDENT RATIO
A CTCHSTD.K=(TCHSTD.K-(DELAY1(TCHSTD.K,1)))/(DELAY1(TCHSTD.K,1))
NOTE EDFNDS=SPENDING DIRECTED AT EDUC,MNEDL,A POLICY VAR., 1000'S OF $'S
NOTE EDFNDSC=PERCENT CHANGE IN EDUC SPENDING OF ABOVE VAR.
A EDFNDSC.K=(EDFNDS.K-(DELAY1(EDFNDS.K,1)))/(DELAY1(EDFNDS.K,1))
NOTE
NOTE
A SCHREV.K=TAXSCH.K+SCFUNDS.K+GLEDUC.K  REG SCHOOL REVENUE  1000'S OF $S
NOTE TAXSCH=SCHOOL TAX RECEIPTS   1000'S OF $'S
NOTE SCFUNDS=FED AND STATE SUPPORT TO REG SCHOOLS  1000'S OF $'S
NOTE
NOTE  VOCATIONAL TRAINING
L VTTRN.K=VTTRN.J+DT*((0.30)(PCTRSPD.J)-(0.30)(MNTNCE.J))(VTTRN.J)
X +(.0001)(TRSPD.J)
N VTTRN=VTTRNN          VTTRN=VOCATIONAL TRAINING,REPRESENTS PERSON
NOTE                        ON HOW COMPARES WITH NAT LEVEL,PERCENT CHGS
NOTE                        AWAY FROM THIS INITIAL VALUE
NOTE
NOTE TRSPD IN 1000'S OF DOLLARS
A PCTRSPD.K=(TRSPD.K-(DELAY1(TRSPD.K,1)))/(DELAY1(TRSPD.K,1))
NOTE PCTRSPD=PRCNT CHG IN VOC TRNING EXPENDITURES
N TRSPD=TRSPDN
A MNTNCE.K=CLIP(0.0,DEMTSP.K,TRSPD.K,TRMANT.K) MAINTENANCE EQUATION
NOTE     CLIP EQUATION MEANS THAT  MNTNCE=0 IF TRSPD>TRMANT
NOTE                        AND    MNTNCE=DEMTSP IF TRSPD<TRMANT
NOTE              THEREFORE IF ANNUAL VOC TRNING EXPENDITURE ARE
NOTE              NOT ENOUGH TO MAINTAIN VOC TRAINING AT ITS CURRENT
NOTE              LEVEL THE VOC TRNING INDX WILL DECREASE AS A FUNCTION
NOTE              OF THE DIFF,TRMANT-TPSPD,OR DEMTSP
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NOTE
L TRMANT.K=TRMANT.J+DT*(INFLTN)(TRMANT.J)(.80)
N TRMANT=TRMANTN
A DFMTSP.K=(TRMANT.K-TRSPD.K)/((TRMANT.K+TRSPD.K)/2)
NOTE
NOTE  HOUSING  SECTION,   VALUE,TAXATION,QUANTITY,AND QUALITY
NOTE
A HSASSD.K=(AASSM.K)(HSMKTV.K)  TOTAL ASSESSED VALUE OF HOUSING
NOTE  HSASSD=TOTAL ASSESSED VALUE OF HOUSING  1000'S OF DOLLARS
NOTE  AASSM =AVERAGE ASSESSMNT PR$ FOR SINGLE-FAMILY HOUSING UNITS,PRCNT
NOTE  HSMKTV=MKT VALUE OF HOUSING, 1000'S OF DOLLARS
A AASSM.K=TABLE(TAASSM,TIME.K,0,25,25)  PERCENT ASSESSMENT
L HSMKTV.K=HSMKTV.J+DT*((0.75)(CNWSTRS.J)-(1.00)(HSDEP)+
X (0.50)(PCGREGP.J))(HSMKTV.J)      MKT VALUE OF HOUSING,1000'S OF $'S
N HSMKTV=HSMKTVN                    AVERAGE TIMES UNITS(AJD)
NOTE CNWSTRS=PRCNT CHG IN NEW STARTS
NOTE HSDEP  =NET DEPRECIATION OF HOUSING,PRCNT OF LAST YEAR'S HOUSING
NOTE PCGREGP=PRCNT CHG REG PRICE INDEX
A CNWSTRS.K=(NWSTRS.K-(DELAY1(NWSTRS.K,1)))/(DELAY1(NWSTRS.K,1))
NOTE                    GOOD IDEA FROM DATA FOR STARTING VALUE OF MNHSNG
A MNHSNG.K=HSMKTV.K/HOUSES.K  MEAN VALUE OF HOUSING UNITS, 1000'S OF $'S
NOTE
A HSDNST.K=HOUSES.K/SZREG      HOUSING DENSITY      HOUSES PER SQ MILE
NOTE
L PSBSTB.K=PSBSTB.J+DT((-.25)(CMNHSNG.J))(PSBSTB.J)
N PSBSTB=PSBSTBN
L PGOODH.K=PGOODH.J+DT((+.25)(CMNHSNG.J))(PSBSTB.J)
N PGOODH=(1-PSBSTBN)
A CORTR.K=(1.0)/(PSBSTB.K+PGOODH.K)
A PSBSTBH.K=(CORTR.K)(PSBSTB.K)  PRCNT SUBSTANDARD HOUSING
A CMNHSNG.K=(MNHSNG.K-(DELAY1(MNHSNG.K,1)))/(DELAY1(MNHSNG.K,1))
NOTE CMNHSNG=PRCNT CHG IN MEAN VALUE OF HOUSING
L HOUSES.K=HOUSES.J+DT*(1.00)(NWSTRS.J)-(PCOUSE.J)(HOUSES.J)
N HOUSES=HOUSESN                    TOTAL NUMBER OF UNITS
A PCOUSE.K=TABLE(TPCOUSE,TIME.K,0,25,25)   ANNUAL PRCNT HOUSING OUT OF
NOTE
L NWSTRS.K=NWSTRS.J+DT*((0.75)(PPICHG1.J)-(0.75)(PCHGIR.J)+
X (.10)(PCHGPOP.J))(NWSTRS.J)       NEW STARTS
N NWSTRS=NWSTRSN
NOTE  PPICHG1=PRCNT CHG PERSONAL INCOME
NOTE  PCHGIR =PRCNT CHG INTEREST RATE
NOTE  PCHGPOP=PRCNT CHG TOTAL REG POP
A INTERST.K=TABLE(TINTERS,TIME.K,0,25,1)+((1.0)/((1000)(DELAY1(NWSTRS.K,
X 1))))((1000)(LNSUB.K)(.01) LNSUB=LOAN SUBSIDY,  1000'S OF $'S
NOTE IT TAKES $1000 PER NEW START TO LOWER EFFECTIVE INT RT BY .01
T TINTERS=.0852/.0775/.0764/.083/.0922/.089/.085/.08/.08/.08/.08/.08/
X .08/.08/.08/.08/.08/.08/.08/.08/.08/.08/.08/.08/.08
A PCHGIR.K=(INTERST.K-(DELAY1(INTERST.K,1)))/(DELAY1(INTERST.K,1))
NOTE
NOTE    TAXES   SALES,SCHOOL,PROPERTY,FED AND STATE
NOTE
A TRCPTS.K=SLSTX.K+TAXSCH.K+OTHTX.K+MSCTX.K+FDSTFD.K
NOTE  TRCPTS=TOTAL REGIONAL GOVT RECEIPTS,1000'S OF DOLLARS
NOTE      SLSTX = SALES TAX RECEIPTS  1000'S OF DOLLARS
NOTE      TAXSCH= SCHOOL TAX RECEIPTS
NOTE      OTHTX = OTHER PROPERTY TAX RECEIPTS
NOTE      MSCTX = MISCELLANEOUS RECEIPTS
NOTE      FDSTFD= FED AND STATE FUNDS TRANSFERRED TO REG GVTS
NOTE
L SLSTX.K=SLSTX.J+DT((SLTXRT.J)(CGTRDPD.J)+(PCHGPOP.J)(SLSTX.J)(.75))
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N SLSTX=SLSTXN
NOTE  SLTXRT= AVERAGE CITY AND STATE TOTAL SALES TAX RATE,EXOG FOR NOW
NOTE  CGTRDPD=CHANGE IN TRADE SECTOR PRODUCTION
NOTE  PCHGPOP=PERCENT CHANGE IN TOTAL REG POPULATION
A CGTRDPD.K=(TRDPRD.K-(DELAY1(TRDPRD.K,1))) CHANGE IN TRADE PRODUCTION
A SLTXRT.K=TABLE(TSLTXRT,TIME.K,0,25,25)
NOTE  TSLTXRT JUST REG, NON-STATE SALES TAX
NOTE
L TAXSCH.K=TAXSCH.J+DT*(CGSCHAS.J)(STXRT.J) SCHOOL TAX RECEIPTS 1000'S $
N TAXSCH=TAXSCHN
NOTE  CGSCHAS=CHANGE IN TOTAL ASSESSED VALUE OF SCHOOL TAXABLE  PROPERTY
NOTE  STXRT  =TAX RATE ON  ASSESSED SCHOOL PROPERTY
NOTE
L SCHAS.K=SCHAS.J+DT*((1.00)(SCHAST.J)+(0.10)(PCRPDS.J)+(0.10)(PPICHG1.J
X )+(0.50)(PSCMNT.J))(SCHAS.J)     1000'S OF DOLLARS
N SCHAS=SCHASN
NOTE    SCHAS=TOTAL VALUATION       OF SCHOOL TAXED PROPERTY
NOTE       SCHAST=ASSESSMENT TREND(FOR INFLATION&USE AS POLICY VARIABLE)
NOTE       PCRPDS=PRCNT CHG IN REG POPULATION DENSITY
NOTE       PPICHG1=PRCNT CHG IN PER CAPITA INCOME
NOTE       PSCMNT=WILL ACCNT FOR CAPITAL REQUIREMENTS BY THE PUBLIC
NOTE              SCHOOL SYSTEM,SEE ED AN TRAINING SECTION FOR DETAILS
A SCHAST.K=TABLE(TSCHAST,TIME.K,0,25,25) PRCT CHG-TREND
A PCRPDS.K=(RPDS.K-(DELAY1(RPDS.K,1)))/(DELAY1(RPDS.K,1)) PRCNT CHG REG
NOTE    AND  FINALLY                                          POP DENSITY
A CGSCHAS.K=(SCHAS.K-(DELAY1(SCHAS.K,1))) CHG TOTAL ASSESSMENT SCHOOL
NOTE                                                    TAXED PROPERTY
NOTE
L STXRT.K=STXRT.J+DT*(-.05)(SBGCHG.J)(STXRT.J)   TAX RATE ON ASSESSED
N STXRT=STXRTN                                          SCHOOL PROPERTY
A SBGCHG.K=(SCHBDGT.K-(DELAY1(SCHBDGT.K,1)))/(DELAY1(SCHBDGT.K,1))
NOTE  SBGCHG=PRCNT CHG IN  SCHOOL BUDJECT EQUATION,RECEIPTS-EXPENITURES
NOTE
L OTHTX.K=OTHTX.J+DT*((0.05)(PCRPDS.J)+(0.10)(PPICHG1.J)+(CPROPAS.J)
X (PROPTRT.J))(OTHTX.J)
N OTHTX=OTHTXN
NOTE  OTHTX=OTHER PROPERTY TAX RECEIPTS,1000'S OF DOLLARS
NOTE    PCRPDS=PRCNT CHG REG POP DENSITY
NOTE    PPICHG1=PRCNT CHG PERCAPITA INCOME
NOTE    CPROPAS=PRCNT CHANGE IN PROPERTY EVALUATIONS
NOTE    PROPTRT=PROPERTY TAX RATE,AVERAGE FOR REGION
L PROPAS.K=PROPAS.J+DT*(INFLTN)(PROPAS.J)(0.5)  PROPERTY EVALUATIONS
N PROPAS=PROPASN                                  FOR OTHER PROPERTY TAXES
A CPROPAS.K=(PROPAS.K-(DELAY1(PROPAS.K,1)))/(DELAY1(PROPAS.K,1))
L PROPTRT.K=PROPTRT.J+DT*(PCGVTBG.J)(PROPTRT.J)(.10)
N PROPTRT=PROPTRN
NOTE PCGVTBG=PRCNT CHG GOVT BALANCE EQ
A PCGVTBG.K=(GVTBDGT.K-(DELAY1(GVTBDGT.K,1)))/(DELAY1(GVTBDGT.K,1))
NOTE
L MSCTX.K=MSCTX.J+DT*(PCGREGY.J)(0.10)(MSCTX.J)  MISCELLANEOUS RECEIPTS
N MSCTX=MSCTXN
NOTE  PCGREGY=PRCNT CHG IN TOTAL REG INCOME
NOTE
L FDSTFD.K=FDSTFD.J+DT*((0.50)(PCHGPOP.J)+(0.10)(PCPPOV.J)+(.3)(INFLTN))
X *(FDSTFD.J)
N FDSTFD=FDSTFDN
NOTE   FDSTFD=FED AND STATE FUNDS  TO  REG GVTS, NOT DIRECTLY TO RESIDTS
NOTE       PCHGPOP=PRCNT CHG POPULATION                 FDSTFD=1000'S OF $
NOTE       PCPPOV =PRCNT CHG IN PRCNT POVERTY
A PCPPOV.K=(PPOV.K-(DELAY1(PPOV.K,1)))/(DELAY1(PPOV.K,1))
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NOTE
NOTE  PERSONAL PERCAPITA TAXES,NEED ACCURATE INITIAL VALUE,DOES NOT
NOTE                                          INCLUDE BUSINESS TAXES
NOTE                                          NOT FELT BY WAGE EARNERS
L PERTAX.K=PERTAX.J+DT*((0.20)(CTRCPTS.J)+(PCICMT.J))(PERTAX.J)
N PERTAX=PERTAXN
NOTE  PERTAX=PERSONAL PERCAPITA TAXES, DOLLARS
NOTE     CTRCPTS=PRCNT CHG TOTAL REG RECEIPTS
NOTE     PCICMT =PRCNT CHG IN AVERAGE PERSONAL INCOME TAX RATE,TOTAL
NOTE     ICMT   =AVERAGE PERSONAL INCOME TAX RATE            STATE,FED
A CTRCPTS.K=(TRCPTS.K-(DELAY1(TRCPTS.K,1)))/(DELAY1(TRCPTS.K,1))
L ICMT.K=ICMT.J+DT*(INFLTN)(0.25)(ICMT.J)
N ICMT=ICMTN
A PCICMT.K=((ICMT.K-(DELAY1(ICMT.K,1)))/(DELAY1(ICMT.K,1))
NOTE
NOTE USE  SENSITY ANALYSIS TO GET STARTED OFF-ON BELOW EQUATION
L GVTNEXP.K=GVTNEXP.J+DT*((0.05)(PCSVPRD.J)+(0.10)(PCEDSPD.J)+
X (0.25)(CGVTPRD.J))(GVTNEXP.J)    1000'S OF DOLLARS
N GVTNEXP=GVTNEXN+1000
NOTE   GVTNEXP=TOTAL REGIONAL GOVERNMENT EXPENDITURES,1000'S OF DOLLARS
NOTE       PCSVPRD=PRCNT CHANGE IN SERVICE SECTOR PRODUCTION
NOTE       PCEDSPD=PRCNT CHANGE IN PUBLIC SCHOOL EXPENDITURES
NOTE       CGVTPRD=PRCNT CHANGE IN GVT SECTOR PRODUCTION
NOTE
A PCSVPRD.K=(SVPRD.K-(DELAY1(SVPRD.K,1)))/(DELAY1(SVPRD.K,1))
A PCEDSPD.K=(EDSPD.K-(DELAY1(EDSPD.K,1)))/(DELAY1(EDSPD.K,1))
A CGVTPRD.K=(GVTPRD.K-(DELAY1(GVTPRD.K,1)))/(DELAY1(GVTPRD.K,1))
NOTE
A GVTBDGT.K=GVTNEXP.K-TRCPTS.K   REG GVT BUDGET BALANCE EQUATION
NOTE
NOTE
A PCWNWK.K=(WNWORK.K-(DELAY1(WNWORK.K,1)))/(DELAY1(WNWORK.K,1))
A PI1.K=DELAY1(PI.K,1)     PERSONAL INCOME LAGGED  ONE PERIOD
A PI2.K=DELAY1(PI1.K,1)                            TWO PERIODS
A PICHG2.K=(PI1.K-PI2.K)  CHG IN PI FROM T-2 TO T-1
A PICHG1.K=(PI.K-PI1.K)   CHG IN PI FROM T-1 TO PRESENT
A UNEMP1.K=DELAY1(UNEMP.K,1)  UNEPLOYMENT LAGGED  ONE  PERIOD
A UNEMP2.K=DELAY1(UNEMP1.K,1)                      TWO PERIODS
A UNMPCG2.K=UNEMP1.K-UNEMP2.K CHG IN UNEMPLOYMENT  T-2  TO T-1
A UNMPCH1.K=UNEMP.K-UNEMP1.K                       T-1  TO PRESENT
A RLUNEMP.K=UNEMP.K-NUNEMP.K  REG UNEMPLOYMENT MINUS NAT UNEMPLOYMENT
A RLWGRT.K=AVWG.K-NATAVWG.K   REG WG RATE MINUS NAT WG RATE
A BRTHS1.K=DELAY1(BRTHS.K,1)    NUMBER OF BIRTHS LAGGED ONE PERIOD
A BRTHS2.K=DELAY1(BRTHS1.K,1)   NUMBER OF BIRTHS LAGGED TWO PERIODS
A BRTHCG1.K=(BRTHS.K-BRTHS1.K)   CHG IN NUMBER OF BIRTHS T-1 TO PRESENT
A BRTHCG2.K=(BRTHS1.K-BRTHS2.K)                          T-2 TO T-1
A MNEDL1.K=DELAY1(MNEDL.K,1)    MED EDUC LEVEL LAGGED ONE PERIOD
A MNEDL2.K=DELAY1(MNEDL1.K,1)                         TWO PERIODS
A MNEDCG2.K=(MNEDL1.K-MNEDL2.K)        CHANGE IN MED EDUC LEVEL-2 TO-1
A MNEDCG1.K=(MNEDL.K-MNEDL1.K)                                -1 TO NOW
A VTTRN1.K=DELAY1(VTTRN.K,1)    VOCATIONAL TRAINING LEVEL LAGGED -1
A VTTRN2.K=DELAY1(VTTRN1.K,1)                                    -2
A VTTRCG1.K=(VTTRN.K-VTTRN1.K)          CHANGE IN VOC TRNING  -2TO-1
A VTTRCG2.K=(VTTRN1.K-VTTRN2.K)                               -1TO NOW
A WGRTCG.K=AVWG.K-(DELAY1(AVWG.K,1))   CHANGE IN REG WG RATE  -1TONOW
A PRCMFG.K=(EMPMF.K/TEMPL.K)    PERCENT MFGING EMPLOYMENT
A CGPRMFG.K=PRCMFG.K-(DELAY1(PRCMFG.K,1)) CHG IN PERCENT  MFG EMPLOYMENT
A CHGPOP.K=POP.K-(DELAY1(POP.K,1))  CHG IN TOTAL POPULATION
A PCGREGP.K=(REGP.K-(DELAY1(REGP.K,1)))/(DELAY1(REGP.K,1))
NOTE  PCGREGP=PRCNT CHANGE IN REG PRICE INDEX
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A CGSKLVL.K=SKLVL.K-(DELAY1(SKLVL.K,1)) CHANGE IN OVERALL SKILL LEVEL,
NOTE                                    UNITS ARE SUCH THAT THIS CHANGE
NOTE                                    IS SAME AS PERCENT CHANGE
A NATTLF.K=(NTEMP.K)(NATPOP.K)    NAT LABOR FORCE,NTEMP=PERCENT IN LABOR
NOTE                              FORCE,I.E.EMPLOYABLE
NOTE
A NTEMP.K=NORMRN(.65,.03)    .65=MEAN PERCENT IN LABOR FORCE
A CGREGY.K=REGY.K-(DELAY1(REGY.K,1))  CHG IN TOTAL REG INCOME
A PCGREGY.K=((REGY.K-(DELAY1(REGY.K,1)))/(DELAY1(REGY.K,1))
NOTE   PCGREGY=PERCENT CHANGE IN TOTAL REGIONAL INCOME
NOTE
A CGTPRD.K=TPRD.K-(DELAY1(TPRD.K,1))  CHANGE IN TOTAL PRODUCTION(REG)
A PCGTPRD.K=CGTPRD.K/(DELAY1(TPRD.K,1)) PERCENT CHANGE IN PRODUCTION
A PWGRTCG.K=WGRTCG.K/(DELAY1(AVWG.K,1)) PERCENT CHANGE IN WAGE RATE
A PCHGI.K=((I.K-(DELAY1(I.K,1)))/(DELAY1(I.K,1))  PRCNT CHG IN TOTAL INVS
A PPICHG1.K=(PICHG1.K)/(PI1.K)  PERCENT CHANGE IN PERSONAL INCOME
A PCGATRC.K=(REGATRC.K-(DELAY1(REGATRC.K,1)))/(DELAY1(REGATRC.K,1))
NOTE  ABOVE PCGATRC=PERCENT CHANGE IN REG ATTRACTIVENESS INDEX
A PCHGPOP.K=(CHGPOP.K)/(DELAY1(POP.K,1)) PERCENT CHANGE IN TOTAL POP
A CGTRCPT.K=(TRCPTS.K-(DELAY1(TRCPTS.K,1))) CG IN TOTAL GVT RECEIPTS
A PCTRCPT.K=(CGTRCPT.K)/(DELAY1(TRCPTS.K,1)) PERCENT CG GVT RECEIPTS
A CCGVTI.K=(GVTI.K)-(DELAY1(GVTI.K,1)) CHANGE IN GVT INVESTMENT
A CGGVTEM.K=(EMPGVT.K)-(DELAY1(EMPGVT.K,1)) CHANGE IN GVT EMPLOYMENT
A CGAGEMP.K=(EMPAG.K)-(DELAY1(EMPAG.K,1))  CHANGE IN AG EMPLOYMENT
A PCAGPRD.K=((AGPRD.K-(DELAY1(AGPRD.K,1)))/(DELAY1(AGPRD.K,1))
NOTE  PCAGPRD=PERCENT CHANGE IN AG PRODUCTION
A CGDPI.K=(DSPI.K-(DELAY1(DSPI.K,1)))  CHANGE IN DISPOSABLE INCOME
A PCGDPI.K=(CGDPI.K)/(DELAY1(DSPI.K,1)) PRCNT CHANGE IN DISPOS INCOME
A NATPOP.K=TABLE(TNATPOP,TIME.K,0,25,5)
T TNATPOP=205E6/213E6/218E6/222E6/225E6/228E6          1970-1995
N PI=PIN
N PI1=PI1N
N UNEMP=UNEMPN
N UNEMP1=UNEMP1N
N BRTHS=BRTHSN
N BRTHS1=BRTHS1N
N MNEDL1=MNEDL1N
N VTTRN1=VTTRN1N
N PRCMFG=PRCMFGN
N POP=POPN
N SKLVL=SKLVLN
N REGY=REGYN
N TPRD=TPRDN
N RLDENS=RLDENSN
N PCTCST=PCTCSTN
N SCHBDGT=SCHBDGN
N STDS=STDSN
N SCHREV=SCHREVN
N MNHSNG=MNHSNGN
N RPDS=RPDSN
N TRCPTS=TRCPTSN
N PCHGPOP=PCHGPON
N GVTBDGT=GVTBDGN
N ASKTN=.85
N ASKYALD=.85
N ASKPRM=.85
N ASKMA=.85
N ASKOLD=.85
A TTLMGS.K=MGCHLD.K+MGTN.K+MGYALD.K+MGPRM.K+MGMA.K+MGOLD.K
A TTLDTHS.K=DLTCHLD.K+DLTTN.K+DLTYALD.K+DLTPRM.K+DLTMA.K+DLTOLD.K
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N PCGATRC=-.001
NOTE
NOTE
NOTE      OPTIMIZATION
NOTE
NOTE
NOTE    LONG RANGE DEVELOPMENT FUNDS,MANUAL
NOTE    SEARCH TO BE MADE OVER VARIOUS ALLOCATIONS
NOTE    OF THESE FUNDS,SEARCHING FOR THE ALLOCATION
NOTE       OR STRATEGY THAT OPIMIZES SOME OBJECTIVE
NOTE
NOTE
NOTE  SEVERAL OTHER KEY VARIABLES WILL HAVE A BOUND SET ON THEM  THAT,
NOTE  WHEN VIOLATED, WILL TRIGGER AN AUTOMATIC EXPENDITURE THROUGH THE
NOTE  APPROPRIATE POLICY VARIABLE TO CORRECT THE PROBLEM,THESE $'S WILL
NOTE  DECREASE(IF ANY SPENT)THE PI,THEREFORE NET PERSONAL INCOME(NPI)
A INDSTPI.K=(TABLE(API,TIME.K,0,25,1))*(TMAXPI.K)
NOTE  INDSTPI=PRCNT FUNDS SPENT THRU INDUST    TO MAXIMIZE NET PI
NOTE  TMAXPI=TOTAL FUNDS SPENT TO MAXIMIZE NET PI
NOTE
A WLFPYPI.K=(TABLE(BPI,TIME.K,0,25,1))*(TMAXPI.K)
NOTE  WLFPYPI=PRCNT FUNDS SPENT THRU WELFARE   TO MAXIMIZE NET PI
NOTE
A EDFNDPI.K=(TABLE(CPI,TIME.K,0,25,1))*(TMAXPI.K)
NOTE  EDFNDPI=PRCNT FUNDS SPENT THRJ GENERAL EDUC SPENING TO MAX NET PI
NOTE
NOTE
A TRSPDPI.K=(TABLE(DPI,TIME.K,0,25,1))*(TMAXPI.K)
NOTE  TRSPDPI=PRCNT FUNDS SPENT THRU VOCATIONAL TRAINING TO MAX NET PI
NOTE
NOTE
A TMAXPI.K=TABLE(TTMAXPI,TIME.K,0,25,5)*(DELAY1(POP.K,1))(.001)
NOTE  TMAXPI=TOTAL PUBLIC EXPENDITURES(FIXED AMOUNT) TO ALLOCATE
NOTE          AMONG ABOVE FOUR POLICY VARIABLES,1000'S OF $'S
NOTE
NOTE
NOTE      POLICY VARIABLES
NOTE
NOTE    ALL THE POLICY VARIABLES USED HAVE BEEN PLACED IN THE
NOTE    FOLLOWING SECTION,THE FIRST FOUR ARE THE ONES USED IN
NOTE    THE MAX OF PI(NOT ONLY FOR MAX PI) AND THE CTHERS ARE
NOTE    EMPLOYED IN THE BOUNDING PROCEDURE
NOTE
A INDUS1.K=TABLE(TNDST,TIME.K,0,25,1)+(INDSTPI.K)+(INDUNMP.K)
X +(INDPWLF.K)+(INDTMG.K)
T TNDST=0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0
A INDUST.K=MIN(INDUS1.K,MXINDST.K)                    1000'S OF  $'S
A MXINDST.K=(1.00)(TMAXPI.K)
NOTE  INDUST=FUNDS SPENT THRU INDUST  TO CREATE JOBS
NOTE  MXINDST=MAXIMUM LEVEL OF SPENDING IN INDUSTRIALIZATION
NOTE
A WLFPYM1.K=TABLE(TWPYMT,TIME.K,0,25,5)+(WLFPYPI.K)
A WLFPYMT.K=MIN(WLFPYM1.K,MXWLF.K)
A MXWLF.K=(0.75)(TMAXPI.K)
NOTE  WLFPYMT=FUNDS SPENT THRU DIRECT WELFARE PAYMENTS
NOTE  MXWLF=MAXIMUM LEVEL OF SPENDING FOR WELFARE,DIRECT PAYMENTS
NOTE
A EDFND1.K=TABLE(TEDFNDS,TIME.K,0,25,25)+EDFNDPI.K+EDFDEDL.K+EDFDLBR.K
X +EDFDRAT.K
A EDFNDS.K=MIN(EDFND1.K,MXEDFND.K)
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A MXEDFND.K=(0.25)(TMAXPI.K)
NOTE   EDFNDS= EDUC SPENDING,DIRECTED AT MNEDL
NOTE   MXEDFND=MAXIMUM LEVEL OF EDUC SPENDING ALLOWED
NOTE
A TRSP1.K=TABLE(TTRSPD,TIME.K,0,25,5)+(TRSPDPI.K)+(TRSPRAT.K)
X +(TRSSKL.K)
T TTRSPD=100/100/100/100/100/100        1000'S OF $'S
A TRSPD.K=MIN(TRSP1.K,MXTRSPD.K)
A MXTRSPD.K=(0.25)(TMAXPI.K)
NOTE  TRSPD=TRAINING EXPENDITURE
NOTE  MXTRSPD=MAXIMUM ALLOWABLE TRAINING EXPENDITURE
NOTE
A MGENC1.K=TABLE(TMGENCG,TIME.K,0,25,5)+(MGEUNMP.K)+(MGENPOP.K)
T TMGENCG=0/0/0/0/0/0          1000'S OF $'S
A MGENCG.K=MIN(MGENC1.K,MXMGEN.K)
A MXMGEN.K=(0.10)(TMAXPI.K)
NOTE  MGENCG=MIG ENCOURAGEMENT EXPENDITURE
NOTE  MXMGEN=MAXIMUM ALLOWABLE  MGENCG SPEVING
NOTE
A LNSU1.K=TABLE(TLNSUB,TIME.K,0,25,5)+(LNSPSH.K)
T TLNSUB=0/0/0/0/0/0
A LNSUB.K=MIN(LNSU1.K,MXLSB.K)
A MXLSB.K=(0.20)(TMAXPI.K)
NOTE  LNSUB=LOAN SUBSIDY TO LOWER EFFECTIVE INTRST RT TO HOME-BUYERS
NOTE  MXLSB=MAX LOAN SUBSIDY
A EXGIN1.K=TABLE(TEXGINJ,TIME.K,0,25,25)+(EXNJPRI.K)+(EXNJGVB.K)
T TEXGINJ=0/0            1000'S  OF $'S
A EXGINJ.K=MIN(EXGIN1.K,MXEXGNJ.K)
A MXEXGNJ.K=(.25)(TMAXPI.K)
NOTE  EXGINJ=EXOG INJECTION INTO REG ECONOMY
NOTE  MXEXGNJ=MAXIMUM ALLOWABLE LEVEL OF EXGINJ
NOTE
A FMLP1.K=TABLE(TFMLPL,TIME.K,0,25,5)+(FMPPOP.K)
T TFMLPL=30/28/26/24/22/20       1000'S OF $'S
A FMLPL.K=MIN(FMLP1.K,MXFMLP.K)
A MXFMLP.K=(.10)(TMAXPI.K)
NOTE   FMLP1=PUBLIC SPENDING ON FAMILY PLANNING
NOTE   MXFMLP=MAXIMUM ALLOWABLE LEVEL OF FAMILY PLANNING EXPENDITURES
NOTE
A GLEDU1.K=TABLE(TGLEDUC,TIME.K,0,25,5)+(GLEDSKL.K)+(GLEDSCB.K)
T TGLEDUC=0/0/0/0/0/0     1000'S OF $'S
A GLEDUC.K=MIN(GLEDU1.K,MXGLED.K)
A MXGLED.K=(.125)(TMAXPI.K)
NOTE   GLEDUC=GENERAL EDUC FUNDS MADE AVAILABLE TO REG PUBLIC SCHOOLS
NOTE
A TSFND1.K=TABLE(TTSFNDS,TIME.K,0,25,5)+(TSFNDTS.K)
T TTSFNDS=36/37/38/39/40/40
A TSFNDS.K=MIN(TSFND1.K,MXTSFND.K)
A MXTSFND.K=(.125)(TMAXPI.K)
A ZERO.K=TABLE(TZERO,TIME.K,0,25,25)
T TZERO=0/0
NOTE  TSFNDS=FUNDS TO INCREASE  TCH/STD RATIO,HIRE TEACHERS
NOTE  MXTSFND=MAX ALLOWABLE PER YEAR ON TSFNDS
NOTE
NOTE CONTOL  OR  BOUNDING  PROCESS
NOTE    SECOND PART OF OPTIZATION PROCESS
NOTE
NOTE  BOUNDS AND AMOUNT TO BE SPENT ON TRYING CORRECT
NOTE  A VARIABLE THAT IS OUT OF BOUNDS
NOTE
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NOTE       UNEMPLOYMENT--INDUST. AND MGENCG USED TO CORRECT IT
L INDUNMP.K=CLIP(CORUNMP.J,0,UNEMP.J,UNMPLT1)    1000'S OF $'S
N INDUNMP=0    IF UNEMP>UNMPLT1  THEN INDUNMP=CORUNMP  AMT SPENT TO LOWER
NOTE           IF UNEMP<UNMPLT1  THEN INDUNMP=0        UNEMP
N CORUNMP=0
A CORUNMP.K=(UNEMP.K-UNMPLT1)(TLF.K)(2.5)     1000'S OF $'S
NOTE CORUNMP=AMT SPENT TO CORRECT UNEMP THRU INDUST.,$2500 PER UNEMPLOY
NOTE          OVER THE LIMIT,THEREFORE SINCE IT TAKES 10000 TO CREAT A
NOTE          JOB, 25 PERCENT OF THE PROBLEM  IS CURED
NOTE NOW FOR MGENCG TO CORRECT UNEMPLOYMENT
L MGEUNMP.K=CLIP(CRUNMP1.J,0,UNEMP.J,UNMPLT2)  1000'S OF $'S
N MGEUNMP=0
A CRUNMP1.K=(UNEMP.K-UNMPLT2)(TLF.K)(2.5)  WHEN THIS EXTREME LIMIT IS
N CRUNMP1=0                                 REACHED,SAME AMT SPENT ON MGN
NOTE  BOUNDING OF PERCENT SUBSTANDARD HOUSING, CORRECTED BY LNSUB,LOAN
NOTE      SUBSIDY TO LOWER EFFECTIVE INTEREST TO NEW HOME BUILDERS,
NOTE      CORRECTION INITIATED AFTER PERCENT SUBSTANDARD GOES OVER
NOTE      PRESCRIBED LIMIT
L LNSPSH.K=CLIP(CORSTDH.J,0,PSBSTBH.J,SBHSLT)  1000'S OF $'S
N LNSPSH=0
A CORSTDH.K=(PSBSTBH.K-SBHSLT)(HOUSES.K)(.5)  1000 PER HOUSE,IR DOWN 1PC
N CORSTDH=0
NOTE  BOUNDING PRCPI=PERCAPITA INVESTMENT WITH EXGINJ=EXOG INJECTION
NOTE                                                  INTO REG ECONOMY
L EXNJPRI.K=CLIP(0,CORPRI.J,PRCPI.J,PRCILMT.J)  1000'S OF $'S
N EXNJPRI=0
A CORPRI.K=(PRCILMT.K-PRCPI.K)(.25)(POP.K) 25PERCENT CORRECTION
N CORPRI=0
L PRCILMT.K=PRCILMT.J+(.005)(PRCILMT)
N PRCILMT=PRCILMN
NOTE  BOUNDING OF MNEDL BY SPENDING IN EDFNDS WHEN MNEDL UNDER BOUND
L EDFDEDL.K=CLIP(0,CORMNED.J,MNEDL.J,EDJCLT.J)  1000'S OF $'S
N EDFDEDL=0
A CORMNED.K=((EDUCLT.K-MNEDL.K)/(EDUCLT.K))(STDS.K)(.5)  $500/STD BELOW
N CORMNED=0
L EDUCLT.K=EDUCLT.J+(0.010)(EDUCLT.J)
N EDUCLT=EDUCLTN
NOTE  BOUNDING  POP WITH FMLPL=FAMILY PLANNING FUNDS
NOTE                AND  MGENCG=MIG ENCOURAGEMENT FUNDS
L FMPPOP.K=CLIP(CORPOP1.J,0,POP.J,POPLT1.J)   1000'S OF $'S
N FMPPOP=0
A CORPOP1.K=(POP.K-POPLT1.K)(.1)  $100/PERSON
N CORPOP1=0
L POPLT1.K=POPLT1.J+(POPLT1.J)(.01)  ALLOWS MAX OF 1PERCNT GROWTH
N POPLT1=POPLT1N                     PER YEAR BEFORE FAMILY PLANNING IN
L MGENPOP.K=CLIP(CORPOP1.J,0,POP.J,POPLT2.J)   1000'S OF $'S
N MGENPOP=0
L POPLT2.K=POPLT2.J+(POPLT2.J)(.015)    ALLOWS POP GROWTH OF 1.5PRCNT
N POPLT2=POPLT1N                        BEFORE MGENCG GOES INTO AFFECT
NOTE BOUNDING OF SKLVL BY USE OF TRSPD=VOC TRAINING FUNDS
NOTE                    AND     GLEDUC=GENERAL EDUC FUNDS,GOES INTO
NOTE                            GENERAL PUBLIC FUND OF REGION
L TRSSKL.K=CLIP(0,CORSKL.J,SKLVL.J,SKLLT)    1000'S OF $'S
N TRSSKL=0
A CORSKL.K=(SKLLT-SKLVL.K)(1000)  100000 SPENT FOR .1 DIFF   SKLVL
N CORSKL=0                                                   AND LIMIT
L GLEDSKL.K=CLIP(0,CORSKL.J,SKLVL.J,SKLLT)
N GLEDSKL=0
NOTE BOUNDING OF PCWLF,PRCNT ON WLFARE WITH INDUST. FUNDS
L INDPWLF.K=CLIP(CORPWLF.J,0,PCWLF.J,PCWLFLT)
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N INDPWLF=0
A CORPWLF.K=(PCWLF.K-PCWLFLT)(POP.K)(.25)(2.5) TO EMPLOY HEADS OF
N CORPWLF=0                                     HOUSEHOLDS(1 JOB FOR
NOTE                                            EVERY 4 ON WLF)
NOTE BOUNDING OF TTLMGS=TOTAL MIGRATION BY THE USE OF INDUST FUNDS
L INDTMG.K=CLIP(CORMG.J,0,((-.1)(TTLMGS.J)),TMGLMT.J)
N INDTMG=0
A CORMG.K=(TTLMGS.K-TMGLMT.K)(2.5)(.25) CREATE 1 JOB FOR EVERY 4
N CORMG=0                                OVER LIMIT,(OF HEADS OF HOUSEHLD)
A TMGLMT.K=(.01)(POP.K)
NOTE BOUNDING OF LABOR=PRCNT LABOR(AS OPPOSED TO MGMNT AND PROFESSIONAL)
NOTE   WITH FUNDS ALLOCATED TO EDFNDS
L EDFDLBR.K=CLIP(CORLBR.J,0,LABOR.J,LBRLMT)     1000'S OF $'S
N EDFDLBR=0
A CORLBR.K=(LABOR.K-LBRLMT)(TLF.K)(1.0)
N CORLBR=0
NOTE BOUNDING OF  REGATRC=REG ATTRACTIVENESS INDEX
NOTE        BY USING EDFNDS AND TRSPD       SAME LIMIT,SAME CORRECTION
NOTE
L EDFDRAT.K=CLIP(0,CORRAT.J,REGATRC.J,RATLMT)   1000'S OF $'S
N EDFDRAT=0
A CORRAT.K=(RATLMT-REGATRC.K)(100)    10000 FOR EACH .1 UNDER LIMIT
N CORRAT=0
A TRSPRAT.K=EDFDRAT.K     SAME LIMIT, SAME CORRECTION,SO SET EQUAL
NOTE  WHEN LIMIT PASSED,EQUAL SPENDING ON EDFNDS AND TRSPD FOR CORRECT-N
NOTE    BOUNDING OF TCHSTD=TEACH/STUDENT RATIO USING POLICY
NOTE                    VARIABLE TSFNDS
L TSFNDTS.K=CLIP(0,CORTSR.J,TCHSTD.J,TSTDLT)     1000'S OF $'S
N TSFNDTS=0
A CORTSR.K=((TSTDLT-TCHSTD.K)/(TSTDLT))(STDS.K)(TCHSTD.K)(2.5)
N CORTSR=0                               ABOUT 25PRCNT CORRECTION
C TSTDLT=.04
NOTE  BOUNDING OF SCHBDGT=SCHOOL BUDGET  BY USE  OF  GLEDUC
L GLEDSCB.K=CLIP(CORSCBG.J,0,0,SCHBDGT.J)    1000'S  OF $'S
N GLEDSCB=0
A CORSCBG.K=(-1)(SCHBDGT.K)(.25)
N CORSCBG=0
NOTE
NOTE  BOUNDING OF GVTBDGT  BY USE OF  EXGINJ
L EXNJGVB.K=CLIP(CORGBDG.J,0,0,GVTBDGT.J)    1000'S OF $'S
N EXNJGVB=0
A CORGBDG.K=(-1)(GVTBDGT.K)(.25)
N CORGBDG=0
NOTE  WHERE FUNDS ARE SPENT
A TOMXNPI.K=INDSTPI.K+WLFPYPI.K+EDFNDPI.K+TRSPDPI.K
A TOBND.K=INDUNMP.K+INDPWLF.K+INDTMG.K+EDFDEDL.K+EDFDLBR.K+EDFDRAT.K
X +TRSPRAT.K+TRSSKL.K+MGEUNMP.K+MGENPOP.K+LNSPSH.K+EXNJPRI.K+EXNJGVB.K
X +FMPPOP.K+GLEDSKL.K+GLEDSCB.K+TSFNDTS.K
A TOTSPNT.K=INDUST.K+WLFPYMT.K+EDFNDS.K+TRSPD.K+MGENCG.K+LNSUB.K
X +EXGINJ.K+FMLPL.K+GLEDUC.K+TSFNDS.K  POLICY FNDS ACTUALLY SPENT
A NPI.K=PI.K-I((TOTSPNT.K*1000)/(POP.K))  NPI
A NREGY.K=REGY.K-TOTSPNT.K   NREGY
L POVACML.K=POVACML.J+PPOV.J  PERCNT POVERTY ACCUMULATED
N POVACML=PPOVN
A DISCNTY.K=(DELAY1(DISCNTY.K,1)(1.06))+REGY.K  DISCOUNTED INCOME 6%
N DISCNTY=0
A DSPFS.K=(DELAY1(DSPFS.K,1))(1.06)+(PFS.K)  DISCNTD POLICY FNDS SPNT
NOTE  DSPFS=DSCNTD FNDS SPNT
NOTE  PFS=  POLICY FNDS SPNT ANNUALLY (TOTAL)
N DSPFS=0
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A PFS.K=TOTSPNT.K
NOTE
A DSYDSPF.K=(DISCNTY.K/DSPFS.K) DISCNTD INCOME/DISCNTD PUBLIC COSTS
A LRPFA.K=TOMXNPI.K    LG RUN FUNDS ALLOC
A PFA.K=TOBND.K+TOMXNPI.K  PUBLIC FNDS ALLOC TOTAL
NOTE          TABLES-PAGE ONE
PRINT 1)(3.1)REGY
PRINT 2)(3.1)NREGY
PRINT 3)(0.0)PI
PRINT 4)(0.0)NPI
PRINT 5)(0.2)POVACML
PRINT 6)(0.1)DSYDSPF
PRINT 7)(0.3)UNEMP
PRINT 8)(0.3)UNDMPCG
PRINT 9)(3.2)POP
PRINT 10)(0.0)TTLMGS
PRINT 11)(0.0)COMMTR
NOTE          TABLES-PAGE TWO
PRINT 1)(0.0)PFS
PRINT 2)(0.0)PFA
PRINT 3)(0.0)LRPFA
PRINT 4)(0.0)TOBND
PRINT 5)(3.2)TLF
PRINT 6)(3.2)TEMPL
PRINT 7)(0.2)AVWG
PRINT 8)(0.3)SKLVL
PRINT 9)(0.3)REGATRC
PRINT 10)(0.3)PLINDX
PRINT 11)(0.2)MNEDL
SPEC DT=1.0/LENGTH=25/PRTPER=1/PLTPER=1
T TTMAXPI=25/25/25/25/25/25
NOTE
NOTE                ALL TABLES AND CONSTANTS FROM HERE ON
NOTE                ARE TO BE CHANGED FOR EACH REGION
NOTE
NOTE
$ENDLIST
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NOTE  CONSTANTS, INITIAL VALUES, TABLES   FOR   SODA
C INCDF=1.10   SODA
C CHLDN=25583
C TNN=24436
C YALDN=17220
C PRMN=36079
C MAN=32799
C OLDN=27880
C BRTNN=.0170
T TTRTNBR=-.00018/-.00016/-.00014/-.00012/-.00010/-.00008
C BRYALDN=.0470
T TTRYLDB=-.00050/-.00040
C BRPRMN=.0336
T TTRPBR=-.00050/-.00040/-.00015/-.00010/0.0/0.0
C BRMAN=.0075
T TTRMB=-.0001/+.00005
C MG3N=-.0025
T TTRMGYD=-.0002/-.0001
C MG4N=-.0018
T TTRMGPR=-.0001/-.0001
C MG5N=-.0008
T TTRMGMA=-.0001/-.0001
C MG6=-.0008
C DRATE1N=.0017  CHLD DEATHS PER CHILD PER YEAR
T TTRDR1=-8.7E-6/-5.8E-6
C DRATE2N=.0012
T TTRDR2=-1.5E-6/-1.5E-6
C DRATE3N=.0012
T TTRDR3=-1.5E-6/-1.5E-6
C DRATE4N=.0025
T TTRDR4=-2.9E-6/-2.9E-6
C DRATE5N=.0080
T TTRDR5=-2.61E-5/-1.74E-5
T TPRCWN=.513/.509
C WNWORKN=20894
T TTRWNWK=105/105
T THCTN=.03/.02
C UNTTNN=.150
C LZTNN=.29
T THCYALD=.03/.02
C UNTYALN=.080
C LZYALDN=.07
T THCPRM=.04/.03
C UNTPRMN=.090
C LZPRMN=.07
T THCMA=.05/.04
C UNTMAN=.090
C LZMAN=.07
T THCOLD=.70/.65
C UNTOLDN=.060
C LZOLDN=.14
C COMMTRN=5347
C EDTNN=.8347
C TRNTNN=.88
C EDYALDN=.8347
C TRNYALN=.88
C EDPRMN=.8347
C TRNPRMN=.88
T TEDMA=.84/.87
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T TTRNMA=.88/.88/.88/.88/.88/.88/.88/
T TEDOLD=.84/.87
T TTRNOLD=.88/.88/.88/.88/.88/.88/.88
C LABORN=.553              PERCENT LABOR  INITIAL VALUE
C PROFSNN=.148
C MGMFNTN=.299             PERCENT MGMENT INITIAL VALUE
C EMPGVTN=11599
T TCGMLEM=0/0/0/0/0/0/0
C EMPAGN=11429
C EMPSVN=18849
C EMPMFN=19191
C EMPTRDN=19447
C EMPMNN=4796
T TMNRRVS=1/.875/.750/.625/.500/.375  1970=BASE YEAR=1.0
C UNEMPSB=.045  SODA
C AVWGN=2.08   HOURLY WAGE RATE
C REGATRN=1.06
C SZREG=6704           AREA IN SQ MILES (REGION)
C OCOSTSN=.45             STARTS AT PRCNT AWAY FROM NAT .5
T TOCTRND=.001/.0005        PRCNT CHANGE PER YEAR,ENERGY INCREASE MOSTLY
C BSIN=36000
C PRFRTN=.095
C IPRFN=.25
C PVIN=16970
C ISVNG=.5           INVESTMENT
C SVRTN=.10
C EXTIN=20370
C GVTENDN=19300
C GVTEXGN=9420
C LYRIN=96300
C PDPCN=.05                 PRCNT PROD CAP OUT OF USE ANNUALLY
C GVTPRDN=43100
C AGPRDN=74500
C AGPRCHN=0.0
T TWEATHE=0/0
C SVPRDN=13500
C MFPRDN=34300
C TRDPRDN=57400
C MNPRDN=90000
C AGPRICN=110                 1967=100.0
T TFMSZ=2.84/2.60
C PPOVN=.260
C PMCLN=.370
C PAFLN=.370
C PCSTRN=26200
C ASCPYN=1.152       1000'S OF $'S
T TERMPAY=8257/7845/8358/4681/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0
X /0
C CONSN=2067                WORK WITH THIS LATER,COMPARE WITH DPI
C REGPN=110
C EDSPDN=9569
C CPCTYN=34487
C SCFUNDN=15785          1000'S OF $'S
C TCHSTDN=.0437
C MNEDLN=10.1
C VTTRNN=.73         YEARS OF TRAINING , STARTS=0TO2 DEPENDING
C TRSPDN=1000
C TRMANTN=1172
T TAASSM=.87/.8             CHECK WITH SOME OTHER SOURCE
C HSMKTVN=395587
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C HSDEP=.02            CONSTANT NET DEP OF HOUSING
C PSBSTBN=.110
C HOUSESN=58675
T TPCOUSE=.020/.020
C NWSTRSN=1427
C SLSTXN=5844                SALES TAX RECEIPTS IN 1000'S OF DOLLARS
T TSLTXRT=.005/.01
C TAXSCHN=9569
C SCHASN=136888
T TSCHAST=.001/.001
C STXRTN=.0694      AVERAGE MILLAGE,
C OTHTXN=5906
C PROPASN=85101
C PROPTRN=.0694
C MSCTXN=1580
C FDSTFDN=21667
C PERTAXN=236
C ICMTN=.114
C GVTNEXN=44566
C PIN=2100
C PI1N=2075
C UNEMPN=.045
C UNEMP1N=.043
C BRTHSN=2200
C BRTHS1N=2150
C MNEDL1N=9.9
C VTTRN1N=.70
C PRCMFGN=.225
C POPN=163.997E3
C SKLVLN=.99
C REGYN=325E3
C TPRDN=300E3
C RLDENSN=.41
C PCTCSTN=.01
C SCHBDGN=750
C STDSN=34780
C SCHREVN=25350
C MNHSNGN=6.7
C RPOSN=23.5
C TRCPTSN=44000
C PCHGPON=.01
C GVTBDGN=900
C TTLMGSB=-558
C TTLDSB=2378
C BRTHSSB=2214
T TWPYMT=500/500/500/500/500/500
T TEDFNDS=127/190                1000'S OF $'S
C UNMPLT1=.080        UNEMPLOYMENT LIMIT,PT AT WHICH INDUST $'S USED
C UNMPLT2=.090
C SBHSLT=.10
C PRCILMN=.55
C EDUCLTN=10.1
C POPLT1N=164000
C SKLLT=.85
C PCWLFLT=.15
C LBRLMT=.55
C RATLMT=.95
NOTE
T API=1/1/1/1/1/1/1/1/1/1/1/1/1/1/1/1/1/1/1/1/1/1/1/1/1/1
T BPI=0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0
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T CPI=0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0
T DPI=0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0
RUN SODA5       1.0IND
T API=.75/.75/.75/.75/.75/.75/.75/.75/.75/.75/.75/.75/.75/.75/.75/.75/.75/
X .75/.75/.75/.75/.75/.75/.75/.75/.75/.75
T BPI=.25/.25/.25/.25/.25/.25/.25/.25/.25/.25/.25/.25/.25/.25/.25/.25/.25/
X .25/.25/.25/.25/.25/.25/.25/.25/.25/.25
T CPI=0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0
T DPI=0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0
RUN SODA7        .75IND  .25WLF
T API=0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0
T BPI=.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/
X .5/.5/.5/.5
T CPI=.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/
X .5/.5/.5/.5
T DPI=0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0
RUN SODA9             .5WLF .5ED
T API=.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/
X .5/.5/.5/.5
T BPI=0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0
T CPI=.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/
X .5/.5/.5/.5
T DPI=0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0
RUN SODA10          .5IND      .5ED
T API=.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/
X .5/.5/.5/.5
T BPI=0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0
T CPI=0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0
T DPI=.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/
X .5/.5/.5/.5
RUN SODA11          .5IND           .5TR
T API=.9/.9/.9/.9/.9/.9/.9/.9/.9/.9/.9/.9/.9/.9/.9/.9/.9/.9/.9/.9/.9/.9/
X .9/.9/.9/.9
T BPI=.1/.1/.1/.1/.1/.1/.1/.1/.1/.1/.1/.1/.1/.1/.1/.1/.1/.1/.1/.1/.1/.1/
X .1/.1/.1/.1
T CPI=0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0
T DPI=0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0
RUN SODA15        .9IND  .1WLF
T API=.9/.9/.9/.9/.9/.9/.9/.9/.9/.9/.9/.9/.9/.9/.9/.9/.9/.9/.9/.9/.9/.9/
X .9/.9/.9/.9
T BPI=0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0
T CPI=.1/.1/.1/.1/.1/.1/.1/.1/.1/.1/.1/.1/.1/.1/.1/.1/.1/.1/.1/.1/.1/.1/
X .1/.1/.1/.1
T DPI=0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0
RUN SODA16          .9IND           .1ED
T API=.9/.9/.9/.9/.9/.9/.9/.9/.9/.9/.9/.9/.9/.9/.9/.9/.9/.9/.9/.9/.9/.9/
X .9/.9/.9/.9
T BPI=0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0
T CPI=0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0
T DPI=.1/.1/.1/.1/.1/.1/.1/.1/.1/.1/.1/.1/.1/.1/.1/.1/.1/.1/.1/.1/.1/.1/
X .1/.1/.1/.1
RUN SODA17          .9IND                .1TR
T API=0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0
T BPI=0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0
T CPI=.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/
X .5/.5/.5/.5
T DPI=.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/
X .5/.5/.5/.5
RUN SODA20                          .5ED .5TR
T API=.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/
```

```
X .7/.7/.7/.7
T BPI=.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/
X .7/.7/.7/.7
T CPI=.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/
X .7/.7/.7/.7
T DPI=.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/
X .7/.7/.7/.7
RUN SODA23          .7IND   .1WLF    .1ED .1TR
T API=.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/
X .7/.7/.7/.7
T BPI=.3/.3/.3/.3/.3/.3/.3/.3/.3/.3/.3/.3/.3/.3/.3/.3/.3/.3/.3/.3/.3/
X .3/.3/.3/.3
T CPI=0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0
T DPI=0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0
RUN SODA24          .7IND   .3WLF
T API=.75/.75/.75/.75/.75/.75/.75/.75/.75/.75/.75/.75/.75/.75/.75/.75/
X .75/.75/.75/.75/.75/.75/.75/.75/.75/.75
T BPI=0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0
T CPI=.25/.25/.25/.25/.25/.25/.25/.25/.25/.25/.25/.25/.25/.25/.25/.25/
X .25/.25/.25/.25/.25/.25/.25/.25/.25/.25
T DPI=0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0
RUN SODA25          .75IND        .25ED
T API=.75/.75/.75/.75/.75/.75/.75/.75/.75/.75/.75/.75/.75/.75/.75/.75/
X .75/.75/.75/.75/.75/.75/.75/.75/.75/.75
T BPI=0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0
T CPI=0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0
T DPI=.25/.25/.25/.25/.25/.25/.25/.25/.25/.25/.25/.25/.25/.25/.25/.25/
X .25/.25/.25/.25/.25/.25/.25/.25/.25/.25
RUN SODA26          .75IND               .25TR
T TTMAXPI=.001/.001/.001/.001/.001/.001
T API=0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0
T BPI=0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0
T CPI=0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0
T DPI=0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0
RUN  SODA           NON-OPTIMAL
NOTE  CONSTANTS, INITIAL VALUES, TABLES   FOR   EODD
C INCDF=1.15   EODD
C CHLDN=35758       EODD (1970)
C TNN=28683
C YALDN=22946
C PRMN=40730
C MAN=36332
C OLDN=26771
C BRTNN=.019
T TTRTNBR=-.00018/-.00016/-.00014/-.00012/-.00010/-.00008
C BRYALDN=.055
T TTRYLDB=-.00050/-.00040
C BRPRMN=.0377
T TTRPBR=-.00050/-.00040/-.00015/-.00010/0.0/0.0
C BRMAN=.0084
T TTRMB=-.0001/+.00005
C MG3N=-.0008
T TTRMGYD=-.0001/.0001
C MG4N=+.0005
T TTRMGPR=.0002/.0001
C MG5N=+.001
T TTRMGMA=.0001/.0002
C MG6=+.002
C DRATE1N=.0015  CHLD DEATHS PER CHILD PER YEAR
T TTRDR1=-6.9E-6/-4.6E-6
```

```
C DRATE2N=.0008
T TTRDR2=-1.1E-6/-1.1E-6
C DRATE3N=.0008
T TTRDR3=-1.1E-6/-1.1E-6
C DRATE4N=.0019
T TTRDR4=-2.3E-6/-2.3E-6
C DRATE5N=.0059
T TTRDR5=-2.04E-5/-1.36E-5
T TPRCWN=.512/.508
C WNWORKN=22702
T TTRWNWK=114/114
T THCTN=.03/.02
C UNTTNN=.175
C LZTNN=.29
T THCYALD=.03/.02
C UNTYALN=.096
C LZYALDN=.08
T THCPRM=.04/.03
C UNTPRMN=.102
C LZPRMN=.08
T THCMA=.05/.04
C UNTMAN=.102
C LZMAN=.08
NOTE
T THCOLD=.70/.65
C UNTOLDN=.072
C LZOLDN=.15
C COMMTRN=6617
C EDTNN=.8182
C TRNTNN=.88
C EDYALDN=.8182
C TRNYALN=.88
C EDPRMN=.8182
C TRNPRMN=.88
T TEDMA=.82/.85
T TTRNMA=.88/.88/.88/.88/.88/.38
T TEDOLD=.82/.85
T TTRNOLD=.88/.88/.88/.88/.88/.88
C LABORN=.561
C PROFSNN=.129
C MGMENTN=.310
C EMPGVTN=12613
T TCGMLEM=0/0/0/0/0/0
C EMPAGN=11578
C EMPSVN=21366
C EMPMFN=26134
C EMPTRDN=21748
C EMPMNN=789
C UNEMPSB=.055   EODD 1970
T TMNRRVS=1.0/.875/.750/.625/.500/.375
C AVWGN=2.18
C SZREG=4711      AREA IN SQ MILES
C OCOSTSN=.38
T TUCTRND=.001/.0005
C BSIN=40000
C PRFRTN=.055
C IPRFN=.25
C PVIN=21910
C SVRTN=.12
C ISVNG=.5
```

```
C EXTIN=10960
C GVTENDN=17450
C GVTEXGN=10420
C PDPCN=.05
C GVTPRDN=78000
C AGPRDN=47200
C AGPRCHN=0.0
T TWEATHE=0/0
C SVPRDN=12000
C MFPRDN=72100
C TRDPRDN=62000
C MNPRDN=5000
C AGPRICN=110
T TFMSZ=3.04/2.80
C PPOVN=.290
C PMCLN=.426
C PAFLN=.284
C POSTRN=89100
C ASCPYN=1.142
T TFRMPAY=6016/5715/6089/3410/2000/1000/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0
X /0/0/0/0
C CONSN=1911
C REGPN=112
C EDSPDN=7862
C SCFUNDN=20265
C TCHSTDN=.0428
C MNEDLN=9.9
C VTTRNN=.73
C TRSPDN=1000
C CPCTYN=29910
C TRMANTN=1365
T TAASSM=.8/.8
C HSMKTVN=491881
C HSDEP=.02
C PSBSTBN=.173
C HOUSESN=62989
T TPCOUSE=.015/.015
C NWSTRSN=1661
C SLSTXN=5161
T TSLTXRT=.005/.01
C TAXSCHN=7862
C SCHASN=115279
T TSCHAST=.001/.001
C STXRTN=.0682
C OTHTXN=6249
C PROPASN=91628
C PROPTRN=.0682
C MSCTXN=1755
C FDSTFDN=24869
C PERTAXN=218
C ICMTN=.114
C GVTNEXN=45896
C LYRIN=98000
C PIN=1600
C PI1N=1575
C UNEMPN=.055
C UNEMP1N=.054
C BRTHSN=3000
C BRTHS1N=2875
C MNEDL1N=9.8
```

```
C VTTRNIN=.70
C PRCMFGN=.278
C POPN=191.22E3
C SKLVLN=1.01
C REGYN=375E3
C TPRDN=350E3
C PCHGPON=.01
C RLDENSN=.69
C PCTCSTN=.01
C SCHBDGN=500
C STDSN=43690
C SCHREVN=28125
C MNHSNGN=7.75
C RPDSN=39.4
C TRCPTSN=45000
C GVTBDGN=900
C TTLMGSB=1511
C TTLDSB=2177
C BRTHSSB=2961
C REGATRN=1.07
T TWPYMT=600/650/650/650/700/700
T TEDFNDS=125/200
C UNMPLT1=.085
C UNMPLT2=.095
C SBHSLT=.15
C PRCILMN=.45
C EDUCLTN=10.7
C POPLT1N=192000
C SKLLT=.83
C PCWLFLT=.15
C LBRLMT=.55
C RATLMT=.95
T API=1/1/1/1/1/1/1/1/1/1/1/1/1/1/1/1/1/1/1/1/1/1/1/1/1/1
T BPI=0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0
T CPI=0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0
T DPI=0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0
RUN EODD5 1970 1.0IND
T API=.75/.75/.75/.75/.75/.75/.75/.75/.75/.75/.75/.75/.75/.75/.75/.75/
X .75/.75/.75/.75/.75/.75/.75/.75/.75/.75
T BPI=.25/.25/.25/.25/.25/.25/.25/.25/.25/.25/.25/.25/.25/.25/.25/.25/
X .25/.25/.25/.25/.25/.25/.25/.25/.25/.25
T CPI=0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0
T DPI=0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0
RUN EODD7 1970  .75IND  .25WLF
T API=0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0
T BPI=.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/
X .5/.5/.5/.5
T CPI=.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/
X .5/.5/.5/.5
T DPI=0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0
RUN EODD9 1970        .5WLF .5ED
T API=.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/
X .5/.5/.5/.5
T BPI=0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0
T CPI=.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/
X .5/.5/.5/.5
T DPI=0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0
RUN EODD10 1970   .5IND     .5ED
T API=.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/
X .5/.5/.5/.5
```

```
T BPI=0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0
T CPI=0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0
T DPI=.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/
X .5/.5/.5/.5
RUN EODD11 1970   .5IND          .5TR
T API=.9/.9/.9/.9/.9/.9/.9/.9/.9/.9/.9/.9/.9/.9/.9/.9/.9/.9/.9/.9/.9/
X .9/.9/.9/.9
T BPI=.1/.1/.1/.1/.1/.1/.1/.1/.1/.1/.1/.1/.1/.1/.1/.1/.1/.1/.1/.1/.1/
X .1/.1/.1/.1
T CPI=0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0
T DPI=0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0
RUN EODD15 1970  .9IND  .1WLF
T API=.9/.9/.9/.9/.9/.9/.9/.9/.9/.9/.9/.9/.9/.9/.9/.9/.9/.9/.9/.9/.9/
X .9/.9/.9/.9
T BPI=0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0
T CPI=.1/.1/.1/.1/.1/.1/.1/.1/.1/.1/.1/.1/.1/.1/.1/.1/.1/.1/.1/.1/.1/
X .1/.1/.1/.1
T DPI=0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0
RUN EODD16 1970   .9IND          .1ED
T API=.9/.9/.9/.9/.9/.9/.9/.9/.9/.9/.9/.9/.9/.9/.9/.9/.9/.9/.9/.9/.9/
X .9/.9/.9/.9
T BPI=0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0
T CPI=0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0
T DPI=.1/.1/.1/.1/.1/.1/.1/.1/.1/.1/.1/.1/.1/.1/.1/.1/.1/.1/.1/.1/.1/
X .1/.1/.1/.1
RUN EODD17 1970   .9IND                 .1TR
T API=0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0
T BPI=0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0
T CPI=.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/
X .5/.5/.5/.5
T DPI=.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/
X .5/.5/.5/.5
RUN EODD20 1970                      .5ED .5TR
T API=.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/
X .7/.7/.7/.7
T BPI=.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/
X .7/.7/.7/.7
T CPI=.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/
X .7/.7/.7/.7
T DPI=.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/
X .7/.7/.7/.7
RUN EODD23 1970  .7IND  .1WLF   .1ED .1TR
T API=.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/
X .7/.7/.7/.7
T BPI=.3/.3/.3/.3/.3/.3/.3/.3/.3/.3/.3/.3/.3/.3/.3/.3/.3/.3/.3/.3/.3/
X .3/.3/.3/.3
T CPI=0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0
T DPI=0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0
RUN EODD24 1970  .7IND  .3WLF
T API=.75/.75/.75/.75/.75/.75/.75/.75/.75/.75/.75/.75/.75/.75/.75/.75/
X .75/.75/.75/.75/.75/.75/.75/.75/.75/.75
T BPI=0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0
T CPI=.25/.25/.25/.25/.25/.25/.25/.25/.25/.25/.25/.25/.25/.25/.25/.25/
X .25/.25/.25/.25/.25/.25/.25/.25/.25/.25
T DPI=0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0
RUN EODD25 1970  .75IND       .25ED
T API=.75/.75/.75/.75/.75/.75/.75/.75/.75/.75/.75/.75/.75/.75/.75/.75/
X .75/.75/.75/.75/.75/.75/.75/.75/.75/.75
T BPI=0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0
T CPI=0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0
```

```
T DPI=.25/.25/.25/.25/.25/.25/.25/.25/.25/.25/.25/.25/.25/.25/.25/.25/
X .25/.25/.25/.25/.25/.25/.25/.25/.25/.25
RUN EODD26 1970  .75IND              .25TR
T TTMAXPI=.001/.001/.001/.001/.001/.001
T API=0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0
T BPI=0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0
T CPI=0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0
T DPI=0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0
RUN  EODD 1970   NON-OPTIMAL
NOTE  CONSTANTS, INITIAL VALUES, TABLES   FOR   NODA
C INCDF=1.05   NODA
C CHLDN=25394        NODA
C TNN=24751
C YALDN=12858
C PRMN=35300
C MAN=35416
C OLDN=27000
C BRTNN=.018
T TTRTNBR=-.00018/-.00016/-.00014/-.00012/-.00010/-.00008
C BRYALDN=.0470
T TTRYLDB=-.00050/-.00040
C BRPRMN=.035
T TTRPBR=-.00050/-.00040/-.00015/-.00010/0.0/0.0
C BRMAN=.008
T TTRMB=-.0001/+.00005
C MG3N=-.0015
T TTRMGYD=-.0006/-.0002
C MG4N=-.0007
T TTRMGPR=-.0004/-.0001
C MG5N=-.0007
T TTRMGMA=-.0004/-.0003
C MG6=-.0009
C DRATE1N=.0016  CHLD DEATHS PER CHILD PER YEAR
T TTRDR1=-7.8E-6/-5.2E-6
C DRATE2N=.0010
T TTRDR2=-1.3E-6/-1.3E-6
C DRATE3N=.0010
T TTRDR3=-1.3E-6/-1.3E-6
C DRATE4N=.0022
T TTRDR4=-2.6E-6/-2.6E-6
C DRATE5N=.0072
T TTRDR5=-2.37E-5/-1.58E-5
T TPRCWN=.515/.511
C WNWORKN=22020
T TTRWNWK=110/110
T THCTN=.03/.02
C UNTTNN=.075
C LZTNN=.26
T THCYALD=.03/.02
C UNTYALN=.06   NODA
C LZYALDN=.06
T THCPRM=.04/.03
C UNTPRMN=.045
C LZPRMN=.06
T THCMA=.05/.04
C UNTMAN=.045
C LZMAN=.06
NOTE
T THCOLD=.70/.65
C UNTOLDN=.030
```

```
C  LZOLDN=.13
C  COMMTRN=3142
C  EDTNN=.9917
C  TRNTNN=.90
C  EDYALDN=.9917
C  TRNYALN=.90
C  EDPRMN=.9917
C  TRNPRMN=.90
T  TEDMA=.992/.999
T  TTRNMA=.90/.9/.9/.9/.9/.9
T  TEDOLD=.992/.999
T  TTRNOLD=.9/.9/.9/.9/.9/.9
C  LABORN=.514
C  PROFSNN=.165
C  MGMENTN=.321
C  EMPGVTN=12094
T  TCGMLEM=0/0/0/0/0/0
C  EMPAGN=5465
C  EMPSVN=23024
C  EMPMFN=19379
C  EMPTRDN=25711
C  EMPMNN=3420
C  UNEMPSB=.030   NODA
T  TMNRRVS=1.0/.675/.750/.625/.500/.375
C  AVWGN=2.56
C  SZREG=7406     AREA IN SQ MILES
C  JCOSTSN=.48
T  TGCTRND=.001/.0005
C  BSIN=63000
C  PRFRTN=.075
C  IPRFN=.25
C  PVIN=30620
C  SVRTN=.15
C  ISVNG=.5
C  EXTIN=28580
C  GVTENDN=18700
C  GVTEXGN=9620
C  PDPCN=.05
C  GVTPRDN=51300
C  AGPRDN=129800
C  AGPRCHN=0.0
T  TWEATHE=0/0
C  SVPRDN=11600
C  MFPRDN=86900
C  TRDPRDN=59400
C  MNPRDN=105000
C  AGPRICN=1.10
T  TFMSZ=3.14/2.89
C  PPOVN=.160
C  PMCLN=.336
C  PAFLN=.504
C  POSTRN=5900
C  ASCPYN=1.299
T  TERMPAY=17693/16810/17910/10030/8000/6000/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0
X  /0/0/0/0/0/0
C  CGNSN=2537
C  REGPN=112
C  EDSPDN=16780
C  SCFUNDN=11467
C  TCHSTDN=.0468
```

```
C  MNEDLN=12.0
C  VTTRNN=.73
C  TRSPDN=1000
C  CPCTYN=49602
C  TRMANTN=1150
T  TAASSM=.8/.8
C  HSMKTVN=542002
C  HSDEP=.02
C  PSBSTBN=.066
C  HOUSESN=57795
T  TPCOUSE=.01/.01
C  NWSTRSN=1186
C  SLSTXN=6604
T  TSLTXRT=.005/.01
C  TAXSCHN=16780
C  SCHASN=281540
T  TSCHAST=.001/.001
C  STXRTN=.0596
C  OTHTXN=7972
C  PROPASN=133758
C  PROPTRN=.0596
C  MSCTXN=1890
C  FDSTFDN=18341
C  PERTAXN=348
C  ICMTN=.137
C  GVTNEXN=51587
C  LYRIN=142000
C  PIN=3000
C  PIIN=2975
C  UNEMPN=.03
C  UNEMP1N=.031
C  BRTHSN=1900
C  BRTHS1N=1875
C  MNEDL1N=11.8
C  VTTRN1N=.70
C  PRCMFGN=.221
C  POPN=160.72E3
C  SKLVLN=1.01
C  REGYN=400E3
C  TPRDN=375E3
C  PCHGPON=.01
C  RLDENSN=.37
C  PCTCSTN=.02
C  SCHBDGN=1500
C  STDSN=34970
C  SCHPEVN=28245
C  MNHSNGN=9.3
C  RPDSN=21
C  TRCPTSN=51000
C  GVTBDGN=900
C  TTLMGSB=-852
C  TTLDSB=2109
C  BRTHSSB=2061
C  REGATRN=1.00
T  TWPYMT=400/400/400/400/400/400
T  TEDFNDS=100/140
C  UNMPLT1=.070
C  UNMPLT2=.080
C  SBHSLT=.08
C  PRCILMN=.75
```

```
C EDUCLTN=11.8
C POPLTIN=162000
C SKLLT=.95
C PCWLFLT=.15
C LBRLMT=.50
C RATLMT=.95
T API=1/1/1/1/1/1/1/1/1/1/1/1/1/1/1/1/1/1/1/1/1/1/1/1/1/1
T BPI=0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0
T CPI=0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0
T DPI=0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0
RUN NODA5        1.0IND
T API=.75/.75/.75/.75/.75/.75/.75/.75/.75/.75/.75/.75/.75/.75/.75/.75/
X .75/.75/.75/.75/.75/.75/.75/.75/.75/.75
T BPI=.25/.25/.25/.25/.25/.25/.25/.25/.25/.25/.25/.25/.25/.25/.25/.25/
X .25/.25/.25/.25/.25/.25/.25/.25/.25/.25
T CPI=0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0
T DPI=0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0
RUN NODA7         .75IND  .25WLF
T API=0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0
T BPI=.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/
X .5/.5/.5/.5
T CPI=.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/
X .5/.5/.5/.5
T DPI=0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0
RUN NODA9              .5WLF .5ED
T API=.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/
X .5/.5/.5/.5
T BPI=0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0
T CPI=.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/
X .5/.5/.5/.5
T DPI=0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0
RUN NODA10          .5IND      .5ED
T API=.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/
X .5/.5/.5/.5
T BPI=0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0
T CPI=0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0
T DPI=.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/
X .5/.5/.5/.5
RUN NODA11          .5IND           .5TR
T API=.9/.9/.9/.9/.9/.9/.9/.9/.9/.9/.9/.9/.9/.9/.9/.9/.9/.9/.9/.9/.9/.9/
X .9/.9/.9/.9
T BPI=.1/.1/.1/.1/.1/.1/.1/.1/.1/.1/.1/.1/.1/.1/.1/.1/.1/.1/.1/.1/.1/.1/
X .1/.1/.1/.1
T CPI=0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0
T DPI=0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0
RUN NODA15         .9IND   .1WLF
T API=.9/.9/.9/.9/.9/.9/.9/.9/.9/.9/.9/.9/.9/.9/.9/.9/.9/.9/.9/.9/.9/.9/
X .9/.9/.9/.9
T BPI=0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0
T CPI=.1/.1/.1/.1/.1/.1/.1/.1/.1/.1/.1/.1/.1/.1/.1/.1/.1/.1/.1/.1/.1/.1/
X .1/.1/.1/.1
T DPI=0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0
RUN NODA16          .9IND           .1ED
T API=.9/.9/.9/.9/.9/.9/.9/.9/.9/.9/.9/.9/.9/.9/.9/.9/.9/.9/.9/.9/.9/.9/
X .9/.9/.9/.9
T BPI=0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0
T CPI=0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0
T DPI=.1/.1/.1/.1/.1/.1/.1/.1/.1/.1/.1/.1/.1/.1/.1/.1/.1/.1/.1/.1/.1/.1/
X .1/.1/.1/.1
RUN NODA17          .9IND                .1TR
```

```
T API=0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0
T BPI=0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0
T CPI=.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/
X .5/.5/.5/.5
T DPI=.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/.5/
X .5/.5/.5/.5
RUN NODA20                                  .5ED .5TR
T API=.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/
X .7/.7/.7/.7
T BPI=.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/
X .7/.7/.7/.7
T CPI=.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/
X .7/.7/.7/.7
T DPI=.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/
X .7/.7/.7/.7
RUN NODA23          .7IND  .1WLF    .1ED .1TR
T API=.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/.7/
X .7/.7/.7/.7
T BPI=.3/.3/.3/.3/.3/.3/.3/.3/.3/.3/.3/.3/.3/.3/.3/.3/.3/.3/.3/.3/.3/.3/.3/.3/.3/
X .3/.3/.3/.3
T CPI=0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0
T DPI=0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0
RUN NODA24          .7IND  .3WLF
T API=.75/.75/.75/.75/.75/.75/.75/.75/.75/.75/.75/.75/.75/.75/.75/.75/.75/
X .75/.75/.75/.75/.75/.75/.75/.75/.75/.75
T BPI=0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0
T CPI=.25/.25/.25/.25/.25/.25/.25/.25/.25/.25/.25/.25/.25/.25/.25/.25/.25/
X .25/.25/.25/.25/.25/.25/.25/.25/.25/.25
T DPI=0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0
RUN NODA25          .75IND          .25ED
T API=.75/.75/.75/.75/.75/.75/.75/.75/.75/.75/.75/.75/.75/.75/.75/.75/.75/
X .75/.75/.75/.75/.75/.75/.75/.75/.75/.75
T BPI=0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0
T CPI=0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0
T DPI=.25/.25/.25/.25/.25/.25/.25/.25/.25/.25/.25/.25/.25/.25/.25/.25/.25/
X .25/.25/.25/.25/.25/.25/.25/.25/.25/.25
RUN NODA26          .75IND                .25TR
T TTMAXPI=.001/.001/.001/.001/.001/.001
T API=0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0
T BPI=0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0
T CPI=0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0
T DPI=0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0/0
RUN  NODA          NON-OPTIMAL
$ENDLIST
```

APPENDIX C

ATTITUDES SURVEY RESULTS

Table XXVIII gives some of the results of a survey conducted by Jackie Smith and Luther Tweeten which was designed to gain information concerning the attitudes of residents in SODA, NODA, and EODD toward types of economic development.

TABLE XXVIII

RESULTS OF QUESTIONNAIRE FOR SODA, NODA, AND EODD

Question	Development District			
	SODA	NODA	EODD	Total
Do you live in a town? (% Yes)	70	59	57	63
Your age? (Mean years)	50	46	51	49
Sex? (% Male)	84	82	76	81
Last year of school completed? (Mean years)	12.2	13.2	12.6	12.6
Are you married? (% yes)	90	86	88	88
Number living in your household? (Mean)	2.9	3.2	3.1	3.1
Your income last year? (Mean $)	7,968	10,033	8,309	8,720
Your wife or husband's income? (Mean $)	2,754	2,250	2,966	2,663
Other family income? (Mean $)	1,432	967	1,281	1,241
Total family income? (Mean $)	12,154	13,250	12,556	12,624
Desire community's population to increase? (% yes)	78	71	67	73
Desirable to have more industry? (% yes)	85	78	83	83
Incentives to encourage industry? (%yes)	73	51	71	66
How far do you drive to work?[a] (Mean miles)	16.4	11.7	16.6	14.9
How far willing to drive?[b] (Mean miles)	30.2	28.1	29.9	29.9
Should the federal government spend more in rural areas? (% yes)	89	85	76	84
Specific type of development program? (% - 2 responses/respondent, actual number)[c]				
Public Assistance	9 (20)	6 (10)	10 (17)	8 (47)
Education	23 (51)	22 (38)	15 (26)	21 (115)
Technical training	27 (59)	32 (56)	29 (49)	29 (164)
Family planning	4 (8)	5 (8)	6 (11)	5 (27)
Industrialization	36 (73)	31 (54)	37 (62)	35 (194)
Moving compensation	1 (3)	4 (7)	3 (4)	3 (14)
General type of development program?[d] (%)				
Industrialization	N/A	40	61	50
Education and training	N/A	48	42	45
Public utility grants and loans	N/A	18	16	17

TABLE XXVIII (Continued)

Question	SODA	NODA	EODD	Total
Would you take another job to supplement your income? (% yes)	40	37	46	41
Would your spouse? (% yes)	41	48	36	42
Would you move to another Oklahoma community to take a job? (% yes)	30	28	27	29
To another state? (% yes)	24	26	16	22
Compensation required to migrate?[e] ($)				
To another Oklahoma community?	1,288	1,463	1,708	1,472
Out of state?	1,712	1,625	1,821	1,718
Does your community have enough jobs for its high school graduates? (% no)	93	87	91	90
Is this a big problem (% yes)	76	70	76	74
How would you define poverty for a family of four? (%)				
Below $3,000	15	11	7	11
Below $4,000	19	14	16	17
Below $5,000	22	29	24	25
Below $6,000	44	46	54	47
Mean Poverty Level ($ income/ year)	4,945	5,089	5,247	5,083
What percent of the families in your county are poor? (%)				
Less than 5%	14	19	7	13
6-10%	19	38	15	24
11-20%	18	27	18	21
over 20%	49	16	60	43
Weighted mean percent[f]	15	11	16	14
What do you consider to be the primary cause of rural poverty?[g] (%)				
Not enough jobs	55	32	45	45
Able bodied poor will not take jobs	36	56	52	47
Lack of educational and technical training	17	13	20	17
Lack of public assistance	2	0	1	1
Other and comments	34	28	33	31

TABLE XXVIII (Continued)

[a]Includes only those who do drive to work.

[b]Includes only those willing to drive to work (63%).

[c]The first number gives the percentage of the total "votes" (2 per respondent) that the particular program received. The number in parentheses is the actual number of "votes" the particular program received. Not everyone "voted" twice on this question as they were instructed.

[d]This question was not on the SODA questionnaire. Also a few respondents chose more than one.

[e]Includes only those willing to move to another community or another state.

[f]Used the mean of the middle ranges.

[g]Some listed more than one choice.

APPENDIX D

RESULTS OF OTHER SELECTED STRATEGIES

The results of strategies 7, 11, 16, 24, 25, and 26 are given for SODA, NODA, and EODD. Refer to tables in text for additional information concerning the variables for these selected strategies. See Table III for allocations of funds in above strategies. See Table IV for definitions of the variables.

REGIONAL ECONOMIC SIMULATION MODEL SODA7 .75IND .25WLF

TIME	REGY	NREGY	PI	NPI	POVACML	DSYDSPF	UNEMP	UNDMPCG	POP	TTLMGS	COMMTR
.0	351.9	347.0	2146.	2116.	.26	71.9	.055	-.108	164.00	-235.	5347.
1.	363.2	357.8	2217.	2184.	.59	69.2	.054	.018	163.85	-145.	5167.
2.	378.5	373.2	2310.	2278.	.92	70.1	.053	-.087	163.82	-51.	5021.
3.	388.8	383.4	2371.	2339.	1.25	70.6	.042	.001	163.95	49.	4952.
4.	391.3	385.6	2382.	2348.	1.57	70.2	.040	-.029	164.25	157.	4831.
5.	401.5	395.8	2437.	2402.	1.88	70.2	.042	-.012	164.74	271.	4768.
6.	407.6	401.9	2465.	2430.	2.20	70.3	.044	-.010	165.36	372.	4683.
7.	406.9	401.1	2449.	2415.	2.51	70.3	.047	-.005	166.10	429.	4588.
8.	406.2	400.4	2434.	2399.	2.83	70.2	.048	-.006	166.92	485.	4486.
9.	406.3	400.4	2422.	2387.	3.14	70.2	.049	-.009	167.77	540.	4383.
10.	406.8	401.0	2412.	2377.	3.46	70.1	.052	-.008	168.66	595.	4283.
11.	407.5	401.6	2403.	2368.	3.77	70.1	.055	-.008	169.59	650.	4182.
12.	408.6	402.4	2396.	2359.	4.09	69.8	.057	-.007	170.56	704.	4080.
13.	410.2	403.7	2391.	2353.	4.41	69.4	.060	-.008	171.57	727.	3980.
14.	412.1	405.3	2388.	2348.	4.73	69.0	.062	-.009	172.59	742.	3883.
15.	414.2	407.2	2386.	2346.	5.05	68.5	.064	-.010	173.61	756.	3790.

REGIONAL ECONOMIC SIMULATION MODEL SODA7 .75IND .25WLF

TIME	PFS	PFA	LRPFA	TOBND	TLF	TEMPL	AVWG	SKLVL	REGATRC	PLINDX	MNEDL
.0	4893.	4100.	4100.	0.	89.98	85.31	2.08	.859	1.065	1.801	10.10
1.	5459.	4663.	4100.	563.	90.15	85.52	2.11	.859	1.076	1.803	10.16
2.	5246.	4449.	4096.	352.	90.32	85.77	2.20	.775	1.043	1.806	10.34
3.	5373.	4573.	4096.	477.	89.48	85.95	2.26	.774	1.039	1.807	10.51
4.	5708.	4905.	4099.	807.	89.67	86.25	2.36	.778	1.033	1.807	10.63
5.	5760.	4963.	4106.	857.	90.06	86.47	2.45	.786	1.019	1.805	10.71
6.	5742.	4961.	4118.	842.	90.60	86.82	2.53	.789	1.014	1.799	10.83
7.	5786.	4995.	4134.	861.	91.28	87.22	2.60	.795	1.006	1.791	10.93
8.	5847.	5038.	4153.	885.	91.82	87.66	2.68	.800	1.006	1.783	10.98
9.	5825.	5011.	4173.	838.	92.46	88.12	2.76	.803	.995	1.775	11.04
10.	5822.	5006.	4194.	811.	93.27	88.61	2.84	.806	.992	1.767	11.10
11.	5903.	5084.	4216.	868.	94.09	89.14	2.92	.809	.989	1.757	11.16
12.	6229.	5408.	4240.	1169.	94.91	89.70	3.00	.813	.984	1.748	11.23
13.	6546.	5723.	4264.	1459.	95.75	90.28	3.09	.817	.977	1.738	11.32
14.	6802.	5977.	4289.	1687.	96.61	90.88	3.18	.822	.972	1.729	11.42
15.	6987.	6159.	4315.	1844.	97.49	91.50	3.27	.828	.968	1.720	11.52

REGIONAL ECONOMIC SIMULATION MODEL SODA11 .5IND .5TR

TIME	REGY	NREGY	PI	NPI	POVACML	DSYDSPF	UNEMP	UNDMPCG	POP	TTLMGS	COMMTR
.0	350.9	347.1	2139.	2116.	.26	93.1	.055	-.108	164.00	-235.	5347.
1.	362.0	357.6	2209.	2183.	.59	88.1	.056	.018	163.85	-186.	5167.
2.	376.8	372.7	2301.	2276.	.92	89.1	.056	-.019	163.78	-134.	5021.
3.	386.8	382.7	2361.	2336.	1.25	90.3	.062	-.020	163.81	-78.	4954.
4.	390.9	386.5	2384.	2357.	1.57	89.9	.067	-.018	163.97	-18.	4896.
5.	397.5	393.0	2421.	2394.	1.89	89.7	.071	-.017	164.21	46.	4829.
6.	403.4	398.9	2452.	2425.	2.21	89.7	.075	-.019	164.50	110.	4760.
7.	401.8	397.3	2437.	2410.	2.53	89.6	.080	-.017	164.87	176.	4691.
8.	400.0	395.5	2420.	2392.	2.85	89.4	.084	-.016	165.30	241.	4619.
9.	398.7	393.3	2405.	2373.	3.17	87.9	.087	-.018	165.77	305.	4543.
10.	398.1	392.0	2394.	2357.	3.49	85.8	.090	-.016	166.28	360.	4468.
11.	398.1	391.4	2386.	2346.	3.81	83.6	.091	-.016	166.83	418.	4391.
12.	398.8	391.7	2382.	2340.	4.14	81.4	.092	-.015	167.41	487.	4314.
13.	399.8	392.5	2379.	2336.	4.46	79.5	.092	-.017	168.05	553.	4241.
14.	401.1	393.5	2377.	2332.	4.79	77.8	.093	-.017	168.75	618.	4172.
15.	402.6	394.8	2375.	2329.	5.11	76.2	.093	-.017	169.50	674.	4107.

REGIONAL ECONOMIC SIMULATION MODEL SODA11 .5IND .5TR

TIME	PFS	PFA	LFPFA	TOBND	TLF	TEMPL	AVWG	SKLVL	REGATRC	PLINDX	MNEDL
.0	3768.	4100.	4100.	0.	89.98	85.31	2.08	.859	1.065	1.801	10.10
1.	4334.	4663.	4100.	563.	90.15	85.41	2.11	.859	1.076	1.805	10.16
2.	4132.	4459.	4096.	362.	90.30	85.53	2.21	.875	1.062	1.809	10.33
3.	4099.	4422.	4094.	328.	90.83	85.55	2.31	.895	1.056	1.812	10.50
4.	4429.	4751.	4095.	656.	91.37	85.56	2.40	.912	1.055	1.815	10.62
5.	4494.	4814.	4099.	715.	91.77	85.58	2.50	.925	1.039	1.816	10.71
6.	4502.	4821.	4105.	716.	92.21	85.63	2.60	.933	1.033	1.813	10.82
7.	4533.	4852.	4113.	740.	92.74	85.70	2.69	.940	1.023	1.809	10.92
8.	4579.	4898.	4122.	776.	93.23	85.83	2.78	.945	1.022	1.804	10.97
9.	5393.	5712.	4133.	1580.	93.73	86.00	2.88	.946	1.009	1.800	11.03
10.	6123.	6443.	4144.	2298.	94.39	86.33	2.97	.945	1.004	1.794	11.08
11.	6698.	7218.	4157.	3061.	95.05	86.77	3.06	.944	.999	1.786	11.15
12.	7093.	8016.	4171.	3846.	95.70	87.30	3.15	.943	.991	1.778	11.22
13.	7303.	8409.	4185.	4224.	96.36	87.86	3.25	.941	.983	1.769	11.31
14.	7571.	8881.	4201.	4680.	97.04	88.44	3.36	.940	.976	1.760	11.41
15.	7828.	9305.	4219.	5087.	97.73	89.04	3.46	.940	.969	1.751	11.52

REGIONAL ECONOMIC SIMULATION MODEL SODA16 .9IND .1ED

TIME	REGY	NREGY	PI	NPI	POVACML	DSYDSPF	UNEMP	UNDMPCG	POP	TTLMGS	COMMTR
.0	350.9	346.0	2139.	2110.	.26	71.7	.055	-.108	164.00	-235.	5347.
1.	362.2	356.8	2211.	2177.	.59	69.0	.054	.018	163.85	-121.	5167.
2.	377.6	372.5	2305.	2273.	.92	70.2	.052	-.084	163.84	-1.	5021.
3.	388.2	382.8	2367.	2334.	1.25	70.7	.040	.004	164.02	126.	4951.
4.	391.1	385.4	2379.	2344.	1.57	70.3	.039	-.025	164.40	261.	4828.
5.	401.6	395.9	2434.	2399.	1.88	70.2	.040	-.007	165.00	380.	4760.
6.	408.2	402.4	2463.	2428.	2.20	70.3	.041	-.006	165.73	452.	4667.
7.	407.9	402.1	2449.	2414.	2.51	70.4	.043	-.003	166.57	523.	4565.
8.	407.9	402.1	2435.	2400.	2.83	70.3	.044	-.004	167.50	594.	4460.
9.	408.3	402.5	2424.	2389.	3.14	70.4	.045	-.007	168.47	664.	4353.
10.	409.2	403.5	2414.	2380.	3.46	70.4	.048	-.006	169.51	726.	4249.
11.	410.4	404.5	2406.	2371.	3.77	70.4	.050	-.005	170.60	747.	4143.
12.	412.0	405.9	2400.	2364.	4.09	70.2	.052	-.005	171.70	767.	4035.
13.	414.1	407.7	2396.	2360.	4.41	69.9	.054	-.006	172.80	787.	3929.
14.	416.6	410.0	2395.	2357.	4.72	69.6	.055	-.007	173.92	807.	3826.
15.	419.3	412.5	2395.	2357.	5.04	69.2	.057	-.008	175.04	826.	3725.

REGIONAL ECONOMIC SIMULATION MODEL SODA16 .9IND .1ED

TIME	PFS	PFA	LRPFA	TOBND	TLF	TEMPL	AVWG	SKLVL	REGATRC	PLINDX	MNEDL
.0	4893.	4100.	4100.	0.	89.98	85.31	2.08	.859	1.065	1.801	10.10
1.	5459.	4663.	4100.	563.	90.15	85.58	2.11	.859	1.076	1.803	10.22
2.	5184.	4386.	4096.	290.	90.34	85.90	2.20	.779	1.043	1.804	10.46
3.	5367.	4567.	4096.	471.	89.59	86.17	2.26	.781	1.041	1.804	10.68
4.	5697.	4895.	4100.	794.	89.88	86.60	2.36	.788	1.036	1.803	10.87
5.	5752.	4948.	4110.	838.	90.37	86.96	2.44	.799	1.023	1.800	11.01
6.	5737.	4941.	4125.	816.	90.99	87.46	2.51	.806	1.019	1.791	11.20
7.	5780.	4970.	4143.	827.	91.73	87.98	2.59	.816	1.013	1.783	11.36
8.	5820.	5008.	4164.	844.	92.35	88.52	2.66	.824	1.014	1.773	11.48
9.	5791.	4977.	4187.	790.	93.07	89.09	2.74	.831	1.003	1.764	11.60
10.	5771.	4955.	4212.	743.	93.97	89.70	2.82	.837	1.001	1.754	11.72
11.	5861.	5043.	4238.	805.	94.88	90.35	2.89	.844	.999	1.743	11.85
12.	6135.	5314.	4265.	1049.	95.80	91.04	2.97	.851	.994	1.733	11.98
13.	6388.	5565.	4292.	1272.	96.73	91.76	3.05	.858	.989	1.722	12.11
14.	6600.	5775.	4320.	1455.	97.67	92.50	3.14	.865	.985	1.712	12.24
15.	6759.	5931.	4348.	1583.	98.63	93.26	3.22	.873	.981	1.702	12.38

REGIONAL ECONOMIC SIMULATION MODEL SODA24 .7IND .3WLF

TIME	REGY	NREGY	PI	NPI	POVACML	DSYDSPF	UNEMP	UNDMPCG	POP	TTLMGS	COMMTR
.0	352.1	347.2	2147.	2117.	.26	72.0	.055	-.108	164.00	-235.	5347.
1.	363.4	358.0	2218.	2185.	.59	69.2	.055	.018	163.85	-153.	5167.
2.	378.6	373.3	2311.	2279.	.92	70.1	.054	-.087	163.82	-68.	5021.
3.	388.9	383.5	2372.	2339.	1.25	70.7	.043	.001	163.93	24.	4953.
4.	391.3	385.5	2383.	2348.	1.57	70.3	.041	-.030	164.20	123.	4832.
5.	401.4	395.6	2438.	2403.	1.88	70.2	.044	-.013	164.65	227.	4771.
6.	407.3	401.5	2465.	2430.	2.20	70.3	.046	-.012	165.22	334.	4689.
7.	406.3	400.6	2449.	2414.	2.52	70.3	.049	-.005	165.92	397.	4599.
8.	405.5	399.7	2433.	2398.	2.83	70.2	.050	-.006	166.69	448.	4499.
9.	405.3	399.5	2420.	2385.	3.14	70.2	.052	-.010	167.49	498.	4398.
10.	405.7	399.9	2410.	2376.	3.46	70.1	.056	-.009	168.33	548.	4300.
11.	406.3	400.4	2401.	2367.	3.78	70.1	.059	-.008	169.20	597.	4202.
12.	407.3	401.1	2394.	2358.	4.09	69.8	.061	-.008	170.11	646.	4103.
13.	408.6	402.1	2389.	2351.	4.41	69.4	.064	-.009	171.04	695.	4006.
14.	410.3	403.5	2385.	2346.	4.73	69.0	.066	-.010	172.01	719.	3912.
15.	412.2	405.3	2383.	2343.	5.05	68.6	.069	-.010	172.99	731.	3822.

REGIONAL ECONOMIC SIMULATION MODEL SODA24 .7IND .3WLF

TIME	PFS	PFA	LRPFA	TOBND	TLF	TEMPL	AVWG	SKLVL	REGATRC	PLINDX	MNEDL
.0	4893.	4100.	4100.	0.	89.98	85.31	2.08	.859	1.065	1.801	10.10
1.	5459.	4663.	4100.	563.	90.15	85.50	2.11	.859	1.076	1.804	10.16
2.	5244.	4447.	4096.	350.	90.32	85.72	2.20	.776	1.043	1.806	10.34
3.	5372.	4572.	4095.	477.	89.47	85.37	2.26	.774	1.039	1.808	10.51
4.	5707.	4904.	4098.	806.	89.64	86.13	2.37	.778	1.033	1.808	10.63
5.	5769.	4962.	4105.	857.	90.02	86.31	2.45	.786	1.018	1.807	10.71
6.	5739.	4959.	4116.	842.	90.54	86.59	2.54	.789	1.013	1.801	10.83
7.	5782.	4992.	4130.	861.	91.20	86.95	2.61	.795	1.005	1.794	10.93
8.	5342.	5034.	4148.	886.	91.74	87.35	2.69	.800	1.005	1.787	10.98
9.	5820.	5006.	4167.	839.	92.36	87.77	2.77	.803	.994	1.779	11.04
10.	5817.	5001.	4187.	814.	93.16	88.22	2.85	.806	.991	1.771	11.09
11.	5880.	5062.	4208.	853.	93.96	88.70	2.93	.809	.988	1.762	11.16
12.	6175.	5354.	4230.	1124.	94.76	89.22	3.02	.813	.982	1.754	11.23
13.	6485.	5662.	4253.	1409.	95.57	89.75	3.11	.817	.975	1.745	11.32
14.	6739.	5914.	4276.	1638.	96.41	90.30	3.20	.822	.970	1.736	11.41
15.	6929.	6101.	4300.	1800.	97.27	90.86	3.29	.828	.966	1.727	11.52

REGIONAL ECONOMIC SIMULATION MODEL SODA25 .75IND .25ED

TIME	REGY	NREGY	PI	NPI	POVACML	DSYDSPF	UNEMP	UNDMPCG	POP	TTLMGS	COMMTR
.0	350.9	346.1	2139.	2110.	.26	73.6	.055	-.108	164.00	-235.	5347.
1.	362.1	357.1	2210.	2179.	.59	72.6	.054	.018	163.85	-145.	5167.
2.	377.3	372.3	2303.	2273.	.92	73.3	.053	-.082	163.82	-51.	5021.
3.	387.7	382.5	2365.	2333.	1.25	73.5	.043	.002	163.94	49.	4952.
4.	390.3	384.8	2377.	2343.	1.57	72.9	.043	-.025	164.24	157.	4835.
5.	400.4	394.8	2431.	2397.	1.89	72.7	.046	-.009	164.72	270.	4772.
6.	406.6	401.0	2459.	2425.	2.20	72.7	.049	-.007	165.32	370.	4690.
7.	405.8	400.2	2444.	2410.	2.52	72.7	.053	-.002	166.05	427.	4598.
8.	405.1	399.5	2428.	2395.	2.83	72.7	.055	-.004	166.84	482.	4499.
9.	405.2	399.6	2416.	2383.	3.15	72.7	.058	-.008	167.66	536.	4399.
10.	405.7	400.1	2407.	2374.	3.47	72.7	.062	-.007	168.52	590.	4303.
11.	406.4	400.8	2399.	2366.	3.78	72.7	.065	-.006	169.42	643.	4206.
12.	407.4	401.6	2392.	2358.	4.10	72.6	.068	-.006	170.35	696.	4109.
13.	408.9	402.9	2387.	2352.	4.42	72.3	.072	-.008	171.32	721.	4014.
14.	410.7	404.4	2384.	2347.	4.74	72.0	.075	-.009	172.30	735.	3922.
15.	412.7	406.3	2382.	2345.	5.06	71.7	.078	-.010	173.27	748.	3834.

REGIONAL ECONOMIC SIMULATION MODEL SODA25 .75IND .25ED

TIME	PFS	PFA	LRPFA	TOBND	TLF	TEMPL	AVWG	SKLVL	REGATRC	PLINDX	MNEDL
.0	4766.	4100.	4100.	0.	89.98	85.31	2.08	.859	1.065	1.801	10.10
1.	5059.	4663.	4100.	563.	90.15	85.52	2.11	.859	1.076	1.803	10.29
2.	5052.	4386.	4096.	290.	90.32	85.76	2.20	.783	1.044	1.806	10.56
3.	5223.	4557.	4095.	462.	89.62	85.94	2.26	.787	1.041	1.807	10.66
4.	5545.	4880.	4099.	782.	89.90	86.24	2.37	.798	1.037	1.807	11.12
5.	5588.	4923.	4106.	817.	90.40	86.46	2.46	.814	1.024	1.806	11.34
6.	5570.	4905.	4118.	787.	91.05	86.80	2.54	.825	1.020	1.799	11.59
7.	5589.	4924.	4133.	791.	91.82	87.20	2.61	.838	1.014	1.792	11.83
8.	5616.	4951.	4151.	800.	92.46	87.63	2.69	.851	1.015	1.784	12.02
9.	5574.	4910.	4171.	739.	93.20	88.09	2.77	.861	1.005	1.776	12.21
10.	5561.	4897.	4192.	706.	94.09	88.57	2.86	.871	1.003	1.768	12.41
11.	5555.	4891.	4213.	678.	95.00	89.08	2.94	.882	1.001	1.759	12.61
12.	5771.	5108.	4236.	872.	95.91	89.63	3.02	.893	.997	1.749	12.81
13.	6032.	5368.	4259.	1110.	96.84	90.20	3.11	.904	.991	1.740	13.02
14.	6257.	5594.	4283.	1311.	97.79	90.78	3.21	.916	.987	1.731	13.22
15.	6427.	5764.	4307.	1457.	98.74	91.39	3.30	.927	.984	1.722	13.43

REGIONAL ECONOMIC SIMULATION MODEL SODA26 .75IND .25TR

TIME	REGY	NREGY	PI	NPI	POVACML	DSYDSPF	UNEMP	UNDMPCG	POP	TTLMGS	COMMTR
.0	350.9	346.1	2139.	2110.	.26	73.2	.055	-.108	164.00	-235.	5347.
1.	362.1	356.8	2210.	2177.	.59	70.3	.054	.018	163.85	-145.	5167.
2.	377.3	372.2	2303.	2272.	.92	71.2	.053	-.018	163.82	-51.	5021.
3.	387.7	382.6	2365.	2334.	1.25	72.2	.058	-.017	163.94	49.	4952.
4.	392.3	386.8	2389.	2355.	1.57	72.2	.062	-.014	164.24	155.	4883.
5.	399.5	394.0	2426.	2393.	1.89	72.2	.064	-.011	164.67	265.	4812.
6.	406.2	400.7	2459.	2425.	2.21	72.3	.066	-.012	165.21	364.	4729.
7.	405.6	400.1	2446.	2412.	2.53	72.4	.068	-.009	165.87	418.	4641.
8.	405.0	399.4	2431.	2397.	2.84	72.3	.070	-.010	166.60	471.	4547.
9.	404.9	399.3	2419.	2386.	3.16	72.3	.071	-.013	167.36	523.	4451.
10.	405.3	399.6	2410.	2376.	3.48	72.3	.073	-.013	168.16	574.	4357.
11.	405.9	400.2	2402.	2368.	3.80	72.2	.075	-.013	169.01	626.	4263.
12.	406.9	401.0	2395.	2361.	4.12	72.1	.076	-.012	169.88	677.	4168.
13.	408.2	402.0	2390.	2354.	4.44	71.8	.078	-.013	170.80	709.	4075.
14.	409.8	403.4	2386.	2349.	4.76	71.4	.079	-.014	171.74	721.	3984.
15.	411.7	405.0	2384.	2346.	5.09	70.9	.080	-.014	172.68	734.	3897.

REGIONAL ECONOMIC SIMULATION MODEL SODA26 .75IND .25TR

TIME	PFS	PFA	LRPFA	TOBND	TLF	TEMPL	AVWG	SKLVL	REGATRC	PLINDX	MNEDL
.0	4793.	4100.	4100.	0.	89.98	85.31	2.08	.859	1.065	1.801	10.10
1.	5359.	4663.	4100.	563.	90.15	85.52	2.11	.859	1.076	1.803	10.16
2.	5156.	4459.	4096.	362.	90.32	85.76	2.20	.875	1.062	1.806	10.33
3.	5124.	4424.	4095.	328.	90.90	85.94	2.30	.895	1.056	1.807	10.50
4.	5457.	4754.	4099.	656.	91.50	86.15	2.39	.912	1.056	1.807	10.63
5.	5524.	4820.	4106.	714.	91.98	86.41	2.48	.925	1.042	1.806	10.72
6.	5538.	4831.	4117.	714.	92.52	86.75	2.56	.933	1.038	1.800	10.82
7.	5577.	4868.	4130.	738.	93.17	87.14	2.64	.941	1.030	1.793	10.92
8.	5632.	4920.	4147.	774.	93.76	87.55	2.72	.946	1.030	1.785	10.98
9.	5619.	4906.	4165.	741.	94.34	88.00	2.80	.947	1.018	1.778	11.04
10.	5621.	4905.	4184.	721.	95.07	88.47	2.88	.947	1.015	1.770	11.09
11.	5687.	4968.	4204.	764.	95.82	88.97	2.96	.947	1.011	1.761	11.16
12.	5850.	5129.	4225.	904.	96.55	89.51	3.05	.945	1.004	1.753	11.23
13.	6164.	5441.	4247.	1194.	97.29	90.06	3.14	.944	.996	1.744	11.32
14.	6461.	5735.	4270.	1465.	98.05	90.64	3.23	.944	.990	1.735	11.42
15.	6690.	5963.	4293.	1669.	98.82	91.22	3.32	.943	.985	1.726	11.52

REGIONAL ECONOMIC SIMULATION MODEL NODA7 .75IND .25WLF

TIME	REGY	NREGY	PI	NPI	POVACML	DSYDSPF	UNEMP	UNDMPCG	POP	TTLMGS	COMMTR
.0	494.7	490.0	3078.	3049.	.16	105.6	.045	-.040	160.72	-134.	3142.
1.	512.0	506.4	3187.	3152.	.49	98.1	.051	.008	160.67	-84.	3097.
2.	533.8	528.3	3322.	3288.	.82	97.8	.050	-.057	160.69	-30.	3083.
3.	542.8	537.8	3375.	3344.	1.15	100.4	.038	.007	160.84	31.	3093.
4.	550.9	545.8	3419.	3387.	1.47	101.6	.037	-.027	161.15	99.	3081.
5.	563.1	557.9	3484.	3452.	1.79	102.5	.038	-.016	161.60	175.	3111.
6.	564.5	559.3	3481.	3449.	2.11	103.1	.040	-.014	162.16	254.	3133.
7.	563.5	558.0	3460.	3427.	2.42	103.2	.043	-.010	162.85	289.	3153.
8.	562.8	557.2	3441.	3407.	2.74	103.1	.045	-.012	163.56	325.	3171.
9.	563.2	557.5	3428.	3393.	3.06	102.7	.049	-.014	164.30	360.	3191.
10.	564.1	558.2	3417.	3382.	3.38	102.2	.053	-.011	165.06	397.	3216.
11.	565.3	559.3	3409.	3372.	3.69	101.7	.058	-.012	165.83	434.	3242.
12.	567.2	561.1	3404.	3367.	4.02	101.1	.062	-.012	166.63	471.	3271.
13.	569.5	563.2	3401.	3363.	4.34	100.6	.066	-.013	167.46	510.	3306.
14.	572.0	565.6	3398.	3360.	4.66	100.0	.071	-.014	168.31	549.	3347.
15.	574.6	567.9	3397.	3357.	4.98	99.3	.075	-.015	169.18	589.	3395.

REGIONAL ECONOMIC SIMULATION MODEL NODA7 .75IND .25WLF

TIME	PFS	PFA	LRPFA	TOBND	TLF	TEMPL	AVWG	SKLVL	REGATRC	PLINDX	MNEDL
.0	4684.	4018.	4018.	0.	93.68	89.59	2.56	.946	1.002	1.960	12.00
1.	5596.	5338.	4018.	1320.	94.50	89.89	2.62	.946	1.009	1.963	12.08
2.	5496.	4827.	4017.	811.	94.76	90.16	2.71	.868	.981	1.967	12.37
3.	4947.	4277.	4017.	259.	93.91	90.42	2.78	.872	.979	1.969	12.64
4.	5149.	4477.	4021.	456.	94.08	90.72	2.91	.881	.975	1.970	12.75
5.	5197.	4524.	4029.	495.	94.41	90.94	3.03	.888	.962	1.970	12.86
6.	5254.	4579.	4040.	539.	94.96	91.27	3.14	.892	.956	1.964	12.98
7.	5412.	4736.	4054.	682.	95.55	91.61	3.25	.897	.948	1.958	13.05
8.	5557.	4879.	4071.	808.	96.10	91.96	3.36	.900	.947	1.950	13.11
9.	5703.	5024.	4089.	935.	96.88	92.33	3.47	.903	.935	1.943	13.17
10.	5854.	5174.	4107.	1066.	97.75	92.72	3.59	.906	.932	1.936	13.23
11.	6000.	5318.	4126.	1192.	98.64	93.13	3.70	.909	.928	1.928	13.29
12.	6146.	5463.	4146.	1317.	99.53	93.56	3.82	.912	.921	1.919	13.36
13.	6290.	5606.	4166.	1440.	100.44	94.00	3.95	.916	.914	1.911	13.42
14.	6418.	5734.	4186.	1567.	101.37	94.44	4.08	.919	.908	1.902	13.49
15.	6700.	6154.	4208.	1947.	102.33	94.90	4.22	.923	.903	1.893	13.56

REGIONAL ECONOMIC SIMULATION MODEL NODA11 .5IND .5TR

TIME	REGY	NREGY	PI	NPI	PCVACML	DSYDSPF	UNEMP	UNDMPCG	POP	TTLMGS	COMMTR
.0	493.7	490.1	3072.	3050.	.16	137.9	.045	-.040	160.72	-134.	3142.
1.	510.6	506.1	3178.	3150.	.49	124.8	.052	.008	160.67	-122.	3097.
2.	531.9	527.4	3311.	3283.	.82	123.1	.052	-.007	160.65	-108.	3083.
3.	540.3	536.6	3362.	3339.	1.15	128.0	.055	-.013	160.71	-88.	3093.
4.	550.7	546.8	3423.	3399.	1.47	130.4	.060	-.019	160.88	-63.	3119.
5.	558.2	554.3	3465.	3441.	1.79	131.9	.063	-.020	161.11	-34.	3151.
6.	559.4	555.4	3466.	3441.	2.12	132.7	.067	-.019	161.39	-2.	3184.
7.	557.3	553.1	3446.	3420.	2.44	132.7	.071	-.019	161.71	34.	3220.
8.	555.4	550.8	3427.	3399.	2.76	131.3	.076	-.020	162.06	70.	3259.
9.	554.4	548.5	3413.	3377.	3.08	127.4	.081	-.020	162.42	121.	3302.
10.	554.2	547.3	3404.	3361.	3.40	122.5	.085	-.018	162.81	196.	3350.
11.	555.0	547.7	3399.	3355.	3.73	118.1	.088	-.018	163.26	247.	3400.
12.	556.7	549.2	3400.	3354.	4.05	114.5	.090	-.018	163.74	296.	3455.
13.	558.9	551.3	3402.	3356.	4.38	111.5	.093	-.019	164.26	346.	3518.
14.	561.3	553.7	3405.	3359.	4.71	109.1	.095	-.019	164.83	398.	3590.
15.	563.8	556.1	3408.	3362.	5.04	107.0	.097	-.020	165.44	450.	3673.

REGIONAL ECONOMIC SIMULATION MODEL NODA11 .5IND .5TR

TIME	PFS	PFA	LKPFA	TOBND	TLF	TEMPL	AVWG	SKLVL	REGATRC	PLINDX	MNEDL
.0	3579.	4018.	4018.	0.	93.68	89.59	2.56	.946	1.002	1.960	12.00
1.	4488.	5338.	4018.	1320.	94.50	89.78	2.62	.946	1.009	1.965	12.07
2.	4446.	4886.	4017.	869.	94.73	89.93	2.71	.961	1.000	1.970	12.36
3.	3677.	4111.	4016.	95.	95.09	90.04	2.83	.986	.997	1.975	12.64
4.	3886.	4319.	4018.	301.	95.57	90.07	2.96	1.009	.997	1.978	12.75
5.	3948.	4380.	4022.	358.	95.94	90.10	3.09	1.020	.983	1.981	12.87
6.	4046.	4479.	4028.	451.	96.41	90.14	3.21	1.029	.978	1.979	12.98
7.	4212.	4645.	4035.	610.	96.84	90.17	3.34	1.036	.968	1.976	13.05
8.	4670.	5104.	4043.	1061.	97.32	90.21	3.47	1.040	.966	1.972	13.11
9.	5890.	6325.	4052.	2273.	97.94	90.32	3.60	1.041	.953	1.969	13.16
10.	6852.	7831.	4061.	3770.	98.64	90.58	3.73	1.040	.948	1.964	13.23
11.	7295.	10023.	4070.	5953.	99.36	90.96	3.85	1.039	.943	1.956	13.29
12.	7452.	11682.	4081.	7601.	100.09	91.38	3.99	1.038	.934	1.949	13.36
13.	7552.	13163.	4093.	9069.	100.82	91.81	4.13	1.036	.926	1.941	13.43
14.	7577.	14591.	4106.	10485.	101.57	92.27	4.27	1.034	.918	1.933	13.50
15.	7672.	16069.	4121.	11948.	102.34	92.73	4.43	1.032	.912	1.925	13.58

REGIONAL ECONOMIC SIMULATION MODEL NODA16 .9IND .1ED

TIME	REGY	NREGY	PI	NPI	POVACML	DSYDSPF	UNEMP	UNDMPCG	POP	TTLMGS	COMMTR
.0	496.7	489.0	3072.	3043.	.16	105.4	.045	-.040	160.72	-134.	3142.
1.	511.1	505.9	3181.	3149.	.49	101.8	.050	.008	160.67	-60.	3097.
2.	533.2	527.8	3318.	3284.	.82	101.0	.049	-.055	160.71	17.	3083.
3.	542.5	537.6	3371.	3341.	1.15	102.9	.037	.007	160.91	102.	3092.
4.	551.1	546.0	3417.	3385.	1.47	103.7	.035	-.024	161.29	196.	3080.
5.	563.6	558.4	3482.	3450.	1.79	104.4	.035	-.013	161.84	284.	3107.
6.	565.7	560.5	3481.	3449.	2.11	104.9	.037	-.010	162.52	331.	3125.
7.	565.2	559.9	3461.	3428.	2.42	104.9	.039	-.008	163.30	379.	3141.
8.	565.3	559.8	3444.	3411.	2.74	104.7	.041	-.011	164.12	428.	3156.
9.	566.1	560.5	3432.	3397.	3.06	104.4	.044	-.012	164.98	478.	3174.
10.	567.5	561.7	3421.	3386.	3.37	103.9	.049	-.010	165.88	529.	3196.
11.	569.2	563.3	3412.	3377.	3.69	103.4	.053	-.011	166.82	582.	3218.
12.	571.7	565.7	3407.	3371.	4.01	102.8	.057	-.011	167.79	629.	3243.
13.	574.6	568.4	3404.	3367.	4.33	102.3	.061	-.012	168.80	640.	3273.
14.	577.7	571.3	3402.	3365.	4.65	101.7	.065	-.013	169.81	652.	3308.
15.	581.0	574.6	3401.	3364.	4.98	101.2	.069	-.013	170.82	663.	3349.

REGIONAL ECONOMIC SIMULATION MODEL NODA16 .9IND .1ED

TIME	PFS	PFA	LFPFA	TOEND	TLF	TEMPL	AVWG	SKLVL	REGATRC	PLINDX	MNEDL
.0	4684.	4018.	4018.	0.	93.68	89.59	2.56	.946	1.002	1.960	12.00
1.	5195.	5338.	4018.	1320.	94.50	89.94	2.62	.946	1.009	1.963	12.13
2.	5372.	4886.	4017.	869.	94.77	90.29	2.71	.871	.982	1.965	12.43
3.	4942.	4272.	4018.	254.	94.02	90.64	2.78	.876	.980	1.966	12.74
4.	5145.	4473.	4023.	450.	94.23	91.05	2.91	.887	.977	1.966	12.91
5.	5189.	4516.	4032.	484.	94.64	91.41	3.02	.897	.964	1.964	13.08
6.	5223.	4549.	4046.	503.	95.30	91.88	3.13	.905	.960	1.957	13.27
7.	5368.	4693.	4063.	629.	95.96	92.33	3.23	.913	.952	1.949	13.40
8.	5498.	4821.	4082.	739.	96.59	92.79	3.34	.920	.952	1.940	13.52
9.	5635.	4957.	4103.	854.	97.46	93.27	3.45	.926	.940	1.932	13.64
10.	5781.	5101.	4124.	976.	98.42	93.77	3.56	.932	.938	1.923	13.77
11.	5924.	5242.	4147.	1095.	99.41	94.30	3.68	.938	.935	1.913	13.90
12.	6067.	5385.	4170.	1214.	100.41	94.86	3.80	.945	.929	1.903	14.03
13.	6209.	5525.	4195.	1330.	101.45	95.43	3.92	.952	.923	1.892	14.16
14.	6356.	5670.	4220.	1450.	102.51	96.02	4.05	.959	.917	1.882	14.29
15.	6420.	5825.	4245.	1580.	103.58	96.62	4.18	.966	.913	1.872	14.43

REGIONAL ECONOMIC SIMULATION MODEL NODA24 .7IND .3WLF

TIME	REGY	NREGY	PI	NPI	POVACML	DSYDSPF	UNEMP	UNDMPCG	POP	TTLMGS	COMMTR
.0	494.9	490.2	3079.	3050.	.16	105.7	.045	-.040	160.72	-134.	3142.
1.	512.1	506.6	3188.	3153.	.49	98.2	.051	.008	160.67	-91.	3097.
2.	533.8	526.4	3322.	3238.	.82	97.9	.051	-.057	160.69	-45.	3083.
3.	542.7	537.8	3375.	3344.	1.15	100.5	.039	.007	160.82	7.	3093.
4.	550.8	545.6	3419.	3387.	1.47	101.6	.038	-.028	161.10	67.	3081.
5.	562.7	557.5	3484.	3452.	1.79	102.6	.039	-.017	161.51	134.	3113.
6.	564.0	558.7	3481.	3448.	2.11	103.2	.042	-.015	162.03	205.	3137.
7.	562.7	557.3	3459.	3426.	2.42	103.2	.045	-.011	162.66	259.	3159.
8.	561.8	556.2	3440.	3405.	2.74	103.0	.047	-.012	163.34	290.	3179.
9.	561.9	556.2	3426.	3391.	3.06	102.6	.051	-.014	164.03	321.	3201.
10.	562.6	556.7	3415.	3380.	3.38	102.1	.056	-.012	164.74	352.	3228.
11.	563.6	557.6	3407.	3370.	3.70	101.6	.061	-.013	165.46	384.	3256.
12.	565.4	559.2	3402.	3365.	4.02	101.0	.065	-.012	166.19	417.	3288.
13.	567.5	561.2	3399.	3361.	4.34	100.4	.070	-.014	166.95	450.	3326.
14.	569.8	563.3	3397.	3359.	4.66	99.8	.074	-.015	167.72	483.	3370.
15.	572.2	564.6	3395.	3350.	4.99	98.5	.079	-.015	168.51	518.	3422.

REGIONAL ECONOMIC SIMULATION MODEL NODA24 .7IND .3WLF

TIME	PFS	PFA	LRPFA	TOBND	TLF	TEMPL	AVWG	SKLVL	REGATRC	PLINDX	MNEDL
.0	4684.	4018.	4018.	0.	93.68	89.59	2.56	.946	1.002	1.960	12.00
1.	5596.	5338.	4018.	1320.	94.50	89.87	2.62	.946	1.009	1.964	12.08
2.	5484.	4816.	4017.	799.	94.75	90.11	2.71	.868	.981	1.967	12.37
3.	4946.	4276.	4017.	259.	93.89	90.35	2.78	.872	.979	1.970	12.64
4.	5148.	4477.	4020.	456.	94.05	90.61	2.92	.881	.975	1.972	12.75
5.	5196.	4523.	4027.	495.	94.36	90.79	3.04	.888	.961	1.972	12.86
6.	5258.	4584.	4038.	546.	94.89	91.06	3.15	.892	.956	1.967	12.98
7.	5418.	4742.	4051.	691.	95.46	91.34	3.26	.897	.947	1.961	13.05
8.	5565.	4888.	4067.	821.	95.99	91.65	3.37	.900	.946	1.954	13.11
9.	5714.	5035.	4083.	952.	96.76	91.98	3.48	.903	.934	1.947	13.16
10.	5867.	5187.	4101.	1086.	97.62	92.33	3.60	.906	.931	1.941	13.22
11.	6013.	5332.	4116.	1213.	98.48	92.70	3.72	.909	.927	1.933	13.29
12.	6159.	5476.	4136.	1340.	99.35	93.08	3.84	.912	.920	1.925	13.35
13.	6302.	5618.	4155.	1463.	100.24	93.47	3.97	.915	.913	1.917	13.42
14.	6407.	5769.	4174.	1596.	101.14	93.87	4.10	.919	.907	1.909	13.49
15.	7600.	7083.	4193.	2890.	102.06	94.28	4.24	.923	.902	1.901	13.56

REGIONAL ECONOMIC SIMULATION MODEL NODA25 .75IND .25ED

TIME	REGY	NREGY	PI	NPI	POVACML	DSYDSPF	UNEMP	UNDMPCG	POP	TTLMGS	COMMTR
.0	493.7	489.1	3072.	3043.	.16	107.7	.045	-.040	160.72	-134.	3142.
1.	510.9	506.3	3180.	3152.	.49	109.4	.051	.008	160.67	-84.	3097.
2.	532.7	527.9	3315.	3285.	.82	110.2	.050	-.053	160.69	-30.	3083.
3.	541.7	536.8	3368.	3338.	1.15	110.6	.040	.005	160.83	31.	3093.
4.	550.1	545.0	3414.	3382.	1.47	110.4	.038	-.025	161.13	99.	3083.
5.	561.8	556.7	3477.	3446.	1.79	110.5	.040	-.013	161.58	174.	3113.
6.	563.4	558.3	3475.	3444.	2.11	110.4	.043	-.012	162.13	254.	3136.
7.	562.5	557.3	3455.	3423.	2.43	110.1	.047	-.008	162.81	288.	3156.
8.	561.8	556.4	3436.	3403.	2.74	109.6	.050	-.010	163.51	323.	3176.
9.	562.1	556.6	3423.	3389.	3.06	108.9	.055	-.012	164.23	358.	3202.
10.	563.0	557.4	3413.	3379.	3.38	108.2	.060	-.011	164.96	394.	3229.
11.	564.2	558.4	3405.	3370.	3.70	107.5	.066	-.011	165.72	430.	3259.
12.	566.1	560.2	3400.	3365.	4.02	106.8	.071	-.011	166.49	466.	3293.
13.	568.3	562.1	3398.	3360.	4.35	105.8	.076	-.013	167.28	503.	3333.
14.	570.9	563.6	3396.	3353.	4.67	104.2	.081	-.014	168.09	546.	3380.
15.	573.9	566.3	3397.	3352.	4.99	102.6	.085	-.015	168.93	597.	3435.

REGIONAL ECONOMIC SIMULATION MODEL NODA25 .75IND .25ED

TIME	PFS	PFA	LRPFA	TOBND	TLF	TEMPL	AVWG	SKLVL	REGATRC	PLINDX	MNEDL
.0	4584.	4018.	4018.	0.	93.68	89.59	2.56	.946	1.002	1.960	12.00
1.	4592.	5338.	4018.	1320.	94.50	89.88	2.62	.946	1.009	1.963	12.21
2.	4770.	4886.	4017.	869.	94.76	90.15	2.71	.875	.983	1.967	12.50
3.	4828.	4262.	4017.	245.	94.03	90.42	2.78	.880	.981	1.969	12.81
4.	5028.	4462.	4021.	442.	94.22	90.71	2.92	.891	.977	1.970	13.06
5.	5069.	4504.	4028.	475.	94.57	90.93	3.03	.905	.965	1.970	13.31
6.	5110.	4545.	4039.	506.	95.23	91.25	3.15	.917	.961	1.965	13.57
7.	5250.	4685.	4053.	632.	95.93	91.59	3.26	.930	.954	1.958	13.78
8.	5377.	4813.	4070.	743.	96.58	91.94	3.37	.940	.954	1.951	13.97
9.	5507.	4943.	4088.	855.	97.46	92.30	3.49	.950	.943	1.944	14.17
10.	5639.	5076.	4106.	970.	98.42	92.68	3.60	.960	.941	1.937	14.37
11.	5788.	5225.	4124.	1101.	99.40	93.09	3.72	.971	.938	1.928	14.57
12.	5938.	5376.	4143.	1233.	100.38	93.51	3.85	.982	.933	1.920	14.78
13.	6286.	5725.	4162.	1562.	101.38	93.93	3.98	.993	.927	1.912	14.99
14.	7256.	7185.	4182.	3003.	102.41	94.39	4.12	1.005	.922	1.903	15.20
15.	7549.	8900.	4202.	4698.	103.47	94.94	4.26	1.016	.918	1.894	15.42

REGIONAL ECONOMIC SIMULATION MODEL NODA26 .75IND .25TR

TIME	REGY	NREGY	PI	NPI	POVACML	DSY	DSPF	UNEMP	UNDMPCG	POP	TTLMGS	COMMTR
.0	493.7	489.1	3072.	3043.	.16	107.7	.045	-.040	160.72	-134.	3142.	
1.	510.9	505.4	3180.	3146.	.49	99.9	.051	.008	160.67	-84.	3097.	
2.	532.7	527.2	3315.	3281.	.82	99.2	.050	-.006	160.69	-30.	3083.	
3.	541.7	537.0	3368.	3339.	1.15	102.7	.052	-.011	160.83	31.	3093.	
4.	552.7	547.8	3430.	3400.	1.47	104.5	.055	-.016	161.13	97.	3116.	
5.	561.1	556.1	3473.	3442.	1.79	105.7	.057	-.016	161.54	170.	3142.	
6.	563.2	558.2	3475.	3444.	2.11	106.4	.059	-.014	162.05	248.	3169.	
7.	562.2	557.0	3456.	3425.	2.43	106.6	.062	-.013	162.66	281.	3194.	
8.	561.6	556.3	3439.	3406.	2.75	106.5	.064	-.015	163.31	314.	3219.	
9.	561.9	556.4	3427.	3393.	3.07	106.1	.068	-.016	163.97	347.	3247.	
10.	562.5	556.9	3417.	3382.	3.39	105.7	.072	-.015	164.65	381.	3279.	
11.	563.7	557.5	3409.	3372.	3.72	104.6	.075	-.016	165.36	416.	3313.	
12.	565.7	558.7	3406.	3364.	4.04	103.0	.078	-.016	166.08	459.	3351.	
13.	568.2	561.1	3406.	3363.	4.36	101.5	.081	-.017	166.83	517.	3394.	
14.	571.1	563.6	3407.	3362.	4.69	100.0	.083	-.018	167.64	576.	3445.	
15.	574.1	566.4	3407.	3361.	5.02	98.6	.086	-.018	168.49	599.	3504.	

REGIONAL ECONOMIC SIMULATION MODEL NODA26 .75IND .25TR

TIME E+00	PFS E+00	PFA E+00	LRPFA E+00	TOBND E+00	TLF E+03	TEMPL E+03	AVWG E+00	SKLVL E+00	REGATRC E+00	PLINDX E+00	MNEDL E+00
.0	4584.	4018.	4018.	0.	93.68	89.59	2.56	.946	1.002	1.960	12.00
1.	5492.	5338.	4018.	1320.	94.50	89.38	2.62	.946	1.009	1.963	12.07
2.	5451.	4886.	4017.	869.	94.76	90.15	2.71	.961	1.000	1.967	12.36
3.	4683.	4112.	4017.	95.	95.17	90.42	2.83	.986	.997	1.969	12.64
4.	4894.	4322.	4021.	302.	95.71	90.64	2.95	1.009	.998	1.971	12.76
5.	4959.	4386.	4028.	358.	96.17	90.89	3.07	1.020	.984	1.971	12.88
6.	5032.	4458.	4038.	419.	96.75	91.20	3.18	1.030	.980	1.965	12.98
7.	5190.	4614.	4051.	563.	97.32	91.52	3.29	1.037	.972	1.959	13.06
8.	5343.	4766.	4067.	700.	97.93	91.87	3.41	1.041	.970	1.953	13.11
9.	5495.	4917.	4083.	834.	98.67	92.22	3.52	1.042	.958	1.946	13.17
10.	5647.	5067.	4099.	968.	99.48	92.59	3.64	1.042	.954	1.939	13.24
11.	6191.	5609.	4116.	1493.	100.29	92.98	3.76	1.042	.950	1.931	13.30
12.	6981.	6702.	4134.	2568.	101.10	93.43	3.88	1.040	.942	1.923	13.37
13.	7134.	7645.	4152.	3493.	101.92	93.96	4.01	1.039	.934	1.914	13.43
14.	7483.	8651.	4171.	4480.	102.77	94.50	4.14	1.037	.927	1.905	13.51
15.	7783.	10156.	4191.	5965.	103.65	95.06	4.29	1.035	.920	1.895	13.58

REGIONAL ECONOMIC SIMULATION MODEL EOD07 1970 .75IND .25WLF

TIME	REGY	NREGY	PI	NPI	POVACML	DSYDSPF	UNEMP	UNDMPCG	POP	TTLMGS	COMMTR
.0	312.3	306.7	1633.	1604.	.29	55.1	.072	-.121	191.22	117.	6617.
1.	323.2	315.7	1679.	1640.	.62	48.5	.075	.048	192.54	286.	6421.
2.	328.9	321.4	1695.	1657.	.95	46.9	.073	-.068	193.99	467.	6200.
3.	334.4	326.6	1709.	1669.	1.28	45.9	.061	.029	195.65	653.	6083.
4.	336.3	328.2	1703.	1662.	1.61	45.0	.061	-.006	197.51	766.	5889.
5.	342.5	334.5	1716.	1676.	1.93	44.7	.066	.014	199.55	884.	5766.
6.	345.7	337.8	1714.	1675.	2.25	44.6	.071	.014	201.70	1002.	5608.
7.	350.1	342.2	1716.	1678.	2.58	44.6	.075	.015	203.95	1093.	5436.
8.	355.2	347.3	1722.	1684.	2.91	44.6	.077	.013	206.26	1133.	5256.
9.	361.1	353.1	1731.	1693.	3.23	44.7	.079	.011	208.59	1172.	5070.
10.	367.5	359.5	1742.	1704.	3.56	44.8	.080	.011	210.94	1212.	4880.
11.	374.4	366.2	1755.	1717.	3.86	44.8	.081	.010	213.32	1252.	4687.
12.	382.0	373.4	1771.	1731.	4.21	44.8	.081	.011	215.75	1293.	4492.
13.	390.2	381.3	1788.	1748.	4.53	44.7	.080	.011	218.21	1335.	4296.
14.	399.0	389.8	1808.	1766.	4.86	44.7	.079	.010	220.73	1378.	4099.
15.	408.2	398.9	1828.	1786.	5.18	44.6	.078	.011	223.29	1422.	3902.

REGIONAL ECONOMIC SIMULATION MODEL EGDD7 1970 .75IND .25MLF

TIME	PFS	PFA	LRPFA	TOBND	TLF	TEMPL	AVWG	SKLVL	REGATRC	PLINDX	MNEDL
.0	5671.	4780.	4780.	0.	101.00	94.23	2.18	.849	1.068	1.214	9.90
1.	7476.	8249.	4780.	3469.	101.75	94.65	2.18	.850	1.087	1.209	9.96
2.	7525.	7969.	4813.	3156.	102.49	95.45	2.24	.759	1.053	1.205	10.24
3.	7772.	7064.	4850.	2214.	102.01	96.19	2.26	.765	1.056	1.201	10.50
4.	8107.	7165.	4891.	2273.	103.08	97.15	2.34	.775	1.059	1.195	10.74
5.	7998.	7043.	4938.	2105.	104.56	98.01	2.39	.791	1.048	1.189	10.96
6.	7892.	6934.	4989.	1945.	106.09	98.98	2.44	.803	1.050	1.181	11.16
7.	7850.	6899.	5043.	1856.	107.64	99.99	2.48	.814	1.047	1.171	11.31
8.	7941.	6978.	5099.	1879.	109.10	101.07	2.52	.822	1.056	1.162	11.44
9.	7936.	6970.	5156.	1814.	110.60	102.23	2.56	.829	1.048	1.153	11.56
10.	7948.	6979.	5215.	1764.	112.09	103.46	2.60	.837	1.053	1.144	11.69
11.	8232.	7261.	5273.	1987.	113.57	104.75	2.64	.844	1.058	1.135	11.81
12.	8602.	7628.	5333.	2294.	115.05	106.11	2.68	.851	1.058	1.126	11.94
13.	8907.	7930.	5394.	2536.	116.54	107.53	2.72	.859	1.057	1.117	12.07
14.	9155.	8175.	5455.	2719.	118.05	109.02	2.76	.866	1.059	1.107	12.20
15.	9353.	8370.	5518.	2852.	119.56	110.57	2.80	.874	1.063	1.098	12.33

REGIONAL ECONOMIC SIMULATION MODEL EDDDII 1970 .5IND .5TR

TIME	REGY	NREGY	PI	NPI	POVACML	DSYDSPF	UNEMP	UNDMPCG	POP	TTLMGS	COMMTR
.0	311.2	306.8	1627.	1604.	.29	71.1	.072	-.121	191.22	117.	6617.
1.	321.6	315.4	1670.	1638.	.62	60.2	.076	.048	192.54	229.	6421.
2.	326.8	320.6	1685.	1653.	.95	57.5	.076	.010	193.93	347.	6200.
3.	331.7	325.4	1697.	1665.	1.28	56.2	.084	.004	195.45	476.	6086.
4.	334.9	328.2	1699.	1665.	1.61	55.0	.092	.010	197.12	613.	5986.
5.	337.3	328.7	1696.	1653.	1.94	52.0	.100	.015	198.90	706.	5858.
6.	340.4	331.0	1696.	1649.	2.27	49.3	.104	.013	200.72	837.	5712.
7.	344.8	335.4	1702.	1655.	2.60	47.5	.108	.008	202.64	976.	5559.
8.	350.0	340.5	1710.	1664.	2.93	46.3	.110	.007	204.67	1082.	5403.
9.	355.7	346.1	1720.	1674.	3.26	45.4	.111	.005	206.78	1123.	5240.
10.	362.0	352.4	1732.	1687.	3.60	44.7	.111	.004	208.93	1166.	5072.
11.	368.9	359.3	1747.	1702.	3.93	44.2	.110	.003	211.11	1209.	4900.
12.	376.4	366.4	1764.	1718.	4.26	43.8	.109	.004	213.34	1253.	4725.
13.	384.4	374.1	1783.	1735.	4.59	43.4	.107	.003	215.61	1298.	4548.
14.	393.0	382.3	1803.	1754.	4.92	43.0	.104	.003	217.95	1345.	4369.
15.	402.1	391.3	1825.	1776.	5.25	42.7	.101	.003	220.34	1393.	4189.

REGIONAL ECONOMIC SIMULATION MODEL E0DD11 1970 .5IND .5TR

TIME	PFS	PFA	LRPFA	TOBND	TLF	TEMPL	AVWG	SKLVL	REGATRC	PLINDX	MNEDL
.0	4376.	4780.	4780.	0.	101.00	94.23	2.18	.849	1.068	1.214	9.90
1.	6161.	8249.	4780.	3469.	101.75	94.52	2.18	.850	1.068	1.210	9.95
2.	6221.	8048.	4813.	3235.	102.46	95.17	2.24	.876	1.075	1.207	10.23
3.	6317.	6940.	4848.	2092.	103.90	95.70	2.32	.906	1.075	1.204	10.48
4.	6672.	7052.	4886.	2165.	105.47	96.27	2.39	.932	1.034	1.200	10.73
5.	8547.	8924.	4928.	3996.	107.07	96.95	2.44	.956	1.072	1.196	10.96
6.	9429.	12150.	4972.	7178.	108.61	97.89	2.50	.976	1.076	1.187	11.14
7.	9452.	14564.	5018.	9546.	110.17	98.91	2.55	.992	1.071	1.178	11.29
8.	9553.	16709.	5066.	11643.	111.71	100.01	2.61	1.003	1.080	1.169	11.43
9.	9572.	18341.	5117.	13224.	113.20	101.19	2.66	1.012	1.069	1.159	11.56
10.	9600.	19182.	5170.	14012.	114.63	102.46	2.71	1.019	1.073	1.150	11.69
11.	9622.	19276.	5223.	14052.	116.05	103.80	2.76	1.025	1.076	1.140	11.82
12.	9954.	19148.	5278.	13870.	117.46	105.21	2.81	1.029	1.074	1.131	11.95
13.	10317.	18575.	5333.	13241.	118.86	106.68	2.85	1.032	1.071	1.121	12.07
14.	10635.	17710.	5390.	12320.	120.26	108.23	2.90	1.035	1.070	1.112	12.20
15.	10893.	16430.	5449.	10981.	121.66	109.84	2.95	1.037	1.072	1.102	12.33

REGIONAL ECONOMIC SIMULATION MODEL EODD16 1970 .9IND .1ED

TIME	REGY	NREGY	PI	NPI	PCVACML	DSY	DSPF	UNEMP	UNDMPCG	POP	TTLMGS	COMMTR
.0	311.2	305.5	1627.	1598.	.29	54.9	.072	-.121	191.22	117.	6617.	
1.	322.1	315.1	1673.	1636.	.62	50.1	.074	.048	192.54	321.	6421.	
2.	328.0	321.0	1691.	1654.	.95	48.9	.072	-.065	194.02	538.	6200.	
3.	333.8	326.5	1705.	1668.	1.28	48.2	.059	.030	195.75	712.	6081.	
4.	336.2	328.5	1700.	1662.	1.61	47.3	.059	-.004	197.68	846.	5884.	
5.	342.7	334.8	1715.	1676.	1.93	46.7	.063	.015	199.81	985.	5755.	
6.	346.4	338.6	1714.	1676.	2.26	46.4	.067	.016	202.07	1089.	5595.	
7.	351.3	343.7	1718.	1681.	2.58	46.4	.070	.018	204.42	1136.	5419.	
8.	357.0	349.3	1726.	1689.	2.90	46.4	.072	.016	206.80	1183.	5233.	
9.	363.4	355.7	1737.	1700.	3.23	46.5	.073	.014	209.21	1230.	5043.	
10.	370.3	362.6	1750.	1713.	3.55	46.6	.073	.015	211.65	1277.	4848.	
11.	377.9	369.8	1765.	1727.	3.88	46.6	.073	.014	214.14	1325.	4648.	
12.	386.2	377.8	1782.	1743.	4.20	46.6	.072	.016	216.68	1374.	4444.	
13.	395.2	386.4	1802.	1762.	4.53	46.5	.070	.015	219.28	1409.	4239.	
14.	404.8	395.7	1824.	1783.	4.85	46.4	.069	.015	221.93	1426.	4033.	
15.	414.9	405.5	1847.	1806.	5.17	46.3	.066	.014	224.60	1443.	3828.	

REGIONAL ECONOMIC SIMULATION MODEL ECOD16 1970 .9IND .1ED

TIME	PFS	PFA	LPPFA	TOBND	TLF	TEMPL	AVWG	SKLVL	REGATRC	PLINDX	MNEDL
.0	5671.	4780.	4780.	0.	101.00	94.23	2.18	.849	1.068	1.214	9.90
1.	6998.	8249.	4780.	3469.	101.75	94.71	2.18	.850	1.087	1.209	10.02
2.	7043.	7906.	4813.	3092.	102.51	95.61	2.24	.763	1.053	1.204	10.31
3.	7280.	6930.	4850.	2080.	102.17	96.48	2.26	.769	1.057	1.199	10.56
4.	7698.	7036.	4894.	2142.	103.25	97.54	2.33	.779	1.061	1.193	10.81
5.	7868.	6915.	4942.	1973.	104.75	98.52	2.38	.795	1.050	1.186	11.04
6.	7741.	6784.	4995.	1788.	106.30	99.60	2.43	.808	1.053	1.176	11.30
7.	7607.	6647.	5052.	1595.	107.89	100.75	2.47	.822	1.051	1.166	11.50
8.	7637.	6674.	5110.	1563.	109.44	101.98	2.51	.834	1.061	1.157	11.67
9.	7663.	6697.	5170.	1527.	111.02	103.28	2.55	.843	1.053	1.147	11.83
10.	7711.	6742.	5230.	1512.	112.58	104.66	2.58	.853	1.060	1.138	12.00
11.	8069.	7097.	5291.	1806.	114.12	106.13	2.62	.862	1.066	1.128	12.17
12.	8459.	7484.	5354.	2130.	115.67	107.67	2.65	.872	1.068	1.118	12.34
13.	8803.	7826.	5417.	2409.	117.25	109.29	2.68	.883	1.069	1.108	12.52
14.	9103.	8123.	5482.	2640.	118.84	110.98	2.72	.893	1.072	1.099	12.71
15.	9353.	8370.	5548.	2821.	120.42	112.70	2.75	.904	1.077	1.089	12.90

REGIONAL ECONOMIC SIMULATION MODEL EODD24 1970 .7 IND .3WLF

TIME	REGY	NREGY	PI	NPI	POVACML	DSYDSPF	UNEMP	UNDMPCG	POP	TTLMGS	COMMTR
.0	312.6	306.9	1635.	1605.	.29	55.1	.072	-.121	191.22	117.	6617.
1.	323.4	315.9	1680.	1641.	.62	48.5	.075	.048	192.54	275.	6421.
2.	329.0	321.5	1696.	1657.	.95	46.9	.074	-.068	193.98	443.	6200.
3.	334.4	326.6	1709.	1670.	1.28	45.9	.061	.028	195.61	624.	6084.
4.	336.2	328.1	1703.	1662.	1.61	45.0	.062	-.006	197.45	739.	5892.
5.	342.2	334.2	1716.	1676.	1.93	44.7	.068	.014	199.46	850.	5771.
6.	345.2	337.3	1712.	1673.	2.26	44.6	.073	.013	201.56	961.	5614.
7.	349.4	341.6	1715.	1676.	2.58	44.6	.077	.014	203.76	1073.	5444.
8.	354.4	346.5	1720.	1682.	2.91	44.6	.080	.012	206.04	1116.	5265.
9.	360.1	352.1	1726.	1690.	3.23	44.6	.082	.010	208.34	1153.	5082.
10.	366.3	358.3	1739.	1701.	3.56	44.7	.084	.011	210.66	1190.	4895.
11.	373.0	364.8	1751.	1712.	3.89	44.8	.085	.009	213.00	1227.	4704.
12.	380.4	371.8	1766.	1726.	4.21	44.8	.085	.010	215.38	1265.	4512.
13.	388.3	379.4	1783.	1742.	4.54	44.7	.085	.009	217.80	1304.	4320.
14.	396.7	387.6	1801.	1760.	4.86	44.6	.084	.009	220.25	1344.	4127.
15.	405.7	396.3	1821.	1779.	5.19	44.6	.083	.009	222.75	1385.	3934.

REGIONAL ECONOMIC SIMULATION MODEL EOD024 1970 .7IND .3WLF

TIME	PFS	PFA	LRPFA	TOBND	TLF	TEMPL	AVWG	SKLVL	REGATRC	PLINDX	MNEDL
.0	5671.	4780.	4780.	0.	101.00	94.23	2.18	.849	1.068	1.214	9.90
1.	7476.	8249.	4780.	3469.	101.75	94.62	2.18	.850	1.087	1.210	9.96
2.	7525.	7953.	4813.	3140.	102.49	95.40	2.24	.760	1.052	1.206	10.25
3.	7772.	7061.	4849.	2211.	101.99	96.10	2.26	.765	1.055	1.201	10.50
4.	8103.	7161.	4890.	2270.	103.05	97.01	2.34	.775	1.059	1.196	10.74
5.	7993.	7038.	4936.	2102.	104.53	97.83	2.39	.791	1.047	1.191	10.96
6.	7838.	6930.	4986.	1943.	106.05	98.75	2.44	.803	1.050	1.182	11.16
7.	7856.	6895.	5039.	1856.	107.58	99.72	2.48	.814	1.046	1.173	11.30
8.	7938.	6974.	5094.	1880.	109.03	100.76	2.53	.822	1.055	1.164	11.44
9.	7934.	6968.	5151.	1817.	110.53	101.87	2.57	.829	1.046	1.155	11.56
10.	7946.	6977.	5208.	1768.	112.00	103.04	2.61	.836	1.052	1.147	11.69
11.	8206.	7234.	5266.	1968.	113.47	104.27	2.66	.844	1.056	1.137	11.81
12.	8573.	7599.	5325.	2274.	114.94	105.57	2.70	.851	1.055	1.128	11.94
13.	8880.	7903.	5385.	2519.	116.42	106.92	2.74	.859	1.055	1.120	12.06
14.	9130.	8150.	5445.	2705.	117.91	108.33	2.78	.866	1.056	1.111	12.19
15.	9327.	8344.	5506.	2837.	119.41	109.80	2.82	.874	1.059	1.102	12.32

REGIONAL ECONOMIC SIMULATION MODEL EDDD25 1970 .75IND .25ED

TIME	REGY	NREGY	PI	NPI	POVACML	DSYDSPF	UNEMP	UNDMPCG	POP	TTLMGS	COMMTR
.0	311.2	305.6	1627.	1598.	.29	56.1	.072	-.121	191.22	117.	6617.
1.	321.9	315.6	1672.	1639.	.62	53.6	.075	.048	192.54	286.	6421.
2.	327.6	321.2	1689.	1656.	.95	53.0	.073	-.062	193.99	467.	6200.
3.	333.0	326.5	1702.	1669.	1.28	52.5	.063	.026	195.64	653.	6083.
4.	335.1	328.2	1697.	1662.	1.61	51.7	.063	-.004	197.50	766.	5896.
5.	340.9	333.8	1709.	1673.	1.93	51.1	.068	.014	199.53	883.	5769.
6.	344.2	337.0	1707.	1671.	2.26	50.6	.073	.014	201.66	1001.	5610.
7.	348.6	341.3	1710.	1674.	2.58	50.3	.077	.016	203.89	1092.	5439.
8.	353.8	346.3	1716.	1680.	2.91	50.0	.080	.015	206.19	1131.	5259.
9.	359.6	352.1	1725.	1689.	3.24	49.9	.083	.014	208.50	1170.	5076.
10.	366.0	358.5	1736.	1700.	3.56	49.8	.085	.014	210.83	1210.	4889.
11.	372.9	365.1	1749.	1712.	3.89	49.6	.086	.013	213.20	1249.	4699.
12.	380.5	371.9	1765.	1725.	4.22	49.3	.087	.014	215.60	1289.	4507.
13.	388.7	379.6	1783.	1741.	4.54	48.9	.088	.013	218.03	1333.	4315.
14.	397.6	388.1	1803.	1760.	4.87	48.5	.087	.013	220.51	1381.	4122.
15.	407.0	397.4	1825.	1782.	5.19	48.1	.086	.013	223.04	1427.	3930.

REGIONAL ECONOMIC SIMULATION MODEL EGD025 1970 .75IND .25ED

TIME	PFS	PFA	LRPFA	TOEND	TLF	TEMPL	AVWG	SKLVL	REGATRC	PLINDX	MNEDL
.0	5546.	4780.	4780.	0.	101.00	94.23	2.18	.849	1.068	1.214	9.90
1.	6281.	8249.	4780.	3469.	101.75	94.64	2.18	.850	1.087	1.209	10.11
2.	6321.	7730.	4813.	2916.	102.49	95.45	2.24	.769	1.054	1.205	10.40
3.	6540.	6746.	4850.	1896.	102.21	96.19	2.27	.775	1.057	1.201	10.65
4.	6948.	6852.	4891.	1961.	103.30	97.13	2.34	.785	1.061	1.195	10.90
5.	7109.	6733.	4937.	1795.	104.77	98.00	2.39	.800	1.049	1.190	11.13
6.	7196.	6601.	4988.	1613.	106.28	98.96	2.44	.813	1.052	1.181	11.38
7.	7323.	6509.	5041.	1467.	107.84	99.97	2.48	.827	1.049	1.171	11.62
8.	7462.	6647.	5097.	1550.	109.36	101.05	2.52	.841	1.060	1.162	11.86
9.	7496.	6682.	5155.	1527.	110.95	102.21	2.57	.855	1.052	1.153	12.11
10.	7537.	6723.	5212.	1511.	112.55	103.42	2.61	.869	1.059	1.145	12.37
11.	7826.	7012.	5271.	1741.	114.15	104.71	2.65	.884	1.064	1.135	12.63
12.	8557.	7744.	5330.	2414.	115.77	106.06	2.70	.900	1.066	1.126	12.90
13.	9162.	8348.	5390.	2959.	117.40	107.50	2.74	.916	1.066	1.117	13.18
14.	9506.	8693.	5451.	3242.	119.06	109.04	2.78	.932	1.069	1.107	13.46
15.	9598.	8785.	5513.	3273.	120.73	110.66	2.82	.948	1.074	1.098	13.75

REGIONAL ECONOMIC SIMULATION MODEL EODD26 1970 .75IND .25TR

TIME	REGY	NREGY	PI	NPI	POVACML	DSYDSPF	UNEMP	UNDMPCG	POP	TTLMGS	COMMTR
.0	311.2	305.6	1627.	1598.	.29	55.3	.072	-.121	191.22	117.	6617.
1.	321.9	314.5	1672.	1634.	.62	49.1	.075	.048	192.54	286.	6421.
2.	327.6	320.1	1689.	1650.	.95	47.4	.073	.011	193.99	467.	6200.
3.	333.0	325.5	1702.	1664.	1.28	46.6	.080	.008	195.64	653.	6083.
4.	337.0	329.1	1706.	1666.	1.61	45.8	.086	.016	197.50	763.	5972.
5.	340.2	332.0	1706.	1665.	1.94	45.1	.092	.018	199.45	876.	5828.
6.	344.1	335.1	1708.	1663.	2.26	44.2	.096	.015	201.49	1001.	5673.
7.	349.0	339.7	1714.	1668.	2.59	43.3	.099	.012	203.62	1095.	5512.
8.	354.5	345.0	1722.	1676.	2.92	42.7	.101	.010	205.82	1140.	5345.
9.	360.7	351.1	1733.	1687.	3.25	42.2	.102	.009	208.05	1183.	5169.
10.	367.4	357.7	1747.	1701.	3.58	41.9	.102	.008	210.32	1227.	4989.
11.	374.7	365.0	1762.	1717.	3.91	41.6	.100	.006	212.63	1272.	4804.
12.	382.7	372.6	1780.	1733.	4.24	41.4	.098	.007	214.98	1318.	4616.
13.	391.3	380.8	1800.	1752.	4.57	41.2	.096	.007	217.40	1366.	4425.
14.	400.4	389.9	1821.	1773.	4.90	41.0	.093	.007	219.87	1410.	4232.
15.	410.2	399.7	1844.	1797.	5.22	40.9	.089	.007	222.41	1427.	4038.

REGIONAL ECONOMIC SIMULATION MODEL E3DD26 1970 .75IND .25TR

TIME	PFS	PFA	LRPFA	TOBND	TLF	TEMPL	AVWG	SKLVL	REGATRC	PLINDX	MNEDL
.0	5571.	4760.	4780.	0.	101.00	94.23	2.18	.849	1.068	1.214	9.90
1.	7376.	8249.	4780.	3469.	101.75	94.64	2.18	.850	1.087	1.209	9.95
2.	7425.	8048.	4813.	3235.	102.49	95.45	2.24	.876	1.076	1.205	10.24
3.	7531.	6938.	4850.	2089.	103.99	96.19	2.32	.906	1.076	1.201	10.49
4.	7895.	7053.	4891.	2162.	105.64	97.02	2.37	.933	1.087	1.196	10.74
5.	8198.	7343.	4937.	2405.	107.26	97.93	2.42	.957	1.076	1.190	10.96
6.	8942.	8701.	4986.	3715.	108.85	98.92	2.47	.977	1.080	1.181	11.15
7.	9307.	10249.	5037.	5211.	110.46	100.03	2.52	.993	1.077	1.171	11.30
8.	9578.	12130.	5091.	7039.	112.04	101.22	2.57	1.005	1.086	1.162	11.44
9.	9601.	13325.	5146.	8179.	113.57	102.50	2.61	1.014	1.077	1.152	11.57
10.	9634.	13801.	5201.	8599.	115.05	103.86	2.66	1.021	1.082	1.143	11.70
11.	9738.	13741.	5258.	8483.	116.51	105.29	2.70	1.027	1.086	1.133	11.82
12.	10112.	13468.	5316.	8153.	117.96	106.80	2.74	1.031	1.085	1.123	11.95
13.	10471.	12724.	5375.	7349.	119.41	108.38	2.78	1.035	1.084	1.113	12.08
14.	10509.	11531.	5435.	6096.	120.85	110.03	2.82	1.038	1.084	1.104	12.21
15.	10476.	10565.	5497.	5068.	122.29	111.75	2.86	1.040	1.087	1.094	12.34

VITA

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Candidate for the Degree of

Doctor of Philosophy

Thesis: A MICROPOLITAN ECONOMIC DEVELOPMENT SIMULATION MODEL

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