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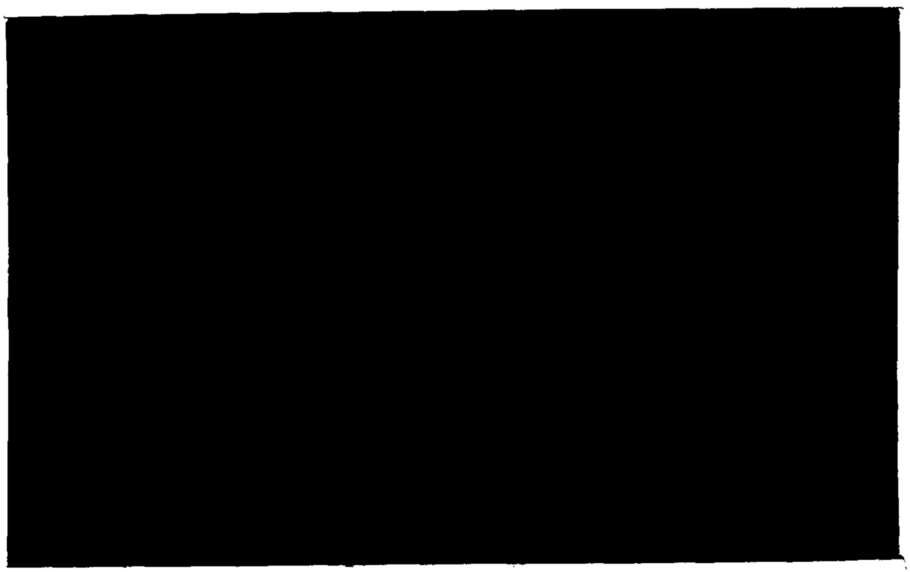

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MATERIALS PREPARED FOR FORECASTING ENERGY FACILITY IMPACTS ON LOCAL GOVERNMENT

Prepared for the
Office of Coastal Zone Management, NOAA
Contract No. 7-35714

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PREFACE

These materials were originally prepared to aid the Coastal Energy Impact Program of the Office of Coastal Zone Management undertake forecasts of impacts of energy facilities on local governments. Because the model developed may have wider use for forecasting impacts on local government from any major investment, we are considering a revision of the materials and development of our own computer program for its use, followed by making the materials widely available. Any comments on either technical aspects, modes of presentation, or the usefulness of the materials to local governments will be appreciated.

Robert L. Bish

OCZM Manual

THE CEIP IMPACT MODEL:
TECHNICAL ASSISTANCE MATERIALS

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Prepared for the
Office of Coastal Zone Management, NOAA
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I. EXPLANATION AND INSTRUCTIONS FOR THE CEIP IMPACT MODEL

INTRODUCTION

The CEIP Impact Model forecasts the fiscal impact of an energy facility and its associated population on a government. To estimate the net fiscal impact of an energy facility, several separate forecasts must be made. These forecasts are:

1) Baseline Revenues and Expenditures - Government revenues and expenditures anticipated without any energy facility.

2) Expenditures after the impact of the energy facility.

3) Revenues after the impact of the energy facility.

4) Net Fiscal Impact - The difference between expenditure and revenue after the impact of the energy facility.

Estimation of net fiscal impact may be an important determinant of the payback schedule of loans made through the CEIP program. To assist in making forecasts for small local governments, we have reviewed studies of more than 300 impacts of new economic activities on their surrounding areas before designing a relatively simple impact model which captures the most essential elements of industrial impact processes. The model is generalized to accommodate a variety of governments. Each stage of the model is clearly defined and can be easily modified to take into account unique local conditions. Unlike other models used for similar purposes, it is not merely a "black box" into which data goes and forecasts emerge without being able to understand the calculations and assumptions inherent in the forecasts. However, effective use of such a model requires a cooperative effort by state and local government officials, private interests, and persons familiar with the consequences of economic impacts in local areas. The processes through which this cooperation is to be achieved include:

1) Local officials complete the Data Schedules. Some of the data requires cooperation of officials of companies proposing the energy facility.

2) Using the data collected by local officials, OCZM technical assistance personnel will use the CEIP Impact Model to make baseline and impact projections.

3) After preliminary projections are made, OCZM personnel will meet with local officials to discuss the projections and the data and assumptions upon which they are based. During this meeting it will be possible to alter data

or assumptions and see how much difference is made in the projections. This will enable local officials to understand the potential impacts of the energy facility and the methods by which the forecasts are made. It will also insure that unique local conditions that affect the forecasts can be taken into account.

It is believed that through common dialogue the fiscal impact forecasts may be calculated in as accurate and equitable a manner as is currently possible.

Every effort has been made to keep data requirements to a minimum. To assist with all data collection, commonly available sources are indicated in the following instructions. In addition, Appendix B lists members of The Association for Business and Economic Research and Appendix C lists members of The Association of Government Research. These member institutes in a state may be able to provide data or recommend data sources to assist local officials to complete the Data Schedules.

INSTRUCTIONS FOR COMPLETING DATA SCHEDULES

Most of the data required will be available from local government fiscal records, the environmental impact statement for the energy facility, or by phone from energy facility company officials and other knowledgeable citizens in the community. The most likely sources for each item are indicated in the following instructions. There are also a couple places where a hand calculator for calculating percentages will be useful, and there are some estimates where the best sources of information may be the general consensus of government officials, realtors, bankers, and/or other knowledgeable citizens.

There are several specific instructions that apply to all schedules.

1) Most data will be filled in on lines or in columns which have a specific number of spaces for entries. Please fill in these places with one letter or number on each space, with entries adjusted to the right margin. For example, in Schedule 1, item 1.1, entries for an estimated 1979 construction workforce of 2,100, with an additional 300 new employees in local firms supplying the construction activity would look like this:

1.1 Construction Workforce:

Year*	Number (CFE)	Number of New Employees In Local Business Supplying Construction (ICFE)
1 9 7 9	_ 2 1 0 0	_ _ 3 0 0

2) In filling in columns, begin with the earliest year at the top. Thus, columns requiring historical data will begin with oldest historical data and finish with current data. Columns requiring future estimates will begin with current year data and terminate with future data.

3) Where there are lines or blank spaces for writing in answers instead of a specific number of spaces, please print or type.

4) Where something is not applicable or unclear, make the entry you feel is best and make a note that you have placed a comment or question on the back of the page. Before data is entered into a computer, forms will be checked for omissions and comments so that instructions or the format of the schedules can be improved in the future.

Following instructions are suggested data sources for each schedule.

SCHEDULE 1 - ENERGY FACILITY DESCRIPTION - CONSTRUCTION PHASE

Data to complete this schedule can be derived from the energy facility Environmental Impact Statement or directly from an official of the company proposing the energy facility. This schedule, along with Schedule 2, is also the same for any government impacted by the energy facility, so a cooperative effort among impacted governments or completion by a regional or state agency may be desirable.

1.1 - The number of construction employees is self-explanatory. The estimate of new employees in local businesses supplying energy facility construction materials is very important. This estimate should be obtained directly from energy facility company officials or from managers of local construction materials supply firms. It may be helpful to obtain an estimate of construction materials to be purchased from the energy facility company official to help local suppliers make new employee estimates.

1.2 - For land purchases indicate the estimated cost of land to be purchased during each year. For total costs of completed parts of the facility indicate all non-land costs. Define completed as that part of the facility completed so that it can be assessed for property tax purposes.

1.3 - These figures will be estimates, but they are important if construction materials are taxed. If construction materials are not taxed, this data may be omitted.

SCHEDULE 2 - ENERGY FACILITY DESCRIPTION - OPERATIONS

Schedule 2 is similar to Schedule 1, except that it is for operation of the facility instead of its construction.

2.1 - Similar to 1.1. Note that for the last line in the table -- years 11-30 -- an estimate of the average annual employment for those years is all that is needed.

2.2 - Similar to 1.3.

SCHEDULE 3 - LOCAL AREA DESCRIPTION

3.1 - Data on population concentrations at different distances from the energy facility may be obtained from the Census of Population volume for the state within which the facility is located. In some cases good highway department maps will contain all the information needed. Simply draw a set of circles around the facility location and add up the population of centers within the respective rings. Subtracting out any population within the governmental unit for which the Fiscal Management Schedule is being prepared. Be sure the population data for the rings is for the same year as the data for the population "within the Local Government" even if data is several years old.

For small governments, such as cities or towns, simply estimate the distance from the center of town to the energy facility. For large governments, such as counties which contain several separate population concentrations, it will be necessary to determine the distance from the weighted average of subarea population concentrations. The weighted average of several population concentrations is calculated as follows:

Center 1 - population x distance =
Center 2 - population x distance =
Center 3 - population x distance =

Total population Sum

Divide the sum by the total population to obtain the distance from the population center of the government to the energy facility.

3.3 - Employment and unemployment for county areas from January through December 1976 is published in State and County Employment and Unemployment January - December 1976 from The National Technical Information Service. A list of state agencies responsible for employment data on each state is included at the end of these instructions as Appendix D. Finally, in smaller areas educated guesses on the number of jobs in the government and the number of employed and unemployed persons residing in the government will have to be made. In addition to data in possession of the local or county government planning office, it may be useful to check with the Chamber of Commerce, an economic development district, or similar organizations in the area.

3.4 - Population data for all counties is available from 1970 on in "Estimates of the Population of Counties" from the Bureau of the Census. Data for before 1970 for large counties is available in "Population Estimates for Selected SMSAs and Their Counties" also Bureau of the Census. Smaller governments will need to use their own estimates, data from a state agency, or perhaps the Rand McNally Commercial Atlas, published annually. See Appendix A for state agencies which may be able to provide assistance with population data and estimates.

Per capita personal income by counties is available from the "Survey of Current Business" and "Local Area Personal Income" (Table 3), both published annually. The "Survey" is available from the Bureau of Economic Analysis, U. S. Department of Commerce; "Local Area Personal Income" is from the National Technical Information Service. The state agency responsible for employment data may also have income data. Use local government data if it is available, otherwise use county area data.

3.6 - If the state or local government makes long range population forecasts, that forecast may be reported here and it will be used for making baseline revenue and expenditure forecasts in the model.

3.7 - Complete school enrollment figures for past 10 years only if applying government is a school district.

3.8 - School district enrollment forecasts (without the energy facility) may be used for baseline forecasts if the school district has such forecasts available.

SCHEDULE 4 - GOVERNMENT REVENUE

This data will generally come directly from local government fiscal records. Be sure and give the dates of the local government's fiscal year in the blank at the top of the page.

4.1 - The column 2 list of total revenues should exclude revenue from borrowing and revenue from grants for specific projects. Revenues should include all tax revenues, special assessments, user charges, fines and fees, and revenues received from other governments such as shared taxes, formula grants or revenue sharing. Revenues from selling packages of services to other governments may be either included or excluded; if included also include expenditures for performance of such services in total expenditures in 5.1; if excluded also exclude expenditures for performing such services from total expenditures in 5.1.

4.2 - List the major taxes and their current rates used by the government. List property tax rates in percent of assessed value instead of in mills. (To do this, simply place a decimal between the hundreds and tens numbers in the millage designation. That is, 175 mills equals 1.75 percent, to be entered as 1.7 5) Based on past trends in tax rates, estimate what future tax is likely to be for each tax (without the energy facility).

4.3 - Check with the assessor or tax collector to determine whether or not property taxes are collected during the same fiscal year assessments are made.

4.4 - The assessor will know if a state agency makes such studies. If not, the assessor should have an idea of the appropriate percentages.

4.5 - The assessor will have this information.

4.6 - If a sales tax is used, indicate whether or not purchases by a business which do not become a physical part of the final product are taxed under it. In some states, as much as one-third of the retail sales tax revenues are derived from this source. A similar situation exists for construction materials which are sometimes taxed under the retail sales tax, unless the constructed facility is itself to be sold.

4.7 - There are unlikely to be previous studies of tax exporting by businesses or tax revenues paid by tourists. The reason for attempting to isolate these revenues is that they cannot be expected to increase in response to energy facility induced growth along with taxes paid by local businesses or local residents. Consult with the tax assessor for an estimate of property taxes paid by businesses who sell their products outside the local government. Consult with major retailers or hotel-motel owners and other retailers serving tourists for an estimate of tourist based revenues.

4.8 - User charges vary among local governments. Be sure and consider utility charges. Contact an energy facility company official if data is needed on activities and requirements of the energy facility to assist in making the estimates.

4.9 - Estimate as closely as possible.

SCHEDULE 5 - GOVERNMENT EXPENDITURE

As with revenue data, the source will be general government fiscal records.

5.1 - Include general expenditures for both operating and capital projects. Exclude expenditures from project-related grants or from borrowed funds. Check with 4.1 to see if consistent.

Energy Facility Name ______________________ Code __________

Name of Government ________________________________

SCHEDULE 1: ENERGY FACILITY DESCRIPTION - CONSTRUCTION PHASE

1.1 Construction Workforce

Year	Number (CFE)	Number of New Employees in Local Businesses Supplying Construction* (ICFE)
_ _ _ _	_ _,_ _ _	_ _,_ _ _
_ _ _ _	_ _,_ _ _	_ _,_ _ _
_ _ _ _	_ _,_ _ _	_ _,_ _ _
_ _ _ _	_ _,_ _ _	_ _,_ _ _
_ _ _ _	_ _,_ _ _	_ _,_ _ _
_ _ _ _	_ _,_ _ _	_ _,_ _ _
_ _ _ _	_ _,_ _ _	_ _,_ _ _
_ _ _ _	_ _,_ _ _	_ _,_ _ _
_ _ _ _	_ _,_ _ _	_ _,_ _ _
_ _ _ _	_ _,_ _ _	_ _,_ _ _

1.2 Construction Costs (Energy Facility Components Within the Government only)

Year	Land	Total Cost of Parts of the Facility Completed During the Year (Exclude land)	Total (L)
_ _ _ _	_ _ _,_ _ _,_ _ _	_ _ _,_ _ _,_ _ _	_ _ _,_ _ _,_ _ _
_ _ _ _	_ _ _,_ _ _,_ _ _	_ _ _,_ _ _,_ _ _	_ _ _,_ _ _,_ _ _
_ _ _ _	_ _ _,_ _ _,_ _ _	_ _ _,_ _ _,_ _ _	_ _ _,_ _ _,_ _ _
_ _ _ _	_ _ _,_ _ _,_ _ _	_ _ _,_ _ _,_ _ _	_ _ _,_ _ _,_ _ _
_ _ _ _	_ _ _,_ _ _,_ _ _	_ _ _,_ _ _,_ _ _	_ _ _,_ _ _,_ _ _
_ _ _ _	_ _ _,_ _ _,_ _ _	_ _ _,_ _ _,_ _ _	_ _ _,_ _ _,_ _ _
_ _ _ _	_ _ _,_ _ _,_ _ _	_ _ _,_ _ _,_ _ _	_ _ _,_ _ _,_ _ _
_ _ _ _	_ _ _,_ _ _,_ _ _	_ _ _,_ _ _,_ _ _	_ _ _,_ _ _,_ _ _
_ _ _ _	_ _ _,_ _ _,_ _ _	_ _ _,_ _ _,_ _ _	_ _ _,_ _ _,_ _ _
_ _ _ _	_ _ _,_ _ _,_ _ _	_ _ _,_ _ _,_ _ _	_ _ _,_ _ _,_ _ _

1.3 Construction Materials to be Purchased:
(Complete only if construction materials are subject to taxation.)

Year	Cost (BT)
_ _ _ _	_ _ _,_ _ _,_ _ _
_ _ _ _	_ _ _,_ _ _,_ _ _
_ _ _ _	_ _ _,_ _ _,_ _ _
_ _ _ _	_ _ _,_ _ _,_ _ _
_ _ _ _	_ _ _,_ _ _,_ _ _
_ _ _ _	_ _ _,_ _ _,_ _ _
_ _ _ _	_ _ _,_ _ _,_ _ _
_ _ _ _	_ _ _,_ _ _,_ _ _
_ _ _ _	_ _ _,_ _ _,_ _ _
_ _ _ _	_ _ _,_ _ _,_ _ _

Energy Facility Name ______________________ Code __________

Name of Government ______________________________

SCHEDULE 2: ENERGY FACILITY DESCRIPTION - OPERATIONS

2.1 Operations Work Force

Year	Number (OFE)	Number of New Employees Likely in Local Businesses From Which Operations Materials Will be Purchased (ICFE)
_ _ _ _	_ _,_ _ _	_ _,_ _ _
_ _ _ _	_ _,_ _ _	_ _,_ _ _
_ _ _ _	_ _,_ _ _	_ _,_ _ _
_ _ _ _	_ _,_ _ _	_ _,_ _ _
_ _ _ _	_ _,_ _ _	_ _,_ _ _
_ _ _ _	_ _,_ _ _	_ _,_ _ _
_ _ _ _	_ _,_ _ _	_ _,_ _ _
_ _ _ _	_ _,_ _ _	_ _,_ _ _
_ _ _ _	_ _,_ _ _	_ _,_ _ _
_ _ _ _	_ _,_ _ _	_ _,_ _ _
Years 11 - 30	_ _,_ _ _	_ _,_ _ _

2.2 Materials Which Do Not Become a Physical Part of the Product or Products: (Complete only if such materials are subject to taxation by the government.)

Year	Cost (BT)
_ _ _ _	_ _ _,_ _ _,_ _ _
_ _ _ _	_ _ _,_ _ _,_ _ _
_ _ _ _	_ _ _,_ _ _,_ _ _
_ _ _ _	_ _ _,_ _ _,_ _ _
_ _ _ _	_ _ _,_ _ _,_ _ _
_ _ _ _	_ _ _,_ _ _,_ _ _
_ _ _ _	_ _ _,_ _ _,_ _ _
_ _ _ _	_ _ _,_ _ _,_ _ _
_ _ _ _	_ _ _,_ _ _,_ _ _
_ _ _ _	_ _ _,_ _ _,_ _ _
Years 11 - 30	_ _ _,_ _ _,_ _ _

Energy Facility Name ____________________ Code ________

Name of Government ____________________

Fiscal Year ____________________

SCHEDULE 3: LOCAL AREA DESCRIPTION

3.1 Population Distribution Around Energy Facility Site

	Population	
Within 10 Miles	_ _,_ _ _,_ _ _	(POP10)
Over 10 to 20	_ _,_ _ _,_ _ _	(POP20)
Over 20 to 30	_ _,_ _ _,_ _ _	(POP30)
Over 30 to 40	_ _,_ _ _,_ _ _	(POP40)
Over 40 to 50	_ _,_ _ _,_ _ _	(POP50)
Over 50 to 60	_ _,_ _ _,_ _ _	(POP60)
Within Local Government	_ _,_ _ _,_ _ _	(POPG)

Exclude population within the local government for which the fiscal management schedule is being prepared.

Year of Population Data _ _ _ _

Distance From Energy Facility Site to Population Center of Government _ _ _ (DIST)

3.2 Is the Energy Facility Located Within the Government?

________ Yes ________ No

3.3 Employment

	Within Government	Within County	Year of Data
Number of Jobs (J)	_ _ _,_ _ _	_ _ _,_ _ _	_ _ _ _
Number of Residents Employed (Even if jobs are outside of area) (E)	_ _ _,_ _ _	_ _ _,_ _ _	_ _ _ _
Number of Residents Unemployed (U)	_ _ _,_ _ _	_ _ _,_ _ _	_ _ _ _

3.4 Population of Government for Past 10 Years

	Year	Population (P)	Per Capita Personal Income (Y)
	_ _ _ _	_ _,_ _ _,_ _ _	_ _,_ _ _
	_ _ _ _	_ _,_ _ _,_ _ _	_ _,_ _ _
	_ _ _ _	_ _,_ _ _,_ _ _	_ _,_ _ _
	_ _ _ _	_ _,_ _ _,_ _ _	_ _,_ _ _
	_ _ _ _	_ _,_ _ _,_ _ _	_ _,_ _ _
	_ _ _ _	_ _,_ _ _,_ _ _	_ _,_ _ _
	_ _ _ _	_ _,_ _ _,_ _ _	_ _,_ _ _
	_ _ _ _	_ _,_ _ _,_ _ _	_ _,_ _ _
	_ _ _ _	_ _,_ _ _,_ _ _	_ _,_ _ _
(Current)	_ _ _ _	_ _,_ _ _,_ _ _	_ _,_ _ _

3.5 Area For Which Per Capita Personal Income Estimates Were Used in 3.4

Governmental Unit _ _ _ County _ _ _ SMSA _ _ _ BEA Area _ _ _

3.6 Population Forecasts Without Energy Facility - For Up to 20 Years

Year	Population (P)	Year	Population (P)
_ _ _ _	_,_ _ _,_ _ _	_ _ _ _	_,_ _ _,_ _ _
_ _ _ _	_,_ _ _,_ _ _	_ _ _ _	_,_ _ _,_ _ _
_ _ _ _	_,_ _ _,_ _ _	_ _ _ _	_,_ _ _,_ _ _
_ _ _ _	_,_ _ _,_ _ _	_ _ _ _	_,_ _ _,_ _ _
_ _ _ _	_,_ _ _,_ _ _	_ _ _ _	_,_ _ _,_ _ _
_ _ _ _	_,_ _ _,_ _ _	_ _ _ _	_,_ _ _,_ _ _
_ _ _ _	_,_ _ _,_ _ _	_ _ _ _	_,_ _ _,_ _ _
_ _ _ _	_,_ _ _,_ _ _	_ _ _ _	_,_ _ _,_ _ _
_ _ _ _	_,_ _ _,_ _ _	_ _ _ _	_,_ _ _,_ _ _
_ _ _ _	_,_ _ _,_ _ _	_ _ _ _	_,_ _ _,_ _ _

3.7 School Enrollments (To be completed only if government is a school district.)

	Year	Enrollment (S)
	_ _ _ _	_,_ _ _,_ _ _
	_ _ _ _	_,_ _ _,_ _ _
	_ _ _ _	_,_ _ _,_ _ _
	_ _ _ _	_,_ _ _,_ _ _
	_ _ _ _	_,_ _ _,_ _ _
	_ _ _ _	_,_ _ _,_ _ _
	_ _ _ _	_,_ _ _,_ _ _
	_ _ _ _	_,_ _ _,_ _ _
	_ _ _ _	_,_ _ _,_ _ _
(Current)	_ _ _ _	_,_ _ _,_ _ _

3.8 School District Forecasts of Future Enrollment, Without Energy Facility - For Up to 20 Years

Year	Enrollment (S)	Year	Enrollment (S)
_ _ _ _	_,_ _ _,_ _ _	_ _ _ _	_,_ _ _,_ _ _
_ _ _ _	_,_ _ _,_ _ _	_ _ _ _	_,_ _ _,_ _ _
_ _ _ _	_,_ _ _,_ _ _	_ _ _ _	_,_ _ _,_ _ _
_ _ _ _	_,_ _ _,_ _ _	_ _ _ _	_,_ _ _,_ _ _
_ _ _ _	_,_ _ _,_ _ _	_ _ _ _	_,_ _ _,_ _ _
_ _ _ _	_,_ _ _,_ _ _	_ _ _ _	_,_ _ _,_ _ _
_ _ _ _	_,_ _ _,_ _ _	_ _ _ _	_,_ _ _,_ _ _
_ _ _ _	_,_ _ _,_ _ _	_ _ _ _	_,_ _ _,_ _ _
_ _ _ _	_,_ _ _,_ _ _	_ _ _ _	_,_ _ _,_ _ _
_ _ _ _	_,_ _ _,_ _ _	_ _ _ _	_,_ _ _,_ _ _

Energy Facility Name ______________________ Code __________

Name of Government ______________________________

Fiscal Year ______________________________

SCHEDULE 4: GOVERNMENT REVENUE

4.1 Total Revenues for Past 10 Years (Excludes borrowing and grants for specific projects.)

	Year	Revenue (BLR)
	_ _ _ _	_ _,_ _ _,_ _ _
	_ _ _ _	_ _,_ _ _,_ _ _
	_ _ _ _	_ _,_ _ _,_ _ _
	_ _ _ _	_ _,_ _ _,_ _ _
	_ _ _ _	_ _,_ _ _,_ _ _
	_ _ _ _	_ _,_ _ _,_ _ _
	_ _ _ _	_ _,_ _ _,_ _ _
	_ _ _ _	_ _,_ _ _,_ _ _
	_ _ _ _	_ _,_ _ _,_ _ _
(Current)	_ _ _ _	_ _,_ _ _,_ _ _

4.2 Major Taxes

Name of Tax	Current Tax Rate (In Percent) (T)	Expected Rates (In Percent) (T) In 5 Yr	In 10 Yrs	In 15 Yrs
__________	_ _ _ %	_ _ _ %	_ _ _ %	_ _ _ %
__________	_ _ _ %	_ _ _ %	_ _ _ %	_ _ _ %
__________	_ _ _ %	_ _ _ %	_ _ _ %	_ _ _ %
__________	_ _ _ %	_ _ _ %	_ _ _ %	_ _ _ %
__________	_ _ _ %	_ _ _ %	_ _ _ %	_ _ _ %
__________	_ _ _ %	_ _ _ %	_ _ _ %	_ _ _ %
__________	_ _ _ %	_ _ _ %	_ _ _ %	_ _ _ %
__________	_ _ _ %	_ _ _ %	_ _ _ %	_ _ _ %

4.3 When are property tax revenues received relative to assessments made?

Same Fiscal Year________ Following Fiscal Year________

4.4 What is the ratio of assessed value to market value for industrial property similar to the proposed energy facility? _ _ _ % (g)

4.5 What proportion of property tax revenues accrue from residential property? _ _ _ % (q)

4.6 If retail sales taxes are used, does the tax base include: (Yes or No)

a. Items purchased by a business which do not become a physical part of the business's final product? _ _ _

b. Construction materials? _ _ _ If not included in sales tax, what tax rate, if any, applies to construction materials? _ _ _ _ %

4.7 Revenues received by a local government are not all paid by local government citizens. Taxes paid by nonresidents are called exported taxes. Exported taxes are of two basic kinds. First, taxes paid by local businesses whose revenues are derived from products sold outside the local government and, second, taxes paid by local businesses whose customers are tourists. Please estimate below the proportion of government revenues which may be characterized as exported taxes.

Proportion of Revenues Exported. _ _ _ % (m)

4.8 Are there any specific user charges the new energy facility will be subject to and, if so, please indicate the estimated revenues below:

Kinds of Charges

____

____

____

____

____

Estimated Revenue

Year	Revenue (UT)
_ _ _ _	_ _ _,_ _ _,_ _ _
_ _ _ _	_ _ _,_ _ _,_ _ _
_ _ _ _	_ _ _,_ _ _,_ _ _
_ _ _ _	_ _ _,_ _ _,_ _ _
_ _ _ _	_ _ _,_ _ _,_ _ _
_ _ _ _	_ _ _,_ _ _,_ _ _
_ _ _ _	_ _ _,_ _ _,_ _ _
_ _ _ _	_ _ _,_ _ _,_ _ _
_ _ _ _	_ _ _,_ _ _,_ _ _
_ _ _ _	_ _ _,_ _ _,_ _ _
Years 11 - 30	_ _ _,_ _ _,_ _ _ per year

4.9 If the energy facility will be subject to an inventory-type tax (personal property), pipeline royalties, or any other kind of tax not listed as a major revenue source in items 4.2, please provide an estimate of the revenues to be received from the energy facility in future years.

Kinds of Taxes

____

____

____

____

____

Estimated Revenue

Year	Revenue (OT)
_ _ _ _	_ _ _,_ _ _,_ _ _
_ _ _ _	_ _ _,_ _ _,_ _ _
_ _ _ _	_ _ _,_ _ _,_ _ _
_ _ _ _	_ _ _,_ _ _,_ _ _
_ _ _ _	_ _ _,_ _ _,_ _ _
_ _ _ _	_ _ _,_ _ _,_ _ _
_ _ _ _	_ _ _,_ _ _,_ _ _
_ _ _ _	_ _ _,_ _ _,_ _ _
_ _ _ _	_ _ _,_ _ _,_ _ _
_ _ _ _	_ _ _,_ _ _,_ _ _
Years 11 - 30	_ _ _,_ _ _,_ _ _ per year

Energy Facility Name ______________________ Code ________

Name of Government ______________________

SCHEDULE 5: GOVERNMENT EXPENDITURE

5.1 Total General Expenditures for Last 10 Years (Excludes expenditures from project-related grants and borrowing.)

	Year	Expenditure
	_ _ _ _	_ _ _,_ _ _,_ _ _
	_ _ _ _	_ _ _,_ _ _,_ _ _
	_ _ _ _	_ _ _,_ _ _,_ _ _
	_ _ _ _	_ _ _,_ _ _,_ _ _
	_ _ _ _	_ _ _,_ _ _,_ _ _
	_ _ _ _	_ _ _,_ _ _,_ _ _
	_ _ _ _	_ _ _,_ _ _,_ _ _
	_ _ _ _	_ _ _,_ _ _,_ _ _
	_ _ _ _	_ _ _,_ _ _,_ _ _
(Current)	_ _ _ _	_ _ _,_ _ _,_ _ _

II. CEIP IMPACT MODEL FORECASTING PROCEDURES

To assist users to understand the CEIP Impact Model, a brief description of each forecasting process is presented here. This description is for general users. Analysts interested in the equations and the computer program may obtain a technical manual directly from OCZM in the near future.

The model is designed to make three final and three intermediate forecasts. The final forecasts include (1) baseline expenditures and baseline revenues, (2) post-energy facility impact expenditures, and (3) post-energy facility impact revenues. The net fiscal impact of the energy facility can be calculated from the post-impact expenditure and revenue forecasts. The three intermediate forecasts are (1) baseline population, (2) population after the energy facility impact, and (3) per capita personal income. Each forecast is made for each year for 20 years.

The population forecasts are important intermediate steps because expenditures and revenues are forecast partially on a per capita basis. The forecast of personal income is necessary because revenue forecasts are tied to personal income growth. The basis of each of these forecasts will be described in turn.

BASELINE FORECASTS

Baseline Population

Forecasts of baseline population are made by simply projecting the historic trend into the future. The local government can substitute its own population projections if it desires.

Baseline Per Capita Income

Forecasts of baseline income are made by simply projecting the historic trend into the future. The local government can substitute its own per capita income projections if it desires.

Baseline Revenues and Expenditures

The revenues forecast are revenues from all general sources including taxes, user charges, special assessments, fines and fees, and revenues received from other governments such as shared taxes, formula grants, or revenue sharing. Excluded from forecasts of revenues are revenues from borrowing or revenues from grants for specific projects. It is assumed that revenues are spent and, thus, the expenditures forecast are expenditures from general revenues excluding expenditures from project-related grants or expenditures from borrowed funds.

The baseline revenue forecast is made by estimating the increase in revenues associated with past increases in population and increases in per capita personal income, and then projecting future increased revenues on the basis of the baseline population and per capita income forecasts. Baseline expenditures are assumed to equal baseline revenues because the same basic variables - changes in population and per capita income - are also the strongest determinants of government expenditure increases over time.

POST-IMPACT FORECASTS

Forecasts of population and revenues after energy facility impacts are more complex than baseline forecasts.

Post-Impact Population Forecast

The number of employees at the energy facility and new employees in local firms directly servicing the energy facility are added to determine the total new direct employment. These employees are then allocated to geographic areas, including the area of the local government for which the impact forecast is being prepared, within commuting distance of the energy facility. The formula for allocation is inversely related to distance (the further the distance the fewer the employees who will be located there) and directly related to existing population concentrations (the larger an existing population concentration the greater the number of employees who will reside there). The weights of each variable in the allocation equation are based on previous studies of the residential location of employees around a facility. The forecasts of the employment residential distribution are one element of the model that will be specifically discussed with local government officials after preliminary forecasts have been made.

After employees have been allocated and the number expected to locate within the local government area known, a multiplier is used to estimate the number of secondary jobs that will be created in response to the higher incomes and new employee population attracted to the energy facility. The multiplier used varies from 1.05 to 1.5, depending on the number of jobs in the existing community. (A multiplier indicates the total number of jobs generated from one new energy facility job, e.g., a multiplier of 1.05 indicates 1 energy facility job and .05 secondary jobs per energy facility job -- with this multiplier it takes 20 energy facility jobs to generate 1 secondary job. With a multiplier of 1.5, it takes only 2 energy facility jobs to generate a secondary job.) The fewer the number of existing jobs in a community the smaller the multiplier, up to 5,000 jobs where the multiplier becomes 1.5. This is because secondary employment in all but the most isolated communities will tend to occur in areas where business activity already exists - not in purely residential areas.

After the total direct and secondary jobs are estimated, an estimate of the number of jobs that will be filled by new residents in the community is necessary. This estimate is made by subtracting .3 of the unemployed - who it is assumed find either energy facility or secondary employment - and if the employee/population ratio in the community is lower than the national average, it is also assumed that some residents not formerly employed will enter the labor force. The further the local area employment/population ratio diverges from the national, the more local residents who enter the labor force. If the area has an employment/population ratio equal to or greater than the national ratio, no additional old residents are assumed to enter the labor force. These adjustments for unemployment and labor force entry result in a forecast of the number of jobs which will be held by residents new to the community.

Following estimation of the number of new resident job holders, the increase in total population is estimated by multiplying the number of new resident job holders by the average population per employee. This estimate of impact population is then added to baseline population estimates to obtain the post-impact population forecast.

Post-Impact Revenue Forecast

The post-impact revenue forecast involves several steps. First revenues from baseline revenue forecasts are adjusted to exclude revenues from businesses whose products are sold outside the local government or whose customers are primarily tourists or nonresidents. These revenue sources are excluded because having new population does not automatically result in increases in these two revenue sources. A second adjustment in revenues is made by lagging and adjusting residential property tax revenues from the new population. The lag is based on the construction-assessment-collection lag within local government and the rate of new population growth. The greater the rate of new population growth, the lower the residential property tax revenues per capita because of the increased likelihood that new residents will occupy apartments or mobile homes. These adjustments for taxes from nonresidents and in residential property taxes from new residents provides an estimate of revenues to be expected from new residents and regular businesses serving them. Revenues expected from the energy facility itself must be added before a final post-impact revenue forecast is achieved.

Revenues anticipated from the energy facility are calculated by applying current or estimated future tax rates to the actual tax bases created by the energy facility. This is a series of simple calculations depending on the tax structure in use by the local government. These revenues and the revenues generated by new residents and existing service businesses are added to the baseline revenue forecast to obtain the post-impact revenue forecast.

Post-Impact Expenditure Forecast

The Post-Impact Expenditure Forecast is obtained by multiplying the increased expenditure associated with an increase in population times the increase in population due to the energy facility impact and adding this estimate of increased expenditures to the baseline expenditure forecast. Because the impacts of the energy facility and its associated population on revenues and expenditures may differ, it is unlikely that forecast post-impact revenues and expenditures will be equal to one another.

Net Fiscal Impact

The net fiscal impact forecast is made by subtracting forecast post-impact revenues from forecast post-impact expenditures. The net fiscal impact may be either positive or negative and in many cases it will be negative in early years and positive in later years.

SUMMARY

CEIP Impact Model Forecasts are simple. Each step must be understood by users, however, to be sure that unique local conditions are taken into account and modifications made where necessary to improve the forecasts.

The most important steps to pay attention to include (1) the allocation of employees to different areas around the energy facility depending on commuting distances and existing population concentrations, (2) the estimation of secondary impacts from multipliers, (3) the adjustment based on a comparison of local and national employee/population ratios and the employment of the unemployed to determine the number of jobs to be filled by new residents, and (4) the lags and adjustments in collection of the residential property tax from new residents or the energy facility. The assumptions used are based on previous impact analyses; but if something regarding one of these factors in a local government area is unique, the forecasts could be in error unless an adjustment based on local knowledge is made. Any of the assumptions can be easily modified so that the difference made in final forecasts can be easily identified. With cooperation among officials who possess local knowledge, energy facility company officials and OCZM personnel familiar with the impacts of energy facilities and other economic developments, it should be possible to make reasonably accurate forecasts with the CEIP Impact Model.

III. CRITERIA FOR ALTERNATIVE MODELS FOR ENERGY FACILITY IMPACT FORECASTS

Many governments have developed their own forecasting models which may potentially be used for energy facility forecasts. These models may be an acceptable alternative to use of the OCZM-developed model. In general, alternative models should meet the following conditions:

(1) Take into account all significant revenues including state shared taxes, formula grants, federal revenue sharing, and other federal formula grants such as aid to federally impacted school districts. Borrowing and project-related grants may be excluded as long as expenditures from borrowed funds or grant-financed projects are excluded.

(2) Expenditures should be forecast on a per capita marginal cost basis, if possible. Marginal costs, however, should not generally exceed average costs. Debt repayment should be considered an expenditure.

(3) The model must include an allocation of new employment and population around the energy facility location in relation to existing population concentrations and expected commuting patterns unless the applying local government is so large as to include all potential employees.

(4) Multipliers for induced employment and population should have an empirical base taking into account different impacts in areas of different size. Empirical bases should rely primarily on actual impact studies and not just cross-sectional analyses. Both direct and indirect population and employment impacts are lower in actual impact analyses than forecasts with cross-sectional data based multipliers.

(5) The model must be able to forecast (a) baseline expenditures and revenues, (b) population impact of the energy facility, (c) revenues with the facility, and (d) expenditures with the facility.

(6) All data and assumptions upon which the model is based must be available to OCZM technical assistance personnel as requested.

The quickest and easiest way to have an alternative model accepted for forecasting purposes is to simultaneously provide data necessary for calculating the CEIP Impact Model, with an accompanying explanation of how the models differ.

APPENDIX A

LIST OF PARTICIPATING STATES IN THE FEDERAL-STATE COOPERATIVE PROGRAM FOR LOCAL POPULATION ESTIMATES, ALONG WITH OFFICIAL AGENCIES AND OFFICIAL CONTACTS AND/OR PARTICIPANTS: NOVEMBER 1975

(An asterisk (*) denotes agencies which contributed to the estimates previously published in Current Population Reports, Series P-26. A dagger (†) denotes key technical person)

State	Agency
Alabama	Alabama Development Office 508 State Office Building Montgomery, Alabama 36104 Mr. R.C. Bamberg, Director
	*Center for Business and Economic Research Graduate School of Business University of Alabama Box AK University, Alabama 35486 Mr. Edward Rutledge, Director †Ms. Carolyn Sawyer
Alaska	Division of Policy Development and Planning Office of the Governor Pouch AD Juneau, Alaska 99811 Mr. Robert B. Weeden, Director
	Research and Analysis Section Alaska Department of Labor Box 3-7000 Juneau, Alaska 99801 †Mr. David L. Gale
Arizona	*Department of Economic Security Bureau of Planning Post Office Box 6123 Phoenix, Arizona 85005 †Mr. Jack Kronenfeld, Demographic Specialist
Arkansas	*Industrial Research and Extension Center University of Arkansas Post Office Box 3017 Little Rock, Arkansas 72203 Dr. Barton A. Westerlund, Director †Dr. Forrest Pollard, Head of Population and Manpower Studies †Dr. Jong Mo Rhee
California	*Population Research Unit State Department of Finance 1025 P Street Sacramento, California 95814 †Dr. Walter P. Hollmann, Chief †Mr. Nelson Rasmussen, Demographer Ms. Isabell Hambright, Demographer
Colorado	*Colorado Division of Planning Room 670 Columbine Building 1845 Sherman Street Denver, Colorado 80203 Mr. Philip H. Schmuck, Director †Mr. Arthur Thompson Mr. Lee Whitney †Mr. Kenneth Prince
Connecticut	*Vital Statistics Section State Health Department 79 Elm Street Hartford, Connecticut 06115 Dr. Douglas S. Lloyd, Commissioner Mr. Hal Burdo †Mr. Robert O'Dell
Delaware	*State Planning Office Thomas Collins Building 530 South DuPont Highway Dover, Delaware 19901 Mr. David R. Keifer, Director †Ms. Hellen Gelof
District of Columbia[1]	Office of Planning and Management Executive Office of the Mayor Room 113 - District Building 14th and E Streets, N.W. Washington, D.C. 20004 †Mr. Gangu Ahuja
Florida	*Division of Population Studies Bureau of Economic and Business Research College of Business Administration University of Florida Gainesville, Florida 32611 Dr. Carter C. Osterbind, Director †Dr. Madelyn Lockhart †Mr. Jack D. Doolittle Mr. Bart Lewis
Georgia	*Office of Planning and Budget 270 Washington Street, S.W. Atlanta, Georgia 30334 Mr. James T. McIntyre, Jr., Director Mr. Richard B. Cobb, Deputy Director †Mr. Ronald G. Crowe, Planner, State Data Center
Hawaii	*Department of Planning and Economic Development Post Office Box 2359 Honolulu, Hawaii 96804 †Mr. Robert C. Schmitt, State Statistician
	*State Department of Health Post Office Box 3378 Honolulu, Hawaii 96801 †Mr. Shigeo Tengan
Idaho	*Bureau of Vital Statistics Idaho Department of Health and Welfare Statehouse Boise, Idaho 83720 †Ms. Janet Vick, Chief
Illinois	*Illinois Department of Public Health 535 West Jefferson Street Springfield, Illinois 62761 †Mr. Clyde A. Bridger, Chief Statistician
Indiana	*Indiana State Board of Health 1330 West Michigan Street Indianapolis, Indiana 46206 Dr. William T. Paynter, State Health Commissioner †Dr. Robert A. Calhoun, Director of Public Health Statistics
Iowa	*Records and Statistics Division Iowa State Health Department State Office Building Des Moines, Iowa 50319 †Mr. James Taylor †Mr. Steve Boal †Ms. Hazel Shearer
Kansas	Kansas Department of Economic Development Division of Planning 1258-W State Office Building Topeka, Kansas 66612 Mr. John P. Halligan, Director
	*Population Research Laboratory Kansas State University Manhattan, Kansas 66506 †Dr. Cornelia Flora †Ms. Karen Schwartz

[1] The District of Columbia is participating on an informal basis.

APPENDIX A—Continued

LIST OF PARTICIPATING STATES IN THE FEDERAL-STATE COOPERATIVE PROGRAM FOR LOCAL POPULATION ESTIMATES, ALONG WITH OFFICIAL AGENCIES AND OFFICIAL CONTACTS AND/OR PARTICIPANTS: NOVEMBER 1975—Continued

(An asterisk (*) denotes agencies which contributed to the estimates previously published in Current Population Reports, Series P-26. A dagger (†) denotes key technical person)

State	Agency
Kentucky	*Urban Studies Center University of Louisville Gardencourt Campus Alta Vista Road Louisville, Kentucky 40205 †Dr. Mike Spar
Louisiana	*Research Division College of Administration and Business Louisiana Tech University Ruston, Louisiana 71270 Dr. Don C. Wilcox, Director †Ms. Barbara Denton
Maine	*Research and Vital Records State Department of Health and Welfare Augusta, Maine 04330 †Mr. Dale Welch, Director
Maryland	Maryland Center for Health Statistics State Department of Health and Mental Hygiene O'Connor Building 201 West Preston Street Baltimore, Maryland 21201 †Mr. Ira Rosenwaike Mr. Luther Frantz, Jr.
Massachusetts	*Bureau of Research and Statistics Massachusetts Department of Commerce and Development State Office Building 100 Cambridge Street Boston, Massachusetts 02202 †Mr. William P. Tsaffaras, Director
Michigan	*Office of the Budget Lewis Cass Building Lansing, Michigan 48913 Mr. Tom Clay, Director †Mr. Bill O'Hare
Minnesota	*Minnesota State Planning 101 Capitol Square Building 550 Cedar Street St. Paul, Minnesota 55101 †Ms. Hazel Reinhardt
Mississippi	*Department of Sociology Mississippi State University Post Office Drawer C State College, Mississippi 39762 Dr. John Saunders, Department Head †Ms. Ellen Bryant, Assistant Sociologist †Ms. Emily Chaney
Missouri	*State Planning and Analysis Division Office of Administration State Capitol Post Office Box 809 Jefferson City, Missouri 65101 †Mr. Michael Boxberger
Montana	*Bureau of Business and Economic Research University of Montana Missoula, Montana 59801 Ms. Maxine C. Johnson, Director †Ms. Susan Selig Wallwork
Nebraska	Nebraska Department of Economic Development Post Office Box 94666 State Capitol Lincoln, Nebraska 68509 Mr. Ronald J. Mertens, Director *Bureau of Business Research The University of Nebraska Lincoln, Nebraska 68508 †Ms. Vicki Stepp
Nevada	*Bureau of Business and Economic Research University of Nevada Reno, Nevada 89507 Dr. Robert C. Weems, Jr., Director Dr. Shih-Fen Chu †Mr. Samuel Males
New Hampshire	*Office of Comprehensive Planning Executive Department State House Annex Concord, New Hampshire 03301 Mr. James Minnoch, Planning Director †Mr. Thomas Duffy
New Jersey	*Office of Business Economics Division of Planning and Research Department of Labor and Industry Post Office Box 845 Trenton, New Jersey 08625 †Mr. Henry A. Watson Ms. Shirly Coetz
New Mexico	*Bureau of Business and Economic Research The University of New Mexico Albuquerque, New Mexico 87131 Dr. Lee B. Zink, Director Mr. Larry Adcock †Mr. James McCormick
New York	Office of Biostatistics New York State Department of Health 3rd Floor Tower Building Empire State Plaza Albany, New York 12237 Mr. Vito Logrillo, Director †Mr. Sid Prasad, Senior Research Scientist †Mr. Richard Krueger, Biostatistician
North Carolina	*Office of State Planning North Carolina Department of Administration 116 West Jones Street Raleigh, North Carolina 27603 Dr. Lynn R. Muchmore, State Planning Officer Mr. Alton Skinner, III, Asst. State Planning Officer for Research †Ms. Francine J. Ewing
North Dakota	*Division of Health Statistics Department of Health 17th Floor Capitol Building Bismarck, North Dakota 58505 †Mr. Richard W. Blair, Director
Ohio	*Human Resource Development Divison Bureau of Research and Analysis Department of Economic and Community Development 30 E. Broad Street - State Office Tower Columbus, Ohio 43215 †Ms. Arlene Eis

APPENDIX A—Continued

LIST OF PARTICIPATING STATES IN THE FEDERAL-STATE COOPERATIVE PROGRAM FOR LOCAL POPULATION ESTIMATES, ALONG WITH OFFICIAL AGENCIES AND OFFICIAL CONTACTS AND/OR PARTICIPANTS: NOVEMBER 1975—Continued

(An asterisk (*) denotes agencies which contributed to the estimates previously published in Current Population Reports, Series P-26. A dagger (†) denotes key technical person)

State	Agency
Oklahoma	*Research and Planning Division Oklahoma Employment Security Commission 310 Will Rogers Building Oklahoma City, Oklahoma 73105 Mr. W.J. Bowman, Chief Mr. William Hunter, Assistant Chief †Mr. Roger Jacks
Oregon	Center for Population Research and Census Portland State University - Box 751 Portland, Oregon 97207 †Dr. James Weiss
Pennsylvania	*Office of State Planning and Development Post Office Box 1323 Harrisburg, Pennsylvania 17120 Mr. A. Edward Simon, Executive Director †Ms. Natnalie Sato
Puerto Rico	Puerto Rico Planning Board Minillas Government Center North Building, De Diego Avenue Post Office Box 9447 Santurce, Puerto Rico 00908 †Ms. Carmen G. Garcia de Laguerre Ms. Edna Schroder, Consultant
Rhode Island	*Statewide Planning Program Room 201 265 Melrose Street Providence, Rhode Island 02907 Mr. Daniel Varin, Chief †Mr. Chester Symanski
South Carolina	*Division of Research and Statistical Services South Carolina Budget and Control Board Post Office Box 11038 Columbia, South Carolina 29211 Mr. Thomas P. Evans, Director †Mr. Bobby Bowers †Ms. Jackie Frishman
South Dakota	*Public Health Statistics State Department of Health Pierre, South Dakota 57501 Mr. William Johnson, Director †Mr. Charles Sisk Mr. Edward Kehrwald
Tennessee	*Tennessee State Planning Office Division of State Planning 660 Capitol Hill Building 301 Seventh Avenue, North Nashville, Tennessee 37219 Mr. Niles C. Schoening, Director †Ms. Annie Moore
Texas	Division of Planning Coordination Office of the Governor Box 12428 Austin, Texas 78711 †Mr. John Perrin †Ms. Joy Travis
Utah	*Utah Department of Employment Security 174 Social Hall Avenue Salt Lake City, Utah 84111 Mr. Richard J. Arnold, Director of Reports and Analysis †Mr. Kenneth Jensen
Vermont	*Division of Public Health Statistics State Department of Health 115 Colchester Avenue Burlington, Vermont 05401 †Mr. Walter L. Cooley, Chief
Virginia	*Tayloe Murphy Institute Graduate School of Business Administration University of Virginia Post Office Box 3430 Charlottesville, Virginia 22903 Dr. Charles O. Meiburg, Director †Dr. William J. Serow †Dr. Julie Martin
Washington	Population Studies Division Office of Program Planning and Fiscal Management House Office Building Olympia, Washington 98504 †Mr. John R. Walker, Chief †Dr. Donald B. Pittenger, Asst. Chief †Ms. Theresa Lowe
West Virginia	*Office of Research and Development Center for Extension and Continuing Education West Virginia University Morgantown, West Virginia 26505 †Dr. Leonard M. Sizer Federal-State Relations Office of the Governor Charleston, West Virginia 25305 Mr. Robert V. Barill, Deputy Director
Wisconsin	*Bureau of Health Statistics State Division of Health Post Office Box 309 Madison, Wisconsin 53701 Dr. Raymond D. Nashold, Director †Mr. Henry Krebs, Asst. Chief, Statistical Services Section †Ms. Margaret Hollerman
Wyoming	*Division of Business and Economic Research College of Commerce and Industry University of Wyoming University Station - Box 3925 Laramie, Wyoming 82070 Dr. Roger Mayen, Director †Mr. Fred Doll Administrator of Research and Statistics Division Department of Administration and Fiscal Control Room 317 - Capitol Building Cheyenne, Wyoming 82001 Mr. Phil Kiner

ESTIMATES PUBLISHED IN SERIES P-26 REPORTS SINCE 1970

(Reports issued under the Federal-State Cooperative Program for Population Estimates, jointly prepared by the Bureau of the Census and designated State agencies)

State	Report No.			State	Report No.		
	1973 and provisional 1974	1972 and provisional 1973	1971 and provisional 1972		1973 and provisional 1974	1972 and provisional 1973	1971 and provisional 1972
Ala..........	125	76	48	Mont........	109	53	19
Alaska.......	([1])	([2])	([3])	Nebr........	104	58	25
Ariz.........	94	50	*11	Nev.........	117	67	29
Ark..........	115	70	33	N. H........	107	52	18
Calif........	119	([2])	*41	N. J........	135	82	20
Colo.........	103	62	17	N. Mex......	123	85	([3])
Conn.........	116	79	([3])	N. Y........	([1])	([2])	([3])
Del..........	111	57	15	N. C........	114	68	44
Fla..........	130	90	46	N. Dak......	102	60	([3])
Ga...........	124	92	37	Ohio........	122	80	*40
Hawaii.......	105	56	23	Okla........	112	63	24
Idaho........	106	51	9	Oreg........	([1])	74	([3])
Ill..........	128	78	27	Pa..........	136	93	*39
Ind..........	113	75	14	R. I........	98	65	22
Iowa.........	138	72	31	S. C........	108	71	34
Kans.........	129	64	43	S. Dak......	101	61	*12
Ky...........	120	84	35	Tenn........	133	83	47
La...........	97	54	*16	Tex.........	([1])	([2])	([3])
Maine........	99	59	28	Utah........	96	55	10
Md...........	([1])	([2])	([3])	Vt..........	95	49	*13
Mass.........	137	91	42	Va..........	127	88	36
Mich.........	110	69	32	Wash........	([1])	66	([3])
Minn.........	132	87	38	W. Va.......	121	89	30
Miss.........	131	86	([3])	Wis.........	126	81	26
Mo...........	134	77	45	Wyo.........	100	73	([3])

*First year only. For second year, see Series P-25, No. 517.

[1]County or county equivalent estimates for 1973 and provisional 1974 are published in Series P-25 for the following States: Maryland, No. 596; Washington, No. 597; New York, No. 599; Oregon, No. 602; Alaska, No. 604; and Texas, No. 609.

[2]County or county equivalent estimates for 1972 and provisional 1973 are published in Series P-25 for the following States: New York, No. 527; Maryland, No. 530; Alaska, No. 531; California, No. 532; and Texas, No. 535.

[3]County estimates for this State for 1971 and provisional 1972 are published in Series P-25, No. 517.

APPENDIX B

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APPENDIX B (continued)

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APPENDIX B (continued)

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Kent, Ohio 44242
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APPENDIX B (continued)

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APPENDIX C

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MONTGOMERY

Alabama League of Municipalities (1935)
535 Adams Ave. 36104
Telephone: (205) 263-1042
John F. Watkins, *Executive Director*
Dan O'Dowe, Jr., *Pub. Mgr.*
D. N. Hamilton, *Gen. Counsel*

Alabama Chamber of Commerce
Research Division
P. O. Box 76 36101
Telephone: (205) 262-7310
Harry C. McMillan, *Director*

State of Alabama
Legislative Reference Service 36104
Telephone: (205) 269-6438
Louis G. Greene, *Director*

Program Development Office
304 Dexter Avenue 36104
Telephone: (205) 269-7171
J. E. Mitchell, Jr., *Director*

UNIVERSITY

University of Alabama 35486
Bureau of Public Administration (1938)
Telephone: (205) 348-5980
Robert B. Highsaw, *Director*
L. Franklin Blitz
Coleman B. Ransone
William H. Stewart
James D. Thomas

Alaska

JUNEAU

State of Alaska
Local Affairs Agency
Pouch AB 99801
Telephone: 586-6221
Byron I. Mallott, *Director*

California

BERKELEY

University of California 94704
Graduate School of Public Affairs
Telephone: (415) 642-4670
2607 Hearst
Aaron Wildavsky, *Dean*

Institute of Governmental Studies
Telephone: (415) 642-6722
Eugene C. Lee, *Director*
*Stanley Scott, *Assistant Director*
*Barbara J. Hudson, *Librarian*
Phyllis Barusch
Ora Huth
Dorothy Tompkins

Institute of Business & Economic Research, Northern Section (1941)
156 Barrows Hall
Joseph W. Garbarino, *Director*

Institute of Urban & Regional Development Center of Real Estate and Urban Economics
260 Stephens Memorial Hall 94720
Telephone: (415) 642-2491
Wallace F. Smith, *Acting Chairman*

Western Governmental Research Association (1937)
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Institute for Public Service (1915)
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Devra Zetlan, *Public Health Librarian* (212) 566-5169
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Center for New York City Affairs
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100 Gold Street 10007
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New York City Off-Track Betting Corporation
1501 Broadway 10036
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Port of New York Authority
111 Eighth Avenue 10011
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Queens College of The City University of New York
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Regional Plan Association, Inc.
235 East 45th Street 10017
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OLEAN

Olean Chamber of Commerce
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ROCHESTER

Citizens' Tax League of Rochester and Monroe County, New York, Inc. (1935)
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Rochester Center for Governmental & Community Research, Inc.
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Rochester Chamber of Commerce
Governmental Action Task Force
55 St. Paul Street 14604
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SCHENECTADY

Schenectady Bureau of Municipal Research, Inc. (1927)
202 State Street 12305
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STEWART AIRPORT, N.Y.

Mid-Hudson Pattern for Progress
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SYRACUSE

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Bureau of Research
218 City Hall 13202
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CULLOWHEE

Western Carolina University
Office of the President
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DURHAM

The L. Q. C. Lamar Society
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RALEIGH

North Carolina Citizens Association
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North Carolina League of Municipalities
Post Office Box 3069 27602
Telephone: (919) 834-1311
S. Leigh Wilson, *Executive Director*

State of North Carolina
Office of Community Resources
P.O. Box 27687 27611
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Irvin Aldridge, *Director*

Ohio

AKRON

Akron Area Chamber of Commerce
Bureau of Research
137 South Main Street 44308
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City Hall 44308
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*Dan P. Zeno, *Director*

Department of Public Service
City Hall 44308
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Better Housing League of Cincinnati
2400 Reading Road 45202
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Charter Research Institute
602 Carew Tower 45202
Telephone: (513) CHerry 1-0303
*Forest Frank, *Director*

City of Cincinnati
Municipal Reference Library
224 City Hall 45202
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Hila O. Foley, *Librarian*

Greater Cincinnati Chamber of Commerce
55 Central Trust Building 45202
Telephone: (513) 721-3300
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CLEVELAND

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City of Cleveland
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Cuyahoga County Mayors and City Managers Association
Cleveland State University
2323 Prospect Avenue 44115
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Governmental Research Institute (1943)
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Greater Cleveland Associated Foundation
700 National City Bank Building 44114
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James A. Norton, *President*

Greater Cleveland Growth Association (1932)
Tax & Legislation Research Department
690 Union Commerce Building 44115
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Municipal Reference Library (1913)
211 City Hall 44114
Telephone: (216) 694-2656
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COLUMBUS

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21 East State Street, Suite 1000 43215
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*Paul E. Hadinger, *Executive Director*

Columbus Area Chamber of Commerce, The (1884)
Research Department (1930)
50 West Broad St., P.O. Box 1527 43216
Telephone: (614) 221-1321

Ohio Chamber of Commerce
Taxation and Research Department (1929)
820 Huntington Bank Building 43215
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John E. Gotherman, Jr., *League Counsel*

Ohio Public Expenditure Council (1941)
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Auditor of State
State House 43216
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James K. Hunter, Jr., *Director*
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Welfare, Statistics and Research
Raymond F. McKenna

DAYTON

Community Research, Inc. (1957)
Rm. 444, 333 W. First Street 45402
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Gary Pence, *Associate Dir.—Police*
Herbert J. Shubick, *Research Associate*

Dayton Area Chamber of Commerce
Sheraton-Dayton Hotel 45402
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KENT

Kent State University
Center for Urban Regionalism
Lowry Hall 44242
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LIMA

Lima Area Chamber of Commerce, The
53 Public Square 45801
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TOLEDO

City of Toledo
Office of City Auditor
City Hall 43624
Telephone: (419) 255-1500
John J. Sheehy, *City Auditor*

Commission of Publicity and Efficiency
Municipal Reference Library
208 Fire and Police Alarm Building 43624
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Toledo Area Governmental Research Association
Community Services Building
1 Stranahan Square 43604
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Warren Area Chamber of Commerce
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Oregon

EUGENE

League of Oregon Cities
Post Office Box 5177 97403
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A. M. Westling, *Planning and Public Works Consultant*

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Kenneth C. Tollenaar, *Director*
Bureau of Business and Economic Research
Donald A. Watson, *Director*

PORTLAND

City Club of Portland (1916)
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Oregon Tax Research (1935)
1104 Loyalty Building 97204
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SALEM

League of Oregon Cities (1925)
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ALTOONA

Pennsylvania Economy League, Inc.
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AVOCA

Economic Development Council of Northeastern Pennsylvania
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Telephone: (717) 457-7456
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BEAVER

Pennsylvania Economy League, Inc.
Beaver County Branch (1943)
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Telephone: (412) 774-6406
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BETHLEHEM

Pennsylvania Economy League, Inc.
Lehigh Valley Branch (1935)
(Includes Lehigh & Northampton Counties)
520 East Broad St. 18018
Telephone: (215) 867-9532

BUTLER

Pennsylvania Economy League, Inc.
Butler County Branch (1937)
403 Mellon Bank Building 16001
Telephone: (412) 287-5610
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GREENSBURG

Pennsylvania Economy League, Inc.
Region I
712 First National Bank Building 15601
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HARRISBURG

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Research Bureau (1916)
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State of Pennsylvania
State Tax Equalization Board
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LANCASTER

Pennsylvania Economy League, Inc.
Lancaster County Branch (1935)
30 West Orange Street 17603
Telephone: (717) 397-8919
*William C. Wagner, II. *Executive Director*

NEW CASTLE

Greater New Castle Association, Inc. (1939)
First Federal Plaza
25 N. Mill Street 16101
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NEWTOWN

Pennsylvania Economy League, Inc. (ED)
Bucks County Branch (1952)
10-B South State Street 18940
Telephone: (215) WOrth 8-3868
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NORRISTOWN

Pennsylvania Economy League, Inc.
Montgomery County Branch (1932)
400 West Johnson Highway 19401
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PHILADELPHIA

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250 South Broad Street 19102
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Bureau of Economic & Business Research (1943)
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PITTSBURGH

ACTION-Housing, Inc. (1957)
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200 Ross Street 15219
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Chamber of Commerce Bldg. 15219
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William Penn Hotel 15230
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Health and Welfare Association of Allegheny County
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*William H. Eisinger, *Assistant Research Associate*
*Armistead L. Guthery, *Director-Urban Research*
*J. Paul Riden, Jr., *Assistant Director of Research and Director of Branch Activities*
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Clark D. Rogers
Anatole A. Solow

Institute of Urban Policy and Administration (1944)
Joseph A. James, *Director*

Department of Public Administration
William F. Matlack, *Director*

Department of International Affairs
Daniel S. Cheever, *Director*

Department of Economic and Social Development
Hamlin Robinson, *Acting Director*

Graduate Center of Public Works
William D. Brinckloe, *Director*

School of Education
*David H. Kurtzman

READING

Pennsylvania Economy League, Inc.
Berks County Branch (1936)
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SHARON

Pennsylvania Economy League, Inc.
Mercer County Branch (1945)
811 E. State St. 16146
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UNIONTOWN

Pennsylvania Economy League, Inc.
Fayette County Branch (1938)
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UNIVERSITY PARK

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WASHINGTON

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BLS Region	State	Agency
IV	ALABAMA	Department of Industrial Relations, Industrial Relations Building, Montgomery 36104
X	ALASKA	Employment Security Division, Department of Labor, P.O. Box 3-7000, Juneau 99802
IX	ARIZONA	Department of Economic Security, P.O. Box 29026, Phoenix 85038
VI	ARKANSAS	Employment Security Division, Department of Labor, P.O. Box 2981, Little Rock 72203
IX	CALIFORNIA	Employment Development Department, P.O. Box 1679, Sacramento 95808 (LAUS and CES)
VIII	COLORADO	Division of Employment, Department of Labor and Employment, Room 222, 1210 Sherman Street, Denver 80203
I	CONNECTICUT	Employment Security Division, Labor Department, 200 Folly Brook Boulevard, Wethersfield 06109
III	DELAWARE	Department of Labor, 801 West Street, Wilmington 19899
III	DIST. OF COL.	Office of Administration and Management Service, D.C. Manpower Administration, Room 626, 500 C Street, N.W., Washington 20001
IV	FLORIDA	Division of Employment Security, Department of Commerce, Caldwell Building, Tallahassee 32304
IV	GEORGIA	Employment Security Agency, Department of Labor, 254 Washington Street, S.W., Atlanta 30334
IX	HAWAII	Department of Labor and Industrial Relations, P.O. Box 3680, Honolulu 96811
X	IDAHO	Department of Employment, P.O. Box 35, Boise 83707
V	ILLINOIS	Bureau of Employment Security, Department of Labor, 910 South Michigan Avenue, Chicago 60605
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VII	IOWA	Employment Security Commission, 1000 East Grand Avenue, Des Moines 50319
VII	KANSAS	Employment Security Division, Department of Labor, 401 Topeka Boulevard, Topeka 66603
IV	KENTUCKY	Department of Human Resources, 275 East Main Street, Frankfort, Kentucky 40601
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THE CEIP IMPACT MODEL

TECHNICAL MANUAL

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CONTENTS

I. INTRODUCTION

This manual provides the technical elements of the CEIP Impact Model. Variables are listed in the order they are used in the equations. Data sources or derivations for each variable are also indicated.

Equations are listed in the order they are used in the Impact Model. Each equation is listed under a heading indicating the purpose for which the equation is used.

Copies of coding forms and the computer program used for calculations are included so that analysts may verify how the variables and equations are utilized in the Impact Model.

II. LIST OF VARIABLES

BLR_t	....	baseline revenues, excluding revenues derived from borrowing or project-related grants source: $t=1,...,10$ Schedule 4.1 data $t=11,...,30$ Equation 3 forecast
BLR_{t-1}	....	baseline revenues, as above, lagged one year
Y_t	....	per capita income for specific locality (or its county area) source: $t=1,...,10$ Schedule 3.4 data $t=11,...,30$ Equation 1 forecast
P_t	....	local population source: $t=1,...,10$ Schedule 3.4 data $t=11,...,30$ Equation 2a forecast
S_t	....	number of students source: $t=1,...,10$ Schedule 3.7 data $t=11,...,30$ Equations 2a and 2b
ΔP_t	....	defined as $P_t - P_{t-1}$
ΔY_t	....	defined as $Y_t - Y_{t-1}$
BLX_t	....	baseline expenditures, excluding expenditure of project grants or borrowed funds source: $t=1,...,30$ Equation 4
ε_{it}	....	disturbance term of i^{th} equation
t	....	time, range 1 to 30. Year 10 is PRESENT YEAR

$\hat{c}_3$ .... estimated coefficient (from Equation 3) of the effect of a change of one person on revenues collected, i.e.,

$$\partial BLR_t / \partial \Delta P_t = \hat{c}_3$$

source: Equation 3

CFE_t .... construction employment

source: t=11,...,30 Schedule 1.1 data

OFE_t .... operating employment

source: t=11,...,30 Schedule 2.1 data

$ICFE_t$ .... indirect construction facility employment

source: t=11,...,30 Schedule 1.1 data

$IOFE_t$ .... indirect operating facility employment

source: t=11,...,30 Schedule 2.1 data

FE_t .... total facility employment

source: t=11,...,30 Equation 5c

DFE_t .... direct facility employment

source: t=11,...,30 Equation 5a

IFE_t .... indirect facility employment (new employees in local businesses supplying the energy facility)

source: t=11,...,30 Equation 5b

FEG_t .... facility employment in local jurisdiction

source: t=11,...,30 Equation 6

DIST .... distance from energy facility site to population center of government

source: Schedule 3.1 data

Z .... gravity distance

source: Equation 6a

POPJ .... population within the J^{th} ring
J = 1, 2, 3, 4, 5, 6 (e.g. POP30=population within the 20 to 30 mile ring)

source: Schedule 3.1 data

POPG .... population within the government for gravity model year

source: Schedule 3.1 data

SUMY .... calculation for gravity model

source: Equation 6b

J .... jobs within the local community

source: Schedule 3.3 data

k .... employment multiplier

source: Equation 7

RFE_t .... residential employment from facility

source: Equation 8

U .... unemployment

source: Schedule 3.3 data

e .... "labor market tightness" coefficient

source: Equation 9

PNat'l .... population nationally

source: use 215,396,000

ENat'l .... employment nationally

source: use 96,817,000

E .... employees residing in local jurisdiction (may work elsewhere)

source: Schedule 3.3 data

$NRFE_t$ .... new residential facility employment

source: $t=11,\ldots,30$ Equation 10

NP_t .... new population associated with the energy facility

source: $t=11,\ldots,30$ Equation 11

WP_t .... total population with the energy facility

source: $t=11,\ldots,30$ Equation 12

s .... student-population multiplier

source: use .25

NS_t .... new student population

source: $t=11,\ldots,30$ Equation 12a

RPT_t .... residential property tax revenues

source: $t=11,\ldots,30$ Equations 13a, c, d

m .... proportion of taxes exported

source: Schedule 4.7 data

q .... proportion of taxes from residential property tax

source: Schedule 4.5 data

h_t .... adjustment for property tax base lag with large population growth

source: Equation 13b

L_t .... value of land purchased for energy facility in given year t OR value of completed physical facility in year subject to property tax (if both occur, then the sum)

source: t=11,...,30 Schedule 1.2 data

g .... assessment ratio for business property

source: Schedule 4.4 data

$T_{1,t}$ .... business property tax rate

source: t=11,...,30 Schedule 4.2 data

BPT_t .... business property taxes

source: t=11,...,30 Equations 14a, 14b

RET_t .... real estate transfer taxes

source: t=11,...,30 Equation 15

$T_{2,t}$ .... real estate transfer tax rate

source: t=11,...,30 Schedule 4.2 data

ST_t .... sales taxes

source: t=11,...,30 Equation 16

$T_{n,t}$ .... other tax rates
n=3,...,J where J is the total number of taxes

source: t=11,...,30 Schedules 4.2 and 4.6b data

BT_n .... other tax bases
n=3,...,J (e.g., sales tax base, etc.)

source: Schedules 1.3 and 2.2 data

UT_t .... user charges, in appropriate year

source: t=11,...,30 Schedule 4.8 data

OT_t .... other revenue sources from taxation, not explicitly covered in property tax, sales tax, etc.

source: Schedule 4.9 data

OBT_t .... other business taxes

source: t=11,...,30 Equation 17

WX_t .... expenditures with the energy facility impact

source: t=11,...,30 Equation 18

WR_t .... revenues with the energy facility impact

source: t=11,...,30 Equation 19

NFI_t .... net fiscal impact

source: t=11,...,30 Equation 20

III. EQUATIONS AND CALCULATIONS

SECTION I. BASELINE FORECASTS

Forecast BLR_t, Y_t, P_t, and BLX_t for t = 11,...,30.

Use ordinary least squares to estimate Equations 1, 2a and 3. Then apply the estimated equations to predict the above variables for t = 11, 30.

Equation 1. Forecast per capita income, t=11,...,30.

(1) $\ln Y_t = a_1 + b_1 t + \mathcal{E}_{1t}$

Equation 2a. Forecast population, t=11,...,30.

(2a) $\ln P_t = a_2 + b_2 t + \mathcal{E}_{2t}$

Equation 2b. Forecast student enrollments.

(2b) $S_t = P_t$ in Equations 2a and 3.

Equation 3. Forecast baseline revenues, t=11,...,30, given above forecasts for the independent variables:

(3) $BLR_t = a_3 + b_3\, BLR_{t-1} + \hat{c}_3 \Delta P_t + d_3 \Delta Y_t + \mathcal{E}_{3t}$

Equation 4. Forecast baseline expenditures, t=11,...,30.

(4) $BLX_t = BLR_t$

(NOTE: Save estimated coefficient above)

SECTION II. WITH IMPACT FORECASTS (CALCULATIONS)

Step 1. Forecast new population (impact) as result of energy installation:

Equation 5. Total facility employment.

(5a) $DFE_t = CFE_t + OFE_t$ definition

(5b) $IFE_t = ICFE_t + IOFE_t$ definition

(5c) $FE_t = DFE_t + IFE_t$ definition

Equation 6. Allocate new employment to the local jurisdiction. Allocation by gravity model and given data:

(6a)

$$Z = \begin{cases} DIST \text{ if } DIST \leq 20 \\ [20 + 3(DIST - 20)] \text{ if } DIST > 20 \end{cases}$$

(6b)

$$SUMY = (POP10/5) + (POP20/15) + (POP30/35) + (POP40/65) + (POP50/95) + (POP60/125) + (POPG/Z)$$

(6c)

$$FEG_t = \left[\frac{POPG/Z}{SUMY}\right] FE_t$$

Equation 7. Employment multiplier.

(7)

If	$J_t < 50$	then	$k = 1.0$
If	$50 \leq J_t < 200$	then	$k = 1.1$
If	$200 \leq J_t < 500$	then	$k = 1.2$
If	$500 \quad J_t < 2000$	then	$k = 1.3$
If	$2000 \leq J_t < 5000$	then	$k = 1.4$
If	$J_t \geq 5000$	then	$k = 1.5$

Equation 8. Residential employment from facility.

(8) $RFE_t = k \ FEG_t$

Equation 9. Labor market tightness coefficient.

(9) If

$$(P/E)/(PNat'l/ENat'l) \begin{cases} < 1 & \text{then } e = 0 \\ \geq 1, < 1.05 & \text{then } e = 0.005 \\ \geq 1.05 & \text{then } e = 0.01 \end{cases}$$

Equation 10. New residential facility employment.

(10) $NFRE_t = RFE_t - 0.3U - eP_t$

Equation 11. New population.

(11) $NP_t = NRFE_t(PNat'l/ENat'l)$

Equation 12. Total population with the energy facility:

(12) $WP_t = P_t + NP_t$

(12a) In the case of school districts, then

$NS_t = sNP_t$

Step 2. Forecast new residential property tax revenues (RPT_t):

Equation 13. Property tax revenues.

Equation 13a. Property tax revenues, first year:

(13a) t = 11: $RPT_{11} = NP_{11}(1-m-q)BLR_{11} / P_{11}$

Equation 13b. Define proportion of new residents paying property tax coefficient (h):

(13b) If $\left\{\frac{WP_{t+1} - WP_t}{WP_{t+1}}\right\}$ $< .1$ then $h = q$; $.1$ to $.2$ then $h = .8\ q$; $.2$ to $.4$ then $h = .6\ q$; $> .4$ then $h = .4\ q$

Equation 13c.1. If property tax receipts in next fiscal year, use Equation 13a for RPT_{12} (derive from data), and subsequently, for t=13,...,30 use Equation 13d for RPT_t (t=13,...,30).

Equation 13c.2. If property tax receipts in same fiscal year, use for t=12,...,30.

$$RPT_t = NP_t(1-m-q)BLR_t /P_t + NP_{t-1} \cdot h \cdot BLR_t /P_t$$

Equation 13d. If property tax receipts following fiscal year, in third year and later, use following equation (t=13,...,30). See note at Equation 13c.1.

(13d) $RPT_t = NP_t(1-m-q)BLR_t /P_t + (NP_{t-2})\ h\ (BLR_t /P_t)$

Step 3. Forecast (calculate) energy facility business property taxes.

Equation 14a. Business property taxes if tax revenues received in SAME fiscal year (data), t=11,...,30.

(14a) For t = 11, $BPT_{11} = 0.5L_t\ (g)(T_{1,11})$

for t = 12,...,30

$$BPT_t = \left[\left(\sum_{i=11}^{t-1} L_i \right) + 0.5L_t \right] (g)(T_{1,\ t})$$

Equation 14b. Business property taxes if tax revenues received in following fiscal year (data), t=11,...,30.

(14b) For t = 11 $BPT_{11} = 0$

for t = 12 $BPT_{12} = 0.5L_{11}(g)(T_{1,\ 12})$

for t = 13,...,30

$$BPT_t = \left[\left(\sum_{i=11}^{t-2} L_i \right) + 0.5L_{t-1} \right] (g)(T_{1,\ t})$$

Step 4. Other business taxes.

Equation 15. Real estate transfer taxes (if applicable).

(15) $RET_t = L_t \cdot T_{2,\ t}$

Equation 16. Sales and other such taxes.

(16) $ST_t = \sum_{n=3}^{J} T_{n,\ t} \cdot BT_{nt}$

where n is the type of tax, and J is total number of such taxes + 2.

Equation 17. All non-property taxes.

(17) $OBT_t = RET_t + ST_t + UT_t + OT_t$

(Note: UT is user charges, and OT other taxes. This data given in schedules.)

Step 5. Calculate expected tax revenues and expenditures with the impact of the energy facility.

Equation 18. Expected expenditures with the energy facility.

$$(18) \quad WX_t = BLX_t + c_3NP_t$$

Equation 19. Forecast expected revenues with energy facility.

$$(19) \quad WR_t = BLR_t + RPT_t + BPT_t + OBT_t$$

Equation 20. Net fiscal impact.

$$(20) \quad NFI_t = WR_t - WX_t$$

IV. COMMENTS

The general description of forecasting procedures is contained in the Technical Assistance Materials along with the data schedules. The comments presented here are supplementary to clarify certain technical aspects of the model.

BASELINE FORECASTS

Data limitations prevent making independent estimates of baseline revenues and baseline expenditures. Hence the baseline revenues are estimated as a function of revenues the previous period, changes in population and changes in per capita income. Revenues from borrowing or project related grants are excluded. Baseline expenditures, excluding expenditures of borrowed funds or project related grants, are then assumed to equal baseline revenues. This assumption is warranted in that after "lumpy" expenditures and revenues are eliminated, revenues generally come very close to equaling expenditures for local government units.

The CEIP Impact Model uses only a simple continuation of trends in forecasting per capita income and population. If alternative estimates are available they should be utilized.

IMPACT FORECASTS

The impact forecasts are a series of calculations which are added to the baseline revenue forecasts. Assumptions and calculations underlying four of the more important steps in the impact forecast are explained below.

1) Gravity Model - The gravity model is based on previous empirical work. The assumptions are that the residential location of facility employees varies directly with the existing population in an area and inversely with the distance from the facility to the local area. The decline in relation to distance is direct up to 20 miles and three times the additional distance beyond 20 miles. This formulation may overstate the number of employees close to the facility and understate the number of employees distant from the facility during its initial years. This is because new employees will commute longer distances until they feel their jobs are permanent, after which they move closer to the facility.

2) After the number of "new" jobs within the local government area are estimated with the gravity model and multiplier, an attempt is made to determine how many holders of new jobs will be new residents. The adjustment for labor market tightness (Equation 9) assumes no new entrants to the labor force if the population-employment ratio in the local area is lower than the national

average. If the local population-employment ratio is up to 5 percent higher than the national average, .5 percent of the existing residential population are assumed to be new entrants to the labor force filling energy facility related jobs. If the local population-employment ratio is more than 5 percent higher than the national average, one percent of the existing residential population is assumed to join the labor force in energy facility related jobs. A second adjustment is made by assuming that 30 percent of the currently unemployed in the community find jobs. These calculations reduce the need for new residents in the community to fill energy facility jobs, and hence reduce the new population impact from the facility.

3) Property Tax Lags - It is assumed that no new residential property tax revenues accrue during the first year of energy facility activity. Beginning in the second year new residents pay the same amount of residential property tax as old residents if a) property taxes are collected in the same year as they are assessed and b) the rate of new population growth was less than 10 percent. If there is a one year lag between assessments and collections, new residential property taxes do not accrue until year three. If population increases are large, the amount of residential property tax paid by new population is decreased by the factors indicated in Equation 13b, i.e., if growth is between 10 and 20 percent, new residents only pay 80 percent as much property tax as old residents.

Business property tax receipts from the energy facility are also lagged if there is an assessment-collection lag. In addition, during the first year of a new business property tax assessment, only 50 percent is estimated to accrue. This is an "expected value" in that if the facility is in place early in the year, the amount would be 100 percent but if in place only at the end of the year, the amount could be 0. This 50 percent assumption can be modified to be either 0 or 100 percent by substituting 0 or 1 for .5 in Equations 14a and 14b.

4) Tax Rates for Estimating Energy Facility Revenues - In Schedule 4.2 local officials are asked to indicate current tax rates and tax rates 5, 10 and 15 years in the future for major taxes. Revenues from the energy facility will be sensitive to future tax rate estimates so it may be desirable to run the model more than once with a different estimate for rates for taxes in the future.

PRELIMINARY DRAFT

CEIP IMPACT FORECAST REVIEW MATERIALS

Prepared by
Dr. Robert L. Bish and Candis L. Brown

Prepared for the
Office of Coastal Zone Management, NOAA
Contract No. 7-35174

June 1977

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NOTE: The Review Questions have been prepared prior to development of the computer program or actual use of the model for forecasting. Consequently, the list of review questions is relatively short. The list will need to be supplemented after some experience with the operation of the model is obtained.

I. INTRODUCTION

Three kinds of reviews of CEIP Impact Models and forecasts can be made. First, data provided in schedules can be verified by checking alternative data sources as listed below. Second, some checks for internal consistency can be made; and third, forecasts can be examined to see if they are reasonable. Each of these review processes will be presented in turn. OCZM staff, however, should follow their own inclinations and also maintain a log of important questions or techniques for checking so that a more detailed, systematic review process can be developed after some experience with the program.

II. ALTERNATIVE DATA SOURCES

Recommended for CEIP-OCZM Special Library Collection

1. Advisory Commission on Intergovernmental Relations (ACIR). SIGNIFICANT FEATURES OF FISCAL FEDERALISM 1976-1977, Vol. II.
2. STATE AND COUNTY EMPLOYMENT AND UNEMPLOYMENT JANUARY-DECEMBER 1976. NTIS (Dept. of Commerce). Microfiche #3.00, paperback $28.75.
3. Bureau of the Census. "Population Estimates and Projections/ Estimates of the Population of Counties;" 1970, 71, 72, 73, 74, 75.
4. Bureau of the Census. "County Business Patterns."
5. Bureau of Economic Analysis. "Local Area Personal Income."
6. Bureau of the Census. "Finances of County Governments." (GF series, Vol. 4, No. 3).
7. Bureau of the Census. "Finances of Municipality and Township Governments." (GF series, Vol. 4, No. 4).
8. Bureau of the Census. "Compendium of Government Finances."
9. Commerce Clearing House. STATE TAX REPORTER, Vol. I, II.

General Sources

1. Official state agencies who participate in federal-state cooperative program for local population estimates.

2. Directory of bureau members of the Association for University Business and Economic Research (see Appendix B, THE CEIP IMPACT MODEL: TECHNICAL ASSISTANCE MATERIALS).

3. Directory of local and state agency members of the Government Research Association, Inc. (see Appendix C, THE CEIP IMPACT MODEL: TECHNICAL ASSISTANCE MATERIALS).

4. RAND MCNALLY COMMERCIAL ATLAS.

5. Bureau of the Census. "State Reports on State and Local Government Finances." (GF series, Vol. 6, No. 2).

6. Bureau of the Census. "Government and Census Depository Libraries Holding Census Bureau Reports."

III. REVIEW QUESTIONS FOR SCHEDULES

Energy Facility (Schedules 1 and 2)

1. Check to see that the totals in column 4 of Schedule 1.2 are equal or slightly less than the cost of inputs, i.e. number of employees from 1.1 x an estimated wage ($16,000 to $20,000), plus the cost of land (1.2) and construction materials (1.3).

2. Be sure that 1.3 has been completed if the answer to 4.6b is yes. If 4.6b is no, Schedule 1.3 may be uncompleted.

3. Be sure that 2.2 is completed if the answer to 4.6a is yes. If 4.6a is no, Schedule 2.2 need not be completed.

Local Area Description

1. Check to see that the local government's population for the year given in 3.1 corresponds to the population data in 3.4.

2. Check to see that the sum of the number of residents employed and number of residents unemployed from 3.3 is one-third to one-half of the total population for the year of the data.

3. If population or school enrollments forecasts are provided (3.6 or 3.8), examine them for comparability to data for past 10 years (3.4 or 3.7).

Government Revenue and Expenditure

1. Compare data on revenue (4.1) with expenditure data (5.1). The way revenues and expenditures are defined, they should be very close to one another each year.

2. If expected tax rates in 4.2 are not increasing, check to see that either 1) revenues are not increasing very much; or 2) population is increasing rapidly.

IV. REVIEW QUESTIONS FOR FORECASTS

1. Calculate the per capita revenues for the current year by dividing total revenue (4.1) by population (3.4). Compare this with the value of coefficient $\hat{c}_3$ as estimated in Equation 3. $\hat{c}_3$ should be less than the average per capita revenues; if it is greater, the forecast is extremely suspect. ($\hat{c}_3$ is the marginal revenue or expenditure from an additional person historically, taking into account income and the previous year's revenues or expenditures.)

2. Examine the population and income data in Schedule 3.4 for any trends that would not be picked up in a linear equation. Compare the predicted population and income growth with historical experience.

3. Compare the taxes used with the changes in impact revenues.
   a) Property taxes will build slowly and level off upon completion of facility and stabilization of population.
   b) Sales taxes on construction materials will cause an early, sharp revenue rise followed by a decrease.
   c) Sales taxes on operating inputs will parallel increases in production and then level off.

4. See if there is a boom effect on expenditures. If there is a sharp population increase followed by a population decrease, the expenditure forecast after the population decline may be a little low. This is because unless population has decreased in the past, the estimating coefficient for the effect of population on expenditures ($\hat{c}_3$) will be based on increases rather than decreases and decreases are likely to be less than increases.

ISSUES IN ENERGY FACILITY IMPACT FORECASTING

Prepared by
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Prepared for the
Office of Coastal Zone Management, NOAA
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CONTENTS

I. INTRODUCTION

This manual provides information to increase understanding of energy facility economic impacts. It is based on studies of rural industrialization throughout the U. S. and energy-impacted communities in the Rocky Mountain and Northern Great Plains states. Some concepts and assumptions implicit in the forecasting procedures and specific findings of empirical data are also explained. This is necessary because many of the issues are not well known or understood. Questioning of procedures or use of data may be expected from local government officials, due mostly to not understanding or misunderstanding the factors involved. In addition, there are potentially important factors which are not used in forecasting procedures due to limitations of available data or methodological difficulties. These factors may change certain expected forecasts and are noted in their discussion. In communication with the applying local governments, these factors can be discussed to provide information for adjustment of the forecasts for that community.

The narrative is divided into three sections, treating issues of (1) the community/resident split and population impact on small local areas, (2) employment multipliers, and (3) fiscal impacts. The first two sections are directly related to the most important issues in the forecasting model. The third section is also relevant, but includes description of less related fiscal impact experience to illustrate misconceptions that may exist among local officials regarding fiscal benefits from industrialization.

Other parts of the manual include an annotated bibliography, and copies of important studies of economic impact issues.

II. THE RESIDENT-COMMUTER SPLIT

The commuting radius of employees to an energy facility is likely to exceed the boundaries of small local governments. Thus, an allocation of increased employment must be made among local areas. While this problem is critical for forecasting impact on local governments and is not a problem for large area forecasting models, this issue has not received significant attention as a forecasting problem. Thus, the technique utilized, while the best available, must be viewed with caution until more evidence on this problem is obtained.

The allocation of employment to geographic areas around a facility is based on the gravity concept. This concept holds that the interaction between two points or places is a function of population and distance. It is directly proportional to its population and inversely proportional to the distance between the two places. For our purposes the interaction is commuting to work. The object of the formula is to forecast the distribution of direct employment to the local governments surrounding the facility site. The gravity concept applied to commuting means that the facility attracts employees from surrounding areas in direct proportion to the population of a particular local government. The larger the population, the greater the number of employees who will live there. And, the facility attracts commuters from surrounding areas inversely related to the distance between the facility and the area. The farther the local government from the facility site, the fewer the number of employees who will live there.

The distribution forecasting formula used in the CEIP Impact Model is the result of several case studies' findings and the analyses of twelve different specifications (5, p. 125). These studies looked at commuting in nonmetropolitan areas. Conditions were similar to the expected conditions of energy impacted in coastal areas. Distance could be used as a substitute for travel time. The evidence from these studies suggests that in rural areas there is a propensity to remain in established residences and a willingness to commute long distances to work. Rural and small town residents commute long distances with the opportunity to work in an industrial plant.

Commuting patterns in one small nonmetropolitan area were studied with data collected from a total of 1,645 employees from two firms. The two patterns were compared and their characteristics analyzed. There was a major difference between the two employee groups' commuting patterns. The average one-way commuting distance of the fiber plant employment was 17.5 miles. This compares with the shirt factory's much smaller average one-way distance of 6.7 miles. The median distances were 13 miles for the fiber plant and 4 miles for the shirt factory employees. Approximately 54 percent of fiber plant workers lived within 15 miles of the plant. Of the shirt factory workers, 80 percent lived within 15 miles of the factory. The state average for workers living within 15 miles of their work place is 77 percent. Thus, the fiber plant work force is drawn from distances farther than are most workers in the state; the shirt factory draws most of its work force in a smaller radius than both the fiber plant and the state average. Slightly more than 15 percent of the fiber workers travel 35 miles or more to work, while less than 1 percent of the shirt factory employees commute that far. In fact, 7 percent of the fiber plant workers commuted over 60 miles to the factory. The comparison of the two plants' commuting patterns shows that there is a significant difference in the distances traveled to work for the two groups. The labor-shed, arbitrarily defined in this case to include the closest 90 percent of the two factories' labor force, is nearly twice as extensive for the fiber plant as for the shirt factory: 38 miles and 20 miles.

Wage differences are the primary factor explaining the significant difference between the two commuting patterns. The wages paid by the fiber plant were substantially above those in the surrounding area and the state. The shirt factory wages were below both area and state wages. Previous studies have left researchers in dispute over the relationship of wages to distances commuted. However, the comparison of the lower and the higher wage groups within the same community suggested that wages have a significant impact on commuting. But it was evident that only when wages were compared with those in the immediate area did they affect the willingness to commute long distances. Several other studies were conducted in similar economically depressed, small nonmetropolitan areas. A comparison of the existing area opportunities and median one-way distances commuted in these studies with those of the fiber and shirt factory shows that wages do have a significant influence on the willingness to commute longer distances, particularly in the "lower wage" environments. In this respect energy facilities will have "high wages" and, thus, draw on a very large labor market area. Thus, commuting distances forecast in the model for an energy facility may be longer than existing employment commuting, but this result is warranted by previous studies.

A second important study finding is the tendency, over time, to move closer to the place of employment. Nearly ¼ of the fiber plant workers and 1/6 of the shirt factory workers had moved closer to their place of employment since they began work there.

And other employees who had not relocated indicated future intentions to do so. The median distance commuted since the opening of the fiber plant dropped from 28.8 miles to 13 miles. The shirt factory shift was less, mostly because it was located inside the town (the fiber plant was 7 miles outside the town).

The existing road networks were also found to influence the commuting pattern. Each of the 1,645 employees of the fiber and shirt factories plotted their residences on a map provided. The effect of road networks is evident from the residential locations. They extend farthest out along main or radial roads.

In addition to case study findings, the results of 12 different exponents of distance were tested to obtain the best prediction. Both time and mileage were used as measures of distance, but one was found to be as good a measure of distance as the other. Mileage, however, serves forecasting purposes better because it is more easily determined. While the models fit very well, each understated or overstated the actual numbers contained in the various zones by some amount. In an attempt to account for the deviations between the model and actual distribution, several other factors were tested.

Per capita income, population density, and intensity of agricultural employment of the local area were found to have an effect on the commuting patterns of the fiber workers. These three variables explained a major portion of the deviation from the expected distribution. Those districts generating more commuters than expected were low (population) density areas, had lower per capita incomes, and a high percentage of the labor force was employed in the agricultural sector. These three factors, which are not accounted for in the forecasting formula, may indicate an adjustment from the forecasted distribution.

To summarize, the forecasting model should give good results if the energy facility has higher than area-average wages and travel time and distance are approximately equal in different commuting directions. The over forecasts, however, should be discussed with local officials to discover any conditions unique to a particular community.

III. EMPLOYMENT MULTIPLIER

Industrial development in rural areas is often expected to result in many new jobs and to stimulate the local economy. However, the evidence indicates that the secondary employment affects from development are relatively small. The range of reported multipliers for small areas is 1.00 to 1.71, the majority of which are less than 1.2. These figures are lower than those generated by regional impact models. These multipliers range above 2.0. State or regional models and models based on cross-sectional data consistently predict much more secondary employment than is evidenced from case studies of small areas impacted by industrial development.

The following sections discuss the principles that significantly affect the mutliplier. Several factors with a less significant effect are also discussed to give a more complete description of the multiplier effect.

GEOGRAPHIC SIZE OF THE AREA

Since secondary jobs tend to locate around already existing business activity, smaller areas with fewer existing jobs will have fewer additional jobs and a smaller multiplier effect. Very small areas have small multipliers. However, smallness is not important after a county-sized area is included. The effect of geographic size, beyond that of a single county, on the size of multipliers was the subject of two case studies. Expecting to find size an important factor, one study extended its consideration of one-county area to a four-county area, and the other study extended its boundaries to an eight-county area. They assumed that extension of the geographic boundaries would increase the degree to which secondary employment effects would be internalized. But the impact was not significantly larger due to the size change at the county-area scale.

SIZE OF THE FACILITY WORK FORCE

The size of the facility work force is a factor associated with the indirect and induced employment growth. The size, however, is not directly related to the size of the multiplier. For example, Box Elder County, Utah, with its rocket fuel and missile fuel development, had a total direct employment of 5,688. This is large when compared with other industrial plants. This figure is also high for most energy facilities in the beginning of operation. The multiplier was low -- 1.34. In contrast, Braxton County, West Virginia had 77 employed in the particle board plant, and a multiplier of 1.50.

The following sections discuss industry and local economic conditions, which have a more significant impact on the size of the multiplier than do the size of the industry work force and the geographic size of the area. Diversity of local economic activity, forward and backward linkages of the industry, payroll leakage, underemployment, excess business capacity, and the number of unfilled vacant jobs, all have significant impact on the size of the multiplier.

DIVERSITY IN THE LOCAL ECONOMIC ACTIVITY

Diversity in local business activity has a significant impact on the number of new jobs generated by the facility. There are several ways in which diversity is important. First, there is an affect of the size of the existing commercial and business sectors on the amount of trade carried on within the local market. Communities with only a few or no commercial and industrial establishments are more dependent on imports, and do not seem to gain many indirect or induced jobs through increased business activity generated by new industry. This is a major reason why small areas have smaller multipliers. They do not have the existing commercial and business capacity to promote higher growth of secondary employment.

The second aspect of diversity important to the number of indirect jobs generated by new industry is the size of the community's existing manufacturing sector. There is empirical evidence that industrialized areas with manufacturing activity have higher multipliers.

CURRENT GROWTH

When areas contain both a large manufacturing sector and a high growth rate, multipliers tend to be high. Studies of impacts in county areas with these characteristics indicate multipliers of 1.65 and 1.68 -- close to the top range of multipliers identified in several hundred studies.

FORWARD AND BACKWARD LINKAGES TO INDUSTRY

Nonmetropolitan communities are also limited to small multipliers by linkage to external markets. Backward linkages are the suppliers of inputs to production. Forward linkages are the connections with external markets for the manufactured product. Industries which depend upon local business to supply the raw materials and services for production, and whose product is consumed on the local market, produce more of an employment impact in those businesses than if the industry were linked to external markets. From the increased economic activity employment is induced in those sectors which do not directly service the industry, in addition to those which do. An example of a small area with a high multiplier is Braxton County, West Virginia. Braxton was able to supply nearly all timber and coal to the particle board plant located there. As a result of the internally supplied raw materials, Braxton had a high multiplier of 1.50. Box Elder County, Utah, in the other extreme, was little more than a labor supply for the rocket fuel and missile fuel industries. Nearly all the raw materials were "imported" into Box Elder, and the product was distributed to external markets. The secondary employment growth was moderately small -- 1.34. The researchers who studied Box Elder attributed the small multiplier effect to the lack of interaction between industry and local businesses. Energy facilities are characteristic of the latter kind of linkage. As with the rocket and missile fuel industry in Box Elder, secondary employment growth in the local business and service sectors is expected to be small because raw materials are imported and products exported.

PAYROLL LEAKAGE

Payroll leakage refers to the facility wages and salaries paid to nonresidents. These employees commute to work and tend to spend their income in their place of residence. For some areas this does not present a serious problem, since the direct employed are community residents and the number of commuters are small. In these cases there is little of the facility income "leaked" out of the local area. But there are communities where a substantial number of the facility employees are not local community residents. Studies of these cases have found substantial leakage evidenced by low multipliers. One study reported 30.8% of the nonresident employees spent about 40% of the factory income outside of the community. In this instance, the purchasing power added through industrial employment leaked out and did not contribute to the creation of new jobs. The lack of respending had a restricting affect on the number of jobs generated by the new factory. In the case of an energy facility, the multiplier is expected to be lower during the construction phase, due to the higher number of commuting construction workers. Commuting is also expected to be significant in the case of the energy facility operation phase due to the lack of available labor in the community with the skills required for the job. This labor must be "imported" to the facility location. The problem presented by the lack of local labor with the necessary skills is an important component of the total number of unemployed who will be hired for indirect employment, and will be discussed further in the section explaining the unemployment issue.

UNDEREMPLOYMENT

The amount of existing underemployment is an important factor of growth in indirect employment. To the extent that local businesses can handle increased business without hiring additional employees or increasing the capital stock, there will be no significant increase in secondary employment. This is easy enough to understand. The problem lies in the measurement of underemployment. Underemployed include those working less than full-time hours and those employed in jobs for which they are over qualified based on previous experience, skill, and education. There is no systematic method for detecting the amount of underemployment. What little is known about the extent of underemployment was collected through surveys conducted in studies of particular local areas. No methods of identifying or measuring the underemployment have resulted from the studies. The best estimates of the extent of underemployment in a community are obtained from local businessmen or business associations. Some communities will have a better idea of the existing conditions than others. But an estimate for this factor is important, since this has a significant effect on the number of jobs which will be generated by the new facility.

EXCESS BUSINESS CAPACITY

In addition to the problem of detecting and quantifying the existing underemployment, there is an additional effect on secondary employment growth of excess business capacity. Excess capacity will absorb economic business activity and decrease the number of jobs generated by direct employment. This effect was noted in one case study of new industry in five small communities. The multipliers ranged from 1.00 to 1.18, and the excess capacity in capital stock of the supporting goods and services was cited. There was particular excess capacity in the construction industry, where there was little induced and indirect employment growth. Historical data for the community are helpful in determining the communities likely to have excess capacity in business and commercial sectors. These are communities which have experienced economic and population declines in the past 10 years or so. The variability of this factor is why direct impact estimates by local businessmen are used in the CEIP Forecasting Model.

UNFILLED VACATED JOBS

Another factor which contributes to the low multipliers found in small communities is that jobs vacated by employees taking jobs with the new facility often are left unfilled. Empirical data show a substantial amount of unfilled vacancies, particularly when the vacant jobs are paid a lower wage or salary than jobs with the new direct and induced activities. In a study of employment patterns, employers were interviewed and asked the previous employment status of their employees. The study reported most employers answered that there was considerable hiring of workers from other industries. Figures as high as 19.3 percent of the vacated jobs are reported unfilled. This is one factor that few models take into account in their calculations of the multiplier effect of new industry. It is important to recognize that not replacing employees who go to work for the energy facility can have a substantial role in reducing the size of the multiplier. This factor is probably not recognized by local officials as a contributor to a lower secondary employment effect. But this information, like the underemployment and excess capacity data, is not systematically collected. It is another reason, however, for the use of small multipliers in the CEIP Model.

INCREASED PARTICIPATION IN THE LABOR FORCE

Increased participation in the labor force is even more difficult to adjust for than is unemployment. Very few studies have measured the potential labor force in an area, nor have specific variables associated with increased participation been identified. The result is that there is no specific data available to determine for a given area who will enter the labor force and under what conditions. However, the studies do suggest explanations for the increased participation in those areas experiencing increases. The most evident explanation is the opening of job opportunities on the local market. Empirical results point to increased participation as new opportunities are made available. Participation rates seem to be more a function of the demand for workers and wages than of the number of existing and potential labor force. While this observation is helpful in developing a theoretical understanding of labor force participation, it does not provide a method for determining the number of those expected to enter the labor force. The national employment/population ratio has been a basis to compare the amount of labor force participation on the local level. The rational here is that the national ratio is an average or expected participation rate, and divergence from this rate indicates the amount of additional participation which can be expected with an increase of employment opportunities. The studies of labor force participation report marked increase in participation in the communities, with pre-industry rates much lower than the national ratio. The lower the labor force ratio compared with the national average, the greater the probability potential members will become active. One study of industry employees found the proportion of new industry employees not previously in the labor force was substantial -- 25%-34%. The increase of local participation in the labor force is most likely in areas of economic and population decline. This is an indication that there is potential, although local business and civic leaders who know their community are the best sources for the estimates. As with the other factors of economic and employment growth, which is not well documented, the national-local labor force participation adjustment is not perfect but it is feasible to use with the information available.

UNEMPLOYMENT

Predicting the distribution of the secondary jobs between local and new residents includes an assumption that 30% of the unemployed are hired in direct or secondary jobs. Previously, it was assumed that new industry locating in a declining area would hire many of the unemployed; substantially raising economic conditions in the local area. But the results of studies of rural industrialization have not supported this belief. New industry does not significantly reduce the number of unemployed. And in some instances, unemployment increases. One of the main reasons for this is the hiring practices of employers. Other applicants are preferred to the unemployed, who are viewed as a risk. Immigrants, commuters, returnees to the area, and those already employed who quit to take a job with the new industry, are hired before the unemployed are. The higher educational levels and skills attained of the incoming and already employed people are the reasons cited for the preference. In most cases studied, the unemployment rate decreased, but only by about 2 percentage points. The number of direct jobs filled by previously unemployed persons was small. The range was 1.0 percent to 43 percent, and only in three instances was the proportion above 14 percent. The only studies which concluded the unemployment rates fell substantially (more than 2 percent) were those of EDA programs, which provided manpower training, direct financial support, and employment-related requirements by industry for program funding. A second reason for such a small decrease in the unemployment rate when new industry locates in a community is the mismatch of skills between industry demand and readily available labor in the area. Case studies have reported that the higher wage, higher skill industries draw more of their employees from immigrants and commuters and less from the unemployed, than do the lower wage, lower skill industries. Since both the construction and operation of the energy facility require particular skills, the conditions for mismatch are expected in hosting communities. Based on the evidence supporting these expectations, .3 of the unemployed indirect labor force, are expected to join the direct and indirect labor force. If local officials believe the unemployed in their community are comprised of higher skilled and educated people required for direct and induced employment, additional adjustment may be advisable.

RELATION TO CROSS-SECTIONAL DATA BASED MODELS

The CEIP Model uses the small multipliers actually identified in case studies of economic impacts on small communities. Two major sources of the difference with higher multipliers estimated from cross-sectional data are 1) the lack of employers refilling jobs vacated by employees who are hired by the energy facility; and 2) the smallness of the areas impacted. We believe that to use multipliers based on cross-sectional data or multipliers based on large areas will grossly overestimate impacts of energy facilities on local communities. This is likely to be a major point of difference between the CEIP and alternative models. From all evidence from actual impact studies, the CEIP Model assumptions are supported by the evidence which exists at the current time.

IV. FISCAL IMPACTS

Nearly all growth in public revenues depends on growth in the private sector. Studies of fiscal impacts on local governments show that whatever the gains made in the public sector, they were small in comparison with those achieved in the private sector. Furthermore, if the benefits of industrialization were better channeled, they could have made a more significant impact on local government fiscal well-being. Most studies of rural industrialization find the costs to local governments higher than necessary. This is because financial inducements to industrial locations are not fully recovered. These inducements may be one-time costs or they may be in the form of services provided to industry at less than cost.

Locational costs include advertising expenses, tax holidays, low interest financing, land acquisition, and site preparation. If the local government purchases the land, there is the loss of previous revenue since government property is not taxed. Tax holidays, which relieve industry of paying any or all taxes lasting as long as 20 years, have been cited by industrialization studies. And it is common practice to tax industry at a lower rate, inducing industry to locate in the area. Site preparation includes extension and improvements of access roads, utility connections, landscape modification, and construction of buildings.

Service provision has been another high cost to local governments. In providing public services like police and fire protection, water and sewerage, electrical and/or gas, and access road maintenance, payments do not always equal the costs of providing them. In some cases, the local government has funded and built utility or sewerage treatment facilities for the industry. Environmental damage has also required public expenditures. Case studies have found that runoff from development has caused serious problems with water systems. Capital expenditures for new or expanded storm sewerage systems were necessary. All of these subsidies are actually costs to the community. In the past it was believed that these costs would be recovered indirectly through the increased business and personal incomes generated by the additional economic activity but empirical evidence disputes this. In some instances the costs are recovered over time, but more often they are not.

Industry's indirect effect on the public sector is through population growth and change. The first effect is the increase in personal income in the local area. Increases in personal income make their way into the public financial sector through two avenues. Property tax revenue is increased. The extra earnings are put into upgrading the standard of living either through home (property) improvement or through a new home purchase. Secondly, there is an increase in retail sales tax revenue or business taxes for local governments using these tax sources. Increased income generates more retail sales or business, which is accompanied by an increase in tax revenue from those sales. But empirical evidence shows that increases in public revenues resulting from increased income is often not as significant as the income growth itself.

While public revenues increase less than private incomes, studies consistently report increases in local tax revenue. The major increases are in retail sales tax revenues, intergovernmental transfer payments, and property tax revenues. For example, the property tax has been observed in many studies as being especially unresponsive to economic growth in the private sector. This presents a serious problem in many local governments. They lack the operating and the "front-end" capital for expansion of facilities which are warranted by residential growth. There are two reasons evident for the lack of growth of local property tax revenues, particularly residential property tax revenues. One is the conditions determining construction and development of residential property. The other is the "lag" associated with property tax assessment and collection. Residential property tax growth is dependent upon several factors in the housing market. The distance to other housing markets influences residential construction and development. Neighboring communities "compete" to provide housing for employees new to the area. Potential residents are lost to nearby housing markets. A second factor is the availability of existing housing. Those who can find vacant housing will have no need to construct homes. Thus, the amount of vacant housing and nearby housing markets consequently minimize growth of property tax revenues.

Another factor which affects residential property revenues is the amount of commuting to work. The more people who commute into the area, specifically for direct (facility) employment, the fewer the number of new residents. Although there is a tendency to move closer to the place of employment over time, the increases in property tax revenues from residential development are potential, at best. As studies of energy-impacted communities in the western states have noted, assessed valuation in residential properties rose very little in response to the economic development. There was little increase of those revenues in inflated dollars and none at all in terms of real dollars.

There are two "lags" associated with property tax assessment and collection. Local governments may be affected by one of these or both. The effect is called a lag because of the time that elapses between the value increase of the property and tax receipts accruing to the government. The first lag occurs with property assessments. Property is assessed periodically at a specified time period. If residential building construction or other property development is completed after the assessment date, property will not be assessed until the next year. The second lag occurs between the assessment and collection of the tax. Often the tax "bill" is not collected during the same fiscal year the assessment is made. Over the years some states have changed fiscal years, while assessment and collection dates remain the same. These lags do not actually diminish revenues. Rather they limit the available revenues during the first years of construction and operation of a new facility, precisely when new government expenditures may be needed to service the facility and its expected population. In Table 1, a summary of revenue sources and their implications for revenue growth in response to energy development is presented. While The Tax Lead Time Study (6, Sec. 3) was prepared for the state of Colorado and is specific to certain rates and taxable goods and services, it still offers basic information on the responsiveness to private sector growth of various taxes.

In many case studies it has been discovered that additional revenues are often not sufficient to cover increased demands for basic services. First, with the increased incomes generated by industrial development, historical empirical data show an increase in the quantity and quality of demand for public services. Second, an increase is evident due to population growth, often requiring capital outlay. This has been especially true of utilities such as water and sewerage treatment and schools. Existing capacities are overloaded by new population, so new or extended facilities are necessary. Usually the increase in user charge revenues for utilities and property taxes and state aid for schools does not cover the capital costs. This puts a burden on the finances of the government, particularly on capital expansion which is necessary to provide services to temporary residents. As is the case with most energy development, there is an employment and population decline after construction. This often leaves the permanent residents bearing the financial burden of the extended, and now underutilized, service capacity.

Predicting the response of a local government to population growth is extremely difficult. In the CEIP Model the historical increase in expenditures added by each new person is estimated, and this estimate is then used to forecast the increase in expenditures associated with new population. This technique is better than simply multiplying average per capita expenditures by the expected population increase -- but it is still a very rough estimating procedure for large population changes.

Increases in revenues are forecast in a similar manner. The historical increase in revenues associated with new population is estimated and used for forecasting, while taking into account property tax revenue lags. In addition, each taxable element of the energy facility itself is forecast and revenues calculated. In general, as much importance should be given to the forecast differences between revenues and expenditures in the CEIP Model as to their absolute levels. It must also be remembered that the revenue and expenditure forecasts depend upon previously estimated population changes, which in turn depend on multiplier and residential-commuter employee split estimates. At each step

TABLE I

Revenue Alternatives For Colorado Local Governments

	GENERAL SALES TAX	SELECTIVE SALES TAX	USE TAX	AD VALOREM PROPERTY TAX	GENERAL OCCUPATION TAX	SPECIFIC OCCUPATION TAX	USER FEES	SEVERANCE TAX	LOCAL INCOME TAX	REAL ESTATE TRANSFER TAX	SITE VALUE TAX	LAND VALUE INCREMENT TAX
DESCRIPTION	Excise tax levied on retail sales of tangible personal property (sometimes services) made inside the taxing jurisdiction.	Excise tax levied on retail sales of certain products inside taxing jurisdiction. Most common are tobacco, alcoholic beverages, motor fuel, public utilities, insurance, and parimutuels.	Tax on the privilege of storing, distributing, using, or consuming articles of tangible personal property in the taxing jurisdiction and on which no sales tax has been paid. It is generally complementary to sales tax.	Ad valorem tax computed on the assessed valuation of all property, real and personal, located within the territorial limits of the authority levying the tax.	Tax imposed for the privilege of carrying on any of a broad range of occupations within the taxing jurisdiction. Denver's head tax is an example.	Tax imposed for the privilege of carrying on certain occupations within a taxing jurisdiction. Utility occupation (franchise) taxes and beer and liquor occupation taxes are common in Colorado.	Prices charged the consumers of various public services such as water and sewer charges or recreation program charges. Fees may include charge for capital facilities as well as operating costs.	Tax on the production or extraction of certain minerals. Colorado's oil and gas production tax is a form of severance tax. It is levied on gross income derived from the production of certain types of oil and gas from Colorado deposits.	Tax on the income of resident individuals, estates, and trusts and income of non-residents derived from local sources. Also would apply to the incomes of corporations located in or doing business in the local area.	Tax levied on the conveyance of real property. The tax is analagous to a sales tax on real property.	Ad valorem tax on assessed valuation of land but not improvements.	Tax imposed on the net gain in the value of a given parcel of land or land with improvements between two points in time.
YIELD	For 1% tax, state average is $35 per capita annually. Localities vary as much as ±$20 around state. No important collection lag with respect to economic development.	State Averages: Cigarette tax--10 cents per pack yields $13 per capita annually. Alcoholic beverages--30 cents per gallon yields $6-$6.50 per capita annually. Motor fuel--7 cents per gallon yields $45-$50 per capita annually. No significant collection lag with respect to economic growth.	Generally about 1/10 the yield of a comparable general sales tax. For 1% tax, the state average is $3 per capita annually. No significant collection lag with respect to economic growth. For local governments, most revenue comes from use of building materials and motor vehicles.	For non-industrialized, but urbanized areas, a levy of 75 mills raises from $150-$225 per capita annually, the higher range for more urbanized areas. Each oil shale retort plant will generate roughly $10 million annually on a mill levy of 75 mills with up to a 2-1/2 year time lag in collection.	The two most productive general occupation taxes in the state, Denver and Durango, raise roughly $20 and $4 per capita annually. May be collection lag with respect to economic growth.	All specific occupation taxes used by Colorado cities and towns together raise less than $3 per capita annually. Collection lag of up to one year is likely.	One-time initial fees (expansion or plant investment fees) and continued use service fees (monthly utility and recreation fees) may be designed to cover all or only a share of the cost of the capital facility and its associated operating costs. Collection generally follows initial capital construction but precedes expansion.	Colorado's oil and gas production tax allows a credit against certain ad valorem taxes paid by producers. A 5% severance tax on the gross proceeds from the sale of oil from oil shale is estimated to generate $3-1/2 million annually per 50,000 bbl/day operation, excluding tax credits. Multi-year revenue collection lag expected.	For fiscal year 1972-73, Colorado collected in excess of $100 per capita in personal and corporate income taxes. A 25% local surcharge or a 1/2% flat rate would each raise approximately $25 per capita annually. Income tax collections are subject to multi-year lags from the occurance of economic activity.	Based on existing documentary fee collections, a 1% real estate tranfer tax would produce $10-$15 per capita annually. Tax collections would tend to lead economic development.	15-20% of yield from identical mill levy on all real and personal property. Same time lag problem as with property tax.	Depends on exact nature of tax, but generally low in existing applications.
LEGALITY	Legal for home rule cities, counties, statutory cities and towns. Election required in all but home rule cities (unless charter requires election). 4% maximum cumulative levy for all cities and counties in any one location	Legal for home rule cities. No statutory authority for counties, statutory cities/towns. Localities with cigarette taxes do not receive cigarette tax distribution from the state.	Legal for home rule cities and statutory cities/towns. No authority for counties. 4% maximum cumulative levy for all cities and towns in any one location.	Legal for home rule cities, counties, and statutory cities/towns subject to extensive charter, constitutional and statutory limitations.	Legal for home rule cities within charter limits. Legal for statutory cities/towns. No authority for counties, districts.	Legal for home rule cities within charter limits. Legal for statutory cities/towns. No authority for counties, districts.	Legal for all types of local governments.	No existing authority for this tax. The General Assembly could enable such a tax at the state, regional, or local level.	A local income tax, levied by the General Assembly at the request of local political subdivisions, may be constitutional but unauthorized by statute.	Counties, statutory cities and towns, and special districts do not have express authority to levy a real estate transfer tax. The tax may be legal for home rule cities, but no court test has been made.	No authorization for statutory political subdivisions. May be legal for home rule cities. Does not appear to be prohibited by constitution.	Same as income tax.
ELASTICITY	Unit elastic (range 0.8-1.3)	Strongly inelastic (range 0.0-0.8)	Unit elastic (range 0.8-1.3)	Moderately inelastic (range 0.4-1.4). Property tax base in Garfield and Rio Blanco counties will be dominated by oil shale facilities, not by local economic conditions.	Strongly inelastic as typically used. Can be structured to be less inelastic.	Strongly inelastic as typically used. Can be structured to be less inelastic.	Strongly inelastic with respect to inflation. Unit elastic with respect to population growth and real income growth.	Changes in revenue from severance taxes are not correlated with changes in local economic conditions.	Strongly elastic (range 1.3-2.0).	Generally elastic, yet subject to strong influence of money market conditions.	Same as property tax.	Highly elastic but subject to strong influence of money market conditions.
INCIDENCE	Regressive to income. Neutral to household size. Taxes non-resident visitors. Relief programs can <u>reduce</u> regressivity.	More regressive to income than general sales tax. Neutral to household size. Taxes non-residents and visitors.	Same as general sales tax. Particularly hits purchasers of motor vehicles and construction and building materials.	Regressivity similar to general sales tax. Neutral to household size. Relief programs can reduce regressivity. Oil shale facilities will dominate tax bases in Garfield and Rio Blanco. Much of the tax would be exported out of the region.	Where taxes are levied on firms doing business locally, same as general sales tax. Where tax is on exporting industry, it is exported outside of the region. A flat rate is regressive to individual income above any exemption level. Government employees exempt.	Same as general occupation tax.	Paid by the beneficiary of the service or facility. User fees ignore citizens' ability to pay. User fees can insure growth pays its own way.	Mining companies faced with severance taxes attempt to pass them along to customers or their labor force. In tight labor markets, more taxes will be passed on to consumers, thus exported from the region.	Graduated income taxes (State of Colorado) are strongly progressive with respect to income. Corporate income taxes are exported by export base industries. Income taxes bear lightly on elderly and low income people.	Conditions in real estate markets determine tax incidence. In a soft, buyers market, the seller will bear more tax burden than in a tight sellers market.	Landowners of all types. Less burden on occupants of high density residences.	Landowners in areas experiencing rapid increases in land value.
CONTROL	High degree of local control for home rule cities. Statutory cities and towns, and counties, must use state form of tax and state collection system.	Where legal, local control is good.	Local use taxes are administered by local government. Good control.	Statutory mill levy limits severely constrain local control in counties, statutory cities and towns, and districts. Oil company decisions will be very important in Garfield and Rio Blanco counties.	Excellent local control.	Excellent local control.	Excellent local control. Control as a revenue source is enhanced by the fact that increased costs due to increased demand are self-financing.	Very poor local control. The General Assembly sets the rates and non-local factors determine the size of the tax base.	Because of the constitutional requirement that only the General Assembly may levy income taxes, rates would not be locally controlled. In the short run, tax base is outside local control.	Tax rate is subject to local control, but the tax base is influenced by non-local economic developments.	Statutory mill levy limits severely constrain local control in counties, statutory cities and towns, and districts. Oil company decisions will be very important in Garfield and Rio Blanco counties.	Very poor local control of rates (established by General Assembly) and tax base (sensitive to money market conditions).
MARKET SIDE EFFECTS	Sets incentives for retail business location just outside of taxing jurisdiction.	Sets incentives for retail business location just outside of taxing jurisdiction.	Reduces incentives for retail business location just outside of taxing jurisdiction, especially with regard to autos and construction materials.	Disincentive to new market development. Could have an effect on development of oil shale resources.	Significant side-effects unlikely at levels currently used in Colorado.	Heavy specific occupation taxes may discourage affected businesses from locating in the area and/or may result in price increases and negatively affect consumption.	Set incentives for the efficient use of public services since users pay for only the amount used. High initial fees for public facilities are reflected in higher housing costs.	Set incentives for the taxed activity to locate outside of taxing jurisdiction or not locate in the area at all. The higher the tax, the stronger the incentive. Effects can be much broader after mining activity is established in an area.	Significant market side-effects not identified.	Creates incentives to avoid property sales. In a tight market, housing prices will rise to cover tax cost. In a soft market, housing prices will be less affected. Such effects correlate to the tax rate applied.	Creates incentives to put land into its highest and best use allowed by law. Favors full development of area.	Reduces return to land speculation. Would inhibit exchange if applied to real rather than accrued gains. If applied to accrued gains, would provide incentive to put land into highest and best use.
CERTAINTY/ PREDICTABILITY	Moderately good predictability in short run. Poor predictability over 3 to 5 year term.	Predictability depends on specific object of taxation. Good for motor fuels, tobacco products, and alcohol.	Same as general sales tax.	Good predictability of residential portion of tax base. Industrial and mining portions are more subject to erratic changes if production is unstable.	Very good predictability.	Very good predictability.	At fixed rate levels, good predictability. However, rate variations can be expected to affect consumption as well as costs.	Very poor certainty/predictability.	Moderately good predictability in short run. Poorer predictability over 3 to 5 year term.	Poor certainty/predictability.	Very good predictability.	Unpredictable. More so if real gains are taxed, as opposed to accrued gains.
ADMINISTRATIVE COST	Largest administrative cost due to vendor fee. Total administrative cost--3-10% for home rule cities. 4-5% for counties and statutory cities and towns.	Somewhat higher than cost for general sales tax.	High. May approach 10% or more of revenue.	The cost of increasing or decreasing reliance on property tax is extremely small.	Depends on size of tax. At higher levels, the administration cost approximates general sales tax.	Depends on size of tax. At higher levels, approximates selective sales tax.	User fee revenue systems may give rise to substantial costs due to rate studies, monitoring, consumption, individual billing, and expanded accounting systems.	Very low.	Very low for state-collected, locally returned local income tax.	Major cost is enforcement in major transactions. Generally low administrative cost. Lack of experience with this tax in Colorado suggests unknown administrative problems.	If land is assessed for property tax, little additional cost would result for site value taxation.	Administrative cost cannot be estimated due to lack of experience with this tax in the U.S. and because of the variety of forms of the tax.
CITIZEN ACCEPTANCE	Opinions vary with existing level. Has consistently topped property tax in popularity surveys. Fractions of 1% may be preferred at times.	Opinions vary with existing level. High level of taxation on tobacco and alcohol expected. Existing levels throughout Colorado low compared to other states.	Strongly favored by local merchants selling major cost items located inside sales taxing jurisdiction.	Considered regressive and unfairly administered. Frequently comes in last in popularity in research opinion polls.	May engender opposition as "new tax." Will have opposition from business community.	Citizens may feel they are being taxed at every turn. Businesses may argue that they are discriminated against.	Generally favorable. For low-income citizens, however, use of some public services may fall below a socially desirable level.	May be favorable if citizens feel energy consumers should share development costs and/or because severance taxes are largely exported.	Less favorable than federal income tax. Citizens can be expected to oppose a "new tax."	May engender opposition as "new tax," especially from realtors.	May engender opposition as "new tax" and since large rates are necessary to generate sizable revenues from small tax base.	Better acceptance if moderate gains accumulated over long periods were exempt. Tax on real rather than accrued gains would be more acceptable.

Source: Briscoe, Maphis, Murray, and Lamont, Inc., <u>Oil Shale Tax Lead Time Study</u>, prepared for Regional Development and Land Use Planning Subcommittee of the Governor's Committee on Oil Shale Environmental Problems, Denver, Colorado, 1974. This chart is a summary of Section 3 of that study.

the CEIP Model utilizes existing evidence, but it remains a relatively simple model of a very complex process. It should be treated as a useful guide and is probably as good as any existing alternative models, but weaknesses in the state of the art for forecasting industrial and fiscal impacts on local governments must be recognized.

V. ABSTRACTED BIBLIOGRAPHIES OF PRINCIPAL INFORMATION SOURCES

Advisory Commission on Intergovernmental Relations. SIGNIFICANT FEATURES OF FISCAL FEDERALISM 1976-1977, Vol. II. Washington, D. C., March 1977.

This report provides detailed information on the federal-state-local revenue and debt structures. The material includes major state and local tax rates and bases; major revenue producers of federal, state, and local finances; federal aid to state and local governments; state aid to local governments; and state and local government debt. This volume is intended to provide the data necessary for a comparison among states of alternative policies in the area of revenue and debt.

Braschler, Curtis, and John Kuehn. "Estimation of Employment Multipliers for Planning in Ozark Nonmetropolitan Counties." SOUTHERN JOURNAL OF AGRICULTURAL ECONOMICS, July 1976, pp. 187-192.

In determining employment multipliers for small areas, this study differs from previous approaches in two respects. The first difference is the grouping of counties by population. Statistical tests indicated estimation was improved by grouping based on population. This recognizes the importance of size in determining an area's secondary employment growth. Secondly, the regression analysis equation separated basic employment into sectors giving separate multipliers for each of the sectors. This recognizes the differences among basic sector impacts. Different industries produce different effects. The reported tables support findings of this and other studies which report significantly lower employment multipliers for nonmetropolitan areas than are projected by regional impact models. This article also notes multipliers should be adjusted to individual areas for more accurate community-specific estimates.

Garrison, Charles B. "New Industry in small Towns: The Impact on Local Government" National Tax Journal, 24, no. 4: 493-500.

This article reports the results of a study which analyzed the net impact of new industry on the local economy and government of five small towns in Kentucky.Regarding the public sector, the school districts received individual analysis. This was the only component of the public side which experienced a growth-related negative impact. And in only one town was the impact significant. Garison used two methods of assessing the impact on the local government. Some disagreement exists as to how the one-time or "transitory" costs (and revenues, if any) to the local government should be accounted for. These are the costs associated with plant location. The first calculation includes all costs and revenues. The second or alternate calculation in effect eliminates those one-time costs. Comparison with five control communities shows industry did affect significantly, the local economies, and in a positive way.

Gilmore, John S. and Mary K. Duff, Boom Town Growth Management: A case study of Rock Springs - Green River, Wyoming, Westview Press, Inc., Boulder, Colorado, 1975.

This book is the result of a case study of two communities experiencing "boom" or rapid growth. Gilmore and Duff found the economic and social framework within the communities were seriously affected. The housing market, public service provision, and stability of local labor supply were strained by the rapid growth, and unable to respond adequately to accomodate the increased demands. It was evident to the researcher that the traditional processes regulating economic growth were not operating well. The serious issue raised by the experiences with boom town growth is that of growth management. Following discussion of the "boom" phenomenon, growth management principals were presented. Identification of tools and methods of implementing objectives were included in that section.

Lonsdale, Richard E. "Two Commuting Patterns in North Carolina" Economic Geography, 42, no. 2: 114-138.

This article reports the findings of a study which compared and analyzed two commuting patterns of two manufacturing plants within the same community. Differences between the two patterns were observed and variables were introduced to explain the differences. Following the analysis and comparison of the two patterns, probability models based on gravity concepts were constructed using population and distance as the variables. Seven models using distance measures and five models using time measures tested the two variables' predictive power. The estimates of the models were compared with the actual distribution obtained in the fiber plant commuting pattern.

Lemont, William, George Beardsley, Andy Briscoe, John Carver, Dan Harrington, John Lansdowne and James Murray, Tax Lead Time Study, Colorado Geological Survey, State of Colorado Department of Natural Resources, Denver, Colorado, 1974.

This study presents the revenue sources available to the State of Colorado and its local governments. Included in the study is a discussion of the revenue alternatives and of techniques to deal with problems caused by rapid population growth. This study was prepared for the Regional Development and Land Use Planning Sub-Committee of the Governor's Committee in Oil Shale Enviromental Problems to provide recommendations for new legislation to improve the financing operations available to local governments. As stated in the preface, the intended users of this study are the local government officials, their staffs, citizens of the oil shale area, and the Colorado legislature.

Summers, Gene F. and Jean M. Lang "Bringing Jobs to People: Does It Pay?" Small Town, 7, no. 3: 4-11

This article provides a concise summary of important issues determining net impacts to the local private and public sectors. The summary of the issues presented here was taken from their book, "Industrial Invasion in Nonmetropolitan America". Direct employment hiring practices, employment multipliers, income effects, and population growth are discussed as they contribute to net impacts. The information and conclusions reported in the sections represent the work of over 100 case studies in 245 locations and 34 states. The conclusion is that the structure of the community, actions of the local public officials, and the character of the industry determine what impact industry will have on a community. Employment, population growth, and economic prosperity are not automatic and predictable gains to the host community.

Summers, Gene F., Sharon D. Evans, Frank Clemente, G. M. Beck and Jon Minkoff, Industrial Invasion of Nonmetropolitan America: A Quarter Century of Experience, Praeger Publishers Inc., New York, N. Y., 1976.

This book is the summary of 25 years of studies of specific plant locations in nonmetropolitan areas in the U. S. The purpose of this work was to determine the effects of industrialization on small towns. Several basic issues were addressed. One is the validity of procedures used with regard to nonmetropolitan industrial development as a tool for promoting the general welfare. Costs and benefits to the public and private sectors provided the framework with which to determine net impacts. The fact that this book presents local community experiences from the local perspective sets this study apart from previous studies, most of which analyzed impacts on the nonlocal private sector.

NEW INDUSTRY IN SMALL TOWNS: THE IMPACT ON LOCAL GOVERNMENT

CHARLES B. GARRISON*

ABSTRACT

The establishment of new manufacturing plants in five rural towns in Kentucky typically resulted in a negative direct impact on local government finances. This impact was usually small, however, since most of the new plants added few new residents to the community and there was therefore very little increased demand for local government services. The school system was the unit of government most likely to be significantly affected; a large negative impact resulted if property taxes were substantially avoided and large numbers of new residents were brought to the community. The negative impacts tended to become positive after a few years.

NEW industry in rural areas is gaining increased acceptance as a solution for many of the nation's social and economic ills. Persons concerned with alleviating rural economic stagnation and poverty see the dispersion of manufacturing plants and jobs to the countryside as perhaps their best hope of making rural communities economically viable again. Those concerned with problems of the major cities see rural development as a way of reducing population pressures in urban areas. In addition, new industry is thought by many to be a solution to the problems of rural local governments. New industry, it is hoped, will produce new tax revenue. That new industry may also produce new costs for local government may be overlooked, however. This article reports the results of an effort to determine the conditions under which these additional costs may equal or exceed additional revenues. Further, the costs to local government are compared with the benefits accruing to the local private economy. The case study approach is used; the communities studied are five small towns in Kentucky in which new manufacturing plants located during the period 1958-63.

The local government impact is considered as two distinct effects — the primary and the secondary. The primary effect involves, on the one hand, the additional direct tax revenues derived from the new plant and, on the other, expenditures or changes in services by local government for the express benefit of, or directly attributable to, the new plant. The primary effect is summarized by the quantity "net primary benefits to local government." This quantity may be either positive or negative, and is given by the excess (deficiency) of the new firm's revenue effect over the expenditures effect. The secondary effect involves the impact of the plant's nontax expenditures on local government revenue, expenditures, and services.

The benefits of new industry to the local private economy also include a primary effect, i.e., the employment and payroll of the plant itself, and a secondary effect, i.e., the impact on the local consumption (or "nonbasic") sector of the community's economy.

An attempt was made to ensure that no major economic developments other than location of new manufacturing plants occurred in the study towns. Accordingly, the criteria used in selecting the study towns were that they be located outside Standard Metropolitan Statistical Areas, that they be small (a 1960 population between 1,000 and 5,000), and that at least one new plant employing at least 100 people had been established in the community during 1958-63. In addition, towns tied to the economies of neighboring larger cities were eliminated from consideration. The five communities selected are described in Table I. The new plants produced a variety of products, although three of the eight manufactured apparel of some type.

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TABLE I

DESCRIPTION OF STUDY TOWNS AND NEW MANUFACTURING ACTIVITY

Community	Population[a] (thousands)	Distance to Nearest Larger City[b] (miles)	New Plants		
			Number	Employment	Year Established
A	2.0	60	2	115	1959
				90	1962
B	4.0	87	1	100	1962
C	2.0	45	1	200	1959
D	4.8	62	3	135	1958
				100	1959
				140	1961
E	1.1	91	1	125	1959

[a]U. S. Census of Population, 1960.
[b]A city with a population of at least 50,000.

The economies of the five communities were characterized in 1958 by low incomes and high rates of unemployment or, more typically, underemployment in agriculture. Per capita incomes in the five study counties[1] ranged from $596 (29 per cent of the national average) to $995 (43 per cent of the national average). Agriculture typically was the largest single source of personal income, accounting for 30 per cent or more of total income in four of the five counties, but both average farm size and average value of farm products sold per farm were low. Manufacturing was a relatively unimportant source of income; in 1958 three of the five counties had fewer than 100 manufacturing employees.

I. *Net Primary Benefits to Local Government*

The direct effects of the new plants on local government revenues and costs are given in Table II. Only two of the eight new plants produced significant new revenue, i.e., revenue in excess of that yielded by the property prior to the plant location. In three cases the plant was owned by the city and was therefore not subject to real property taxes (A-2, B, and D-3). In these cases the cities issued industrial revenue bonds and with the proceeds purchased the plant sites and constructed the plant buildings. The manufacturing firms make monthly rental payments to the cities sufficient to cover principal and interest payments on the bonds. In two cases "favorable assessments" on real property resulted in minimal revenue (C and E). The three plants in Community D were located outside the city limits and were not subject to city taxes.

The amount and cost of new public services attributable to location of the new plants depended in large measure on the number of new residents brought to the community. New residents mean new school children, and if the previous level of local support is to be maintained, additional revenue is required.[2] It is also the new residents who force expansion in fire and police protection and other basic services, if they are needed. A community may also incur a cost in providing services directly to the plant itself, such as provision of water services or traffic control.

In six of the eight cases reported here, additional costs to local government exceeded additional revenue, i.e., net primary benefits were negative. The additional costs

[1]"Study town" and "study county" are used somewhat interchangeably as an economic unit. It is difficult to separate small rural towns from the county; further, some local government units affected by new industry are countywide (county governments and school districts).

[2]This approach was taken in a study of suburban communities by Louis K. Loewenstein, "The Impact of New Industry on the Fiscal Revenues and Expenditures of Suburban Communities," *National Tax Journal*, XVI (June 1963), pp. 113-136.

TABLE II

ANNUAL NET PRIMARY BENEFITS TO LOCAL GOVERNMENT OF NEW MANUFACTURING PLANTS, FIVE RURAL COMMUNITIES IN KENTUCKY

Community and Plant	Additional Revenue	Cost of Additional Services	Net Primary Benefits
A-1 (Average, 1960-63)	$2,505	$ 2,675	$ −170
A-2 (1963)	28	3,400	−3,372
B-1 (1963)	−24	511[a]	−535
C-1 (Average, 1960-63)	54	953	−899
D-1 (1963)	187	0[b]	187
D-2 (Average, 1960-63)	−517	1,320[c]	−1,837
D-3 (Average, 1962-63)	530	1,200[d]	−670
E-1 (Average, 1960-63)	42	0	42
Total	$2,805	$10,059	$ −7,254

[a]Does not include a cost to the city government of $92,000 assigned entirely to the year 1962. The expenditure was made from the proceeds of a tax-supported industrial bond issue approved by city voters in 1957, and represents the donation of the plant site and the construction of an elevated water tank and sewage disposal plant on the site.

[b, c, d]Does not include one-time costs to the city of $1,200, $8,000, and $10,000, respectively, for the extension of water lines.

Source: Municipal, county, and company records and interviews.

were largely due to the addition of new students to the local school systems. However, the typical plant location studied here resulted in few new residents in the community, and therefore very little increased demand for public services, including education. Indeed, a major location factor in each case was the availability of an adequate local labor force. The largest number of new residents, and accordingly the largest cost to local government, occurred in Community A, where each of the two companies brought in 15 managerial and supervisory employees. Company officials estimated that each plant accounted for an increase of 25 students in the local school system. The remaining six plant locations involved the transfer of only 19 new employees and a total of 27 new students. The small number of new residents had important implications for local government: the direct effect on public expenditures as well as revenues was typically small. Thus, whether net primary benefits were negative or positive, they were likely to be small.

The impact was by no means uniform among the several units of local government studied. The units most susceptible to a negative effect were the school districts (Table III). To estimate the cost of new students, it was assumed that the cost to the school district of educating an additional student without reducing the quality of education received by other students is equal to the average local revenue per student. It might be argued that, with the exception of Community A, the num-

TABLE III
ANNUAL NET PRIMARY BENEFITS OF NEW MANUFACTURING PLANTS, BY TYPE OF LOCAL GOVERNMENT UNIT, FIVE RURAL COMMUNITIES IN KENTUCKY

Community and Plant	County	School District	City
A-1	$ 370	$—1,563	$ 1,025
A-2	9	—2,380	—1,000
B-1	—6	—18	—511
C-1	8	—197	—709
D-1	52	135	0
D-2	—144	—1,693	0
D-3	148	—818	0
E-1	18	23	1
Total	$ 455	$—6,511	$—1,194[a]

[a]"One-time" costs omitted from calculation; see Table II footnotes.
Source: Municipal, county, and company records and interviews.

ber of new students was so small that they could be absorbed without diluting the quality of education. Indeed, alternate treatments could be defended for a number of revenue and expenditure items entering into the calculation of net fiscal impact. These ambiguities in large part disappear, however, if the calculation is made for a later year. Such an "improved" calculation is shown in Table IV, which differs from Table II in the following respects:

1. Tax concessions initially granted by local government but later removed result in larger revenue effects. Specifically, real property assessments were increased substantially for plants C-1, D-1, and E-1. In the opposite direction, correction of an assessment error discovered in 1966 reduced the revenue yielded by plant A-1.

2. An alternate treatment of the revenue calculation is accorded plant D-2. This firm moved into a building previously occupied by a manufacturing concern which had left the community in 1957. When the new firm acquired the property, the assessment was reduced, apparently reflecting the purchase price. It may reasonably be argued that the resulting decline in tax revenue should not be attributed to location of the new firm but to the loss of its predecessor. Accordingly, Table IV treats the total taxes paid by the new plant as "additional revenue."

3. The cost of new students, except in Community A, is considered to be zero. The costs which remain are those representing actual outlays which will recur well into the future. The effect is to eliminate from consideration one-time costs incurred at the time of plant location (in cases B-1, D-1, D-2, and D-3). Further, in case C-1 an annual outlay incurred by the city was completed in 1968.[3] In the other direction, the cost associated with plant A-2 was increased in 1965 by a further addition of 15 new residents and 20 new school children.

The alternate calculation to a considerable extent removes from the analysis the "transitory" cost and revenue effects, i.e., those associated with the actual plant location process or applicable for only a limited time period following the plant location. By this calculation modest gains accrue to three of the communities and only in Community A is there a significant negative impact. Community A was the only study town receiving a sizeable number of new residents; payment of all taxes by plant A-1 was not sufficient to offset the added cost of new students.

II. *Benefits to the Local Economy*

Small towns which recruit new industry obviously consider the stimulus to the local

[3]The "one-time" cost of $92,000 incurred by the city in case B-1 might be considered an annually recurring cost in the amount of the tax required to support the industrial bond issue. At any rate, the bond issue was retired, and the supporting tax was eliminated, in 1966; accordingly, no cost is assigned to the post-1966 period.

TABLE IV
ANNUAL NET PRIMARY BENEFITS TO LOCAL GOVERNMENT OF NEW MANUFACTURING PLANTS, FIVE RURAL COMMUNITIES IN KENTUCKY: ALTERNATE CALCULATION

Community and Plant	Additional Revenue	Cost of Additional Services	Net Primary Benefits
A-1 (1966)	$1,655	$2,675	$ -1,020
A-2 (1965)	29	5,360	-5,332
B-1 (1967)	—24	0	—24
C-1 (1968)	875	0	875
D-1 (1964)	906	0	906
D-2 (1964)	1,667	0	1,667
D-3 (1964)	530	0	530
E-1 (1967)	1,285	0	1,285
Total	$6,922	$8,035	$—1,113

Source: Municipal, county, and company records and interviews.

private economy as the major benefit to be derived. It is of interest, then, to provide an estimate of such benefits in the case studies reported here. Table V gives the estimated impact of the new plants on personal income in the five communities (where the unit of study is actually the county). The total impact consists of two components: (1) the direct or primary effect, which represents the increase in the community's basic income, and (2) the secondary effect, which represents the increase in nonbasic income.

The distinction between "basic income" and "nonbasic income" derives from the concept of an economic base. The basic income of a community is earned in those activities which export goods and services to other areas.[4] Nonbasic income, on the other hand, is earned in the local consumption sector of the county's economy. This sector is dependent on the respending locally of basic income. The increase in basic income here attributed to new industry is measured by the 1963 plant payroll, less the earnings of employees who commuted from other counties. The total increase in income due to new industry is equal to the community income multiplier times the new industry payroll accruing to county residents. The estimated multipliers for communities A through D are, respectively, 1.46, 1.73, 1.43, 2.02, and 1.26.[5] The interpretation is that, in Community A, an increment of $100 in new industry wages paid to local residents led to an increase of $46 in nonbasic income.

The secondary impact on employment was relatively smaller than that on income. For the five counties combined, employment of the new plants was 1,517 in 1963, 1,177 of whom were county residents. But the associated increase in nonbasic employment was estimated as only 98 jobs. This estimate involved calculating for each county the ratio of the increase in basic income "required" to generate one additional nonbasic job. For example, in Community A an increase of $30,830 in basic income during the study period was required per additional nonbasic job. The implication for new industry is that for each $30,830 in annual wages paid to county residents, one additional job was created in the county's nonbasic sector.

Apparently the small secondary effect on

[4]Basic activities in the counties studied here include agriculture, mining, manufacturing, and, in some cases, certain other components such as retail and services income associated with tourism, income earned by county residents commuting to jobs outside the county, and transfer payments.

[5]The multiplier for a county was calculated as the ratio of the total increase in annual income to the increase in annual basic income, with 1958 serving as the base year and 1963 as the terminal year. Calculation of the multiplier thus involved separating the county's personal income into basic and nonbasic components. While subject to serious limitations if applied to complex economies, this type of analysis appears well suited to small economies characterized by a minimum of interindustry relationships.

TABLE V
ESTIMATED IMPACT OF NEW INDUSTRY ON COUNTY INCOME, 1958-63, FIVE RURAL COMMUNITIES IN KENTUCKY

Community	Increase in Basic Annual Income	Increase in Nonbasic Annual Income	Total Impact on Annual Income
	(Thousands of dollars)		
A	1,007	466	1,473
B	326	238	564
C	663	287	950
D	1,076	1,098	2,174
E	463	120	583
Total	3,535	2,209	5,744

Source: Author's estimates.

employment is explained by underutilization of employees in the local consumption sector prior to the location of the new plants. This sector could then accommodate increased sales without a commensurate increase in employment. This explanation is supported by the minor role of the construction industry in the secondary impact (13 of 98 new nonbasic jobs); apparently the communities' capital stock was also underutilized. The lack of a significant effect on nonbasic employment is demonstrated further by the fact that the income multiplier effect on wage and salary income was smaller than the effect on proprietors' and property income.

III. *Secondary Impact on Local Government*

The calculation of new industry's effect on local government has considered only the direct or primary impact, while it was pointed out that the impact on the local private economy consisted of both a primary and a secondary effect. The possibility thus exists that the multiplier effect on the nonbasic sector might result in a significant secondary effect on local government revenues or expenditures.

The evidence suggests that such an effect in the five case studies reported here, if it exists at all, is quite limited. As noted above, the economic impact did not include a population increase; the new plants themselves brought in very few new residents, and the relatively small employment expansion in the local consumption sector doubtlessly also came from the local labor force. (Population estimates indicate a decline of 2.9 per cent for the five counties during the 1958-63 period.) Further, analysis of construction industry data and interviews with local businessmen indicated very little investment in new business or residential construction during the study period. One would thus expect a net secondary effect on local government of no increase in the demand for local government services and little or no increase in the revenues, since the local revenue base was dominated by the assessed value of real and personal property.[6] This conclusion tends to be supported by an analysis of local government data covering the five study communities and a group of five "control" communities which had similar economic characteristics but did not receive new industry (Table VI). For all local government units combined, the relative increase in direct general expenditures from 1957 to 1962 was somewhat greater in the study communities than in the control group, but the range of increases within the groups was even larger. And if the analysis is extended to 1967, the percentage increase in expenditures was actually larger in the control group. There

[6] At the state government level, Legler and Shapiro have observed that the responsiveness of revenue to economic growth of a particular tax varies according to whether the income increase is due to per capita improvement or to population growth. See John B. Legler and Perry Shapiro, "The Responsiveness of State Tax Revenue to Economic Growth," *National Tax Journal,* XXI (March 1968), pp. 46-56.

TABLE VI
COMPARISON OF STUDY AND CONTROL COMMUNITIES: CHANGE IN LOCAL GOVERNMENT REVENUES, SERVICES, AND EXPENDITURES

Item	Study Communities		Control Communities	
	Change	Per cent Change	Change	Per cent Change
I. *All Local Government Units (1957-62)*				
General revenue ($1,000)	2,638	57.0	1,932	55.0
Per capita	$ 35	61.2	$ 33	60.0
Direct general expenditures ($1,000)	2,998	66.6	1,955	58.0
Per capita	$ 39	70.2	$ 33	62.2
Employment	31	2.5	141	16.0
II. *School Districts (1959-64)*				
Enrollment	—359	—1.8	—411	—2.6
Number of teachers	—1	—0.1	—3	—0.5
Full market value of taxable property ($1,000)	78,483	32.1	50,787	39.4
Local revenue ($1,000)	103	7.4	78	10.6
III. *County Governments (1959-64)*				
Operating expenditures ($1,000)	191	34.0	98	25.4
IV. *Municipal Governments (1958-63)*				
Assessed value of property ($1,000)	2,437	15.6	n.a.	n.a.
Property tax revenue ($1,000)	18	13.6	n.a.	n.a.
Total revenue ($1,000)	167	49.7	n.a.	n.a.
Expenditures ($1,000)	131	39.9	n.a.	n.a.

n.a. Not available
Source: For I, U. S. Bureau of the Census, Census of Governments: Kentucky VI (1957), Table 36, and VII (1962), Tables 27 and 28. For II, Kentucky Department of Education, *Report of Superintendent of Public Instruction*, (Frankfort: Kentucky Department of Education), XXVII (1959) and XXXIII (1964) and Kentucky Department of Revenue. For III, Kentucky Auditor of Public Accounts, "Report on Examination," 1959 and 1964. For IV, Municipal records of the five study communities.

is some evidence of relatively greater dependence on nonlocal sources of revenue by the control communities during the study period. This is perhaps explained by the fact that incomes were lower in these counties than in the study group. The analysis of the private economic impact indicates that about 15 per cent of the per capita income difference between the two groups as of 1963 was attributable to the study communities' new manufacturing plants.

IV. *Summary and Conclusions*

The establishment of new manufacturing plants in five rural towns in Kentucky during the period 1958-63 typically resulted in a negative direct impact on local government finances. Of equal importance, however, this impact, summarized in the quantity "net primary benefits to local government," was usually small. Most of the new plants studied here added few new residents to the community; the availability of local labor was in fact a major reason for the locations. For this reason there was very little increased demand for local government services, and this factor served to keep the magnitude of negative impacts relatively small. A large negative impact resulted for the school system only if property taxes were substantially avoided and significant numbers of new residents (and school children) were brought to the community. A sizeable negative impact on the municipal government occurred if a large nontax inducement (e.g., provision of water or sewer services or donation of land) was combined with property tax avoidance.

There was a tendency in the towns studied here for the negative impact to be converted into positive net primary benefits (although rather modest in magnitude) a few years after the plant location. A variety of reasons accounted for this result, including (1) the elimination of tax concessions in the form of low property assessments granted at the time of location; (2) the fact that some costs incurred by municipal governments are applicable to only the year in which the new plant was established or are amortized over a relatively few years; and (3) more rarely, the later imposition of new types of taxes, such as occupational taxes applicable to the employees of new industry.

Whether net primary benefits to local government are calculated for the period immediately following plant location or for a later period, and whether they are positive or negative, they tend to be very small relative to new industry's benefits to the local private economy. These benefits were calculated to include both the primary impact (i.e., the plant payroll) and the secondary impact (i.e., the increase in income induced by local spending of the plant payroll). The total impact on the private economy, as measured by the increase in county personal income, ranged from $564,000 per year to $2,174,000. This may be compared with negative net primary benefits to local government ranging from $535 to $6,352 per year, or with "one-time" costs incurred at the time of plant location limited to $10,000 or less, except in one case in which $92,000 was expended.

The secondary impact on local government was apparently quite small, if indeed it existed at all. This conclusion is suggested by comparing local government revenues, expenditures, and services in the study communities with those in five rural communities which did not attract new industry during the study period, and by interviews with local civic leaders, who contended that the new plants had placed no strains on local government services. As further indirect evidence of the adequacy of local public facilities and services, each of the study towns was seeking further new industry at the time of the study, and three (communities B, C, and D) had already succeeded. New industry attracted to small rural towns mainly by the availability of local labor does not produce significant population growth; a small impact on local government services is therefore not surprising.

TWO NORTH CAROLINA COMMUTING PATTERNS

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THIS study examines the commuting patterns of production workers at two industrial establishments in eastern North Carolina. Each of the two plants investigated is situated in the area of Kinston, a city of nearly 30,000 population, and together they account for well over half of the manufacturing employment in the county centered on that city.[1] One of the establishments, a producer of synthetic fiber,[2] employs approximately 2200 persons and is noted for its "above-average" wages; it employs workers who commute from points within a broad area extending out 40 miles and more. The other plant, a shirt factory,[3] employs about 900 persons, and is considered "below-average" in its wages; it draws much of its labor from the area in the immediate vicinity of the plant. The two industrial facilities thus provide a broad spectrum of wages and commuting distances and facilitate an examination of wages and other factors as variables affecting the pattern of commuting of industrial workers in the area. The study was conducted in the spring of 1964.

The specific objectives in this study are fourfold: (1) to analyze and compare the characteristics of the two commuting patterns and identify the respective labor market areas; (2) to observe the effect on commuting of such personal factors as wages, age, sex, and length of service; (3) to investigate the significance of two geographic variables—population and distance—by constructing a series of probability models based on gravity concepts; (4) to consider some other geographic variables which may explain discrepancies between the actual distribution of commuters and those suggested in the probability models. These probability models are not universally applicable, but they may nevertheless provide a tentative basis for estimating the potential availability of commuting labor in areas where conditions might be similar to those in eastern North Carolina.

Commuting studies have a proper and important place in geography. Commuting distance can be used as a basis for delimiting labor market areas or "labor-sheds"—the area supplying labor to some central point. The labor-shed is a regional conception—an extent of space functionally organized about some nodal point such as an individual

[1] Kinston is the commercial center and largest town in Lenoir County, which has a population approaching 60,000 and manufacturing plants employing about 5600 persons.

[2] E. I. du Pont de Nemours & Company, Kinston plant, established in 1953, is a major supplier of *Dacron*® polyester fiber.

[3] The Kinston Shirt Company, in operation since 1937, accounts for about 2 per cent of the United States output of men's dress and sport shirts.

factory, a group of plants, or a whole complex of economic activities embraced by a city. Commuting or "journey-to-work" patterns could form the basis for delimiting networks of overlapping regions across the whole expanse of a territory. Commuting studies offer geographers the opportunity to apply their skills in seeking answers to some important practical questions. For example, the extent of the labor force potentially available at some point is directly influenced by the territorial extent of the labor-shed, i.e., by the number of miles workers are willing to commute. This may be an important consideration when an industry seeking a new location with an assured labor supply must decide among several alternative places.

Commuting studies are particularly appropriate and pertinent in the case of North Carolina, a state striving to attract new industry in order to expand employment and raise presently low income levels. The traditional attraction for manufacturing concerns has been the large supply of labor willing to work for wages which, though "modest" by national standards,[4] are above those prevailing in many non-industrial occupations in North Carolina. Surveys conducted by the Employment Security Commission of North Carolina indicate that a large reservoir of employable labor remains to be tapped;[5] the supply is especially abundant in rural areas[6] where out-migration has proceeded more slowly than might be expected in view of the limited economic opportunities in many of these areas. Given an opportunity to work in a nearby industrial plant, rural and small-town dwellers have shown a marked propensity to maintain their established place of residence and a willingness to commute great distances to work.[7] Thus industries often draw their labor from remarkably broad geographic areas. As might be expected, the higher-wage industries are able to attract labor from much wider areas than are other industries; this point will be demonstrated later in this paper. An industry considering a location in North Carolina can compare the wages it is prepared to offer with those prevailing in a specified area, and with an understanding of commuting tendencies in this region, it can proceed to estimate the size of the labor force that might be marshalled at any particular point.

While this paper focuses on two individual cases in a single region, the study is intended to be of more than just local interest. Hopefully, it will be of use to other analysts undertaking similar studies by pointing out some of the problems encountered in conducting such journey-to-work surveys. In addition, the paper presents one method for analyzing a commuting pattern. Also, by adding to the number of studies of individual areas, the likelihood of developing a general theory on commuting is perhaps improved by some small degree. It can be reasoned that if an acceptable general theory on travel-to-work behavior is ever to be established,

[4] The average hourly wage in North Carolina manufacturing plants in October, 1964, was $1.69, the lowest for any state in the United States. The national average for manufacturing workers at this time was $2.47.

[5] For example, when the Proctor Electric Company established a new plant at Mt. Airy in 1957, they had 3500 applicants for 288 job openings, far in excess of the anticipated number of applicants; see "Staffing a New Plant in a Small Labor Market Area" (Employment Security Commission of N.C., Raleigh, 1960).

[6] The extensive reserves of labor in and around small towns has also been observed in the Middle West by Richard C. Wilcock and Irvin Sobel: "Small City Job Markets: The Labor Market Behavior of Firms and Workers" (Urbana, Ill., 1958).

[7] K. J. Walraven discusses this same point in his Arkansas study: "Impact of New Plants on Local Labor Supply: Northwest Arkansas" (Little Rock, Ark., 1962).

the key elements in the theory—e.g., the relationships between commuting distance and wages, length of service, etc.—will likely be discerned from a multitude of individual empirical studies.

The Study Area

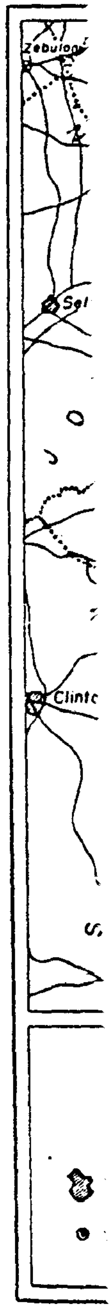
Workers commuting to the two industrial plants examined in this paper are mostly drawn from a ten-county area[5] on the coastal plain of eastern North Carolina (Table I and Fig. 1). There are no major natural features such as mountains or large water bodies which seriously influence the general geographic pattern of commuting. Significant differences in the density of paved roads do exist, however; the availability of such roads decreases as one moves south and eastward (Table I). This reflects diminishing population densities toward the south and east where the land is decidedly less suitable for agriculture because of poorer soil and drainage conditions. About one-third of the study area's labor force is in agriculture (compared with 7 per cent nationally); tobacco is by far the most important crop, with peanuts, cotton, corn, and soybeans also significant.

The population of the ten-county area was approximately one-half million in 1960, up about 8 per cent from 1950 (compared with a national gain of 19 per cent in the same period); four counties experienced population losses in this decade (Table I). The population density ranges from about 150 per square mile in the northwest to less than 50 in the south and east (Table I). Five towns (Goldsboro, Greenville, Kinston, New Bern, and Wilson) have populations over 10,000; overall the population is about 30 per cent urban, nearly average for North Carolina, but far below the national level. The Negro population is rather uniformly high, averaging about 40 per cent, and Negroes account for about a quarter of the manufacturing labor force.

Income levels are generally low. In 1962 the average per capita personal income in the study-area counties ranged from about $900 to $1500, averaging two-thirds the state mean and less than half the national level. Wages in manufacturing, which employs about 17 per cent of the area's labor force, are generally above those in most other branches of the economy, but still averaged scarcely $70 a week in 1963. The leading branches of manufacturing are food products, textiles, apparel, wood products, and chemicals. The majority of food, textile, and apparel workers earn between $1.25 and $1.50 an hour, while those at the large synthetic fiber plant near Kinston average over $2.50 an hour. Local chambers of commerce boast of the "lack of labor strife" and the prevailing absence of strong labor unions. But economic opportunities are limited, unemployment has been high, and many workers remain underemployed.

The Questionnaire

A travel-to-work questionnaire (Fig. 2) was given all production workers (wage earners) at the two industrial plants. Salaried personnel were omitted only because company officials preferred they be excluded. The questionnaires were distributed and collected by plant supervisors, and there was a return rate of about 90 per cent. Of the returned questionnaires about 10 per cent were screened out because of incomplete or obviously false answers. The final sample population consisted of 1052 workers at the synthetic fiber plant and 734



[5] Ten counties supply approximately 98.5 per cent of the commuters who identified their residential location on a questionnaire. Small numbers of commuters originate from four other counties (Edgecombe, Martin, Onslow, and Pamlico).

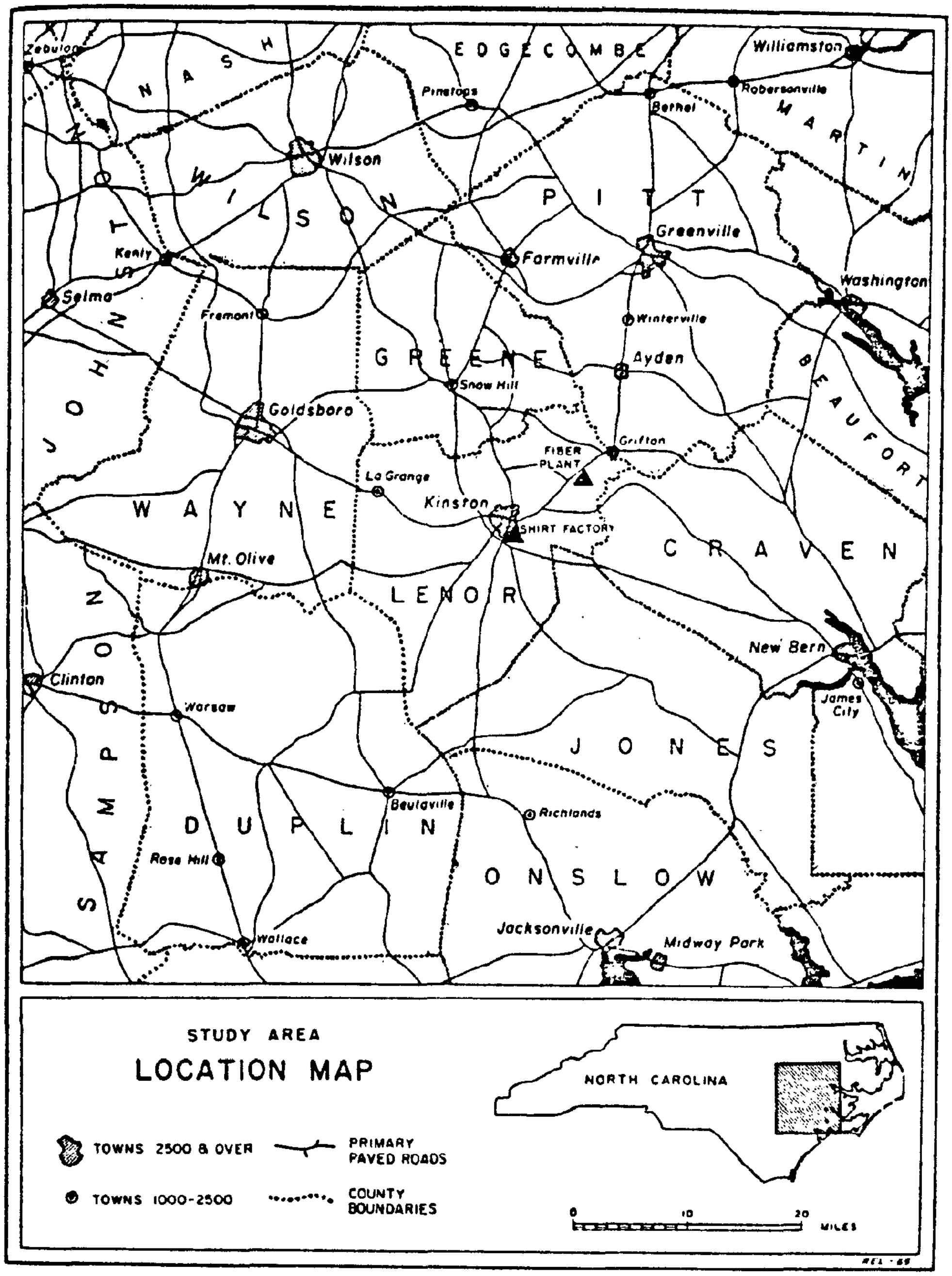


FIG. 1.

workers at the shirt factory, a total of 1786 wage earners. The questions asked of the workers are indicated in the sample questionnaire shown as Figure 2. Workers living a significant distance (over 3 miles) from the plant were also asked to locate their place of residence on a map included on the questionnaire.

TABLE I

SOME CHARACTERISTICS OF INDIVIDUAL COUNTIES IN THE STUDY AREA

	Population, 1960[a]					Employment				Income		Per cent of labor force unemployed 1963[d]	Paved roads, 1963, mi. per sq. mi.[e]
	Total	Per cent change 1950–1960	Density per sq. mi.	Per cent urban	Per cent non-white	Total 1960[a,f]	Agricultural 1960[a,f] No.	Agricultural 1960[a,f] Per cent	Manufacturing 1963[b,g]	Per capita 1962[c,f]	Average weekly mfg. wages 1963[b,g]		
CENTRAL COUNTIES													
Lenoir	55,276	+20	141	45	40	18,016	3,882	22	5,609	$1,495	$95.50	8.5	1.84
Pitt	69,942	+10	106	43	44	22,353	6,488	29	3,270	1,387	72.39	8.8	1.56
Greene	16,741	−7	62	0	50	4,531	2,831	63	132	1,288	52.27	8.4	1.70
NORTHWESTERN COUNTIES													
Wayne	82,059	+28	148	41	37	22,522	5,087	23	3,328	1,472	72.68	6.6	1.74
Wilson	57,716	+6	155	50	40	19,596	4,386	22	3,915	1,510	67.34	11.0	1.83
Johnston	62,936	−5	79	20	22	20,989	6,768	32	3,989	1,427	59.58	7.1	1.88
SOUTHERN COUNTIES													
Duplin	40,270	−2	49	0	38	13,259	5,893	44	2,085	1,193	64.40	4.0	1.74
Jones	11,005	0	24	0	47	3,186	1,467	46	144	902	49.15	6.0[h]	0.68
EASTERN COUNTIES													
Beaufort	36,014	−3	43	28	37	11,061	2,866	26	2,095	1,265	53.32	5.1	1.05
Craven	58,773	+20	81	27	29	14,999	2,333	16	2,031	1,541	68.61	6.6[h]	1.14

[a] *1960 Census of Population*, Vol. 1, Part 35.
[b] *North Carolina Insured Employment and Wage Payments, 1963*, Employment Security Commission of N.C., Raleigh, 1964, Table 5.
[c] from data compiled by Dept. of Tax Research, State of N.C., Raleigh, 1964.
[d] from data compiled by Employment Security Commission of N.C., Raleigh.
[e] from data compiled by Planning Dept., N.C. State Highway Commission.
[f] by place of residence.
[g] by place of employment.
[h] 1960 data.

[illegible] Two Sample Populations

[illegible] basic characteristics of the two [illegible]uter groups are indicated in Table [illegible] As is evident, the two populations [illegible]ther similar with regard to age and [illegible] of employment (the fiber plant [illegible]ed only in 1953; the average length [illegible] service of fiber workers should in[illegible] with the passage of time), but [illegible] greatly in average wages and the [illegible] between sexes. As would be [illegible]ted, the shirt factory relies heavily [illegible] female labor, most of whom receive [illegible] an hour. The shirt firm is located [illegible] the city of Kinston, enabling [illegible] number of employees to walk to [illegible]. The fiber plant, on the other [illegible], is situated in the country, seven [illegible] outside of Kinston, and essentially [illegible] employees commute by automobile.

The Measure of Commuting

[illegible]here is some question as to what is [illegible] most satisfactory measure of com[illegible]. In the majority of studies a [illegible] mileage measurement is em[illegible]. A few analysts have measured [illegible] distance in time (i.e., min[illegible]). The popularity of miles over [illegible] is understandable; mileage can [illegible] measured directly from an ordinary road map, whereas the determination of travel time requires either a field survey or an interview of workers actually doing the commuting. The use of time as a measure can be defended on the ground that a worker's willingness to commute presumably depends in part on the "effort" involved. Ten miles of "fast" open highway requires less effort than 10 miles of "slow" city streets or dirt roads, and in this instance the number of miles would likely be a poor measure of commuting distance. Along this line, one geographer has recently suggested that commuting be measured in terms of "travel effort," taking into consideration the number of stop signs, turns, congestion, etc.[9] But the obvious difficulty in obtaining such data for all the roads in the commuting area will likely preclude much use of this measure. Cost has been suggested as a possible measure of commuting. The assumption is that the expense involved may, beyond a certain limit, discourage commuting. However, in this study area and in most others, many workers join car pools, and for them the cost is relatively minor compared with the time involved. On the other hand, a worker driving alone 30 miles each way would, at the rate of eight cents a mile, incur a daily expense of almost five dollars.

In this study, information on commuting mileage and time was obtained from the questionnaires. The presumption was that one might provide a better measure of distance than the other. To test the relationship between the two, time and mileage distance values for a 10 per cent random sample of fiber workers were plotted against one another on a scatter diagram (Fig.

TABLE II

[illegible]aracteristics of Two Commuter Groups

	Fiber Plant	Shirt Factory
[illegible] wage earners	1,052	734
[illegible]	875	71
[illegible]	177	663
[illegible] of employment	98 mos.	82 mos.
[illegible]	98 mos.	86 mos.
[illegible]	97 mos.	81 mos.
[illegible]	32.1 yrs.	32.7 yrs.
[illegible]	32.3 yrs.	31.2 yrs.
[illegible]	31.4 yrs.	32.9 yrs.
[illegible] wage	$109.13	$51.75
[illegible]	111.77	60.00
[illegible]	96.54	51.06
[illegible] conveyance		
[illegible]	1,051	608
[illegible]	1	1
[illegible]	0	122
[illegible]	0	3

[9] John D. Nystuen: A Measure of Effective Distance in Urban Travel, *Abstracts of Papers*, 20th International Geographical Congress, London, 1964.

TRAVEL-TO-WORK QUESTIONNAIRE

A University of North Carolina research group is anxious to find out how much time workers spend travelling to and from work. The results of this and other studies will contribute to an overall understanding of North Carolina's industrial labor force, and will assist in developing plans for continued industrial progress.

Your cooperation in answering the questions below will be greatly appreciated. After completion of this form, please deposit it in the box marked "Travel-to-Work Questionnaire", which will be placed in a convenient location in your plant. Thank you very much.

---

1. Name of company where you now work: ______________________.

   (a) How long have you worked for them? __________ years.

2. How many miles from the plant do you live? __________ miles.

3. How long does it take you to get to work? __________ minutes.

4. How do you get to work? ______________ (auto, bus, walk, etc.)

5. Have you moved closer to work since taking your present job? __________.

   (a) If so, how many miles from work did you live previously? ________ miles.

6. Are you now considering moving closer to the plant? ______________.

7. Personal data:

   (a) age ______ (b) sex ______ (c) average weekly wage, before taxes: $________.

8. If you live more than three miles from where you work, place an "X" mark on the map below, showing approximately where you live:

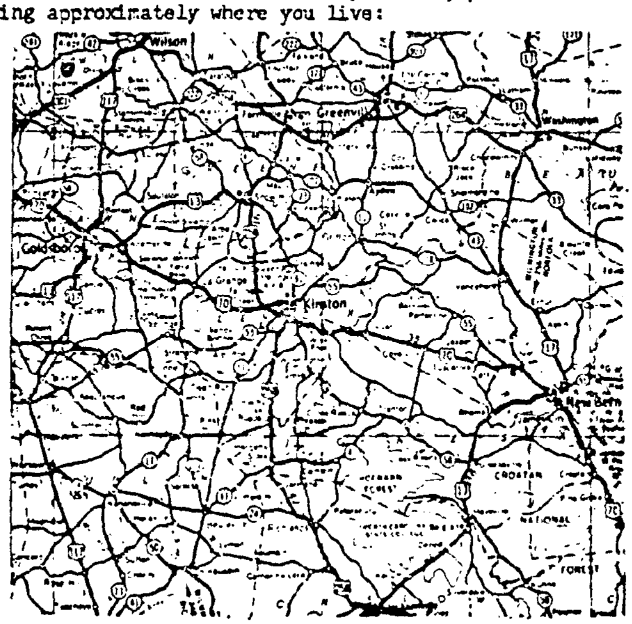


FIG. 2.

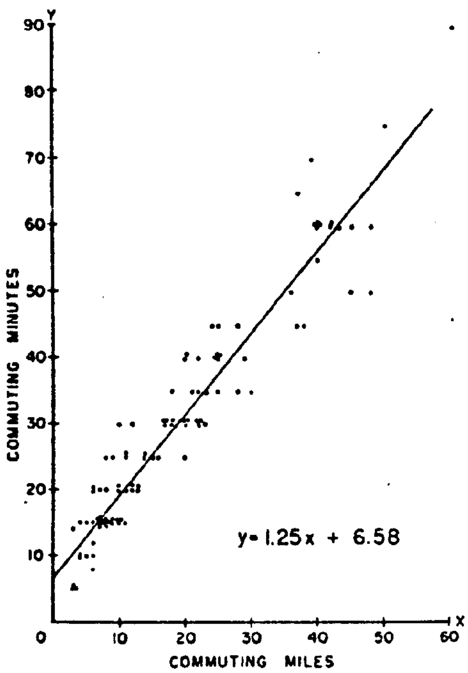


FIG. 3. Scatter diagram and regression line showing relationship between commuting mileage and commuting minutes, based on a 10 per cent sample of fiber plant workers.

3). As would be expected, a positive trend was clearly evident. The coefficient of correlation between the two is a very high +.96, suggesting that one is about as satisfactory a measure as the other. A regression line was established, with the "X" axis representing miles, and the "Y" axis minutes. The regression equation is $Y = 1.25x + 6.58$, which indicates that for fiber workers the commuting time increases 1.25 minutes per additional mile, and to commute "zero" miles requires approximately 6.6 minutes. The latter is presumably a measure of "terminal time," i.e., the time consumed in starting the car, getting out of the driveway, walking from parking lot to plant gate, etc. The possible superiority of one measure over the other is perhaps indicated by the degree of association between actual distributions of commuters and those distributions suggested by probability models based on gravity-model concepts. Twelve such models were constructed, using both miles and minutes as measures of distance; they are discussed later in this paper. A closer fit was obtained using mileage as a distance measure, but at best this is highly inconclusive evidence. In the probability models the frictional value attached to distance can be adjusted *ad infinitum*. It is indeed likely, therefore, that fits better than those achieved in this study could be obtained. In this study mileage is used more extensively than travel time only because it facilitates comparisons with other commuting studies, most of which used mileage exclusively.

CHARACTERISTICS OF THE TWO COMMUTING PATTERNS

The higher-wage fiber plant workers commute considerably farther than do shirt factory workers. The spatial extent of the two labor-sheds, in this case arbitrarily defined as the region encompassing the nearest 90 per cent of an individual plant's labor force, is shown in Figure 4. The fiber plant labor market area extends out almost twice as far from the point of employment and embraces an area about three times larger than the labor-shed for the shirt factory. Fiber plant workers travel an average of 17.5 miles each way and require an average of 28.7 minutes to cover this distance; median figures are approximately 13 miles and 27 minutes. By contrast, shirt factory workers travel an average of 6.7 miles one-way and require an average of 18.2 minutes; the median values are about 4 miles and 17 minutes. The distribution of commuters by five-mile and ten-minute zones for each of the plants is given in Tables III and IV. As can be seen by the figures in the cumulative percentage

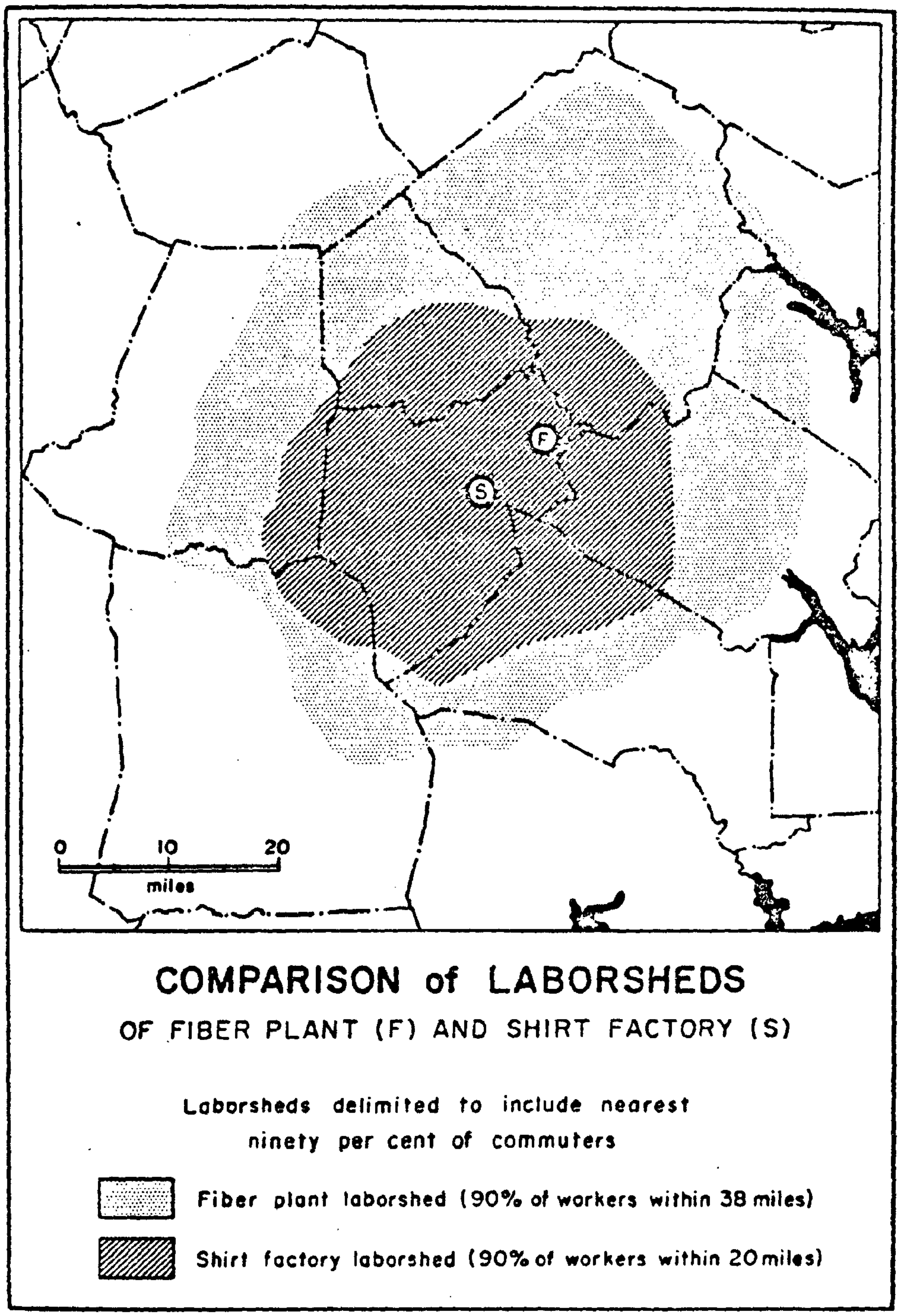

0 10 20
miles
COMPARISON of LABORSHEDS
OF FIBER PLANT (F) AND SHIRT FACTORY (S)
Laborsheds delimited to include nearest ninety per cent of commuters
Fiber plant laborshed (90% of workers within 38 miles)
Shirt factory laborshed (90% of workers within 20 miles)

FIG. 4.

TABLE III

DISTRIBUTION OF COMMUTERS BY MILEAGE ZONES

Zone	Miles	Fiber plant workers			Shirt factory workers		
		Number	Per cent of total	Cumulative per cent	Number	Per cent of total	Cumulative per cent
1	0–4	113	10.7	10.7	435	59.3	59.3
2	5–9	258	24.5	35.2	71	9.7	69.0
3	10–14	201	19.1	54.3	81	11.0	80.0
4	15–19	82	7.8	62.1	72	9.8	89.8
5	20–24	117	11.1	73.2	40	5.5	95.3
6	25–29	61	5.8	79.0	25	3.4	98.7
7	30–34	55	5.2	84.2	8	1.1	99.8
8	35–39	78	7.4	91.6	1	0.1	99.9
9	40–44	54	5.1	96.7	1	0.1	100.0
10	45 & over	33	3.1	99.8	0	.....	.....
Total		1,052	99.8	....	734	100.0	.....

columns of these tables, 80 per cent of the shirt workers live within 14 miles of their place of work, whereas just over half of the fiber workers live a similar distance from their plant. Over 15 per cent of the fiber workers travel 35 miles or more, while virtually none of the shirt workers commutes that far. The striking difference between the commuting habits of the two groups is not surprising in view of the better than two-to-one wage differential in favor of fiber workers, and the in-city location of the shirt factory as opposed to the more rural site of the fiber plant some seven miles outside Kinston.

The commuting distance of fiber workers appears to be above the state average, and that for shirt workers somewhat less than average. In unpublished surveys conducted by the North Carolina Employment Security Commission, 77 per cent of the North Carolinians they interviewed live within 15 miles of their place of work, and 93 per cent within 24 miles. By comparison, within 15 miles of work are 80 per cent of the shirt workers but only 54 per cent of the fiber workers. It is worth noting that in average weekly wages in 1964 the fiber plant ($109) is also much above the state mean, and the shirt factory ($52) again below average.

A federal government survey of 6000 households in 357 geographic areas of the United States, conducted in October, 1963, provides a kind of "national norm" with which the two commuting patterns in this study can be compared.[10] According to this survey, 45 per cent of American workers commute up to four miles, and 76 per cent up to 10 miles. For these distances the fiber plant percentages are 11 and 40, indicating that its commuting distances are considerably above the national mean. The shirt factory percentages are 59 and 71, or much closer to the national average. The meaningfulness of such comparisons can be seriously questioned, as the national figures reflect largely urban conditions dissimilar to those prevailing in eastern North Carolina.

It is difficult to compare the commuting patterns in this study with those in previous studies of other areas in the United States. Comparisons of this sort suffer because of great differences in such circumstances as degree of urbanization, city size, terrain, availability of paved roads, mode of transportation, job opportunities, wage levels, etc. With these limitations in mind, a few com-

[10] *Home-to-Work Travel*, advance report, 1963 Census of Transportation, Bureau of Census, Washington, 1965, p. 6.

TABLE IV

DISTRIBUTION OF COMMUTERS BY TIME ZONES

Zone	Minutes	Fiber plant workers			Shirt factory workers		
		Number	Per cent of total	Cumulative per cent	Number	Per cent of total	Cumulative per cent
1.	Under 10	36	3.4	3.4	131	17.9	17.9
2.	10–19	288	27.4	30.8	308	42.0	59.9
3.	20–29	258	24.5	55.3	130	17.7	77.6
4.	30–39	173	16.4	71.7	97	13.2	90.8
5.	40–49	164	15.6	87.3	59	8.0	98.8
6.	50–59	57	5.4	92.7	5	0.7	99.5
7.	60 & over	76	7.2	99.9	4	0.5	100.0
Totals		1,052	99.9	....	734	100.0	.....

parisons may be attempted. In a 1959 study of over 2000 workers at the Maytag Company plant in Newton, Iowa (population 15,000), the median distance was about seven or eight miles,[11] much below that for the fiber plant workers. Although each laborshed embraces a largely rural area, the farm wages are lower and the alternate job opportunities are more limited in North Carolina; perhaps this partially explains greater commuting distances in North Carolina.

The commuting habits of Kaiser Aluminum workers at the new Ravenswood, West Virginia (pop. 1175 at time of plant establishment in 1956), plant were analyzed in a 1957 investigation. This was a "depressed" and largely rural area where agricultural incomes were low and "well-paying" industrial jobs were as highly sought after as those with the fiber plant in this study. One year after the plant's opening, aluminum workers traveled a median one-way distance of about 20 miles,[12] or about half again as far as fiber plant workers. But many of the aluminum employees subsequently moved closer to the plant. In comparing fiber plant commuting with that observed in the Kaiser study, it is appropriate to consider the commuting distances of fiber plant workers when they first obtained employment. Questionnaire data indicate that 260, or nearly one-fourth, of the fiber plant workers have moved closer to the plant since commencing their employment; they originally commuted an average of 28.8 miles one-way, compared with the present 8.4 mile average. This would seem to indicate that the median distance of fiber plant workers when first hired was comparable to that of the West Virginia aluminum workers shortly after their hire by Kaiser. Both plants, in similar "low-income" environments, initially attracted commuters from exceptionally wide areas.

A 1948 survey of commuting at a spinning mill on the South Carolina piedmont showed a median one-way distance of six miles,[13] only slightly greater than that for the shirt factory. While the South Carolina plant is in a more rural setting, the rather similarly-low median commuting ranges probably stems from the fact that both

[11] C. A. Peterson: An Iowa Commuting Pattern and Labor Market Areas in General (Bureau of Labor and Management, State University of Iowa, Iowa City, 1961), p. 1.

[12] *Labor Supply and Mobility in a Newly Industrialized Area* (Bulletin 1261, U.S. Dept. Labor, Bureau of Labor Statistics, Washington, 1960), p. 21.

[13] J. M. Steep and J. S. Plaxico: The Labor Supply of a Rural Industry (South Carolina Agr. Experiment Station, Bulletin 376, Columbia, 1948), p. 21.

are in the "low-wage" category. Thus, despite limited job opportunities and low farm wages, neither plant attracted any large number of persons living a sizeable distance from the plant.

DELIMITING THE LABOR-SHEDS

In the majority of commuting studies few attempts have been made to delimit accurately labor-sheds or labor market areas. Where they have been delimited, their boundaries usually appear as perfectly concentric circles, or they are drawn to coincide with existing political boundaries. To the geographer, a proper delimitation would seem to be a necessary step if the labor-shed is to be conceived as a region. But immediately evident are several obstacles to such a regionalization. Labor-sheds overlap, particularly in those zones intermediate between two plants or "nodes" which are attracting labor. It may often happen, as it does in this study (Fig. 4), that one labor-shed may lie entirely within another, larger labor-shed. They cannot be conceived as mutually exclusive entities. On the other hand, the labor-shed can be thought of as a distinct region, but always as one whose limits: (1) diminish by degree rather than abruptly and (2) commonly overlap or encompass those of other labor-sheds.

The outlines of such a "diminishing" region can be shown on maps by the use of isolines. Around each factory or other nodal point attracting workers will be a series of commuting isolines ("isocoms"). These isolines can represent commuting mileage or time intervals (e.g., an isoline for every additional five miles of commuting distance). Each isoline can be translated into a line indicating the cumulative percentage of commuters contained within that line (e.g., the 25-mile isoline may encompass 75 per cent of the commuters, and be labeled either way). There is an absolute outer limit for any existing labor-shed, the isoline which includes 100 per cent of the commuters. However, a mere handful of persons commuting unusual distances can cause this outer limit to lie far beyond what might be termed the "effective limit" of the labor-shed. This raises the question of what constitutes such an "effective limit" in terms of the percentage of commuters included. There is no established norm, and any decision is presumably subjective. A reasonable limit might be the isoline embracing the nearest 90 per cent of the workers (Fig. 4).

Commuting isoline maps were prepared for the fiber plant and shirt factory labor-sheds (Figs. 5, 6, and 7). The data for constructing the maps were obtained from the questionnaires which, in addition to asking each worker his one-way commuting mileage and time, also requested each person commuting over 3 miles to locate his home on a map included in the questionnaire (Fig. 2). About 87 per cent of the fiber plant workers and 98 per cent of those at the shirt factory who returned questionnaires fully complied with this request. With this information it was possible to plot the approximate place of residence of 926 fiber plant and 719 shirt factory workers. Next to each place of residence on the map were recorded the mileage and minutes indicated on the questionnaire. This provided the control necessary to construct the commuting isolines. Intervals of five miles and ten minutes were chosen arbitrarily. The isolines are identified not only in terms of the miles or minutes from the plant, but also in terms of the percentage of all commuters contained within each isoline. Another approach, not employed here, would be to select those distance isolines which would indicate the percentage of commuters enclosed at regular intervals (e.g., 30 per cent, 40 per cent, etc.).

The commuting mileage isoline maps for the two plants (Figs. 5 and 6) both show the influence of the existing road network orientation. Isolines extend farthest out along major radial roads in typical "spiderweb" fashion. The fiber plant isolines appear rather elliptical in shape with a northeast-southwest orientation. This apparently reflects the position of the fiber plant on a main northeast-southwest road and the absence of a major east-west road in the immediate vicinity of the plant. The shirt factory isolines are more nearly circular because of the many roads radiating out from Kinston in all directions. In neither case are there any major distortions in the shapes of isolines because of the lack of through roads in any area. The shirt factory labor-shed is contained entirely within the fiber plant labor-shed, an observation noted earlier in connection with Figure 4. The fiber plant labor-shed was extended to the 45-mile isoline, which encloses 97 per cent of the commuters. For the shirt factory, it was only necessary to extend the labor-shed to the 30-mile isoline to embrace 99 per cent of the workers.

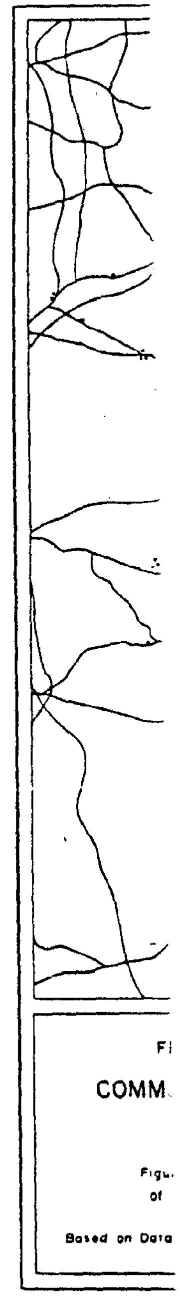
A commuting time isoline map was prepared for the fiber plant labor-shed (Fig. 7) for the purpose of comparing time isolines with those based on mileage. The commuting time isolines appear more irregular than do the mileage ones. They extend farther out along main roads, indicative of the higher speeds possible on major arteries. Nevertheless, the 60-minute isoline very roughly corresponds with the 45-mile isoline, which is consistent with the regression analysis. There does not appear to be any clear-cut advantage in using isolines based on time rather than on miles; the added difficulty of obtaining data on commuting time in itself seems to recommend the use of isolines based on mileage.

The delimitation of labor-sheds in terms of commuting isolines can be objected to on the grounds that the isolines do not necessarily identify the areas of densest commuter origins. For example, Figures 4 and 6 tend to give different impressions of the distribution of shirt factory commuters. As is clear in Figure 6, a much larger number of shirt workers originates from the lower-income areas south of Kinston than from the north; the labor-shed shown in Figure 4, delimited to include the nearest 90 per cent of commuters, includes areas north of Kinston, where few workers reside, and excludes districts south of Kinston (e.g., around Beulaville), where significant numbers of them live. A case can be made for rather arbitrarily positioning the outer limit of the labor-shed so as to include all areas of denser commuter origins and then drawing in just those isolines wholly or in part within the labor-shed.

WAGES AS A FACTOR INFLUENCING COMMUTING

A comparison of the fiber plant and shirt factory labor-sheds clearly suggests that "higher wage" workers are more willing to travel farther and therefore give up more of their "free" time. Presumably, everyone attaches some value to his time[14] and is reasonably aware of the full cost of driving and maintaining an automobile. Thus, one could assume that a more highly-paid worker is in a better position to bear the additional expenditures of

[14] For a discussion of this matter, see L. K. Loewenstein: The Spatial Distribution of Residences and Work Places in Urban Areas (Dept. of City Planning, Univ. of Pennsylvania, Philadelphia, 1962), pp. 4i-j (mimeo.).



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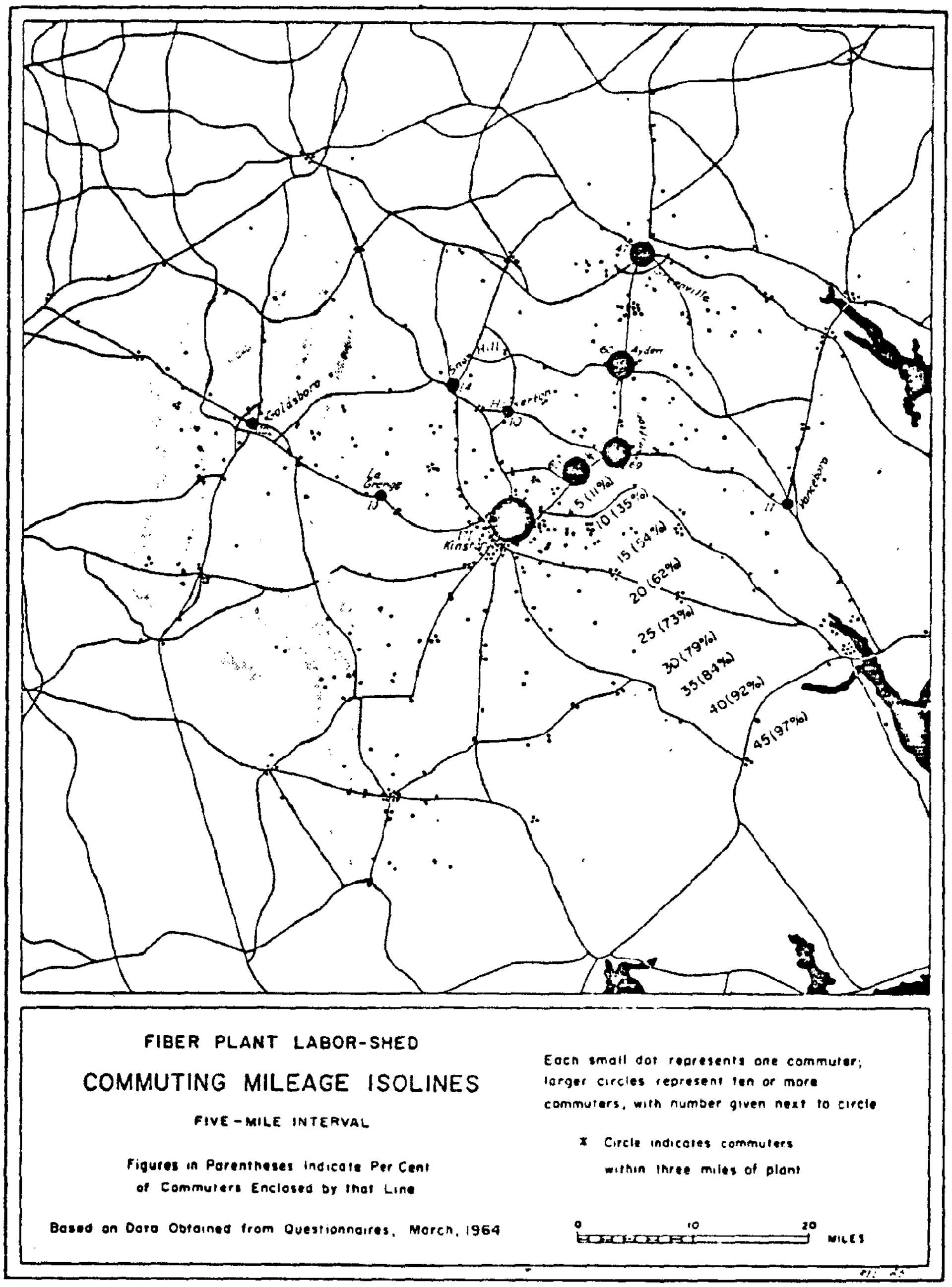


FIG. 5.

time and money. Yet among those who have studied commuting there are decided differences of opinion as to the relationship between wages and the journey-to-work.[15] Some analysts suggest that there is no relationship be-

[15] These differences were noted by James H. Thompson: Labor Market Areas for Manufacturing Plants in West Virginia (Bureau of Business Research, West Virginia Univ., Morgantown, 1955), p. 23.

tween the two factors, and one analyst, C. A. Peterson, in a study of commuting in Iowa, found data which suggested that there was an inverse relationship between the two factors; i.e., more-distant commuters received, on the average, a lower wage than those living closer to the plant.[16]

An examination of the fiber plant data alone indicates the lack of a direct link between wages and commuting distance. A scatter diagram with wages plotted against distance, drawn from a random sample of 100 fiber plant questionnaires, showed no discernible trend. The fiber plant data were then arranged to show the average wage of workers in each commuting zone (Table V). To make certain that a possible relationship was not obscured by differences based on the sex of workers, the data were also arranged by sex. The only conclusion that can be drawn from this table is that there is no correlation whatsoever between wages and distance within the fiber plant group. Another factor—the length of service of workers—was examined on the theory that it might be responsible for obscuring the link between wages and distance. A slightly higher percentage of long-distance commuters are younger, newly-hired workers (Table VI), and their average wage is below that for the group as a whole. However, a sample inspection indicated that even with this latter factor considered, there is still an apparent lack of connection between wages and distance within the fiber plant group.

It would be a mistake, however, to conclude from the above that wages and commuting distance are completely unrelated variables. It is true that within the fiber plant group there is no evident connection, but one has only to examine the commuting habits of the shirt factory workers for evidence that lower-paid workers in the same region do not commute nearly as far (Tables III and IV). The fact that a much higher percentage of shirt factory workers are female than male is apparently not a factor here; as shown in Table VI, there are no significant differences between male and female commuting in this area. Perhaps the critical element is whether wages are above or below those prevailing in the region being examined. The overall non-agricultural wage in the ten-county study area in 1964 was about $65 per

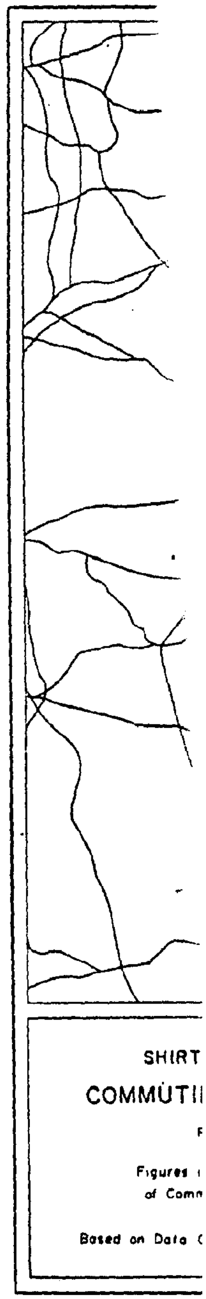
[16] Peterson, *op. cit.*, pp. 8–9.

TABLE V

AVERAGE WEEKLY WAGE OF FIBER PLANT WORKERS*
BY COMMUTING ZONES AND BY SEX

Zone	Miles	All commuters		Male commuters		Female commuters	
		No.	Wages	No.	Wages	No.	Wages
1..........	0–4	105	$112.89	89	$115.91	16	$96.06
2..........	5–9	245	107.60	195	110.68	50	95.60
3..........	10–14	198	110.75	172	112.72	26	97.69
4..........	15–19	81	106.20	70	108.07	11	94.27
5..........	20–24	112	108.96	96	111.09	16	96.19
6..........	25–29	56	109.34	47	113.11	9	89.67
7..........	30–34	51	104.71	36	107.44	15	98.13
8..........	35–39	76	110.86	59	114.97	17	96.59
9..........	40–44	52	107.87	43	111.35	9	91.22
10..........	45 & over	32	110.25	29	111.69	3	96.33

*The size of this population (1008) is somewhat smaller than in some other tables due to the necessity for eliminating a few questionnaires where the desired combination of data required for this table were not wholly provided.



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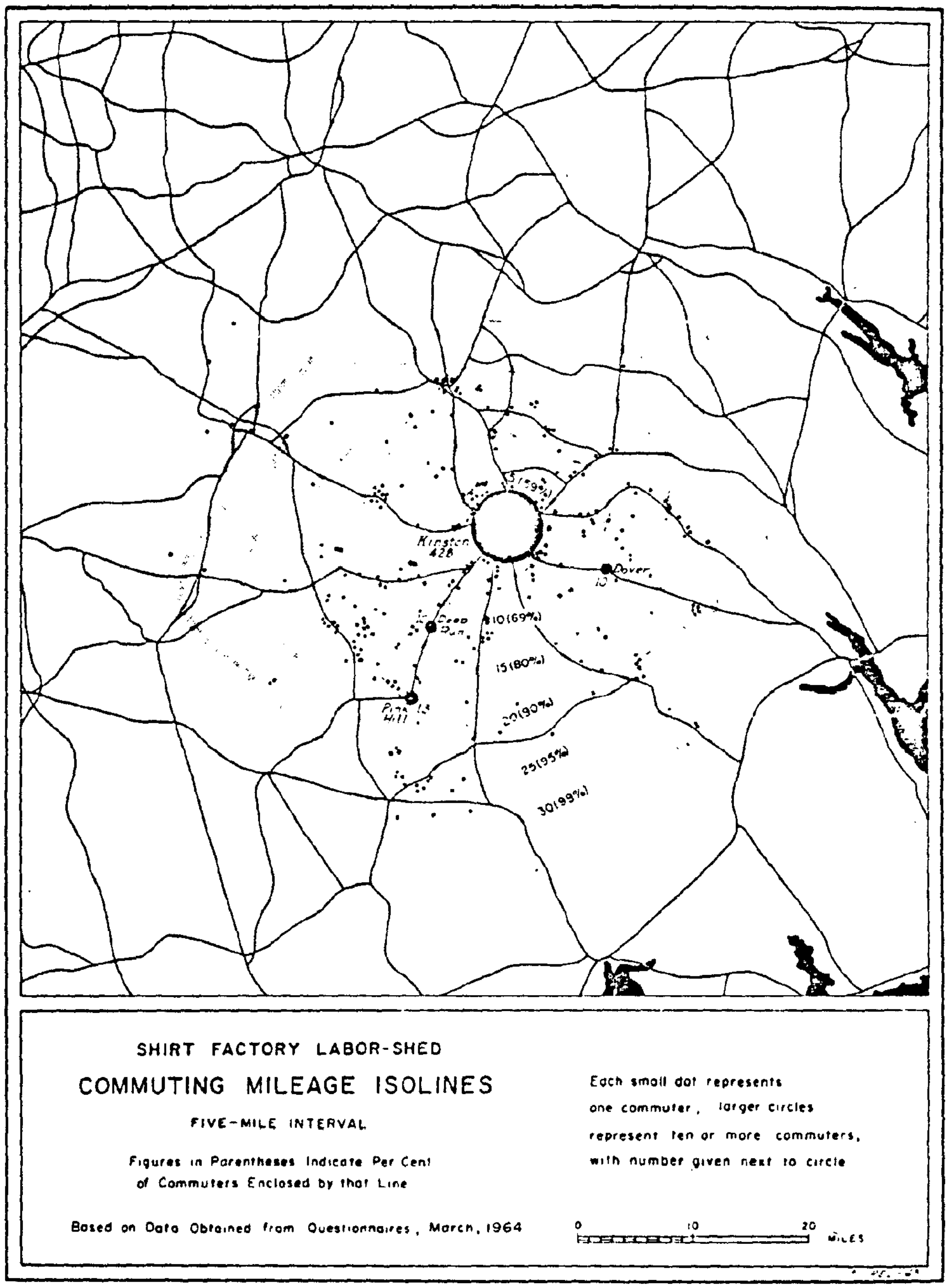

FIG. 6.

week, compared with $109 at the fiber plant and $52 at the shirt factory. Possibly, differences in commuting habits failed to show up within the fiber plant sample because virtually all fiber workers receive a wage above the ten-county average. The same was true of the shirt factory where the great majority of workers are paid a wage below the regional average. This suggests that there is a positive relationship between wages and commuting, and that when a plant offers wages appreciably above those prevailing in a region, one can expect, *cetera paribus*, workers to exhibit a greater willingness to commute long distances. This is consistent with findings in the study of Kaiser aluminum workers at Ravenswood, West Virginia.[17]

OTHER PERSONAL FACTORS INFLUENCING COMMUTING

Personal factors, those that vary with the individual worker, which may influence and thus help to explain a commuting pattern include, in addition to wages, the age, sex, and length of service of workers. Data on the latter three factors are shown by commuting zone in Table VI. The average age of workers declines somewhat with increased commuting distance; workers living close to the plant tend to average four years older than those doing considerable commuting. This is about equally true for both plants. Similarly, the average length of service for both groups diminishes with increased commuting distance, particularly in the case of the shirt factory. These findings are consistent with those of most other analysts who have noted a greater willingness (or necessity) of younger persons to commute and a lower seniority level of the average longer-distance commuter. These two observed facts are probably related: a younger person takes a job, commutes a considerable distance, and after several years when he commands a higher wage, decides to buy a house closer to the plant. Testifying to this is the fact that about one-fourth of the present fiber plant workers and one-sixth of those at the shirt factory have moved closer to the plant since taking their present job.

Sex does not seem to be a factor in explaining commuting; for both plants the commuting habits of women are about the same as for those of the men. As Peterson noted in his Iowa study, "the lack of any consistent relationship between sex and commuting behavior is the only safe generalization that can be made."[18]

CONSTRUCTION OF PROBABILITY MODELS

A means of investigating the significance of two geographic variables—population and distance—is provided by constructing gravity probability models. The gravity concept holds that the potential interaction between two points or areas is directly proportional to their populations and inversely proportional to the distance between them. In the case of commuting, the gravity idea can be conceived as suggesting that an individual plant (or group of plants) attracts commuters from surrounding areas in direct proportion to the population of the area and in inverse proportion to the distance between the area and the plant. As is evident in Figures 5, 6 and 7, the density of commuter origins is not constant; nor does it diminish at a constant rate with increased distance from the plant. It is here assumed that much of this "unevenness" can be attributed to differences in distance and the spatial arrangement of population. Employing the gravity idea, a series of probability models was constructed, experimenting with various exponents of distance (measured in miles and minutes) in an attempt to establish a model which most closely approximated the actual distribution of commuters. It is reasoned that such a model provides a basis for judging the influence of population and distance

[17] *Labor Supply and Mobility*, *op. cit.*, pp. 28–30.

[18] Peterson, *op. cit.*, p. 11.

Zone	Miles
1.....	0–4
2.....	5–9
3.....	10–14
4.....	15–19
5.....	20–24
6.....	25–29
7.....	30–34
8.....	35–39
9.....	40–44
10.....	45 & over
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TABLE VI

AGE, SEX, AND LENGTH OF SERVICE OF WORKERS, BY COMMUTING ZONES

Zone	Miles	*Average age*		*Sex, fiber plant*			*Sex, shirt factory*			*Average length of service (months)*	
		Fiber plant	*Shirt factory*	*Male*	*Female*	*Per cent female*	*Male*	*Female*	*Per cent female*	*Fiber plant*	*Shirt factory*
1.....	0–4	34.2	33.9	96	17	15.0	44	391	89.9	110	95
2.....	5–9	33.1	32.9	205	53	20.5	8	63	88.7	106	89
3.....	10–14	32.5	30.8	174	27	13.8	4	77	95.1	98	63
4.....	15–19	29.8	30.8	71	11	13.4	7	65	90.3	74	53
5.....	20–24	31.6	29.0	101	16	13.7	4	36	90.0	97	31
6.....	25–29	31.6	28.4	52	9	14.8	3	22	88.0	92	44
7.....	30–34	30.5	29.1	40	15	27.3	1	7	87.5	89	79
8.....	35–39	30.0	22.0	61	17	21.8	..	1	100.0	95	48
9.....	40–44	30.4	28.0	45	9	16.7	..	1	100.0	89	144
10.....	45 & over	30.0	....	30	3	9.1	..	...	.....	90	...
All Zones..........		32.0	32.7	875	177	16.8	71	663	90.3	98	82

on commuting.[19] Such models also suggest a means for estimating the potential extent of a labor-shed about a proposed new industrial facility.

Probability models are presented for the fiber plant only. The fiber plant commuting pattern, involving greater distances and a much larger area, provides a more satisfactory basis for appraising the significance of population and distance as factors influencing commuting than does the geographically more-restricted shirt factory commuting pattern.

Before constructing the models it was necessary to make several decisions on methods and procedure. First, in all models a direct positive relationship was postulated between the number of commuters from an area and that area's population; distinctions between models are confined to varying expressions of the effect of distance on commuting. Second, the existing network of townships was used as the basis for regionalizing the ten-county area because of the availability of population data for each township. Third, the 1960 population data, available on a township basis, were used despite a four-year time difference; estimates of 1964 county populations fail to show any significantly large shifts in population within the study area since 1960. Fourth, the area under consideration was limited to those 74 townships shown to be wholly or largely within a one-hour commuting distance of the fiber plant (Fig. 7). One-hour's distance was selected because it includes almost all commuters and appears to represent a distance beyond which few workers would consider commuting. As noted earlier, the one-hour isoline corresponds rather closely with the 45-mile isoline on Figure 5. Fifth, the approximate population center-of-gravity of each township was used to measure the distance between a township and the plant; distances were read off the commuting isoline maps, in miles or minutes (Figs. 5 and 7). Sixth, in indicating the distribution of commuters suggested by a model, each of the 74 townships is placed in an appropriate distance zone for purposes of simplicity and the data presented by such zones; zones were established over intervals of five miles and six minutes, respectively. Six minutes was chosen as the time interval

[19] A similar approach was used by Edward J. Taaffe, and others: The Peripheral Journey to Work, A Geographic Consideration (Evanston, Ill., 1963), pp. 36ff.

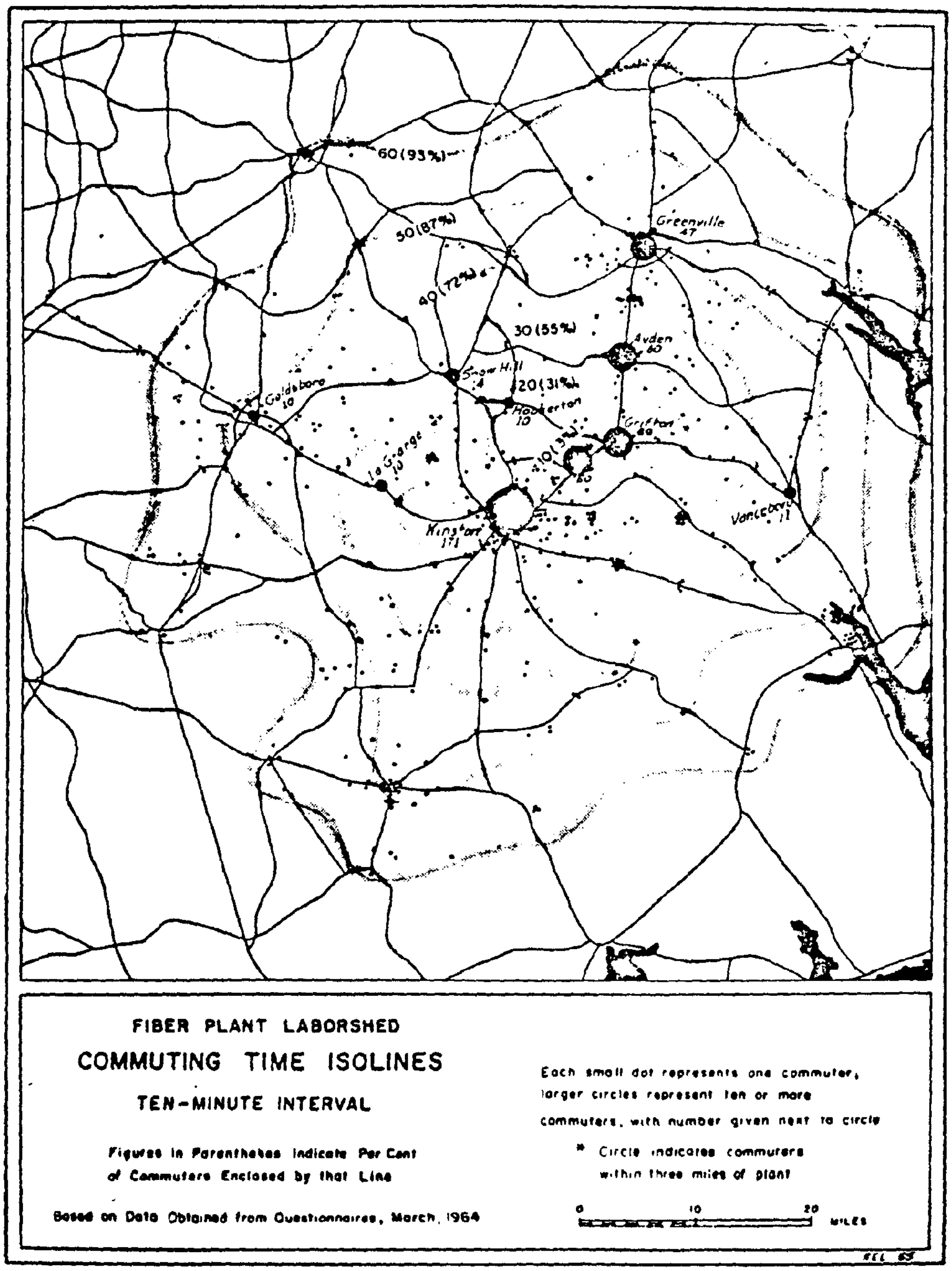

FIG. 7.

(rather than ten as in Figure 7) only because a regression analysis indicated a commuting time of 1.25 minutes per additional mile; 1.25 times 5 miles equals 6.25 minutes, with six being the closest round number.

In the first series of seven models distance is measured in miles. The distribution of commuters suggested in each of these models is shown by distance zones in Table VII. The distributions are expressed as percentages of the 74-township total. For each model the coefficient of geographic association[20] is calculated, measuring the degree of coincidence between the distribution suggested by the model and the actual distribution of commuters by distance zones.

Model one assumes that distance retards commuting in direct proportion to mileage. This is the most elementary formulation of the gravity concept; $c = p/d$ with c representing the number of commuters, p the population of the township under consideration, and d the distance in miles from the township's population center-of-gravity to the plant (read from Fig. 5). Model one suggests that there are more commuters from the more distant zones and somewhat fewer from the nearer zones than is actually the case. In other words, the retarding effect of distance is understated beyond 25 miles, and overstated closer in. Nevertheless, a reasonably high (.851) coefficient of geographic association is attained.

In the second model the frictional effect of distance in discouraging commuting is increased by squaring the distance. This formulation, $c = p/d^2$, is rather commonly employed by those constructing gravity models. In this instance the negative influence of distance is grossly exaggerated, and the coefficient of geographic association is a poor .728. In all but the two closest zones the suggested number of commuters is understated.

Model three seeks a better fit by attempting to combine the approaches in the two previous models. Since model one's suggested commuters in the closer zones were somewhat below but close

[20] In this study the coefficient of geographic association is used to compare the geographic distribution of commuters suggested in a probability model with the actual distribution by distance zones, expressed in percentages of the total. Percentage values for each zone in one distribution are subtracted from values in the other, and the sum of the positive (or negative) differences divided by 100 is then subtracted from one. All coefficients will have a value somewhere between zero and one; zero signifies a complete lack of association, and a value of one indicates a perfect association. For a discussion of this measure see Walter Isard: Methods of Regional Analysis (New York, 1960), pp. 253, 255; or John W. Alexander: Economic Geography (Englewood Cliffs, 1963), pp. 595-597.

TABLE VII

DISTRIBUTION OF FIBER PLANT COMMUTERS SUGGESTED BY PROBABILITY MODELS

(Distance measured in miles)

Zone	Miles	*Actual distribution Per cent*	*Model 1 Per cent*	*Model 2 Per cent*	*Model 3 Per cent*	*Model 4 Per cent*	*Model 5 Per cent*	*Model 6 Per cent*	*Model 7 Per cent*
1......	0-4	7.56	6.12	24.74	9.30	1.64	1.69	7.00	7.63
2......	5-9	31.86	27.52	41.96	41.85	19.69	20.29	31.52	34.37
3......	10-14	15.77	8.62	8.78	13.11	9.27	9.55	9.88	10.77
4......	15-19	7.57	5.76	4.05	8.79	8.95	9.29	6.63	7.21
5......	20-24	13.29	13.13	7.17	17.12	21.18	20.33	13.73	13.73
6......	25-29	2.59	3.83	1.81	2.78	5.34	4.91	3.60	3.31
7......	30-34	3.79	6.17	2.46	2.20	7.27	6.79	5.30	4.60
8......	35-39	11.22	16.96	5.68	3.27	16.74	16.53	13.45	11.18
9......	40-44	4.54	5.42	1.61	.75	4.76	4.97	4.13	3.36
10......	45 & over	1.82	6.48	1.75	.78	5.17	5.69	4.79	3.85
Total..............		100.01	100.01	100.01	99.95	100.01	100.04	100.03	100.01
Coefficient of geographic association with actual distribution			.851	.728	.830	.754	.763	.919	.934

to the actual, model three assumes that the number of commuters decreases directly with distance up to a range of 20 miles; beyond that the distance is squared just as in model two. Overall, the result is an improvement over model two, with a .830 coefficient of geographic association, but the number of commuters in the more distant zones is even more severely understated.

In models four and five, a different approach is used; a frictionless zone is assumed. It is reasoned that since the average fiber plant worker drives over 17 miles, and since over one-fourth of all workers drive 20 miles or more, perhaps distance seriously discourages commuting only beyond a certain point. Twenty miles was selected, somewhat arbitrarily (but with the distribution in model one in mind), as the outer limit of this frictionless zone. In model four, calculations all distances over 20 miles are squared, and distances up to 20 miles all assigned a value of 400 (20 squared). In model five, distances over 20 are tripled, and distances up to 20 miles all assigned a value of 20. The suggested distribution of commuters by distance zones is about the same in both models; the number of short-distance commuters is badly understated, with the result that the suggested number of medium and long-distance commuters is generally too high. In this instance it appears that the assumption of a frictionless zone is inappropriate.

Model six abandons any assumption that there is a frictionless zone or that distance discourages commuting proportional to some power (e.g., the square) of the mileage. At the same time, it is recognized that the retarding effect of distance is accelerated toward the outer margin of the labor-shed. In model six calculations, commuting is assumed to diminish directly with distances up to 20 miles, and beyond that at a pace proportional to twice the mileage (e.g., a distance of 30 miles would be assigned a value of 20 + 10 x 2 = 40). Employing this approach, a quite favorable .919 coefficient of geographic association is obtained. Nevertheless, the proportion of longer-distance commuters was sufficiently overstated to warrant continued experimentation.

Model seven utilizes the same approach as model six, but the frictional effect of distance beyond 20 miles is increased. Commuting is assumed to diminish directly with mileage up to 20 miles, and beyond that at a pace proportional to three times the mileage. In this case the suggested percentage of commuters from each mileage zone is close to the actual distribution, and a very favorable .934 coefficient of geographic association is realized. The restraining effect of mileage could be further restated in subsequent models and the coefficient of association probably improved somewhat, but the approximate significance of mileage would appear to be already evident.

Another set of five models was constructed. These differ from the others in that distance is measured in terms of commuting time (Table VIII). It was reasoned that it might be possible to achieve a better fit using this distance measure, and, if so, it might suggest that time is a better measure of commuting distance than mileage.

Models eight and nine, patterned after models one and two, employ the two most standard formulations of the gravity concept. In model eight distance is assumed to retard commuting in direct proportion to the number of minutes, and in model nine in direct relation to the square of the number of minutes involved. Model eight results are inferior to those of model one; the proportion of commuters beyond 35

TABLE VIII

DISTRIBUTION OF FIBER PLANT COMMUTERS SUGGESTED BY PROBABILITY MODELS

(Distance measured in minutes)

Zone	Minutes*	Actual distribution Per cent	Model 8 Per cent	Model 9 Per cent	Model 10 Per cent	Model 11 Per cent	Model 12 Per cent
1	6–11	7.56	3.37	10.39	4.10	9.31	35.63
2	12–17	30.35	21.28	35.54	25.85	58.73	33.42
3	18–23	12.74	6.25	8.53	7.59	14.78	6.61
4	24–29	9.30	6.03	6.24	7.31	4.91	3.99
5	30–35	8.64	7.42	6.53	9.01	3.35	3.86
6	36–41	9.94	12.59	9.33	13.78	3.38	5.01
7	42–47	4.32	7.07	4.31	5.95	1.19	2.22
8	48–53	10.37	20.60	11.76	15.85	2.80	5.72
9	54–60	6.79	15.40	7.34	10.53	1.57	3.54
Total		100.01	100.01	99.97	99.97	100.02	100.00
Coefficient of geographic association with actual distribution			.758	.900	.849	.678	.689

*The "0–5" minute zone is considered nonexistent. As indicated by the regression line in Figure 3, it requires about six minutes to travel zero miles; this is presumably a measure of terminal time.

miles is badly overstated, and within 35 miles understated. By contrast, the results in model nine are immensely superior to those of the unsuccessful model two. While the values for the two closest zones are significantly high, a favorable (.900) coefficient of geographic association is attained.

Model ten uses the highly effective model seven as a guide; distance is assumed to restrain commuting directly as the number of minutes up to 35 (as suggested by model eight), and beyond that at the rate of three times the number of minutes. Model ten did not achieve model seven's measure of success, and recorded a fair (.849) coefficient of geographic association.

Model eleven attempts to improve on model nine by adjusting the assumed frictional effect of distance. In model nine the suggested values were high up to 18 minutes. Therefore, in model eleven distance is presumed to retard commuting directly as the number of minutes up to 18, and beyond that at the rate of the square of values in excess of 18 (e.g., 25 minutes would be assigned a value of 18 + 7 squared, or 67). The results provide an example of how a seemingly minor adjustment can severely change suggested distributions; model eleven registers a very poor (.678) coefficient of geographic association.

One final model was constructed. In the previously discussed regression analysis comparing commuting mileage with minutes, a "terminal time" of about six minutes was indicated. Perhaps a superior measure of distance would be attained by subtracting six minutes from all indicated commuting times, thus specifying the time elapsed while actually travelling. Otherwise, model twelve is similar to the successful model nine, i.e., commuting is assumed to be discouraged in direct proportion to the square of the distance. The results in this model are disappointing; the very poor (.689) coefficient of geographic association suggests that the subtraction of "terminal time" is unwarranted. Despite the failure of attempts to improve on model nine, the best in this group, it must be assumed that continued experimentation could in all likelihood produce a somewhat closer fit.

The construction of the probability models demonstrates that geographic distributions similar to the actual ones can be approximated, lending some credence to the assumption that the number of commuters will vary directly with population and inversely with distance from a specified point. The significance of an irregular population distribution as a factor contributing to an uneven geography of commuter origins is evident in the models. Less obvious is the specific impact of distance on commuting. The fact that a very high fit was attained in model seven suggests that in this area distance does exert a greater restraining influence beyond about twenty miles, perhaps proportional to thrice the mileage beyond that point. As to whether the number of miles or the number of minutes is the better measure of distance, there is little evidence here to support one over the other, even though a somewhat better fit was obtained using mileage.

THE CONSIDERATION OF OTHER GEOGRAPHIC VARIABLES

Population and distance are not the only geographic variables which probably have a bearing on the spatial pattern of commuter origins. This would partially explain the difficulty in constructing models which consider only these two variables. When probability model distributions were compared with actual distributions, discrepancies were noted. For example, a particular distance zone may be supposed to generate a specified number of commuters according to some model, but in fact provides only a few. Perhaps some other factors are causing the distance zone to supply fewer commuters than would be expected on the basis of the population-distance relationship built into the model. As can be seen in Table I, there are sizable differences among labor-shed counties in such matters as rates of population growth, urbanization, intensity of agricultural and manufacturing employment, per capita income, wages, levels of unemployment, and density of paved roads. One might consider other factors, such as levels of education, land tenancy, and farm abandonment. All of these factors and many more may have some influence on the tendency or willingness of workers to commute.

As a means of observing the possible significance of some of the variables noted above, Table IX was prepared, comparing the actual number of fiber plant commuters from each of nine counties with the number suggested in probability model seven, the model achieving the highest coefficient of geographic association. Model seven values are treated as the "expected norm," and the percentage deviation of the actual number from that expected in model seven is indicated. The southern counties provide many more commuters than model seven suggests, and the northwestern counties quite the reverse. The deviations were compared with the county data presented in Table I. Clearly evident is a reasonably high correlation between these deviations (actual from expected commuters) and at least three geographic variables: per capita income, population density, and intensity of agricultural employment. To facilitate regional comparisons, for each of the four variables the nine counties are ranked, one through nine (Table IX). In the case of agricultural employment, where the correlation is negative, the ranking is given in inverse order to maintain concordance.

The similarity of the four rankings shown in Table IX is sufficient to suggest that these three geographic variables may have a significant effect on the commuting pattern of fiber plant workers. The moderately high rank correlation coefficients attained (+.57 to about three times the area. Commuting isolines provide a promising means of delimiting labor market areas; this permits the labor-shed to be conceived as a region diminishing by degree rather than terminating abruptly at some arbitrarily-designated limit. Commuting isolines can be based on miles or minutes, but the additional effort required to obtain data on travel time in itself recommends the use of mileage in constructing isoline maps. As to the question of which is the better measure of commuting distance—miles or minutes—the evidence in this study, while inconclusive, does suggest that there is relatively little advantage in one over the other.

Wages appear to be the primary factor explaining the acute differences in the two commuting patterns. Wages at the fiber plant are, like their commuting distances, much above the average for the state and the ten-county study area. Within the fiber plant group, there is no correlation between wages and distance, but the critical point here may be that almost all fiber plant workers receive a wage above the study-area average. The shirt factory workers, with a below-average wage, commute a distance somewhat under the state mean. The prevalence of female workers at the shirt factory does not explain the variance in distance, as there are no apparent differences in the commuting habits of men and women in this area. A firm considering a location in this or a similar district should compare its wage standards with those prevailing in the area before making estimates on the size of the labor-shed from which it can expect to draw labor.

A series of probability models based on gravity concepts provided a useful method of appraising the importance of two geographic variables, population and distance. The positive relation between the irregular population distribution and the uneven geographic pattern of commuter origins is effectively indicated by the high degree of association between the distributions of commuters suggested by some models and the actual geographic distribution. The apparent significance of distance in retarding commuting in this section of eastern North Carolina was approximated through a lengthy process of experimentation with assorted valuations of distance in the probability models.

Discrepancies between the actual distribution of commuters and those designated by the more successful models are possibly explained by spatial differences in other conditions. Districts generating more commuters than a model suggests tend to be areas with a high percentage of the labor force in agriculture, low per capita income, low population density, and little if any recent population growth. In the final analysis, an appraisal of any commuting pattern requires a consideration of a multitude of interrelated geographic variables.

ACKNOWLEDGMENTS

The kind cooperation of E. I. du Pont officials, and Sol Schechter of the Kinston Shirt Company, and the advice and help given by Hugh M. Raper, Lonnie Dill, and others of the Employment Security Commission of North Carolina are sincerely appreciated.

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Spatial Aspects of a
Dev. and Cul. Change
J. R. P. Friedman
Economic Developm
No. 3, 1956, pp. 213-

TABLE IX

SOME GEOGRAPHIC VARIABLES POSSIBLY RESPONSIBLE FOR DISCREPANCY BETWEEN MODEL SEVEN AND ACTUAL DISTRIBUTION OF FIBER PLANT COMMUTERS

County[a]	*Number of commuters suggested in Model 7*	*Actual number of commuters*	*Percentage deviation, actual from suggested*	*Rank*[b] *deviation of actual from suggested (negative to positive)*	*Rank*[b] *1962 per capita income*[c]	*Rank*[b] *1960 population density*[c]	*Rank*[b] *percentage of 1960 labor force in agriculture*[c] *(inverse order)*
CENTRAL COUNTIES							
Lenoir	435	368	−15	3	3	3	3
Pitt	203	261	+29	7	5	4	6
Greene	56	57	+2	5	6	6	9
NORTHWESTERN COUNTIES							
Wayne	88	73	−17	2	4	2	4
Wilson	31	7	−77	1	2	1	2
SOUTHERN COUNTIES							
Duplin	19	51	+168	9	8	7	7
Jones	13	23	+77	8	9	9	8
EASTERN COUNTIES							
Beaufort	19	19	0	4	7	8	5
Craven	54	64	+19	6	1	5	1
Spearman's rank correlation coefficient with figures in fourth column					+.62	+.73	+.57

[a] Only those counties within a one-hour commuting distance (arbitrary cut-off point in probability models) are considered.
[b] Rank among nine counties here considered.
[c] Derived from data in Table I.

+.73) would be much higher were it not for Craven County's sizable rank inconsistency. Craven is unique among study area counties in that it possesses a large military installation (Cherry Point Marine Air Station) employing large numbers of civilians, thus explaining in part that county's higher per capita income and lower intensity of agricultural employment.

The generation of greater than expected numbers of commuters from lower-income counties[21] tends to substantiate the observation made earlier that when a manufacturing plant offers wages appreciably above those prevailing in a region, one can expect the workers to show a greater willingness to commute longer distances. The data for Duplin and Jones counties in Tables I and IX suggest that the greater the positive difference between a plant's wages and those prevalent in an area, the greater the distance workers will be willing to travel. The counties with the highest percentage of the labor force in agriculture are also the counties with lower per capita incomes and stagnant or declining populations; such conditions are indicative of poor or declining agricultural opportunities and presumably stimulate commuting.[22]

SUMMARY

The commuting pattern of the higher-wage fiber plant workers contrasts sharply with that of the lower-wage shirt factory employees. The former commute a mean distance of 17.5 miles each way, while the latter average 6.7 miles. Where the two labor-sheds are outlined to encompass the "nearest 90" per cent of the respective commuters, the fiber plant labor-shed covers

[21] Further evidence of such a relationship can be seen in Figure 6 which shows the distribution of shirt workers. Duplin County, where the average income is particularly low, supplies many more workers than other higher-income counties equidistant from the factory.

[22] The greater tendency of workers to commute where agricultural conditions are poor was observed in upstate New York by Harold E. Conklin: The Rural-Urban Economy of the Elmira-Corning (N.Y.) Region, *Journ. Land and Public Utility Economics*, Vol. 20, 1944, p. 3.

Bringing Jobs to People: Does It Pay?

by GENE F. SUMMERS and JEAN M. LANG

This article was prepared by Gene F. Summers, Professor of Rural Sociology, University of Wisconsin-Madison, and Jean M. Lang, Editor and Science Writer, Institute for Environmental Studies, University of Wisconsin-Madison. It is based upon material in Gene F. Summers, Sharon Evans, Frank Clemente, Elwood M. Beck, Jr. and Jon Minkoff, *Industrial Invasion of Nonmetropolitan America;* Praeger, 1976.

The University of Wisconsin Department of Rural Sociology issues a semi-annual list of "Publications in Print." Many of these deal with applied programs in Wisconsin, others with specific studies in community development and rural industrialization related to problems discussed in this article. For a copy of the publications list, write Gene Summers at the Department of Rural Sociology, 603 WARF Building, University of Wisconsin, Madison, Wisconsin, 53706.

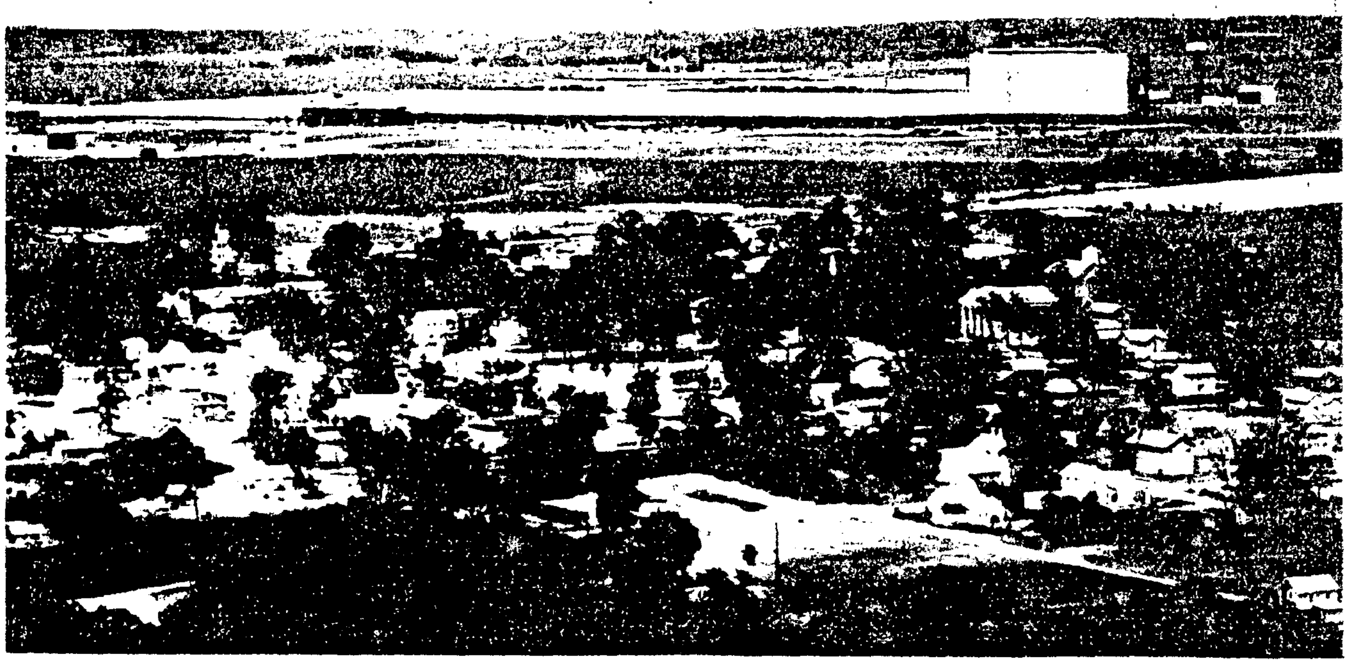
Over the last twenty-five years manufacturing industries have been moving out of the city and into the countryside at an ever increasing rate. Between 1960 and 1970 manufacturing employment in nonmetropolitan areas grew by 22 percent while manufacturing jobs in metropolitan areas grew only four percent.

Industries have had their own reasons for expanding into rural areas: lower local taxes, cheaper land and water costs, and a good supply of laborers, presumably steeped in the American work ethic.

Industry's interest in rural factory sites has been strongly encouraged by the eager solicitations of potential host communities and by federal policy. For example, nonmetropolitan location of industry has been an explicit goal of recent federal anti-poverty legislation including the Economic Opportunity Act of 1964, the Public Works Act of 1965, the Appalachian Regional Act of 1965, and the Rural Development Act of 1972.

The apparent logic behind this interventionist strategy is fairly simple. Both rural poverty and urban socioeconomic problems are seen as products of a geographic mismatch of labor supply and demand. The mismatch has been caused by a decline in economic opportunities in rural areas and an increase of the same opportunities in urban areas. One means of correcting this imbalance is to stimulate the rural economy, thereby increasing job opportunities and halting the exodus of rural labor to the city.

An industry, particularly a manufacturing plant that generates a direct flow of money to the local community, is considered an ideal stimulus for the rural economy. Indus-



This aerial photo shows the village of Hennepin, Illinois, and the Putnam County Court House (center, right)—the oldest in continuous use in Illinois—with a new Jones & Laughlin Steel plant in the background. The plant produces cold rolled and galvanized steel sheets. This, and the photo on page 10 are courtesy of the Jones & Laughlin Steel Corporation.

try's presence is expected to spark income growth, population redistribution, housing improvements, better community services, and other amenities. It is exactly these presumed benefits that make large industry so attractive to the small community. But are these benefits being delivered? Do rural communities really profit from industry's arrival, or are there undesirable side effects?

In a study sponsored by the Economic Development Administration, U.S. Department of Commerce, a team of sociologists attempted to answer these questions.[1]

Our group reviewed almost 100 case studies of the impacts of industrial location on nonmetropolitan communities. The case studies encompassed more than 700 manufacturing plants in 245 locations and 34 states. The predominant industries were metals production and fabrication, chemicals manufacture and wearing apparel assembly. The factories ranged in size from those with less than ten workers to plants with over 4,000 employees. The majority of factories were located in the Midwest and the South.

Although the studies included a great diversity of industries and locations, they did not constitute a representative sample and should be judged accordingly.

Employment - Direct Hiring

There is no question that industry brings new jobs to a community. Some of the jobs come from direct hiring of plant personnel, and others follow indirectly as the new industry stimulates growth in existing sectors of the local economy. The important question is who gets the new jobs.

Our study revealed that new factories generally *did not* hire the local unemployed. In the majority of cases only a small portion of the jobs were filled by local disadvantaged or unemployed persons (Table 1). There was also considerable evidence that nonwhites were underrepresented in rural factories.

There appeared to be two primary reasons why local poor, minorities and disadvantaged were infrequently hired:

First, the labor pool for a rural industry extends well beyond the area of the host community. Long distance commuters are not uncommon, and the new factory generates considerable in-migration and settlement of workers from the surrounding area (Table 2). From this widespread labor force, industry selects the better educated, more highly skilled worker with the "right" racial heritage. The local unskilled resident often has little hope of qualifying.

Second, many jobs are taken by newcomers to the labor force, primarily women. Many rural industries, particularly textiles and electronics assembly, prefer female labor. Thus previously nonworking women fill the factory jobs. This increases the number of people in the labor force but does not decrease the number of unemployed workers in the community.

Ironically, it is possible for new industry to reduce unemployment and poverty in a community without providing a

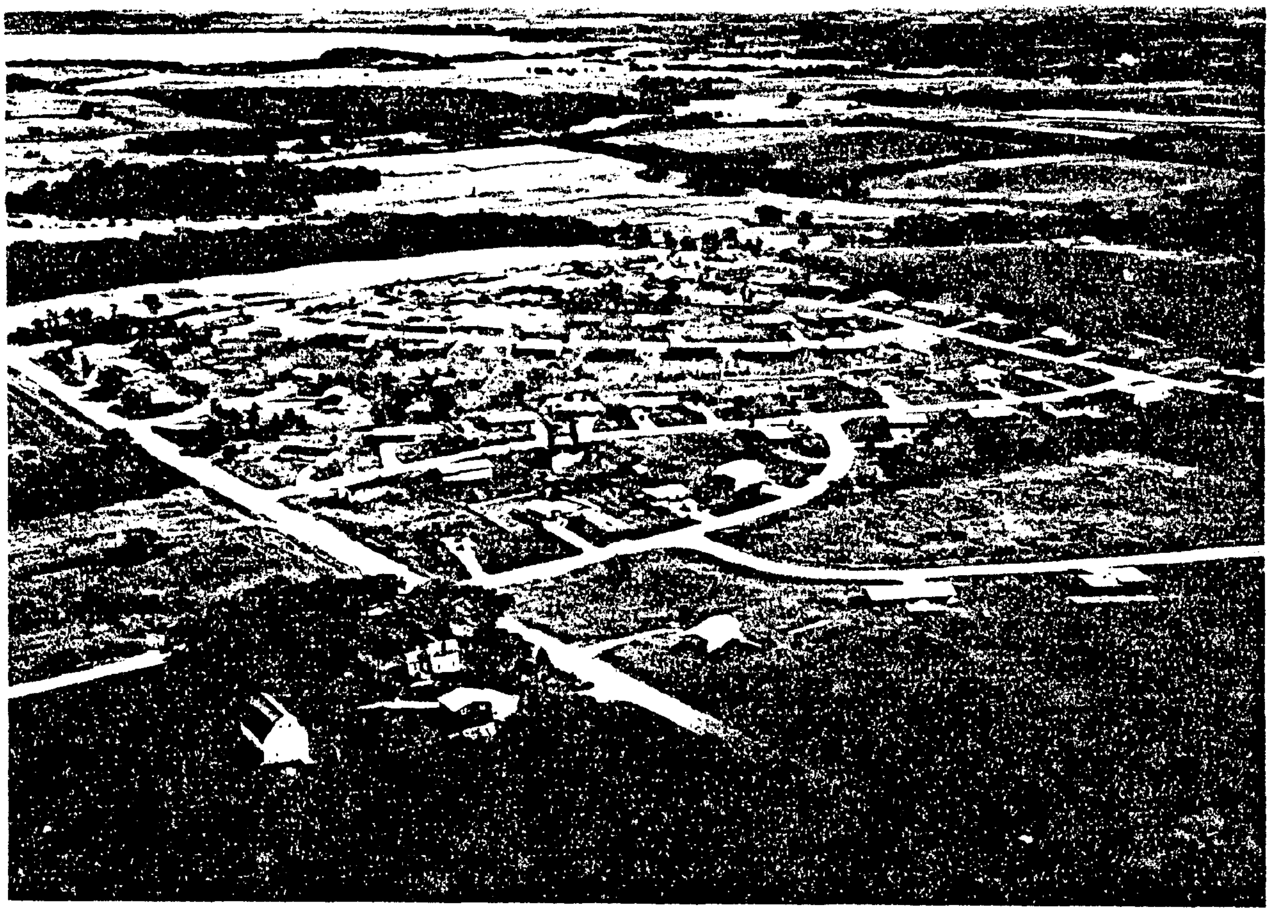
Zoning laws prohibit subdividing farms in this Wisconsin township so developers get around this rule by creating 5-acre "farmettes." University of Wisconsin photograph by Jim Larison.

Table 1
Percentage of New Plant Workers Previously Unemployed

Study Site	*Industry*	*No. of Jobs*	*% of Jobs Filled by Previously Unemployed*
Linton, Ind.	Aluminum chairs	100	25.0%
Wynne, Ark.	Apparel; copper tubing	1,900	11.2
Rochester, Minn.	Business machines	1,862	14.0
Ravenswood, W. Va.	Aluminum	894	11.0
E. Oklahoma Comm.	12 plants (mixed)	554	7.7
A.R.A. Area Survey	33 plants (mixed)	1,262	43.0
Mt. Airy, N. C.	Appliances	435	8.0
Jefferson, Ia.	Stamping, athletic equipment	369	3.0
Orange City, Ia.	10 plants (mixed)	364	19.0
Creston, Ia.	Appliance, chemicals, oil filters	424	1.0
Grinnell, Ia.	Farm machinery, stadium bleachers, plastics	200	7.0
Decorah, Ia.	Screws; undetermined	212	8.0
Star City, Ark.	Apparel (shirts)	336	9.5

Table 2
Proportion of Plant Workers Migrating to Take New Employment

Census Region	*No. of Studies*	*Average Percent*
North Central	6	32
South	4	32
West	1	18
All Regions	11	30



An example of the encroachment of housing developments on agricultural land. Photo courtesy of Jim Larison, University of Wisconsin.

single job to the disadvantaged who live there. Although the labor force may expand faster than the ranks of the unemployed, the absolute number of persons in economic distress may be unchanged or slightly increased (Table 3). In general, the case studies showed that the operations of the local labor market often work against the needs of the people for whom rural industrial development has been allegedly promoted.

Employment - Multiplier Effect

Besides hiring local workers for its factory, new industry is expected to generate secondary jobs in the retail, wholesale and service trades of the host community. This indirect effect on employment is called a "multiplier." A multiplier of 1.0 means the industry brings no new jobs except those by direct hiring. A multiplier of 1.65 means that for every new job in the factory, another .65 job is created within the community.

A significant finding of the case study review was that the majority of industries in the rural community had a multiplier effect of *less than 1.2*. Several reasons were given for these low multipliers:

First, the less diversified the existing manufacturing, commercial and service industries are, the less impact the new industry will have on local economy.

Table 3
Unemployment Rates Before and After Industrial Development

Study Sites	*Dates* *Before*	*Dates* *After*	*Rates (%)* *Before*	*Rates (%)* *After*	*Change*
Jackson Co., Ia.	1950	1960	1.8	3.7	+1.9
Cross Co., Ark.	1960	1970	5.2	4.6	-0.6
Washington Co., Miss.	1950	1963	10.1	4.2	-5.9
Box Elder Co., Utah	1955	1965	6.7	7.0	+0.3
Putnam, LaSalle and Bureau Co., Ill.	1966	1973	3.6	5.0	+1.4
Adair Co., Okla.	1960	1970	16.4	17.5	+1.1
Cherokee Co., Okla.	1960	1970	16.2	10.0	-6.2
Muskogee Co., Okla.	1960	1970	8.9	7.4	-1.5
Hot Springs Co., Ark.	1958	1970	11.9	7.0	-4.9
Baxter Co., Ark.	1964	1970	8.2	4.7	-3.5
Howard Co., Ark.	1960	1970	4.3	3.9	-0.4
Logan Co., Ark.	1958	1970	15.6	6.8	-8.8
Randolph Co., Ark.	1964	1970	9.4	9.3	-0.1
Benton Co., Ark.	1960	1970	5.5	4.5	-1.0
White Co., Ark.	1960	1970	12.1	12.1	0.0
Laurel Co., Ky.	1960	1963	12.6	7.1	-5.5
Lamar Co., Texas	1952	1962	6.0	5.2	-0.8

Second, commuters, who generally make up a substantial part of the rural factory work force, often spend their salary in their place of residence rather than their place of work. Much of the factory income "leaks out" of the host community.

Third, many small towns already have excess underutilized business capacity. As a result, the firm can handle industry-induced increases in sales without hiring additional workers or enlarging their capital stock.

Fourth, many industries are linked by a national network to outside suppliers and processors and have no need to draw upon local services or products.

At worst, the local community may become little more than a labor source for the factory with virtually no indirect or induced employment.

Four often cited studies (nos. 15, 16, 17, and 18 in Table 4) that depict nonmetropolitan industry with a multiplier of 1.5 or more were closely examined by the review team. In each of the studies it was found that only those rural counties had been selected that had relatively large manufacturing sectors (more than 15 percent of total employment) and were undergoing rapid and substantial economic growth. According to these criteria, only 30 counties in the entire U.S. qualified in 1970.

Income

Industrialization of the rural area does bring an increase in average income over a period of time. The case studies showed that average increases in individual income varied from 5.3 to 183.0 percent, and average family income increases ranged from 25.6 to 178.4 percent. However, in most cases both family and individual income increases were less than 50 percent.

Three factors were largely responsible for the frequent cases of relatively small income growth:

* Small income increases were usually associated with lower wage industries such as wood, textiles and apparel.
* Industries importing raw materials into the area and exporting products out of the area created smaller secondary income effects as discussed above.
* A substantial amount of commuting by nonresidents into an area for work, and by residents out of an area to shop, reduced the size of income growth.

Significantly, of the numerous case studies on industry's impact, very few had considered how income growth is distributed throughout the population. Of those studies which did examine this factor, all suggested that certain sectors of the population receive no benefits from industrial development. Indeed, for groups such as the elderly and blacks, industrialization often has negative effects. As the community's standard of living rises, prices go up and the purchasing power of these disadvantaged groups decreases.

In addition, several of the impact studies showed that the greatest gain in benefits went to newcomers in the com-

Table 4
Employment Multipliers

	Study Site	Unit of Analysis	Research Time Period	Industrial Product	Direct Employment	Employment Multiplier
1.	Linton, Ind.	City	1964	Aluminum chairs	119	1.02
2.	Gassville, Ark.	8-County Area	1960-63	Shirt plant	750	1.11
3.	Summerville, S. C.	4-County Area	1963	Brick factory	25	1.36
4.	Pickens, Miss.	4-County Area	1964-65	Tissue paper mill	57	1.14
5.	Braxton Co., W. Va.	County	1963	Particle board plant	77	1.50
6.	Hart Co., Ky.	County	1963	Bedding plant	111	1.06
7.	Fleming Co., Ky.	County	1958-63	Auto & appliance trim, shoes	328	1.11
8.	Laurel Co., Ky.	County	1958-63	Yarn	107	1.18
9.	Lincoln Co., Ky.	County	1958-63	Apparel	380	1.00
10.	Marion Co., Ky.	County	1958-63	Barrels, Communications equipment, Apparel	496	1.11
11.	Russell Co., Ky.	County	1958-63	Apparel	206	1.03
12.	Howard Co., Ind.	County	1949-60	All manufacturing	4,006	1.44
13.	Box Elder Co., Utah	County	1955-61	Chemicals	5,688	1.34
14.	Lawrence Co., Tenn.	County	1954-63	Bicycles	2,270	1.36
15.	Select U.S. Counties	11 Counties	1950-60	All manufacturing	17,116	1.65
16.	Select U.S. Counties	10 Counties	1960-70	All manufacturing	25,677	1.68
17.	Leflore Co., Miss.	County	1959-64	All manufacturing	1,430	1.59
18.	White Co., Ark.	County	1951-59	All manufacturing	590	1.71

munity rather than to the original residents. This suggests that the people who bear the cost of the development (by increased taxes for land development, for example) may not be the *same* people who will capture the benefits and in fact they may find themselves in a *worse* relative position after development than before.

The question arises as to whether industrial development is a desirable community goal simply because it may marginally increase *average* income. The basic issue boils down to whether growth in "community" well-being should be purchased at the expense of the disadvantaged.

Population Changes

Does industrial development halt population decline in small towns or rural communities? The answer is unequivocally, yes.

All case studies dealing with industry's impact on rural population showed that the rate of population decline had been slowed, halted, or—as in the majority of cases—reversed after industry's arrival. However, the studies also made it clear that most population growth was based on an increased migration of workers into the area.

In eleven case studies, an average 30 percent of factory workers had moved into the host communities to take their jobs. The majority of these workers had originally commuted to the factory from neighboring areas within a radius of 50 miles. Eventually, however, as the workers became more settled and secure in their jobs, most of them moved into the host community or nearby towns. Exceptions to this trend occurred when a county had well-developed transportation and educational systems, as well as a surplus of labor. In such instances, employees preferred to commute rather than move to town.

The population growth that accompanied industrialization was found to be centered in the factory town rather than being spread throughout the country. In almost all cases, the population in the host town increased while the rural and farm population of the surrounding area decreased. Thus, industrialization frequently caused more of the county population to become "urbanized" or "suburbanized" without causing any overall increase in county population.

Industrial location is often promoted as a technique for achieving urban-rural population balance. Our findings, however, suggest that what industry does achieve is a redistribution of the local rural population rather than a movement of people into the area from distant metropolitan areas.

In a number of case studies, the age composition of the population also showed slight change with the arrival of industry. The changes were primarily due to migration in one form or another. In some instances, age declined due to in-migration of young workers with young families.

A close look at twelve case studies revealed that most industries preferred to hire young adults who could handle physically hard work. Yet, surprisingly, industrial development failed to stem the flow of young people migrating out of rural communities. This is noteworthy in light of the popular notion that attracting more industry to the small town will eliminate the need for the young to leave home in search of work.

Benefits to the Public Sector

Industry is actively sought by small communities in the hopes of enlarging the community's tax base. An enlarged tax base means an increase in public income and the expansion of community services. In general, industry's contributions to the public income can be divided into two categories: direct payments and induced (or indirect) payments.

Direct Payments

Property Tax. The actual size of industry's property tax bill is largely determined by local and state tax structures and by negotiated agreements between local government officials, development representatives and industrial management. Case studies show that frequently local government is willing to grant "tax holidays" exempting industrial property from taxation for 5, 10, or 15 years. This is a form of subsidization for industrial development and as such is a *cost* to local government.

Fees and Service Charges. Communities with municipally owned utilities can expect direct payments from industry for services rendered. These utility fees should at least equal the cost of extending service to the plant. The evidence suggests that in many communities costs are, in fact, all that is recovered from fees and there are no net gains from utility payments.

The few studies which focused on industry's direct payments to local government suggest that most of the potential for income gain by the host community is bargained away. Many local leaders are willing to trade direct revenues from new industry for indirect funds on the apparent assumption that the latter will outweigh the former.

Indirect Payments

Indirect payments by industry to the public sector are more diverse and are based on industry's ability to boost local average income and subsequently increase the value—and tax assessments—of local properties and businesses.

Wages and salaries paid by the new industry are a stimulus to growth and add to local income only to the extent that the plant's payroll is spent in the host community. However, one case study revealed that through leakage of income to nonlocal recipients, an average weekly plant payroll of $6,000 shrunk to $4,779. The "leaked" money was spent primarily on food, services and investments in neighboring communities; was put into savings; and was used to pay off old debts. In rural communities, gains in aggregate disposable income may be more apparent than real for the local market.

Increases in local public revenues result from industrial development only when growth in the private sector is converted into public monies. These monies include increased property taxes from the expansion or construction of new homes and businesses, increased retail sales and sales tax,

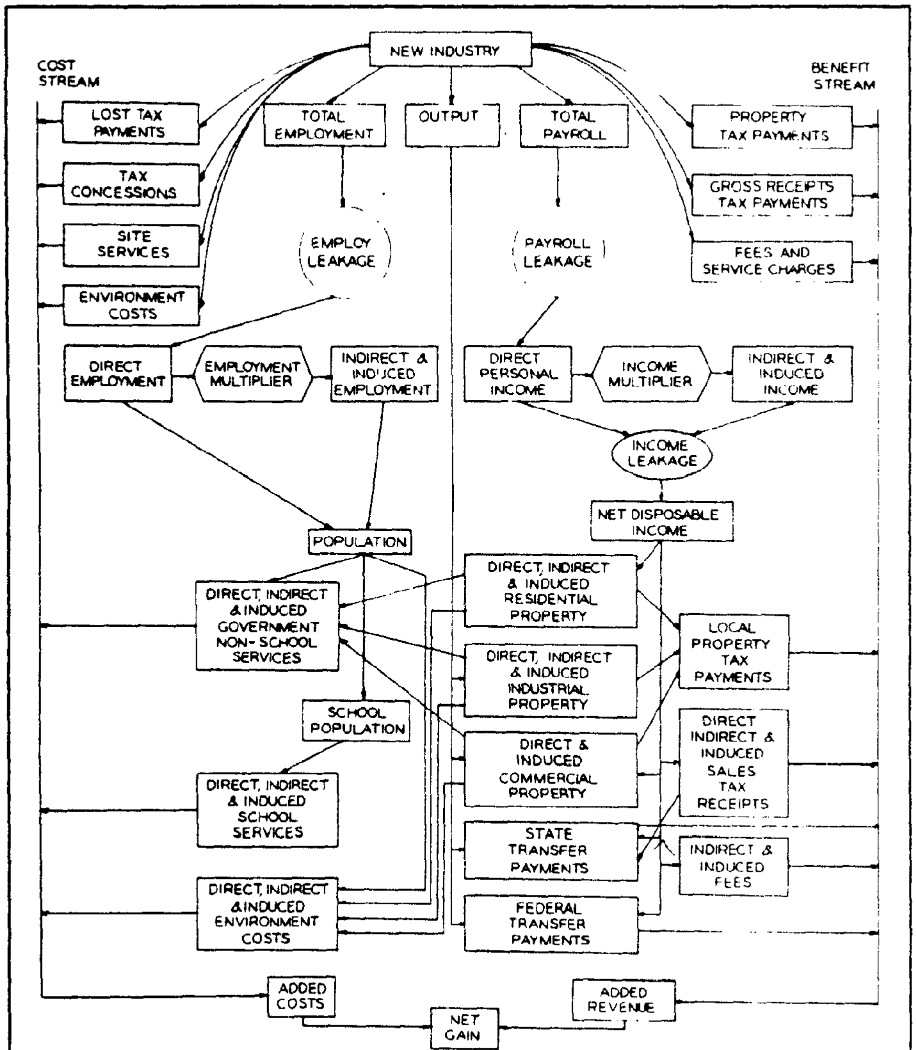


Figure 1: Flow chart for Public Sector Costs and Benefits of New Industry
(Adapted from Hirsch, 1961)

increased utility fees and an increase in the transfer of state and federal revenues to the local community.

Residential and Commercial Property Tax. New manufacturing jobs in a community generally mean that more income will flow into home construction and improvements. This in turn means an increase in property values and proportionately, property taxes. Likewise, as residents spend more disposable income and as industry draws upon the services of local businesses, existing commercial establishments will expand. In fact, all the case studies showed that industrial development did bring increases in assessed valuation of property and subsequent increases in local property tax revenues.

However, the case studies also revealed that increases in housing construction or business expansion cannot be predicted with certainty. Many small towns have both underutilized housing and excess business capacity. This slack means that the town can accommodate a certain amount of growth without ever increasing its commercial or residential tax base.

Retail Sales. Case studies showed that retail sales in industrially developing communities increased substantially from pre-industry levels. In those communities which have a local sales tax, or which receive a transfer of state sales tax receipts, this growth in sales can mean increased revenues.

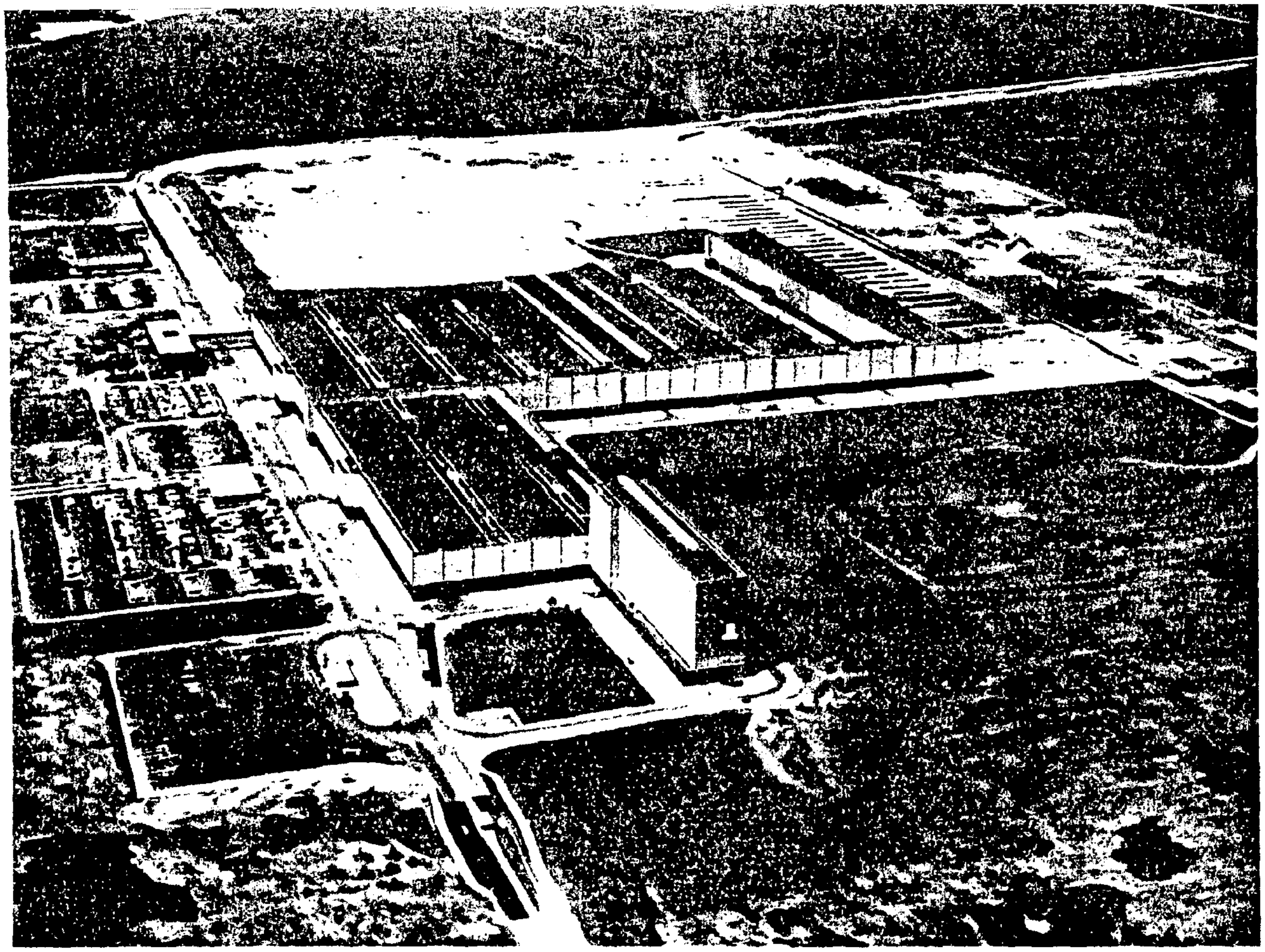
Fees for Services. User fees and charges such as licenses, building permits and rental fees on publicly owned land generally increased as a result of increases in disposable income or a change in the consumption pattern of residents.

Public utility income was seen to rise in a number of case studies.

Intergovernmental Transfer of Payments. Because of legislative constraints placed upon their taxing authority, many municipalities appeal to state and federal governments for a transfer of funds back to the local level. The case studies indicate that as industrial development increases the local average income and as industry's output grows, the volume of these transfer payments also increases. Larger amounts of the taxes on personal income (gasoline, sales, and income tax are typical) find their way back to the local community. Similarly, a greater proportion of corporate income taxes or gross receipt taxes on industrial output are turned back to the host community rather than being added to the state's general fund.

The case studies suggest, however, that industrialized communities may come to depend on state and federal payments for a larger share of their total receipts. Frequently, this dependence on transfer payments is only temporary and declines after a period of adjustment. For example, since the gasoline tax is more immediately responsive to growth in economic activity than is assessed valuation of property, local officials may temporarily rely on gasoline tax transfer payments rather than on property tax to meet immediate costs.

The case studies are very consistent in reporting increases in local revenue following industrial location. The assessed



valuation of property clearly is expanded and property tax receipts increased in every community. Retail sales consistently increased resulting in added revenue from sales tax. Intergovernmental transfer payments increased in absolute dollar amounts and communities appeared to shift the tax burden from local toward nonlocal revenue sources. The sum in the benefit column can add up to a substantial amount.

Cost to the Public Sector

If one considers only the benefit stream, the conclusion must be that new industry produces added revenue for the local public sector. But an often overlooked fact is that the added revenue brought to the community by industry may be equalled or even exceeded by added and often unexpected costs. For this reason it is extremely important to consider how new industry contributes to the costs of the public sector.

Attracting New Industry. The initial costs of new industry arise when a community attempts to attract a plant to its area. The most frequently incurred costs in the wooing of industry are as follows:

* land acquisition costs,
* site preparation (including extension and improvement of access roads and preliminary landscaping),
* loss of previously collectable property taxes in instances where new industry is given a tax "holiday" or reduced rate,
* increased police and fire protection,
* provision of water and sewerage, electricity and/or gas, often for fees that are less than cost.

As an example of the large investments that some communities have in their efforts to attract industry, consider the city in Kentucky that issued $250,000 worth of industrial revenue bonds to finance land acquisition and building construction for a shoe factory. Since the land and building were city-owned, they were exempt from real property tax. In addition, the city granted the company a five-year exemption from personal property taxes.

In another case, a Kentucky city issued a $650,000 revenue bond and held title to the land, building and part of the equipment of the plant making them nontaxable. The city also extended a water line to the plant at a cost of $10,000 to the city.

All these development efforts by the local community are forms of subsidy and must be regarded as costs to the community. In some instances, part of the subsidy cost is recovered, but in other instances only a partial recovery is achieved. Often local public officials underestimate a new industry's requirements for community services above and beyond the initial commitment to land, building and equipment. These additional costs of government services, plus costs of school expansion and environmental degradation, also must be recovered by the public sector if it is to realize a net gain from new industry.

Accommodating Growth. Besides the costs of attracting industry, the host community must also accommodate the costs of a growing population. As mentioned above, industry frequently brings an influx of new workers who are primarily young adults with families. These in-migrants place increased demands on the community for schools, health care, and recreational and general services.

Growth in the number of residential and business properties also places greater demands on local government to provide improved police and fire protection, road maintenance and water and sewerage services. Eleven out of twelve case studies showed substantial increases in costs of community services to residents with the arrival of industry. Water and sewerage services, particularly, were important sources of increased cost. Rockdale, Texas, for example, was forced to drill a new city well and to issue a bond for sewerage line extension as a result of industrial development.

The case studies suggest that while public officials often overestimate their communities' growth capacities, they underestimate the capacity of existing utilities and services to accommodate development. The result is a major outlay of public funds that increase the per capita cost of public services.

Expanding School Services. The case studies provided consistent evidence that new industry increases the population of school-age children. It is also clear that increased enrollment resulted in increased operating budgets for schools and sometimes in high capital outlay to accommodate new students.

While some of these additional costs are recovered through increased taxes and intergovernmental transfer payments, part of the burden must be carried by the host community.

Left (page 10): Aerial photograph of the new Hennepin Works Division of Jones & Laughlin Steel Corporation, about 120 miles southwest of Chicago. The plant, which is now nearing full production, is located on J&L's 6,000 acre site, and has about 30 acres under roof.

Below: Jim Larison photo shows the effect of new sewage lines on rural land.

Environmental Degradation. Industry brings long-term alterations of the environment: loss of open space and agricultural land, increased man-land density and changes in land use patterns. In addition, industry frequently brings problems of air, noise and water pollution. At the time most of the case studies were made, the environment was not a major concern and one observer made this comment:

> The most striking social cost to the town imposed by industry is water pollution, which in most of the towns studied has reached serious proportions. The concern for this problem shown by town governments is after the fact. Since industry is primarily responsible, the weak position taken by local government suggests that the absence of water pollution control is one form of industrial incentive.[2]

Net Gains

The net gain of new industry to the local public sector is the difference between its direct and indirect cost and its direct and indirect benefits. While most case studies have stressed the benefits side of the ledger, a few have also looked at the cost side and found some interesting facts. In one study five Kentucky towns with eight new plants were examined. It was found that only two of the plants produced revenues in excess of that yielded by the property prior to the plant location. Analysis of secondary impacts, where one might expect net benefits due to operation of the multiplier effect, corroborated the negative impact of new industry.

Other studies which compared estimated net gains of the private sector with net gains by the public sector also showed some sharp contrasts. One estimate, which closely approximated actual conditions in twelve communities, showed the private sector averaging a net gain of $152,981. The public sector averaged only $521 and the school district $401. This kind of evidence challenges the belief that new industry will substantially improve the fiscal burden of many nonmetropolitan communities. The evidence also suggest that were local government more assertive in channeling private sector gains into the public sector, industrial location could contribute more positively to a community's fiscal well-being.

In summary, industrial location in the rural community can bring employment, population growth and economic prosperity to the area; but as the studies have shown, these benefits do not come automatically nor do they apply in all cases. In some instances the structure of the community and the character of the particular industry merge to the benefit of both parties. More often the industry clearly gains while having a negligible or even negative effect on the host community over the long run.

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1 Gene F. Summers, Sharon Evans, Jon Minkoff, Frank Clemente, and Elwood M. Beck, Jr., *Industrial Invasion of Nonmetropolitan America*, New York: Praeger Publishers, 1976.

2 Abt Associates, Inc., "The Industrialization of Southern Rural Areas: A Study of Industry and Federal Assistance in Small Towns with Recommendations for Future Policy," Washington, D.C.: U.S. Dept. of Commerce, Economic Development Administration, Office of Economic Research, December, 1968.