13459

COASTAL ZONE
INFORMATION CENTER

WP

Texas Coastal Management Program

...ral Land Office.

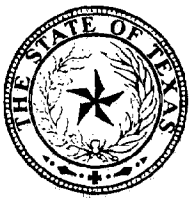
F
391
.I57
1978

Texas Coastal Management Program
Technical Paper No. 6

INPUT/OUTPUT MODELS OF THE TEXAS COASTAL REGION

ACTIVITY ASSESSMENT ROUTINE SOCIAL AND ECONOMIC COMPONENT

U.S. DEPARTMENT OF COMMERCE NOAA
COASTAL SERVICES CENTER
2234 SOUTH HOBSON AVENUE
CHARLESTON, SC 29405-2413



The General Land Office of Texas
Bob Armstrong, Commissioner
August 1978

Property of CSC Library

RPC, INC.
Austin, Texas

August 1978

F391.I57 1978
SEP 25 1981

This is one of a series of technical papers, which cover a variety of topics. For information concerning other technical papers in this series, or to order more copies of this paper, contact:

Elizabeth Christian Wilds
RPC, Inc.
1705 Guadalupe
Austin, Texas 78701

This paper was prepared under contract with the General Land Office of Texas, Coastal Management Program. The report was partially funded through financial assistance provided by the Coastal Zone Management Act of 1972, administered by the Office of Coastal Zone Management, U.S. Department of Commerce.

FOREWORD

This technical paper is one of a series of seven papers in which the background material, models, and data used to develop the social and economic component (SEC) of the activity assessment routine (AAR) are discussed. Together, the papers are reference sources for the SEC user's manual and form a basis for further system development.

Staff members of the Environmental Management Division, Texas General Land Office, in Austin are available to assist interested parties in learning to use the system, and they welcome any questions, comments, and suggestions concerning the SEC.

Many individuals assisted in the production of these technical papers. The principal-in-charge was Ron Luke. Project managers were Dennis Cooper and Ann Orzech. Authors of this paper were Robert Kieschnick and Ann Orzech. The technical editor was Nancy Grona. Production assistance was provided by Lori Snyder, Kim Frazier, and Joanne Click.

Bob Armstrong

Bob Armstrong, Commissioner
General Land Office of Texas

TABLE OF CONTENTS

		Page
1.	Introduction	1
2.	General Description of Process	5
3.	Mathematical Discussion	7
	Mathematics of Input/Output Models	7
	Location-Quotient Method for Deriving Regional Models	11
	Mathematical Derivations of Input/Output Multipliers	16
4.	Procedures for Deriving the Regional Totals	25
	Regional Control Totals	25
	Regional Employment Totals	30
	Regional Water Use Totals	30
5.	Sources for Aggregate Economic Data	31
	Total Regional Employment and Income	31
	Per Capita State Government Expenditures	31
	Per Capita Local Government Expenditures	32
	Appendix A: Sectors in the Texas Input/Output Model	33
	Appendix B: Sectors in the Regional Input/Output Model	45

LIST OF FIGURES

Page

1. Texas Coastal Input/Output Regions 3

LIST OF TABLES

1. Example of an Input/Output Transactions Table 9

2. Inputs Required by Purchasing Sectors from Producing Sectors per Dollar of Output of Purchasing Sectors 12

3. State Transactions Table 13

1. INTRODUCTION

Regional input/ouput (I/O) models form the framework in the social and eoconomic component of the activity assessment routine for estimating the impact of a project on a regional economy. Such a model describes quantitatively the flows between categories of economic activities in a regional economy. This type of interindustry flow analysis permits the estimation of gross output, employment, income, tax revenue, and water use which result both directly and indirectly from expansion or construction of a coastal facility.

An input/output model is basically a system of simultaneous equations relating the output of an economic activity to its different uses. These uses can be categorized as interindustry uses and final uses. Interindustry uses are those using the output of one economic activity in the production of the output of another. An example is the use of steel by the auto industries in producing cars. Final uses are those used by final consumers; an example is the purchase of an automobile.

Interindustry flows of goods and services for interindustry uses are represented in the transactions table of matrix. Final uses of goods and services are represented in the final demand vector. Normalizing the transactions matrix by dividing each payment of a sector by the total value of output of the industrial sector forms the direct coefficients matrix. Each coefficient in this matrix represents the use of the output of the row industry per dollar of output of the column industry. By subtracting the direct coefficient matrix from an identity matrix and inverting the resulting matrix, it is possible to derive what is called the Leontief matrix, named after the founder of modern input/output analysis. By appropriate transformations of this matrix, income, employment, output, and tax multipliers are calculated.

These input/output-based multipliers, like export-based multipliers, are the keys to regional economic impact assessment. For example, an income multiplier represents the total direct, indirect (and induced, when households are included in the interindustry portion of the model) change in income as a result of dollar change in direct income payments by a particular industrial sector. Such multipliers can be developed for each of the industrial sectors represented in the transactions matrix.

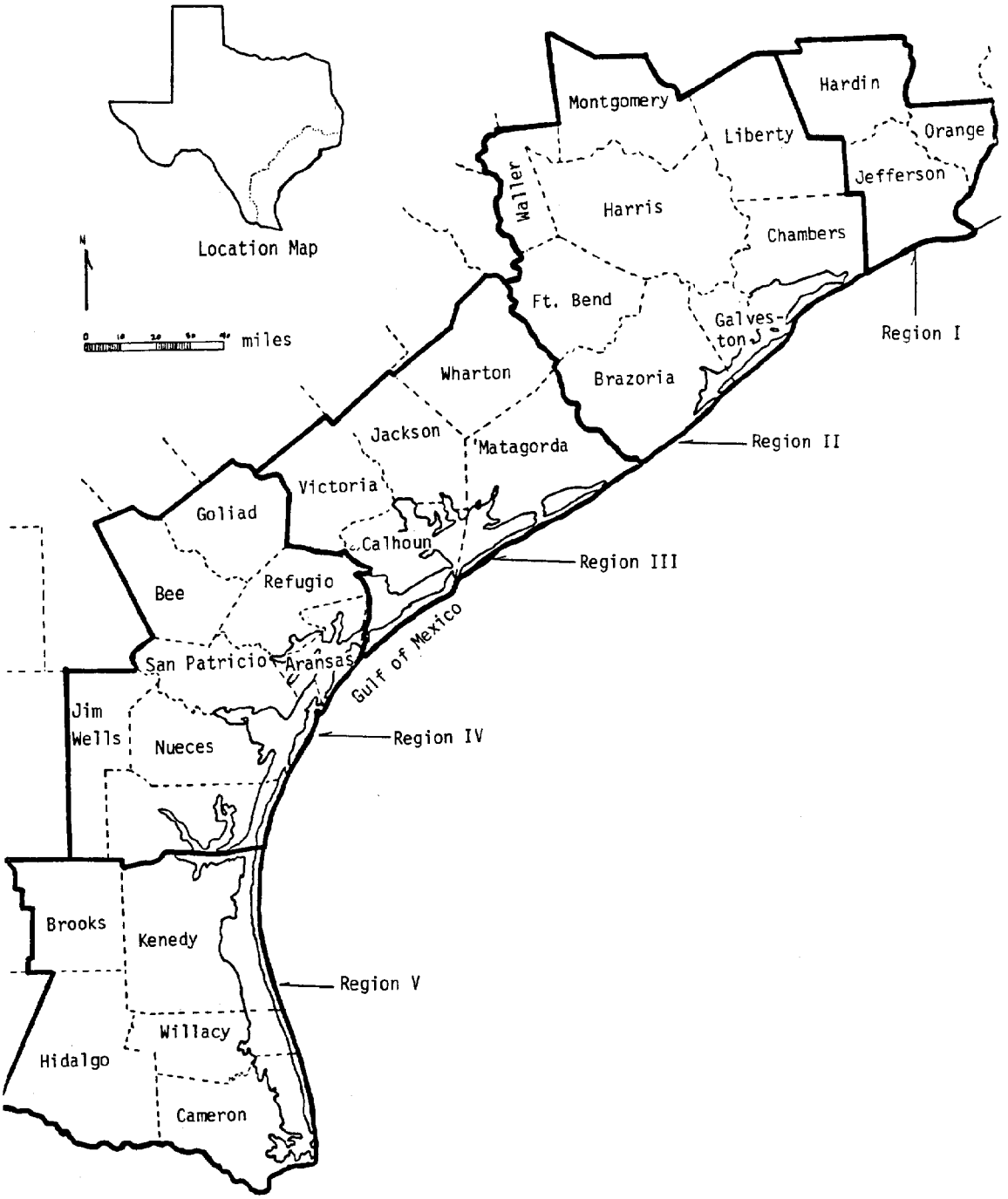
Five regional I/O models were derived from the 1972 state of Texas I/O model maintained by the Texas Department of Water Resources and serve as the basis for assessing the indirect impacts of industrial development in the regions. The I/O regions follow councils of governments boundaries and are

delineated in Figure 1. Similar models could be constructed for other regions of the state. While the state I/O model is sample-survey based, each of the regional models is a nonsurvey-based model.

The procedure used to derive the regional models is described in this technical paper. Chapter 2 presents a general overview of the methodology; Chapter 3 is a mathematical discussion of the development of the regional models; Chapter 4 specifies the procedures whereby regional control and employment totals were estimated; and Chapter 5 outlines the sources for the aggregate economic data presented for each I/O region in the SEC user's manual.

Figure 1

TEXAS COASTAL INPUT/OUTPUT REGIONS



2. GENERAL DESCRIPTION OF PROCESS

The Texas I/O model and several computer programs developed by the Texas Department of Water Resources (with modifications) were used to derive the regional models and income, employment, tax, and water use multipliers.

The state I/O model consists of 175 processing sectors, as specified in Appendix A. Because of data restrictions, it was not feasible to maintain such a detailed level of disaggregation for the coastal regional models. Instead, the regional models have 66 sectors. These are listed in Appendix B. The procedure used to derive the regional models involved (1) compressing the state model to 66 processing sectors; (2) collecting data on total value of output and employment for each sector of each regional model; and (3) using these data to transform the compressed state model into regional models.

1. Compress state model. Information concerning those sectors to be kept separate and those sectors to be merged were entered as input into the computer program COMPRESS, maintained by the Texas Department of Water Resources. The program then created an adjusted transactions table for the state consisting of 66 processing sectors.

2. Collect output and employment data. The total value of output (control total) and employment for each sector in each regional model was collected, as was water use by major sectors.

3. Transform the compressed state model into regional models. The control totals and the compressed state model were entered as input into the computer program LOCATION QUOTIENT I/O MODEL. This program is an operational program maintained by the Texas Department of Water Resources and is fully described in User Reference Manual WD6200. The results are an I/O transactions table and a direct coefficients matrix for each of the regions. The regional transactions table represents the interindustry relationships of the regional economy.

The regional transactions tables are then entered with the control totals and the employment and water use data as inputs into the computer program ECONOMIC-ECOLOGICAL I/O MODEL. This program is also maintained by the Texas Department of Water Resources; it is fully described in User Reference Manual WD7200. Outputs are the Type II income, employment, environmental (water use), and tax multipliers.

The Type II employment multiplier for sector j, for example, is the total (direct, indirect, and induced) change in employment in the region as a result of an increase in direct employment in sector j. The other Type II multipliers have similar interpretation. The multipliers are then used to estimate the economic impacts of a project on the regional economy.

The above procedures could be used to develop a regional I/O model for any region in Texas. The most difficult step in the process, of course, is the collection of necessary output and employment data.

3. MATHEMATICAL DISCUSSION

This section is a technical discussion of input/output models in general, the location-quotient method for creating regional I/O models, and the derivation of I/O multipliers.

MATHEMATICS OF INPUT/OUTPUT MODELS

As previously mentioned, an input/output model may be viewed as a system of simultaneous equations. Each equation relates the total output of an input/output industrial sector to its different uses, both interindustry and final. For industry i the equation looks like the following:

(1) $$X_i = x_{i1} + x_{i2} + \ldots + x_{ij} + x_{jn} + y_i$$

where X_i = total output of industry i

x_{ij} = output of industry i purchased by industry j for its use

y_i = total purchases of the output of industry i for final use (or by the final demand sectors)

If the equations for all the sectors in an input/output model are grouped, then they form a system of simultaneous equations as represented in equation 2.

(2)
$$X_1 = x_{11} + x_{12} + \ldots + x_{1j} + \ldots + x_{1n} + y_1$$
$$X_2 = x_{21} + x_{22} + \ldots + x_{2j} + \ldots + x_{2n} + y_2$$
$$\vdots \qquad \vdots \qquad \vdots$$
$$X_i = x_{i1} + x_{i2} + \ldots + x_{ij} + \ldots + x_{in} + y_i$$
$$\vdots \qquad \vdots \qquad \vdots$$
$$X_n = x_{n1} + x_{n2} + \ldots + x_{nj} + \ldots + x_{nn} + y_n$$

If the final uses of the industry i output are now disaggregated into the different final demand sectors (for example, households, local government, state government, federal government) and additional rows are included which represent the final payment sectors (which loosely correspond to the final demand sectors), the resultant matrix is an input/output transactions table. Table 1 is a representative transactions table. The development of the transactions table is the major part of any project to create an input/output model for a region. Reading across row 1, the figures represent the sale of the output of industry 1 to different users. Reading down column 1, the payments that industry 1 makes to the different sectors whose products or services the industry 1 uses in its production are shown.

In the input/output framework, it is assumed that a linear relationship exists between the purchases of sector i's output by sector j and sector j's level of output. Since total output of a sector equals total payments of a sector, the above relationship may be expressed as:

(3) $$x_{ij} = a_{ij}X_j$$

x_{ij} = output of industry i purchased by industry j for its use

X_i = total payments (or total output) of sector j

a_{ij} = the dollar amount of output of sector i required by sector j in order to produce one dollar of output by sector j

If equation 3 is substituted into equation 1 for industry i for each sector j, then equation 4 can be derived:

(4) $$X_i = a_{i1}X_1 + a_{i2}X_2 + \cdots a_{ij}X_j + \cdots a_{in}X_n + Y_i$$

Table 1

EXAMPLE OF AN INPUT/OUTPUT TRANSACTIONS TABLE

FINAL PAYMENTS SECTORS (PRODUCING SECTORS)	PURCHASING SECTORS: Interindustry Uses — Sectors 1	2	3	. . . .	n	Final Uses (FINAL DEMAND SECTORS): Households (Consumption)	Federal Government Defense	Federal Government Non-Defense	State Government	Local Government	Capital Formation	Inventory	Exports	Total Gross Output
Sectors 1	X_{11}	X_{12}	X_{13}	. . . .	X_{1n}	C_1	FGD_1	$FGND_1$	SG_1	LG_1	CF_1	INV_1	E_1	X_1
2	X_{21}	X_{22}	X_{23}	. . . .	X_{2n}	C_2	FGD_2	$FGND_2$	SG_2	LG_2	CF_2	INV_2	E_2	X_2
3	X_{31}	X_{32}	X_{33}	. . . .	X_{3n}	C_3	FGD_3	$FGND_3$	SG_3	LG_3	CF_3	INV_3	E_3	X_3
.	.	.	.	. . . .	.	.	.	.	.	.	.	.	.	.
.	.	.	.	. . . .	.	.	.	.	.	.	.	.	.	.
.	.	.	.	. . . .	.	.	.	.	.	.	.	.	.	.
.	.	.	.	. . . .	.	.	.	.	.	.	.	.	.	.
.	.	.	.	. . . .	.	.	.	.	.	.	.	.	.	.
Households	H_1	H_2	H_3	. . . .	H_n	H_H	.	.	.	.	.	.	H_E	H
Depreciation	.	.	.	. . . .	.	.	.	.	.	.	.	.	.	D
Property Payments	.	.	.	. . . .	.	.	.						.	PP
Local Government	.	.	.	. . . .	.	.	.						.	LGP
State Government	.	.	.	. . . .	.	.	.						.	SGP
Federal Government	.	.	.	. . . .	.	.	.						E_{FG}	FGP
Imports	.	.	.	. . . .	.	M_H	.	.	.	.	.	.	-	M
Total Gross Outlays	X_1	X_2	X_3	. . . .	X_n	C	FGD	FGND	SG	LG	CF	INV	E	X

Performing the same operation for each equation in the system of equation 2, then equation 5 is derived:

$$
\begin{aligned}
(5)\qquad X_1 &= a_{11}X_1 + a_{12}X_2 + \ldots + a_{1j}X_j + \ldots + a_{1n}X_n + Y_1 \\
X_2 &+ a_{21}X_1 + a_{22}X_2 + \ldots + a_{2j}X_j + \ldots + a_{2n}X_n + Y_2 \\
&\vdots \\
X_i &= a_{i1}X_1 + a_{i2}X_2 + \ldots + a_{ij}X_j + \ldots + a_{in}X_n + Y_n \\
&\vdots \\
X_n &= a_{n1}X_1 + a_{n2}X_2 + \ldots + a_{nj}X_j + \ldots + a_{nn}X_n + Y_n
\end{aligned}
$$

The coefficients a_{ij} are the basic elements of the input/output model and are sometimes called the input coefficients. The matrix of coefficients, A, is called the direct requirements table, and is represented in equation 6.

$$
(6)\qquad A = \begin{bmatrix}
a_{11} & \cdots & a_{1j} & \cdots & a_{1n} \\
\vdots & & \vdots & & \vdots \\
a_{i1} & \cdots & a_{ij} & \cdots & a_{in} \\
\vdots & & \vdots & & \vdots \\
a_{n1} & \cdots & a_{nj} & \cdots & a_{nn}
\end{bmatrix}
$$

The matrix A may also be derived from the transactions table (Table 1) by dividing each column by its column sum (total gross outlays component). If the final payments sectors are grouped together, then the resultant of the above operation, performed for each column, would look like Table 2.

The direct requirements table is important because each column specifies the input requirements for the production of a dollar's worth of output of that particular industry. For example, column 2 in Table 2 indicates that industry 2 needs a_{12} of the output of industry 1, a_{22} of its own output, and so on to produce a dollar's worth of its product. The direct requirements table can be further manipulated to derive I/O multipliers, as discussed below.

LOCATION-QUOTIENT METHOD FOR DERIVING REGIONAL MODELS

The regional I/O models were derived from the state model through the use of the location-quotient method. This methodology, developed by William A. Schaffer and Kong Chu, forms the basis for the Texas Department of Water Resources (TDWR) computer program LOCATION-QUOTIENT INPUT/OUTPUT MODEL. The present discussion centers on how to derive the impact area transactions table and indicates only the equations for deriving values for the regional final payments and final demand sectors. A complete discussion of the latter would be long and involved; adequate description exists in Appendix A of the TDWR User Reference Manual WD 6200.

The first step in creating a regional input/output model is to determine the number of processing sectors that the model should have. If the number is less than the number of sectors in the state model, the state model must be compressed to the appropriate number of sectors.

The location-quotient method forms a regional transactions table from the transactions table of the state model (compressed to the proper number of sectors) by comparing a sector's regional output to the state output for that sector and making adjustments on this basis. For the purposes of illustration, group all the final payments sectors, except for imports, into the category, VALUE ADDED. Further, identify the final demand sectors as local demand sectors with indices running from 1 to t, keeping the exports column separate. The imports row and exports column are kept separate because they require special treatment. With these adjustments, the state transactions table may be shown as in Table 3, for illustrative purposes.

The location quotient for industry i may now be defined as:

$$(1) \qquad L.Q._i = Z_i/Z/X_i/X$$

Table 2

INPUTS REQUIRED BY PURCHASING SECTORS FROM PRODUCING SECTORS PER DOLLAR OUTPUT OF PURCHASING SECTORS

Producing Sectors	Purchasing Sectors (Intermediate)				
	1	2	. . . . . j	. . . . .	n
1	a_{11}	a_{12}	. . . . . a_{1j}	. . . . .	a_{1n}
2	a_{21}	a_{22}	. . . . . a_{2j}	. . . . .	a_{2n}
.	.	.	.		.
.	.	.	.		.
.	.	.	.		.
i	a_{i1}	a_{i2}	. . . . . a_{ij}	. . . . .	a_{in}
.	.	.	.		.
.	.	.	.		.
.	.	.	.		.
n	a_{n1}	a_{n2}	. . . . . a_{nj}	. . . . .	a_{nn}
Final Payments	a_{F1}	a_{F2}	. . . . . a_{Fj}	. . . . .	a_{Fn}
Total	1.0	1.0	. . . . . 1.0	. . . . .	1.0

Table 3

STATE TRANSACTIONS TABLE

Outputs / Inputs	Selling Industries 1	2	3	. . . . .	S	Local Demand 1	. . . . .	t	Exports	Total Sales
Producing Industries 1	X_{11}	X_{12}	X_{13}	. . . . .	X_{1s}	Y_{11}	. . . .	Y_{1t}	E_1	X_1
2	X_{21}	X_{22}	X_{23}	. . . . .	X_{2s}	Y_{21}	. . . .	Y_{2t}	E_2	X_2
3	X_{31}	X_{32}	X_{33}	. . . . .	X_{3s}	Y_{31}	. . . .	Y_{3t}	E_3	X_3
.	.				.	.		.	.	.
.	.				.	.		.	.	.
.	.				.	.		.	.	.
S	X_{s1}	X_{s2}	X_{s3}	. . . . .	X_{ss}	Y_{s1}	. . . .	Y_{st}	E_s	X_s
Imports	M_1	M_2	M_3	. . . . .	M_s	Y_{1m}	. . . .	Y_{tm}	M_e	
Value Added	V_1	V_2	V_3	. . . . .	V_s	Y_{1v}	. . . .	Y_{tv}		
Total Inputs	X_1	X_2	X_3	. . . . .	X_s	Y_1	. . . .	Y_t		X

where Z_i = the impact area output of industry i for the base year

Z = the total impact area output for the base year

X_i = the state output of industry i for the base year

X = the total state output for the base year

Further, using the following definitions:

(2) $A_{ij} = \frac{X_{ij}}{X_i}$ = the state direct coefficient, where X_{ij} and X_i are from Table 3

a_{ij} = the corresponding impact area direct coefficient = $\frac{x_y}{x_i}$

Y_{if} = demand for the output of industry i by the f^{th} final demand sector (in the state model)

y_{if} = the demand for the output of industry i by the f^{th} final demand sector for the impact area

V_j = final payments (excluding imports) by industry j (in the state model)

v_j = final payments (excluding imports) by industry j for the impact area

it is now possible to create the regional technical coefficients of production and transactions table. There are two cases that might arise, and the following equations describe the procedures appropriate in each case.

Case 1

(3) If $LQ_i \geq 1$

$$a_{ij} = A_{ij}$$

$$x_{ij} = A_{ij}x_j$$

$$y_{if} = Y_{if} \cdot \frac{x}{X}$$

$i = 1, 2.....s$
$f = 1, 2.....t$

Case 2

(4) If $LQ_i < 1$

$$a_{ij} = LQ_i A_{ij}$$

$$x_{ij} = a_{ij} \cdot x_j$$

$$y_{if} = Y_{if} \cdot \frac{x}{X}$$

$$v_j = V_j \cdot \frac{x_j}{X_j}$$

This procedure leaves exports and imports to be computed as remainders. Imports for the ith row and jth column sector are $m_{ij} = A_{ij}x_j - x_{ij}$, and exports for the ith row sector are

$$e_i = x_i - \sum_{j=1}^{s} xij - \sum_{f=1}^{t} Yif$$

Therefore,

(5) $$m_e = -\sum m_i - \sum y_{im}$$

But e_i may be negative in this procedure. Therefore, a balancing correction is necessary because the negative export (e_i) means positive imports, and the imports are supposed to be taken care of by the import row. This correction adjusts gross flows for the ith importing sector downward and distributes to the column sectors the negative e_i in quantitites proportional to each sector's use of the ith sector's within-regional output. For example, let x_{ij}^N = estimated impact area gross flows, and let e_i be negative; then,

(6) $$x_{ij}^N = x_{ij} + x_{ij} \cdot \frac{e_i}{x_i - e_i}$$

$$= x_{ij} \left(1 + \frac{e_j}{x_i - e_i}\right)$$

$$= x_{ij} \cdot \frac{x_i}{x_i - e_i}$$

Similarly,

$$(7) \qquad y_{ij}^{N} = y_{if} \cdot \frac{x_i}{x_i - e_i}$$

Therefore, the general rule is

$$x_{ij}^{N} = x_{ij} \text{ or } x_{ij} \cdot \frac{x_i}{x_i - e_i} \quad \text{whichever is lesser}$$

$$x_{ij}^{N} = y_{if} \text{ or } y_{if} \cdot \frac{x_i}{x_i - e_i} \quad \text{whichever is lesser}$$

$$(8) \qquad m_{ij}^{N} = A_{ij}x_j - x_{ij}^{N}$$

$$e_i^{N} = x_i - \sum^{s} x_{uj}^{N} - \sum^{s} y_{if}^{N}$$

$$j = 1,\ldots, n \text{ and } f = 1,\ldots,t$$

The final regional transactions table is developed by using the values of x_{ij}^{N}, y_{ij}^{N}, m_{ij}^{N}, and e_i^{N} derived in the manner explained in this section. Once this impact area transactions table is developed, the technical coefficients and interdependence coefficients matrices may be completed.

MATHEMATICAL DERIVATIONS OF INPUT/OUTPUT MULTIPLIERS

Having discussed the derivation of an input/output model for a region using the state input/output model, the derivation of the input/output multipliers will now be discussed. For illustrative purposes, a three-sector economy will serve as a conceptually valid example.

For each sector i of this economy:

$$(1) \qquad x_i = x_{i1} + x_{i2} + x_{i3} + y_i \qquad i = 1, 2, 3$$

Assuming a linear relationship between the purchases of a sector and the level of output of a sector of the form:

$$(2) \qquad x_{ij} = a_{ij}x_j \qquad j = 1, 2, 3 \qquad i = 1, 2, 3$$

Substituting (2) into (1), the following relationship for each sector can be derived:

$$(3) \qquad x_i = a_{i1}x_1 + a_{i2}x_2 + a_{i3}x_3 + y_i \qquad i = 1, 2, 3$$

When all sectors are grouped together, the resulting system of equations may be written as:

$$(4) \qquad x_1 = a_{11}x_1 + a_{12}x_2 + a_{13}x_3 + y_1$$

$$x_2 = a_{21}x_1 + a_{22}x_2 + a_{23}x_3 + y_2$$

$$x_3 = a_{31}x_1 + a_{32}x_2 + a_{33}x_3 + y_3$$

By manipulation of the system of equations (4), the y_i's may be solved for as in equation (5).

$$(5) \qquad y_1 = (1 - a_{11})\, x_1 - a_{12}x_2 - a_{13}x_3$$

$$y_2 = a_{21}x_1 + (1 - a_{22})\, x_2 - a_{23}x_3$$

$$y_3 = a_{31}x_1 - a_{32}x_2 + (1 - a_{33})\, x_3$$

In matrix notation, this system of equations may be written as:

$$(6) \qquad \begin{bmatrix} y_1 \\ y_2 \\ y_3 \end{bmatrix} = \begin{bmatrix} (1 - a_{11}) & - a_{12} & - a_{13} \\ - a_{21} & (1 - a_{22}) & - a_{23} \\ - a_{31} & - a_{32} & (1 - a_{33}) \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix}$$

or,

$$(7) \qquad Y = (I - A)X$$

where $Y = \begin{bmatrix} y_1 \\ y_2 \\ y_3 \end{bmatrix}$ $\qquad I = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$

$A = \begin{bmatrix} a_{11} & a_{12} & 1_{13} \\ a_{21} & a_{22} & a_{23} \\ a_{31} & a_{32} & a_{33} \end{bmatrix}$ $\qquad X = \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix}$

The matrix (I-A) does satisfy certain criteria which allow it to be inverted to form $(I-A)^{-1}$, which is known as the Leontief matrix and may be written as:

$$(8) \qquad (I-A)^{-1} = \begin{bmatrix} K_{11} & K_{12} & K_{13} \\ K_{21} & K_{22} & K_{23} \\ K_{31} & K_{32} & K_{33} \end{bmatrix}$$

Further, inverting (I - A) permits x to be expressed as a function of:

$$(9) \qquad x = (I-A)^{-1}y$$

Hence, the total output of sector i may be written as a function of the final demand for the output of each of the producing sectors in the regional economy as:

$$(10) \qquad x_i = K_{i1}y_1 + K_{i2}y_2 + K_{i3}y_3$$

The coefficients, K_{ij}, are known as the interdependence coefficients and they represent the change in output of industry i as a result of a change in the final demand for industry j's output (i.e., $\frac{\partial X_i}{\partial Y_j}$). Since the household sector was excluded in the above discussion, the $(I-A)^{-1}$ matrix represents the inter-

dependence matrix for what is called the "open" input/output model. The "closed" input/output model includes the household row from the final payments sectors and the consumption column from the final demand sectors in the direct requirements matrix A. Therefore the direct requirements matrix A may be re-written as:

$$(11) \qquad A_h = \begin{bmatrix} a_{11} & a_{12} & a_{13} & a_{14} \\ a_{21} & a_{22} & a_{23} & a_{24} \\ a_{31} & a_{32} & a_{33} & a_{34} \\ a_{41} & a_{42} & a_{43} & a_{44} \end{bmatrix}$$

Consequently the interdependence matrix for the "closed" input/output model would look like:

$$(12) \qquad (I-A_h)^{-1} = \begin{bmatrix} K_{11} & K_{12} & K_{13} & K_{14} \\ K_{21} & K_{22} & K_{23} & K_{24} \\ K_{31} & K_{32} & K_{33} & K_{34} \\ K_{41} & K_{42} & K_{43} & K_{44} \end{bmatrix}$$

From the "open" input/output model, Type I multipliers are derived, and from the "closed" input/output model, Type II multipliers are derived. Type I multipliers represent the direct and indirect change due to a change in final demand. The Type II multipliers represent the direct, indirect, and induced change due to a change in final demand and therefore reflect a more comprehensive impact assessment of a change in final demand. In the following discussion of the derivation of the various types of multipliers, the Type II multipliers will be the primary object of analysis.

TYPE II OUTPUT MULTIPLIERS

The output multiplier of sector 1, for example, represents the total change in the economy's output as a result of a dollar change in output for the product of sector 1. The output multiplier for sector 1 is equal to $K_{11} + K_{21} + K_{31} + K_{41}$.

TYPE II EMPLOYMENT MULTIPLIERS

The Type II employment multiplier for sector j represents the direct, indirect, and induced change in employment in the economy as a result of a unit change in employment in sector j. It is equal to the ratio of the direct, indirect, and induced change in employment to the direct employment change. One method used to derive this multiplier is to first develop employment to output coefficients (π)for each sector. This is done by taking the ratio between employment in sector j (E_j) and total output of sector j (X_j):

$$(13) \qquad \pi_j = E_j/X_j.$$

The direct, indirect, and induced change in employment as a result of a unit change in final demand for the product of sector j is equal to:

$$(14) \qquad \sum_{i=1}^{4} K_{ij}\pi_i$$

The Type II employment multiplier for sector j is then equal to the ratio of equations (14) and (13) (i.e., equal to equation 14 divided by equation 13). It should be pointed out that equation (14) also represents a Type II final demand-employment coefficient for sector j, since it represents the direct, indirect, and induced change in employment as a result of a unit change in final demand for the product of sector j.

TYPE II INCOME MULTIPLIERS

The Type II income multiplier is similar to the Type II employment multiplier in that it is equal to the ratio of the direct, indirect, and induced change in income to the direct change in sector income. The direct, indirect, and induced income change due to a unit increase in final demand for the product of sector j is equal to the coefficient K_{hj} in the "closed" input/output model's interdependence matrix. The direct income change is equal to the coefficient a_{hj} in the "closed" input/output model's direct requirements matrix (A_h). Therefore, the Type II income multiplier for sector j equals K_{hj}/A_{hj}.

TYPE II TAX MULTIPLIERS

Tax multipliers are used to determine the relationship between state and local government revenues and the production levels of each industry. Specifically, they measure the direct, indirect, and induced change in state

and local tax revenue in the I/O region as a result of a change in a given industry's sales to final users (final demand multiplier) or output (output multiplier). As such, they measure the total tax effect of an industry's economic activity.

The tax effects are of two types. The first is the final demand-driven tax effect. This type of tax effect quantifies the amount of additional taxes which will be paid to any given tax sector resulting from an increase in sales to final demand by a sector of the economy. The second type of tax effect is the output-driven tax effect resulting from an increase in production by a sector. The type of effect which is applicable in any given situation is dependent upon that situation. For example, if planners are considering steps to take to increase the export of a commodity, the tax effect which would be realized is the final demand type. However, if a new factory were to establish itself in a region, the tax effect of that factory would be the output-driven type.

COMPUTATION OF MULTIPLIERS

Tax effects are computed using the direct requirements matrix and interdependence coefficients table of a regional input/output model. For purposes here, it is assumed that final demand has changed, and the final demand Type II local tax multiplier will be described as an example. While the computation is the same for both the final demand and output multipliers, in order to compute the output multiplier, each columnar element of the interdependence table must first be divided by the diagonal element in that column.

When the transactions table was transformed into the direct requirements matrix, a row of coefficients for each government sector was created reflecting the tax payments per unit of output by each of the producing sectors, (e.g., for the local government sector, LG_i, $_i$ = 1, 2, 3, 4). When the inner product of this row and a column of the interdependence matrix of the "closed" input/output is taken, the final demand Type II local tax multiplier for the column sector is derived. This may be also represented as

$$(15) \qquad \sum_{i=1}^{4} K_{ij} LG_i$$

This represents the direct, indirect, and induced change in local tax revenue as a result of a unit change in final demand for the product of sector j.

ADJUSTMENTS TO THE MULTIPLIERS

The multipliers derived through this process must be further adjusted because certain government activities (e.g., education) are considered in the

I/O models as part of the producing sectors, rather than as part of the government sector. Consequently the multiplier, if used without adjustment, underestimates tax revenue because certain government activities (e.g., education) are considered in the I/O models as part of the producing sector, rather than as part of the government sector.

The multipliers were adjusted to account for government activities in four producing sectors:

1. Sector 62: Hospitals
2. Sector 63: Education
3. Sector 64: Colleges
4. Sector 66: Outdoor Recreation

The multipliers were adjusted for each regional model in three steps. First, the state and local governments' shares of each of the four sectors' control totals were estimated. Second, the state and local governments' shares of each sector were applied to each of the four sectors' row in the direct, indirect, and induced requirements table. Third, the resulting products for each column sector were added to that sectors' state and local government tax multipliers.

ENVIRONMENTAL-SELF MULTIPLIERS

Up to this point in the discussion, the subject has been the derivation of the more "traditional" types of input/output multipliers. The Texas Department of Water Resources' computer program, ECONOMIC-ECOLOGICAL INPUT/OUTPUT MODEL, also calculates three types of "environment" multipliers: environmental-income, environmental-employment, and environmental-self multipliers. For the purposes of this report, concern is only with the environmental-self multiplier, and in particular, the environmental-self multiplier for water use. This multiplier is based upon the relationship between the amount of water that an industrial sector uses and the water use that results from the interdependencies implicit in the economy. The multiplier represents the direct, indirect, and induced change in water use resulting from a unit change in direct water use by a sector.

The multiplier is developed in the following manner. By assuming a linear relationship between the amount of water used by sector j and the level of output of sector j:

$$(16) \qquad r_{wj} = b_{wj} X_j$$

where r_{wj} = amount of water used by sector j

X_j = output of sector j

The coefficient, b_{wj}, is therefore equal to (r_{wj}/X_j). Grouping the relationship expressed in (16) for each sector, the following system of equations can be formed:

(17) $R = B\ X$

where $R = \begin{bmatrix} R_{w1} \\ R_{w2} \\ R_{w3} \\ R_{w4} \end{bmatrix}$ $X = \begin{bmatrix} X_1 \\ X_2 \\ X_3 \\ X_4 \end{bmatrix}$

and $B = \begin{bmatrix} b_{w1} & 0 & 0 & 0 \\ 0 & b_{w2} & 0 & 0 \\ 0 & 0 & b_{w3} & 0 \\ 0 & 0 & 0 & b_{w4} \end{bmatrix}$

Substituting equation (9) for X yields:

(18) $R = B\ (I-A_h)^{-1}Y$

And letting $P = B\ (I-A_h)^{-1}$, equation (18) may be rewritten as:

(19) $R = PY$

where the P matrix contains the environmental final demand multipliers, which express change in water use in sector i as a result of a unit change in final demand for the product of sector j (i.e., $\frac{\partial Ri}{\partial Yj}$). Therefore, the environmental-self multiplier for sector j is equal to:

(20) $\sum_{1=1}^{4} P_{ij}/b_{wj}$

4. PROCEDURES FOR DERIVING THE REGIONAL TOTALS

In this chapter, the procedures used to estimate for each sector in each region the total value of output (control total), total employment, and total water use are discussed.

REGIONAL CONTROL TOTALS

In order to develop a regional input/output model, it is necessary to estimate the total value of output for each sector in the model. The total value of output of each sector is expressed in the input/output model in terms of the prices of freight on board the shipper sets for products and in terms of gross billings for services. This is known as the producer price concept, and the estimate of a sector's total value of output is known as that sector's control total. It is the estimation of the control totals for each sector of the regional input/output models that is the key to the location-quotient method for estimating each of the regional input/output models.

The methodology for estimating the regional input/output control totals is in accordance with the methodology of the Texas input/output project and the Texas Department of Water Resources. Therefore, the following discussion will primarily center on information sources used. For a more detailed discussion of estimation procedures, the reader is referred to the following publications:

1. "Methodology for Input/Output Model Control Totals, 1972," Texas Department of Water Resources

2. "Preparation of Input/Output Models for Groups of Counties in Texas", Richard J. Foote, Ronald B. Rutledge, Department of Agricultural Economics, College of Agricultural Sciences, Texas Tech University (August 1973)

3. "SAES Input-Output Model Control Totals and Methodology," Harry Bradley, Texas Department of Water Resources (July 1972)

AGRICULTURE, FORESTRY, AND FISHERIES (COASTAL I/O SECTORS 1 TO 7)

The estimates of the total value of output of sectors 1, 2, and 3 were obtained from the Texas Crop and Livestock Reporting Service published statistics of agricultural commodity production in Texas in 1972. Agricultural products were valued at 1972 market prices with government payments to farmers included separately as a part of farm income. Thus, government payments to farmers were treated as purchases from the farm sectors, even though no actual purchase was made. Estimation of the control total for the agricultural supply was made directly from the 1972 Census of Retail Trade value of sale. The trade margins estimated from the Texas input/output survey were applied to census-reported gross sales to obtain the appropriate total value of output for this sector.

The control total for sector 5, cotton ginning, was determined by multiplying the cost per bale times the total quantity of cotton ginned during 1972. Data were obtained from "Average Charges for Sawed Ginning Upland Cotton, Average Charges for Selected Services Incident to Marketing and Related Information by State, Season of 1972-1973" as provided by the Natural Fibers Research, The University of Texas at Austin.

The control total for agricultural service, sector 6, was estimated as linear interpolation of data provided in the 1969 and 1974 Census of Agriculture, Vol. III, Agricultural Service for each of the coastal counties.

Sector 7 represents a composite of primary forestry and fisheries. The total value of output of primary forestry was derived from the reported wood production statistics for Texas from Table 5, "Interstate Movement of Roundwood by Species, Group and Produce for 1972" of the Texas Forest Resource Harvest Trends, 1972, as published by the Texas Forest Service. This table was selected on advisement of the Forest Service as presenting the most representative data. For fisheries, the total value of output estimates was derived from the Economic Impact Analysis of Texas Marine Resources and Industries, Texas A&M University, and was the total value of the fish catch at the landing point of the catch.

MINING (COASTAL I/O SECTORS 8 TO 11)

The total value of output (gross value of billings at the point of delivery of service) of crude petroleum, as measured at oil and gas wells, was obtained from the Railroad Commission of Texas, Annual Report of the Oil and Gas Division: 1972. The average price of the petroleum was applied to its volume to obtain this estimate of total value. An estimate of the total value of output of natural gas liquids (as a combination of value of liquids produced at other plants and at cycling plants) was obtained from the Bureau of Mines, Mineral Yearbook, 1972 (Washington, D.C.: U.S. Government Printing Office, 1973) and from the Railroad Commission of Texas, Annual Report of the Oil and Gas Division: 1972, Austin, Texas.

Total value of output for oil and gas field services was obtained from the U.S. Department of Commerce, Bureau of the Census, 1972 Census of Mineral Industries: Oil and Gas Field Services (U.S. Government Printing Office, Washington, D.C.).

The control total for the "other mining and quarrying" sector, which includes sulphur, sand, and gravel, was calculated from data supplied in the Census of Mineral Industries and the Bureau of Economic Geology's publication "The Mineral Industry of Texas, 1972."

CONSTRUCTION (COASTAL I/O SECTOR 12)

Due to disclosure rules, estimation of the control totals for more disaggregated construction sectors is not possible at the county level. Therefore, the construction sector is an aggregation of the Texas input/output sectors 23 to 26. Further, Texas Employment Commission unpublished employment data were used to estimate the regional control totals for construction. These data were used to allocate estimates to the regional level by viewing:

$$\text{regional share (or regional control total)} = \frac{\text{regional construction employment}}{\text{state construction employment}} \quad \text{(total value of output for construction for state)}$$

Those estimates were then compounded with estimates from the 1972 Census of Construction Industries, and suitable adjustments were made.

MANUFACTURING (COASTAL I/O SECTORS 13 TO 29)

The data for estimating the total value of output (control total) of each of the coastal manufacturing sectors came from the 1972 Census of Manufacturers. In some cases, these data were not sufficiently disaggregated at the county level to permit estimation except through the use of an allocation scheme as performed for the construction sector. In such cases, unpublished Texas Employment Commission data were used to allocate output estimates from the next highest reported SIC level to a four-digit level on the basis of percentage share of employment.

TRANSPORTATION (COASTAL I/O SECTORS 30 TO 33)

While gross income data are available through the Railroad Commission of Texas for railroad companies, intercity buslines, and motor freight, the data do not exist in sufficient spatial detail to permit exact estimation for all transportation sectors. Therefore, unpublished Texas Employment Commission

data were used to allocate the state total value of output estimates for these sectors on the basis of the region's percentage share of state employment in each of these sectors.

COMMUNICATIONS (COASTAL
I/O SECTORS 34 TO 36)

Estimates of the control totals for sectors 35 and 36 were made through use of data in the "Annual Report of the Federal Communications Commission, 1972." For sector 34, the state control total estimate was allocated to the regions on the basis of percentage share of state population in the region.

UTILITIES (COASTAL
I/O SECTORS 37 TO 39)

The control total for sector 37, gas services, was estimated using data from individual establishments' annual reports to the Gas Utilities Division of the Railroad Commission of Texas.

For sector 38, electric services, the Statistical Yearbook of the Electric Utility Industry for 1972, published by the Edison Electrical Institute, did not present data in a sufficiently spatially disaggregated manner. Therefore, by using data from the Public Utilities Commission and the percentage regional share of state population, the state control total was allocated to the regions.

The data for estimating the water and sanitary service sector control total were primarily provided in the 1972 Census of Governments.

WHOLESALE TRADE (COASTAL
I/O SECTORS 40 TO 44)

The data for estimating the total sales for the wholesale trade sectors came from the 1972 Census of Wholesale Trade. The trade margins estimated from the Texas input/output survey were applied to the above total sales estimates to derive the wholesale trade sectors' control totals. This was necessary since the total value of output of the wholesale trade sectors was defined as the markup on merchandise purchased for resale minus transportation costs for the shipping to the receiving point.

RETAIL TRADE (COASTAL I/O SECTORS 45 TO 52)

Except in the case of sector 51, eating and drinking establishments, the retail trade sectors' control totals are defined similarly to the wholesale trade sectors. Therefore, trade margins obtained from the Texas input/output survey were applied to the total sales data obtained from the 1972 Census of Retail Trade. In the case of sector 51, the census data were used without applying a trade margin since merchandise purchased was included in the outputs to this sector.

FINANCE, INSURANCE, AND REAL ESTATE (COASTAL I/O SECTORS 53, 54)

Data for estimating the control total for sector 53, banking, were obtained from the "Income State and Condition Reports" compiled by the Texas Banking Commission for state-chartered banks and the Federal Deposit Insurance Corporation's "Banking Operating Statistics, 1972" for federally chartered banks. Spatially disaggragated data for sector 54 are not available and, hence, an employment allocation scheme (as previously described) was used to derive a control total for this sector.

SERVICES (COASTAL I/O SECTORS 55 TO 65)

Data for estimating the control totals for sectors 55, 56, 57, 58, 59, and 60 were available from the 1972 Census of Selected Services. For sector 62, hospitals, data were obtained from the Texas Hospital Association and the Texas Department of Health. The Texas Education Agency and the Texas College Coordinating Board were the primary sources of data for estimating the control totals for sectors 63 and 64. For sectors 61 and 65, and employment-based allocation scheme (as previously described) was used.

OUTDOOR RECREATION (COASTAL I/O SECTOR 66)

Data for estimating the control total were provided by the Texas Parks and Wildlife Department and the National Recreation Park Association. The control total for outdoor recreation is defined as the total public funds spent in the operation and maintenance of outdoor recreation facilities.

COASTAL ZONE
INFORMATION CENTER

HOUSEHOLDS (COASTAL
I/O SECTOR 67)

Data for estimating the household control total were provided by the 1972 Bureau of Economic Analysis Income tape.

GOVERNMENTS (COASTAL
I/O SECTORS 68 TO 71)

The 1972 and 1973 Office of Economic Opportunities' publications, "Federal Outlays in Texas" were used to estimate the control total for sector 69; for sectors 68 and 70, the Annual Report of the Comptroller of the State of Texas for fiscal year 1972 and 1973 provided the necessary data; and for sector 71, the 1972 Census of Governments provided the data for estimating this sector's control total.

REGIONAL EMPLOYMENT TOTALS

The primary source of employment data was the Texas Employment Commission's unpublished data tapes. These data present the establishment name, county, SIC code (to the four-digit level in most cases), employment, and payroll. Aggregating the data according to the SIC codes contained in a sector for each sector of the relevant coastal input/output model allows derivation of the sector employment totals for each county. These county data are then aggregated according to coastal region definitions to derive each of the regional input/output employment totals.

For most regional input/output sectors, these data were the best available information, the major exceptions being sectors 1, 2, 3, 5, 6, and 7, the agriculture, forestry, and fisheries sectors. The reason for this is that Texas Employment Commission data are based upon covered employment. Therefore, appropriately defined labor:output ratios are computed for each of these sectors using the Texas input/output project data. These labor:output ratios are then applied to the sector output estimates to derive sector employment estimates. These estimates are aggregated and then checked against interpolated estimates of total employment from the 1969 and 1974 Census of Agriculture, and adjustments were made as required.

REGIONAL WATER USE TOTALS

Since it was not possible to survey coastal water users to estimate coastal input/output water use coefficients, it was necessary to use secondary data provided by the Texas Department of Water Resources. By using water use totals for sectors of the Texas input/output model and aggregating the state sectors according to coastal sectoring definitions, water use (acre-feet) per unit of sector output coefficients can be derived. These coefficients are then applied to the appropriate coastal sector control total to estimate that coastal sector's total water use.

5. SOURCES FOR AGGREGATE ECONOMIC DATA

In the SEC user's manual the following data are provided for each I/O region for use in the assessment process: total regional employment, total regional personal income, per capita state government expenditures, and per capita local government expenditures. The estimates of total project-related employment and income, derived with the I/O multipliers, are compared with total regional employment and income, respectively, in order to determine the percentage change in current employment and income as a result of the project. The per capita government expenditures information is used as an indicator of current government service costs in the fiscal impact assessment methodology. (See Technical Paper No. 7, Assessment of Fiscal Impacts.)

Because these data represent current totals and expenditure levels, it is important that they be updated periodically. The data sources and procedures used to derive the information are outlined below and form the basis for subsequent revisions.

TOTAL REGIONAL EMPLOYMENT AND INCOME

The Bureau of Economic Analysis (U.S. Department of Commerce) estimates total employment and income by county on an annual basis. These data may be obtained from the Bureau of Business Research, University of Texas at Austin. The total regional employment and income are the sum of total employment and income, respectively, of all counties in the I/O region. The totals for 1975 (the latest year for which data are available) are presented in the SEC user's manual. These totals should be updated annually as new data become available.

PER CAPITA STATE GOVERNMENT EXPENDITURES

Total expenditures of the state government within each county for fiscal year 1973 are available from the state of Texas Legislative Budget Board, State Agency Expenditures by County, Fiscal Year 1973, April 1974. Only state dollars, not federal dollars funneled through state agencies, were included. The values for the individual counties were then summed.

Each county's 1973 population estimate was obtained from the U.S. Department of Commerce, Bureau of the Census, Current Population Reports, Series P-25. The estimates were then summed.

Total expenditures for the entire region were divided by total regional population to derive a per capita state expenditures level for FY1973 in 1973 dollars. Because 1973 is the latest year for which state government expenditures by county are available, the 1973 figure was converted to 1977 dollars by applying the GNP Implicit Price Deflator, State and Local Government Purchases Component.

PER CAPITA LOCAL GOVERNMENT EXPENDITURES

Total expenditures of local governments within each county for fiscal year 1972 were obtained from the 1972 Census of Governments. For each county, local government expenditure is equal to direct general expenditures minus intergovernmental transfers. The values for each county were summed to obtain regional local government expenditures.

The 1972 population estimate for each county, obtained from Bureau of Census P-25 reports, were summed to obtain regional population.

Total regional expenditures were divided by regional population to derive per capita local government expenditures for FY1972 in 1972 dollars. The figure was converted to 1977 dollars by applying the GNP Implicit Price Deflator, State and Local Government Purchases Component.

The census of governments is undertaken every five years. Information from the 1977 census should be available shortly and will be used to derive a more up-to-date expenditure estimate.

Appendix A

SECTORS IN THE TEXAS INPUT/OUTPUT MODEL

Sectors and the Four-Digit Standard Industrial Classification Codes (SIC) Contained Within each Sector of the Statewide Input-Output Model[a/]

Sector Number	Sector Name	SIC's Contained Within Sector
Agriculture, Forestry and Fisheries:		
1	Irrigated cotton	0112
2	Irrigated food grains	0113
3	Irrigated feed grains	0313
4	Other irrigated crops	0119, 0122, and 0123
5	Dryland cotton	0212
6	Dryland food grains	0213
7	Dryland feed grains	0413
8	Other dryland crops	0114, 0141, 0190, and 0219
9	Range livestock production	0139 and 0235
10	Feedlot livestock production	0135 and 0136
11	Dairy	0132
12	Poultry and eggs	0133 and 0134
13	Agricultural supply except farm machinery	5962 and 5969
14	Cotton ginning	0712
15	Agricultural services[b/]	0713, 0714, 0715, 0719, 0722 0723, 0729, 0731, and 0741
16	Primary forestry	0811, 0822, 0823, 0844, 0843, 0851 and 0861 plus stumpage value of timber harvested
17	Fisheries	0912, 0913, 0914, 0919, and 0989
Mining:		
18	Crude Petroleum	1311
19	Natural gas liquids	1321
20	Oil and gas field services	1381, 1382, and 1389
21	Other mining and quarrying	1011, 1021, 1031, 1051, 1062, 1064, 1069, 1081, 1092, 1093, 1094, 1099, 1411, 1422, 1423, 1429, 1442, 1466, 1452, 1453, 1454, 1455, 1456, 1459, 1476, 1492, 1477, and 1499

(Continued)

Sector Number	Sector Name	SIC's Contained Within Sector
Construction:		
22	Residential construction	15111, plus subcontractors parts of two-digit SIC 17
23	Commercial, educational, and institutional construction	15112, plus subcontractors parts of two-digit SIC 17
24	Industrial construction	15113, plus subcontractors parts of two-digit SIC 17
25	Facility construction	1611 and 1621
26	Maintenance and Repair	Maintenance and Repair part of two-digit SIC 17
Manufacturing:		
27	Meat products	2011 and 2013
28	Poultry products	2015
29	Dairies	2021, 2022, 2023, 2024, and 2026
30	Grain milling	2041, 2043, 2044, 2045, and 2046
31	Animal feeds	2042
32	Bakery products	2051 and 2052
33	Canned, preserved, pickled, dried and frozen foods	2031, 2032, 2033, 2034, 2035, 2036, 2037, and 2038
34	Other food and kindred products	2061, 2062, 2063, 2071, 2072, 2091, 2092, 2093, 2094, 2095, 2096, 2097, 2098, 2099, and 2121
35	Beverages	2082, 2084, 2086, and 2087
36	Textile mill products	2211, 2221, 2231, 2241, 2251, 2253, 2256, 2259, 2261, 2262, 2269, 2271, 2272, 2279, 2281, 2284, 2291, 2293, 2294, 2295, 2297, 2298, and 2299
37	Mens and boys, women and misses and children furnishings	2311, 2321, 2322, 2323, 2327, 2328, 2329, 2331, 2335, 2336, 2337, 2339, 2341, 2342, 2351, 2352, 2361, 2363, and 2369

(Continued)

Sector Number	Sector Name	SIC's Contained Within Sector
38	Related apparel	2371, 2381, 2384, 2385, 2386, 2387, 2389, 2391, 2392, 2393, 2394, 2395, 2396, 2397, and 2399
39	Logging	2411
40	Lumber mills	2421, 2426, and 2429
41	Millwork and wood products	2431, 2432, 2433, 2441, 2442, 2443, 2445, 2491, and 2499
42	Wood furniture and fixtures	2511, 2512, 2515, 2519, 2521, 2531, 2541, 2591, and 2599
43	Metal furniture and fixtures	2514, 2522, and 2542
44	Paper and paper mills	2611, 2621, 2631, and 2661
45	Paper products except boxes and containers	2641, 2642, 2643, 2645, 2646, 2647, and 2649
46	Boxes and paper containers	2651, 2652, 2653, 2654, and 2655
47	Newspapers	2711
48	Publishing	2721, 2731, and 2741
49	Printing	2732, 2751, 2752, and 2753
50	Manifold business forms	2761
51	Other printing and publishing	2771, 2782, 2789, 2791, 2793, 2794, and 2799
52	Chlorine and alkalies	2812 and 2813
53	Cyclic crudes and intermediates and inorganic pigments	2815
54	Organic chemicals	2818
55	Inorganic chemicals	2819
56	Fibers, plastics	2821, 2823, and 2824
57	Synthetic rubber	2822
58	Drugs	2831, 2833, and 2834
59	Agricultural chemicals	2871, 2872, and 2879

(Continued)

Sector Number	Sector Name	SIC's Contained Within Sector
60	Soaps, Cleansers and toiletries	2841, 2842, 2843, and 2844
61	Paints and varnishes	2851
62	Other chemicals	2861, 2891, 2892, 2893, 2895, and 2899
63	Petroleum refining	2911
64	Other petroleum products	2951, 2952, 2992, and 2999
65	Tires	3011
66	Fabricated rubber products	3069
67	Plastics products	3079
68	Leather and leather products	3111, 3121, 3131, 3141, 3142, 3151, 3161, 3171, 3172, and 3199
69	Glass	3221, 3229, and 3231
70	Clay	3251, 3253, 3255, 3259, 3261, 3262, and 3269
71	Cut stone and other clay and shell products	3281, 3291, 3292, 3293, 3295, 3296, 3297, 3299, 3274, 3275 and 3201
72	Cement and concrete products	3241, 3271, 3272, and 3273
73	Blast furnaces	3312
74	Primary steel and iron	3313, 3315, 3316, and 3317
75	Foundries	3321, 3322, and 3323
76	Nonferrous primary and secondary smelting	3331, 3332, 3333, 3339, and 3341
77	Aluminum smelting and non-ferrous rolling and drawing	3334, 3352, 3356, and 3357
78	Castings and forgings	3361, 3362, 3369, 3391, 3392, and 3399
79	Fabricated steel	3441
80	Plate work	3443
81	Sheet metal and architectural	3444, 3446, and 3449

(Continued)

Sector Number	Sector Name	SIC's Contained Within Sector
82	Metal doors	3442
83	Fabricated metal products	3411, 3421, 3423, 3425, and 3429
84	Plumbing	3431, 3432, and 3433
85	Bolts, nuts and screws	3451, 3452, and 3461
86	Electroplating, coating and engraving	3471 and 3479
87	Valves and pipe fittings	3494 and 3498
88	Other fabricated metal	3481, 3491, 3492, 3493, 3496, 3497, and 3499
89	Farm, construction and industrial machinery	3522, 3531, and 3537
90	Materials handling machinery and equipment	3534, 3535, and 3536
91	Mining machinery and equipment	3532 and 3533
92	Engines	3511 and 3519
93	Metal working machinery	3541, 3542, 3544, 3545, and 3548
94	Industrial processing machinery	3551, 3552, 3553, 3554, 3555, and 3559
95	General industrial machinery	3561, 3562, 3564, 3565, 3566, 3567, and 3569
96	Refrigeration machinery	3585
97	Computers, accounting, office and service industry machinery	3571, 3572, 3573, 3576, 3579, 3581, 3582, 3586, 3589, and 3599
98	Electric instruments and apparatus	3611, 3612, 3613, 3621, 3622, 3623, 3624, 3641, 3642, 3643, 3644, and 3629
99	Electric household equipment	3631, 3632, 3633, 3634, 3635, 3636, and 3639
100	Electronic communications equipment	3651, 3652, 3661, 3662, 3671, 3672, 3673, 3674, and 3679

(Continued)

Sector Number	Sector Name	SIC's Contained Within Sector
101	Other electrical apparatus	3691, 3693, 3694, and 3699
102	Aircraft	3721 and 3728
103	Aircraft engines	3722
104	Other aircraft	3723 and 3729
105	Motor vehicles and parts	3711, 3712, 3713, 3714, and 3715
106	Ship and boat building	3731 and 3732
107	Other transportation equipment	3741, 3742, 3751, 3791, and 3799
108	Scientific instruments	3811
109	Mechanical measuring devices	3821 and 3822
110	Medical instruments	3841, 3842, and 3843
111	Photographic, time and optical instruments	3831, 3851, 3861, and 3871
112	Games and toys	3941, 3942, and 3949
113	Other manufacturing industries	3911, 3913, 3914, 3931, 3951, 3952, 3953, 3955, 3961, 3962, 3963, 3964, 3982, 3983, 3984, 3987, 3991, 3993, 3994, 3995, and 3999
Transportation:		
114	Railroad transportation	4011, 4013, 4021, and 4041
115	Intercity rural highway transportation	4131 and 4132
116	Motor freight transportation and local trucking and storage	4212, 4213, 4214, 4222, 4223, 4224, 4225, 4226, and 4231
117	Water transportation	4411, 4421, 4441, 4452, 4453, 4454, 4459, 4463, 4464, and 4469
118	Air transportation	4511, 4521, 4582, and 4583
119	Pipeline transportation	4612, 4613, and 4619

(Continued)

Sector Number	Sector Name	SIC's Contained Within Sector
120	Local and suburban transportation	4111, 4119, and 4121
121	Other transportation services	4141, 4142, 4151, 4171, 4172, 4712, 4721, 4742, 4782, 4783, 4784, and 4789
	Communications:	
122	Telephone and telegraph	4811 and 4821
123	Radio and TV	4832 and 4833
124	Other communications	4899
	Utilities:	
125	Gas services	4922, 4923, 4924, and 4925
126	Electric services	4911
127	Water and sanitary services	4941, 4952, 4953, 4959, 4961, and 9302
	Wholesale Trade:	
128	Wholesale auto, parts and supplies	5012, 5013, and 5014
129	Wholesale groceries and related products	5041, 5042, 5043, 5044, 5045, 5046, 5047, 5048, and 5049
130	Wholesale farm products and farm product warehousing	4221, 5052, 5053, and 5059
131	Wholesale livestock	5054 and 4731
132	Wholesale machinery, equipment and supplies	5081, 5082, 5083, 5084, 5085, 5086, 5087, and 5088
133	Wholesale petroleum and petroleum products	5092
134	General wholesale	5022, 5028, 5029, 5033, 5034, 5036, 5037, 5039, 5063, 5064, 5065, 5072, 5074, 5077, 5091, 5093, 5094, 5095, 5096, 5097, 5098, and 5099

(Continued)

Sector Number	Sector Name	SIC's Contained Within Sector
Retail Trade:		
135	Lumber yards	5211
136	Farm equipment dealers	5252
137	Hardware, heating, electrical, paint and wallpaper	5221, 5231, 5241, and 5251
138	Department and variety stores	5311, 5321, 5331, and 5399
139	Food stores	5411, 5421, 5431, 5441, 5451, 5462, and 5499
140	Automotive dealers and repair shops	5511, 5521, 5531, 7531, 7534, 7535, 7538, 7539, 7542, and 7549
141	Gasoline service stations	5541
142	Apparel and accessory stores	5611, 5621, 5631, 5641, 5651, 5661, 5671, 5681, and 5699
143	Furniture, home furnishings and equipment stores	5712, 5713, 5714, 5715, 5719, 5722, 5732, and 5733
144	Eating and drinking places	5812 and 5813
145	Other retail	5341, 5351, 5591, 5592, 5599, 5912, 5921, 5932, 5933, 5942, 5943, 5952, 5953, 5971, 5982, 5983, 5984, 5992, 5994, 5995, 5996, 5997, and 5999
Finance, Insurance and Real Estate:		
146	Banking and credit agencies	6011, 6022, 6023, 6024, 6025, 6026, 6027, 6028, 6032, 6033, 6034, 6042, 6044, 6052, 6053, 6054, 6055, 6056, 6059, 6112, 6113, 6122, 6123, 6124, 6125, 6131, 6142, 6143, 6144, 6145, 6146, 6149, 6152, 6153, 6159, and 6161
147	Insurance carriers	6312, 6313, 6319, 6322, 6323, 6324, 6329, 6332, 6333, 6339, 6351, 6352, 6361, 6399, and 6411

(Continued)

Sector Number	Sector Name	SIC's Contained Within Sector
148	F.I.R.E. nec	6211, 6221, 6231, 6281, 6512, 6513, 6514, 6515, 6516, 6517, 6518, 6519, 6531, 6541, 6552, 6553, 6561, 6611, 6711, 6722, 6723, 6724, 6725, 6732, 6733, 6792, 6793, 6794, and 6799
	Services:	
149	Legal services	8111
150	Lodging services	7011, 7021, 7031, 7032, and 7041
151	Personal services	7211, 7212, 7213, 7214, 7215, 7216, 7217, 7218, 7231, 7241, 7251, 7261, 7271, and 7299
152	Advertising	7311, 7312, 7313, and 7319
153	Duplicating and addressing	7331, 7332, and 7339
154	Employment agencies; private	7361
155	Photographic services	7221, 7813, 7814, 7815, 7816, 7817, 7818, 7821, and 7395
156	Research and development	7391 and 8921
157	Other business services	7321, 7341, 7342, 7349, 7351, 7392, 7393, 7394, 7396, 7397, 7398, and 7399
158	Motion picture, amusement and recreation services	7832, 7833, 7911, 7929, 7932, 7933, 7941, 7942, 7943, 7945, 7946, 7947, 7948, and 7949
159	Automobile rental services	7512, 7513, and 7519
160	Automobile parking	7523 and 7525
161	Electrical repair	7622, 7623, and 7629
162	Miscellaneous repair services	7631, 7641, 7692, 7694, and 7699
163	Physicians and dentists services	8011, 8021, 8031, and 8041
164	Hospital and laboratory services	8061, 8071, and 8072

(Continued)

Sector Number	Sector Name	SIC's Contained Within Sector
165	Other medical services	8092 and 8099
166	Education (public and private)	8211
167	Colleges and universities	8221 and 8222
168	Other educational services	8229, 8231, 8241, and 8242
169	Engineering and architectural services	8911
170	Accounting, auditing and bookkeeping	8931
171	Other professional services	8999
172	Other services	8411, 8421, 8611, 8621, 8631, 8641, 8651, 8661, 8671, 8699, and 8811
	Other Manufacturing:	
173	Ordnance and ordnance accessories	1911, 1925, 1929, 1931, 1941, 1951, 1961, and 1999
	Other Services:	
174	Outdoor recreation	
	Final Payments:	
175	Scrap	
176	Households	
177	Property payments	
178	Federal government	
179	State government	
180	Local government	
181	Imports	
182	Depreciation	

(Continued)

Sector Number	Sector Name	SIC's Contained Within Sector
Final Demand:		
177	Federal government defense	9119, 9123, 9128, 9136, 9137 9190, 9710, 9711, 9721, and 9731
178	Federal government non-defense	9108, 9109, 9141, 9144, 9147, 9160, 9161, 9163, 9180, 9182, 9185, 9187, and 9199
179	State government	9241, 9244, 9282, 9285, 9287, 9291, and 9299
180	Local government	9341, 9382, 9385, 9387, 9391, and 9399
181	Exports	
182	New capital investments	
183	Inventory change	

a/ Standard Industrial Classification Manual - 1967, Executive Office of the President/Bureau of the Budget, Washington, D. C.

b/ Livestock auctioning of SIC 0729 is contained in 131 sector.

Appendix B

SECTORS IN THE REGIONAL INPUT/OUTPUT MODELS

Texas Coastal Input-Output Sectors
Including State Model Sectors and Standard
Industrial Classification Codes (SIC)

Coastal Sector Number	Coastal Sector Name	State Sector Number	S.I.C.'s contained within sector
Agriculture, Forestry and Fisheries:			
1	Irrigated crops	1, 2, 3, 4	0131, 0111, 0112, 0115, 0119, 0116, 0133, 0134, 0139, 0161, 0171, 0172, 0173, 0174, 0175, 0179, 0191
2	Dryland crops	5, 6, 7, 8	0131, 0111, 0112, 0115, 0119, 0116, 0133, 0134, 0139, 0161, 0171, 0172, 0173, 0174, 0175, 0179, 0191, 0271, 0272, 0279, 0291
3	Livestock	9, 10, 11, 12	0212, 0214, 0219, 0211, 0213, 0241, 0251, 0252, 0253, 0254, 0259
4	Agricultural supply	13	5191
5	Ginning	14	0724
6	Agricultural services	15	0711, 0721, 0722, 0723, 0729, 0741, 0742, 0751, 0752, 0761, 0762, 0781, 0782, 0783, 0971
7	Forestry, fisheries	16, 17	0811, 0821, 0843, 0849, 0851, 0912, 0913, 0919, 0921
Mining:			
8	Crude petroleum and natural gas	18	1311
9	Natural gas liquids	19	1321

Coastal Sector Number	Coastal Sector Name	State Sector Number	SIC's contained within sector
10	Oil and gas services	20	1381, 1382, 1389
11	Other mining	21	1011, 1021, 1031, 1051, 1061, 1081, 1092, 1094, 1099, 1211, 1213, 1411, 1422, 1423, 1429, 1442, 1446, 1452, 1453, 1454, 1455, 1459, 1472, 1473, 1474, 1475, 1476, 1477, 1479, 1481, 1492, 1496, 1499
Construction:			
12	Construction	22, 23, 24, 25, 26	1521, 1522, 1531, 1542, 1541, 1611, 1622, 1623, 1629
Manufacturing:			
13	Meat Products	27, 28	2011, 2013, 2016, 2017
14	Dairies	29	2021, 2022, 2023, 2024, 2026
15	Grains	30, 31	2041, 2043, 2044, 2045, 2046, 2047, 2048
16	Bakeries and food	32, 33, 34	2051, 2052, 2032, 2033, 2034, 2035, 2037, 2038, 2091, 2092, 2061, 2062, 2063, 2065, 2066, 2067, 2074, 2075, 2076, 2077, 2079, 2095, 2097, 2098, 2099, 2121
17	Beverages	35	2082, 2084, 2086, 2087

Coastal Sector Number	Coastal Sector Name	State Sector Number	SIC's contained within sector
18	Textiles	36, 37, 38	2211, 2221, 2231, 2241, 2251, 2253, 2254, 2257, 2258, 2259, 2261, 2262, 2269, 2271, 2272, 2279, 2281, 2283, 2284, 2291, 2292, 2293, 2294, 2295, 2296, 2297, 2298, 2299, 2311, 2321, 2322, 2323, 2327, 2328, 2329, 2331, 2335, 2337, 2339, 2341, 2342, 2351, 2352, 2361, 2363, 2369, 2371, 2381, 2384, 2385, 2386, 2387, 2389, 2391, 2392, 2393, 2394, 2395, 2396, 2397, 2399
19	Wood and furniture	39, 40, 41, 42, 43, 44, 45, 46	2411, 2421, 2426, 2429, 2431, 2434, 2435, 2436, 2439, 2441, 2448, 2449, 2452, 2491, 2492, 2499, 2511, 2512, 2515, 2517, 2519, 2521, 2531, 2541, 2591, 2599, 2514, 2522, 2542, 2611, 2621, 2631, 2661, 2641, 2642, 2643, 2645, 2646, 2647, 2648, 2649, 2651, 2652, 2653, 2654, 2655
20	Newspapers and printing	47, 48, 49, 50, 51	2711, 2721, 2731, 2741, 2732, 2751, 2752, 2753, 2795, 2761, 2771, 2782, 2789, 2791, 2793, 2794

Coastal Sector Number	Coastal Sector Name	State Sector Number	SIC's contained within sector
21	Chemicals	52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62	2812, 2813, 2865, 2861, 2869, 2816, 2819, 2821, 2823, 2824, 2822, 2831, 2833, 2834, 2873, 2874, 2879, 2841, 2842, 2843, 2844, 2851, 2891, 2892, 2893, 2895, 2899
22	Petroleum	63, 64	2911, 2951, 2952 2992, 2999
23	Plastic, leather and glass	65, 66, 67, 68, 69	3011, 3021, 3041, 3069, 3079, 3111, 3131, 3142, 3143, 3144, 3149, 3151, 3161, 3171, 3172, 3199, 3211, 3221, 3229, 3231
24	Clay, stone and cement	70, 71, 72	3251, 3253, 3255, 3259, 3261, 3262, 3269, 3281, 3291, 3292, 3293, 3295, 3296, 3297, 3299, 3274, 3275, 3241, 3271, 3272, 3273
25	Metals	73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88	3312, 3313, 3315, 3316, 3317, 3321, 3322, 3324, 3325, 3331, 3332, 3333, 3339, 3341, 3356, 3357, 3361, 3362, 3398, 3399, 3441, 3443, 3444, 3446, 3448, 3449, 3442, 3411, 3412, 3421, 3423, 3425, 3429, 3431, 3432, 3433, 3451, 3452, 3461, 3462, 3463, 3465,

Coastal Sector Number	Coastal Sector Name	State Sector Number	SIC's contained within sector
25	Metals (continued)		3466, 3469, 3471, 3479, 3494, 3498, 3493, 3495, 3496, 3497, 3499
26	Machinery	89, 90, 91, 92, 93, 94, 95, 96, 97	3523, 3524, 3531, 3537, 3534, 3535, 3536, 3532, 3533, 3511, 3519, 3541, 3542, 3544, 3545, 3546, 3547, 3549, 3551, 3552, 3553, 3554, 3555, 3559, 3561, 3562, 3563, 3564, 3565, 3566, 3567, 3568, 3569, 3585, 3572, 3573, 3574, 3576, 3579, 3582, 3586, 3589, 3592, 3599, 3581
27	Electrical equipment	98, 99 100, 101	3612, 3613, 3621, 3622, 3623, 3624, 3629, 3641, 3643, 3644, 3645, 3646, 3647, 3648, 3631, 3632, 3633, 3634, 3635, 3636, 3639, 3651, 3652, 3661, 3662, 3671, 3672, 3673, 3674, 3675, 3676, 3677, 3678, 3679, 3691, 3693, 3694, 3699
28	Transportation equipment	102, 103, 104, 105 106, 107	3721, 3761, 3724, 3764, 3728, 3769, 3711, 3713, 3714, 3715, 3731, 3732, 3743, 3751, 3792, 3799, 2451
29	Other manufacturing	108, 109 110, 111, 112, 113, 173	3811, 3822, 3823, 3824, 3829, 3825, 3841, 3842, 3843, 3832, 3851, 3861, 3873, 3942, 3944, 3949, 3911, 3914, 3915, 3931, 3951, 3952, 3953, 3955, 3561, 3962, 3963,

Coastal Sector Number	Coastal Sector Name	State Sector Number	SIC's contained within sector
29	Other manufacturing (continued)		3964, 3991, 3993, 3995, 3996, 3999, 3482, 3483, 3484, 3489, 3761, 3795
	Transportation:		
30	Railroad	114	4011, 4013, 4041
31	Motor vehicle	115, 116	4131, 4212, 4213, 4214, 4222, 4224, 4225, 4226, 4231
32	Water transportation	117	4411, 4421, 4441, 4452, 4453, 4454, 4459, 4463, 4464, 4469
33	Air and other transportation	118, 119, 120, 121	4511, 4521, 4582, 4583, 4612, 4613, 4619, 4111, 4119, 4121, 4141, 4142, 4151, 4171, 4172, 4712, 4722, 4723, 4742, 4782, 4783, 4784, 4789
	Communications:		
34	Telephone	122	4811, 4821
35	Radio and television	123	4832, 4833
36	Other communication	124	4899
	Utilities:		
37	Gas services	125	4922, 4923, 4924, 4925, 4932
38	Electric services	126	4911, 4931
39	Water and sanitary services	127	4941, 4952, 4953, 4959, 4961

Coastal Sector Number	Coastal Sector Name	State Sector Number	SIC's contained within sector
Wholesale Trade:			
40	Wholesale automotive	128	5012, 5013, 5014
41	Groceries	129	5141, 5142, 5143, 5144, 5145, 5146, 5147, 5148, 5149
42	Farms wholesale farm product	130, 131	4221, 5152, 5153, 5159, 5154
43	Machinery wholesale machine products	132, 133	5081, 5082, 5084, 5085, 5086, 5087, 5088, 5171, 5172
44	General wholesale	134	5021, 5023, 5031, 5039, 5041, 5042, 5043, 5051, 5052, 5063, 5064, 5065, 5072, 5074, 5075, 5078, 5093, 5094, 5099, 5111, 5112, 5113, 5122, 5133, 5134, 5136, 5137, 5139, 5161, 5181, 5182, 5194, 5198, 5199
Retail Trade:			
45	Retail lumber yards	135	5211
46	Equipment supply	136, 137	5083, 5231, 5251
47	Department stores	138	5311, 5331, 5399, 5961
48	Food stores	139	5411, 5422, 5423, 5431, 5441, 5451, 5462, 5463, 5499
49	Automotive and apparel	140, 141, 142	5511, 5521, 5531, 7531, 7534, 7535, 7538, 7539, 7542, 7549, 5541, 5611, 5621, 5631, 5641, 5651, 5661, 5681, 5699

Coastal Sector Number	Coastal Sector Name	State Sector Number	SIC's contained within sector
50	Furniture	143	5712, 5713, 5714, 5719, 5722, 5732, 5733
51	Eat and drink	144	5812, 5813
52	Other retail	145	5261, 5271, 5551, 5561, 5571, 5599, 5912, 5921, 5931, 5941, 5942, 5943, 5944, 5945, 5946, 5947, 5948, 5949, 5962, 5963, 5982, 5983, 5984, 5992, 5993, 5994, 5999
Finance, Insurance and Real Estate:			
53	Banking	146	6011, 6022, 6023, 6024, 6025, 6026, 6027, 6028, 6032, 6033, 6034, 6042, 6044, 6052, 6054, 6055, 6056, 6059, 6112, 6113, 6122, 6123, 6124, 6125, 6131, 6142, 6143, 6144, 6145, 6146, 6149, 6153, 6159, 6152, 6163
54	Other finance, insurance and real estate	147, 148	6311, 6321, 6324, 6331, 6351, 6361, 6371, 6399, 6411, 6211, 6221, 6231, 6281, 6512, 6513, 6514, 6515, 6517, 6519, 6531, 6541, 6552, 6553, 6611, 6711, 6722, 6723, 6724, 6725, 6732, 6733, 6792, 6793, 6794, 6799
Services:			
55	Legal services	149	8111

Coastal Sector Number	Coastal Sector Name	State Sector Number	SIC's contained within sector
56	Lodging	150	7011, 7021, 7032, 7033, 7041
57	Personal services	151	7211, 7212, 7213, 7214, 7215, 7216, 7217, 7218, 7219, 7231, 7241, 7251, 7261, 7271, 7299
58	Advertising and other business services	151, 152, 153, 154, 155, 156, 157	7311, 7312, 7313, 7319, 7331, 7332, 7339, 7361, 7221, 7333, 7813, 7814, 7819, 7823, 7824, 7829, 7395, 7391, 8922, 7321, 7341, 7342, 7349, 7351, 7362, 7369, 7392, 7393, 7394, 7395, 7396, 7397, 7399
59	Recreational services	158	7832, 7833, 7911, 7922, 7929, 7932, 7933, 7941, 7948, 7992, 7993, 7996, 7997, 7999
60	Auto service and repairs	159, 160, 161, 162	7512, 7513, 7519, 7523, 7525, 7622, 7623, 7629, 7631, 7641, 7692, 7694, 7699
61	Doctors	163	8011, 8021, 8031, 8041
62	Hospitals	164, 165	8062, 8063, 8069, 8071, 8072, 8042, 8049, 8081, 8091
63	Education	166	8211
64	Colleges	167	8221, 8222
65	Other services	168, 169, 170, 171, 172	8231, 8241, 8243, 8244, 8249, 8299, 8911, 8931, 7372, 7374, 7379, 8999, 8321, 8331, 8351, 8361, 8399,

Coastal Sector Number	Coastal Sector Name	State Sector Number	SIC's contained within sector
65	Other services (continued)		8411, 8421, 8611, 8621, 8631, 8641, 8651, 8661, 8699
66	Outdoor recreation	174	Texas P & W, county, city exp.
	Final Payments:		
67	Households	176	
68	Property payment	177	
69	Federal government	178	
70	State government	179	
71	Local government	180	
72	Depreciation	181	
73	Imports	182	
	Final demand:		
67	Households	176	
68	Federal defense	177	9119, 9123, 9128, 9136, 9137, 9190, 9710, 9711, 9721, 9731
69	Federal non-defense	178	9108, 9109, 9141, 9144, 9147, 9160, 9161, 9163, 9180, 9182, 9185, 9187, 9199
70	State government	179	9241, 9244, 9282, 9285, 9287, 9291, 9299
71	Local government	180	9341, 9382, 9385, 9387, 9391, 9399
72	Exports	181	
73	New capital investment	182	

Coastal Sector Number	Coastal Sector Name	State Sector Number	SIC's contained within sector
74	Inventory change	183	

COASTAL ZONE
INFORMATION CENTER

DATE DUE