

A LOCATION QUOTIENT AND SHIFT SHARE ANALYSIS
OF REGIONAL ECONOMIES IN TEXAS

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Acknowledgments

“When’re you gonna finish your paper?”

—Mary Beth Kiser

Thanks to my wife for all the help and motivation. Guess what . . . I’m done.

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CHAPTER ONE

Introduction

This paper is an exploratory study of the economic base of the regions of Texas. The study will employ two well known economic base analysis techniques: location quotient analysis and shift share analysis.

Policy makers, regional and fiscal planners, economic development practitioners and business people alike have much to gain from a careful consideration of the economy. Economic conditions form the underpinnings of nearly every decision we make. In this light, local economic base analysis proves itself a useful tool in the public administration and business environment.

The goal of economic base analysis is to uncover revealing characteristics, strengths, weaknesses and trends that describe a local economy. Any number of techniques, in which economic indicators or data are manipulated and analyzed, can be used to reveal the characteristics that differentiate a local economy and describe its uniqueness. Two of the most well known economic base analysis techniques are the location quotient analysis and shift share analysis, both of which are used in this research project.

A “local economy” can be considered any geographic unit below the national level. Most often states, regions, metropolitan areas and counties are analyzed and measured against the larger national economy. The geography to be considered in this research is the ten “Uniform State Service Regions” of Texas. The state’s sheer size and diversity often necessitate it be subdivided into regions. Texas state government agencies divide the state into regions for the purposes of administration, regulation and service delivery. The regions used in this study are the product of a recent effort to bring uniformity to the regional definitions used by state agencies. In this case, economic base analysis at the regional level of geography—and using these newly decided upon boundaries—allows a glimpse into the workings and unique qualities of these component parts of the larger state economy.

Government agencies are often the repositories for data of all kinds. One of the most effective ways that government can foster the economic development process is to make a proactive

effort to share these data. These efforts prove all the more useful to decision makers if economic data can be packaged in the form of meaningful analysis.

Comptroller John Sharp came into office in 1991 having been elected overwhelmingly on a platform of fighting government waste and using the Comptroller's office to enhance the state's economic development goals. In keeping with the latter goal, the Comptroller's office has worked to disseminate pertinent economic data of all kinds to the business community, local government officials and academia, where it can be put to use in building economic development strategies and informing taxpayers about local economic conditions. The analysis contained in this paper is part of that effort.

Chapter Two of this report describes the research setting under which this study has been conducted. This research is linked to two major projects undertaken by the Comptroller's office. These links will be further explained in the next chapter.

Chapter Three of this study provides a review of the relevant literature on location quotient and shift share analysis. The principal methodological approach to be used in this paper is derived from this review of the scholarly literature.

Used in tandem, the location quotient and shift share techniques provide an economic base analysis that concentrates on industries in which the local economy specializes as well as those which are experiencing growth. Chapter Four outlines the methodology used to discern these industries in each of the ten regional economies.

Chapter Five presents the research findings for each of the ten regions of Texas. Chapter Six contains summary comments. While the analysis in Chapter Five is based on the thirty top industries based on the location quotient and shift share techniques, an appendix is included at the end of this report containing sample spreadsheets showing the entirety of the analysis for one of the ten regions. The spreadsheets are included to give the reader a first hand look at the methodology and the scope of the data used.

CHAPTER TWO

The Research Setting

This chapter will detail the research setting under which this study has been carried out. This research is linked to two projects on which the author has worked as an employee of the Texas Comptroller of Public Accounts' office. It is an extension of an effort completed earlier in the year—the “Uniform State Service Regions” project—and an integral part of an ongoing project known as “The Forces of Change.”

The Uniform State Service Regions

The regions which form the geographical basis for this research—a relatively new set of regional boundaries for Texas—come from a project designed to bring uniformity to regions used by Texas state agencies.

Section 120 of Article V of the Appropriations Act passed by the 72nd Texas Legislature directed the Comptroller of Public Accounts, in cooperation with the Commissioner of Health and Human Services, to propose a uniform set of boundaries to divide the state into regions. These new regions are to be used by all state agencies that divide the state into administrative or service delivery regions. The Comptroller's office completed the task of designating new uniform state service region boundaries in May, 1992.

This was by no means an autocratic decision making process. State agency input was sought during all phases of the project. Initially, agency representatives were brought together at a meeting where the project and its goals were outlined. At this meeting Ric Williamson, one of the state representatives who authored the appropriations rider (section 120), spoke about the far reaching implications of regional uniformity. Williamson called this effort the first step in a process whereby agencies might one day be asked by the legislature to move toward co-location of regional offices. Also, at this meeting a survey instrument was distributed to agency representatives to determine the current use of regions.

Sixty-two agencies participated in the survey and the findings proved interesting. Of the 36 agencies using regions, 69 different regional definitions were reported. The number of regions

used ranged from two to 119, with divisions using between four and 24 most common. Among the agencies, the use of the 24 Council of Government (COG) regions provided the only common ground for regionalizing the state.

An Interagency Working Group with representatives from 20 state agencies and the legislature was formed to work through agency concerns and develop a draft plan of Uniform State Service regions. The Interagency Working Group's proposal called for basing the regional definitions on a "nested" approach in which ten regions would be created from the COG region boundaries and would be consistently applied across agencies. But it would be an agency's prerogative to further subdivide these ten regions along existing COG boundaries. So, any agency that used regions could have between ten and 24, but they would still be held to reporting data for the ten Uniform State Service regions. This approach would achieve the benefits of a uniform regional geography, but allow some flexibility in response to the diversity of agency concerns.

The Comptroller and Commissioner of Health and Human Services adopted this proposal and these new regions will be used henceforth by state agencies. Detail on the counties contained in each region appears in Chapter Four. This paper is an extension of the above described project in that it will provide an analysis of regional economies in Texas based on the Uniform State Service region boundaries. This applied research project is also linked to The Forces of Change, another effort underway at the Comptroller's office.

The Forces of Change

Governor Ann Richards signed Executive Order 92-1 which called on the Comptroller's office to conduct a study of the economic, demographic and social changes taking place that will affect Texas over the next 35 years.

Part of the Comptroller's analysis—entitled The Forces of Change—is a series of reports on the regions of Texas. The analysis from this applied research project is presented as one chapter in each of this series of reports, called "Texas Regional Outlook." Other chapters in the reports explore the individual region's economic history, demographics, labor force trends and the "forces of change" that may be playing out particularly strongly in each region. The regional reports also present a forecast of selected economic variables for the region through 2000. The

third chapter—“Economic Structure and Trends”—in each of the Texas Regional Outlook reports draws directly from this applied research project. In each case, the analysis is based on a location quotient and shift share analysis performed by the author. This research will help to identify key industries and important economic trends for these new regions of Texas.

In a cover letter for the Texas Regional Outlook reports Comptroller John Sharp writes that “to learn about Texas, you have to find out about the incredible range of economic . . . activity across the state. To know the whole, you have to figure out the pieces.” This quote provides a succinct commentary on the goal of this applied research project.

The next chapter discusses the relevant scholarly literature on location quotient and shift share analysis.

CHAPTER THREE

Review of the Relevant Literature

The focus of this applied research project is to provide an analysis of the regional economies of Texas. This chapter, then, will explore the scholarly literature and establish the theoretical framework under which such an examination will provide meaningful results. Also, a review of the literature should yield an approach to accepted methodologies for the applied techniques to be utilized in this research.

The notion of a local economy—as an interdependent unit that functions at times differently than the larger economy of which it is a part—is a basic assumption. This idea is becoming increasingly salient as localities struggle to increase their attractiveness in order to lure businesses in from other regions. According to Buttress, regionalism is the new force in economic development. (Buttress, 1989: 24)

Many economists—for example Amey, Fik and Maleki, 1991—have developed economic base models to explain changing employment structures and other economic activities particular to a local economy. Economic base analysis involves the statistical analysis of economic data for a particular region in order to sharpen the focus on the economic structure or trends in that region.

Economic base analysis is a way to look analytically at a local economy. Techniques used to view a local economy range from econometric forecasting of economic variables to regional input-output modeling and impact analysis.¹ This paper focuses on two economic base analysis techniques that seek to examine local economic conditions and characteristics: the location quotient and shift share analyses.

This chapter will explore each of these techniques with a discussion of the theoretical rationale, the basic methodology, the data, the limitations of the technique and expansions to the methodology offered in the scholarly literature.

¹For an example see Canipbell, Economic Development Review, Summer 1989

Location Quotient Analysis

Rationale

The location quotient—a technique that mathematically indexes a region's economy to a larger reference economy—"has been widely used by researchers in economic geography and regional economics since the 1940s."(Gibson, Miller and Wright, 1991: 65) Location quotient analysis is recognized in the scholarly literature as an effective way of describing the structure of a regional economy. Isserman maintains that the technique has remained popular "in large part because it requires little data and analytical skill and can be carried out quickly and inexpensively." (Isserman, 1977: 33) The rationale behind the location quotient, and what it describes, is prevalent in the literature.

Gibson, Miller and Wright state that the location quotient "yields a coefficient, or a simple expression, of how well represented a particular industry is in a given study region."(Gibson, Miller and Wright, 1991: 65) This notion of industry representation is central to the rationale behind the location quotient technique. This technique describes a region's industry mix and determines whether or not a region has its fair share of each industry.

Another concept central to the location quotient technique is that of exports. According to Galambos and Schreiber, the location quotient is an economic base analysis technique that "concentrates on the importance of exports to the local economy."(Galambos and Schreiber, 1978: 13) In this context, exports are goods—and, some scholars argue, services—which are produced in a region and consumed outside the region. An economic base analysis by the Institute for Studies in Business at the University of Texas at San Antonio (UTSA) describes it this way: "Economic regions export (to other areas-not necessarily out of the country) goods and services they produce so they may import the ones they do not produce."(UTSA, 1991: 13) Gilmer affirms the importance of the concept of exports, asserting that "exports generate income from outside the region and they become key to long term growth and development."(Gilmer, 1990: 2)

The inverse of exports, nonexports, is also a central theoretical component of the location quotient. The UTSA study points out that "the remainder of local economic activity, nonexport activities, includes all locally produced goods and services that are consumed or purchased within the local area."(UTSA, 1991: 14) Isserman points out the dependent nature of nonexport activity

on income generated by exports. “Local activity (sometimes called residentiary, service or nonbasic) is assumed to depend on export activity (sometimes called basic) and to be proportional to it.”(Isserman, 1977: 33)

Multipliers represent a final core concept of the location quotient. The multiplier effect means that a dollar brought in to a local economy through export activity will turn over several times in the nonbasic sector of the region’s economy. According to Galambos and Schreiber “if income from export sales increases, the total income of the local economy will increase by an even greater amount--it will be multiplied.”(Galambos and Schreiber, 1978: 13) Amey, Fik and Maleki link the multiplier effect of exports directly to regional growth. “To understand the expansionary role of income-generating basic employment—the multiplier effect—is to understand the growth potential of a regional economy.”(Amey, Fik and Maleki, 1991: 87)

The theoretical framework of the location quotient analysis is fairly straightforward. It represents “a quick and inexpensive means of categorizing economic activity into those that are basic, systematically traded, and those that are nonbasic or locally produced and consumed.”(Gilmer, Keil and Mack, 1989: 1) For the economist, policy maker or economic development practitioner, the analysis offers a reference by which to judge “goods and services that an area exports, is merely self sufficient in, or must import.”(UTSA, 1991: 13) In this way, it points to areas of specialization—strengths and weaknesses in relation to the national norm—in a region’s economic base.

Discussion of the Methodology

The mathematical operation for calculating the coefficient in location quotient analysis is surprisingly simple. Isserman describes the calculation in terms of expressions of supply and demand. He asserts that the mathematical terms in the location quotient equation describe 1) “the region’s share of the total production, or quantity supplied, of the products of industry *i* available to the nation, [and 2)] the region’s share of the nation’s consumption or quantity demanded. . . . Then if their difference is positive, the region produces a greater share of the nation’s production than it consumes and the excess is assumed to be exported.”(Isserman, 1977: 35) Isserman

continues that “the multiplier can be calculated by dividing export activity into total activity.”(Isserman, 1977: 34)

Galambos and Schreiber describe the operation in terms of percentages. “When a local industry has a greater percentage of total local employment than is true for the nation, then it is exporting.”(Galambos and Schreiber, 1978: 16) The Galambos and Schreiber article suggests the following steps for calculating location quotients: First calculate employment in each U.S. industry expressed as a percentage of total national employment. Multiply these percentages by total employment in each local industry to get an estimate of local employment if the region followed national patterns. These estimates are called “estimated local requirements.” Finally, subtract estimated local requirements employment from actual employment in each local industry. Positive numbers indicate export industries. Galambos and Schreiber divide total local employment by total local export employment to arrive at an expression of the region’s export multiplier.

Gibson, Miller and Wright prefer to state the location quotient “as a ratio of ratios.”(Gibson, Miller and Wright, 1991: 66) The authors suggest the following formula:

$$LQ = \frac{R_i/R}{RR_i/RR}$$

Where R=employees in all industries in region R;
 R_i=employees in industry i in region R;
 RR=employees in all industries in reference region RR
 RR_i=employees in industry i in reference region RR

All of these methodologies are mathematically equivalent, and some form of this basic formula is used in all the literature reviewed herein.

Discussion of the Data

The location quotient technique can be used on any type of data for which there exists comparable data, both from the standpoint of classification and time frame, for a region and a larger reference economy. Most often, analysts have used employment data. There is not a clear indication in the literature as to why measures of employment are generally preferred, but some

authors suggest that employment is a quantifiable and visceral measure of an industry. In other words, most identify the size of an industry's workforce with its relative strength.

Another argument for using employment data is accessibility. Galambos and Schreiber suggest that the most accessible data is employment classified by Standard Industrial Classification (SIC) codes. SIC data exists for counties, states and the nation at several levels of detail. These levels of detail progressively define industries more narrowly, and include 1, 2 and 4 digit classifications. The classification scheme is relatively simple. Additional digits in the SIC code add to the level of detail in the description of the industry. Take, for example, a business in Austin with 50 employees that manufactures guitars. Those 50 employees would be classified under the one digit SIC code "3" for manufacturing.¹ Other one digit classifications include mining, construction, trade, services and government among others. At the two digit level, the 50 employees engaged in making guitars would be classified under SIC 39, or miscellaneous manufacturing. Two digit classifications in manufacturing include transportation equipment (37), electronics (36), primary metals (33) and rubber and plastics (30) among others. A final level of detail is offered at the four digit level, where the guitar makers would be classified under SIC code 3931, for manufacturers of musical instruments. Other four digit SIC classifications under the two digit code 39 include manufacturers of jewelry (3911), silverware (3914), games and toys (3944) and sporting goods (3949).

This data is published for public use in the U.S. Bureau of the Census' "County Business Patterns." The data in County Business Patterns do have limitations, however, in that government employees, the self employed, farm workers and domestic service workers are not counted. Also, Galambos and Schreiber point out that problems arise with these data in that some employment is reported as "undisclosed," or is published using ranges to avoid disclosure problems for individual firms. "Employment information that is not covered or disclosed in County Business Patterns must be obtained locally."(Galambos and Schreiber, 1978: 19)

Buongiorno and Orr offer an alternative to obtaining employment data locally.

"Employment data for small geographic areas such as counties are often published only as ranges,

¹Actually both one digit SIC codes "2" and "3" indicate manufacturing industries.

to avoid disclosing information pertaining to a specific firm.”(Buongiorno and Orr, 1989: 225) They suggest a technique that can be helpful in closely estimating employment for firms that is published as a range. Their article describes two stages: The first uses the published employment range together with the number of firms by size class to reduce the range. The second technique uses data from other industries in the same area to reduce the range further. This technique “appears to be an effective way of increasing the accuracy of employment data reported by the U.S. Bureau of the Census for small geographic areas.”(Buongiorno and Orr, 1989: 234)

Isserman identifies “disaggregation,” as a data problem that clouds the results of a location quotient analysis. He offers as an example a region that specializes in and exports one type of electrical machinery but does not produce other types of electronics. Data that broadly groups all electronics employment together—such as that at the 1 and 2 digit levels—would tend to underestimate the impact of the particular industry in which this region specializes. “This problem in the use of location quotients is often referred to as product-mix. Its effects can be diminished by calculating the multiplier using data at a lower level of the Standard Industrial Classification (SIC) Code so that a smaller range of products is mixed together.”(Isserman, 1978: 35)

Limitations of the Technique

Aside from the problems with disclosure and disaggregation, which are essentially data limitations, it is important to note that there are identifiable limitations to the technique itself and the results it reports. Most of these limitations take the form of assumptions that cannot be supported with empirical evidence.

The UTSA study cites as the assumptions of location quotient analysis: uniform labor productivity, identical consumption per capita, and homogeneous goods in each sector.

Isserman expands on these assumptions and provides some detail. According to Isserman, the location quotient assumes that (1) “there must be identical productivity per employee in industry *i* as in the nation,” (2) “there must be identical consumption per employee (or per capita) of the products of industry *i* in the region as in the nation,” and (3) “the product of industry *i* in the region is identical to the product of industry *i* in the rest of the nation.”(Isserman, 1978: 35) In other

words, Isserman is pointing out the impossibility of uniform labor productivity, identical consumption per capita, and homogeneous goods in each sector for each region.

Also inherent in the location quotient analysis is what Isserman calls “the closed economy assumption.” That is that “the entire nation must be assumed to consume an amount exactly equal to the nation’s entire production.”(Isserman, 1978: 35)

According to Gibson, Miller and Wright empirical evidence suggests that the location quotient may exaggerate multipliers, but the exaggeration can be reduced by using more detailed data. The authors warn, however, that this may defeat the cost effectiveness of the analysis.

Amey, Fik and Maleki assert that the “magnitude of [the location quotient’s] estimation error is known to be inversely proportional to community size.”(Amey, Fik and Maleki, 1991: 90)

Gilmer, Keil and Mack note three “deficiencies” of the location quotient: (1) differences in taste can give rise to variable location quotient values that do not reflect actual trading patterns, (2) differing economies of scale across nonbasic industries may give rise to variable location quotient results and (3) a “central place hierarchy” exists which may give rise to problems in the nonbasic location quotient results. Gilmer, Keil and Mack go on to propose an expansion of the methodology designed to resolve the third problem.

These limitations, however, are not without remedy. This will be explored further in the next section. Most importantly, while they are important to note, these limitations do not negate the value of the results of the technique. A location quotient analysis, even in its most basic formulation, offers important insights.

Expansions of the Methodology

The literature is rife with scholars’ suggestions for expansion and improvement of the location quotient methodology. Some scholars suggest modifications of the actual formula for calculating location quotients, while others offer new ways to view the results.

Amey, Fik and Maleki describe an economic base model designed to explain changing employment structures in relation to export oriented activities. Location quotients are used to estimate economic base multipliers for two digit employment in Florida counties at different time periods. Changes in multipliers over time are compared. They suggest that regional transactions

can be broken down into “a four tier typology.”(Amey, Fik and Maleki, 1991: 87) This typology would include basic and nonbasic transactions, as suggested by the traditional location quotient methodology. Amey, Fik and Maleki propose that the typology also include “system leakage”—or monetary flows out of a region and transfer payments like social security and retirement income, which create an “influx of dollars without a complimentary exchange of goods or services.”(Amey, Fik and Maleki, 1991: 87)

Gibson, Miller and Wright also suggest grouping industries, but by a hierarchy based on the relative representation their location quotient value would suggest. Gibson, Miller and Wright’s study presents five groupings: 1) very underrepresented, 2) moderately underrepresented, 3) average representation, 4) moderately high representation and 5) very high representation.

In two separate studies, Gilmer looks into how well the location quotient captures service sector exports and urban/rural economic interdependence.

Gilmer poses the question of “whether the service sector initiates growth or passively reacts to expansion in other sectors.”(Gilmer, 1990: 1) He maintains that in large metropolitan areas, services do initiate growth. The article develops a new methodology to examine service sector exports. Gilmer’s expansion looks at the mean and standard deviation of the location quotient values for an industry measured across a large number of places. Under this scheme, nonbasic industries will have a location quotient value near one and a small standard deviation, basic industries will have a much larger standard deviation. Gilmer asserts that this technique will give a more accurate picture of how service industries in large metropolitan areas can serve as exports to the surrounding hinterlands.

Gilmer, Keil and Mack expand on this notion of a “central place hierarchy,” which is the effect on location quotient values of an economy’s position in the surrounding urban/rural hierarchy. He suggests developing a hierarchy of higher-order and lower-order places (metropolitan versus nonmetropolitan) and indexing areas against a larger norm made up of like components.

Isserman proposes modifying the export sector to include what he calls “exogenous employment.” “Federal government employment in a region is a good illustration of exogenous

employment which brings money into the region, but which is not an export in the strict sense of goods being sent outside of the region.”(Isserman, 1977: 36)

One limitation of the location quotient that is cited frequently is that it offers only a “snapshot” in time, a static picture of a regional economy. This is not a criticism that can be easily explained away or answered by expanding the methodology. It is in this light that “shift share analysis” proves to be a valuable companion to the location quotient. Shift share gives the regional analyst a dynamic picture of changes in an economy over time.

Shift Share Analysis

Rationale

The shift share analysis and what it attempts to measure are not quite so straight forward as the location quotient. Basically, the technique diffuses change over time into component parts. Using this technique, an analyst can discern the forces at work in the growth of a regional economy. Like the location quotient, in using a shift share analysis a local economy is indexed against a reference economy. “The shift share method is a measure of the relative pieces of the gains or losses of an entity compared with a growth norm.”(Lipnick, 1987: 1) The growth norm is usually taken to be the average growth of a set or group of comparable entities. An example would be the comparison of the gains or losses in employment for the sectors of a regional economy compared with the national economy, which is made up of comparable regions.

According to Esteban-Marquillas “this technique of analysis intends to express the factors that cause the differences of growth among the regions.” He continues that the success of the shift share “has probably been due to the fact that the statistical information required is very elementary and the analytical possibilities that it offers are quite large.”(Esteban-Marquillas, 1972: 249)

For Galambos and Schreiber, shift share answers two basic questions: “Is our mix of local industries a rapid or slow growth mix compared to the total mix of U.S. industries. . . [and] Is our local area getting an increasing or a decreasing share of each industry.”(Galambos and Schreiber, 1978: 26)

Mondal relates the name of the technique to its purpose, saying that “the ‘shift’ component of the technique measures the movement of the local economy into faster or slower growth sectors,

while the 'share' component measures the larger or smaller share of the growth occurring in a given economic sector.”(Mondal, 1990: 4)

There is considerable debate in the literature about whether or not the shift share technique points to industries that will exhibit growth in the future. While some scholars have embraced the notion, many remain skeptical about the predictive value of the results of a shift share analysis. As Andrikopoulos, Brox and Carvahlo state, “views have ranged from a complete rejection of the model as a tool designed for explaining and predicting regional economic growth to more supportive arguments.”(Andrikopoulos, Brox and Carvahlo, 1990: 1)

According to McDonough and Sihag, “the intent of shift share is to measure the residual component of economic growth not attributable to growth in the base economy or differences in industrial mix between the base economy and the region.”(McDonough and Sihag, 1991: 1) This quote indicates that while the technique diffuses change into several component parts, it is one part in particular—the residual component—that analysts are most interested in isolating. This assertion leads into a discussion of the methodology.

Discussion of the Methodology

As was the case for the location quotient, there exists in the literature a generally agreed upon basic methodology for calculating shift share.

In their discussion of the methodology, Galambos and Schreiber say that the shift share “takes the total change in local employment for a given period in time and splits it into three parts: national growth, industrial mix and competitive share.”(Galambos and Schreiber, 1978: 27) For each local industry the analyst needs to determine the net change (gain or loss) over the time period in question. The analyst then needs only two additional pieces of information: the percent change in total U.S. employment over the same time frame, and the percent change for each industry at the U.S. level over the same time frame.

Galambos and Schreiber offer a thorough discussion of what the three growth components describe and how to calculate them using the above described data. The national growth component represents the increase in employment that would have occurred if the local industry

grew at the same rate as national employment grew across all industries. To arrive at this figure, multiply the beginning local industry employment by the national growth rate for all industries.

The industrial mix component indicates the change in employment in an industry that occurred because of the difference between the growth rate for this industry and the national growth rate for all industries. In other words, is this industry growing at a faster or slower rate than the national average? To arrive at this figure subtract the overall U.S. growth rate from the national industry growth rate and multiply by the beginning year local industry employment figure.

The competitive share component indicates whether an area has attracted a larger share of an industry or lost a portion of its share to other regions. To get at this figure, subtract the U.S. growth rate for the industry from the local growth rate for the industry and multiply by the beginning year local industry employment figure.

Fuchs pioneered the shift share technique in the 1950's. His methodology is only slightly cruder than what has come to be the standard procedure. In Fuchs' study, "the emphasis is on areal differentials in rates of growth or relative changes in location."(Fuchs, 1959: 1) According to Fuchs "the basis of [the] analysis is the comparison of actual figures for each state in 1954 with hypothetical figures showing what the state would have had if it had changed at the same rate as did the nation between 1929 and 1954. Thus if the state increased faster than the U.S. we say the state gained; if the state did not grow as rapidly, we say it lost, and a comparison of the 1954 figure with the hypothetical 1954 figure shows the magnitude of the gain or loss."(Fuchs, 1959: 6)

Fuchs goes on to describe what his methodology measures. He says that the:

relative growth of manufacturing in a state will depend upon (a) the rate at which specific industries grow in the state compared with the growth of these industries in the U.S., and (b) the industrial structure of the state, i.e. whether the state has, on balance, industries which at the national level are growing faster or slower than manufacturing in general. It [is] very useful to have a measure of the relative growth of manufacturing in each state, adjusted for its industrial structure, and to have a measure of the extent to which the state had a favorable or unfavorable structure.(Fuchs, 1959: 9)

Esteban-Marquillas defines the components thusly: "the industry mix effect represents the positive or negative effects of the specialization of the regional employment in sectors where the rate of growth at the national level is more or less fast. The competitive effect shows the

contribution to growth due to the special dynamism of the sector in that region compared with the average growth that such a sector has at the national level.”(Esteban-Marquillas, 1972: 250)

The UTSA study uses the same basic formula to calculate shift share, but uses different terminology to identify the components of growth. The study splits growth among 1) the economic growth component, 2) the proportional shift component and 3) the differential shift component.

Discussion of the Data

The data requirements of the shift share analysis are similar to those for the location quotient. Also, like the location quotient, the technique can be applied to a broad spectrum of data types, but employment data is most frequently used. Some studies diffuse the components of growth in indicators like gross state product or local area product, which measures the value of all goods and services produced in the region. Lipnick used the shift share technique, in a study on the business applications of shift share, with product market share data. For the most part, however, analysts have chosen employment as their yardstick. Using employment as the variable of measure “is desirable . . . because much of the interest attached to location, especially on the part of government officials, labor leaders, and market researchers, is more closely related to the question of employment.”(Fuchs, 1959: 4)

The UTSA study states that “shift share analysis requires employment data from two reference years for both the local economy and the reference economy.”(UTSA, 1991: 8) Galambos and Schreiber again suggest County Business Patterns as a good source for the necessary employment data.

Fuchs offers a discussion of the data which points out a significant hurdle in the use of SIC coded employment data. Periodically, the codes themselves are updated to account for new industries. Often, reconciliation is difficult if not impossible. In Fuchs’ study “there were two major revisions of industry classification in addition to dozens of minor changes between 1929 and 1954.”(Fuchs 1959: 2) Fuchs was unable to include these industries in his analysis. “A few industries in 1929 and a few in 1954 . . . have been excluded from the study. Industries excluded are mainly those which were not covered by the census in one of the two years.”(Fuchs 1959: 3)

The literature offers examples of studies which apply shift share analysis to data other than employment. Cortes and Copeland apply the technique to real gross state product for the state of Kansas. They analyze “the sources of relative gains and losses in the Kansas GSP [Gross State Product]. . .to determine whether the changes are due to national growth effects, shifts in industry mix or competitive advantages.”(Cortes and Copeland, 1991: 16)

A study by Coomes and Olson recognizes the “tradeoff between the timeliness and the comprehensiveness of data,”(Coomes and Olson, 1990: 167) in monitoring economic growth. Coomes and Olson assert that “economic growth is probably more closely tied to earnings growth than job growth.”(Coomes and Olson, 1990: 167) Their study applies the shift share technique to income data and folds it into an index that includes employment data. The result is an index that combines the timeliness of job data with the completeness of wage and income data.

Lipnick offers a practical suggestion for managing the sometimes large amounts of data involved in a shift share analysis. He advocates the use of a computer spreadsheet program because “shift share analysis is columnar and row oriented.”(Lipnick, 1987: 31)

Limitations of the Technique

Several limitations of the shift share technique are pointed out in the scholarly literature. Galambos and Schreiber illuminate a common criticism of the shift share. “The employment shift and share components do not explain *why* the employment changes occurred.[italics added] This statistical technique is a monitoring device: it signals changes in the local area's competitive position.”(Galambos and Schreiber, 1978: 32)

In his article, Esteban-Marquillas tries to address the 1959 criticism of Rosenfeld that the values that the competitive effect “can take are not only due to the special dynamism of the sector, but also to the specialization of the regional employment in this activity.” He continues that “the competitive effect, as it is normally formulated, does not reflect exactly what is pretended, but is influenced and interwoven with the industry mix effect.”(Esteban-Marquillas,1972: 250)

UTSA highlights similar criticisms of the shift share, saying that the proportional shift (their equivalent of the industry mix effect) and differential shift (their equivalent of the competitive effect) results are not independent of each other and should not be viewed as such. They continue

that some researchers have noticed substantial and unexplained instability in the differential shift component over time. Finally, the shift share simply describes local employment trends, it does not explain them or guarantee that they will continue over time.

Arcelus complains that the standard model assumes “that regional economic activity is directed exclusively toward the export market, even though it is well known that, in many industries, a great part of [regional employment] goes to meet local demands.”(Arcelus, 1984: 5)

Expansions of the Methodology

To answer these limitations or simply to offer improvements, economists have prescribed expansions to the basic shift share methodology.

Esteban-Marquillas—in what is one of the most often cited and generally accepted improvements of shift share—introduces the concept of homothetic employment. He defines it as “the employment that sector i of region j would have if the structure of the employment in such a region were equal to the national structure.”(Esteban-Marquillas, 1972: 251) The author suggests substituting homothetic employment for effective employment, and gives a formula for calculating homothetic employment:

$$b'_{ij} = b_{0j} (b_{i0} / b_{00})$$

where b'_{ij} = homothetic employment in sector i of region j

where b_{0j} = total employment in region j

where b_{i0} = national employment in sector i

where b_{00} = total national employment

He also introduces the allocation effect—a “component [that] will show us if the region is specialized in those sectors in which it enjoys better competitive advantages.”(Esteban-Marquillas, 1972: 252) The formula for the allocation effect is as follows:

$$a_{ij} = (b_{ij} - b'_{ij})(r_{ij} - r_{i0})$$

where a_{ij} = the allocation effect in sector i of region j

where b_{ij} = effective employment in sector i of region j

where b'_{ij} = homothetic employment in sector i of region j

where r_{ij} = growth rate of sector i of region j

where r_{i0} = national average rate of growth of sector i

Esteban-Marquillas proposes adding the allocation effect as another component of growth, along with the national growth effect, the industry mix effect and competitive effect. The author explains that the allocation effect will be positive if the region is specialized in those sectors of faster regional growth or if it is not specialized in the sectors in which it is lacking in competitive advantages. "On the contrary, the allocation effect will be negative if the region is specialized in sectors for which at the moment the region is lacking in advantages, or if it is not specialized in the sectors in which it has those advantages."(Esteban-Marquillas, 1972: 253) Many economists¹ now use the allocative effect in their shift share methodology as a matter of course.

McDonough and Sihag incorporate "primary and secondary base economies in the shift share model."(McDonough and Sihag, 1991: 1) According to the authors, studies in the past used a singular base economy for the growth and industry mix effects—typically the nation is used as a base for state analyses and the state is used as base for sub-regions. McDonough and Sihag believe that the growth of an industry in a sub-region is likely to be tied to both the state and national economies."(McDonough and Sihag, 1991: 1) The suggested modification "enables the proper allocation of credit for subregional economic growth." (McDonough and Sihag, 1991: 9)

In another study, McDonough and Sihag offer an expansion of the shift share method to include international effects. The shift share analyses focus on regional growth that derives from regional superiority relative to the national economy. "Some industries however, compete internationally for markets."(McDonough and Sihag, 1989: 81) The article proposes a three-way classification of industries on the basis of market dominance: 1) industries for which the international market is dominant (such as manufacturing), 2) industries for which the national market is dominant (such as wholesale trade and transportation) and 3) industries for which the regional market is dominant (retail trade and construction). McDonough and Sihag recommend the inclusion of variables for world growth effect and world industry mix effect for industries for which the international market is dominant.

¹See for example Arcelus, McDonough and Sihag and Rankin.

According to Lipnick business and marketing analysts began using the shift share technique in the late 1970s. He catalogs the business uses of shift share as including: 1) predicting future product performance, 2) assisting causal explanations of market growth changes, 3) product performance appraisal and 4) identification of product and market opportunities.

Arcelus says that the standard formula “lacks a regional factor that will account for the strength of the local market. . . . In order to take this factor into account, [the competitive effect] is broken down into two components: R_{ij} , the regional growth component, and RI_{ij} , the regional industry mix component.”(Arcelus, 1984: 5-6)

Andrikopoulos, Brox and Carvahlo link shift share with regression analysis to arrive at causal explanations. The authors use regression analysis to forecast the competitive component of each industry. They maintain that their study supports “the assertion that the shift share model is a useful tool in regional development and growth when the differential shift can be tied to a behavioral model of maximizing behavior.” (Andrikopoulos, Brox and Carvahlo, 1990: 9)

Some scholars find the location quotient and shift share analyses complimentary of each other, and employ them both to describe economic activity in a region.

Arcelus ties his shift share extension to location quotient methodology. The extension discussed in the paper:

deals with the degree of specialization of region J in sector i by using the concept of homothetic employment. The use of this concept is particularly helpful when one considers that E_{ij} [employment in industry i for region j] corresponds to a location quotient L_{ij} of 1 in sector i of region j. The main advantage of this linkage is that the location quotient is a good indicator of relative structure and has been shown to perform relatively well when applied to disaggregated data.(Arcelus, 1984: 7)

Practical Application

Despite all the scholarly discussion that centers around the theoretical underpinnings of these techniques, location quotient and shift share are *applied* techniques. The results of these techniques can be used in a variety of contexts. Policy makers, regional and fiscal planners, economic development practitioners and business people alike have much to gain from focusing on their local economy using the results of location quotient and shift share analysis. Economic conditions, particularly at the local level, form the basis of nearly every decision made in business

and government. So, location quotient and shift share analysis are more than just theories and formulas about which economists argue. They are analytical tools that prove useful in both the public administration and business environment. They will certainly be used as such in this applied research project.

Both the UTSA and University of Texas at Dallas (UTD) studies apply both location quotient and shift share to illuminate their subjects. The UTSA study is an attempt to define the demand for engineers in the Lower Rio Grande Valley, while UTD uses location quotient and shift share to identify target growth industries for the Dallas/Fort Worth region. According to the authors of the UTSA study, the two techniques go hand in hand, as “location quotient analysis is intended to augment shift share analysis.”(UTSA, 1991: 13)

These studies, with their emphasis on the insights offered by a combination of shift share and location quotient analysis, offer a model for the approach this paper will take.

From this literature review emerges a picture of the location quotient and shift share analyses as techniques for which much positive can be said. The analyses offer unique insights into the structure and change that characterizes local economies. In addition, they are premised on readily available data and fairly simple, understandable methodologies. These two techniques have stood the test of intense scholarly scrutiny, and academicians and practitioners alike find value in their application. The next chapter details the methodology to be used in this research.

CHAPTER FOUR

Methodology

This chapter will discuss the methodology used in this applied research project. Both the practical and theoretical discussions in the literature proved valuable in formulating a methodological approach. Precedent has been set in the literature to use the location quotient and shift share techniques in tandem to illuminate the structure of a regional economy and recent economic trends.

This paper explores the structure of each region's economy and how it has changed over the past several years. The location quotient is used to identify the unique structural components of each region's economy. As discussed in the previous chapter, this technique compares an industry's proportion of employment in a region with its proportion in the nation's economy. This identifies areas of specialization in a regions economy that "export" outside the region, thereby bringing in many of the dollars that flow through other sectors of the economy.

Merely examining structural concerns often misses important trends. To identify the dynamic components of the region's economy, a "shift share" analysis helps to point out the economic strengths and weaknesses. The technique decomposes the change in an economy over time into component parts. One part, the national growth component, explains the change in a region's employment growth that can be attributed to growth in the national economy. A second component, the industry mix, adjusts for the industries represented in the region, relative to the national economy. The final and the key component is the competitive effect which points to industries for which the region has gained or lost competitive share in employment.

One criticism of the location quotient technique is that it offers only a static—or "snapshot"—view of an economy. The strength of location quotient analysis is that it highlights areas of regional specialization, but it does so only for a particular point in time. The shift share analysis, however, shows a broader picture of change in a regional economy over time. Shift share analysis points to industries that may be waxing or waning in terms of attractiveness and competitive advantage relative to other regions in the United States. Industries that gained in competitive share have been successful in grabbing a disproportionately large amount of the

available pool of new employment generated in that industry over the time period in question. This indicates that the region is comparatively more attractive to the industry than other regions in the nation. In this way, the shift share analysis portrays a more dynamic view of change in an economy, and highlights industries that may continue to capture a large share of new growth in the future.

The unit of analysis will be employment in the ten regions. For the location quotient, 1991 average annual employment will be indexed against U.S. employment data for the same time period. For the shift share analysis, the period 1988 to 1991 will be examined using average annual employment data for the regions and U.S. Employment will be measured at the four-digit Standard Industrial Classification (SIC) code level for all manufacturing industries. All other industries will be measured at the two-digit SIC level. An explanation of and practical example using the SIC coding system is presented in chapter 2 (p. 10) of this report.

The regional data have been obtained from a database maintained by the Comptroller's Research Division. The database contains employment data at the one-, two- and four-digit levels for all counties in Texas. The data originates from the Texas Employment Commission's E.S. 202 employment survey. It is considered the most comprehensive time series on employment for Texas counties.

The U.S. data were secured from the U.S. Department of Labors' Bureau of Labor Statistics (BLS). The data tape secured from BLS reports aggregate U.S. employment data at the 1, 2 and 4 digit levels as well. However, some of the data are unpublished. This necessitates a reconciliation process whereby the two data sets—regional and U.S.—are matched up and the analysis is performed only for SIC codes for which the data exists for both the region and the U.S.

This project will utilize the basic methodology outlined in the literature in articles by—among others—Gibson, Miller and Wright and Galambos and Schreiber. The analysis itself is performed using the spreadsheet program Microsoft Excel. Figure 4.1 shows a sample spreadsheet for the location quotient analysis with the formulas printed in each cell. The calculations in this spreadsheet are based on Gibson, Miller and Wright's recommended methodology of expressing the location quotient as "ratio of ratios." Columns A and B list the SIC

Figure 4.1: Location Quotient—Sample Spreadsheet with Formulas

	A	B	C	D	E	F	G	H	I
1			US	REGION 3	US % SHARE OF	REG % SHARE OF	LOCATION	EXPECTED	REGION
2	SIC	DESCRIPTION	EMP 1991	EMP91	TOTAL EMP	TOTAL EMP	QUOTIENT	LOCAL REQ	EXPORT EMP
3		TOTAL EMPLOYMENT	10831000	2059230	= (C3/\$C\$3)*100	= (D3/\$D\$3)*100			
4	7	AGRICULTURAL SERVICES	485800	10828	= (C4/\$C\$3)*100	= (D4/\$D\$3)*100	= F4/E4	= (E4/100)*\$D\$3	= D4-H4
5	10	METAL MINING	56200	19	= (C5/\$C\$3)*100	= (D5/\$D\$3)*100	= F5/E5	= (E5/100)*\$D\$3	= D5-H5
6	12	COAL MINING	135100	176	= (C6/\$C\$3)*100	= (D6/\$D\$3)*100	= F6/E6	= (E6/100)*\$D\$3	= D6-H6
7	13	OIL AND GAS EXTRACTION	394100	23566	= (C7/\$C\$3)*100	= (D7/\$D\$3)*100	= F7/E7	= (E7/100)*\$D\$3	= D7-H7
8	14	NONMETALLIC MINERALS, EXCEPT FUELS	104900	787	= (C8/\$C\$3)*100	= (D8/\$D\$3)*100	= F8/E8	= (E8/100)*\$D\$3	= D8-H8
9	15	GENERAL BUILDING CONTRACTORS	1151800	15797	= (C9/\$C\$3)*100	= (D9/\$D\$3)*100	= F9/E9	= (E9/100)*\$D\$3	= D9-H9
10	16	HEAVY CONSTRUCTION, EX. BUILDING	728500	17686	= (C10/\$C\$3)*100	= (D10/\$D\$3)*100	= F10/E10	= (E10/100)*\$D\$3	= D10-H10
11	17	SPECIAL TRADE CONTRACTORS	2804300	45251	= (C11/\$C\$3)*100	= (D11/\$D\$3)*100	= F11/E11	= (E11/100)*\$D\$3	= D11-H11
12	2011	MEAT PACKING PLANTS	137700	1243	= (C12/\$C\$3)*100	= (D12/\$D\$3)*100	= F12/E12	= (E12/100)*\$D\$3	= D12-H12
13	2013	SAUSAGES AND OTHER PREPARED MEATS	86400	3225	= (C13/\$C\$3)*100	= (D13/\$D\$3)*100	= F13/E13	= (E13/100)*\$D\$3	= D13-H13
14	2015	POULTRY SLAUGHTERING AND PROCESSING	202000	434	= (C14/\$C\$3)*100	= (D14/\$D\$3)*100	= F14/E14	= (E14/100)*\$D\$3	= D14-H14
15	2022	CHEESE, NATURAL AND PROCESSED	41700	40	= (C15/\$C\$3)*100	= (D15/\$D\$3)*100	= F15/E15	= (E15/100)*\$D\$3	= D15-H15
16	2023	DRY, CONDENSED, EVAPORATED PRODUCTS	17300	8	= (C16/\$C\$3)*100	= (D16/\$D\$3)*100	= F16/E16	= (E16/100)*\$D\$3	= D16-H16
17	2024	ICE CREAM AND FROZEN DESSERTS	22300	452	= (C17/\$C\$3)*100	= (D17/\$D\$3)*100	= F17/E17	= (E17/100)*\$D\$3	= D17-H17
18	2026	FLUID MILK	72600	517	= (C18/\$C\$3)*100	= (D18/\$D\$3)*100	= F18/E18	= (E18/100)*\$D\$3	= D18-H18
19	2032	CANNED SPECIALTIES	23100	612	= (C19/\$C\$3)*100	= (D19/\$D\$3)*100	= F19/E19	= (E19/100)*\$D\$3	= D19-H19
20	2033	CANNED FRUITS AND VEGETABLES	89700	4	= (C20/\$C\$3)*100	= (D20/\$D\$3)*100	= F20/E20	= (E20/100)*\$D\$3	= D20-H20
21	2034	DEHYDRATED FRUITS, VEGETABLES, SOUPS	19700	0	= (C21/\$C\$3)*100	= (D21/\$D\$3)*100	= F21/E21	= (E21/100)*\$D\$3	= D21-H21
22	2035	PICKLES, SAUCES, AND SALAD DRESSINGS	23000	992	= (C22/\$C\$3)*100	= (D22/\$D\$3)*100	= F22/E22	= (E22/100)*\$D\$3	= D22-H22
23	2037	FROZEN FRUITS AND VEGETABLES	50600	44	= (C23/\$C\$3)*100	= (D23/\$D\$3)*100	= F23/E23	= (E23/100)*\$D\$3	= D23-H23
24	2038	FROZEN SPECIALTIES, NEC	45500	975	= (C24/\$C\$3)*100	= (D24/\$D\$3)*100	= F24/E24	= (E24/100)*\$D\$3	= D24-H24
25	2041	FLOUR AND OTHER GRAIN MILL PRODUCTS	20800	437	= (C25/\$C\$3)*100	= (D25/\$D\$3)*100	= F25/E25	= (E25/100)*\$D\$3	= D25-H25
26	2044	RICE MILLING	5500	187	= (C26/\$C\$3)*100	= (D26/\$D\$3)*100	= F26/E26	= (E26/100)*\$D\$3	= D26-H26
27	2045	PREPARED FLOUR MIXES AND DOUGHS	11500	513	= (C27/\$C\$3)*100	= (D27/\$D\$3)*100	= F27/E27	= (E27/100)*\$D\$3	= D27-H27
28	2047	DOG AND CAT FOOD	16300	0	= (C28/\$C\$3)*100	= (D28/\$D\$3)*100	= F28/E28	= (E28/100)*\$D\$3	= D28-H28
29	2048	PREPARED FEEDS, NEC	46500	332	= (C29/\$C\$3)*100	= (D29/\$D\$3)*100	= F29/E29	= (E29/100)*\$D\$3	= D29-H29
30	2051	BREAD, CAKE, AND RELATED PRODUCTS	156400	2420	= (C30/\$C\$3)*100	= (D30/\$D\$3)*100	= F30/E30	= (E30/100)*\$D\$3	= D30-H30
31	2053	FROZEN BAKERY PRODUCTS, EXCEPT BREAD	57900	168	= (C31/\$C\$3)*100	= (D31/\$D\$3)*100	= F31/E31	= (E31/100)*\$D\$3	= D31-H31
32	2061	RAW CANE SUGAR	7000	0	= (C32/\$C\$3)*100	= (D32/\$D\$3)*100	= F32/E32	= (E32/100)*\$D\$3	= D32-H32
33	2064	CANDY & OTHER CONFECTIONERY PRODUCTS	48100	367	= (C33/\$C\$3)*100	= (D33/\$D\$3)*100	= F33/E33	= (E33/100)*\$D\$3	= D33-H33
34	2068	SALTED AND ROASTED NUTS AND SEEDS	8300	15	= (C34/\$C\$3)*100	= (D34/\$D\$3)*100	= F34/E34	= (E34/100)*\$D\$3	= D34-H34
35	2076	VEGETABLE OIL MILLS, NEC	13500	101	= (C35/\$C\$3)*100	= (D35/\$D\$3)*100	= F35/E35	= (E35/100)*\$D\$3	= D35-H35
36	2077	ANIMAL AND MARINE FATS AND OILS	7700	114	= (C36/\$C\$3)*100	= (D36/\$D\$3)*100	= F36/E36	= (E36/100)*\$D\$3	= D36-H36
37	2079	EDIBLE FATS AND OILS, NEC	9900	1044	= (C37/\$C\$3)*100	= (D37/\$D\$3)*100	= F37/E37	= (E37/100)*\$D\$3	= D37-H37
38	2082	MALT BEVERAGES	39900	952	= (C38/\$C\$3)*100	= (D38/\$D\$3)*100	= F38/E38	= (E38/100)*\$D\$3	= D38-H38
39	2084	WINES, BRANDY, AND BRANDY SPIRITS	16700	5	= (C39/\$C\$3)*100	= (D39/\$D\$3)*100	= F39/E39	= (E39/100)*\$D\$3	= D39-H39
40	2086	BOTTLED AND CANNED SOFT DRINKS	98700	2246	= (C40/\$C\$3)*100	= (D40/\$D\$3)*100	= F40/E40	= (E40/100)*\$D\$3	= D40-H40
41	2087	FLAVORING EXTRACTS AND SYRUPS, NEC	17600	190	= (C41/\$C\$3)*100	= (D41/\$D\$3)*100	= F41/E41	= (E41/100)*\$D\$3	= D41-H41
42	2092	FRESH OR FROZEN PREPARED FISH	45400	1	= (C42/\$C\$3)*100	= (D42/\$D\$3)*100	= F42/E42	= (E42/100)*\$D\$3	= D42-H42
43	2095	ROASTED COFFEE	11400	403	= (C43/\$C\$3)*100	= (D43/\$D\$3)*100	= F43/E43	= (E43/100)*\$D\$3	= D43-H43
44	2096	POTATO CHIPS AND SIMILAR SNACKS	35900	2620	= (C44/\$C\$3)*100	= (D44/\$D\$3)*100	= F44/E44	= (E44/100)*\$D\$3	= D44-H44
45	2097	MANUFACTURED ICE	8400	111	= (C45/\$C\$3)*100	= (D45/\$D\$3)*100	= F45/E45	= (E45/100)*\$D\$3	= D45-H45
46	2098	MACARONI AND SPAGHETTI	8400	64	= (C46/\$C\$3)*100	= (D46/\$D\$3)*100	= F46/E46	= (E46/100)*\$D\$3	= D46-H46

codes and descriptions for the industries to be analyzed. 1991 employment data for each industry is listed in column C for the U.S. and in column D for the region. The formulas in columns E and F produce the percentage that each industry represents of total employment in both the nation and the region. Column G represents the location quotient, using a formula that places the industry share of total employment for the region over the same ratio for the nation. The data are sorted in descending order by their column G—location quotient—value. (The rows are not sorted in the sample spreadsheet.) In this way, the industries for which the most regional “specialization” exists rise to the top of the list. Values for “expected employment to fulfill local requirements” and “regional export employment” are also calculated in Columns H and I, but they are not considered in the text analysis in the next chapter.

The methodology used for the shift share analysis comes from Galambos and Schreiber. Figure 4.2 shows a sample spreadsheet for the shift share analysis. Columns A and B list the SIC codes and descriptions for the industries to be analyzed. U.S. employment data for each industry are listed in column C for 1988 and column D for 1991. Likewise, regional employment data for each industry are listed in column F for 1988 and column G for 1991. Percent change in employment for each industry is calculated in column E for the U.S., and in column H for the region. The national growth component, in column I, is derived by multiplying the percent change in total U.S. employment for the period—found in cell E3—by each figure in column F, 1988 employment for each industry. Column J, the industry mix component, is calculated by multiplying the figure in column F by the difference between total national employment percent change and each industry’s percent change at the national level. The competitive share component, in column K, is the percent change for each industry in the region minus the percent change for that industry in the nation multiplied by the region’s 1988 industry employment figure. The data are sorted in descending rank order by the values for competitive share. (The rows are not sorted in the sample spreadsheet.) Columns L and M provide a check, as the three components, in columns I, J and K, should add to the total change in employment over the period for each industry in the region.

The geographic unit of measurement in this study will be each of ten regions of Texas. The regions include the High Plains, Northwest Texas, the Metroplex, Upper East Texas, Southeast Texas, the Gulf Coast, Central Texas, South Texas, West Texas, and the Upper Rio Grande region. Each region is made up of a collection of counties, so the regional data used in this study is county data that is aggregated up to the regional level.

Following are the counties that make up the ten regions of Texas, and the Metropolitan Statistical Areas (MSA) contained within each region. Figure 4.3 is a map of the state which shows the regional boundaries and the counties contained within each region. In all cases, the counties listed below are entirely contained within the regions and MSAs.

Region 1: High Plains

Counties included:

Armstrong, Bailey, Briscoe, Carson, Castro, Childress, Cochran, Collingsworth, Crosby, Dallam, Deaf Smith, Dickens, Donley, Floyd, Garza, Gray, Hale, Hall, Hansford, Hartley, Hemphill, Hockley, Hutchinson, King, Lamb, Lipscomb, Lubbock, Lynn, Moore, Motley, Ochiltree, Oldham, Parmer, Potter, Randall, Roberts, Sherman, Swisher, Terry, Wheeler, Yoakum

MSAs included

Amarillo
Lubbock

Counties within MSA:

Potter, Randall
Lubbock

Region 2: Northwest Texas

Counties included:

Archer, Baylor, Brown, Callahan, Clay, Coleman, Comanche, Cottle, Eastland, Fisher, Foard, Hardeman, Haskell, Jack, Jones, Kent, Knox, Mitchell, Montague, Nolan, Runnels, Scurry, Shackelford, Stephens, Stonewall, Taylor, Throckmorton, Wichita, Wilbarger, Young

MSAs included

Abilene
Wichita Falls

Counties within MSA:

Taylor
Wichita

Region 3: Metroplex

Counties included:

Collin, Cooke, Dallas, Denton, Ellis, Erath, Fannin, Grayson, Hood, Hunt, Johnson, Kaufman, Navarro, Palo Pinto, Parker, Rockwall, Somervell, Tarrant, Wise

MSAs included

Dallas
Fort Worth-Arlington
Sherman-Denison

Counties within MSA:

Collin, Dallas, Denton, Ellis, Kaufman, Rockwall
Johnson, Parker, Tarrant
Grayson

Region 4: Upper East Texas

Counties included:

Anderson, Bowie, Camp, Cass, Cherokee, Delta, Franklin, Gregg, Harrison, Henderson, Hopkins, Lamar, Marion, Morris, Panola, Rains, Red River, Rusk, Smith, Titus, Upshur, Van Zandt, Wood

MSAs included

Longview-Marshall
Texarkana
Tyler

Counties within MSA:

Gregg, Harrison
Bowie
Smith

Region 5: Southeast Texas

Counties included:

Angelina, Hardin, Houston, Jasper, Jefferson, Nacogdoches, Newton, Orange, Polk, Sabine, San Augustine, San Jacinto, Shelby, Trinity, Tyler

MSAs included

Beaumont-Port Arthur

Counties within MSA:

Hardin, Jefferson, Orange

Region 6: Gulf Coast

Counties included:

Austin, Brazoria, Chambers, Colorado, Fort Bend, Galveston, Harris, Liberty, Matagorda, Montgomery, Walker, Waller, Wharton

MSAs included

Brazoria
Galveston-Texas City
Houston

Counties within MSA:

Brazoria
Galveston
Chambers, Fort Bend, Harris, Liberty, Montgomery,
Waller

Region 7: Central Texas

Counties included:

Bastrop, Bell, Blanco, Bosque, Brazos, Burleson, Burnet, Caldwell, Coryell, Falls, Fayette, Freestone, Grimes, Hamilton, Hays, Hill, Lampasas, Lee, Leon, Limestone, Llano, Madison, McLennan, Milam, Mills, Robertson, San Saba, Travis, Washington, Williamson

MSAs included

Austin
Bryan-College Station
Killeen-Temple
Waco

Counties within MSA:

Hays, Travis Williamson
Brazos
Bell, Coryell
McLennan

Region 8: South Texas

Counties included:

Aransas, Atascosa, Bandera, Bee, Bexar, Brooks, Calhoun, Cameron, Comal, Dewitt, Dimmitt, Duval, Edwards, Frio, Gillespie, Goliad, Gonzales, Guadalupe, Hidalgo, Jackson, Jim Hogg, Jim Wells, Karnes, Kendall, Kenedy, Kerr, Kinney, Kleberg, LaSalle, Lavaca, Live Oak, Maverick, McMullen, Medina, Nueces, Real, Refugio, San Patricio, Starr, Uvalde, Val Verde, Victoria, Webb, Willacy, Wilson, Zapata, Zavala

MSAs included

Brownsville-Harlingen
Corpus Christi
Laredo
McAllen-Edinburg-Mission
San Antonio
Victoria

Counties within MSA:

Cameron
Nueces, San Patricio
Webb
Hidalgo
Bexar, Comal, Guadalupe
Victoria

Region 9: West Texas

Counties included:

Andrews, Borden, Coke, Concho, Crane, Crockett, Dawson, Ector, Gaines, Glasscock, Howard, Irion, Kimble, Loving, Martin, Mason, McCulloch, Menard, Midland, Pecos, Reagan, Reeves, Schleicher, Sterling, Sutton, Terrell, Tom Green, Upton, Ward, Winkler

MSAs included

Midland
Odessa
San Angelo

Counties within MSA:

Midland
Ector
Tom Green

Region 10: Upper Rio Grande

Counties included:

Brewster, Culberson, El Paso, Hudspeth, Jeff Davis, Presidio

MSAs included

El Paso

Counties within MSA:

El Paso

Having laid out the research setting, a review of the relevant literature and the methodology, the next chapter presents the findings of this applied research project.

CHAPTER FIVE

Research Findings

Following are the findings of this research presented in the form of an analysis of the location quotient and shift share results for each of the ten regions. This analysis is presented in a series of reports, entitled Texas Regional Outlook, as chapters on the economic structure and trends in each region.

Region 1: The High Plains

Key Points

- The High Plains region has government, wholesale and retail trade sectors that are proportionally larger than in the state as a whole.
- The region specializes in agriculture and related food processing, oil and gas and several manufacturing industries.
- Industries such as business and health services, meat packing and other food processing, some wholesale and retail trade operations, and various manufacturing industries gained in competitive share from 1988 to 1991 and are likely to capture a large share of future job growth.

The High Plains boasts an economy that is both similar to, and different from, other regions of the state. The distinctiveness of a regional economy can be expressed in terms of the ways in which it differs from other regions, the state and the nation. This section of the report will examine the economic structure and trends of the High Plains region.

In broad terms the region shares with the state a large and growing service sector, and significant employment in retail trade. But a relatively large government sector and manufacturing industries which are unique to the region differentiate the High Plains from other parts of the state.

Broad Employment Trends in the High Plains Region

Overall employment in the High Plains has varied, reflecting many of the same trends that have impacted the state as a whole. The region experienced employment declines in 1983 and 1986 following the crash in the state's oil industry. In fact, the entire decade of the 1980s offered a mixed bag of economic trends for the High Plains. Sustained growth in services and government and stabilization in the oil and gas industry brought some good news to the region in the late 1980s. At the same time construction and manufacturing declined steadily. So far in the 1990s the region has been adding jobs, although at a rate slower than the state as a whole. Employment in 1991 reached 281,000, a net gain of 3,300 jobs or 1.2 percent over 1988 employment. During the last four years employment grew by 7.0 percent in Texas and by 2.6 percent in the U.S. So, during the period 1988 to 1991, employment in the High Plains grew at a pace much slower than the state and at less than half the growth rate for the nation. As job growth in the High Plains has not kept pace with the state over the past decade, the region's share of statewide employment has slowly dwindled since 1982.

With some variations, the largest employment sectors in the High Plains reflect the largest sectors statewide. Table 5.1 highlights the fact that the High Plains region has relatively larger government and trade sectors and is much less manufacturing intensive than the state as a whole.

Table 5.1: Largest Industries Based on 1991 Employment

<u>Texas</u>	<u>% of Total</u>	<u>High Plains</u>	<u>% of Total</u>
Services	23.0	Government	21.9
Retail Trade	18.4	Services	19.4
Government	18.0	Retail Trade	19.1
Manufacturing	13.9	Manufacturing	11.5
Wholesale Trade	6.2	Wholesale Trade	6.7

The importance of the service sector is evident. In fact, in both the region and the state, the largest employment gains over the past decade have occurred in the service sector. Between 1982 and 1991, Texas' service sector added more than 560,000 jobs, including 13,200 in the High Plains.

But services, by their nature, are provided locally, and are not export-oriented. In fact, the growth of services is mostly attributable to several trends driven by demand from inside the region.

Recent growth in services has been tied to the increasing complexity of the business environment. With the rise of the global economy, technology, regulation and other forces affecting the business climate, businesses have come to rely more and more on independent firms for legal, accounting, data processing, consulting and many other services. Not surprisingly, business services is one area in which service growth has been concentrated.

Another area of prominent service growth for the state, and for the High Plains in particular, is health care. This trend has been driven by the aging of the population as well as rising income and the rapid advancement of health care technology.

Finally, the large-scale entry of women into the work place has driven up household income and stimulated demand for such things as child care and cleaning services.

Areas of Specialization

One key to understanding a region's economy is to define the industries that drive income and employment growth. Typically, these industries sell their particular goods or services outside the region, thereby generating regional "export" income. While these industries may or may not be an area's largest, they play a much larger role in the regional economy than in the state's or nation's.

One measure of this greater importance is the "location quotient" which expresses how large a local industry is relative to the national economy. Mathematically the location quotient is defined as the percentage of the region's total employment that is accounted for by a particular industry, divided by the same industry's percentage share of total national employment. Thus, a location quotient greater than "1" means that the industry employs proportionally more people in the region than it does in the nation as a whole. Table 5.2 presents 30 High Plains industries

whose share of total regional employment is more than two times larger than the industry's corresponding share of total national employment.

Agriculture and Food Processing

Agricultural production is a dominant business in the High Plains, as cattle and crops are raised throughout the region. Not surprisingly, agriculture-related businesses are well represented among the region's specialized industries. Agricultural services and the manufacture of feed, fertilizers and farm machinery and equipment rank high among the High Plains areas of specialization.

In addition, many agricultural commodities are processed within the region, making food products some of the region's top areas of specialization. Meat packing is a large industry in the region, with major plants in the Amarillo metropolitan area, Moore, Parmer, Hale and several other High Plains counties. Regional specialization in food products also includes beet sugar, flour and grain mill products, chips and snacks, edible fats and oils and corn milling. Not all of the region's agricultural processing specialization is centered around food. Regionwide employment in broadwoven fabric mills and leather tanning is proportionally larger than in the nation as a whole.

Oil and Gas Production and Chemicals

The High Plains region has a strong concentration of oil and gas production industries. The impact of oil and gas is felt across industry lines, with specialization spread among extraction, petroleum refining, pipelines and oil and gas field machinery. Heavy construction is also listed as a specialized industry in The High Plains region. This can be traced back to the region's oil and gas and refining, which are construction-intensive industries.

Other Manufacturing

The High Plains employment base is relatively less manufacturing intensive in comparison to both the state's and the nation's economy. The region's manufacturing sector accounts for 11.5 percent of its total employment as compared with 14 percent statewide and 17 percent nationally. Still, the region has numerous distinct manufacturing exports in which the region specializes. Manufacturing in the High Plains region is fairly concentrated in the region's two metropolitan areas. In 1991, nearly half (49 percent) of all manufacturing employment in the region was located in the Amarillo and Lubbock metropolitan areas.

Copper production tops the list of High Plains specialized industries. Asarco's Amarillo plant refines copper sent from El Paso. Carson County, outside Amarillo, is home to Pantex, the nation's only nuclear weapons assembly plant. Hence, ammunition manufacturing is an industry of strong regional specialization.

Industrial equipment is another regional area of specialization. General industrial machinery, industrial gases, gears and fluid power pumps and motors all appear on the list of specialized High Plains industries.

Government

Government employment makes up a much larger portion of the High Plains employment base than in the state as a whole. The presence of a large military installation and state universities boosts the region's government employment. In addition, local government employment, primarily concentrated in elementary and secondary education, adds to the size of the sector. Two government industry classifications appear on the list of areas of specialization in the High Plains region. "Administration of Economic Programs" includes government employment in regulation and inspection of commercial sectors and regulation of agricultural commodities. "Environmental Quality and Housing" refers to government employment related to community development agencies, housing, waste management and environmental protection agencies.

Table 5.2: Top 30 Areas of Specialization for the High Plains Region Economy

<u>Industry</u>	<u>Regional Employment in 1991</u>	<u>Location Quotient*</u>
Primary Copper	631	45.9
Meat Packing Plants	8,779	24.6
Ammunition	2,452	21.8
Administration of Economic Programs	1,259	19.6
Nitrogenous Fertilizers	361	13.1
Beet Sugar	287	11.9
Oil and Gas Extraction	9,358	9.1
Environmental Quality and Housing	881	8.8
Pressed and Blown Glass	768	6.7
Petroleum Refining	1,885	6.0
Prepared Feeds	728	6.0
Broadwoven Fabric Mills, Cotton	494	5.5
Flour and Other Grain Mill Products	275	5.1
Potato Chips and Similar Snacks	464	5.0
Oil and Gas Field Machinery	555	4.7
Speed Changers, Drives and Gears	177	4.4
Phosphatic Fertilizers	119	4.4
Manufactured Ice	72	4.3
Pipelines	208	4.2
Industrial Gasses	237	3.8
Leather Tanning and Finishing	140	3.7
Fluid Power Pumps and Motors	246	3.3
General Industrial Machinery	333	3.3
Agricultural Services	3,999	3.2
Noncurrent-Carrying Wiring Devices	120	2.7
Wet Corn Milling	67	2.6
Farm Machinery and Equipment	499	2.6
Heavy Construction	4,720	2.5
Plastic Pipe	93	2.4
Edible Fats and Oils	58	2.3

*Values larger than 1 indicate an industry in which the region specializes.

Areas of Comparative Advantage

Another key to understanding a region's economy lies in defining its growth industries. Growth is attributable to several different causes. Some growth in a region tends to be driven by national economic growth trends. Whether the mix of industries in a region reflects relatively faster or slower growing industries is yet another factor affecting regional employment trends. The most telling indicator, however, describes employment growth in a region that is related to the region's relative attractiveness. "Shift share" analysis provides such an indicator. The shift share technique identifies regional employment growth that is attributable to national employment growth and the unique mix of industries found in a particular region. The remainder represents the growth in a region that has been generated by the region's ability to compete with other regions for their share of new jobs in an industry. A region that has gained in competitive share in a particular industry has been relatively more successful than other regions—or has exhibited a comparative advantage—in attracting jobs.

Services and Trade

The High Plains region has a large and growing service sector. Business and health services top the list among the industries that gained the most in competitive share (see Table 5.3). Other services that gained in competitive share include miscellaneous repair services and automotive repair services. These service industries are driven more by demand from within the region than export potential to areas outside the region.

Several retail trade industries appear to be gaining in competitive share. The High Plains region generates a good deal of economic activity from retail transactions. This includes dollars brought in from outside the region by students at High Plains' colleges and universities. Eating and drinking places and automotive dealers both increased their competitive share of employment between 1988 and 1991. Wholesale trade of durable goods, a more export-oriented industry, is also among the strong gainers of competitive share.

Tourism and travel-related expenditures are boosting the export potential in the region's trade and services sectors. Tourism, like more traditional exports, brings in dollars from outside the region. In the High Plains region, tourism and business travel-related expenditures topped \$453 million in 1989 (latest data available). Travel-related employment rose to more than 4,600 in 1989.

Manufacturing

Several of the region's manufacturing industries added significant amounts of competitive share employment. Agriculture-related processing is an important industry in the High Plains region, and the region grabbed a large share of the jobs generated over the period 1988 to 1991. The region remained attractive for meat packing, cotton fabric mills, flour and grain mills, beet sugar and sausage manufacturers.

Various other manufacturing industries gained in competitive share from 1988 to 1991, including petroleum refining and several of the region's heavy industries. Manufacturers of industrial machinery, pumps and gears, as well as blast furnaces and steel mills, added competitive share jobs during the period. Sporting goods, furniture, wood and plastics products manufacturers all remained competitive.

Interestingly, using the shift share technique, an industry can gain in competitive share employment while actually showing slight overall job losses for the period in question. Such was the case for an industry in the High Plains region. Semiconductors and related devices, which includes Lubbock's Texas Instruments electronics assembly plant, suffered a mild employment decline between 1988 and 1991. Still it appears on the list of industries that gained in competitive share. This indicates that while regional employment was declining, this industry was doing much better within the region than throughout the rest of the nation.

What emerges from this analysis of specialization and change is a picture of a region with strong agriculture and government sectors providing support to other industries. Agriculture cuts across industry lines in terms of regional specialization. The High Plains not only produces agricultural commodities, feed, fertilizer and farm machinery, but also processes within the region a portion of the food and fiber raised here. Services, including health care and business services, are a large and growing area of specialization for the the High Plains region. The oil and gas and industrial equipment industries also play a major role in the region's economic make-up.

Table 5.3: Top 30 High Plains Industries Ranked by Gain in Competitive Share

(based on change in employment from 1988 to 1991)

<u>Industry</u>	<u>Regional Employment in 1991</u>	<u>Gain in Competitive Share*</u>
Business Services	9,245	1,000
Health Services	27,845	983
Meat Packing Plants	8,779	737
Special Trade Contractors	6,669	612
Eating and Drinking Places	18,550	325
Broadwoven Fabric Mills, Cotton	494	320
Miscellaneous Repair Services	1,413	302
Wholesale Trade, Durable Goods	8,914	270
Automotive Dealers	6,873	183
Executive, Legislative and General Gov't.	2,775	179
Transportation by Air	825	177
Flour and Other Grain Mill Products	275	146
Auto Repair	2,398	146
Plastics Products	420	124
Industrial Machinery	565	109
Semiconductors and Related Devices	1,265	101
Pumps and Pumping Equipment	150	76
Beet Sugar	287	67
Wood Products	78	64
Nondepository Institutions	921	62
Real Estate	2,733	59
Furniture and Fixtures	59	58
Blast Furnaces and Steel Mills	69	51
Upholstered Household Furniture	59	47
Petroleum Refining	1,885	46
Sausages and Prepared Meats	128	46
Speed Changers, Drives and Gears	177	42
Textile Goods	75	40
Sporting and Athletic Goods	89	38
Commercial Printing, Lithographic	514	38

*Represents employment growth from 1988 to 1991 that is attributable to the region's comparative advantage in the industry over other regions in the United States.

Region 2: Northwest Texas

Key Points

- Northwest Texas has government, retail trade and mining sectors that are proportionally larger than in the state as a whole.
- The region's economy is heavily dependent on agriculture, oil and gas and several manufacturing industries.
- Industries such as aircraft, building contractors, engineering services, some retail trade operations, and various manufacturing industries gained in competitive share from 1988 to 1991 and are likely to capture a large share of future job growth.

The distinctiveness of a regional economy can be expressed in terms of the ways in which it differs from other regions, the state and the nation. This section of the report will examine the economic structure and trends of Northwest Texas.

In broad terms the region shares with the state a large and growing service sector, and significant employment in retail trade. But a relatively large government sector and manufacturing industries that are unique to the region differentiate Northwest Texas from other parts of the state.

Broad Employment Trends in Northwest Texas

Overall employment in Northwest Texas has varied, reflecting many of the same trends that have impacted the state as a whole. The region experienced employment declines in 1983 and 1986 following the crash in the state's oil industry. In fact, the entire decade of the 1980s offered a mixed bag of economic trends for Northwest Texas. Sustained growth in services and government brought some good news to the region in the late 1980s. At the same time, however, construction and mining employment dipped. So far in the 1990s the region's economy has been stagnant, at times adding jobs but always at a rate slower than the state as a whole. Employment in 1991 reached 174,200, a net loss of 1,900 jobs or 1.1 percent below 1988 employment. During the last four years employment grew by 7.0 percent in Texas and by 2.6 percent in the U.S. So, during the period 1988 to 1991, employment in Northwest Texas declined, while it rose in the state and the nation. As job growth in Northwest Texas has not kept pace with the state over the past decade, the region's share of statewide employment has slowly dwindled since 1982.

With some variations, the largest employment sectors in Northwest Texas reflect the largest sectors statewide. Table 5.4 highlights the fact that Northwest Texas has relatively larger government and trade sectors than the state as a whole. The region is only slightly less manufacturing intensive than the state. Mining, not shown in the table, is relatively more important in Northwest Texas where it represented 4.9 percent of total employment than statewide where it accounts for 2.6 percent.

Table 5.4: Largest Industries Based on 1991 Employment

<u>Texas</u>	<u>% of Total</u>	<u>Northwest Texas Region</u>	<u>% of Total</u>
Services	23.0	Government	22.4
Retail Trade	18.4	Services	21.3
Government	18.0	Retail Trade	18.9
Manufacturing	13.9	Manufacturing	13.4
Wholesale Trade	6.2	Transportation, Communications, Public Utilities	5.5

The importance of the service sector is evident. In the state, the largest employment gains over the past decade have occurred in the service sector. In Northwest Texas, services added more jobs than any other sector. Between 1982 and 1991, Texas' service sector added more than 560,000 jobs, including 7,200 in Northwest Texas.

But services, by their nature, are provided locally, and are not export-oriented. In fact, the growth of services is mostly attributable to several trends driven by demand from inside the region.

Recent growth in services has been tied to the increasing complexity of the business environment. With the rise of the global economy, technology, regulation and other forces affecting the business climate, businesses have come to rely more and more on independent firms for legal, accounting, data processing, consulting and many other services. Not surprisingly, business services is one area in which service growth has been concentrated.

Another area of prominent service growth for the state, and for Northwest Texas in particular, is health care. This trend has been driven by the aging of the population as well as by rising income and the rapid advancement of health care technology.

Finally, the large-scale entry of women into the work place has driven up household income and stimulated demand for such things as child care and cleaning services.

Areas of Specialization

One key to understanding a region's economy is to define the industries that drive income and employment growth. Typically, these industries sell their particular goods or services outside the region, thereby generating regional "export" income. While these industries may or may not be an area's biggest, they play a much larger role in the regional economy than in the state's or nation's.

One measure of this greater importance is the "location quotient" which expresses how large a local industry is relative to the national economy. Mathematically the location quotient is defined as the percentage of the region's total employment that is accounted for by a particular industry, divided by the same industry's percentage share of total national employment. Thus, a location quotient greater than "1" means that the industry employs proportionally more people in the region than it does in the nation as a whole. Table 5.5 presents 30 industries in Northwest

Texas whose share of total regional employment is larger than the industry's corresponding share of total national employment.

Manufacturing

Northwest Texas' employment base is only slightly less manufacturing intensive in comparison to both the state's economy and the nation's. The region's manufacturing sector accounts for 13.4 percent of its total employment as compared with 13.9 percent statewide and 17 percent nationally. The region has numerous distinct manufacturing exports in which it specializes. Manufacturing employment is spread across the region, with just over half concentrated in Northwest Texas' two metropolitan areas. In 1991, 53 percent of all manufacturing employment in the region was located in the Abilene and Wichita Falls metropolitan areas.

Construction-related manufacturing industries are dominant on the list of Northwest Texas specialization. Plumbing fixtures, steel foundries, gypsum and glass products are industries of strong regional specialization, as are wire and pipe manufacturing. Metal buildings and furniture are also specialized manufacturing industries in Northwest Texas.

Apparel manufacturing is among the region's areas of specialization. Northwest Texas is well represented in industries such as men's footwear, men's and boys' work clothing, belts, hats, men's and boys' trousers and women's and children's underwear. Levi Strauss makes jeans and Nocona makes boots at major facilities in Northwest Texas.

Agriculture and Oil Production

Agricultural production is a dominant business in Northwest Texas, as livestock and crops are raised throughout the region. Not surprisingly, agriculture-related businesses are well represented among the region's specialized industries. The manufacture of feed, and food processing industries like vegetable oil mills and sausage and prepared meats rank high among Northwest Texas areas of specialization.

Northwest Texas has a strong concentration of oil and gas production industries. The impact of oil and gas is felt across industry lines, with specialization spread among extraction, pipelines and oil and gas field machinery.

Government

Government employment makes up a larger portion of Northwest Texas' employment base (22.4 percent) than in the state as a whole (18.0 percent). The presence of Dyess Air Force Base in Abilene and Sheppard Air Force Base in Wichita Falls, both major military installations, boosts the region's government employment. In addition, local government functions—particularly elementary and secondary education—add to the size of the sector. Two government industry classifications are included among the areas of specialization in Northwest Texas. The majority of the employment in both of these classifications is related to the region's large agriculture industry.

“Administration of Economic Programs” is a broad industry classification that includes government employment in regulation of agricultural commodities. The United States Department of Agriculture and Texas Agricultural Extension Service maintain offices in counties across the region. “Environmental Quality and Housing” refers to government employment related to community development agencies, housing, waste management and environmental protection agencies. In Northwest Texas, employment in this category is mainly located at many Soil Conservation Service offices as well as water and housing authorities.

Table 5.5: Top 30 Areas of Specialization for the Northwest Texas Economy

<u>Industry</u>	<u>Regional Employment in 1991</u>	<u>Location Quotient*</u>
Plumbing Fixtures	842	20.0
Steel Foundries	1,146	14.9
Gypsum Products	534	9.4
Commercial Laundry Equipment	253	9.4
Flat Glass	602	7.5
Plastic Pipe	397	5.5
Pressed and Blown Glass	973	4.5
Oil and Gas Extraction	8,498	4.5
Environmental Quality and Housing	777	4.2
Men's and Boys' Work Clothing	848	4.1
Pipelines	350	3.8
Administration of Economic Programs	394	3.3
Men's Footwear	412	2.8
Coated and Laminated Paper	583	2.7
Oil and Gas Field Machinery	545	2.5
Apparel Belts	101	2.5
Vegetable Oil Mills	157	2.4
Plumbing Fixture Fittings and Trims	290	2.4
Hats, Caps, Millinery	153	2.0
Fabricated Pipe and Fittings	234	2.0
Prefabricated Metal Buildings	217	2.0
Men's and Boys' Trousers and Slacks	708	1.7
Prepared Feeds	383	1.7
Women's and Children's Underwear	395	1.7
Power Transmission Equipment	138	1.5
Public Building and Related Furniture	217	1.4
Nonferrous Wire	462	1.3
Sausages and Prepared Meats	536	1.3
Sheet Metalwork	547	1.2
Railroad Equipment	153	1.0

*Values larger than 1 indicate an industry in which the region specializes.

Areas of Comparative Advantage

Another key to understanding a region's economy lies in defining its growth industries. Growth is attributable to several different causes. Some growth in a region tends to be driven by national economic trends. Whether the mix of industries in a region reflects relatively faster or slower growing industries is yet another factor affecting regional employment trends. The most telling indicator, however, describes employment growth in a region that is related to the region's relative attractiveness. "Shift share" analysis provides such an indicator. The shift share technique identifies regional growth that is attributable to national growth and industry mix. The residual represents the growth in a region that has been generated by the region's ability to compete with other regions for their share of new jobs in an industry. A region that has gained in competitive share in a particular industry has been relatively more successful than other regions—or has exhibited a comparative advantage—in attracting jobs.

Manufacturing

Several of the region's manufacturing industries added significant amounts of competitive share employment. Aircraft manufacturing, centered around Abilene's General Dynamics plant, grabbed a large share of the new jobs in their industry between 1988 and 1991. While the company has reduced employment at its Fort Worth plant, the Abilene plant recently underwent an expansion that boosted employment.

Various other manufacturers gained in competitive share from 1988 to 1991, including several of the region's heavy equipment industries. Manufacturers of industrial machinery and railroad equipment as well as iron foundries added competitive share jobs during the period. Oil and gas field machinery and chemical preparations manufacturers remained competitive.

Some agriculture-related and food products industries—including farm equipment, canned fruits and vegetables and prepared meats—gained competitive share employment during the past four years.

Construction

Construction and related industries head the list of Northwest Texas region industries that gained in competitive share. Among the industries in Table 5.6 are special contractors, general contractors and engineering services. Construction gains in the region can be traced to the region recently becoming the site of new prison construction. In addition, the region has enjoyed gains in competitive share for construction-related manufacturing industries like pipe, plumbing fixtures, wire and cement.

Services and Trade

The Northwest Texas region has a large service sector. Engineering services appears on the list among the industries that gained the most in competitive share. Service industries are driven more by demand from within the region than export potential to areas outside the region.

Retail trade industries are also important to the region, and one—general merchandise stores—appears to be gaining in competitive share. The Northwest Texas region generates a good deal of economic activity from retail transactions.

Some finance and real estate industries in Northwest Texas have done well over the past four years. Investment offices, securities brokers and real estate all appear on the list of industries that added competitive share from 1988 to 1991.

Summary

What emerges from this analysis of specialization and change is a picture of a region with a large presence in agriculture and oil and gas. The region has a variety of manufactured commodities in which it specializes—including construction materials, oil and gas equipment, apparel, food and several heavy equipment industries. In addition, a strong government sector, anchored by military bases, provides support to other industries. Services and trade will continue to be important industries in Northwest Texas.

Table 5.6: Top 30 Northwest Texas Region Industries Ranked by Gain in Competitive Share

(based on change in employment from 1988 to 1991)

<u>Industry</u>	<u>Regional Employment in 1991</u>	<u>Gain in Competitive Share*</u>
Aircraft	1,268	469
Engineering and Management Services	2,171	215
General Building Contractors	1,110	199
Oil and Gas Field Machinery	545	187
General Merchandise Stores	5,191	173
Prefabricated Metal Buildings	217	159
General Industrial Machinery	152	134
Men's Footwear	412	129
Fabricated Pipe and Fittings	234	126
Local & Interurban Passenger Transportation	437	114
Men's and Boys' Work Clothing	848	98
Chemical Preparations	146	92
Special Trade Contractors	2,993	87
Iron Foundries	219	83
Investment Offices	193	82
Sausages and Prepared Meats	536	72
Real Estate	1,686	69
Industrial Machinery, N.E.C.**	411	61
Railroad Equipment	153	59
Canned Fruits and Vegetables	76	58
Plastic Foam Products	104	57
Men's and Boys' Trousers and Slacks	708	56
Plumbing Fixtures	842	55
Public Building and Related Furniture	217	55
Motion Pictures	382	53
Nonferrous Wire	462	53
Farm Machinery and Equipment	126	45
Security and Commodity Brokers	203	42
Cement	61	39
Conveying Equipment	38	30

*Represents employment growth from 1988 to 1991 that is attributable to the region's comparative advantage in the industry over other regions in the United States.

**Not Elsewhere Classified

Region 3: The Metroplex

Key Points

- The Metroplex is a major transportation and trade center. Manufacturing, services, retail and wholesale trade are all proportionally larger than in the state as a whole.
- The region specializes in air transportation, including the manufacture of aircraft and parts, electronics and communication equipment, semiconductors and a diverse group of other manufacturing industries.
- Industries such as business and health services, air transportation, communications and communications equipment, wholesale trade and various retail establishments gained in competitive share from 1988 to 1991 and are likely to capture a large share of future job growth.

The distinctiveness of a regional economy can be expressed in terms of the ways in which it differs from other regions, the state and the nation. This section of the report will examine the economic structure and recent economic trends of the Metroplex.

In broad terms the region shares with the state a large and growing service sector, and significant employment in retail trade. Manufacturing industries which are unique to the region and a prominent position in the national air transportation market differentiate the Metroplex from other parts of the state.

Broad Employment Trends in the Metroplex

Overall employment in the Metroplex has run counter to some of the trends that have impacted the state as a whole. While most of the rest of the state was suffering following the crash in the state's oil industry in 1983, the Metroplex continued to add jobs. The region was buffered from decline by a flourishing defense and technology manufacturing industry. However, the Metroplex has long been a commerce center and was particularly hard hit by troubles in the financial sector. The economic woes of the rest of the state finally caught up with the Metroplex and the region experienced an employment decline in 1987. Growth in services, transportation and trade produced impressive job gains in the Metroplex in the late 1980s. But the early 1990s has been a period of economic stagnation for the region, as layoffs at large defense contractors and oil and gas industry headquarters have hampered growth in other sectors. Employment in 1991 reached 2,058,800, a net gain of 87,600 jobs, or 4.4 percent over 1988 employment. During the last four years, employment grew by 7.0 percent in Texas and by 2.6 percent in the U.S. So, during the period 1988 to 1991, employment in the Metroplex region grew at a slower pace than the state but faster than in the nation.

The pace of job growth in the Metroplex was well ahead of the state during the first half of the past decade. Since then it has slowed. As a result, the region's share of statewide employment rose sharply from 1982 to 1987, and has dipped slightly since then.

With some variations, the largest employment sectors in the Metroplex reflect the largest sectors statewide. Table 5.7 highlights the fact that the Metroplex region has relatively larger service manufacturing and wholesale trade sectors than the state as a whole.

Table 5.7: Largest Industries Based on 1991 Employment

<u>Texas</u>	<u>% of Total</u>	<u>The Metroplex</u>	<u>% of Total</u>
Services	23.0	Services	24.1
Retail Trade	18.4	Retail Trade	18.3
Government	18.0	Manufacturing	17.2
Manufacturing	13.9	Government	12.7
Wholesale Trade	6.2	Wholesale Trade	7.7

The importance of the service sector is evident. In fact, in both the region and the state, the largest employment gains over the past decade have occurred in the services sector. Between 1982 and 1991, Texas' service sector added more than 560,000 jobs, including 203,600, more than 36 percent, in the Metroplex.

But services, by their nature, are provided locally, and are not export-oriented. In fact, the growth of services is mostly attributable to several trends driven by demand from inside the region.

Recent growth in services has been tied to the increasing complexity of the business environment. With the rise of the global economy, technology and regulation, businesses have come to rely more and more on independent firms for legal, accounting, data processing, consulting and many other services. Not surprisingly, business services is one area in which service growth has been concentrated, particularly in the Metroplex region.

Another area of prominent service growth for the state, and for the Metroplex as well, is health care. This trend has been driven by the aging of the population as well as rising income and the rapid advancement of health care technology.

Finally, the large-scale entry of women into the work place has driven up household income and stimulated demand for such things as child care and cleaning services.

Areas of Specialization

One key to understanding a region's economy is to define the industries that drive income and employment growth. Typically, these industries sell their particular goods or services outside the region, thereby generating regional "export" income. While these industries may or may not be an area's biggest, they play a much larger role in the regional economy than in the state's or nation's.

One measure of this greater importance is the “location quotient” which expresses how large a local industry is relative to the national economy. Mathematically, the location quotient is defined as the percentage of the region’s total employment that is accounted for by a particular industry, divided by the same industry’s percentage share of total national employment. Thus, a location quotient greater than “1” means that the industry employs proportionally more people in the region than it does in the nation as a whole. Table 5.8 presents 30 industries in the Metroplex whose share of total regional employment is more than two times larger than the industry’s corresponding share of total national employment.

Air Transportation

The Metroplex is a center for the nationwide air transportation industry. Transportation by air appears high on the list of specialized industries for the Metroplex region. As one of the busiest airports in the United States, Dallas-Fort Worth International Airport solidifies the region’s position in the air transportation market. American Airlines has its headquarters in the Metroplex region, and the emergence of Alliance Airport in Tarrant County is further bolstering the Metroplex air transportation industry.

But, regional specialization in this industry also extends to the manufacture of aircraft and aircraft parts and equipment. Much of the region’s aircraft manufacturing is done through prime defense contracts, and as such this industry has been suffering lately. Cutbacks in defense expenditures have hampered such major Metroplex employers as General Dynamics, Bell Helicopter and LTV, now known as Vought Aircraft.

Not all aircraft equipment manufacturers in the Metroplex are defense-related. Weber has a large plant in Gainesville in Cooke County, which makes aircraft seats.

Manufacturing

The Metroplex’ employment base is more manufacturing intensive than the state’s economy, and slightly more so than the nation. The region’s manufacturing sector accounts for 17.2 percent of its total employment as compared with 13.9 percent statewide and 17 percent nationally. The region has numerous distinct and specialized manufacturing exports. This is a region that is nearly entirely composed of metropolitan areas. Hence, manufacturing in the Metroplex is predominantly concentrated in the region’s three metropolitan areas. Nearly 95 percent of all manufacturing employment in the region in 1991 was located in the Dallas, Fort Worth and Sherman-Denison metropolitan areas.

Electronics, Semiconductors and Communications Industries

The Metroplex is home to a strong and growing, highly specialized electronics and communications industry. Anchored by the location of defense technology firms—like Texas Instruments and E-Systems—the high tech sector in the Metroplex has prospered. Electronic components, communications equipment—including telephone apparatus, radio, TV and other

communications equipment—and semiconductors rank high among the region's areas of specialization. Semiconductor industry giant Texas Instruments is headquartered here and other microchip manufacturers, like National Semiconductor and Dallas Semiconductor have facilities in the Metroplex. The Metroplex's technology sector is further buttressed by a communications equipment industry that includes firms like AT&T, Northern Telecom, Motorola and others.

Other Industries

The Metroplex has some concentration of employment related to oil and gas. Oil and gas extraction in the Metroplex region is not as high as it is in many other regions of the state. But many oil and gas companies have headquarters operations in the Metroplex. As a result, oil and gas production and oilfield equipment manufacturing are listed among the region's specialized industries. Chemicals, including alkalies and chlorine, are areas of specialization for the Metroplex as well.

Food products industries are also some of the region's top areas of specialization. Edible fats and oils is a large industry in the region, with several major plants in the Sherman-Denson metropolitan area. Regional specialization in food products also includes chips and snacks, other food preparations and food containers.

Some specialized construction-related manufacturing industries are located in the Metroplex. Plastic pipe and refrigeration and heating equipment are well represented industries. Medical equipment—including ophthalmic goods and electromedical equipment—are Metroplex specialties as well.

Government

Government employment makes up a smaller portion of the Metroplex' employment base than in the state as a whole. Still, the region has some significant government employment. Two government industry classifications top the list of areas of specialization in the Metroplex. "Administration of Economic Programs" is a broad industry classification that includes, among other things, government employment in regulation or administration of transportation programs. As would be expected given the size of the region's air transportation industry, the Federal Aviation Administration has a large presence in the Metroplex. "Environmental Quality and Housing" refers to government employment related to community development agencies, housing, waste management and environmental protection agencies. This industry classification is inflated above the national proportion by the location in the Metroplex of a regional headquarters for the Environmental Protection Agency.

Table 5.8: Top 30 Areas of Specialization for the Metroplex Region Economy

<u>Industry</u>	<u>Regional Employment in 1991</u>	<u>Location Quotient*</u>
Administration of Economic Programs	5,196	11.0
Edible Fats and Oils	1,044	5.5
Aircraft	37,065	5.4
Semiconductors and Related Devices	23,879	5.4
Oil and Gas Field Machinery	4,523	5.3
Telephone Apparatus	11,755	5.2
Aircraft Parts and Equipment	15,646	4.8
Electronic Components	10,757	4.2
Radio and TV Communications Equipment	8,298	4.0
Potato Chips and Similar Snacks	2,620	3.8
Transportation by Air	51,642	3.7
Asphalt and Roof Coatings	871	3.6
Environmental Quality and Housing	2,468	3.4
Alkalies and Chlorine	752	3.2
Food Preparations, N.E.C.**	3,809	3.2
Oil and Gas Extraction	23,566	3.1
Power Transmission Equipment	1,085	3.0
Sanitary Food Containers	864	3.0
Fluid Valves and Hoses	1,534	3.0
Leather Goods, N.E.C.**	550	3.0
Public Building and Related Furniture	1,677	2.8
Hats and Caps	825	2.7
Manufacturing Industries, N.E.C.**	1,386	2.7
Electromedical Equipment	1,618	2.6
Plastic Pipe	747	2.6
Plastic and Coated Paper Bags	1,653	2.5
Refrigeration and Heating Equipment	5,462	2.5
Apparel Belts	395	2.5
Communications Equipment, N.E.C.**	1,119	2.5
Ophthalmic Goods	1,921	2.4

*Values larger than 1 indicate an industry in which the region specializes.

**Not Elsewhere Classified

Areas of Comparative Advantage

Another key to understanding a region's economy lies in defining its growth industries. Growth is attributable to several different causes. Some growth in a region tends to be driven by national economic growth trends. Whether the mix of industries in a region reflects relatively faster or slower growing industries is yet another factor affecting regional employment trends. The most telling indicator, however, describes employment growth in a region that is related to the region's relative attractiveness. "Shift share" analysis provides such an indicator. The shift share technique identifies regional growth that is attributable to national growth and industry mix. The residual represents the growth in a region that has been generated by the region's ability to compete with other regions for their share of new jobs in an industry. A region that has gained in competitive share in a particular industry has been relatively more successful than other regions—or has exhibited a comparative advantage—in attracting jobs.

Services and Trade

The Metroplex has a large and growing service sector. Business, health, and social services are among the industries that gained the most in competitive share (see Table 5.9). Other services that gained in competitive share include legal services, miscellaneous repair services and agricultural services. Many service industries are driven more by demand from within the region than export potential to areas outside the region.

Several retail trade industries appear to be gaining in competitive share. The Metroplex generates a good deal of economic activity from retail transactions. As a result, eating and drinking places, food stores and general merchandise stores showed strong increases in competitive share. In addition, Metroplex automotive dealers and furniture and home furnishings stores increased their competitive share of employment between 1988 and 1991.

The Metroplex serves as wholesale trade center. Wholesale trade of durable and nondurable goods, more export-oriented industries, were also among the strong gainers of competitive share.

Tourism and travel is boosting the export potential in the region's trade and services sectors. Tourism, like more traditional exports, brings in dollars from outside the region. In the Metroplex region, tourism and business travel-related expenditures topped \$6.07 billion in 1989 (latest data available). Travel-related employment in the region rose to more than 119,800 in 1989.

Transportation and Communications

The Metroplex's transportation industry has expanded over the last four years. Transportation by air, aircraft engines and parts manufacturing in the Metroplex all added a large share of the new jobs generated nationwide in this industry. The Metroplex communications industry has also been expanding. Among the Metroplex industries that gained in competitive share employment are Communications, Telephone Apparatus, Search and Navigation Equipment

and communications equipment manufacturing. Lithographic and other commercial printing operations also added jobs at a healthy pace from 1988 to 1991.

Other Industries

Several of the region's manufacturing industries added significant amounts of competitive share employment. The region remained attractive for rubber, plastics, sheet metal work and wire manufacturers.

The region's once beleaguered financial industry has been on the mend since 1988. In fact, nondepository credit institutions, including mortgage lenders, is one finance industry that shows up on the list of Metroplex region industries that gained in competitive share.

Summary

What emerges from this analysis of specialization and change is a picture of a region with a very diverse economy. A few major sectors provide support to other industries. Manufacturing, particularly defense-related aircraft and electronics, air transportation and telecommunications anchor the Metroplex economy. Services, including business and health care, are also a large and growing area of specialization for the Metroplex region. The region also serves as a statewide trade center, with both wholesale and retail operations in abundance.

Table 5.9: Top 30 Metroplex Industries Ranked by Gain in Competitive Share

(based on change in employment from 1988 to 1991)

<u>Industry</u>	<u>Regional Employment in 1991</u>	<u>Gain in Competitive Share*</u>
Business Services	139,475	14,733
Aircraft Parts and Equipment	15,646	12,563
Health Services	149,839	11,478
Transportation by Air	51,642	7,834
Wholesale Trade-Durable Goods	104,925	6,921
Communication	32,372	4,918
Telephone Apparatus	11,755	4,341
Social Services	33,088	4,103
Eating and Drinking Places	127,846	3,924
Food Stores	63,466	3,719
Furniture and Homefurnishings Stores	18,486	2,595
Executive, Legislative and General Gov't.	16,144	1,659
General Merchandise Stores	55,925	1,528
Agricultural Services	10,828	1,335
Automotive Dealers	36,426	1,127
Communications Equipment, N.E.C.**	1,119	1,039
Search and Navigation Equipment	9,874	807
Commercial Printing, N.E.C.**	2,886	779
Wholesale Trade-Nondurable Goods	52,599	740
Women's Outerwear	2,513	681
Legal Services	19,720	676
Plastics, N.E.C.**	7,016	669
Commercial Printing, Lithographic	11,316	651
Nonferrous Wire	1,305	604
Manufacturing Industries, N.E.C.**	1,386	543
Nondepository Credit Institutions	14,105	543
Aircraft Engines and Engine Parts	2,930	537
Fabricated Rubber Products	1,399	513
Sheet Metalwork	4,230	493
Miscellaneous Repair Services	5,593	470

*Represents employment growth from 1988 to 1991 that is attributable to the region's comparative advantage in the industry over other regions in the United States.

**Not Elsewhere Classified

Region 4: Upper East Texas

Key Points

- The Upper East Texas region is more manufacturing intensive and has a proportionally larger government sector than the state as a whole.
- The region specializes in manufacturing industries—such as defense-related manufacturing, food products, wood and paper products and construction equipment.
- The region also specializes in the oil and gas industry, including oil and gas production, equipment manufacturing, related services and chemical production.
- From 1988 to 1991, the region increased its share of employment in many industries—most notably in health services, educational services and poultry processing among others.

The Upper East Texas region boasts an economy that is both similar to, and different from, other regions of the state. The distinctiveness of a regional economy can be expressed in terms of the ways in which it differs from other regions, the state and the nation. This section of the report will examine the economic structure and trends of the Upper East Texas region.

In broad terms the region shares with the state a large and growing service sector, and significant employment in retail trade. But a relatively large government sector and manufacturing industries which are unique to the region differentiate Upper East Texas from other parts of the state.

Broad Employment Trends in Upper East Texas

Overall employment in Upper East Texas has varied, reflecting many of the same trends that have impacted the state as a whole. The region experienced employment declines in 1983 and 1986 following the crash in the state's oil industry. In the late 1980s, however, Upper East Texas enjoyed some employment growth. Employment in 1991 reached a record 304,900, a net gain of 9,900 jobs or 3.4 percent over 1988 employment. During the last four years employment grew by 7.0 percent in Texas and by 2.6 percent in the U.S. So, during the period 1988 to 1991 employment in the Upper East Texas region grew at about half the rate of the state, but it grew somewhat faster than in the nation.

Since the mid-1980s, the region has been adding jobs. But as the job growth in the state consistently outpaced the Upper East Texas region throughout the past decade, the region has slowly been losing its share of statewide employment.

With some variations, the largest employment sectors in the Upper East Texas region reflect the largest sectors statewide. Table 5.10 highlights the fact that the Upper East Texas region has a larger government presence and is more manufacturing intensive than the state as a whole.

Table 5.10: Largest Industries Based on 1991 Employment

<u>Texas</u>	<u>% of Total</u>	<u>Upper East Texas</u>	<u>% of Total</u>
Services	23.0	Services	20.1
Retail Trade	18.4	Government	19.3
Government	18.0	Manufacturing	19.1
Manufacturing	13.9	Retail Trade	18.7

The importance of the service sector is also evident. In fact, in both the region and the state, the largest employment gains over the past decade have occurred in the services sector. Between 1982 and 1991, Texas' service sector added more than 560,000 jobs, including 19,000 in the Upper East Texas region.

But services, by their nature, are provided locally, and are not export-oriented. In fact, the growth of services is attributable to several demand-induced trends rather than any comparative advantage for the state or region.

Recent growth in services has been tied to the increasing complexity of the business environment. With the rise of the global economy, technology, regulation and other forces affecting the business climate, businesses have come to rely more and more on independent firms for legal, accounting, data processing, consulting and many other services. Not surprisingly, business services is one area in which service growth has been concentrated.

Another area of prominent service growth for the state, and for the Upper East Texas region in particular, is health care. This trend has been driven by the aging of the population as well as rising income and the rapid advancement of health care technology.

Finally, the large-scale entry of women into the work place has driven up household income and stimulated demand for such things as child care and cleaning services.

Areas of Specialization

One key to understanding a region's economy is to define the industries that drive income and employment growth. Typically, these industries sell their particular goods or services outside the region, thereby generating regional "export" income. While these industries may or may not be an area's biggest, they play a much larger role in the regional economy than in the state's or nation's.

One measure of this greater importance is the "location quotient" which expresses how large a local industry is relative to the national economy. Mathematically the location quotient is defined as the percentage of the region's total employment that is accounted for by a particular industry, divided by the same industry's percentage share of total national employment. Thus, a location quotient greater than "1" means that the industry employs proportionally more people in the region than it does in the nation as a whole. Table 5.11 presents 30 industries in Upper East

Texas whose share of total regional employment is more than five times larger than the industry's corresponding share of total national employment.

Manufacturing

Upper East Texas' employment base is relatively manufacturing intensive in comparison to both the state's and the nation's economy. The region's manufacturing sector accounts for 19 percent of its total employment as compared with 14 percent statewide and 17 percent nationally. Not surprisingly, manufacturing dominates the list of industries in which the region specializes. In fact, 26 of the 30 industries listed in Table 5.11 are manufacturing industries. More than 54 percent of all manufacturing employment in the region in 1991 was located in the metropolitan areas of Texarkana, Longview-Marshall and Tyler.

Upper East Texas has a strong concentration of defense-related manufacturers, evidenced by the presence of tanks and tank components, as well as ammunition, among the industries of specialization. Responsible for much of this dominance is the government-owned, contractor-operated Lone Star Army Ammunitions Plant, located in Bowie County. Employees at the facility load, assemble and pack ammunition items and explosive components. Employment peaked at 12,000 in the late 1960s during the height of the Vietnam War. Recently, employment has fallen because of continued defense-related cutbacks.

Construction equipment manufacturers are well represented in the region. Plumbing fixtures, refrigeration and heating equipment, brick and structural clay tile and iron foundries all appear among the region's areas of specialization. Tyler Pipe, that city's largest manufacturer, makes pipe for municipal, commercial and residential construction. The city of Tyler is home to two manufacturers of air conditioning equipment.

Food products—in particular canned food, poultry products and animal and marine fats and oils—are another area of specialization for the region. Panola, Titus and Camp counties add heavily to the manufacturing makeup of the region. Chicken processing companies Pilgrim's Pride and Tyson have the majority of their manufacturing facilities in these Upper East Texas non-metropolitan counties. Another major Upper East Texas food products manufacturer is Campbell Soup, located in Lamar County.

Much of the Upper East Texas region is heavily forested. It is not surprising then, that wood and paper products manufacturing is among the region's top areas of specialization. Upper East Texas is well represented in industries such as wood containers, sanitary paper products, nailed wooden boxes, wooden pallets and skids, paperboard mills and wood preserving.

Oil and Gas Production and Mining

Upper East Texas is a center of Texas oil and gas production. The impact of oil and gas is felt across industry lines, with jobs spread among oil and gas equipment manufacturing, chemicals production, oil and gas field services, drilling and coal mining. The region's oil and gas industry

has suffered through the 1980s, as precipitous price declines translated into layoffs. This industry-wide sluggishness has continued into the 1990s.

Areas of specialization for Upper East Texas' oil and gas, mining and petrochemicals industries included chemical preparations, industrial organic chemicals, oil and gas field machinery, oil and gas extraction and coal mining.

Texas Eastman, a Longview subsidiary of Eastman Kodak, is one of the region's largest employers. The facility manufactures chemicals and plastics.

Government

Local, state and federal government employment makes up one of Upper East Texas' largest sectors, with 19 percent of total nonfarm employment. The region boasts a large federal presence, at the Red River Army Depot in Texarkana. State facilities include a state university, highway construction and social services. Still, local government represents the bulk of government employment in the region, primarily found in the region's many public school systems.

The largest government employer in the Upper East Texas region is the Red River Army Depot (RRAD) in Texarkana. Opening in 1941, this 9,000 acre facility began as an ammunition storage site. Since then, RRAD has grown into the Army's largest depot with major maintenance, supply and ammunition storage functions. The depot assembles and repairs Chaparral surface-to-air missiles and also is the supply site for the Hawk air defense missile. In addition, the depot preserves, packages, certifies and stores the Patriot missile.

Table 5.11: Top 30 Areas of Specialization for the Upper East Texas Region Economy

<u>Industry</u>	<u>Regional Employment in 1991</u>	<u>Location Quotient*</u>
Tanks and Tank Components	4,621	125.2
Canned Specialties	1,350	20.7
Plumbing Fixtures	508	20.7
Leather Gloves and Mittens	136	20.1
Ammunition	2,015	16.5
Wood Containers	345	15.9
Refrigeration and Heating Equipment	3,517	10.9
Sanitary Paper Products	926	10.6
Iron Foundries	2,221	10.3
Brick and Structural Clay Tile	418	10.3
Clay Refractories	182	10.3
Railroad Equipment	805	9.5
Animal and Marine Fats and Oils	189	8.7
Chemical Preparations	1,043	8.3
Industrial Organic Chemicals	2,820	8.1
Oil and Gas Field Machinery	1,029	8.1
Manufacturing Industries, NEC**	608	8.1
Pottery Products	295	8.0
Administration of Economic Programs	558	8.0
Nailed Wood Boxes	89	7.7
Environmental Quality and Housing	826	7.6
Oil and Gas Extraction	8,361	7.5
Metal Cans	815	7.4
Wood Pallets and Skids	668	7.4
Paperboard Mills	1,007	7.1
Poultry Slaughtering and Processing	3,901	6.9
Tires and Inner Tubes	1,483	6.5
Coal Mining	2,119	5.6
Wood Preserving	185	5.6
Noncurrent-carrying Wiring Devices	260	5.6

*Values larger than 1 indicate an industry in which the region specializes.

**Not Elsewhere Classified

Areas of Comparative Advantage

Another key to understanding a region's economy lies in defining its growth industries. Growth is attributable to several different causes. Some growth in a region tends to be driven by national economic growth trends. Whether the mix of industries in a region reflects relatively faster or slower growing industries is yet another factor affecting regional employment trends. The most telling indicator, however, describes employment growth in a region that is related to the region's relative attractiveness. "Shift share" analysis provides such an indicator. The shift share technique identifies regional growth that is attributable to national growth and industry mix. The residual represents the growth in a region that has been generated by the region's ability to compete with other regions for their share of new jobs in an industry. A region that has gained in competitive share in a particular industry has been relatively more successful than other regions—or has exhibited a comparative advantage—in attracting jobs.

Services and Trade

Health and educational services head the list of Upper East Texas region industries that gained in competitive share (See Table 5.12). Other services that gained in competitive share include social services, business services and personal services. These service industries are driven more by demand from within the region than export potential to areas outside the region.

Along those same lines, several retail trade industries appear to be gaining in competitive share. Food stores, general merchandise stores and eating and drinking places all showed increases in competitive share. Wholesale trade of durable goods, a more export-oriented industry, is also among the strong gainers of competitive share.

Tourism is boosting the export potential in the region's trade and services sectors. Tourism, like more traditional exports, brings in dollars from outside the region. In the Upper East Texas region, tourism and business travel-related expenditures topped \$632.4 million in 1989 (latest data available). Travel-related employment rose to 11,590 in 1989. Much of the area's allure to tourists is based on its natural resources. Water-based recreation and weekend and retirement homes are abundant on Upper East Texas lakes.

Manufacturing

Several of the region's manufacturing industries added significant amounts of competitive share employment.

Poultry slaughtering and processing is big business in Upper East Texas, and the region grabbed a large share of the jobs in this industry over the period 1988 to 1991. In addition, the region remained attractive for hardware, ammunition, sanitary paper products and special industry machinery manufacturers.

The timber industry is important in some parts of Upper East Texas. The majority of timber harvesting in the region occurs along the Texas-Louisiana border—in Cass, Marion,

Harrison, Rusk, Cherokee and Panola counties. Upper East Texas accounts for 26.7 percent of the total Texas timber harvest. Logging is among the industries that gained in competitive share from 1988 to 1991.

Several transportation industries have also showed an increase in competitive share. These include transportation services, local and interurban passenger transportation and transportation by air. Driven by the construction-intensive oil and gas and chemical production industries, the Upper East Texas heavy construction industry added employment faster than other regions from 1988 to 1991. Another construction industry, special trade contractors, appears on the list of industries that gained competitive share.

Interestingly, using the shift share technique, an industry can gain in competitive share employment while actually showing slight overall job losses for the period in question. Such was the case for two industries in the Upper East Texas region. Refrigeration and heating equipment and coal mining suffered mild employment declines between 1988 and 1991, but they appear on the list of industries that gained in competitive share. This indicates that while regional employment may be declining, these industries are doing much better within the region than throughout the rest of the nation.

What emerges from this analysis of specialization and change is a picture of a region with a strong manufacturing sector providing outside income to support other industries. Health care is also a large and growing area of specialization for the Upper East Texas region. In addition, the Upper East Texas region is still largely dependent on exports of its natural resources. The oil and gas industries still play a major role, as do timber and poultry products. Government employment plays heavily in the region's export potential with military bases, defense contractors, higher educational institutions and a large local government sector. The area is also building a growing tourism industry around its natural beauty.

Table 5.12: Top 30 Upper East Texas Industries Ranked by Gain in Competitive Share

(based on change in employment from 1988 to 1991)

<u>Industry</u>	<u>Regional Employment in 1991</u>	<u>Gain in Competitive Share*</u>
Health Services	36,631	1,083
Educational Services	30,665	915
Food Stores	12,945	630
Eating and Drinking Places	15,945	575
Special Trade Contractors	5,751	518
General Merchandise Stores	8,870	501
Social Services	5,790	490
Poultry Slaughtering and Processing	3,901	447
Wholesale Trade—Durable Goods	7,307	390
Electric, Gas and Sanitary Services	6,060	348
Manufacturing Industries, NEC**	608	322
Hardware	386	279
Heavy Construction	6,893	234
Ammunition	2,015	205
Sanitary Paper Products	926	203
Business Services	5,660	187
Executive, Legislative & Gen. Government	2,407	185
Refrigeration and Heating Equipment	3,517	178
Special Industry Machinery	307	173
Radio & TV Communication Equipment	394	159
Men's & Boy's Suits and Coats	173	155
Fabricated Structural Metal	311	149
Transportation Services	649	146
Logging	386	145
Personal Services	2,992	140
Plastics Foam Products	270	140
Local & Interurban Passenger Transport.	268	139
Sporting & Athletic Goods	395	138
Transportation by Air	386	125
Coal Mining	2,119	120

*Represents employment growth from 1988 to 1991 that is attributable to the region's comparative advantage in the industry over other regions in the United States.

**Not Elsewhere Classified

Region 5: Southeast Texas

Key Points

- The Southeast Texas region is more manufacturing intensive and has a proportionally larger construction sector than the state as a whole.
- The region specializes in many facets of the oil and chemical production industries, including refining, industrial organic chemicals, oil and gas field machinery and pipelines.
- The region also specializes in timber-related industries—such as hardwood and softwood veneer and plywood, paperboard products, wood pallets and logging.
- From 1988 to 1991, the region increased its share of employment in many industries—most notably in heavy construction, special and general building contractors, health services and poultry processing among others.

The Southeast Texas region boasts an economy that is both similar to, and different from, other regions of the state. The distinctiveness of a regional economy can be expressed in terms of the ways in which it differs from other regions, the state and the nation. This section of the report will examine the economic structure and trends of Southeast Texas.

In broad terms the region shares with the state a large and growing service sector, and significant employment in retail trade. But a relatively large construction sector and manufacturing industries which are unique to the region differentiate Southeast Texas from other parts of the state.

Broad Employment Trends in Southeast Texas

Overall employment in Southeast Texas has varied, reflecting many of the same trends that have impacted the state as a whole. The region experienced employment declines in 1983 and 1986-87 following the crash in the state's oil industry. In the late 1980s, however, Southeast Texas enjoyed some employment growth. Employment in 1991 reached a record 234,800, a net gain of 16,900 jobs or 7.8 percent over 1988 employment. During the last four years employment grew by 7.0 percent in Texas and by 2.6 percent in the U.S. So, during the period 1988 to 1991 employment in the Southeast Texas region grew at a pace slightly ahead of the state, but it grew three times faster than in the nation.

Since 1987, the region has been adding jobs. But for most years throughout the decade, job growth in the state outpaced Southeast Texas. The region has slowly been losing its share of statewide employment, a trend temporarily reversed by an uptick in the region's share of Texas employment in 1991.

With some variations, the largest employment sectors in the Southeast Texas region reflect the largest sectors statewide. Table 5.13 highlights the fact that the Southeast Texas region has a relatively larger construction sector and is more manufacturing intensive than the state as a whole.

Table 5.13: Largest Industries Based on 1991 Employment

<u>Texas</u>	<u>% of Total</u>	<u>Southeast Texas</u>	<u>% of Total</u>
Services	23.0	Services	20.7
Retail Trade	18.4	Manufacturing	20.1
Government	18.0	Retail Trade	19.0
Manufacturing	13.9	Government	17.9
Wholesale Trade	6.2	Construction	8.1

The importance of the service sector is also evident. In fact, in both the region and the state, the largest employment gains over the past decade have occurred in the services sector. Between 1982 and 1991, Texas' service sector added more than 560,000 jobs, including 13,900 in the Southeast Texas region.

But services, by their nature, are provided locally, and are not export-oriented. In fact, the growth of services is mostly attributable to several demand-induced trends.

Recent growth in services has been tied to the increasing complexity of the business environment. With the rise of the global economy, technology, regulation and other forces affecting the business climate, businesses have come to rely more and more on independent firms for legal, accounting, data processing, consulting and many other services. Not surprisingly, business services is one area in which service growth has been concentrated.

Another area of prominent service growth for the state, and for the Southeast Texas region in particular, is health care. This trend has been driven by the aging of the population as well as rising income and the rapid advancement of health care technology.

Finally, the large-scale entry of women into the work place has driven up household income and stimulated demand for such things as child care and cleaning services.

Areas of Specialization

One key to understanding a region's economy is to define the industries that drive income and employment growth. Typically, these industries sell their particular goods or services outside the region, thereby generating regional "export" income. While these industries may or may not be an area's biggest, they play a much larger role in the regional economy than in the state's or nation's.

One measure of this greater importance is the "location quotient" which expresses how large a local industry is relative to the national economy. Mathematically the location quotient is defined as the percentage of the region's total employment that is accounted for by a particular industry, divided by the same industry's percentage share of total national employment. Thus, a location quotient greater than "1" means that the industry employs proportionally more people in

the region than it does in the nation as a whole. Table 5.14 presents 30 industries in Southeast Texas whose share of total regional employment is more than two times larger than the industry's corresponding share of total national employment.

Southeast Texas' employment base is relatively manufacturing intensive in comparison to both the state's and the nation's economy. The region's manufacturing sector accounts for 20 percent of its total employment as compared with 14 percent statewide and 17 percent nationally. Not surprisingly, manufacturing dominates the list of industries in which the region specializes. In fact, 25 of the 30 industries listed in Table 5.14 are manufacturing industries. More than 53 percent of all manufacturing employment in the region in 1991 was located in the Beaumont-Port Arthur metropolitan area. A good deal of the region's manufacturing strength is built around oil and gas.

Oil and Gas Production, Refining and Chemicals

Southeast Texas has a strong concentration of oil and gas and chemical and petrochemical production industries. The region is a center of Texas oil and gas production, and the impact of oil and gas is felt across industry lines, with specialization spread among petroleum refining, oil and gas equipment manufacturing and pipelines.

In addition, chemicals and petrochemical production are strong areas of specialization in the region, particularly industrial organic chemicals, agricultural and other chemical production industries. Huge names in the petroleum and chemical industries—such as Mobil, Dupont, Chevron, Fina and Texaco—are among the region's largest employers.

Forest Products

Much of the Southeast Texas region is heavily forested. It is not surprising then, that wood and paper products manufacturing is among the region's top areas of specialization. Southeast Texas is well represented in industries such as softwood and hardwood veneer and plywood, reconstituted wood products, wooden pallets and skids, paperboard mills, logging and sawmill operations. Wood and paper products manufacturers like Temple-Inland, Champion and Louisiana Pacific have major facilities in Southeast Texas.

Other Manufacturing

Poultry products are another area of specialization for the region. In Shelby, Angelina and Nacogdoches counties, chicken processing companies Holly Farms, Pilgrims Pride and Green Acre Foods have manufacturing facilities.

Major tire manufacturing plants in Jefferson County translate to synthetic rubber being a specialized industry in Southeast Texas. Iron foundries are also well represented in the region.

Table 5.14: Top 30 Areas of Specialization for the Southeast Texas Region Economy

<u>Industry</u>	<u>Regional Employment in 1991</u>	<u>Location Quotient*</u>
Synthetic Rubber	2,024	29.4
Malleable Iron Foundries	710	19.7
Petroleum Refining	6,710	12.4
Softwood Veneer and Plywood	1,351	10.9
Reconstituted Wood Products	628	8.4
Industrial Organic Chemicals	4,646	8.4
Paperboard Mills	1,789	7.9
Environmental Quality and Housing	1,239	7.2
Oil and Gas Field Machinery	1,385	6.8
Alkalies and Chlorine	318	5.8
Hardwood Veneer and Plywood	556	5.6
Administration of Economic Programs	513	4.6
Electromedical Equipment	628	4.3
Metal Household Furniture	426	4.3
Motor Homes	289	3.9
Pipelines, Except Natural Gas	328	3.8
Plumbing Fixtures	608	3.6
Sawmills and Planing Mills	2,333	3.5
Wood Pallets and Skids	500	3.5
Logging	1,202	3.4
Poultry Processing	2,867	3.2
Heavy Construction	10,335	3.2
Plastics Materials and Resins	1,186	3.1
Truck Trailers	317	2.9
Agricultural Chemicals	319	2.8
Hardwood Dimension and Flooring Mills	382	2.6
Water Transportation	2,180	2.6
Industrial Valves	295	2.5
Gray and Ductile Iron Foundries	803	2.3
Rice Milling	54	2.1

*Values larger than 1 indicate an industry in which the region specializes.

Areas of Comparative Advantage

Another key to understanding a region's economy lies in defining its growth industries. Growth is attributable to several different causes. Some growth in a region tends to be driven by national economic growth trends. Whether the mix of industries in a region reflects relatively faster or slower growing industries is yet another factor affecting regional employment trends. The most telling indicator, however, describes employment growth in a region that is related to the region's relative attractiveness. "Shift share" analysis provides such an indicator. The shift share technique identifies regional growth that is attributable to national growth and industry mix. The residual represents the growth in a region that has been generated by the region's ability to compete with other regions for their share of new jobs in an industry. A region that has gained in competitive share in a particular industry has been relatively more successful than other regions—or has exhibited a comparative advantage—in attracting jobs.

Construction

Construction and related industries head the list of Southeast Texas region industries that gained in competitive share (See Table 5.15). The first four industries in Table 5.15 are heavy construction, special contractors, general contractors and engineering services. Construction gains in the region can be traced to several sources. Refining and petrochemicals—which are predominant in the region—are construction intensive industries. Plant expansions and "turnarounds" have driven construction job gains in the region. At the same time, the region has recently become the site of intense construction on three different prisons. Construction of facilities to house federal, state and county prisoners has fueled the region's competitive gains in construction employment.

Services and Trade

Health and social services are also among the industries that gained in competitive share. Other services that gained in competitive share include agricultural services, legal services and miscellaneous repair services. These service industries are driven more by demand from within the region than export potential to areas outside the region.

Along those same lines, several retail trade industries appear to be gaining in competitive share. Food stores, general merchandise stores and eating and drinking places all showed increases in competitive share. Wholesale trade of durable goods, a more export-oriented industry, is also among the strong gainers of competitive share.

Tourism is boosting the export potential in the region's trade and services sectors. Tourism, like more traditional exports, brings in dollars from outside the region. In the Southeast Texas region, tourism and business travel-related expenditures topped \$356.4 million in 1989 (latest data available). Travel-related employment rose to 6,370 in 1989. Much of the area's allure

to tourists is based on its natural resources, including water-based recreation on Southeast Texas lakes.

Manufacturing

Several of the region's manufacturing industries added significant amounts of competitive share employment.

Poultry slaughtering and processing is a growing industry in Southeast Texas, and the region grabbed a large share of the jobs generated over the period 1988 to 1991. In addition, the region remained attractive for soft drinks, fabricated metals, sheet metal and refrigeration equipment manufacturers as well as iron foundries.

As pointed out earlier, the timber industry is important in most parts of Southeast Texas. Softwood veneer and plywood, paperboard mills and millwork are among the industries that gained in competitive share from 1988 to 1991.

Driven by more stable prices, oil and gas extraction in the Southeast Texas region added employment faster than other regions from 1988 to 1991.

Interestingly, using the shift share technique, an industry can gain in competitive share employment while actually showing slight overall job losses for the period in question. Such was the case for one industry in the Southeast Texas region. Softwood veneer and plywood employment suffered mild employment declines between 1988 and 1991, but it appears on the list of industries that gained in competitive share. This indicates that while regional employment may be declining, this industry is doing much better within the region than throughout the rest of the nation.

What emerges from this analysis of specialization and change is a picture of a region with a strong manufacturing sector providing outside income to support other industries. In addition, the Southeast Texas region is still largely dependent on exports of its natural resources. The oil and gas industries—including refining, extraction and petrochemicals production—still play a major role, as do timber, paper and wood products. Health care is also a large and growing area of specialization for the Southeast Texas region.

Table 5.15: Top 30 Southeast Texas Industries Ranked by Gain in Competitive Share

(based on change in employment from 1988 to 1991)

<u>Industry</u>	<u>Regional Employment in 1991</u>	<u>Gain in Competitive Share*</u>
Heavy Construction	10,335	3,815
Special Trade Contractors	6,152	2,044
General Building Contractors	4,143	1,997
Engineering and Management Services	3,349	1,155
Eating and Drinking Places	14,241	650
Health Services	24,775	464
Food Stores	9,694	350
Poultry Slaughtering and Processing	2,867	447
Softwood Veneer and Plywood	1,351	327
Social Services	5,904	298
Paperboard Mills	1,789	292
General Merchandise Stores	5,970	253
Miscellaneous Repair Services	1,097	239
Transportation Services	523	227
Wholesale Trade--Durable Goods	5,227	226
Oil and Gas Extraction	2,291	221
Bottled and Canned Soft Drinks	489	211
Fabricated Structural Metal	728	180
Gray and Ductile Iron Foundries	803	165
Sausages and Prepared Meats	178	162
Agricultural Services	917	155
Malleable Iron Foundries	710	154
Sheet Metalwork	414	128
Motor Homes	289	118
Metal Household Furniture	426	110
Oil and Gas Field Machinery	1,385	106
Legal Services	1,713	99
Millwork	777	95
Refrigeration and Heating Equipment	120	90
Fabricated Platework (Boiler Shops)	569	82

*Represents employment growth from 1988 to 1991 that is attributable to the region's comparative advantage in the industry over other regions in the United States.

Region 6: Gulf Coast

Key Points

- The Gulf Coast is a major petroleum and chemical production, water transportation and trade center. Services, construction, mining, transportation and wholesale trade are all proportionally larger than in the state as a whole.
- The region specializes in a broad range of industries related to oil and gas and chemical production. Also water transportation, concentrated around four major ports, and several other manufacturing industries are well represented in the Gulf Coast.
- Industries such as business and educational services, special trade contractors, heavy construction, wholesale trade and various retail establishments gained in competitive share from 1988 to 1991 and are likely to capture a large share of future job growth.

The distinctiveness of a regional economy can be expressed in terms of the ways in which it differs from other regions, the state and the nation. This section of the report will examine the economic structure and recent economic trends of the Gulf Coast.

In broad terms the region shares with the state a large and growing service sector, and significant employment in retail trade. Manufacturing industries which are unique to the region, a larger proportion of employment in construction and a prominent position in the petroleum and chemicals industry differentiate the Gulf Coast from other parts of the state.

Broad Employment Trends in the Gulf Coast

Overall employment in the Gulf Coast has varied, reflecting many of the same trends that have impacted the state as a whole. The region experienced employment declines in 1983 and 1986-87 following the crash in the state's oil industry. In the late 1980s, however, the Gulf Coast enjoyed an economic resurgence, with gains in construction, manufacturing and services. Fueled by a round of petrochemical plant expansions and the reinvigoration of a more diverse Houston economy, the region bounced back strong beginning in 1988. The region's expansion continued into 1991 but has recently stalled. Employment in 1991 reached a record 1,800,600, a net gain of 194,000 jobs or 12.1 percent over 1988 employment. During the last four years employment grew by 7.0 percent in Texas and by 2.6 percent in the U.S. So, during the period 1988 to 1991 employment in the Gulf Coast region grew much faster than the state, and it grew at more than four times the rate of growth in the nation.

The pace of job growth in the Gulf Coast lagged behind the state during the first half of the past decade. Since then it has accelerated significantly. As a result, the region's share of statewide employment fell sharply from 1982 to 1987, and has increased since then.

With little variation, the largest employment sectors in the Gulf Coast reflect the largest sectors statewide. Table 5.16 highlights the fact that the Gulf Coast region has relatively larger

service and construction sectors than the state as a whole. Mining, not shown in the table, is relatively more important in the Gulf Coast where it represented 4.2 percent of total employment than statewide where it accounts for 2.6 percent.

Table 5.16: Largest Industries Based on 1991 Employment

<u>Texas</u>	<u>% of Total</u>	<u>Gulf Coast</u>	<u>% of Total</u>
Services	23.0	Services	24.8
Retail Trade	18.4	Retail Trade	16.8
Government	18.0	Government	14.9
Manufacturing	13.9	Manufacturing	11.9
Wholesale Trade	6.2	Construction	7.3

The importance of the service sector is evident. In fact, in both the region and the state, the largest employment gains over the past decade have occurred in the service sector. Between 1982 and 1991, Texas' service sector added more than 560,000 jobs, including 127,000, more than 22 percent, in the Gulf Coast.

But services, by their nature, are provided locally, and are not export-oriented. In fact, the growth of services is mostly attributable to several trends driven by demand from inside the region.

Recent growth in services has been tied to the increasing complexity of the business environment. With the rise of the global economy, technology and regulation, businesses have come to rely more and more on independent firms for legal, accounting, data processing, consulting and many other services. Not surprisingly, business services is one area in which service growth has been concentrated, particularly in the Gulf Coast region.

Another area of prominent service growth for the state, and for the Gulf Coast as well, is health care. This trend has been driven by the aging of the population as well as rising income and the rapid advancement of health care technology.

Finally, the large-scale entry of women into the work place has driven up household income and stimulated demand for such things as child care and cleaning services.

Areas of Specialization

One key to understanding a region's economy is to define the industries that drive income and employment growth. Typically, these industries sell their particular goods or services outside the region, thereby generating regional "export" income. While these industries may or may not be an area's biggest, they play a much larger role in the regional economy than in the state's or nation's.

One measure of this greater importance is the "location quotient" which expresses how large a local industry is relative to the national economy. Mathematically, the location quotient is defined as the percentage of the region's total employment that is accounted for by a particular

industry, divided by the same industry's percentage share of total national employment. Thus, a location quotient greater than "1" means that the industry employs proportionally more people in the region than it does in the nation as a whole. Table 5.17 presents 30 industries in the Gulf Coast whose share of total regional employment is more than two times larger than the industry's corresponding share of total national employment.

Manufacturing

The Gulf Coast's employment base is somewhat less manufacturing intensive than the state's and the nation's economy. The region's manufacturing sector accounts for 11.9 percent of its total employment as compared with 13.9 percent statewide and 17 percent nationally. The region has numerous distinct and specialized manufacturing exports. This is a region that is almost entirely composed of metropolitan areas. Hence, manufacturing in the Gulf Coast is predominantly concentrated in the region's three metropolitan areas. Nearly 97 percent of all manufacturing employment in the region in 1991 was located in the Houston, Galveston-Texas City and Brazoria metropolitan areas.

Oil and Gas Production, Refining and Chemicals

The Gulf Coast has a strong concentration of oil and gas and chemical and petrochemical production industries. The region is a center of Texas oil and gas production, and the impact of oil and gas is felt across industry lines, with specialization spread among petroleum refining, oil and gas extraction, oilfield equipment manufacturing, industrial gases and pipelines.

In addition, chemicals and petrochemical production are strong areas of specialization in the region, particularly industrial organic chemicals, alkalies and chlorine, fertilizers and agricultural chemicals, rubber, plastics and other chemical production industries. Huge names in the petroleum and chemical industries—such as Exxon, Shell, Phillips, Chevron, Dow, Dupont and Union Carbide—are among the region's largest employers.

Much of the Gulf Coast's other manufacturing is linked to the oil and gas industry. Along with supplier industries like oilfield equipment, the region specializes in fabricated pipe and fittings, valves, fluid meters and metal drums.

Food products industries are also among the region's top areas of specialization. Regional specialization in food products includes rice milling, cane sugar refining and roasted coffee.

Water Transportation

The Gulf Coast is a center for the water transportation industry. Water transportation appears high on the list of specialized industries for the Gulf Coast region. The region boasts four major ports—Houston, Galveston, Texas City and Freeport—some of which number among the nation's busiest. Crude petroleum, chemicals and grain are the major commodities handled by these ports.

Government

Government employment makes up a smaller portion of the Gulf Coast' employment base than in the state as a whole. Still, the region has some significant government employment. One government industry classification tops the list of areas of specialization in the Gulf Coast. "Administration of Economic Programs" is a broad industry classification that includes, among other things, government employment in space research. This industry classification is inflated above national the proportion by the location in the Gulf Coast region of NASA's Johnson Space Center.

Table 5.17: Top 30 Areas of Specialization for the Gulf Coast Region Economy

<u>Industry</u>	<u>Regional Employment in 1991</u>	<u>Location Quotient*</u>
Oil and Gas Field Machinery	16,439	21.9
Administration of Economic Programs	6,371	15.4
Oil and Gas Extraction	73,897	11.3
Industrial Organic Chemicals	20,891	10.2
Rice Milling	915	10.0
Alkalies and Chlorine	1,888	9.2
Cyclic Crudes and Intermediates	3,461	7.6
Cane Sugar Refining	635	7.2
Petroleum Refining	13,376	6.7
Fabricated Pipe and Fittings	2,705	6.7
Industrial Valves	2,800	6.3
Pipelines	1,804	5.7
Roasted Coffee	1,079	5.7
Fluid Meters and Counting Devices	1,079	5.5
Nitrogenous Fertilizers	977	5.5
Synthetic Rubber	1,368	5.4
Heavy Construction	58,120	4.8
Valves and Pipe Fittings	2,199	4.7
Metal Barrels and Drums	706	4.5
Water Transportation	13,841	4.4
Chemical Preparations	3,162	4.2
Prefabricated Metal Buildings	1,541	4.0
Industrial Gases	1,596	4.0
Nonmetallic Mineral Products	554	3.9
Hoists and Cranes	572	3.9
Agricultural Chemicals	1,626	3.9
Iron and Steel Forgings	1,872	3.6
Gaskets, Packing and Sealing Devices	2,017	3.5
Plastics Materials and Resins	3,827	2.7
Primary Nonferrous Metals	615	2.6

*Values larger than 1 indicate an industry in which the region specializes.

Areas of Comparative Advantage

Another key to understanding a region's economy lies in defining its growth industries. Growth is attributable to several different causes. Some growth in a region tends to be driven by national economic growth trends. Whether the mix of industries in a region reflects relatively faster or slower growing industries is yet another factor affecting regional employment trends. The most telling indicator, however, describes employment growth in a region that is related to the region's relative attractiveness. "Shift share" analysis provides such an indicator. The shift share technique identifies regional growth that is attributable to national growth and industry mix. The residual represents the growth in a region that has been generated by the region's ability to compete with other regions for their share of new jobs in an industry. A region that has gained in competitive share in a particular industry has been relatively more successful than other regions—or has exhibited a comparative advantage—in attracting jobs.

Services and Trade

The Gulf Coast has a large and growing service sector. Business and educational services are among the industries that gained the most in competitive share (see Table 5.18). Other services that gained in competitive share include amusement and recreation services, social services, transportation services, auto repair, legal services, miscellaneous repair services and agricultural services. Many service industries are driven more by demand from within the region than export potential to areas outside the region.

Several retail trade industries appear to be gaining in competitive share. The Gulf Coast generates a good deal of economic activity from retail transactions. As a result, eating and drinking places, food stores and general merchandise stores showed strong increases in competitive share. In addition, Gulf Coast furniture and home furnishings stores and miscellaneous retailers increased their competitive share of employment between 1988 and 1991.

The Gulf Coast also serves as wholesale trade center. Wholesale trade of durable and nondurable goods, more export-oriented industries, were also among the strong gainers of competitive share.

Tourism and travel is boosting the export potential in the region's trade and services sectors. Tourism, like more traditional exports, brings in dollars from outside the region. In the Gulf Coast region, tourism and business travel-related expenditures topped \$3.33 billion in 1989 (latest data available). Travel-related employment in the region rose to more than 64,500 in 1989.

Construction

Construction and related industries head the list of Gulf Coast region industries that gained in competitive share. Three of the first five industries in Table 5.18 are special contractors, engineering services and heavy construction. Construction gains in the region can be traced to several sources. General building contractors have gained in competitive share, as residential and

commercial construction have risen from the doldrums over the past four years. Also, refining and petrochemicals—which are predominant in the region—are construction intensive industries. Plant expansions and “turnarounds” have driven construction job gains in the region.

Other Industries

Several of the region’s manufacturing industries added significant amounts of competitive share employment. As Houston moved away from its strict dependence on the oil industry in the mid-1980s, several technology based manufacturing industries gained importance. Computer manufacturing, centered around Houston-based computer giant Compaq, grabbed a large share of the new jobs created nationwide in that industry over the past four years. Also, several contractors to NASA—among them Rockwell and McDonnell Douglas—contributed to guided missiles and space vehicles adding significant amounts of competitive share employment. In addition, the region remained attractive for industrial machinery, iron and steel forgings and fabricated platework manufacturers.

Between 1988 and 1991, the region’s oil and gas industry was on the mend. In fact, oil and gas extraction and petroleum refining show up on the list of Gulf Coast region industries that gained in competitive share. Since 1991 these industries have suffered.

Summary

What emerges from this analysis of specialization and change is a picture of a region with a fairly diverse economy. A few major sectors provide support to many other industries. The oil and gas industries—including refining, extraction and petrochemicals production—still play a major role. Water transportation provides the link to outside markets for petroleum and other products. Services, including business and education services, are also a large and growing area of specialization for the Gulf Coast region. The region serves as a statewide trade center, with both wholesale and retail operations in abundance.

Table 5.18: Top 30 Gulf Coast Industries Ranked by Gain in Competitive Share

(based on change in employment from 1988 to 1991)

<u>Industry</u>	<u>Regional Employment in 1991</u>	<u>Gain in Competitive Share*</u>
Special Trade Contractors	59,106	19,260
Educational Services	165,182	16,118
Business Services	115,464	11,592
Engineering and Management Services	63,273	9,824
Heavy Construction	58,120	7,690
Eating and Drinking Places	101,591	7,481
Wholesale Trade-Durable Goods	78,930	6,223
Oil and Gas Extraction	73,897	5,649
Electronic Computers	8,927	4,835
General Building Contractors	19,277	3,992
Food Stores	55,603	3,783
General Merchandise Stores	35,987	2,828
Amusement and Recreation Services	21,426	2,565
Electric, Gas and Sanitary Services	36,930	2,371
Miscellaneous Repair Services	8,301	2,356
Social Services	28,266	1,919
Industrial Machinery	7,191	1,839
Wholesale Trade-Nondurable Goods	42,966	1,757
Transportation Services	9,184	1,675
Auto Repair Services	15,733	1,516
Petroleum Refining	13,376	1,493
Iron and Steel Forgings	1,872	1,419
Agricultural Services	10,247	1,403
Fabricated Platework	4,116	1,345
Water Transportation	13,841	1,307
Miscellaneous Retail	33,500	1,231
Furniture and Home Furnishings Stores	10,848	1,190
Insurance Carriers	19,067	1,179
Guided Missiles and Space Vehicles	1,589	1,120
Legal Services	19,048	993

*Represents employment growth from 1988 to 1991 that is attributable to the region's comparative advantage in the industry over other regions in the United States.

Region 7: Central Texas

Key Points

- Central Texas has a dominant government sector—boosted by state government and higher education—that is proportionally much larger than in the state as a whole.
- The region specializes in government, electronics, semiconductors and other technology-oriented manufacturing industries.
- Industries such as computers, business, health, and educational services and various retail establishments gained in competitive share from 1988 to 1991 and are likely to capture a large share of future job growth.

The distinctiveness of a regional economy can be expressed in terms of the ways in which it differs from other regions, the state and the nation. This section of the report will examine the economic structure and recent economic trends of Central Texas.

In broad terms the region shares with the state a large and growing service sector, and significant employment in retail trade. A government sector that is proportionally much larger than in the state and manufacturing industries which are unique to the region differentiate Central Texas from other parts of the state.

Broad Employment Trends in Central Texas

Overall employment in Central Texas has run counter to some of the trends that have impacted the state as a whole. While much of the rest of the state was suffering following the crash in the state's oil industry in 1983, Central Texas continued to add jobs. The region was buffered from decline by its huge government sector and a flourishing high technology manufacturing industry. However, overbuilding in the region's metropolitan areas caused a real estate market collapse, and the economic woes of the rest of the state finally caught up with Central Texas. The region experienced employment declines in 1986-87. Stabilization in real estate combined with continued gains in manufacturing, government and services produced impressive job gains in Central Texas in the late 1980s and early 1990s. Employment in 1991 reached a record 699,800, a net gain of 57,800 jobs over 1988 employment. During the last four years, employment grew by 7.0 percent in Texas and by 2.6 percent in the U.S. So, during the period 1988 to 1991, employment in the Central Texas region grew at a pace well ahead of the state and more than three times faster than in the nation.

Job growth in Central Texas has kept pace or been ahead of the state for the past decade. As a result, the region's share of statewide employment has risen since 1982, dipping only slightly in 1987-88.

With some variations, the largest employment sectors in Central Texas reflect the largest sectors statewide. Table 5.19 highlights the fact that the Central Texas region has a relatively larger government sectors and manufacturing that is on par with the state as a whole.

Table 5.19: Largest Industries Based on 1991 Employment

<u>Texas</u>	<u>% of Total</u>	<u>Central Texas</u>	<u>% of Total</u>
Services	23.0	Government	28.3
Retail Trade	18.4	Services	22.6
Government	18.0	Retail Trade	17.8
Manufacturing	13.9	Manufacturing	13.5
Wholesale Trade	6.2	Finance, Insurance, Real Estate	5.2

The importance of the service sector is evident. In fact, in both the region and the state, the largest employment gains over the past decade have occurred in the services sector. Between 1982 and 1991, Texas' service sector added more than 560,000 jobs, including 66,800 in Central Texas.

But services, by their nature, are provided locally, and are not export-oriented. In fact, the growth of services is mostly attributable to several trends driven by demand from inside the region.

Recent growth in services has been tied to the increasing complexity of the business environment. With the rise of the global economy, technology and regulation, businesses have come to rely more and more on independent firms for legal, accounting, data processing, consulting and many other services. Not surprisingly, business services is one area in which service growth has been concentrated.

Another area of prominent service growth for the state, and for Central Texas in particular, is health care. This trend has been driven by the aging of the population as well as rising income and the rapid advancement of health care technology.

Finally, the large-scale entry of women into the work place has driven up household income and stimulated demand for such things as child care and cleaning services.

Areas of Specialization

One key to understanding a region's economy is to define the industries that drive income and employment growth. Typically, these industries sell their particular goods or services outside the region, thereby generating regional "export" income. While these industries may or may not be an area's biggest, they play a much larger role in the regional economy than in the state's or nation's.

One measure of this greater importance is the "location quotient" which expresses how large a local industry is relative to the national economy. Mathematically, the location quotient is defined as the percentage of the region's total employment that is accounted for by a particular

industry, divided by the same industry's percentage share of total national employment. Thus, a location quotient greater than "1" means that the industry employs proportionally more people in the region than it does in the nation as a whole. Table 5.20 presents 30 industries in Central Texas whose share of total regional employment is more than two times larger than the industry's corresponding share of total national employment.

Government

Government employment makes up a much larger portion of Central Texas' employment base than in the state as a whole. The state capitol and state government operations in Austin, the presence of state universities in Austin, College Station, San Marcos and elsewhere, all boost the region's government employment. In addition, a large and growing military installation in Killeen adds to the size of the sector. Two government industry classifications top the list of areas of specialization in Central Texas. "Administration of Economic Programs" includes government employment that is classified as regulation or administration of transportation programs, regulation and inspection of commercial sectors, and regulation of agricultural commodities. "Environmental Quality and Housing" refers to government employment related to community development agencies, housing, waste management and environmental protection agencies.

Manufacturing

Central Texas' employment base is about as manufacturing intensive as the state's economy, but less so than the nation. The region's manufacturing sector accounts for 13.5 percent of its total employment as compared with 13.9 percent statewide and 17 percent nationally. The region has numerous distinct and specialized manufacturing exports. Manufacturing in Central Texas is predominantly concentrated in the region's four metropolitan areas. Nearly 85 percent of all manufacturing employment in the region in 1991 was located in the Austin, Waco, Killeen-Temple and Bryan-College Station metropolitan areas.

Computers, Semiconductors and Other High Technology Industries

Central Texas is home to a strong and growing, highly specialized electronics and technology industry. Anchored by the location of two high technology research consortiums—MCC and Sematech—and large university research programs, the high tech sector in Central Texas has prospered. Computers and semiconductors rank high among the region's areas of specialization. Industry giants in computers and microchips like IBM, Texas Instruments, Motorola and Advanced Micro Devices have facilities in Central Texas. Recently, Apple Computer made a substantial investment in the region, locating a 400 person customer support center in Austin. Central Texas' computer and semiconductor sector is further buttressed by emerging industry leaders like Dell Computer, CompuAdd, Cypress Semiconductor and others.

High tech in Central Texas is not solely concentrated in computers and microchips. Manufacturers of fluid meters and counting devices, process control instruments, telephone and telegraph apparatus, printed circuit boards and surgical appliances also thrive here.

Other Manufacturing

Central Texas has some concentration of manufacturing related to its natural resources. Oil and gas production in Central Texas is centered around the Giddings Field, which stretches across the southeastern portion of the region. As a result, oil and gas equipment manufacturing and heavy construction are listed among the region's specialized industries.

In the western, hill country portion of Central Texas, mining of native stone is an important industry. Limestone—used for agricultural lime and road construction—and granite used for monuments and construction are prevalent. Regionwide employment in these industries is proportionally larger than in the nation as a whole.

Other construction-related manufacturing industries are located in Central Texas. Cement, bricks, blinds and shades and even mobile homes are well represented industries. Primary aluminum is another area of specialization in the region.

Two Temple manufacturers—both of whom make school desks and chairs—have helped make furniture an area of regional specialization. Ice cream and candy are Central Texas specialties as well: candy maker M&M Mars in Waco and Blue Bell Ice Cream in Washington County have large operations that boost regional employment in these industries.

Table 5.20: Top 30 Areas of Specialization for the Central Texas Region Economy

<u>Industry</u>	<u>Regional Employment in 1991</u>	<u>Location Quotient*</u>
Administration of Economic Programs	6,034	37.6
Environmental Quality and Housing	4,878	19.7
Primary Aluminum	1,662	10.4
Lime	303	9.4
Laboratory Apparatus and Furniture	513	8.9
Electronic Computers	14,794	8.8
Public Building and Related Furniture	1,616	7.9
Semiconductors and Related Devices	8,516	5.7
Cut Stone and Stone Products	493	5.5
Minerals, Ground or Treated	453	5.2
Fluid Meters and Counting Devices	346	4.5
Brick and Structural Clay Tile	409	4.4
Jewelry, Precious Metal	935	3.9
Process Control Instruments	1,482	3.7
Candy and Other Confectionery Products	1,138	3.7
Fabricated Pipe and Fittings	561	3.5
Plastics Foam Products	1,112	3.5
Ice Cream and Frozen Desserts	497	3.4
Telephone and Telegraph Apparatus	2,516	3.3
Glass Containers	726	2.9
Oil and Gas Field Machinery	831	2.9
Mattresses and Bedsprings	492	2.7
Mobile Homes	648	2.6
Clay Refractories	105	2.6
Leather Goods	151	2.4
Printed Circuit Boards	1,440	2.3
Drapery Hardware, Blinds and Shades	293	2.2
Cement	259	2.2
Heavy Construction	10,355	2.2
Surgical Appliances and Supplies	1,323	2.2

*Values larger than 1 indicate an industry in which the region specializes.

Areas of Comparative Advantage

Another key to understanding a region's economy lies in defining its growth industries. Growth is attributable to several different causes. Some growth in a region tends to be driven by national economic growth trends. Whether the mix of industries in a region reflects relatively faster or slower growing industries is yet another factor affecting regional employment trends. The most telling indicator, however, describes employment growth in a region that is related to the region's relative attractiveness. "Shift share" analysis provides such an indicator. The shift share technique identifies regional growth that is attributable to national growth and industry mix. The residual represents the growth in a region that has been generated by the region's ability to compete with other regions for their share of new jobs in an industry. A region that has gained in competitive share in a particular industry has been relatively more successful than other regions—or has exhibited a comparative advantage—in attracting jobs.

Services and Trade

Central Texas has a large and growing service sector. Business, health, and educational services are among the industries that gained the most in competitive share (see Table 5.21). Other services that gained in competitive share include social services and amusement and recreation services. Many service industries are driven more by demand from within the region than export potential to areas outside the region. However, educational services in Central Texas—centered around several large state and private universities and technical schools—tend to draw in dollars from outside the region in the form of student spending. In addition, some of the region's health care institutions—in particular Temple's Scott and White Hospital—are renowned for highly specialized treatment and draw many patients from outside the region.

Several retail trade industries appear to be gaining in competitive share. Central Texas generates a good deal of economic activity from retail transactions, boosted by student spending. As a result, eating and drinking places and general merchandise stores showed strong increases in competitive share. In addition, Central Texas automotive dealers, furniture and home furnishings stores and miscellaneous retail establishments increased their competitive share of employment between 1988 and 1991.

Wholesale trade of nondurable goods, a more export-oriented industry, is also among the strong gainers of competitive share. Employment in this industry is boosted by McLane Company, a large Temple-based grocery distributor.

Tourism and travel is boosting the export potential in the region's trade and services sectors. Tourism, like more traditional exports, brings in dollars from outside the region. In the Central Texas region, tourism and business travel-related expenditures topped \$1.16 billion in 1989 (latest data available). Travel-related employment rose to more than 25,400 in 1989.

Other Industries

Several of the region's manufacturing industries added significant amounts of competitive share employment. High tech manufacturing is an important industry in Central Texas, and the region grabbed a large share of the jobs generated over the period 1988 to 1991. The region remained attractive for electronic computers, semiconductor, telephone and telegraph, printed circuit board and motor and generator manufacturers.

Aircraft manufacturing is also important in Central Texas. Waco is home to Chrysler Technology Airborne Systems which performs aircraft modifications, including installation of telecommunications equipment and navigation systems.

The region's once beleaguered construction and real estate markets have been on the mend since 1988. Some construction, real estate and related industries are included on the list of Central Texas region industries that gained in competitive share—in particular special contractors, engineering services and real estate.

Driven by more stable prices, oil and gas extraction in the Central Texas region added employment faster than other regions from 1988 to 1991.

Summary

What emerges from this analysis of specialization and change is a picture of a region with a strong government sector—spread among military bases, state government operations and state universities—providing support to other industries. Services, including education and health care, are also a large and growing area of specialization for the Central Texas region. Students at the region's several large educational institutions boost retail spending. In addition, university-related research helped spawn a now robust computer and microchip industry. Other high technology manufacturing industries continue to grow in importance here.

Table 5.21: Top 30 Central Texas Industries Ranked by Gain in Competitive Share

(based on change in employment from 1988 to 1991)

<u>Industry</u>	<u>Regional Employment in 1991</u>	<u>Gain in Competitive Share*</u>
Electronic Computers	14,794	6,764
Business Services	28,076	6,137
Health Services	59,769	2,754
Semiconductors and Related Devices	8,561	1,706
Eating and Drinking Places	46,445	1,547
Aircraft	1,864	1,496
Educational Services	96,330	1,396
Miscellaneous Retail	13,679	1,368
General Merchandise Stores	16,027	1,161
Social Services	24,377	1,084
Executive, Legislative and General Gov't.	9,359	1,048
Telephone and Telegraph Apparatus	2,516	976
Special Trade Contractors	13,940	898
Wholesale Trade-Nondurable Goods	13,244	878
Engineering and Management Services	17,441	743
Printed Circuit Boards	1,440	736
Real Estate	9,647	654
Insurance Agents, Brokers & Service	5,376	639
Communication	8,940	596
Amusement and Recreation Services	8,946	584
Nondepository Institutions	2,691	559
Coal Mining	1,149	552
Transportation by Air	2,170	545
Automotive Dealers	12,740	487
Agricultural Services	3,761	473
Environmental Quality and Housing	4,878	470
Furniture and Home Furnishings Stores	4,108	417
Primary Aluminum	1,662	402
Motors and Generators	700	401
Oil and Gas Extraction	3,301	396

*Represents employment growth from 1988 to 1991 that is attributable to the region's comparative advantage in the industry over other regions in the United States.

Region 8: South Texas

Key Points

- South Texas has government, services and retail trade sectors that are proportionally larger than in the state as a whole.
- The region specializes in government, apparel manufacturing and oil and chemical production industries.
- Industries such as health and educational services, retail establishments, construction and transportation gained in competitive share from 1988 to 1991 and are likely to capture a large share of future job growth.

The South Texas region boasts an economy that is both similar to, and different from, other regions of the state. The distinctiveness of a regional economy can be expressed in terms of the ways in which it differs from other regions, the state and the nation. This section of the report will examine the economic structure and trends of South Texas.

In broad terms the region shares with the state a large and growing service sector, and significant employment in retail trade. But a relatively large government sector and manufacturing industries which are unique to the region differentiate South Texas from other parts of the state.

Broad Employment Trends in South Texas

Overall employment in South Texas has varied, reflecting many of the same trends that have impacted the state as a whole. The region experienced employment declines in 1983 and 1986-87 following the crash in the state's oil industry. The region's close economic ties with Mexico adversely affected the South Texas economy when the peso was dramatically devalued in 1982 and 1987. The devaluation hampered previously robust levels of retail purchases by Mexicans in South Texas shops. But rapid industrialization along both sides of the Texas-Mexico border combined with stabilization in the oil and gas industry combined to produce impressive job gains in South Texas in the late 1980s. Employment in 1991 reached a record 1,081,000, a net gain of 72,400 jobs or 7.2 percent over 1988 employment. During the last four years employment grew by 7.0 percent in Texas and by 2.6 percent in the U.S. So, during the period 1988 to 1991, employment in the South Texas region grew at a pace slightly ahead of the state and nearly three times faster than in the nation.

Job growth in South Texas has kept pace or been slightly ahead of the state for the past decade. As a result, the region's share of statewide employment has slowly risen since 1982.

With some variations, the largest employment sectors in South Texas reflect the largest sectors statewide. Table 5.22 highlights the fact that the South Texas region has relatively larger government, services and trade sectors and is much less manufacturing intensive than the state as a whole.

Table 5.22: Largest Industries Based on 1991 Employment

<u>Texas</u>	<u>% of Total</u>	<u>South Texas</u>	<u>% of Total</u>
Services	23.0	Government	23.6
Retail Trade	18.4	Services	22.3
Government	18.0	Retail Trade	21.0
Manufacturing	13.9	Manufacturing	9.6
Wholesale Trade	6.2	Finance, Insurance, Real Estate	5.5

The importance of the service sector is evident. In fact, in both the region and the state, the largest employment gains over the past decade have occurred in the services sector. Between 1982 and 1991, Texas' service sector added more than 560,000 jobs, including 84,200 in South Texas.

But services, by their nature, are provided locally, and are not export-oriented. In fact, the growth of services is mostly attributable to several demand-induced trends.

Recent growth in services has been tied to the increasing complexity of the business environment. With the rise of the global economy, technology, regulation and other forces affecting the business climate, businesses have come to rely more and more on independent firms for legal, accounting, data processing, consulting and many other services. Not surprisingly, business services is one area in which service growth has been concentrated.

Another area of prominent service growth for the state, and for the South Texas region in particular, is health care. This trend has been driven by the aging of the population as well as rising income and the rapid advancement of health care technology.

Finally, the large-scale entry of women into the work place has driven up household income and stimulated demand for such things as child care and cleaning services.

Areas of Specialization

One key to understanding a region's economy is to define the industries that drive income and employment growth. Typically, these industries sell their particular goods or services outside the region, thereby generating regional "export" income. While these industries may or may not be an area's biggest, they play a much larger role in the regional economy than in the state's or nation's.

One measure of this greater importance is the "location quotient" which expresses how large a local industry is relative to the national economy. Mathematically the location quotient is defined as the percentage of the region's total employment that is accounted for by a particular industry, divided by the same industry's percentage share of total national employment. Thus, a location quotient greater than "1" means that the industry employs proportionally more people in the region than it does in the nation as a whole. Table 5.23 presents 30 industries in South Texas

whose share of total regional employment is more than two times larger than the industry's corresponding share of total national employment.

Government

Government employment makes up a much larger portion of South Texas' employment base than in the state as a whole. The presence of numerous large military installations in San Antonio, Corpus Christi and elsewhere boosts the region's government employment. In addition, government functions relating to the border and trade with Mexico—such as border patrol and customs agents—add to the size of the sector. Two government industry classifications top the list of areas of specialization in South Texas. "Administration of Economic Programs" includes government employment that is classified as regulation or administration of transportation, such as port authorities, regulation and inspection of commercial sectors, and regulation of agricultural commodities. "Environmental Quality and Housing" refers to government employment related to community development agencies, housing, waste management and environmental protection agencies.

Manufacturing

South Texas' employment base is relatively less manufacturing intensive in comparison to both the state's and the nation's economy. The region's manufacturing sector accounts for 10 percent of its total employment as compared with 14 percent statewide and 17 percent nationally. Still, the region has numerous distinct manufacturing exports in which the region specializes. Manufacturing in South Texas is predominantly concentrated in the region's six metropolitan areas. More than 84 percent of all manufacturing employment in the region in 1991 was located in the San Antonio, Victoria, Corpus Christi, Brownsville, McAllen and Laredo metropolitan areas.

Apparel

For a number of reasons, average wage rates for most industries in the South Texas region are below state and national averages. It is not surprising then, that apparel manufacturing—a highly labor intensive industry—is dominant among the region's areas of specialization. South Texas is well represented in industries such as men's and boy's trousers and slacks, underwear, and work clothing and girl's dresses and blouses. Other apparel and accessory industries in which the region specializes include women's footwear, house slippers, belts and leather goods. Apparel and accessory manufacturers like Levi Strauss, San Antonio Shoe, Fruit of the Loom and Williamson-Dickey have major facilities in South Texas.

Oil and Gas Production and Chemicals

South Texas has a strong concentration of oil and gas and chemical and petrochemical production industries. From the recent success of horizontal drilling in the Pearsall Field to the huge reserves of natural gas in Webb County, the region is a center of Texas oil and gas

production. The impact of oil and gas is felt across industry lines, with specialization spread among extraction, petroleum refining and oil and gas equipment manufacturing.

In addition, chemicals and petrochemical production are strong areas of specialization in the region, particularly industrial organic chemicals, minerals and other chemical production industries. Primary aluminum is another area of specialization in the region. South Texas chemical and petrochemical production is primarily centered around the Corpus Christi and Victoria metropolitan areas and Calhoun County.

Heavy construction is also listed as a specialized industry in South Texas. This can be traced to the back to the region's oil and gas, refining and petrochemicals, which are construction-intensive industries.

Other Manufacturing

Agricultural production is a big business throughout the region. Cattle, grains, fruits and vegetable are raised throughout South Texas. Many of these commodities are processed within the region, making food products some of the region's top areas of specialization. Regional specialization includes frozen and dehydrated fruits and vegetables, flour and grain mill products, and sugar. Manufactured ice and cigars are specialized industries which do not employ large numbers of South Texans. However, regionwide employment in these industries is proportionally larger than in the nation as a whole.

Table 5.23: Top 30 Areas of Specialization for the South Texas Region Economy

<u>Industry</u>	<u>Regional Employment in 1991</u>	<u>Location Quotient*</u>
Administration of Economic Programs	2,418	9.8
Environmental Quality and Housing	3,048	8.0
Leather Goods	737	7.5
Men's and Boy's Trousers and Slacks	6,350	7.5
Women's Footwear	1,741	7.1
Automatic Vending Machines	486	7.0
Alkalies and Chlorine	630	5.1
Curtains and Draperies	1,099	5.0
Ground or Treated Minerals	654	4.9
Apparel Belts	384	4.6
Girl's Dresses and Blouses	989	4.5
Oil and Gas Extraction	17,127	4.3
Leather and Sheep-lined Clothing	129	4.3
Primary Aluminum	1,054	4.3
Oil and Gas Field Machinery	1,892	4.2
Raw Cane Sugar	285	4.1
Manufactured Ice	254	4.0
Industrial Organic Chemicals	4,295	3.5
Flour and Grain Mill Products	685	3.3
Men's and Boy's Underwear/Nightwear	832	3.3
Men's and Boy's Work Clothing	1,317	3.1
Electronic Resistors	351	3.1
Cigars	81	3.0
Dehydrated Fruits, Vegetables, Soups	555	2.8
Frozen Fruits and Vegetables	1,411	2.8
Heavy Construction	20,121	2.8
House Slippers	103	2.7
Petroleum Refining	3,006	2.5
Abrasive Products	497	2.4
Plumbing Fixtures	210	2.4

*Values larger than 1 indicate an industry in which the region specializes.

Areas of Comparative Advantage

Another key to understanding a region's economy lies in defining its growth industries. Growth is attributable to several different causes. Some growth in a region tends to be driven by national economic growth trends. Whether the mix of industries in a region reflects relatively faster or slower growing industries is yet another factor affecting regional employment trends. The most telling indicator, however, describes employment growth in a region that is related to the region's relative attractiveness. "Shift share" analysis provides such an indicator. The shift share technique identifies regional growth that is attributable to national growth and industry mix. The residual represents the growth in a region that has been generated by the region's ability to compete with other regions for their share of new jobs in an industry. A region that has gained in competitive share in a particular industry has been relatively more successful than other regions—or has exhibited a comparative advantage—in attracting jobs.

Services and Trade

South Texas has a large and growing service sector. Health, educational and social services are among the industries that gained the most in competitive share (see Table 5.24). Other services that gained in competitive share include business services and automotive repair services. These service industries are driven more by demand from within the region than export potential to areas outside the region.

Several retail trade industries appear to be gaining in competitive share. South Texas generates a good deal of economic activity from retail transactions with tourists. In addition, Mexican visitors flock to retail establishments along the border and in San Antonio to purchase goods not available in Mexico. As a result, general merchandise stores and eating and drinking places all showed strong increases in competitive share. Also, South Texas automotive dealers, furniture and home furnishings stores, apparel and accessory stores and miscellaneous retail establishments increased their competitive share of employment between 1988 and 1991. Wholesale trade of durable goods, a more export-oriented industry, is also among the strong gainers of competitive share.

Tourism is certainly boosting the export potential in the region's trade and services sectors. Tourism, like more traditional exports, brings in dollars from outside the region. The region boasts a variety of tourist attractions, from the historical attractions and theme parks in San Antonio to the beaches at Corpus Christi and South Padre Island to the temperate climate that lures "winter Texans" to the Rio Grande Valley. In the South Texas region, tourism and business travel-related expenditures topped \$2.58 billion in 1989 (latest data available). Travel-related employment rose to more than 57,000 in 1989.

Other Industries

Construction and related industries are included on the list of South Texas region industries that gained in competitive share—including heavy construction, special contractors, general contractors and engineering services. Construction gains in the region can be traced to several sources. Oil and gas, refining and petrochemicals—which are predominant in Victoria, Corpus Christi and Calhoun County—are construction-intensive industries. Plant expansions and “turnarounds” have driven construction job gains in this part of the region.

Several of the region’s manufacturing industries added significant amounts of competitive share employment. Apparel manufacturing is an important industry in South Texas, and the region grabbed a large share of the jobs generated over the period 1988 to 1991. The region remained attractive for men’s and boy’s trousers and slacks, girl’s dresses and blouses and women’s footwear manufacturers.

Driven by more stable prices, oil and gas extraction and oil and gas field machinery manufacturing in the South Texas region added employment faster than other regions from 1988 to 1991.

Several transportation industries have also showed an increase in competitive share. These include transportation services, local and interurban passenger transportation and transportation by air. The region’s strategic importance to trade with Mexico has led to a burgeoning trucking industry and improvements at South Texas airports.

What emerges from this analysis of specialization and change is a picture of a region with a strong government sector providing support to other industries. Services, including health care and education, are also a large and growing area of specialization for the South Texas region. Tourist spending and ties to Mexico have elevated South Texas retail trade operations to the status of an export industry, as dollars flow in from outside the region. The oil and gas and petrochemical industries still play a major role here, as do apparel and agriculture.

Table 5.24: Top 30 South Texas Industries Ranked by Gain in Competitive Share

(based on change in employment from 1988 to 1991)

<u>Industry</u>	<u>Regional Employment in 1991</u>	<u>Gain in Competitive Share*</u>
General Merchandise Stores	35,970	4,752
Health Services	100,458	3,845
Eating and Drinking Places	74,446	3,575
Educational Services	126,475	3,493
Social Services	26,923	2,465
Special Trade Contractors	24,530	2,211
Men's and Boy's Trousers and Slacks	6,350	2,099
Heavy Construction	20,121	1,865
General Building Contractors	11,129	1,848
Transportation Services	5,941	1,803
Engineering and Management Services	18,819	1,665
Communication	14,516	1,514
Miscellaneous Retail	20,666	1,332
Insurance Carriers	15,925	1,290
Automotive Dealers	23,061	1,080
Oil and Gas Extraction	17,127	978
Automotive Repair Services	10,502	972
Real Estate	15,540	970
Wholesale Trade-Durable Goods	25,564	846
Transportation by Air	4,988	762
Furniture and Home Furnishings Stores	8,322	753
Executive, Legislative and General Gov't.	8,341	735
Engine Electrical Equipment	1,006	699
Oil and Gas Field Machinery	1,892	692
Apparel and Accessory Stores	14,749	688
Business Services	40,253	686
Bread, Cake and Related Products	2,661	685
Girl's Dresses and Blouses	989	621
Women's Footwear	1,741	620
Local and Interurban Passenger Transport	3,808	611

*Represents employment growth from 1988 to 1991 that is attributable to the region's comparative advantage in the industry over other regions in the United States.

Region 9: West Texas

Key Points

- West Texas has mining, government, and retail trade sectors that are proportionally larger than in the state as a whole.
- The region's economy is heavily dependent on oil and gas, with agriculture and several manufacturing industries also important.
- Industries such as health services, special trade contractors, some wholesale and retail trade operations, and various manufacturing industries gained in competitive share from 1988 to 1991 and are likely to capture a large share of future job growth.

The distinctiveness of a regional economy can be expressed in terms of the ways in which it differs from other regions, the state and the nation. This section of the report will examine the economic structure and trends of West Texas.

In broad terms the region shares with the state a large and growing service sector, and significant employment in retail trade. But relatively large mining and government sectors, and manufacturing industries which are unique to the region differentiate West Texas from other parts of the state.

Broad Employment Trends in West Texas

Overall employment in West Texas has varied, reflecting many of the same trends that have impacted the state as a whole. The region experienced employment declines in 1983 and 1986 following the crash in the state's oil industry. In fact, the entire decade of the 1980s offered a mixed bag of economic trends for West Texas. Sustained growth in services and government and stabilization in the oil and gas industry brought some good news to the region in the late 1980s. At the same time, however, construction and manufacturing employment dipped. So far in the 1990s the region has been adding jobs, although at a rate slower than the state as a whole. Employment in 1991 reached 186,500, a net gain of 3,300 jobs or 1.8 percent over 1988 employment. During the last four years employment grew by 7.0 percent in Texas and by 2.6 percent in the U.S. So, during the period 1988 to 1991, employment in West Texas grew at a pace much slower than in the state and somewhat slower than the nation. As job growth in West Texas has not kept pace with the state over the past decade, the region's share of statewide employment has slowly dwindled since 1982.

With some variations, the largest employment sectors in West Texas reflect the largest sectors statewide. Table 5.25 highlights the fact that West Texas has a much larger mining sector and relatively larger government and trade sectors than the state as a whole. The region, however, is much less manufacturing intensive than the state.

Table 5.25: Largest Industries Based on 1991 Employment

<u>Texas</u>	<u>% of Total</u>	<u>West Texas Region</u>	<u>% of Total</u>
Services	23.0	Government	20.6
Retail Trade	18.4	Retail Trade	18.8
Government	18.0	Services	17.6
Manufacturing	13.9	Mining	13.3
Wholesale Trade	6.2	Manufacturing	8.2

The importance of the service sector is evident. In the state, the largest employment gains over the past decade have occurred in the service sector. In West Texas, services added more jobs than any sector except government. Between 1982 and 1991, Texas' service sector added more than 560,000 jobs, including 3,500 in West Texas.

But services, by their nature, are provided locally, and are not export-oriented. In fact, the growth of services is mostly attributable to several trends driven by demand from inside the region.

Recent growth in services has been tied to the increasing complexity of the business environment. With the rise of the global economy, technology, regulation and other forces affecting the business climate, businesses have come to rely more and more on independent firms for legal, accounting, data processing, consulting and many other services. Not surprisingly, business services is one area in which service growth has been concentrated.

Another area of prominent service growth for the state, and for West Texas in particular, is health care. This trend has been driven by the aging of the population as well as by rising income and the rapid advancement of health care technology.

Finally, the large-scale entry of women into the work place has driven up household income and stimulated demand for such things as child care and cleaning services.

Areas of Specialization

One key to understanding a region's economy is to define the industries that drive income and employment growth. Typically, these industries sell their particular goods or services outside the region, thereby generating regional "export" income. While these industries may or may not be an area's biggest, they play a much larger role in the regional economy than in the state's or nation's.

One measure of this greater importance is the "location quotient" which expresses how large a local industry is relative to the national economy. Mathematically the location quotient is defined as the percentage of the region's total employment that is accounted for by a particular industry, divided by the same industry's percentage share of total national employment. Thus, a location quotient greater than "1" means that the industry employs proportionally more people in the region than it does in the nation as a whole. Table 5.26 presents 30 industries in West Texas

whose share of total regional employment is more than two times larger than the industry's corresponding share of total national employment.

Oil and Gas Production and Chemicals

West Texas has perhaps the strongest concentration of oil and gas production industries in the state. Midland and Odessa serve as centers of the Texas oil industry. The impact of oil and gas is felt across industry lines, with specialization spread among extraction, petroleum refining, pipelines, industrial gas production and oil and gas field machinery. Heavy construction is also listed as a specialized industry in West Texas. This also can be traced back to the region's oil and gas and refining, which are construction-intensive industries. Some of the biggest names in the oil and gas industry have operations in West Texas, including Exxon, Texaco, Phillips Petroleum and Chevron.

Manufacturing

West Texas' employment base is relatively less manufacturing intensive in comparison to both the state's and the nation's economy. The region's manufacturing sector accounts for 8.2 percent of its total employment as compared with 14 percent statewide and 17 percent nationally. Still, the region has numerous distinct manufacturing exports in which it specializes. Manufacturing in West Texas is largely concentrated in the region's three metropolitan areas. In 1991, nearly 80 percent of all manufacturing employment in the region was located in the Midland, Odessa and San Angelo metropolitan areas.

Petroleum-related manufacturing industries are dominant on the list of West Texas specialization. Oil and gas field machinery and compressors are industries of strong regional specialization, as are rubber and plastics—both petroleum based products. Chemical preparations and fertilizer are also specialized industries in West Texas. Industrial machinery is another regional area of specialization.

Apparel manufacturing is among the region's areas of specialization. West Texas is well represented in industries such as house slippers, men's and boys' work clothing and other textile goods. Levi Strauss makes jeans and R.G. Barry makes house slippers at major facilities in West Texas.

The presence of Ethicon—which manufactures surgical sutures and needles in San Angelo—boosts the importance of the surgical supplies industry in the region.

Government

Government employment makes up a larger portion of West Texas' employment base than in the state as a whole. The presence of Goodfellow Air Force Base, a major military installation in San Angelo, boosts the region's government employment. The region also boasts large state universities, including the University of Texas of the Permian Basin and Angelo State University. In addition, local government functions—particularly elementary and secondary education—add to

the size of the sector. Two government industry classifications are included among the areas of specialization in West Texas. "Administration of Economic Programs" is a broad industry classification that includes government employment in regulation of agricultural commodities. Texas A&M University maintains an agricultural research center in San Angelo, and extension service offices in counties across the region. "Environmental Quality and Housing" refers to government employment related to community development agencies, housing, waste management and environmental protection agencies. In West Texas, employment in this category is mainly located at many Soil Conservation Service offices as well as water and housing authorities.

Agriculture

Agricultural production is a dominant business in West Texas, as livestock (primarily sheep and goats) and crops are raised throughout the region. San Angelo is a center of wool and mohair production. Not surprisingly, agriculture-related businesses are well represented among the region's specialized industries. Agricultural services and the manufacture of fertilizers rank high among West Texas areas of specialization.

Table 5.26: Top 30 Areas of Specialization for West Texas Economy

<u>Industry</u>	<u>Regional Employment in 1991</u>	<u>Location Quotient*</u>
House Slippers	283	43.2
Oil and Gas Extraction	24,585	36.2
Pipelines	796	24.3
Oil and Gas Field Machinery	1,187	15.3
Administration of Economic Programs	527	12.3
Surgical Appliances and Supplies	1,799	11.2
Environmental Quality and Housing	574	8.7
Men's and Boys' Work Clothing	620	8.5
Synthetic Rubber	206	7.8
Gum and Wood Chemicals	45	5.7
Carburetors, Pistons, Rings, Valves	216	5.6
Transportation Equipment, N.E.C.**	109	4.9
Industrial Gasses	201	4.9
Plastics Materials and Resins	568	3.8
Air and Gas Compressors	158	3.7
Manufactured Ice	38	3.4
Textile Goods, N.E.C.	165	3.4
Cement	104	3.3
Fabricated Structural Metal	422	3.3
Heavy Construction	3,642	2.9
Power Transmission Equipment	90	2.8
Roasted Coffee	51	2.6
Petroleum Refining	525	2.5
Plastic Bottles	126	2.4
Pens and Mechanical Pencils	35	2.4
Chemical Preparations	170	2.2
Nitrogenous Fertilizers	40	2.2
Miscellaneous Repair Services	1,244	2.2
Industrial Machinery	869	2.1
Agricultural Services	1,721	2.1

*Values larger than 1 indicate an industry in which the region specializes.

**Not Elsewhere Classified

Areas of Comparative Advantage

Another key to understanding a region's economy lies in defining its growth industries. Growth is attributable to several different causes. Some growth in a region tends to be driven by national economic trends. Whether the mix of industries in a region reflects relatively faster or slower growing industries is yet another factor affecting regional employment trends. The most telling indicator, however, describes employment growth in a region that is related to the region's relative attractiveness. "Shift share" analysis provides such an indicator. The shift share technique identifies regional growth that is attributable to national growth and industry mix. The residual represents the growth in a region that has been generated by the region's ability to compete with other regions for their share of new jobs in an industry. A region that has gained in competitive share in a particular industry has been relatively more successful than other regions—or has exhibited a comparative advantage—in attracting jobs.

Services and Trade

The West Texas region has a large and growing service sector. Health and social services top the list among the industries that gained the most in competitive share (see Table 5.27). Hospitals in the region's metropolitan areas serve a large population in surrounding counties. In addition, the San Angelo State School provides long term care for the mentally retarded. Other services that gained in competitive share include miscellaneous and automotive repair services, business and personal services. These service industries are driven more by demand from within the region than export potential to areas outside the region.

Tourism and travel-related expenditures are boosting the export potential in the region's trade and services sectors. Tourism, like more traditional exports, brings in dollars from outside the region. Hotels and museums gained in competitive share employment during the period 1988 to 1991. In West Texas, tourism and business travel-related expenditures topped \$284.5 million in 1989 (latest data available). Travel-related employment rose to 4,860 in 1989.

Several retail trade industries appear to be gaining in competitive share. The West Texas region generates a good deal of economic activity from retail transactions. Eating and drinking places and food stores both increased their competitive share of employment between 1988 and 1991. Wholesale trade of durable goods, a more export-oriented industry, is also among the strong gainers of competitive share.

Interestingly, using the shift share technique, an industry can gain in competitive share employment while actually showing slight overall job losses for the period in question. Such was the case for a trade industry in West Texas. Although automotive dealers suffered a mild employment decline between 1988 and 1991, they still appear on the list of industries that gained in competitive share. This indicates that while regional employment may be declining somewhat, this industry is doing much better within the region than throughout the rest of the nation. This is also

the case for special trade contractors, an industry that has suffered nationwide but enjoyed employment growth in West Texas.

Manufacturing

Several of the region's manufacturing industries added significant amounts of competitive share employment. Fabricated structural metal, centered around San Angelo's Hirschfield Steel, grabbed a large share of the new jobs in their industry between 1988 and 1991. The region remained attractive for fabricated platework, an industry that includes manufacturers of tanks for the oil and gas industry.

Various other manufacturers gained in competitive share from 1988 to 1991, including several of the region's heavy equipment industries. Manufacturers of industrial machinery, pumps and auto parts as well as motors and generators added competitive share jobs during the period. Transportation equipment, soft drink and food manufacturers all remained competitive.

Summary

What emerges from this analysis of specialization and change is a picture of a region with a dominant oil and gas industry. Oil and gas cuts across industry lines in terms of regional specialization, with production, refining, equipment manufacturing and industries that use petroleum as a primary feedstock in abundance. In addition, strong agriculture and government sectors provide support to other industries. Services, including health care, are a large and growing industry in West Texas.

Table 5.27: Top 30 West Texas Region Industries Ranked by Gain in Competitive Share

(based on change in employment from 1988 to 1991)

<u>Industry</u>	<u>Regional Employment in 1991</u>	<u>Gain in Competitive Share*</u>
Special Trade Contractors	4,021	726
Wholesale Trade-Durable Goods	6,435	712
Health Services	16,974	700
Social Services	4,269	446
Miscellaneous Repair Services	1,244	412
Fabricated Structural Metal	422	200
Automotive Dealers	4,479	156
Hotels	1,790	150
Executive, Legislative and General Gov't.	1,885	130
Fabricated Plate Shops	302	129
Industrial Gases	201	121
Transportation by Air	490	118
Industrial Machinery	869	114
Carburetors, Pistons, Rings, Valves	216	108
Food Stores	7,153	102
Eating and Drinking Places	11,682	102
Men's and Boys' Work Clothing	620	101
Auto Repair	1,626	98
Holding and Investment Offices	355	83
Personal Services	1,978	62
Environmental Quality and Housing	574	60
Transportation Equipment, N.E.C.**	109	58
Pumps and Pumping Equipment	65	52
Motion Pictures	499	52
Business Services	5,197	51
Food Preparations, N.E.C.**	157	49
Bottled and Canned Soft Drinks	156	47
Museums, Botanical, Zoological Gardens	96	44
Motors and Generators	54	43
Plating and Polishing	85	42

*Represents employment growth from 1988 to 1991 that is attributable to the region's comparative advantage in the industry over other regions in the United States.

**Not Elsewhere Classified

Region 10: Upper Rio Grande Region

Key Points

- The Upper Rio Grande region has manufacturing, government and retail trade sectors that are proportionally larger than in the state as a whole.
- The region specializes in apparel manufacturing, copper production, electronics and several other manufacturing industries.
- Industries such as health, business and educational services, retail and wholesale establishments, semiconductors and plastics products gained in competitive share from 1988 to 1991 and are likely to capture a large share of future job growth.

The distinctiveness of a regional economy can be expressed in terms of the ways in which it differs from other regions, the state and the nation. This section of the report will examine the economic structure and trends of the Upper Rio Grande region.

In broad terms the region shares with the state a large and growing service sector, and significant employment in retail trade. But a relatively large government sector and manufacturing industries which are unique to the region differentiate the Upper Rio Grande region from other parts of the state.

Broad Employment Trends in the Upper Rio Grande Region

Overall employment in the Upper Rio Grande has grown fairly steadily through the past decade, running counter to many of the trends that have affected the state as a whole. The region experienced a slight employment decline in 1983. The region's close economic ties with Mexico hurt the Upper Rio Grande's economy when the peso was dramatically devalued in 1982, hampering previously robust levels of retail purchases by Mexicans in the region's shops. But rapid industrialization along both sides of the Texas-Mexico border combined with the stability of El Paso's large government sector produced impressive job gains in the Upper Rio Grande region throughout the rest of the 1980s. Employment in 1991 reached a record 214,000, a net gain of 15,900 jobs or 8.0 percent over 1988 employment. During the last four years employment grew by 7.0 percent in Texas and by 2.6 percent in the U.S. So, during the period 1988 to 1991, employment in the Upper Rio Grande region grew at a pace slightly ahead of the state and more than three times faster than in the nation.

Job growth in the Upper Rio Grande region has kept pace or been slightly ahead of the state for the past decade. As a result, the region's share of statewide employment has slowly risen since 1982.

With some variations, the largest employment sectors in the Upper Rio Grande region reflect the largest sectors statewide. Table 5.28 highlights the fact that the Upper Rio Grande

region has relatively larger government and retail trade sectors and is much more manufacturing intensive than the state as a whole.

Table 5.28: Largest Industries Based on 1991 Employment

<u>Texas</u>	<u>% of Total</u>	<u>Upper Rio Grande Region</u>	<u>% of Total</u>
Services	23.0	Government	22.0
Retail Trade	18.4	Services	19.8
Government	18.0	Retail Trade	19.6
Manufacturing	13.9	Manufacturing	19.3
Wholesale Trade	6.2	Wholesale Trade	5.7

The importance of the service sector is evident. In fact, in both the region and the state, the largest employment gains over the past decade have occurred in the services sector. Between 1982 and 1991, Texas' service sector added more than 560,000 jobs, including 16,500 in the Upper Rio Grande region.

But services, by their nature, are provided locally, and are not export-oriented. In fact, the growth of services is mostly attributable to several trends driven by demand from inside the region.

Recent growth in services has been tied to the increasing complexity of the business environment. With the rise of the global economy, technology, regulation and other forces affecting the business climate, businesses have come to rely more and more on independent firms for legal, accounting, data processing, consulting and many other services. Not surprisingly, business services is one area in which service growth has been concentrated.

Another area of prominent service growth for the state, and for the Upper Rio Grande region in particular, is health care. This trend has been driven by the aging of the population as well as by rising income and the rapid advancement of health care technology.

Finally, the large-scale entry of women into the work place has driven up household income and stimulated demand for such things as child care and cleaning services.

Areas of Specialization

One key to understanding a region's economy is to define the industries that drive income and employment growth. Typically, these industries sell their particular goods or services outside the region, thereby generating regional "export" income. While these industries may or may not be an area's biggest, they play a much larger role in the regional economy than in the state's or nation's.

One measure of this greater importance is the "location quotient" which expresses how large a local industry is relative to the national economy. Mathematically the location quotient is defined as the percentage of the region's total employment that is accounted for by a particular industry, divided by the same industry's percentage share of total national employment. Thus, a

location quotient greater than “1” means that the industry employs proportionally more people in the region than it does in the nation as a whole. Table 5.29 presents 30 industries in the Upper Rio Grande region whose share of total regional employment is more than three times larger than the industry’s corresponding share of total national employment.

Manufacturing

The Upper Rio Grande region’s employment base is much more manufacturing intensive in comparison to both the state’s and the nation’s economy. The region’s manufacturing sector accounts for more than 19 percent of its total employment as compared with 14 percent statewide and 17 percent nationally. The region has numerous distinct manufacturing exports in which the region specializes. Manufacturing in the Upper Rio Grande region is nearly entirely concentrated in the region’s only metropolitan area. All but 200 of the region’s 41,400 manufacturing jobs in 1991 were located in and around El Paso.

Apparel

For a number of reasons, average wage rates for most industries in the Upper Rio Grande are below state and national averages. It is not surprising that apparel manufacturing—a highly labor-intensive industry—is dominant among the region’s areas of specialization. The Upper Rio Grande region is well represented in industries such as pleating and stitching, men’s and boys’ trousers, work clothing, suits, coats and women’s outerwear, dresses and handbags. Footwear—primarily leather boots—is also an area of specialization for the region. Other accessory industries in which the region specializes include leather gloves and personal leather goods. Apparel and footwear manufacturers like Levi Strauss, Wrangler, Lee, Tony Lama and Lucchese Boots have major facilities in the Upper Rio Grande region.

Other Manufacturing

Copper production is a big business in the Upper Rio Grande region. In fact, primary copper tops the list of specialized industries in the region. Asarco and Phelps Dodge have copper production facilities in El Paso.

The region’s top areas of specialization includes food products like canned specialties, nuts, pet food and manufactured ice. Electronics and automotive electrical equipment are growing industries in El Paso. Regionwide employment in these industries is proportionally larger than in the nation as a whole. Paper products like cardboard and sanitary paper products are well represented among Upper Rio Grande region industries.

Government

Government employment makes up a much larger portion of the Upper Rio Grande region’s employment base than in the state as a whole. The presence of Fort Bliss, a major military installation in El Paso boosts the region’s government employment. The region also

boasts a large state university, the University of Texas at El Paso. In addition, government functions relating to the border and trade with Mexico—such as border patrol and customs agents—add to the size of the sector. One government industry classification is included among the areas of specialization in the Upper Rio Grande region. “Administration of Economic Programs” includes government employment that is classified as regulation or administration of transportation, regulation and inspection of commercial sectors, and regulation of agricultural commodities.

Table 5.29: Top 30 Areas of Specialization for the Upper Rio Grande Region Economy

<u>Industry</u>	<u>Regional Employment in 1991</u>	<u>Location Quotient*</u>
Primary Copper	994	94.8
Pleating and Stitching	1,556	53.4
Men's and Boys' Work Clothing	3,911	46.5
Electronic Resistors	850	37.7
Men's and Boys' Trousers and Slacks	4,807	28.7
Canned Specialties	1,124	24.6
Men's Footwear	1,417	23.6
Leather Gloves	73	15.4
Salted and Roasted Nuts and Seeds	217	13.2
Sanitary Paper Products	661	10.7
Leather and Sheep-Lined Clothing	63	10.6
Women's Outerwear	3,858	10.5
Administration of Economic Programs	502	10.2
Apparel and Accessories, N.E.C.**	279	9.9
Dog and Cat Food	301	9.3
Personal Leather Goods	160	9.1
Engine Electrical Equipment	1,146	9.0
Brooms and Brushes	221	8.4
Metal Household Furniture	327	7.5
Architectural Metalwork	360	6.8
Games, Toys and Children's Vehicles	526	6.3
Women's Handbags and Purses	62	6.1
Footwear Cut Stock	64	6.0
Miscellaneous Metal Work	150	5.8
Die-Cut Paperboard and Cardboard	162	4.9
Men's and Boys' Suits and Coats	425	4.5
Copper Rolling and Drawing	198	4.3
Manufactured Ice	54	4.3
Environmental Controls	373	4.1
Women's Dresses	495	3.8

*Values larger than 1 indicate an industry in which the region specializes.

**Not Elsewhere Classified

Areas of Comparative Advantage

Another key to understanding a region's economy lies in defining its growth industries. Growth is attributable to several different causes. Some growth in a region tends to be driven by national economic trends. Whether the mix of industries in a region reflects relatively faster or slower growing industries is yet another factor affecting regional employment trends. The most telling indicator, however, describes employment growth in a region that is related to the region's relative attractiveness. "Shift share" analysis provides such an indicator. The shift share technique identifies regional growth that is attributable to national growth and industry mix. The residual represents the growth in a region that has been generated by the region's ability to compete with other regions for their share of new jobs in an industry. A region that has gained in competitive share in a particular industry has been relatively more successful than other regions—or has exhibited a comparative advantage—in attracting jobs.

Services and Trade

Upper Rio Grande has a large and growing service sector. Health, business and educational services are among the industries that gained the most in competitive share (see Table 5.30). But growth in this industry has been broad-based, spread among many types of services. Other services that gained in competitive share include personal services, social, legal, agricultural and transportation services. These service industries are driven more by demand from within the region than export potential to areas outside the region.

Several retail trade industries appear to be gaining in competitive share. The Upper Rio Grande region generates a good deal of economic activity from retail transactions with Mexican visitors who flock to retail establishments in El Paso to purchase goods not available in their home country. As a result, general merchandise stores and eating and drinking places all showed strong increases in competitive share. In addition, Upper Rio Grande food stores, apparel and accessory stores and miscellaneous retail establishments increased their competitive share of employment between 1988 and 1991. Wholesale trade of durable and nondurable goods, more export-oriented industries, are also among the strong gainers of competitive share.

Tourism and travel are also boosting the export potential in the region's trade and services sectors. Tourism, like more traditional exports, brings in dollars from outside the region. The region is home to the Big Bend National Park, a popular tourist destination. El Paso has become an increasingly popular convention site, and the area's strong ties with Mexico have enhanced business travel. In the Upper Rio Grande region, tourism and business travel-related expenditures topped \$398 million in 1989 (latest data available). Travel-related employment rose to 7,790 in 1989.

Other Industries

Several of the region's manufacturing industries added significant amounts of competitive share employment. Apparel and accessory manufacturing is an important industry in the Upper Rio Grande region, and the region grabbed a large share of the jobs generated over the period 1988 to 1991. The region remained attractive for pleating and stitching, men's and boys' suits and coats, women's dresses and personal leather goods manufacturers.

Several growth industries in the Upper Rio Grande region have enjoyed success due in large part to their association with the *maquiladora* industry across the river in Juarez, Mexico. Automotive parts, electronics and plastic injection molding are such industries that have experienced marked growth, broadening the region's traditional manufacturing employment base. Engine electrical equipment, semiconductors and plastics products are all listed among Upper Rio Grande industries that added competitive share employment between 1988 and 1991.

Construction and related industries are included on the list of Upper Rio Grande region industries that gained in competitive share—including general contractors and engineering services.

Summary

What emerges from this analysis of specialization and change is a picture of a region with a strong government sector providing support to other industries. Manufacturing is dominant here, fueled in part by rapid industrialization on both sides of the Texas-Mexico border. Services, including health care, *maquiladora*-related business services and educational services, are also a large and growing area of specialization for the Upper Rio Grande region. The region's geographic position on the border and in the center of the Southwestern United States has boosted retail and wholesale trade. Ties to Mexico have elevated Upper Rio Grande retail trade operations to the status of an export industry, as dollars flow in from outside the region.

Table 5.30: Top 30 Upper Rio Grande Industries Ranked by Gain in Competitive Share

(based on change in employment from 1988 to 1991)

<u>Industry</u>	<u>Regional Employment in 1991</u>	<u>Gain in Competitive Share*</u>
Health Services	16,804	1,945
Eating and Drinking Places	14,469	1,676
General Merchandise Stores	7,461	1,053
Pleating and Stitching	1,556	951
Business Services	9,047	744
Food Stores	6,849	619
Educational Services	24,591	559
Apparel and Accessory Stores	2,822	557
Personal Services	3,866	555
Wholesale Trade-Nondurable Goods	4,944	542
Social Services	4,467	516
Engine Electrical Equipment	1,146	505
Engineering and Management Services	2,583	482
Executive, Legislative and General Gov't.	1,547	372
Wholesale Trade-Durable Goods	7,310	304
Legal Services	1,555	294
Semiconductors and Related Devices	1,294	289
Men's and Boys' Suits and Coats	425	274
Telephone Apparatus	696	266
Plastics Products	1,818	255
Women's and Junior's Dresses	495	250
Brooms and Brushes	221	219
Metal Household Furniture	327	213
Miscellaneous Retail	3,540	206
Agricultural Services	909	178
Transportation Services	865	167
Salted and Roasted Nuts and Seeds	217	166
Building Materials and Garden Supplies	1,170	166
Motor Vehicle Car Bodies	339	154
General Building Contractors	2,227	153

*Represents employment growth from 1988 to 1991 that is attributable to the region's comparative advantage in the industry over other regions in the United States.

CHAPTER SIX

Summary

Given the breadth of material covered in this applied research project, summarizing the findings is not an easy task. What is readily apparent is the tremendous diversity of the Texas economy. Also, this analysis has highlighted disparities among the regional economies in Texas. Some regions of the state have enjoyed robust growth in the recent past. Others have experienced decline.

The geography and the land in Texas have, in many ways, defined its economy. Texans have been the beneficiaries of fertile farm and ranch land and large deposits of oil and natural gas. The state spans two time zones, is positioned in the center of the Sunbelt, along the border with Mexico and the Gulf of Mexico. This legacy of natural resources and geographic advantages has generated income for generations. But the economic base of the state is undergoing a transition. Texas maintains, in the minds of many, its image as an economy driven by agriculture and oil. Yet, one of the strengths of the state's economy is its broad range of industries. This has only intensified in recent years as Texas has diversified away from its reliance on oil as a major source of export income. The state continues to evolve away from its dependence on natural resources.

It would be imprudent to suggest that Texas' resource-based industries are not still vital to the state's economy. The continued importance of oil and gas production in East and West Texas, and refining and petrochemicals in the Gulf Coast is evident. In addition, farming and ranching remain pillars of the economy in the High Plains, Northwest Texas, West Texas and South Texas, as does timber in Southeast Texas. But many other Texas industries have grown in importance, and many have surpassed these resource-based industries in terms of employment impact.

Technology-based manufacturing has become a major source of export income for Texas. From computers, microchips and technology research in Central Texas, to telecommunications and defense electronics in the Metroplex, to computers and space research in the Gulf Coast, Texas has gained national recognition as a high technology industry growth center. A wide array of other manufacturing industries fill out Texas' industrial profile. Some of the state's manufacturing

centers around chemicals, petrochemicals and oil and gas refining. But equally important are the state's food processing, apparel, paper and wood products, heavy equipment and other industries.

Trade with Mexico is another prominent driver of growth in the state's economy. Rapid industrialization along the Texas-Mexico border and increased spending in Texas by Mexican consumers have had a profound effect on the South Texas and Upper Rio Grande regional economies.

The service sector has generated the bulk of new jobs in Texas in recent years. Health services, business services, educational services and many other service industries have been at the forefront in terms of job creation. Services and retail trade are bolstered by the fact that tourism is growing in importance in nearly all regions. Wholesale trade is adding jobs in many areas of the state including the Metroplex, the state's ports along the Gulf Coast and along the Texas-Mexico border. Transportation—particularly air transportation in the Metroplex and water transportation in the Gulf Coast region—contributes to the growing industrial diversity of the state's economy.

The economic base analysis techniques employed in this applied research project are not new, nor do they demand a great deal of statistical sophistication. But, in the context of breaking the Texas economy into parts—regional economies—in order to gain insight on the whole, they have proven to be useful tools. Location quotient and shift share analysis, applied to the regions of Texas, shed light on the resource-based industries that form the foundations of the state's economic base. These techniques also point to the technology- and information-based industries that will be the engines of employment growth for the future in Texas.

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A P P E N D I X

This appendix presents a sample of the spreadsheets used in this research. The analysis in this applied research project focused on the thirty industries that rose to the top using each technique. However, many more industries were analyzed; they are included in the tables that follow. Ten regional economies were included in this research. The full analysis is provided—as a sample—only for the Southeast Texas region. The methodology remained constant for all regions included in this study. Readers who wish to see the full analysis for other regions may contact the author, who resides as of this writing at 5811 Mesa Drive, Austin, 78731.

SIC	DESCRIPTION	US	REGION 5	US % SHARE	REG % SHARE	LOCATION	EXPECTED	REGION
		EMP 1991	EMP91	TOTAL EMP	TOTAL EMP	QUOTIENT	LOCAL REQ	EXPORT EMP
		108,310,000	235048					
2822	SYNTHETIC RUBBER	15,300	2,024	0.014126119	0.416632359	29.4937587	33	1,991
3322	MALLEABLE IRON FOUNDRIES	8,000	710	0.007386206	0.146150679	19.7869751	17	693
2911	PETROLEUM REFINING	120,400	6,710	0.111162404	1.381226842	12.4253056	261	6,449
2436	SOFTWOOD VENEER AND PLYWOOD	27,700	1,351	0.025574739	0.278097983	10.8739323	60	1,291
2493	RECONSTITUTED WOOD PRODUCTS	16,600	628	0.015326378	0.129271305	8.43456328	36	592
2869	INDUSTRIAL ORGANIC CHEMICALS, NEC	123,300	4,646	0.113839904	0.956360642	8.40092629	268	4,378
2631	PAPERBOARD MILLS	50,400	1,789	0.046533099	0.368258543	7.91390531	109	1,680
95	ENVIRONMENTAL QUALITY AND HOUSING	38,400	1,239	0.03545379	0.255043228	7.19368021	83	1,156
3533	OIL AND GAS FIELD MACHINERY	45,100	1,385	0.041639738	0.285096748	6.84674695	98	1,287
2812	ALKALIES AND CHLORINE	12,300	318	0.011356292	0.065459037	5.76412054	27	291
2435	HARDWOOD VENEER AND PLYWOOD	22,300	556	0.02058905	0.114450391	5.55879904	48	508
96	ADMINISTRATION OF ECONOMIC PROGRAM	24,800	513	0.022897239	0.105599012	4.61186653	54	459
3845	ELECTROMEDICAL EQUIPMENT	32,200	628	0.02972948	0.129271305	4.34825312	70	558
2514	METAL HOUSEHOLD FURNITURE	21,900	426	0.02021974	0.087690408	4.33687125	48	378
3716	MOTOR HOMES	16,300	289	0.015049395	0.059489502	3.95294966	35	254
46	PIPELINES, EXCEPT NATURAL GAS	19,000	328	0.01754224	0.067517497	3.84885268	41	287
3432	PLUMBING FIXTURE FITTINGS AND TRIM	25,000	399	0.023081895	0.082132565	3.55831124	54	345
2421	SAWMILLS AND PLANING MILLS, GENERAL	148,900	2,333	0.137475764	0.480238781	3.49326141	323	2,010
2448	WOOD PALLETS AND SKIDS	32,200	500	0.02972948	0.102923014	3.46198497	70	430
2411	LOGGING	78,100	1,202	0.072107839	0.247426925	3.43134574	169	1,033
2015	POULTRY SLAUGHTERING AND PROCESSING	202,000	2,867	0.186501708	0.59016056	3.1643708	438	2,429
16	HEAVY CONSTRUCTION, EX. BUILDING	728,500	10,335	0.672606408	2.127418691	3.1629474	1,581	8,754
2821	PLASTICS MATERIALS AND RESINS	85,600	1,186	0.079032407	0.244133388	3.08902889	186	1,000
3715	TRUCK TRAILERS	24,200	317	0.022343274	0.065253191	2.92048474	53	264
2879	AGRICULTURAL CHEMICALS, NEC	25,300	319	0.023358877	0.065664883	2.8111318	55	264
2426	HARDWOOD DIMENSION & FLOORING MILLS	32,600	382	0.030098791	0.078633182	2.61250306	71	311
44	WATER TRANSPORTATION	187,700	2,180	0.173298864	0.448744339	2.58942458	407	1,773
3491	INDUSTRIAL VALVES	26,800	295	0.024743791	0.060724578	2.45413397	58	237
3321	GRAY AND DUCTILE IRON FOUNDRIES	76,400	803	0.07053827	0.16529436	2.34332881	166	637
2044	RICE MILLING	5,500	54	0.005078017	0.011115685	2.18898162	12	42
3441	FABRICATED STRUCTURAL METAL	74,800	728	0.069061029	0.149855908	2.16990553	162	566
2491	WOOD PRESERVING	11,800	112	0.010894654	0.023054755	2.11615298	26	86
2048	PREPARED FEEDS, NEC	46,500	387	0.042932324	0.079662413	1.8555346	101	286
2431	MILLWORK	99,100	777	0.09149663	0.159942363	1.74806835	215	562
2999	PETROLEUM AND COAL PRODUCTS, NEC	12,300	96	0.011356292	0.019761219	1.74011186	27	69
3053	GASKETS, PACKING AND SEALING DEVICES	34,300	254	0.031668359	0.052284891	1.65101357	74	180

3612	TRANSFORMERS, EXCEPT ELECTRONIC	46,300	339	0.042747669	0.069781803	1.6324119	100	239
2621	PAPER MILLS	181,500	1,308	0.167574555	0.269246604	1.60672725	394	914
3494	VALVES AND PIPE FITTINGS, NEC	28,400	187	0.026221032	0.038493207	1.46802791	62	125
3851	OPHTHALMIC GOODS	41,600	257	0.038408273	0.052902429	1.37737069	90	167
3731	SHIP BUILDING AND REPAIRING	131,000	795	0.120949128	0.163647592	1.35302829	284	511
3462	IRON AND STEEL FORGINGS	31,600	187	0.029175515	0.038493207	1.31936685	69	118
13	OIL AND GAS EXTRACTION	394,100	2,291	0.363862986	0.471593248	1.29607371	855	1,436
3443	FABRICATED PLATE WORK (BOILER SHOPS	106,000	569	0.097867233	0.117126389	1.19678861	230	339
2086	BOTTLED AND CANNED SOFT DRINKS	98,700	489	0.09112732	0.100658707	1.10459418	214	275
3442	METAL DOORS, SASH, AND TRIM	70,700	350	0.065275598	0.07204611	1.10372194	153	197
49	ELECTRIC, GAS, AND SANITARY SERVICES	962,900	4,673	0.889022251	0.961918485	1.08199596	2,090	2,583
3081	UNSUPPORTED PLASTICS FILM & SHEET	55,500	264	0.051241806	0.054343351	1.06052763	120	144
2761	MANIFOLD BUSINESS FORMS	49,300	232	0.045517496	0.047756278	1.04918509	107	125
3444	SHEET METALWORK	95,200	414	0.087895854	0.085220255	0.96955944	207	207
3498	FABRICATED PIPE AND FITTINGS	24,400	102	0.022527929	0.020996295	0.93201176	53	49
2655	FIBER CANS, DRUMS & SIMILAR PRODUCTS	16,000	65	0.014772413	0.013379992	0.90574182	35	30
3251	BRICK AND STRUCTURAL CLAY TILE	14,400	57	0.013295171	0.011733224	0.88251767	31	26
2865	CYCLIC CRUDES AND INTERMEDIATES	27,300	107	0.025205429	0.022025525	0.87384051	59	48
2064	CANDY & OTHER CONFECTIONERY PRODUCT	48,100	188	0.044409565	0.038699053	0.87141257	104	84
3087	CUSTOM COMPOUND PURCHASED RESINS	23,600	92	0.021789308	0.018937834	0.86913426	51	41
3732	BOAT BUILDING AND REPAIRING	46,700	173	0.043116979	0.035611363	0.82592435	101	72
15	GENERAL BUILDING CONTRACTORS	1,151,800	4,143	1.063429046	0.852820091	0.80195298	2,500	1,643
2851	PAINTS AND ALLIED PRODUCTS	57,900	207	0.053457668	0.042610128	0.79708168	126	81
3365	ALUMINUM FOUNDRIES	23,100	81	0.021327671	0.016673528	0.78177915	50	31
2097	MANUFACTURED ICE	6,400	21	0.005908965	0.004322767	0.7315607	14	7
76	MISCELLANEOUS REPAIR SERVICES	337,600	1,097	0.311697904	0.225813092	0.72446137	733	364
2092	FRESH OR FROZEN PREPARED FISH	45,400	147	0.041916721	0.030259366	0.7218925	99	48
2899	CHEMICAL PREPARATIONS, NEC	44,800	142	0.041362755	0.029230136	0.70667768	97	45
3273	READY-MIXED CONCRETE	91,600	285	0.084572062	0.058666118	0.69368201	199	86
3312	BLAST FURNACES AND STEEL MILLS	199,900	619	0.184562829	0.127418691	0.69038111	434	185
3569	GENERAL INDUSTRIAL MACHINERY, NEC	39,200	119	0.036192411	0.024495677	0.67681806	85	34
54	FOOD STORES	3,203,900	9,694	2.958083279	1.995471387	0.67458256	6,953	2,741
2095	ROASTED COFFEE	11,400	33	0.010525344	0.006792919	0.64538688	25	8
2541	WOOD PARTITIONS AND FIXTURES	40,800	116	0.037669652	0.023878139	0.63388266	89	27
3743	RAILROAD EQUIPMENT	30,200	85	0.027882929	0.017496912	0.62751343	66	19
2891	ADHESIVES AND SEALANTS	23,500	65	0.021696981	0.013379992	0.61667528	51	14
3449	MISCELLANEOUS METAL WORK	13,100	36	0.012094913	0.007410457	0.61269206	28	8
83	SOCIAL SERVICES	2,173,700	5,904	2.006924568	1.215314944	0.60556085	4,717	1,187
2499	WOOD PRODUCTS, NEC	52,100	137	0.048102668	0.028200906	0.58626489	113	24

80	HEALTH SERVICES	9,645,300	24,775	8.905271905	5.099835323	0.57267598	20,932	3,843
3084	PLASTICS PIPE	15,000	38	0.013849137	0.007822149	0.56481131	33	5
82	EDUCATIONAL SERVICES	9,606,800	24,179	8.869725787	4.977151091	0.56113923	20,848	3,331
52	BUILDING MATERIALS & GARDEN SUPPLIES	745,900	1,874	0.688671406	0.385755455	0.56014443	1,619	255
53	GENERAL MERCHANDISE STORES	2,426,100	5,970	2.239959376	1.228900782	0.54862637	5,265	705
3523	FARM MACHINERY AND EQUIPMENT	74,200	178	0.068507063	0.036640593	0.53484402	161	17
3364	NONFERROUS DIE-CASTING EXC. ALUMINUM	11,700	28	0.010802327	0.005763689	0.53355994	25	3
55	AUTOMOTIVE DEALERS & SERVICE STATIONS	1,996,000	4,527	1.842858462	0.931864965	0.5056628	4,332	195
3599	INDUSTRIAL MACHINERY, NEC	243,900	547	0.225186963	0.112597777	0.50001907	529	18
56	APPAREL AND ACCESSORY STORES	1,153,400	2,573	1.064906288	0.529641828	0.49736003	2,503	70
3433	HEATING EQUIPMENT, EXCEPT ELECTRIC	18,500	41	0.017080602	0.008439687	0.49410947	40	1
58	EATING AND DRINKING PLACES	6,465,400	14,241	5.969347244	2.931453273	0.49108439	14,031	210
17	SPECIAL TRADE CONTRACTORS	2,804,300	6,152	2.589142277	1.266364759	0.4891059	6,086	66
2951	ASPHALT PAVING MIXTURES AND BLOCKS	13,200	28	0.01218724	0.005763689	0.47292813	29	-1
3559	SPECIAL INDUSTRY MACHINERY, NEC	59,700	126	0.055119564	0.025936599	0.47055161	130	-4
2013	SAUSAGES AND OTHER PREPARED MEATS	86,400	178	0.079771028	0.036640593	0.45932206	188	-10
3471	PLATING AND POLISHING	71,800	140	0.066291201	0.028818444	0.43472502	156	-16
2813	INDUSTRIAL GASES	23,800	46	0.021973964	0.009468917	0.43091531	52	-6
75	AUTO REPAIR, SERVICES, AND PARKING	882,400	1,690	0.81469855	0.347879786	0.4270043	1,915	-225
7	AGRICULTURAL SERVICES	485,800	917	0.448527375	0.188760807	0.42084568	1,054	-137
3299	NONMETALLIC MINERAL PRODUCTS, NEC	8,500	16	0.007847844	0.003293536	0.41967404	18	-2
81	LEGAL SERVICES	910,300	1,713	0.840457945	0.352614245	0.41955014	1,975	-262
42	TRUCKING AND WAREHOUSING	1,609,800	3,029	1.486289355	0.623507616	0.41950621	3,493	-464
72	PERSONAL SERVICES	1,108,200	2,072	1.023174222	0.426512968	0.41685273	2,405	-333
59	MISCELLANEOUS RETAIL	2,466,800	4,368	2.2775367	0.899135447	0.39478417	5,353	-985
84	MUSEUMS, BOTANICAL, ZOOLOGICAL GARDENS	68,300	119	0.063059736	0.024495677	0.38845195	148	-29
48	COMMUNICATION	1,297,200	2,218	1.197673345	0.456566488	0.3812112	2,815	-597
2711	NEWSPAPERS	459,400	775	0.424152894	0.159530671	0.37611596	997	-222
57	FURNITURE AND HOME FURNISHINGS STORES	801,200	1,346	0.739728557	0.277068753	0.37455463	1,739	-393
60	DEPOSITORY INSTITUTIONS	2,185,200	3,629	2.01754224	0.747015233	0.37026002	4,742	-1,113
78	MOTION PICTURES	408,700	657	0.377342812	0.13524084	0.35840312	887	-230
2819	INDUSTRIAL INORGANIC CHEMICALS, NEC	80,000	128	0.073862063	0.026348291	0.35672293	174	-46
64	INSURANCE AGENTS, BROKERS, & SERVICE	668,500	1,056	0.617209861	0.217373405	0.35218719	1,451	-395
47	TRANSPORTATION SERVICES	344,800	523	0.31834549	0.107657472	0.3381781	748	-225
2325	MEN'S AND BOYS' TROUSERS AND SLACKS	84,500	127	0.078016804	0.026142445	0.33508737	183	-56
2026	FLUID MILK	72,600	107	0.067029822	0.022025525	0.32859292	158	-51
65	REAL ESTATE	1,305,000	1,911	1.204874896	0.393371758	0.32648349	2,832	-921
50	WHOLESALE TRADE^DURABLE GOODS	3,606,100	5,227	3.329424799	1.075957184	0.32316609	7,826	-2,599
51	WHOLESALE TRADE^NONDURABLE GOODS	2,544,000	3,551	2.348813591	0.730959242	0.3112036	5,521	-1,970

87	ENGINEERING & MANAGEMENT SERVICES	2,424,800	3,349	2.238759117	0.689378345	0.30792877	5,262	-1,913
3949	SPORTING AND ATHLETIC GOODS, NEC	61,100	84	0.05641215	0.017291066	0.30651316	133	-49
3792	TRAVEL TRAILERS AND CAMPERS	15,700	21	0.01449543	0.004322767	0.29821583	34	-13
3799	TRANSPORTATION EQUIPMENT, NEC	12,900	17	0.011910258	0.003499382	0.29381249	28	-11
73	BUSINESS SERVICES	5,086,700	6,655	4.696426923	1.369905311	0.29169097	11,039	-4,384
41	LOCAL AND INTERURBAN PASSENGER TRA	353,700	461	0.326562644	0.094895019	0.29058749	768	-307
3354	ALUMINUM EXTRUDED PRODUCTS	28,400	37	0.026221032	0.007616303	0.29046541	62	-25
79	AMUSEMENT & RECREATION SERVICES	1,107,100	1,389	1.022158619	0.285920132	0.27972188	2,403	-1,014
3993	SIGNS AND ADVERTISING SPECIALITIES	55,100	69	0.050872496	0.014203376	0.27919558	120	-51
3317	STEEL PIPE AND TUBES	24,600	27	0.022712584	0.005557843	0.24470323	53	-26
70	HOTELS AND OTHER LODGING PLACES	1,627,000	1,784	1.502169698	0.367229312	0.24446593	3,531	-1,747
2396	AUTOMOTIVE AND APPAREL TRIMMINGS	51,100	55	0.047179392	0.011321531	0.23996773	111	-56
2752	COMMERCIAL PRINTING, LITHOGRAPHIC	360,900	379	0.33321023	0.078015644	0.2341334	783	-404
3585	REFRIGERATION AND HEATING EQUIPMENT	114,900	120	0.106084387	0.024701523	0.23284787	249	-129
14	NONMETALLIC MINERALS, EXCEPT FUELS	104,900	108	0.09685163	0.022231371	0.22954049	228	-120
3315	STEEL WIRE AND RELATED PRODUCTS	16,800	17	0.015511033	0.003499382	0.22560602	36	-19
2452	PREFABRICATED WOOD BUILDINGS	17,000	17	0.015695688	0.003499382	0.22295183	37	-20
3625	RELAYS AND INDUSTRIAL CONTROLS	63,100	62	0.058258702	0.012762454	0.21906519	137	-75
3613	SWITCHGEAR AND SWITCHBOARD APPARA	44,600	41	0.0411781	0.008439687	0.20495572	97	-56
3589	SERVICE INDUSTRY MACHINERY, NEC	41,700	38	0.0385006	0.007822149	0.20316954	90	-52
2299	TEXTILE GOODS, NEC	28,300	25	0.026128705	0.005146151	0.19695392	61	-36
3446	ARCHITECTURAL METAL WORK	26,900	23	0.024836119	0.004734459	0.19062796	58	-35
3398	METAL HEAT TREATING	14,800	12	0.013664482	0.002470152	0.18077176	32	-20
61	NONDEPOSITORY INSTITUTIONS	378,700	303	0.349644539	0.062371346	0.17838501	822	-519
2434	WOOD KITCHEN CABINETS	64,900	51	0.059920598	0.010498147	0.17520098	141	-90
91	EXECUTIVE, LEGISLATIVE, AND GENERAL	2,903,000	2,053	2.680269597	0.422601894	0.15767141	6,300	-4,247
3271	CONCRETE BLOCK AND BRICK	17,000	12	0.015695688	0.002470152	0.15737776	37	-25
2011	MEAT PACKING PLANTS	137,700	94	0.127135075	0.019349527	0.1521966	299	-205
3272	CONCRETE PRODUCTS, NEC	64,500	43	0.059551288	0.008851379	0.14863455	140	-97
2759	COMMERCIAL PRINTING, NEC	163,700	105	0.151140246	0.021613833	0.14300515	355	-250
2051	BREAD, CAKE, AND RELATED PRODUCTS	156,400	100	0.144400332	0.020584603	0.14255232	339	-239
86	MEMBERSHIP ORGANIZATIONS	2,000,600	1,270	1.84710553	0.261424455	0.14153195	4,342	-3,072
2024	ICE CREAM AND FROZEN DESSERTS	22,300	14	0.02058905	0.002881844	0.13996976	48	-34
3999	MANUFACTURING INDUSTRIES, NEC	26,800	16	0.024743791	0.003293536	0.13310557	58	-42
67	HOLDING AND OTHER INVESTMENT OFFICE	227,400	132	0.209952913	0.027171676	0.12941795	493	-361
89	SERVICES, NEC	38,900	21	0.035915428	0.004322767	0.1203596	84	-63
3531	CONSTRUCTION MACHINERY	78,400	40	0.072384821	0.008233841	0.11375093	170	-130
3519	INTERNAL COMBUSTION ENGINES, NEC	61,500	31	0.056781461	0.006381227	0.11238222	133	-102
3553	WOODWORKING MACHINERY	8,100	4	0.007478534	0.000823384	0.11009967	18	-14

2741	MISCELLANEOUS PUBLISHING	83,300	39	0.076908873	0.008027995	0.10438321	181	-142
62	SECURITY AND COMMODITY BROKERS	419,200	187	0.387037208	0.038493207	0.09945609	910	-723
2099	FOOD PREPARATIONS, NEC	63,200	28	0.058351029	0.005763689	0.09877613	137	-109
2353	HATS, CAPS, AND MILLINERY	15,900	7	0.014680085	0.001440922	0.09815489	35	-28
2335	WOMEN'S, JUNIOR'S, & MISSES' DRESSES	65,000	28	0.060012926	0.005763689	0.09604079	141	-113
2392	HOUSEFURNISHINGS, NEC	52,200	22	0.048194996	0.004528613	0.09396437	113	-91
3639	HOUSEHOLD APPLIANCES, NEC	22,100	9	0.020404395	0.001852614	0.09079486	48	-39
63	INSURANCE CARRIERS	1,494,500	575	1.379835657	0.118361466	0.08577939	3,243	-2,668
3822	ENVIRONMENTAL CONTROLS	45,500	17	0.042009048	0.003499382	0.08330068	99	-82
2429	SPECIAL PRODUCT SAWMILLS, NEC	2,700	1	0.002492845	0.000205846	0.08257475	6	-5
3412	METAL BARRELS, DRUMS, AND PAILS	9,400	3	0.008678792	0.000617538	0.07115484	20	-17
3873	WATCHES, CLOCKS, WATCHCASES & PAR	10,000	3	0.009232758	0.000617538	0.06688555	22	-19
2394	CANVAS AND RELATED PRODUCTS	16,700	5	0.015418706	0.00102923	0.06675205	36	-31
45	TRANSPORTATION BY AIR	733,400	205	0.677130459	0.042198436	0.06231951	1,592	-1,387
3448	PREFABRICATED METAL BUILDINGS	22,900	6	0.021143015	0.001235076	0.05841533	50	-44
3713	TRUCK AND BUS BODIES	35,100	9	0.03240698	0.001852614	0.05716714	76	-67
2515	MATTRESSES AND BEDSPRINGS	27,800	7	0.025667067	0.001440922	0.05613895	60	-53
3823	PROCESS CONTROL INSTRUMENTS	62,600	15	0.057797064	0.00308769	0.05342296	136	-121
2791	TYPESETTING	29,400	7	0.027144308	0.001440922	0.05308377	64	-57
3543	INDUSTRIAL PATTERNS	8,600	2	0.007940172	0.000411692	0.05184926	19	-17
3479	METAL COATING AND ALLIED SERVICES	44,500	10	0.041085772	0.00205846	0.05010154	97	-87
3089	PLASTICS PRODUCTS, NEC	393,700	86	0.363493676	0.017702758	0.0487017	854	-768
2511	WOOD HOUSEHOLD FURNITURE	119,300	24	0.110146801	0.004940305	0.044852	259	-235
2875	FERTILIZERS, MIXING ONLY	10,000	2	0.009232758	0.000411692	0.04459037	22	-20
3231	PRODUCTS OF PURCHASED GLASS	55,600	11	0.051334134	0.002264306	0.04410918	121	-110
2391	CURTAINS AND DRAPERIES	22,000	4	0.020312067	0.000823384	0.0405367	48	-44
3556	FOOD PRODUCTS MACHINERY	22,400	4	0.020681378	0.000823384	0.03981283	49	-45
2721	PERIODICALS	127,400	22	0.117625335	0.004528613	0.03850032	276	-254
3086	PLASTICS FOAM PRODUCTS	49,500	8	0.045702151	0.001646768	0.03603262	107	-99
2339	WOMEN'S AND MISSES' OUTERWEAR, NEC	185,600	28	0.171359985	0.005763689	0.03363497	403	-375
3496	MISC. FABRICATED WIRE PRODUCTS	51,000	7	0.047087065	0.001440922	0.03060123	111	-104
3261	VITREOUS PLUMBING FIXTURES	8,700	1	0.008032499	0.000205846	0.02562665	19	-18
2512	UPHOLSTERED HOUSEHOLD FURNITURE	88,800	10	0.081986889	0.00205846	0.02510719	193	-183
3829	MEASURING & CONTROLLING DEVICES, NEC	45,000	5	0.04154741	0.00102923	0.02477243	98	-93
2731	BOOK PUBLISHING	83,800	9	0.077370511	0.001852614	0.02394471	182	-173
3568	POWER TRANSMISSION EQUIPMENT, NEC	18,900	2	0.017449912	0.000411692	0.02359279	41	-39
3149	FOOTWEAR, EXCEPT RUBBER, NEC	9,500	1	0.00877112	0.000205846	0.02346861	21	-20
3469	METAL STAMPINGS, NEC	76,400	8	0.07053827	0.001646768	0.02334574	166	-158
3199	LEATHER GOODS, NEC	9,800	1	0.009048103	0.000205846	0.02275019	21	-20

3564	BLOWERS AND FANS	31,200	3	0.028806204	0.000617538	0.02143768	68	-65
3561	PUMPS AND PUMPING EQUIPMENT	31,300	3	0.028898532	0.000617538	0.02136919	68	-65
3812	SEARCH AND NAVIGATION EQUIPMENT	263,600	25	0.243375496	0.005146151	0.0211449	572	-547
2326	MEN'S AND BOYS' WORK CLOTHING	42,500	4	0.039239221	0.000823384	0.0209837	92	-88
3699	ELECTRICAL EQUIPMENT & SUPPLIES, NEC	54,900	5	0.05068784	0.00102923	0.02030527	119	-114
3452	BOLTS, NUTS, RIVETS, AND WASHERS	47,000	4	0.043393962	0.000823384	0.01897462	102	-98
3911	JEWELRY, PRECIOUS METAL	36,800	3	0.033976549	0.000617538	0.01817542	80	-77
2952	ASPHALT FELTS AND COATINGS	12,900	1	0.011910258	0.000205846	0.01728309	28	-27
3843	DENTAL EQUIPMENT AND SUPPLIES	13,100	1	0.012094913	0.000205846	0.01701922	28	-27
3842	SURGICAL APPLIANCES AND SUPPLIES	93,200	7	0.086049303	0.001440922	0.01674531	202	-195
3492	FLUID POWER VALVES & HOSE FITTINGS	27,300	2	0.025205429	0.000411692	0.01633347	59	-57
3499	FABRICATED METAL PRODUCTS, NEC	54,900	4	0.05068784	0.000823384	0.01624421	119	-115
3714	MOTOR VEHICLE PARTS AND ACCESSORIES	397,700	16	0.367186779	0.003293536	0.00896965	863	-847
3563	AIR AND GAS COMPRESSORS	25,100	1	0.023174222	0.000205846	0.00888254	54	-53
2789	BOOKBINDING AND RELATED WORK	27,300	1	0.025205429	0.000205846	0.00816673	59	-58
3465	AUTOMOTIVE STAMPINGS	94,100	3	0.086880251	0.000617538	0.00710792	204	-201
2673	BAGS: PLASTICS, LAMINATED, & COATED	34,100	1	0.031483704	0.000205846	0.00653818	74	-73
2844	TOILET PREPARATIONS	68,400	2	0.063152064	0.000411692	0.00651906	148	-146
2834	PHARMACEUTICAL PREPARATIONS	203,900	4	0.188255932	0.000823384	0.00437375	442	-438
3544	SPECIAL DIES, TOOLS, JIGS & FIXTURES	141,700	2	0.130828178	0.000411692	0.00314681	308	-306
10	METAL MINING	56,200	0	0.051888099	0	0	122	-122
2038	FROZEN SPECIALTIES, NEC	45,500	0	0.042009048	0	0	99	-99
2041	FLOUR AND OTHER GRAIN MILL PRODUCTS	20,800	0	0.019204136	0	0	45	-45
2045	PREPARED FLOUR MIXES AND DOUGHS	11,500	0	0.010617671	0	0	25	-25
2047	DOG AND CAT FOOD	16,300	0	0.015049395	0	0	35	-35
2221	BROADWOVEN FABRIC MILLS, MANMADE	73,200	0	0.067583787	0	0	159	-159
2329	MEN'S AND BOYS' CLOTHING, NEC	50,500	0	0.046625427	0	0	110	-110
2341	WOMEN'S AND CHILDREN'S UNDERWEAR	48,800	0	0.045055858	0	0	106	-106
2369	GIRLS' AND CHILDREN'S OUTERWEAR, NEC	30,900	0	0.028529222	0	0	67	-67
2393	TEXTILE BAGS	9,400	0	0.008678792	0	0	20	-20
2439	STRUCTURAL WOOD MEMBERS, NEC	22,800	0	0.021050688	0	0	49	-49
2449	WOOD CONTAINERS, NEC	7,700	0	0.007109224	0	0	17	-17
2451	MOBILE HOMES	38,200	0	0.035269135	0	0	83	-83
2521	WOOD OFFICE FURNITURE	30,000	0	0.027698273	0	0	65	-65
2531	PUBLIC BUILDING & RELATED FURNITURE	31,600	0	0.029175515	0	0	69	-69
2591	DRAPERY HARDWARE & BLINDS & SHADES	20,200	0	0.018650171	0	0	44	-44
2599	FURNITURE AND FIXTURES, NEC	14,000	0	0.012925861	0	0	30	-30
2611	PULP MILLS	14,200	0	0.013110516	0	0	31	-31
2754	COMMERCIAL PRINTING, GRAVURE	18,400	0	0.016988274	0	0	40	-40

LOCATION QUOTIENT ANALYSIS FOR THE SOUTHEAST TEXAS REGION

2782	BLANKBOOKS AND LOOSELEAF BINDERS	42,600	0	0.039331548	0	0	92	-92
2841	SOAP AND OTHER DETERGENTS	43,300	0	0.039977841	0	0	94	-94
2873	NITROGENOUS FERTILIZERS	10,600	0	0.009786723	0	0	23	-23
2874	PHOSPHATIC FERTILIZERS	10,300	0	0.009509741	0	0	22	-22
2893	PRINTING INK	16,100	0	0.01486474	0	0	35	-35
3069	FABRICATED RUBBER PRODUCTS, NEC	55,400	0	0.051149478	0	0	120	-120
3161	LUGGAGE	10,500	0	0.009694396	0	0	23	-23
3171	WOMEN'S HANDBAGS AND PURSES	5,100	0	0.004708706	0	0	11	-11
3241	CEMENT, HYDRAULIC	18,200	0	0.016803619	0	0	39	-39
3269	POTTERY PRODUCTS, NEC	13,100	0	0.012094913	0	0	28	-28
3281	CUT STONE AND STONE PRODUCTS	13,800	0	0.012741206	0	0	30	-30
3292	ASBESTOS PRODUCTS	4,600	0	0.004247069	0	0	10	-10
3295	MINERALS, GROUND OR TREATED	13,500	0	0.012464223	0	0	29	-29
3296	MINERAL WOOL	22,800	0	0.021050688	0	0	49	-49
3325	STEEL FOUNDRIES, NEC	25,900	0	0.023912843	0	0	56	-56
3341	SECONDARY NONFERROUS METALS	18,300	0	0.016895947	0	0	40	-40
3356	NONFERROUS ROLLING AND DRAWING, NEC	17,900	0	0.016526637	0	0	39	-39
3369	NONFERROUS FOUNDRIES, NEC	8,200	0	0.007570861	0	0	18	-18
3411	METAL CANS	39,100	0	0.036100083	0	0	85	-85
3429	HARDWARE, NEC	70,000	0	0.064629305	0	0	152	-152
3532	MINING MACHINERY	17,100	0	0.015788016	0	0	37	-37
3535	CONVEYORS AND CONVEYING EQUIPMENT	33,000	0	0.030468101	0	0	72	-72
3536	HOISTS, CRANES, AND MONORAILS	8,800	0	0.008124827	0	0	19	-19
3537	INDUSTRIAL TRUCKS AND TRACTORS	25,400	0	0.023451205	0	0	55	-55
3541	MACHINE TOOLS, METAL CUTTING TYPES	41,500	0	0.038315945	0	0	90	-90
3542	MACHINE TOOLS, METAL FORMING TYPES	17,200	0	0.015880343	0	0	37	-37
3545	MACHINE TOOL ACCESSORIES	52,600	0	0.048564306	0	0	114	-114
3549	METALWORKING MACHINERY, NEC	12,300	0	0.011356292	0	0	27	-27
3565	PACKAGING MACHINERY	21,200	0	0.019573447	0	0	46	-46
3566	SPEED CHANGERS, DRIVES, AND GEARS	15,200	0	0.014033792	0	0	33	-33
3592	CARBURETORS, PISTONS, RINGS, VALVES	22,400	0	0.020681378	0	0	49	-49
3593	FLUID POWER CYLINDERS & ACTUATORS	17,900	0	0.016526637	0	0	39	-39
3634	ELECTRIC HOUSEWARES AND FANS	31,000	0	0.028621549	0	0	67	-67
3643	CURRENT-CARRYING WIRING DEVICES	68,800	0	0.063521374	0	0	149	-149
3652	PRERECORDED RECORDS AND TAPES	23,600	0	0.021789308	0	0	51	-51
3661	TELEPHONE AND TELEGRAPH APPARATUS	118,000	0	0.108946542	0	0	256	-256
3672	PRINTED CIRCUIT BOARDS	96,900	0	0.089465423	0	0	210	-210
3674	SEMICONDUCTORS AND RELATED DEVICES	233,500	0	0.215584895	0	0	507	-507
3677	ELECTRONIC COILS AND TRANSFORMERS	17,200	0	0.015880343	0	0	37	-37

3679	ELECTRONIC COMPONENTS, NEC	134,600	0	0.12427292	0	0	292	-292
3691	STORAGE BATTERIES	27,900	0	0.025759394	0	0	61	-61
3694	ENGINE ELECTRICAL EQUIPMENT	64,700	0	0.059735943	0	0	140	-140
3721	AIRCRAFT	357,300	0	0.329886437	0	0	775	-775
3724	AIRCRAFT ENGINES AND ENGINE PARTS	143,200	0	0.132213092	0	0	311	-311
3728	AIRCRAFT PARTS AND EQUIPMENT, NEC	170,600	0	0.157510848	0	0	370	-370
3825	INSTRUMENTS TO MEASURE ELECTRICITY	85,400	0	0.078847752	0	0	185	-185
3841	SURGICAL AND MEDICAL INSTRUMENTS	109,500	0	0.101098698	0	0	238	-238
3944	GAMES, TOYS, AND CHILDREN'S VEHICLES	42,400	0	0.039146893	0	0	92	-92
3995	BURIAL CASKETS	8,800	0	0.008124827	0	0	19	-19
99	NONCLASSIFIABLE ESTABLISHMENTS	128,100	0	0.118271628	0	0	278	-278

SIC	DESCRIPTION	US	US	US	REGION 5	REGION 5	REGION 5	NATIONAL	INDUST	COMP	TOTAL	REGION 5
		EMP 1988	EMP 1991	%CHANGE	EMP88	EMP91	%CHANGE	GROWTH	MIX	SHARE	CHANGE	91-88
		105,536,000	108,310,000	2.62848696	218,182	235,048	7.730244	(\$E\$3/10)	((E4-\$E\$3)/(H4-E4))	14.14	K4	G4-F4
16	HEAVY CONSTRUCTION, EX. BUILDING	743,500	728,500	-2.0174849	6,654	10,335	55.32011	175	-309	3,815	3,681	3,681
17	SPECIAL TRADE CONTRACTORS	3,013,700	2,804,300	-6.9482696	4,415	6,152	39.34315	116	-423	2,044	1,737	1,737
15	GENERAL BUILDING CONTRACTORS	1,352,800	1,151,800	-14.858072	2,520	4,143	64.40476	66	-441	1,997	1,623	1,623
87	ENGINEERING & MANAGEMENT SERVICES	2,241,000	2,424,800	8.20169567	2,028	3,349	65.13807	53	113	1,155	1,321	1,321
58	EATING AND DRINKING PLACES	6,285,800	6,465,400	2.85723376	13,213	14,241	7.780216	347	30	650	1,028	1,028
80	HEALTH SERVICES	8,600,300	9,645,300	12.1507389	21,677	24,775	14.29165	570	2,064	464	3,098	3,098
54	FOOD STORES	3,078,700	3,203,900	4.06665151	8,979	9,694	7.963025	236	129	350	715	715
2015	POULTRY SLAUGHTERING AND PROCESSING	179,300	202,000	12.6603458	2,237	2,867	28.16272	59	224	347	630	630
2436	SOFTWOOD VENEER AND PLYWOOD	36,800	27,700	-24.728261	1,360	1,351	-0.66176	36	-372	327	-9	-9
83	SOCIAL SERVICES	1,905,300	2,173,700	14.0870204	4,914	5,904	20.14652	129	563	298	990	990
2631	PAPERBOARD MILLS	52,600	50,400	-4.1825095	1,562	1,789	14.53265	41	-106	292	227	227
53	GENERAL MERCHANDISE STORES	2,473,100	2,426,100	-1.9004488	5,828	5,970	2.436513	153	-264	253	142	142
76	MISCELLANEOUS REPAIR SERVICES	351,200	337,600	-3.8724374	893	1,097	22.84434	23	-58	239	204	204
47	TRANSPORTATION SERVICES	313,300	344,800	10.0542611	269	523	94.42379	7	20	227	254	254
50	WHOLESALE TRADE-DURABLE GOODS	3,660,500	3,606,100	-1.4861358	5,076	5,227	2.974783	133	-209	226	151	151
13	OIL AND GAS EXTRACTION	400,700	394,100	-1.6471175	2,105	2,291	8.836105	55	-90	221	186	186
2086	BOTTLED AND CANNED SOFT DRINKS	113,300	98,700	-12.886143	319	489	53.29154	8	-49	211	170	170
3441	FABRICATED STRUCTURAL METAL	76,800	74,800	-2.6041667	563	728	29.30728	15	-29	180	165	165
3321	GRAY AND DUCTILE IRON FOUNDRIES	84,500	76,400	-9.5857988	706	803	13.73938	19	-86	165	97	97
2013	SAUSAGES AND OTHER PREPARED MEATS	81,100	86,400	6.5351418	15	178	1086.667	0	1	162	163	163
7	AGRICULTURAL SERVICES	448,100	485,800	8.4133006	703	917	30.44097	18	41	155	214	214
3322	MALLEABLE IRON FOUNDRIES	9,300	8,000	-13.978495	646	710	9.907121	17	-107	154	64	64
3444	SHEET METALWORK	92,500	95,200	2.91891892	278	414	48.92086	7	1	128	136	136
3716	MOTOR HOMES	20,700	16,300	-21.256039	217	289	33.17972	6	-52	118	72	72
2514	METAL HOUSEHOLD FURNITURE	27,200	21,900	-19.485294	393	426	8.396947	10	-87	110	33	33
3533	OIL AND GAS FIELD MACHINERY	40,800	45,100	10.5392157	1,157	1,385	19.70614	30	92	106	228	228
81	LEGAL SERVICES	849,900	910,300	7.10671844	1,507	1,713	13.66954	40	67	99	206	206
2431	MILLWORK	111,900	99,100	-11.438785	770	777	0.909091	20	-108	95	7	7
3585	REFRIGERATION AND HEATING EQUIPMENT	130,200	114,900	-11.751152	34	120	252.9412	1	-5	90	86	86
3443	FABRICATED PLATE WORK (BOILER SHOPS)	102,700	106,000	3.21324245	472	569	20.55085	12	3	82	97	97
79	AMUSEMENT & RECREATION SERVICES	985,600	1,107,100	12.3275162	1,166	1,389	19.12521	31	113	79	223	223
95	ENVIRONMENTAL QUALITY AND HOUSING	37,900	38,400	1.31926121	1,148	1,239	7.926829	30	-15	76	91	91
86	MEMBERSHIP ORGANIZATIONS	1,747,700	2,000,600	14.4704469	1,045	1,270	21.5311	27	124	74	225	225
2493	RECONSTITUTED WOOD PRODUCTS	16,200	16,600	2.4691358	548	628	14.59854	14	-1	66	80	80
3498	FABRICATED PIPE AND FITTINGS	23,800	24,400	2.5210084	37	102	175.6757	1	0	64	65	65
3569	GENERAL INDUSTRIAL MACHINERY, NEC	38,200	39,200	2.61780105	55	119	116.3636	1	0	63	64	64
2899	CHEMICAL PREPARATIONS, NEC	46,300	44,800	-3.2397408	83	142	71.08434	2	-5	62	59	59
3559	SPECIAL INDUSTRY MACHINERY, NEC	61,800	59,700	-3.3980583	70	126	80	2	-4	58	56	56
3625	RELAYS AND INDUSTRIAL CONTROLS	68,600	63,100	-8.0174927	5	62	1140	0	-1	57	57	57
78	MOTION PICTURES	344,500	408,700	18.6357039	506	657	29.8419	13	81	57	151	151
91	EXECUTIVE, LEGISLATIVE, AND GENERAL	2,911,900	2,903,000	-0.3056424	2,005	2,053	2.394015	53	-59	54	48	48
73	BUSINESS SERVICES	4,669,300	5,086,700	8.93924143	6,060	6,655	9.818482	159	382	53	595	595
46	PIPELINES, EXCEPT NATURAL GAS	18,500	19,000	2.7027027	268	328	22.38806	7	0	53	60	60
2396	AUTOMOTIVE AND APPAREL TRIMMINGS	43,000	51,100	18.8372093	3	55	1733.333	0	0	51	52	52

3442	METAL DOORS, SASH, AND TRIM	76,500	70,700	-7.5816993	324	350	8.024691	9	-33	51	26	26
62	SECURITY AND COMMODITY BROKERS	447,700	419,200	-6.36587	147	187	27.21088	4	-13	49	40	40
3471	PLATING AND POLISHING	77,500	71,800	-7.3548387	99	140	41.41414	3	-10	48	41	41
3494	VALVES AND PIPE FITTINGS, NEC	28,400	28,400	0	140	187	33.57143	4	-4	47	47	47
3053	GASKETS, PACKING AND SEALING DEVICES	32,700	34,300	4.89296636	198	254	28.28283	5	4	46	56	56
3273	READY-MIXED CONCRETE	101,600	91,600	-9.8425197	269	285	5.947955	7	-34	42	16	16
3523	FARM MACHINERY AND EQUIPMENT	74,800	74,200	-0.802139	138	178	28.98551	4	-5	41	40	40
3949	SPORTING AND ATHLETIC GOODS, NEC	57,900	61,100	5.52677029	44	84	90.90909	1	1	38	40	40
2411	LOGGING	88,000	78,100	-11.25	1,315	1,202	-8.59316	35	-183	35	-113	-113
3732	BOAT BUILDING AND REPAIRING	71,700	46,700	-34.867503	216	173	-19.9074	6	-81	32	-43	-43
2499	WOOD PRODUCTS, NEC	61,300	52,100	-15.008157	126	137	8.730159	3	-22	30	11	11
3089	PLASTICS PRODUCTS, NEC	385,000	393,700	2.25974026	58	86	48.27586	2	0	27	28	28
2339	WOMENS AND MISSES' OUTERWEAR, NEC	186,200	185,600	-0.3222342	2	28	1300	0	0	26	26	26
75	AUTO REPAIR, SERVICES, AND PARKING	836,000	882,400	5.55023923	1,577	1,690	7.165504	41	46	25	113	113
65	REAL ESTATE	1,287,000	1,305,000	1.3986014	1,860	1,911	2.741935	49	-23	25	51	51
3462	IRON AND STEEL FORGINGS	31,800	31,600	-0.6289308	165	187	13.33333	4	-5	23	22	22
2865	CYCLIC CRUDES AND INTERMEDIATES	29,100	27,300	-6.185567	90	107	18.88889	2	-8	23	17	17
3364	NONFERROUS DIE-CASTING EXC. ALUMINUM	13,300	11,700	-12.030075	7	28	300	0	-1	22	21	21
2434	WOOD KITCHEN CABINETS	72,800	64,900	-10.851648	35	51	45.71429	1	-5	20	16	16
3365	ALUMINUM FOUNDRIES	29,000	23,100	-20.344828	77	81	5.194805	2	-18	20	4	4
2335	WOMENS, JUNIORS, & MISSES' DRESSES	77,800	65,000	-16.452442	10	28	180	0	-2	20	18	18
2819	INDUSTRIAL INORGANIC CHEMICALS, NEC	90,100	80,000	-11.209767	123	128	4.065041	3	-17	19	5	5
2092	FRESH OR FROZEN PREPARED FISH	41,000	45,400	10.7317073	116	147	26.72414	3	9	19	31	31
3084	PLASTICS PIPE	14,900	15,000	0.67114094	21	38	80.95238	1	0	17	17	17
70	HOTELS AND OTHER LODGING PLACES	1,576,500	1,627,000	3.20329845	1,713	1,784	4.144775	45	10	16	71	71
2655	FIBER CANS, DRUMS & SIMILAR PRODUCTS	16,400	16,000	-2.4390244	51	65	27.45098	1	-3	15	14	14
3822	ENVIRONMENTAL CONTROLS	48,900	45,500	-6.9529652	2	17	750	0	0	15	15	15
3993	SIGNS AND ADVERTISING SPECIALITIES	60,300	55,100	-8.6235489	59	69	16.94915	2	-7	15	10	10
3354	ALUMINUM EXTRUDED PRODUCTS	33,100	28,400	-14.199396	28	37	32.14286	1	-5	13	9	9
3446	ARCHITECTURAL METAL WORK	31,400	26,900	-14.33121	14	23	64.28571	0	-2	11	9	9
3845	ELECTROMEDICAL EQUIPMENT	23,100	32,200	39.3939394	443	628	41.76072	12	163	10	185	185
2051	BREAD, CAKE, AND RELATED PRODUCTS	156,800	156,400	-0.255102	90	100	11.11111	2	-3	10	10	10
3317	STEEL PIPE AND TUBES	24,800	24,600	-0.8064516	17	27	58.82353	0	-1	10	10	10
3231	PRODUCTS OF PURCHASED GLASS	55,200	55,600	0.72463768	1	11	1000	0	0	10	10	10
2761	MANIFOLD BUSINESS FORMS	49,500	49,300	-0.4040404	223	232	4.035874	6	-7	10	9	9
3799	TRANSPORTATION EQUIPMENT, NEC	14,100	12,900	-8.5106383	8	17	112.5	0	-1	10	9	9
3449	MISCELLANEOUS METAL WORK	17,200	13,100	-23.837209	35	36	2.857143	1	-9	9	1	1
3398	METAL HEAT TREATING	15,000	14,800	-1.3333333	3	12	300	0	0	9	9	9
2435	HARDWOOD VENEER AND PLYWOOD	24,200	22,300	-7.8512397	594	556	-6.39731	16	-62	9	-38	-38
3999	MANUFACTURING INDUSTRIES, NEC	28,700	26,800	-6.6202091	8	16	100	0	-1	9	8	8
14	NONMETALLIC MINERALS, EXCEPT FUELS	111,800	104,900	-6.1717352	107	108	0.934579	3	-9	8	1	1
3792	TRAVEL TRAILERS AND CAMPERS	20,500	15,700	-23.414634	18	21	16.66667	0	-5	7	3	3
3469	METAL STAMPINGS, NEC	79,900	76,400	-4.3804756	1	8	700	0	0	7	7	7
3299	NONMETALLIC MINERAL PRODUCTS, NEC	8,000	8,500	6.25	9	16	77.77778	0	0	6	7	7
2353	HATS, CAPS, AND MILLINERY	14,500	15,900	9.65517241	1	7	600	0	0	6	6	6
3479	METAL COATING AND ALLIED SERVICES	42,000	44,500	5.95238095	4	10	150	0	0	6	6	6
2299	TEXTILE GOODS, NEC	28,700	28,300	-1.3937282	21	25	19.04762	1	-1	4	4	4

3496	MISC. FABRICATED WIRE PRODUCTS	54,100	51,000	-5.7301294	3	7	133.3333	0	0	4	4	4
2099	FOOD PREPARATIONS, NEC	55,000	63,200	14.9090909	21	28	33.33333	1	3	4	7	7
2097	MANUFACTURED ICE	6,100	6,400	4.91803279	17	21	23.52941	0	0	3	4	4
2834	PHARMACEUTICAL PREPARATIONS	188,300	203,900	8.28465215	1	4	300	0	0	3	3	3
2512	UPHOLSTERED HOUSEHOLD FURNITURE	99,800	88,800	-11.022044	8	10	25	0	-1	3	2	2
3713	TRUCK AND BUS BODIES	43,200	35,100	-18.75	8	9	12.5	0	-2	3	1	1
3613	SWITCHGEAR AND SWITCHBOARD APPARAT	48,400	44,600	-7.8512397	42	41	-2.38095	1	-4	2	-1	-1
2326	MEN'S AND BOYS' WORK CLOTHING	49,200	42,500	-13.617886	2	4	100	0	0	2	2	2
2392	HOUSEFURNISHINGS, NEC	52,900	52,200	-1.3232514	20	22	10	1	-1	2	2	2
2791	TYPESETTING	35,300	29,400	-16.713881	6	7	16.66667	0	-1	2	1	1
2044	RICE MILLING	5,500	5,500	0	52	54	3.846154	1	-1	2	2	2
2064	CANDY & OTHER CONFECTIONERY PRODUCTS	48,700	48,100	-1.2320329	189	188	-0.5291	5	-7	1	-1	-1
3873	WATCHES, CLOCKS, WATCHCASES & PARTS	11,700	10,000	-14.529915	2	3	50	0	0	1	1	1
2394	CANVAS AND RELATED PRODUCTS	17,700	16,700	-5.6497175	4	5	25	0	0	1	1	1
3465	AUTOMOTIVE STAMPINGS	103,500	94,100	-9.0821256	2	3	50	0	0	1	1	1
3544	SPECIAL DIES, TOOLS, JIGS & FIXTURES	145,700	141,700	-2.7453672	1	2	100	0	0	1	1	1
2731	BOOK PUBLISHING	83,900	83,800	-0.1191895	8	9	12.5	0	0	1	1	1
3568	POWER TRANSMISSION EQUIPMENT, NEC	18,400	18,900	2.7173913	1	2	100	0	0	1	1	1
3812	SEARCH AND NAVIGATION EQUIPMENT	316,100	263,600	-16.608668	29	25	-13.7931	1	-6	1	-4	-4
45	TRANSPORTATION BY AIR	646,400	733,400	13.4591584	180	205	13.88889	5	19	1	25	25
3639	HOUSEHOLD APPLIANCES, NEC	26,700	22,100	-17.228464	10	9	-10	0	-2	1	-1	-1
3599	INDUSTRIAL MACHINERY, NEC	229,900	243,900	6.08960418	515	547	6.213592	14	18	1	32	32
3842	SURGICAL APPLIANCES AND SUPPLIES	87,000	93,200	7.12643678	6	7	16.66667	0	0	1	1	1
3556	FOOD PRODUCTS MACHINERY	23,100	22,400	-3.030303	4	4	0	0	0	0	0	0
3261	VITREOUS PLUMBING FIXTURES	9,700	8,700	-10.309278	1	1	0	0	0	0	0	0
2952	ASPHALT FELTS AND COATINGS	14,200	12,900	-9.1549296	1	1	0	0	0	0	0	0
3843	DENTAL EQUIPMENT AND SUPPLIES	13,700	13,100	-4.379562	1	1	0	0	0	0	0	0
2741	MISCELLANEOUS PUBLISHING	79,100	83,300	5.30973451	37	39	5.405405	1	1	0	2	2
2789	BOOKBINDING AND RELATED WORK	27,900	27,300	-2.1505376	1	1	0	0	0	0	0	0
2875	FERTILIZERS, MIXING ONLY	10,100	10,000	-0.990099	2	2	0	0	0	0	0	0
2873	BAGS: PLASTICS, LAMINATED, & COATED	33,300	34,100	2.4024024	1	1	0	0	0	0	0	0
2391	CURTAINS AND DRAPERIES	25,100	22,000	-12.350598	5	4	-20	0	-1	0	-1	-1
3531	CONSTRUCTION MACHINERY	83,300	78,400	-5.8823529	43	40	-6.97674	1	-4	0	-3	-3
2515	MATTRESSES AND BEDSPRINGS	29,700	27,800	-6.3973064	8	7	-12.5	0	-1	0	-1	-1
2429	SPECIAL PRODUCT SAWMILLS, NEC	3,500	2,700	-22.857143	2	1	-50	0	-1	-1	-1	-1
3825	INSTRUMENTS TO MEASURE ELECTRICITY	104,000	85,400	-17.884615	1	0	-100	0	0	-1	-1	-1
2591	DRAPERY HARDWARE & BLINDS & SHADES	23,000	20,200	-12.173913	1	0	-100	0	0	-1	-1	-1
3411	METAL CANS	42,500	39,100	-8	1	0	-100	0	0	-1	-1	-1
2841	SOAP AND OTHER DETERGENTS	44,000	43,300	-1.5909091	1	0	-100	0	0	-1	-1	-1
3536	HOISTS, CRANES, AND MONORAILS	8,300	8,800	6.02409639	1	0	-100	0	0	-1	-1	-1
2599	FURNITURE AND FIXTURES, NEC	13,200	14,000	6.06060606	1	0	-100	0	0	-1	-1	-1
3269	POTTERY PRODUCTS, NEC	12,300	13,100	6.50406504	1	0	-100	0	0	-1	-1	-1
2045	PREPARED FLOUR MIXES AND DOUGHS	9,400	11,500	22.3404255	1	0	-100	0	0	-1	-1	-1
2024	ICE CREAM AND FROZEN DESSERTS	21,700	22,300	2.76497696	15	14	-6.66667	0	0	-1	-1	-1
2844	TOILET PREPARATIONS	72,500	68,400	-5.6551724	4	2	-50	0	0	-2	-2	-2
2782	BLANKBOOKS AND LOOSELEAF BINDERS	47,200	42,600	-9.7457627	2	0	-100	0	0	-2	-2	-2
3911	JEWELRY, PRECIOUS METAL	38,100	36,800	-3.4120735	5	3	-40	0	0	-2	-2	-2

SHIFT SHARE ANALYSIS FOR THE SOUTHEAST TEXAS REGION

2531	PUBLIC BUILDING & RELATED FURNITURE	32,600	31,600	-3.9674847	2	0	-100	0	0	-2	-2	-2
3553	WOODWORKING MACHINERY	10,900	8,100	-25.688073	8	4	-50	0	-2	-2	-4	-4
89	SERVICES, NEC	32,200	38,900	20.8074534	19	21	10.52632	0	3	-2	2	2
3492	FLUID POWER VALVES & HOSE FITTINGS	27,400	27,300	-0.3649635	4	2	-50	0	0	-2	-2	-2
2095	ROASTED COFFEE	12,000	11,400	-5	37	33	-10.8108	1	-3	-2	-4	-4
2822	SYNTHETIC RUBBER	15,200	15,300	0.65789474	2,013	2,024	0.546448	53	-40	-2	11	11
2999	PETROLEUM AND COAL PRODUCTS, NEC	12,100	12,300	1.65289256	97	96	-1.03093	3	-1	-3	-1	-1
3271	CONCRETE BLOCK AND BRICK	20,800	17,000	-18.269231	18	12	-33.3333	0	-4	-3	-6	-6
3325	STEEL FOUNDRIES, NEC	28,100	25,900	-7.8291815	3	0	-100	0	0	-3	-3	-3
3086	PLASTICS FOAM PRODUCTS	50,200	49,500	-1.3944223	11	8	-27.2727	0	0	-3	-3	-3
3592	CARBURETORS, PISTONS, RINGS, VALVES	29,100	22,400	-23.024055	4	0	-100	0	-1	-3	-4	-4
3995	BURIAL CASKETS	9,300	8,800	-5.3763441	4	0	-100	0	0	-4	-4	-4
2048	PREPARED FEEDS, NEC	45,200	46,500	2.87610619	380	387	1.842105	10	1	-4	7	7
2491	WOOD PRESERVING	12,700	11,800	-7.0866142	125	112	-10.4	3	-12	-4	-13	-13
2393	TEXTILE BAGS	9,000	9,400	4.44444444	4	0	-100	0	0	-4	-4	-4
2521	WOOD OFFICE FURNITURE	35,400	30,000	-15.254237	5	0	-100	0	-1	-4	-5	-5
3661	TELEPHONE AND TELEGRAPH APPARATUS	139,500	118,000	-15.412186	6	0	-100	0	-1	-5	-6	-6
2851	PAINTS AND ALLIED PRODUCTS	63,300	57,900	-8.5308057	232	207	-10.7759	6	-26	-5	-25	-25
3312	BLAST FURNACES AND STEEL MILLS	209,700	199,900	-4.6733429	655	619	-5.49618	17	-48	-5	-36	-36
3714	MOTOR VEHICLE PARTS AND ACCESSORIES	409,300	397,700	-2.834107	23	16	-30.4348	1	-1	-6	-7	-7
3724	AIRCRAFT ENGINES AND ENGINE PARTS	155,800	143,200	-8.0872914	8	0	-100	0	-1	-7	-8	-8
3499	FABRICATED METAL PRODUCTS, NEC	50,500	54,900	8.71287129	11	4	-63.6364	0	1	-8	-7	-7
2541	WOOD PARTITIONS AND FIXTURES	44,800	40,800	-8.9285714	137	116	-15.3285	4	-16	-9	-21	-21
2759	COMMERCIAL PRINTING, NEC	172,400	163,700	-5.0464037	120	105	-12.5	3	-9	-9	-15	-15
3589	SERVICE INDUSTRY MACHINERY, NEC	41,600	41,700	0.24038462	47	38	-19.1489	1	-1	-9	-9	-9
3543	INDUSTRIAL PATTERNS	9,200	8,600	-6.5217391	12	2	-83.3333	0	-1	-9	-10	-10
3241	CEMENT, HYDRAULIC	19,500	18,200	-6.6666667	10	0	-100	0	-1	-9	-10	-10
3272	CONCRETE PRODUCTS, NEC	72,400	64,500	-10.911602	59	43	-27.1186	2	-8	-10	-16	-16
2951	ASPHALT PAVING MIXTURES AND BLOCKS	13,100	13,200	0.76335878	38	28	-26.3158	1	-1	-10	-10	-10
3652	PRERECORDED RECORDS AND TAPES	21,600	23,600	9.25925926	11	0	-100	0	1	-12	-11	-11
3281	CUT STONE AND STONE PRODUCTS	13,500	13,800	2.22222222	12	0	-100	0	0	-12	-12	-12
2452	PREFABRICATED WOOD BUILDINGS	23,900	17,000	-28.870293	42	17	-59.5238	1	-13	-13	-25	-25
84	MUSEUMS, BOTANICAL, ZOOLOGICAL GARDEN	58,800	68,300	16.1564626	114	119	4.385965	3	15	-13	5	5
2369	GIRLS' AND CHILDREN'S OUTERWEAR, NEC	36,200	30,900	-14.640884	16	0	-100	0	-3	-14	-16	-16
2011	MEAT PACKING PLANTS	138,900	137,700	-0.8639309	109	94	-13.7615	3	-4	-14	-15	-15
3251	BRICK AND STRUCTURAL CLAY TILE	17,600	14,400	-18.181818	87	57	-34.4828	2	-18	-14	-30	-30
3612	TRANSFORMERS, EXCEPT ELECTRONIC	52,300	46,300	-11.472275	399	339	-15.0376	10	-56	-14	-60	-60
3743	RAILROAD EQUIPMENT	30,900	30,200	-2.2653722	102	85	-16.6667	3	-5	-15	-17	-17
3593	FLUID POWER CYLINDERS & ACTUATORS	19,400	17,900	-7.7319588	16	0	-100	0	-2	-15	-16	-16
2511	WOOD HOUSEHOLD FURNITURE	137,800	119,300	-13.425254	46	24	-47.8261	1	-7	-16	-22	-22
2426	HARDWOOD DIMENSION & FLOORING MILLS	35,200	32,600	-7.3863636	431	382	-11.3689	11	-43	-17	-49	-49
2026	FLUID MILK	76,500	72,600	-5.0980392	131	107	-18.3206	3	-10	-17	-24	-24
2721	PERIODICALS	127,600	127,400	-0.1567398	40	22	-45	1	-1	-18	-18	-18
3674	SEMICONDUCTORS AND RELATED DEVICES	259,500	233,500	-10.019268	20	0	-100	1	-3	-18	-20	-20
2325	MEN'S AND BOYS' TROUSERS AND SLACKS	89,500	84,500	-5.5865922	154	127	-17.5325	4	-13	-18	-27	-27
2911	PETROLEUM REFINING	120,800	120,400	-0.3311258	6,751	6,710	-0.60732	177	-200	-19	-41	-41
2891	ADHESIVES AND SEALANTS	24,100	23,500	-2.4896266	88	65	-26.1364	2	-5	-21	-23	-23

3823	PROCESS CONTROL INSTRUMENTS	60,100	62,600	4.15973378	35	15	-57.1429	1	1	-21	-20	-20
2879	AGRICULTURAL CHEMICALS, NEC	21,400	25,300	18.2242991	288	319	10.76389	8	45	-21	31	31
41	LOCAL AND INTERURBAN PASSENGER TRANS	311,900	353,700	13.4017313	426	461	8.215962	11	46	-22	35	35
3087	CUSTOM COMPOUND PURCHASED RESINS	26,200	23,600	-9.9236641	128	92	-28.125	3	-16	-23	-36	-36
2813	INDUSTRIAL GASES	21,500	23,800	10.6976744	67	46	-31.3433	2	5	-28	-21	-21
57	FURNITURE AND HOMEFURNISHINGS STORES	805,700	801,200	-0.5585205	1,383	1,346	-2.67534	36	-44	-29	-37	-37
2611	PULP MILLS	15,100	14,200	-5.9602649	40	0	-100	1	-3	-38	-40	-40
3448	PREFABRICATED METAL BUILDINGS	26,300	22,900	-12.927757	53	6	-88.6792	1	-8	-40	-47	-47
2448	WOOD PALLETS AND SKIDS	30,500	32,200	5.57377049	514	500	-2.72374	14	15	-43	-14	-14
2451	MOBILE HOMES	44,300	38,200	-13.769752	50	0	-100	1	-8	-43	-50	-50
3433	HEATING EQUIPMENT, EXCEPT ELECTRIC	21,500	18,500	-13.953488	100	41	-59	3	-17	-45	-59	-59
49	ELECTRIC, GAS, AND SANITARY SERVICES	932,200	962,900	3.2932847	4,569	4,673	2.276209	120	30	-46	104	104
2711	NEWSPAPERS	473,500	459,400	-2.9778247	847	775	-8.50059	22	-47	-47	-72	-72
3081	UNSUPPORTED PLASTICS FILM & SHEET	53,000	55,500	4.71698113	303	264	-12.8713	8	6	-53	-39	-39
72	PERSONAL SERVICES	1,062,000	1,108,200	4.35028249	2,039	2,072	1.61844	54	35	-56	33	33
3412	METAL BARRELS, DRUMS, AND PAILS	10,300	9,400	-8.7378641	66	3	-95.4545	2	-8	-57	-63	-63
2821	PLASTICS MATERIALS AND RESINS	83,300	85,600	2.76110444	1,212	1,186	-2.14521	32	2	-59	-26	-26
3851	OPHTHALMIC GOODS	38,900	41,600	6.94087404	296	257	-13.1757	8	13	-60	-39	-39
2621	PAPER MILLS	176,200	181,500	3.00794552	1,336	1,308	-2.09581	35	5	-68	-28	-28
67	HOLDING AND OTHER INVESTMENT OFFICES	210,300	227,400	8.13124108	186	132	-29.0323	5	10	-69	-54	-54
61	NONDEPOSITORY INSTITUTIONS	365,400	378,700	3.63984674	361	303	-16.0665	9	4	-71	-58	-58
2421	SAWMILLS AND PLANING MILLS, GENERAL	165,900	148,900	-10.247137	2,681	2,333	-12.9802	70	-345	-73	-348	-348
3491	INDUSTRIAL VALVES	26,000	26,800	3.07692308	359	295	-17.8273	9	2	-75	-64	-64
96	ADMINISTRATION OF ECONOMIC PROGRAMS	20,800	24,800	19.2307692	499	513	2.805611	13	83	-82	14	14
2752	COMMERCIAL PRINTING, LITHOGRAPHIC	354,500	360,900	1.80535966	455	379	-16.7033	12	-4	-84	-76	-76
64	INSURANCE AGENTS, BROKERS, & SERVICE	642,200	668,500	4.09529742	1,099	1,056	-3.91265	29	16	-88	-43	-43
3452	BOLTS, NUTS, RIVETS, AND WASHERS	50,500	47,000	-6.9306931	101	4	-96.0396	3	-10	-90	-97	-97
3432	PLUMBING FIXTURE FITTINGS AND TRIM	27,500	25,000	-9.0909091	538	399	-25.8364	14	-63	-90	-139	-139
3715	TRUCK TRAILERS	30,800	24,200	-21.428571	552	317	-42.5725	15	-133	-117	-235	-235
59	MISCELLANEOUS RETAIL	2,409,600	2,466,800	2.37383798	4,399	4,368	-0.70471	116	-11	-135	-31	-31
3731	SHIP BUILDING AND REPAIRING	124,000	131,000	5.64516129	887	795	-10.372	23	27	-142	-92	-92
51	WHOLESALE TRADE*NONDURABLE GOODS	2,475,000	2,544,000	2.78787879	3,645	3,551	-2.57888	96	6	-196	-94	-94
82	EDUCATIONAL SERVICES	8,916,800	9,606,800	7.73920205	22,655	24,179	6.726992	595	1,158	-229	1,524	1,524
63	INSURANCE CARRIERS	1,436,300	1,494,500	4.05207826	775	575	-25.8065	20	11	-231	-200	-200
48	COMMUNICATION	1,282,700	1,297,200	1.130428	2,473	2,218	-10.3114	65	-37	-283	-255	-255
52	BUILDING MATERIALS & GARDEN SUPPLIES	780,500	745,900	-4.4330557	2,296	1,874	-18.3798	60	-162	-320	-422	-422
55	AUTOMOTIVE DEALERS & SERVICE STATION	2,075,400	1,996,000	-3.8257695	5,092	4,527	-10.9209	134	-328	-361	-555	-555
56	APPAREL AND ACCESSORY STORES	1,168,300	1,153,400	-1.2753574	2,972	2,573	-13.4253	78	-116	-361	-399	-399
44	WATER TRANSPORTATION	172,300	187,700	8.93789901	2,469	2,180	-11.7051	65	156	-510	-289	-289
2869	INDUSTRIAL ORGANIC CHEMICALS, NEC	111,900	123,300	10.1876676	4,806	4,646	-3.32917	126	363	-650	-160	-160
42	TRUCKING AND WAREHOUSING	1,551,800	1,609,800	3.73759505	3,657	3,029	-17.1725	96	41	-765	-628	-628
60	DEPOSITORY INSTITUTIONS	2,259,500	2,185,200	-3.2883381	4,589	3,629	-20.9196	121	-272	-809	-960	-960