Regional Economic Development: An Economic Base Study and Shift-Share Analysis of Hays County, Texas

By

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"*Whether therefore ye eat, or drink, or whatsoever ye do, do all to the glory of God."*
1 Corinthians 10:31

Far and away the most difficult page of the ARP to write; this page does not do justice to all of the people who have helped me achieve my goals. To my Dad, your vision, persistence, and determination have been a driving force in my academic and personal life. Thank you for encouraging me to dream and never letting me give up. To my Mom, your counsel, guidance, understanding, and patience have given me an inner peace and strength which I draw upon daily. Thank you for allowing me the freedom to develop into the individual I am today – I know it has not been easy. To my friends and family, your support and enthusiasm have always been steadfast and trustworthy – I hope that I am fortunate enough to always have you at my side.

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Abstract

The purpose of this paper is two-fold. First is to analyze the economy of Hays County, Texas using the economic base study to determine the structure and composition of the local market. Using the location quotient technique as an indirect method of employment analysis, this research examines leading export industry sub-sectors to determine which industries “drive” the local economy by generating outside income for the community. The second is to analyze Hays County’s economy using shift-share analysis to compare regional growth against national development. The shift-share technique presents a supplemental aggregate data analysis method to strengthen the conclusions of the economic base study. The research findings conclude that Hays County is a rapidly growing region primarily dependent upon the retail, health care and social assistance, and manufacturing sectors to advance and maintain its economic development. As compared to the U.S. economy, the manufacturing sector is expanding locally while concurrently declining in the national marketplace. Given that the local manufacturing sub-sector is an integral component of employment propagation via export employment, the national decline of this industry in Hays County is significant.

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Chapter I. Introduction

Research Purpose

The purpose of this research project is to examine the local economy of Hays County, Texas using two economic development models – the economic base study (EBA) and the shift-share analysis (SSA). The objective of the economic base study is to determine which industries generate actual economic growth and which industries demonstrate growth potential. The goal of the shift-share analysis is to indicate the relative economic growth rate of the region's industries as compared to national trends and determine the level of industrial diversification. This research further analyzes Hays County's population growth, business development, and regional setting to articulate its geographic and economic significance.

Summary of Chapters

This applied research project consists of five primary chapters:

- Chapter two provides information on the regional setting of Hays County, Texas and discusses its economic importance. Two economic growth models – the economic base study and shift-share analysis –are introduced as techniques used to aid policy makers in the decision-making and planning processes.

- Chapter three reviews existing literature on the EBA and SSA techniques. This chapter uses the literature to demonstrate the utility of the two techniques as applied to a local economy.
- Chapter four discusses the methodologies used to perform the economic analyses of Hays County. A primary focus of this chapter is the construction of an EBA and SSA Operationalization Table. This chapter also elaborates on the limitations of the EBA and SSA models.
- Chapter five analyzes the empirical outcomes of the models as they apply to the local economy.
- Chapter six briefly summarizes the project findings and provides recommendations using the results.

Chapter II. Hays County, Texas

Chapter Overview

At the onset of this chapter, an overview of Hays County, Texas and the surrounding region is presented. Key socioeconomic characteristics of the area, such as current and projected population estimates, major industrial employers, and the on-going development of the Austin-San Antonio corridor are highlighted to emphasize the importance of studying this county. To conclude, this chapter introduces two economic development models – the economic base analysis (EBA) and shift-share analysis (SSA) – as a pair of reliable techniques to manage the region's economic infrastructure.

Hays County: Setting and Growth

Located within a 200 mile radius of four of the fastest growing metropolitans in the U.S. – Austin, San Antonio, Dallas, and Houston[1] – Hays County, Texas is a rapidly growing region fraught with economic opportunities and trade-industry growth potential. Originally consolidated in 1848 from small settlements in the southwestern most portion of Travis County, Hays County has since transformed into the 34th fastest growing county in the U.S.[2] In 2006, the county's population exceeded 130,000 residents – marking a 33.6% growth since 2000[3]. Over a 678 square mile area, Hays County consists of seven major cities[4]: San Marcos, Kyle, Wimberley, Buda, Dripping Springs, Woodcreek, and

[1] For detailed information on the exact ranking of each city, see United States Census Bureau. U.S. Census Bureau News. 2007. *50 fastest-growing metro areas concentrated in the west and south.*

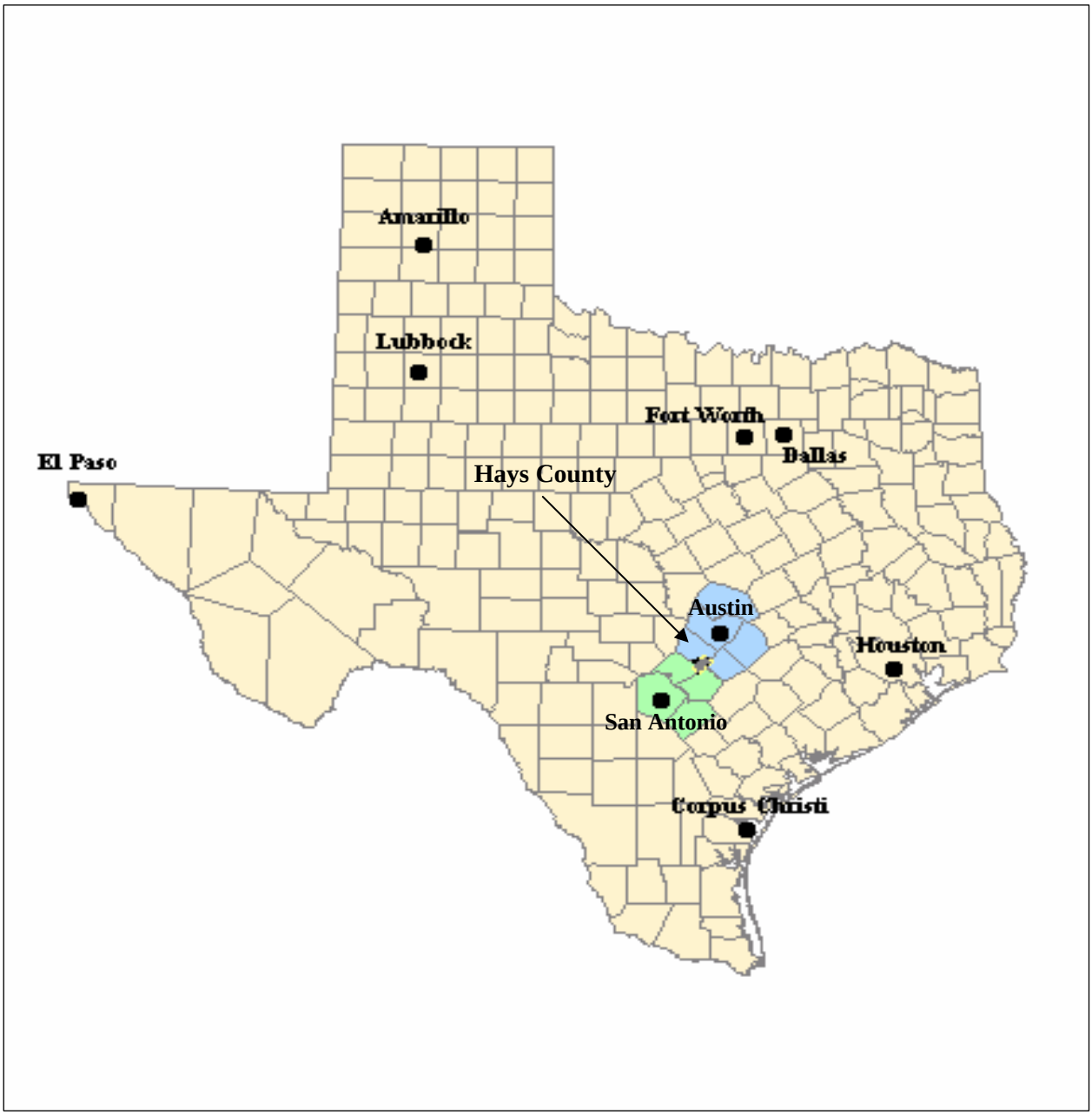
2 This figure is indicative of population estimates as measured by percentage growth between 2000 and 2006. See United States Census Bureau. U.S. Census Bureau News. 2007. *Arizona's Maricopa County leads counties in population growth since census 2000.*

3 See United States Census Bureau. U.S. Census Bureau News. 2007. *Arizona's Maricopa County leads counties in population growth since census 2000.*

[4] For this research, only cities with a population of 500 people or more were listed. For a complete list of 2006 population estimates, see Texas Association of Counties. The County Information Project. 2007. *Hays County profile.*

Mountain City. To more effectively illustrate Hays County's surroundings, Figure 2.1 pinpoints the region's statewide location.

Figure 2.1: Establishing a Statewide Setting[5]



Source: City of San Marcos: Planning and Development Services Department

[5] The blue color shading represents the Austin MSA; the green shading highlights the San Antonio MSA. Hays County, TX is centrally located between the two metropolitan areas.

Geographically situated among several of the fastest growing counties in Texas, Hays County's population growth rate per decade is a strong indicator of the county's continuing prosperity. Between 1990 and 2000, Hays County grew at a decadal rate of nearly 50%; population projections predict a similar rate of growth between 2000 and 2010 (see Table 2.1). Comparably, Hays is ranked in the top half of the fastest growing counties in the area for both the 1990 – 2000 and 2000 – 2010 comparison periods. Table 2.1 indicates that the county is ranked 4th in percentage growth per decade (both 1990-2000 and 2000-2010); however, only 2.3% separate Hays from becoming the second fastest growing county in the comparison region.

Table 2.1: County Population Growth Comparisons

Population Growth Comparison					
County	**1990**	**% Growth Decade**	**2000**	**% Growth Decade**	**2010 Estimate**
Hays	65,164	48.7%	97,589	48.7%	146,091
Bastrop	38,263	50.9%	57,799	50.9%	87,219
Bexar	1,185,394	17.5%	1,392,931	17.5%	1,636,693
Caldwell	26,392	22.0%	32,194	22.0%	39,267
Comal	51,832	50.5%	78,021	50.5%	117,421
Guadalupe	64,873	37.2%	89,023	37.2%	122,139
Travis	576,407	40.9%	812,280	40.9%	1,144,502
Williamson	139,551	79.1%	249,967	79.1%	447,690

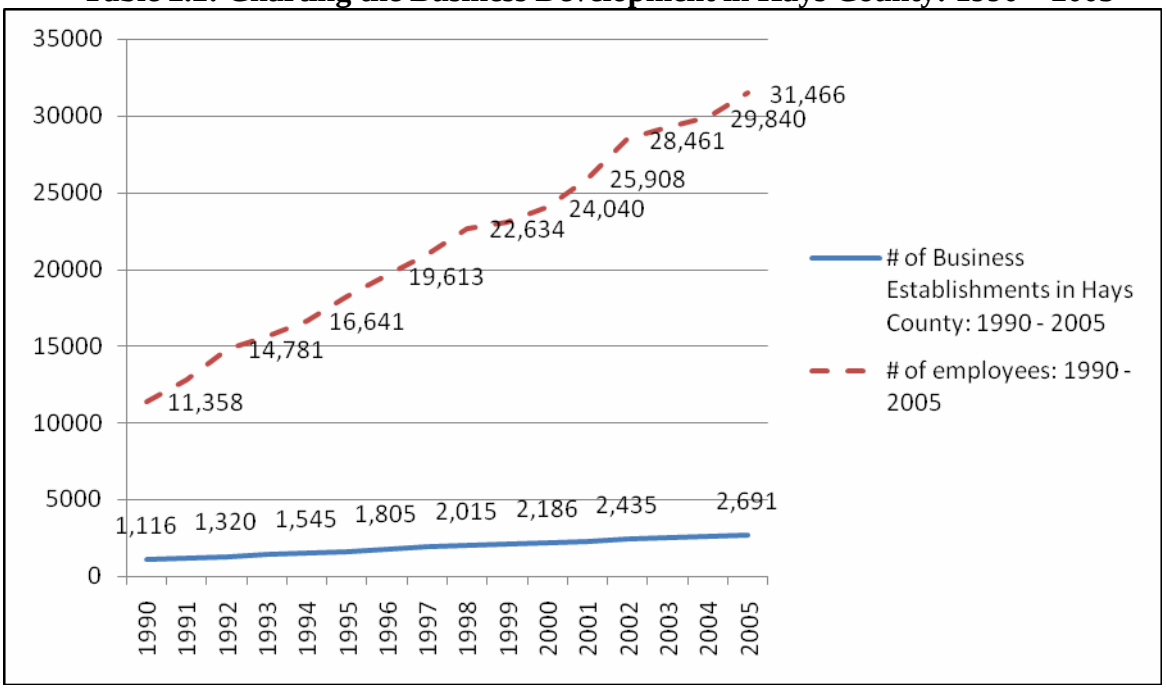
Source: San Marcos Chamber of Commerce

New and existing businesses in Hays County are continuing to expand at an equally remarkable pace. For fifteen consecutive years – 1990 through 2005 – the total number of business establishments and the total number of employees in the county experienced a steady annual increase[6]. At the conclusion of this fifteen year period, the number of business enterprises located in Hays increased by over 241%. The expansion

[6] See Texas State University – San Marcos. Statbank. 2006. Business enterprises by county.

of business enterprises has also had a positive effect on the total number of privately employed persons (see Table 2.2). In 1990, the U.S. Census Bureau estimated that there were approximately 11,300 privately employed persons in the county; that figure has nearly tripled to 31,466[7] in 2005.

Table 2.2: Charting the Business Development in Hays County: 1990 – 2005



Source: Statbank: Business Enterprises by County

An analysis of the top 25 major private and public employers in Hays County for 2005 shows a diverse assortment of business enterprises and municipal entities. The top employer in Hays County for 2005 was Texas State University – San Marcos with 6,406 employees; followed by the Prime and Tanger Outlet Centers with a combined employee base of 3,540 (see Table 2.3). With a total labor force of 66,550[8], the top three public and private employers for the area constitute virtually 15% of the total local employment.

[7] The employment figure 31,466 represents the total private nonfarm employment estimate. For additional information, see City of San Marcos. Economic Development San Marcos. 2006. *San Marcos: demographic profile – 2006.*

[8] See City of San Marcos. Economic Development San Marcos. 2006. *San Marcos: demographic profile – 2006.*

Table 2.3: Hays County's Top 25 Major Private and Public Employers - 2005

Major Hays County Employers - 2005		
Rank	**Employer**	**Number of Employees**
1	Texas State University - San Marcos	6,406
2	Prime Outlets - San Marcos	2,000
3	Tanger Factory Outlet Center	1,540
4	San Marcos Consolidated Independent School District	1,081
5	Grande Communications	850
6	Hays County	802
7	Hunter Industries	650
8	Central Texas Medical Center	580
9	Gary Jobs Corps Center	567
10	HEB Distribution Center	540
11	City of San Marcos	465
12	Wal-Mart Super Center	435
13	Wide-Lite Corporation	325
14	San Marcos Treatment Center	284
15	C-FAN	276
16	Community Action Inc.	260
17	Chartwells	250
18	Heldenfels Enterprises, Inc.	227
19	Butler Manufacturing	220
20	Goodrich Aerostructures Group	200
21	McCoy Corporation	198
22	Thermon Manufacturing	177
23	Sac N Pac Stores, Inc.	147
24	San Marcos Baptist Academy	130
25	TXI Hunter Cement	130

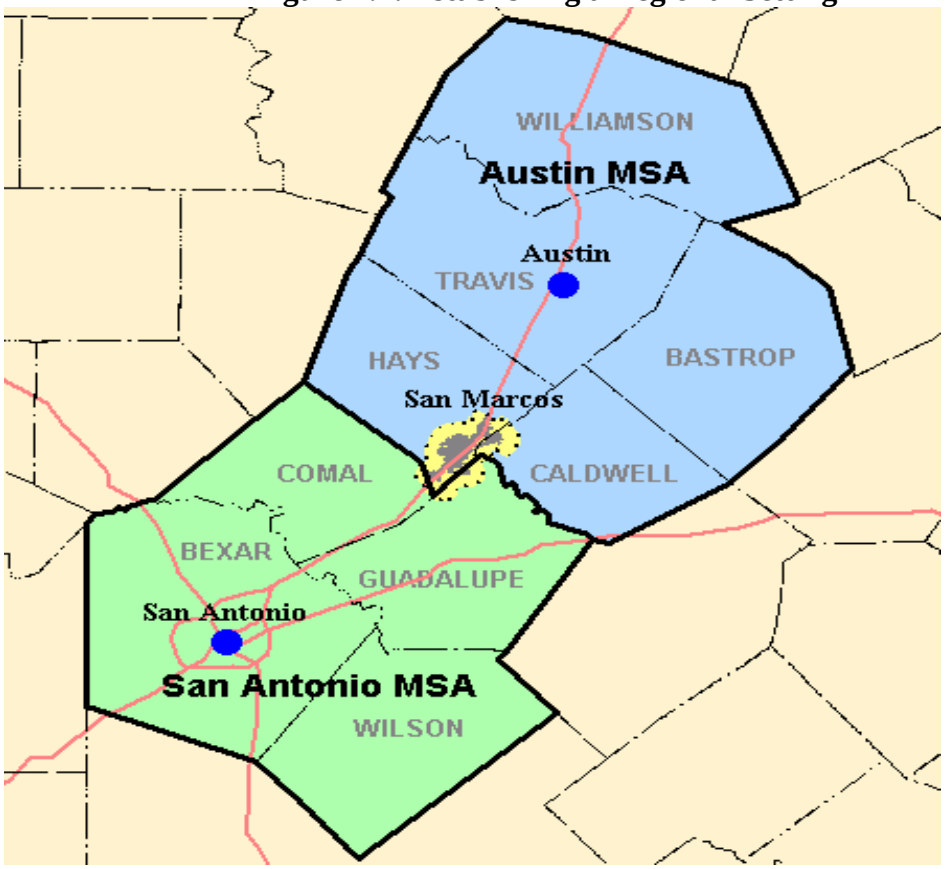
Source: Economic Development San Marcos

The dynamic population growth and continuing business development within Hays County is characteristic of the rapid development occurring throughout this particular region of the state. However, there are distinguishing features in Hays County that are responsible for a significant portion of the county's economic and social development. One of these distinctive characteristics is city of San Marcos.

San Marcos: The County Seat

Centrally located between the Austin MSA[9] and the San Antonio MSA, the city of San Marcos has considerably benefited from Hays County's geographic position. Situated only 26 miles from Austin and 45 miles from San Antonio, San Marcos' ideal locale is where 35% or roughly 50,000 of the county's total population reside[10]. As the county seat, San Marcos commands the county's largest municipal operating budget at $136, 419,252[11] for the 2008 fiscal year.

Figure 2.2: Establishing a Regional Setting



Source: City of San Marcos: Planning and Development Services Department

[9] As defined by the U.S. Census Bureau, a Metropolitan Statistical Area (MSA) is a geographic population cluster of more than 50,000 residents in a single city or consists of an urban area with more than 100,000 residents and includes each affected county.

[10] The population estimates used to calculate this figure are located at the Texas Association of Counties. The County Information Project. 2007. *Hays County profile.*

11 See City of San Marcos. 2007. *City of San Marcos: 2007-08 Annual Budget.*

San Marcos' rapid economic expansion has substantial ties to the retail and tourism enterprises located in the area. As a cornerstone of fiscal development, the Prime and Tanger Outlet Centers have been a foundation of the economic prosperity in San Marcos. Mayor Susan Narvaiz recently made the observation that the city had become "the third most popular tourist destination in Texas due to the success of our outlet malls" (Millecam 2007, 2). *San Marcos Today* (2004, 35) further detail the success of the retail and tourist attraction:

> The development of two factory outlet retail centers in the city has had a strong impact on retail sales and tourism in San Marcos. Prime Outlets and the Tanger Outlet Center have a combined total of over 200 outlet stores. The centers employ approximately 2,800 persons. According to the Greater San Marcos Economic Development Council, the outlet malls attracted over 6 million shoppers in 2002. Since the vast majority of customers come from outside San Marcos, these facilities are similar to tourist attractions in terms of their economic impact.

Since the publication of this article, the total number of employees for the outlet centers has increased to 3,540 in Dec. 2005[12]. Building on these economic achievements, a large-scale operation is currently underway to construct a $21 million city conference center and a $50 million Embassy Suite Hotel in close proximity to downtown San Marcos. Both the conference center and the full-service hotel are slated to open in Oct. 2008 and expectations are that the two projects will further bolster the tourism and retail industries for the area.

San Marcos Today (2004, 35) identifies two important factor contributing to the dramatic increase in size and prosperity; the article makes the observation that the "large population increase is attributable to (both) growth pressures from the Austin and San Antonio metro areas and the large enrollment increases at Texas State University."

[12] See City of San Marcos. Economic Development San Marcos. 2006. *San Marcos: demographic profile – 2006.*

Texas State University – San Marcos

Texas State University – San Marcos (TSU) has also played an especially vital role in the growth of the city and the county. As the largest university in the Texas State University System[13], TSU dominates the San Marcos landscape with a 457 acre main campus and has over 5,000 additional acres of farm, ranch, residential, and recreational space[14]. According to an excerpt by the San Marcos Planning and Development Services Department (San Marcos Today 2004, 35):

> Texas State University–San Marcos (formerly Southwest Texas State University), has a current enrollment of approximately 23,500 and a campus of over 300 acres. It is the sixth largest public university in the state and the largest employer in San Marcos. Texas State has expanded its educational offerings to include more than 114 undergraduate, 81 master's, and 5 doctoral degree programs. Texas State directly employs approximately 2,600 people. Due to its size in relation to the rest of San Marcos, the university has a large impact on the economy of the city and surrounding area.

TSU's student population has increased by 17% – to almost 28,000 – in the three years since the publication of the *San Marcos Today* article; since then the university has had to dramatically enlarge the number of faculty and staff on campus (Millecam 2007, 1). In Dec. 2005, TSU was the leading public employer in the county – an estimated 6,406 persons were employed by the university during that year[15]. Additional data analysis reveals that the number of faculty at the university is currently estimated to be 1,272[16]. The steady annual increase in TSU students, faculty, and staff has provided San

[13] The Texas State University System includes Texas State University at San Marcos, Lamar University at Beaumont, Sul Ross State University at Alpine, Sam Houston State University at Huntsville, and Angelo State University at San Angelo.

[14] See Texas State University System. Texas State University – San Marcos. 2007. *Texas State University profile*.

[15] See City of San Marcos. Economic Development San Marcos. 2006. *San Marcos: demographic profile – 2006*.

[16] See Texas State University System. Texas State University – San Marcos. 2007. *Texas State University profile*.

Marcos with a reliable consumer base and educated labor market that supports their burgeoning tourist and retail industries.

An analysis of the growth of TSU, San Marcos, and Hays County shows that the three entities are experiencing similar rates of development (see Table 2.4). Between 1950 – 2000, Hays County grew at an average of 22% each decade. Comparatively, San Marcos experienced an average decadal growth rate of 18%, while TSU experienced decadal gains of 28% for the same time period. Remarkably, newly released population forecasts project Hays County to exceed 173,000 residents in 2010, 279,000 in 2020, 417,000 in 2030 and 584,000 in 2040; these figures far outstrip previous county growth rates and represent an estimated 499.1% increase in total population from 2000 to 2040[17] (see table 2.4). In the near future, Table 2.4 indicates that the city of San Marcos is expected to more than double its total population by 2020 to 279,228. Although this research does not specifically propose a correlation in the rates of growth between Hays County, TSU, and San Marcos, the projected rapid expansion of one entity will invariably have dramatic consequences on the growth of the other two.

Table 2.4: Population Growth Projections

Population Area	1950	1960	1970	1980	1990	2000	2005	2010 estimate	2020 estimate	2030 estimate	2040 estimate
Hays County	17,840	19,934	27,642	40,954	65,614	97,589	126,250	173,377[1]	279,228[1]	417,590[1]	584,642[1]
City of San Marcos	9,980	12,713	18,860	23,420	28,743	34,733	46,112	53,457	71,841	96,548	n/a
Texas State University – San Marcos	2,013	2,653	9,852	15,400	20,940	23,556	27,500	n/a	n/a	n/a	n/a

Source: City of San Marcos: Planning and Development Services Department

[1] - Texas State Data Center and Office of the State Demographer

[17] See Texas State Data Center and Office of the State Demographer.

Interstate Highway 35: Linking Business Development and Community Growth

The enormous growth pressures and commerce activity generated by the Austin-San Antonio corridor cannot be fully realized without taking into account the major thoroughfare that connects them – Interstate Highway 35 (IH 35). According to the Austin-San Antonio Intermunicipal Commuter Rail District (ASA Rail), the volume of traffic on IH 35 has reached an all time high with "almost three million people in Central Texas, traveling daily between Georgetown and San Antonio" (Financial and economic benefits study 2007, 1). U.S. involvement in NAFTA[18] contributes significantly to the volume of daily commuters traveling through the area on IH 35 since the roadway provides a vertical passageway between Mexico, Canada, and the U.S. According to the Greater Austin-San Antonio Corridor Council:

> 80% of all Mexican exports pass through the Lone Star State, 75% of those exports traveling up Interstate 35 through Austin and San Antonio. Trade between Mexico and the United States has doubled to more than $100 billion in the last five years, and will double again by the year 2000. Nearly half of America's foreign exchange with Mexico involves products originating in or destined for Texas, and this explosion of trade presents ever-increasing opportunities for businesses throughout the Corridor[19].

The regional population explosion is occurring at such a rapid rate that "the Federal Highway Administration (FHWA) estimates that the current six lanes of IH-35 would need to be expanded to 12 to 18 lanes to accommodate expected population growth in the Austin-San Antonio region by the year 2025" (Financial and economic benefits study 2007, 7). Given the obvious economic implications of the Austin-San Antonio corridor via IH 35, cities located near the roadway – such as Buda, Kyle, and

[18] The North American Free Trade Agreement (NAFTA) is a trading bloc of nations which includes the United States, Mexico, and Canada. The primary goal of NAFTA is to increase trade by phasing out and eventually eliminating tariffs between the three North American trading partners.
[19] See the Greater Austin-San Antonio Corridor Council homepage at http://www.thecorridor.org/history.html.

San Marcos – rely on competent local leadership to advance their community's economic profile using comprehensive methods of analysis.

Managing the Growth

Clearly, as the local population and economy continue to grow in complexity and size, the need for Hays County to understand their economy using reliable methodological tools to provide decision-making guidance has become greater. Lacking the proper methods to monitor and regulate the progress of the regional economy, local policymakers face an "extremely difficult task to promote industrial growth or to preserve existing economic development" (Dake 1985, 10). Further exacerbating problems of local economic development, a community's dependence on relatively few industry types make it exceedingly vulnerable to national economic fluctuations. Hence, it is important that the regional economy be frequently monitored and properly diversified because "without economic growth and a system to manage it, all of the other functions of public administration" suffer (Rodriguez, 11).

Given its prime location, rapidly growing population, and economic growth potential, the importance of identifying and encouraging key segments of Hays County's economy cannot be overstated. Economic development models provide a comprehensive method for understanding the local economy and its strengths and weaknesses. Therefore, it is the intention of this research project to examine the local economic structure of Hays County, Texas using two distinct economic development models – the economic base analysis (EBA) and shift-share analysis (SSA).

Economic Development Models: A Synopsis

Applying the economic base analysis[20] and shift-share analysis consistently can generate data capable of assisting local government officials understand the industrial makeup of their local economy, control the rate of economic growth, forecast local and national industrial trends, and interpret the fiscal impact of current decisions on future growth. Briefly, an EBA allows researchers to classify an industry within a local economy according to its import-export trade activities. An EBA places particular emphasis on the export sector of an economy because it is theorized that export activities are the engine of a local market. Export industries represent the economic base of an economy and are responsible for attracting outside sources of revenue for the community. Thus, the EBA allows analysts to determine which industries are "driving" the local economy by identifying industries that export goods and/or services. On the other hand, the SSA allows researchers to comparatively analyze local and national trends to determine their differences across a fixed period of time.

> Shift-share analysis is very practical in assessing the impacts of industrial restructuring on regional and local economies and for providing guidance for industrial targeting, and hence can make a significant contribution to understanding and selection of key leading industries in the region, which can help forming local industry partnerships (Dinc 2004, 4).

In addition to explaining the existing local economic environment, the EBA and SSA models allow public administrators to shape the local economy using informed economic development policies. Deliberate growth policies and actions are more likely to translate into controllable fiscal growth patterns; in turn, this allows local government

20 The literature also refers to the EBA as a comprehensive economic survey, economic base survey, economic survey, input-output approach, and regional export base study.

officials to draw from a reliably strong tax base, adeptly manage public goods and service initiatives, and better plan for capital improvement projects.

In rapidly expanding locations, such as Hays County, it is important to have a comprehensive economic development plan to maximize the local community's economic influence. Uncontrolled economic growth or decline is troublesome for a community because of the various problems associated with major booms and rapid declines (Galambos and Schreiber 1978). For example, rapid unstable economic growth could potentially result in overcrowded public institutions, i.e. jails, hospitals, etc. Overcrowded public facilities require the local government to make immediate infrastructure expenditures to return the effected public institutions back to equilibrium. The resulting debt incurred by the local government leaves the entire community vulnerable to economic fluctuations. A significant disruption in a community's tax base can result in the loss of potential tax revenue and a rise in economic welfare assistance programs demanded by an increasingly impoverished proportion of the community. EBA and SSA models give policy makers a set of reliable tools capable of guiding their decision-making process.

Despite some limitations within the EBA and SSA models (these will be discussed at length in future chapters), the techniques are widely used analytical tools that assist decision-makers to understand their communities' local economy, protect against the effects of uncontrolled growth and stagnation[21], and maximize a community's input-output ratio to achieve optimal economic development conditions.

21 See Dake (1985, 8) for additional information regarding the diversification and stability of the regional economic base.

Chapter Summary

This chapter presents a rationale for studying Hays County's local economy. The rapid economic development combined with the large scale population growth has made the county one of the fastest growing regions in the U.S. The need to protect and guide the local economy according to effective economic policies has never been greater. Near the conclusion of chapter two, a pair of economic development models – the economic base study and shift-share analysis – are introduced as analytical methods to manage the economic growth in the region. Using these techniques, public officials can maintain a working knowledge of how their local economy is structured and operates. The next chapter examines literature pertinent to the function and utility of the economic base and shift-share models. Finally, the following chapter concludes with the construction of a conceptual framework table.

Chapter III. Literature Review

Chapter Overview

This chapter provides a synopsis of previous research that examines the value and applicability of the economic base study (EBA) and shift-share analysis (SSA). In particular, this literature review emphasizes the research conducted by Galambos and Schreiber, Dinc, and Hustedde et al. To conclude the chapter, this research constructs a conceptual framework table based on the literature that is later used to perform an assessment of the economic health of Hays County, Texas.

Economic Growth: A Government's Responsibility

In their article, "Economic Base Studies in Resource Administration", Paul Barkley and Thaine Allison, Jr. (1968) contend that the entire regional economic structure is rapidly evolving and growing in complexity. Therefore, it is essential that local officials have effective techniques to determine the cause, rate, and stability of their area's economic growth. In his applied research project, Jesus Rodriguez (1987, 8) re-affirms that "in order to resolve problems of economic growth, local governments devise (economic development) strategies to address defined issues" and, by doing so, they insulate themselves from many unforeseen circumstances. Thus, as a result of avoiding unexpected economic turmoil by using economic development models, policy makers create a healthier economic environment for the entire local population.

According to the article "Regional and Local Economic Analysis Tools" by Mustafa Dinc (2002, 3):

> The ultimate goal of local and regional policy makers is to improve the well-being of the local population and promote opportunity and equity for them, which is possible only by increasing the competitive edge of their respective

> regions. To do so, local and regional policy makers need to develop sound policies, and closely monitor the outcomes of these policies.

To combat the complexity of the regional economic structure and address the need for analytical tools to interpret a local economy, the literature proposes a number of economic growth models. The available techniques include "economic base studies, shift-share analyses, input-output and labor supply or migration studies (all of which) have gained their popularity in one form or another in terms of theoretical development and to a lesser extent, in empirical analysis" (Liu 1974, 297). These models vary in measurement, precision, prognostication accuracy, and simplicity; however, the intent of each method is to guide policy makers in answering fundamental questions about their area. For example, "what are the current economic conditions in the community? What components of the community have been growing or what components have been declining? What are the community's options for improving its economic future and which of those options should be pursued first?" (Hustedde et al. 2005, 1). By gaining a better understanding of the current economic environment, policy makers can more accurately predict their local community's future financial health in an objective and systematic manner.

As previously mentioned, there are a variety of existing techniques to analyze an economy; however, two of the most well-known economic development models are the economic base analysis (EBA) and the shift-share analysis (SSA). The EBA and SSA are "models, (that) due to their simple and user friendly structures, are widely used by local and regional development practitioners in industrial targeting, economic impact analysis, and regional comparison across the world" (Dinc 2002, 4). Lending further credence to the success of the EBA and SSA models is that they have a reliable reputation of

producing dependable data when consistently performed using the same data sets (Dake, 1985).

Economic Base Analysis: An Introduction

The classification of local industries into import and export categories is the basis for the technique known as the economic base analysis. In their book, *Making Sense Out of Dollars: Economic Analysis for Local Government*, Arthur Galambos and Eva Schreiber (1978, 5) explain why segregating a local economy according to import and export activities is an important feature of the model:

> A good way to start diagnosing the health of the local economy is with an economic base study. Such a study is a systematic way of looking at each job in your local area and classifying it in one of two ways: Is it an export job [a job that produces goods and services sold mainly outside the local area], or is it a non-export job, whose output is consumed locally? The export job results in money from outside the area being pumped into the local economy through wages and business income.

Throughout the literature, several direct and indirect industry classification techniques are identified; these techniques are used to designate an industry as import or export oriented. Despite the precision that direct methods typically offer, Galambos and Schreiber (1978) ardently argue against the use of these methods due to their intensive time, labor, and financial requirements. As a way to avoid these research boundaries, Dinc (2005) proposes using the most commonly applied indirect method of industrial classification - the location quotient.

Indirect Industry Classification: The Location Quotient

The location quotient (LQ) is a popular indirect method of identifying export industries because it is easily applied and interpreting the results requires little expertise. Fundamentally, the LQ measurement assesses “the extent to which total export employment is spread among various industries and whether the economic base is

becoming more diversified over time or more widely spread among industries" (Galambos and Schreiber 1978, 20). Location quotients are calculated for each industry to determine if the local economy has a greater proportion of each industry than the national economy. Thus, the location quotient can reasonably determine which industries are comparatively exporting their goods and service and the extent of their involvement in "driving" the local economy.

Another function of the LQ is that it can be used comparatively against the LQ of another region of similar size and structure. For example, if region B is robustly exporting goods and services in a specific sector and region A is aware of the circumstances via the LQ, then region A can adjust its economic strategy accordingly. Region A can choose to select an alternate industry type to encourage or local officials can adopt an approach that aggressively challenges region B's dominance in that sector. In either scenario, using the location quotient to assess the strengths and weaknesses of surrounding communities provides policy makers with a competitive advantage in determining which direction the local economy should move.

The location quotient's inferences are based on employment data gathered from *County Business Patterns* (CBP) published by the United States Census Bureau. Although the location quotient can be used in conjunction with a variety of other community data – i.e. population, income, input/output variables, etc. – employment figures from CBP are the most popular because of their accessibility. Both local and national employment statistics are available through CBP to the general public in a user friendly format. The basis for CBP's employment data comes from calculating employers quarterly payroll tax returns. Since employment data is retrieved in this fashion, CBP

does not include a small number of employee categories. These omitted categories include: 1) government employees, 2) agricultural laborers, 3) entrepreneurs, and 4) domestic service laborers. The literature asserts that the LQ results are reliable, but cautions against using the conclusions of the study literally.

Once the LQ is determined using CBP data, the export employment multiplier (EEM) can be calculated to examine the total economic impact of various decisions. Specifically, the EEM is an estimate of the total employment attributable to changes in the local export employment (Galambos and Schreiber 1978). Since export industries create additional employment opportunities by generating new sources of revenue, the multiplier estimates how many import jobs are created by the addition of one export job. This estimate can be extrapolated to determine the total economic impact of export employment changes in an industry. Lane (1966, 346) comments that the EEM can be "a powerful tool for analyzing and forecasting economic activity," if properly used in conjunction with other techniques.

Economic Base Analysis: Clarifying the Export & Import Sectors

Since economic base analyses rely on distinguishing and classifying industries according to their economic activities, it is important to make the distinction between export[22] and import[23] industries. In his article, Sirkin (1959, 426) concludes that the total economic output of a region can be divided into two sectors – "output and productive services sold outside the area (i.e. exports) and output absorbed internally (i.e. imports)." Noticeably, the distinguishing factor between the two sectors is whether an industry's goods and services are consumed locally or outside the region.

[22] The literature also uses the terms base and/or basic industries to identify export industries.
[23] The literature also uses the terms non-base or non-basic industries to identify import industries.

Export industries are the most important sector of a local economy because they represent economic activities that generate additional revenue for the community. As a result, a community is reliant on the export base to "produce spendable income for use by the local economy" and to create new employment opportunities for the community by increasing the region's total economic output (Dake 1985, 16). The export base creates "more jobs and income in the community than is found at the site of the new employer" because of the increased consumption level of the import sector via the export sector (Hustedde et al. 2005, 11). Since the import sector relies directly on the achievements of the export base, the growth of export industries directly affects total economic growth. A variety of consequences can result from decline of the export base, i.e. employment stagnation, weak economic growth, or high levels of industrial concentration.

Import industries are "the economic complement of the base – namely, the service enterprises" of a local market whose goods and services are consumed locally (Thomas 1964). Andrews (1953, 161) elaborates further:

> Service enterprises include enterprises whose principal function is that of providing for the needs of persons within the community's economic limits. They are also distinguished from the base in the fact that they are, principally, importers, or if they do not import, do not export their finished goods or services.

Hultman (1967, 151) lessens the importance of the import sector because "a region develops largely around the export base which, according to some versions, becomes the critical autonomous variable in determining the level of regional income." Yet, despite its diminished importance in export base research, Galambos and Schreiber (1978, 23) offer a rare perspective on the role of imports, seldom discussed throughout the literature.

> Attempts to increase local employment in industrial categories that show imports can be just as effective in stimulating growth. Thus, local economic development

> strategy should not concern itself strictly with increasing export employment to the exclusion of reducing imports.

As mentioned above, a significant of portion of EBA literature neglects the importance of import industries. Some research suggests that this is true because researchers have been unable to establish a precise causal relationship between the import and export sectors (Thomas, 1964). Although the export base theory has yet to calculate the import sector as an absolute function of the total output, it is presumed that when the "existence of the non-export sector of the region's commercial economy is completely dependent on the export sector," then the predictive value of the EBA model will have substantially increased (Thomas 1964, 428).

Direct vs. Indirect Industry Classification

The most direct method to determine the export/import categorization of a local industry is to "conduct market surveys of all employers, or of a carefully selected sample, through personal interviews with employers or mail questionnaires" (Galambos and Schreiber 1978, 15). However, Galamobs and Schreiber (1978) conclude that contacting every individual employer in a community is too costly and time intensive to be given any serious consideration. Alternatively, Hustedde, Shaffer, and Pulver (2005) suggest using direct observation to gauge whether or not an employer's primary economic activity is export oriented. Unfortunately, in many cases, the size and complexity of the surrounding community make the direct observation technique nearly impossible. The direct observation method is also viewed with skepticism as it is prone to higher levels of researcher error and bias (Dinc, 2002).

Given the considerable limitations of directly identifying export industries, researchers have largely turned their attention to indirect methods of classification. Dinc (2002) identifies three popular indirect methods: 1) the minimum requirements technique; 2) differential multipliers: multiple regression analysis and 3) the location quotient technique. Multiple regression analysis is not typically used to determine export employment because of its limited flexibility and demanding time requirements. The minimum requirements technique is seldom utilized because it has a "very specific selection criteria for comparison areas" that can be restrictive (Dinc 2002, 23). Due to their applicability and simplicity, "location quotients are frequently used as the indirect method for classifying export and non-export employment" (Galambos and Schreiber 1978, 16). Se-Hark Park (1965, 384) cautions that whichever "method (is) used to divide industry employment into export and local employment," the results will vary according to the applied method.

County Business Patterns

The economic base analysis and shift-share analysis utilize the same data source and the same data variable to analyze the local economy. Typically, the techniques examine employment data rather than other variables, i.e. population, income, output, etc. Frequently, this is because employment statistics are easily obtained and come from a reliable source – the United States Census Bureau[24]. Hustedde, Shaffer, and Pulver (2005) identify a variety of the resources for local and national employment information:

- United States Census Bureau
- County Business Patterns
- Census Of Business
- United States Bureau of Labor Statistics

[24] The EBA and SSA models are worldly renowned for their simple and user-friendly data requirements; this is especially true in many developing countries where data is limited or unavailable.

Of these data sources, the most commonly used to perform regional analyses is *County Business Patterns* (CBP). CBP is an annual publication issued by the U.S. Census Bureau and includes local and national employment data that is calculated every March. CBP arranges local employment estimates by county and U.S. employment figures display the total national employment. Regional and national employment statistics are organized according to the U.S. Census Bureau's economic classification system – the North American Industrial Classification System (NAICS). Although the literature references the Standard Industrial Classification (SIC) system, modern adaptations to the classification structure have produced NAICS[25]. NAICS contains more statistical detail than SIC and accounts for various economic activities conducted by the U.S. with Mexico and Canada that were previously disregarded.

Despite the level of detail and availability in CBP, there are two important limitations that apply to this data set and, consequently, affect both models. First, *County Business Patterns* is typically published two to three years later than the current date. The lack of current data is a hindrance to the validity of an analysis because of the increasing complexity and speed of a globalized economy. Although CBP provides large quantities of reliable data, the statistics do not account for present phenomena. Secondly, CBP does not take into consideration certain categories of employees. As previously discussed, these employees include government workers, entrepreneurs, agricultural laborers, and domestic service laborers. The oversight of this data occurs because employment statistics are taken from quarterly payroll tax returns sent by employers. Although these limitations are notable, EBA and SSA conclusions from CBP still maintain a solid

[25] For additional information on SIC, please visit the U.S. Census Bureau at http://www.census.gov/epcd/www/naics.html.

reputation and are reliable if consistently performed to maintain the local economy and are used as advisory tools.

Export Employment Multiplier

Walter Isard (1960, 190) defines the export employment multiplier (EEM) as the ratio of "total employment in both basic and service activities divided by total basic employment." The EEM is an important mathematical expression that indicates the effect of local export employment over total local employment. The relevance of the export employment multiplier exists in its predictive ability to indicate the consequences on the total local economy of local export employment fluctuations. This indicator gives policy makers a general impression of the impact that export employment growth or decline would have on the economy as a whole. Although this calculation can be made for a single year's worth of data, Galambos and Schreiber (1978) note the narrow scope of this type of measurement and caution against its use. Instead, they recommend researchers obtain a more complete picture of the economic situation by comparing the EEM's over several years. Analyzing the EEM in this manner allows policy makers to draw conclusions from data that is not representative of the true level of economic activity.

Despite the usefulness of the EBA and its various measurements, the method provides no basis for comparing the local economy against national trends. By supplementing the EBA with the shift-share technique, this issue is specifically addressed.

Shift-Share Analysis: A Brief Literary Overview

Complementing the EBA, the shift-share analysis (SSA) is another trusted and renowned economic development model. The SSA is "designed to interpret a region's

growth in terms of the dynamics of its industrial structure by decomposing differences between the value of a chosen variable as observed regionally and nationally" (Buck 1970, 445). Simply put, a shift-share analysis concentrates on local employment fluctuations over a specific period of time and compares them against national employment trends. Similarly, the shift-share analysis can use a variety of economic variables to perform the study; however, employment data is most often used. The local and national employment data used to perform the analysis in this research also originates from *County Business Patterns*.

Shift-share analysis deconstructs a regional economy into three primary components – national growth, industrial mix, and competitive share. The summation of these three components is equal to the total economic change of the area. Dinc (2005, 4) explains:

> Shift-share analysis can give a description of total economic change that is attributable to the growth of the national economy, the industrial mix of the region, and the competitiveness of the local industries. By interpreting the results of the shift-share analysis, it is possible to explore the advantages of the local area, as well as to identify growth, or potential growth industries that are worthy of further investigation.

National Growth Component

The first step in conducting a shift-share analysis is to calculate the national growth component (NG). NG measures the hypothetical share of regional job growth attributable to growth of the national economy. Dinc (2002, 4) further remarks that the "national share component measures the regional economic change that could have occurred if the region had grown at the same rate as the reference area, and generally refers to the national economy."

Industrial Mix Component

The next step in computing the SSA is to calculate the industrial mix component (IM). This measurement appraises the quantity of growth that can be attributed to the regions mix of industries. As such, it is a helpful indicator in determining if the community has large quantities of rapidly expanding industries or vice versa. According to Hustedde, Shaffer, and Pulver (2005, 35):

> The industrial mix component is determined by multiplying the local employment in each economic sector by the difference in the national growth rate for that sector and the growth rate for the whole economy. A positive industrial mix rate indicates the majority of local employment is in sectors growing faster national total employment negative industrial mix indicates just the opposite.

Competitive Share Component

The final component of SSA is the competitive share indicator (CS). The competitive share component is often viewed by researchers as the most important of the three because it is the only SSA variable which can be directly influenced by the local population. The CS component measures the growth (decline) in an industry locally and nationally; the resulting figure represents the region's competitiveness for that industry. This measurement is calculated by "multiplying the local employment in each economic sector by the difference in the growth rate of that sector nationally and locally" (Hustedde et al. 2005, 36).

Component Summation

The total economic change component (TEC) indicates an area's actual growth or decline and can be expressed as the sum of the three derivatives – the competitive share, industrial mix, and national growth components (Houston, 1967).

Although the SSA is useful in illuminating certain aspects of a local economy, the technique does not specify the reasons for the actual growth or decline in an area. Instead local officials are responsible for diagnosing the reasons for changes using the SSA in conjunction with other techniques. Hustedde, Shaffer, and Pulver (2005, 38) comment that although the results of the SSA do not yield a one size fits all solution, policy makers commonly select from a variety of solutions based on SSA results:

- Strengthen management capacities of existing firms through educational programs (personnel, finance, organization, etc.)
- Encourage business growth through identification of capital sources:
    - Loans (S.B.A., banks, industrial revenue bonding).
    - Equity (small business investment corporations, investment groups).
- Increase knowledge of new technology through educational programs in science and engineering.
- Aid employers in improving work force quality through educational programs, employment counseling and social services (e.g., day care, health services)

The results of the economic base study and shift-share analysis provide basic information about the local economic structure that can be used as "a prime ingredient for an effective local development strategy" (Galambos and Schreiber 1978, 3). Given that the national economy is largely beyond the control of local policy makers, it is important that local officials maintain a high degree of control over their own local economy (Rodriguez 1987). Guidance provided by EBA and SSA conclusions allows informed policy makers to have a greater degree of control over their community's economic growth strategy. Hence, "if done properly and routinely, the economic base analysis (and shift-share analysis) will reveal trends which then can be effectively turned into strategies designed to stabilize and encourage the economic base" (Dake 1985, 18).

Conceptual Framework: Overview

This research project utilizes the operations research method to provide a framework for evaluating Hays County's economy. Specifically, the operations research

models – the economic base analysis and the shift-share analysis – are the conceptual framework used to conduct the examination.

Economic Base Study: Conceptual Framework

Considering the finite amount of resources that a local economy has at its disposal, policy makers must make informed decisions to benefit the entire community. By interpreting the results of an export base analysis, policy makers can best use "scarce resources (tax dollars and other sources of revenue) to produce the most benefits, so that constituents and taxpayers will be relatively well satisfied next they go to the polls" (Galambos and Schreiber, 3). The literature emphasizes various scenarios which can occur as a result of incompetent or inaccurate economic forecasting techniques; i.e. the assumption of large amounts of local debt within a small period, turbulent economic periods incongruent with national trends, etc. Shields (1998, 218) characterizes models of operations research as a set of "complex techniques (which) are predictive by nature." Operations research models – such as the EBA - provide decision makers with user friendly techniques to protect the community against misguided economic policies.

The first step in performing an export base analysis is to identify the components and variables associated with the model. Table 3.1 identifies three EBA components – the location quotient, the export employment estimate, and the export employment multiplier. These components help give the technique substance and validity. The four variables used to calculate the EBA components are identified in the table below as various local and national employment statistics. Table 3.1a augments the conceptual framework table by organizing the components and variables into mathematical expressions.

Table 3.1: Conceptual Framework of an Economic Base Analysis

Conceptual Framework Table	
Research Purpose: To analyze Hays County, TX to determine which industries generate economic growth and which industries demonstrate economic growth potential	
Components of an EBA:	**Scholarly Support:**
(X) Export Employment (LQ) Location Quotient (M) Export Employment Multiplier (E) Total National Employment (Ei) Total National Industry Employment (e) Total Local Employment (ei) Total Local Industry Employment	Dake (1985), Di Matteo (1993), Dinc (2002), Galambos and Schreiber (1978), Guccione and Gillen (1980), Linnemann (1985), Rodriguez (1987), Sirkin (1959)

Table 3.1a: Economic Base Analysis Equations

Equations for the EBA Conceptual Framework Table
LQ = ei / e ÷ Ei / E
X = [ei / Ei - e / E] * Ei
M = ei / X

Once the conceptual framework table is organized, the next step is to identify what industries are present in the local economy. A local economy's industries can be located in *County Business Patterns.* Once the local employment data is located for the regional economy using the six digit NAICS code, its national counterpart can be found using the same code. For example, using CBP, hypothetical Industry Q would be listed as an industry in Hays County, with a pre-assigned NAICS code[26] and a total local industry employment figure (ei). Once the NAICS code has been identified for hypothetical Industry Q locally, the national employment figures are used to determine the total national industrial employment (Ei). In Table 3.2, Example City has a local industry employment figure of 900 workers and the total local employment figure for this city is 3,700. Comparatively, the total national industry figure for hypothetical Industry Q is

[26] For the sake of simplicity, the NAICS code has been omitted in this example; however, it will be discussed more thoroughly in the next chapter.

4,000; the total national employment for the U.S. is 19,000. For the sake of brevity, the figures in this example have been dramatically scaled down.

Table 3.2: Example – Identifying Local and National Employment Estimates

Area	Industry Q Employment	Total Employment	Location Quotient (LQ)	Export Employment (X)	Export Employment Multiplier (M)
Example City	900 (ei)	3,700 (e)			
United States	4,000 (Ei)	19,000 (E)			

Once this employment data is recorded, the researcher can then employ the location quotient to identify export industries in the local economy.

Location Quotient Equation

As previously discussed, the location quotient is an indirect method of identifying export industries. The location quotient is the ratio of total local industry employment to total local employment divided by the ratio of total national industry employment to total national employment. For any industry, if the resulting LQ is larger than 1, then that industry contributes to the export base. If the LQ is equal to one, then it is assumed that the industry produces only enough goods and services for local consumption. Therefore, it would be categorized as a non-basic industry. If the resulting location quotient is less than 1, then that industry is assumed to import its goods or not produce enough to sell externally and is also classified as a non-basic industry. contributes to the import base. Mathematically, the equation can be expressed as:

$$LQ = ei / e \div Ei / E$$

For the purposes of hypothetical Industry Q, in Table 3.2, the location quotient is computed accordingly:

$$LQ = ei / e \div Ei / E = 900/3,700 \div 4,000/19,000 = 1.16$$

Since the outcome of the equation can be expressed as a ratio greater than one, the industry is identified as an export industry and further calculations can be made. If the outcome of the equation had been less than or equal to one, the industry would be classified as non-basic or import and would be largely irrelevant for the purposes of further EBA considerations.

Table 3.3: Example – Determining the Location Quotient

Area	Industry Q Employment	Total Employment	Location Quotient (LQ)	Export Employment (X)	Export Employment Multiplier (M)
Example City	900 (ei)	3,700 (Ei)	1.16		
United States	4,000 (Ei)	19,000 (E)			

Once Industry Q has been confirmed as an exporter, the LQ is recorded and the number of export employment positions created by this industry can be determined.

Export Employment Equation

Export employment (X) can be thought of as "extra" jobs in an industry whose sole function is to generate outside revenue. Export employment estimates the number of an industry's employment positions that directly contribute to the export base. An area's export employment is the ratio of total local industry employment (ei) divided by the total national industry employment (Ei) subtracted from the ratio of total local employment (e) divided by total national employment (E) multiplied by the total national industry employment (Ei).

The export employment formula is expressed as:

$$X = [ei / Ei - e / E] * Ei$$

For the purposes of calculating the estimated export employment contribution made by hypothetical Industry Q, the equation is:

$$X = [ei / Ei - e / E] * Ei = [900/4,000 – 3,700/19,000] * 4,000 = 121$$

Table 3.4: Example – Calculating the Number of Export Employment Positions

Area	Industry Q Employment	Total Employment	Location Quotient (LQ)	Export Employment (X)	Export Employment Multiplier (M)
Example City	900 (ei)	3,700 (e)	1.16	121	
United States	4,000 (Ei)	19,000 (E)			

In other words, 121 of the 900 employees at Industry Q are contributing directly to the export base.

Export Employment Multiplier Equation

The third and final EBA component is the export employment multiplier, also referred to as the regional base multiplier. According to the literature, the export employment multiplier helps to "estimate local basic sector employment and allows analysts to project non-basic sector job creation given an increase in basic sector employment" (Dinc 2002, 15). The EEM is helpful in predicting the impact of fluctuations in the export base on the total local economy. The EEM is the total local industry employment (ei) divided by total export employment (X). The resulting figure reflects the total number of jobs created in return for each new export employment position. The EEM equation is:

$$M = ei / X$$

To determine the export employment multiplier for the example data given in Table 5, the equation would be calculated as:

$$M = ei / X = 900/121 = 7.438$$

Table 3.5: Example – Examining the Impact of the Export Base

Area	Industry Q Employment	Total Employment	Location Quotient (LQ)	Export Employment (X)	Export Employment Multiplier (M)
Example City	900 (ei)	3,700 (e)	1.16	121	7.4
United States	4,000 (Ei)	19,000 (E)			

In summary, one additional employee in industry Q will increase employment in non-basic industries by 7.4 jobs. It is important to note that for this example, the EEM was only calculated for hypothetical Industry Q. In practice, the EEM is calculated based on an area's **total** export employment figure.

By interpreting the results of an EBA, a researcher can determine if the industry is an exporter (LQ), to what extent it contributes to the export base (X), and what effect changes to the industry's export employment will have on non-basic industries. This information offers decision makers empirical evidence to guide their decisions.

Shift-Share Analysis: Conceptual Framework

The first step in constructing an SSA conceptual framework table is to identify the variables and components needed to make the computations. The four employment variables identified in Table 3.6 include: total national employment figures, total national industry employment estimates, and local industry employment data for two separate years (see Table 3.6). Since shift-share measurements require two years of employment data, Galambos and Schreiber (1978) suggest using current employment data contrasted with employment data no older than seven years prior. The components identified in the

conceptual framework table are the national growth, competitive share, industrial mix, and total economic change components. Based on the suggestion from Galambos and Schreiber (1978), this research uses employment data 2005 and 1998.

Once all relevant local and national employment statistics are assembled using the conceptual framework table, the process of determining the national growth, industrial mix, and competitive share components can proceed. "When added together, the three parts equal the total change in employment" and the shift and shares analysis can be completed (Galambos and Schreiber 1978, 27). Table 3.6a supplements the SSA conceptual framework table and provides the formulas needed to complete the analysis.

Table 3.6: Conceptual Framework Table of Shift-Share Analysis

Conceptual Framework Table	
Research Purpose: To analyze the local economy of Hays County, Texas so as to analyze the relative growth rate of the region against the national growth trend, measure industry diversification and its effect on the surrounding community, and examine regional industry growth as compared to national industry growth.	
Components of SSA:	**Scholarly Support:**
(Ei) Regional employment in a given industry at the beginning of a period (Ei*) Regional employment in a given industry at the end of a period (USi) National employment in a given industry at the beginning of the period (USi*) National employment in a given industry at the end of the period (US) Total national employment at the beginning of a period (US*) Total national employment at the end of the period (NG) National Growth (IM) Industrial Mix (CS) Competitive Share (TEC) Total Economic Change	Dake (1985), Di Matteo (1993), Dinc (2002), Galambos and Schreiber (1978), Houston (1967), Linnemann (1985), Seyfried (1996)

Table 3.6a: Shift and Share Analysis Equations

Equations for the Conceptual Framework Table
$NG = E_i (US^* / US - 1)$
$IM = E_i (US_i^* / US_i - US^* / US)$
$CS = E_i (E_i^* / E_i - US_i^* / US_i)$
$TEC = NG + IM + CS$

Shift-Share Components: NG, IM, CS, & TEC

The national growth (NG) component is used to calculate a local industry's growth rate as compared to the total national economy. As illustrated above in Table 3.6a, the national growth component is expressed as:

$$NG = E_i (US^* / US - 1)$$

The industrial mix (IM) component is used to determine the extent to which individual local industries factor into the growth or decline of the local economy as a whole. The industrial mix formula is:

$$IM = E_i (US_i^* / US_i - US^* / US)$$

Finally, the competitive share (CS) component of the shift-share analysis estimates how well or poorly an industry has performed versus its national counterparts. This equation is expressed as:

$$CS = E_i (E_i^* / E_i - US_i^* / US_i)$$

The total economic change (TEC) is equivalent to the total employment change in the region; this estimate is relatively simple to compute. The equation is:

$$TEC = NG + IM + CS$$

The shift-share analysis is a multi-faceted series of techniques designed to supplement the export base study. The SSA strengthens the EBA by providing the analysis with a reference point, i.e. the U.S. economy, to compare the local economy against.

Chapter Summary

Scholarly works such as Rodriguez (1987), Galambos and Schreiber (1978), Dake (1985), and Hustedde, Shaffer, and Pulver (2002) are excellent literary sources that identify the utility and practicality of economic development models. The economic base and shift-share results can be further strengthened if data is collected and processed routinely. Barkley and Allsion (1968, 473) caution that if only a snapshot of time is taken, then the conclusions suffer from being "static and represent the structure of a local economy only at one point in time." In spite of these limitations, there is a "growing appreciation of the magnitude of the problems urban communities face" and the need to effectively address these issues (Murdock 1962, 69). Thus, models of operations research – such as the EBA and SSA – are needed to assist policy makers. The components and variables identified in the literature and recorded in the conceptual framework tables demonstrate how policy makers can begin to operationalize these methods.

Chapter IV. Methodology

Chapter Overview

The purpose of this chapter is to describe the data collection methods used to analyze the local economy of Hays County, Texas. The chapter also operationalizes the

conceptual framework table presented in the previous chapter. Finally, this chapter discusses the limitations of conducting an economic base study and shift-share analysis.

North American Industrial Classification System

This research uses aggregate data analysis to determine the level of export employment spread throughout various industries in Hays County, the extent of industrial diversification in the region, and compare local and national economic trends. To accomplish these objectives, local and national employment statistics are collected from the annual publication *County Business Patterns* (CBP). Released by the U.S. Census Bureau, CBP typically lags two to three years behind real-time economic activities. The publication provides employment data that support comprehensive industry analysis for both local and nationwide examination purposes.

Prior to 1997, economic statistics were categorized according to the Standard Industrial Classification (SIC) system. However, due to the growing complexity of the international economic environment and the need for more precise methods of measurement, the Census Bureau adopted the North American Industrial Classification System (NAICS) in 1997. Developed in cooperation with Mexico and Canada, the NAICS established a North American business classification system and allows for more congruent data comparison between the three trading partners. As opposed to the 9 industrial categories associated with the SIC system, the NAICS has 20 international industrial classification categories.

The NAICS categorizes industries according to a predetermined six-digit industrial code which allows for a greater amount of precision as compared to the four-digit SIC index. In 2002, the NAICS codes underwent a partial revision and the changes were

reflected in the 2003 *County Business Patterns* publication. According to the U.S. Census Bureau, fourteen of the twenty sectors were completely unaffected by the restructuring process and only two sectors – Wholesale Trade and Construction – were overhauled substantially[27]. Briefly, the Census Bureau defines the six-digit North American Industrial Classification System accordingly:

- The 1st and 2nd digits represent a sector of the economy; this is the broadest level of the categorization.
- The 3rd digit signifies a sub-sector.
- The 4th digit represents an industry group.
- The 5th digit designates a particular industry. This digit is the most precise of the national industrial classification codes.
- The 6th and final digit is used to classify industries according to national origin, i.e. Canada, Mexico, or the United States.

An example of the NAICS classification process is illustrated in Table 4.1. As demonstrated below, the categorization of manufactured goods becomes more refined with the inclusion of an additional digit.

Table 4.1: Example – North American Industrial Classification System

NAICS Code	Description
31----	**Manufacturing**
313	Textile Mills: Fiber, Yarn, and Thread
3131	Mills: Fiber, Yarn, and Thread
31311	Mills

[27] The 2002 NAICS revision process affected six sector categories: Construction, Wholesale Trade, Information, Retail Trade, Mining, and Administrative Support, Waste Management, & Remediation Services. For additional information, visit the United States Census Bureau – North American Industrial Classification System (NAICS) webpage at http://www.census.gov/naics/2007/index.html.

313111	Yarn Spinning Mills: Yarn Texturizing, Throwing, and Twisting

Although CBP yields reliable aggregate data, there are various limitations to the precision of the NAICS employment statistics. First, there is a substantial delay in data reporting by the *County Business Patterns*. The tremendous volume of information collected by the Census Bureau typically takes two to three years to process and release to the general public. In a rapidly changing global marketplace, a two to three year data lag can present a misleading or inaccurate economic profile of a community. Secondly, CBP fails to include employment data for government workers, agricultural laborers, and domestic homemakers. Since CBP derives its data from an employers' payroll tax return, it fails to include any worker not reported using this method. This limitation can be mitigated if the analyses are augmented with employment data from other sources. Despite these minor limitations, CBP remains the most trusted method of indirect data collection and analysis; this is particularly true because CBP is not overly resource intensive and it provides a reasonably accurate economic profile.

Economic Base Study: Operationalization Table

For this research project, the unit of analysis is employment data published in *County Business Patterns*. By manipulating the employment statistics using the formulas and techniques located in the literature, this research can operationalize the conceptual framework table proposed at the conclusion of Chapter III. The four variables and three

components that constitute the EBA are located below in Table 4.2; also included in the table are the methods this research uses to generate the measurements from the employment data.

Table 4.2: Operationalization of the EBA Conceptual Framework Table

Operationalization Table	
Components of an EBA:	**Measurement:**
(E) Total National Employment (Ei) Total National Industry Employment (e) Total Local Employment (ei) Total Local Industry Employment	Employment figures based on estimates derived from U.S. Census Bureau Data, County Business Patterns
(LQ) Location Quotient	LQ =ei / e ÷ Ei / E
(X) Export Employment	X = [ei / Ei - e / E] * Ei
(M) Export Employment Multiplier	M = e / X

Shift-Share Analysis: Operationalization Table

This research also conducts a shift-share analysis using employment data gathered from *County Business Patterns* across a period of five years – 2000 and 2005. By manipulating these employment statistics using selected formulas located the shift-share conceptual framework table is operationalized – see Table 4.3.

Table 4.3: Operationalization of the SSA Conceptual Framework Table

Operationalization of Conceptual Framework Table	
Components of SSA:	**Measurement:**
(Ei) Regional employment in a given Industry at the beginning of a period	Estimates based on figures derived from U.S. Census Bureau Data, *County Business Patterns*
(Ei*) Regional employment in a given industry at the end of a period	
(USi) National employment in a given industry at the beginning of a period	
(USi*) National employment in a given industry at the end of the period	
(US) Total national employment at the beginning of a period	
(US*) Total national employment at the end of the period	
(NG) National Growth	$NG = E_i (US^* / US - 1)$
(IM) Industrial Mix	$IM = E_i (US_i^* / US_i - US^* / US)$
(CS) Competitive Share	$CS = E_i (E_i^* / E_i - US_i^* / US_i)$
(TEC) Total Economic Change	TEC = NG + IM + CS

Methodological Considerations

Economic development techniques, such as the EBA and SSA, are proven analytical tools; however, there are a few considerations that should be taken into account when these methods are used for analysis.

- First, these models make broad generalizations about a local economy and its industrial infrastructure. Hence, it is important that the results from the analyses should be used to inform and provide direction to policymakers and are not intended for explicit functions.
- Next, conclusions drawn from the models can be bolstered over time if enough data is collected and processed routinely to provide a method of comparison across time. If only an economic snapshot is taken, the conclusions risk being "static and (may) represent the structure of a local economy only at one point in time" (Barkley and Allison 1968, 473).

- Finally, the results from the economic growth models can be augmented by utilizing sources of data to supplement *County Business Pattern*. Although some methods may prove expensive in terms of time, money, and manpower, these analyses should provide a richer picture of the local economy when used in conjunction with the results of the EBA and SSA.

Economic Growth Models: Advantages

The literature cites critical advantages that the EBA and SSA models bring to local economic analyses. First, these tools provide a logical method of examining local economic data where none previously existed. Both models of operations research offer "a practical analytical framework enabling researchers to gain an increased insight into the functions of economic growth" (Thomas 1964, 424). Even Tiebout, who offers harsh criticisms about the structure and function of the EBA and SSA models, cedes that it offers up analysis of data in a meaningful way as compared to other competing frameworks (Tiebout 1956). Given the significance of understanding the local economy, the importance of objectively organizing and analyzing the fiscal health of a community is an important priority.

Secondly, the structured framework provided by the EBA and SSA techniques offers the user a simple and straightforward method to analyze a local market. The simplicity and direct applicability of these models to any local economy around the world has distinguished these techniques and made them extremely popular analytical tools. The speed and simplicity of the models, however, do not always work to their advantage. Murdock (1962, 68) observes that "as a quick, simple method (it) was an admittedly crude instrument, but this was understood and accepted as the cost to be paid for the

speed and simplicity it embodied." Although some critics decry the models as overly simplistic at times, the need for local governments to quickly analyze their economies and make informed decisions means that economic development models have an important function in local government.

Economic Growth Models: Disadvantages

As is true for all methodologies, the literature identifies some inherent design limitations within the economic base and shift-share models. First, Barkley and Allison (1968) stress that the export base and shift-share method are static economic profiles of a local market. The results generated from a single year's analysis should be cautiously used because they may not be representative of a community's actual economic development. By applying the methods to several different points in time, ranging from five to seven years apart, the validity of the models dramatically increases (Thomas 1968). However, the SSA and EBA findings are not meant to prognosticate with absolute precision, but rather offer a more profound impact as advisory tools for public administrators (Galambos and Schreiber 1978). Performing the analyses competently and consistently in this manner mitigates the severity of this limitation and allows for a more accurate picture of the local economy.

Another disadvantage to the use of economic growth models is outlined in the 1964 article authored by Morgan Thomas. Thomas (1964, 429) points to several variables that can cause industries in an economy to grow despite the conclusions from the models. The list of external factors that can adversely affect the findings of EBA and SSA are as follows:

1. If there is an injection of investment from the outside region sufficiently large enough to compensate for the contraction of exports, in a given region,

2. If the industries which obtain their resources and sell their products in the region grow sufficiently to compensate at least for the decline in exports, or
3. Through an improvement in the regions terms of trade with surrounding areas or the national markets.

Tiebout (1956) expands on these points by remarking that a typical regional economy is comprised of hundreds of economic units which are all engaged in creating wealth. Researchers have been unable, thus far, to precisely identify all of the variables that account for the scenarios mentioned above. The increasing integration of the local economy in the global marketplace has only exacerbated the number of unknown external variables.

Lastly, local officials in cities with a high ratio of government employees, i.e. Hays County, must be vigilant when using analyses of this type. The conclusions generated from these methods fail to account for government employees and, depending on the size of the workforce, will vary from the actual results. For example, Hays County has several significant government employers – Texas State University – San Marcos, San Marcos CISD, and Hays County – which are unaccounted for by employment estimates in *County Business Patterns*. The absence of this data negatively affects the value of these analyses; however, this inadequacy can be limited by using the EBA and SSA techniques in conjunction with other economic analysis models to offer a comprehensive view of the local economy.

Human Subjects Protection

This applied research project used aggregate data analysis to address the research topic and achieve its objectives. After a thorough review of exempt research categories

listed by the Institutional Review Board (IRB)[28], this research project was found to be exempt from IRB approval by 45 CFR, Part 46, Sec. 101(b), Item 4[29]. Exemption status was granted on the basis that only existing data sources were reviewed and no human subjects were used throughout the course of this study.

Chapter Summary

This chapter presented a methodological basis for performing the EBA and SSA on Hays County's economy. The chapter also discussed the utility of using CBP as a reliable data source despite the exclusion of certain categories of workers. This chapter concluded with a summation of the major strengths and weaknesses of the two techniques as they are applied to a local economic structure. The next chapter discusses the results of the application of the EBA and SSA models to the local economy of Hays County, Texas.

[28] For additional information regarding IRB exempt categories please visit http://www.txstate.edu/research/irb/irb_exemption_categories.php.
[29] For additional information regarding IRB statutes please visit http://edocket.access.gpo.gov/cfr_2002/octqtr/45cfr46.101.htm.

Chapter V. Results

Chapter Overview

The purpose of this chapter is to review the results of the economic base analysis (EBA) and the shift-share analysis (SSA) as applied to Hays County, Texas. The chapter presents a sector analysis that identifies the largest industry exporters in the county. The chapter also analyzes the county's competitive share component against national trends. Prior to examining the details of export employment or competitive shares, a broad perspective of the local economy is given to summarize the findings. The complete list of EBA and SSA data computations are found in Appendices A & B.

Economic Base Analysis: Summary of Results

A total of 76 sub-sectors were identified in Hays County, TX as contributing to the local economy (see Appendix A). Using the location quotient technique, 32 of the 76 sub-sectors were classified as export oriented. Summarizing the conclusions in Table 5.1, this research identifies five sectors – Retail Trade, Health Care and Social Assistance, Mining, Manufacturing, and Construction – with the greatest number of export industries. These five sectors have a total of 25 export sub-sectors that represent 78% of the total number export industries (see Table 5.1). Alternatively, the results of the analysis also indicate that there are nine major NAICS sectors in Hays County lacking export oriented industries. These industries include:

- Forestry, Fishing, Hunting, and Agriculture Support
- Wholesale Trade
- Finance and Insurance
- Professional, Scientific, and Technical Services
- Management of Companies and Enterprises
- Admin., Support, Waste Mgmt., and Remediation Services
- Educational Services
- Arts, Entertainment, and Recreation
- Unclassified Establishments

The remaining six categories have a varying combination of export and import oriented industries.

Table 5.1: Twenty Major Business Sectors Contributing to the Hays County Export Economy

NAICS Code	Sector Categories	Total # of Sub-Sectors Examined	Number of Export Industry
11----	Forestry, Fishing, Hunting, and Agriculture Support	1	0
*21----	*Mining*	*3*	*3*
22----	Utilities	1	1
*23----	*Construction*	*3*	*3*
*31----	*Manufacturing*	*18*	*7*
42----	Wholesale Trade	3	0
*44----	*Retail Trade*	*12*	*9*
48----	Transportation and Warehousing	6	1
51----	Information	5	1
52----	Finance and Insurance	3	0
53----	Real Estate, Rental, and Leasing	3	1
54----	Professional, Scientific, and Technical Services	1	0
55----	Management of Companies and Enterprises	1	0
56----	Admin., Support, Waste Mgmt., and Remediation Services	2	0
61----	Educational Services	1	0
*62----	*Health Care and Social Assistance*	*4*	*3*
71----	Arts, Entertainment, and Recreation	3	0
72----	Accommodation and Food Services	2	1
81----	Other Services (except Public Administration)	3	2
99----	Unclassified Establishments	1	0
	Sub-Sector Totals	76	32

Source: Appendix A

** Italicized NAICS sector codes indicate top export oriented industries*

Economic Base Analysis: Top Export Employers

Table 5.2 analyzes the top ten export employment contributors in Hays County. The top three include Food Services and Drinking Places, Clothing and Clothing Accessories Stores, and Social Assistance. Taken as a whole, these three industries comprise 54% of Hays County's total local export employment, while the top ten combine to constitute 84% of the county's total export employment.

Table 5.2: Top 10 Export Employment Sub-Sectors

Ranking	NAICS Code	Sub-sector	Local Employment	Percentage of Total Local Employment	Export Employment
1	722	Food Services and Drinking Places	4,427	14.1%	1,947
2	448	Clothing and Clothing Accessories Stores	2,357	7.5%	1,935
3	624	Social Assistance	1,000 – 2,499*	5.6%	1,121
4	237	Heavy and Civil Engineering Construction	871	2.8%	626
5	623	Nursing and Residential Care Facilities	1,412	4.5%	613
6	332	Fabricated Metal Product Manufacturing	859	2.7%	447
7	327	Nonmetallic Mineral Product Manufacturing	525	1.7%	399
8	335	Electrical Equipment, Appliance, and Component Manufacturing	250 - 499*	1.2%	259
9	493	Warehousing and Storage	250 - 499*	1.2%	218
10	441	Motor Vehicle and Parts Dealers	730	2.3%	205
TOTAL *For those employment estimates where no whole number was given, the mean was used to calculate the outcomes.			13,681	43.6%	7,770

Source: Appendix A

Export Employment Multiplier

After identifying which industries in Hays were export oriented, the export employment multiplier was calculated to determine the cumulative effect on the total local employment. As previously discussed in the Literature Review and Methodology chapter, the EEM is used to estimate potential changes to the total local employment resulting from an increase or decrease in export employment. Although the export employment multiplier in Table 5.3 only represents a single year's employment calculation, it is intended to give local officials an approximation of the impact of changes in the economic structure.

Table 5.3: EEM Calculation for Hays County 2005

Export Employment Multiplier			
Year	Total Local Employment (A)	Total Export Employment (B)	Multiplier = A/B
2005	31,466	9,228	3.41

Using the EEM results calculated in Table 5.3, total local employment for Hays County was almost three and a half times larger than the total export employment levels. Given that, the EEM for Hays in 2005 was 3.41. Based on these results, this study can hypothesize that if the number of export employment jobs were to increase by 100, then the total local employment would correspondingly increase by about 341. Similarly, if the number of export employment jobs were to decrease by 100, then the total local employment would likely suffer from the loss of approximately 341 jobs. Although the EEM is only a rough estimate of the impact of export industries, the results from this analysis can be strengthened by conducting a series of export employment multiplier analyses and averaging the results.

Shift-Share Analysis: Summary of Results

The SSA is comprised of three different components that measure a local economy; the national growth, industrial mix, and the competitive share component. Of these three measurements, the competitive share is the most important calculation because it is the only component that can be directly affected by local policy makers. Calculating the competitive share component routinely can help determine whether or not the local economy is capturing its share of that industry as compared to the national economy. If the result of the competitive share (CS) is positive, then the local economy is capturing its market share of that industry. If the result of the competitive share is negative, then the local economy is not capturing its full market share of that industry and policy makers should look to improve the situation, especially if the industry has been identified as an important exporter through export base analysis.

Tables 5.4 through 5.7 specifically address the competitive share component of the Hays County shift-share analysis. Each table represents an aspect of the competitive share component; this is useful for policy makers to understand because they comparatively identify the strengths and weaknesses of the local economy with how the national economy is performing. Prior to analyzing the results, it is important to re-iterate that the results of the SSA tell the researcher what is occurring, it does not reveal **why** the local economy is reacting in the way it has.

Table 5.4 is the most important table of the four addressing the CS component because it alerts researchers to negative trends in the local economy. According to the table, there are a total of nine industries that are losing their competitive share in the local economy as compared to the nation. Electronics and Appliance Stores (NAICS Code

443) show the greatest amount of loss at -107 jobs. This reduction in CS represents over a quarter of the county's current total losses. Furthermore, the identification of this industry, in particular, is important to note because it was previously identified by the EBA results as one of the top ten exporters in the county. Again, although the reasons for the decline in this industry are beyond the scope of the EBA and SSA, policy makers should be urged to investigate further.

Table 5.4: CS – Expanding Nationally and Declining Locally

NAICS Code	Description	Competitive Share (CS)*
442	Furniture and Home Furnishings Store	-18
443	Electronics and Appliance Stores	-107
488	Support Activities for Transportation	-7
533	Lessors of Nonfinancial Intangible Assets (except Copyrighted Works)	-1
561	Administrative and Support Services	-38
562	Waste Management and Remediation Services	-68
622	Hospitals	-46
711	Performing Arts, Spectator Sports, and Related Industries	-60
712	Museums, Historical Sites, and Similar Institutions	-56
Total Competitive Share (CS)		-401

Source: Appendix B

** Each competitive share component represents one employment position*

Table 5.5 indicates that 26 sub-sectors and 2 sectors[30] demonstrated a strong local economic presence while simultaneously declining nationally. While some may assume that this optimistic picture of the local economy should be cause for praise, this table should be looked at with extreme prejudice. The industries listed in Table 5.5 are all receding at the national level; since national growth is more likely to be an indicator of local growth, the economic benefits currently experienced by the community may be short lived. In other words, industries possessing a competitive share in a declining national field may shortly be experiencing the same fate. On a positive note, the industries listed in the table below have obviously been successful in improving their economic standing in the community and local officials should take notice of that fact.

[30] The shift-share analysis for 2000 and 2005 used two distinct NAICS code systems. Some of the codes for this study were incongruent, thus the study relied on two digit sector totals.

Table 5.5: CS – Declining Nationally and Expanding Locally

NAICS Code	Description	Competitive Share (CS)*
11	Forestry, fishing, hunting, and agriculture support	8
212	Mining (except Oil and Gas)	59
213	Support Activities for Mining	54
221	Utilities	94
311	Food Manufacturing	2
312	Beverage and Tobacco Product Manufacturing	1
314	Textile Product Mills	9
322	Printing and Related Support Activities	6
323	Petroleum and Coal Products Manufacturing	16
326	Plastics and Rubber Products Manufacturing	18
327	Nonmetallic Mineral Product Manufacturing	265
331	Primary Metal Manufacturing	3
332	Fabricated Metal Product Manufacturing	138
333	Machinery Manufacturing	16
334	Computer and Electronic Product Manufacturing	19
336	Transportation Equipment Manufacturing	47
337	Furniture and Related Product Manufacturing	103
339	Miscellaneous Manufacturing	60
42	Wholesale Trade	220
445	Food and Beverage Stores	242
447	Gasoline Stations	11
454	Nonstore Retailers	49
481	Air Transportation	13
486	Pipeline Transportation	9
492	Couriers and Messengers	51
51	Information	179
532	Rental and Leasing Services	115
811	Repair and Maintenance	206
Total Competitive Share (CS)		2013

Source: Appendix B

** Each competitive share component represents one employment position*

As can be inferred by the title of Table 5.6, industries located in this table are experiencing a loss of market share nationally and locally. Although this chart cannot be made to say why these industries are experiencing economic hardships, this table

provides an excellent way for policy makers to determine which sub-sectors need direct assistance from the local government.

Table 5.6: CS – Declining Nationally and Declining Locally

NAICS Code	Description	Competitive Share (CS)*
321	Wood Product Manufacturing	-103
324	Petroleum and Coal Products Manufacturing	-103
325	Chemical Manufacturing	-3
335	Electrical Equipment, Appliance, and Component Manufacturing	-25
453	Miscellaneous Store Retailers	-38
523	Securities, Commodity Contracts, and Other Financial Investments and Related Activities	-12
551	Management of Companies and Enterprises	-200
99	Unclassified establishments	-7
Total Competitive Share (CS)		-491

Source: Appendix B

* *Each competitive share component represents one employment position*

Finally, Table 5.7 examines those local and national industries that are experiencing synonymous growth. A number of industries in this table have large competitive share values. Within these industries, in particular, policy makers can look for clues and strategies on how to improve the standing's of the rest of their local industries. The expansion of these industries nationally is a powerful indicator that these sub-sectors will continue to grow locally as well.

Table 5.7: CS – Expanding Nationally and Expanding Locally

NAICS Code	Description	Competitive Share (CS)*
211	Oil and Gas Extraction	50
23	Construction	497
441	Motor Vehicle and Parts Dealers	218
444	Building Material and Garden Equipment and Supplies Dealers	84
446	Health and Personal Care Stores	64
448	Clothing and Clothing Accessories Stores	98
451	Sporting Goods, Hobby, Book, and Music Stores	168
452	General Merchandise Stores	59
484	Truck Transportation	48
493	Warehousing and Storage	332
522	Credit Intermediation and Related Activities	13
524	Insurance Carriers and Related Activities	52
531	Real Estate	106
541	Professional, Scientific, and Technical Services	779
611	Educational Services	60
621	Ambulatory Health Care Services	537
623	Nursing and Residential Care Facilities	556
624	Social Assistance	129
713	Amusement, Gambling, and Recreation Industries	13
721	Accommodation	71
722	Food Services and Drinking Places	700
812	Personal and Laundry Services	136
813	Religious, Grantmaking, Civic, Professional, and Similar Organizations	220
Total Competitive Share (CS)		4990

Source: Appendix B

* *Each competitive share component represents one employment position*

The industrial mix and national growth components are important variables when comparing the local economy against national trends for a given period; however, these components are largely outside the control of local policy makers. For this reason, they

are not as extensively reviewed by the results chapter of this research project as the competitive share component is. However, the calculations and results of the industrial mix and national growth components are included in Appendix B for further review.

Chapter Summary

This chapter analyzed the results of the economic base study and shift-share analysis performed on Hays County 2005. The economic base analysis identified retail, construction, and manufacturing industries as leading the way, economically speaking, in Hays County. With regard to the results of the shift-share analysis, the element analyzed for this method was the competitive share component because it is the only variable that local policy makers have the ability to affect. The next chapter will offer concluding thoughts and recommendations.

VI. Conclusion

Chapter Overview

This chapter briefly summarizes the findings of each chapter. Moreover, this chapter offers recommendations on the practicality and usefulness of economic base analysis and shift-share analysis for diagnosing a community's financial health.

Summary of Chapters

This research project is divided into five primary chapters. Chapter two examines the economic progress Hays County has made via maintaining positive population trends, a prosperous business atmosphere, and hypothesizes how the future growth of Hays County might impact the region. Hays County's rapid growth can be primarily attributed to the Austin-San Antonio Corridor, Texas State University – San Marcos, and the continued growth of the county seat, San Marcos. The Austin-San Antonio Corridor, aided by NAFTA and made possible by IH 35, has provided the surrounding region with a sustainable flow of outside revenue. The annual growth of TSU ensures the community of an educated labor pool and consumer base. Finally, San Marcos' geographic location between two of the fastest growing metropolitans in the U.S. – Austin and San Antonio – and within 200 miles of Dallas and Houston present the city with a number of opportunities. Continual population growth in conjunction with steady employment increases bodes well for the city at the present time. Finally, the chapter concludes with the introduction of the economic base analysis (EBA) and the shift-share analysis as a means to manage the rapid growth in the region.

Chapter three reviews literature pertinent to the discussion of the economic base analysis and the shift-share analysis. By analyzing various literary sources, an indirect

industry classification technique – the location quotient – is selected to perform the analysis on Hays County. Utilizing employment statistics located in *County Business Patterns,* the literature identifies a reliable and user friendly data set. From the methodological foundation documented in the literature, a conceptual framework table is constructed to analyze Hays County's local economy.

Chapter four introduces the reader to the methodology surrounding the export base theory and shift-share technique. The chapter reviews the concept of the North American Industrial classification System (NAICS) and how it functions within *County Business Patterns*. The chapter builds upon the conceptual framework table constructed in the previous chapter and provides direction on how the research aims to operationalize the methods.

Finally, chapter five provides a summary of the results that occurred from the application of the EBA and SSA to Hays County's local economy. This chapter confirms what many people had suspected, Hays County is a robust and diverse economy with strong ties to the retail, construction, manufacturing, and health services industry groups. An important revelation made by the SSA was that despite the national economic slowdown occurring in manufacturing, the industry is experiencing significant growth in Hays County. The relevance of this notion is that local economy's typically have little influence on their national counterparts; thus, if the manufacturing industries are failing nationally, then a manufacturing slowdown may well be on the horizon for Hays County as well.

Final Considerations

EBA and SSA models are limited in the perspective they can provide policy makers; however, these techniques can guide policy makers, assuming they are consistently applied and the results are interpreted in the proper context. With regard to Hays County, the research conclusions for the county have a limited impact because of the large government sectors in the area. In particular, the exclusion of 6,406 TSU staff and faculty, 1,081 San Marcos CISD employees, and 802 Hays County municipal workers by *County Business Patterns*' data set should caution policy makers against accepting the conclusions of this study outright. The exclusion of this data this limits the validity and accuracy of the EEM shown in Table 5.3.

Despite the effort of this research initiative to project absolute results, it takes several years worth of analyses to have accurate measurements and consistent data to draw true conclusions from. It would be naively incorrect to base any major decisions on the results of this analysis alone. This further re-emphasizes the necessity of local governments to perform analyses on a regular basis to monitor the fiscal health of the community, so that they avoid relying solely on conclusions which might contain skewed data. In spite of these limitations, this research demonstrates that in a period of national prosperity, Hays County is flourishing and experiencing rapid growth of its own in an increasingly diversified local economy. Whether the trend will continue can only be determined by careful observation and informed action.

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Appendix A

Appendix Purpose

The purpose of Appendix A is to provide empirical data to support the conclusions of the EBA portion of this research project. The data listed below has been uniformly assembled and organized according to the column titles and NAICS identification. Further elaboration on the construction and organization of this table is outlined below.

Column Identification

Identification and explanation of the columns in this spreadsheet:

I. The first two columns – (1) and (2) - express the North American Industrial Classification System (NAICS) code used by *County Business Patterns* and give a description of the industry code. For the purposes of this research, a three digit NAICS code is used to conduct the economic base study. In brief, the six-digit NAICS code can be defined accordingly:

    - The 1st and 2nd digits identify an overall industry classification; this represents the broadest level of classification.
    - The 3rd digit signifies a sub-sector within a given industry. This digit is the most used for general research purposes.
    - The 4th digit denotes a given industry group.
    - The 5th digit represents a specific industry; this digit is the most precise indicator reflecting national industrial classification codes.
    - The 6th and final digit is used to classify industries according to their national origin, i.e. Canada, Mexico, or the United States.

II. Columns three (3) and four (4) provide specific industry employment figures for the national economy in 2005 and the percentage each industry represents in the total national economy. As of 2005, the total national employment figure for the U.S. was 116,317,003.

III. The figures in column five (5) express the quantity of local employees per each industry. Since some employment figures were presented as a range, the mean of the two variables was used to make further calculations. Specifically, the following employment ranges were averaged accordingly:

0 - 19 – employment mean used = 10
20 - 99 – employment mean used = 60
100 - 249 – employment mean used = 175
250 - 499 – employment mean used = 375
500 - 999 – employment mean used = 750
1,000 - 2,4999 – employment mean used = 1,750

IV. Column six (6) provides the local employment requirements for each NAICS code and is determined by multiplying the percentage figure in column four by 31,466 – this represents the total local employment amount for Hays County in 2005.

V. The figures in column seven indicate either export or import employment figures. Export/import employment statistics are used to determine the strengths and weaknesses of the local economy, as well as the location quotient in column eight.

VI. The LQ notations in column eight are determined by subtracting the Hays County employment figure in column five from the local requirements in column 6 thereby generating a result which is $> 1 \leq$. If the difference between the two columns is greater than one, then it indicates export employment for Hays County

and is represented in the table as a normal integer. If the difference between the two columns is less than or equal to one, then it indicates import employment Hays County and is represented in the table as red colored integer enclosed in parentheses.

The national employment figures are provided by the County Business Patterns, United States, 2005, published by the United States Census Bureau. Employment figures for Hays County are provided by the County Business Patterns, Texas, 2005, also published by the U.S. Census Bureau. The format for this export employment spreadsheet is based a similar worksheet by Galambos and Schreiber (1978, 25).

Export Employment Worksheet: Hays County, TX - 2005

Export Employment computed from location quotients: Hays County, TX – 2005							
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Employment Category		U.S. Employment		Hays County Employment	Hays County Employment for Local Requirements	Excess Employment = Export or (deficit)	LQ Notation
NAICS Code	Description	Amount	% of Total	Amount	(col. 4 times 31,466)	(col. 5 minus col. 6)	(col. 7 > 1 = Export)
For non-specific employment figures, calculations were made using the mean							
Forestry, fishing, hunting, and agriculture support:							
115	Support Activities for Agriculture and Forestry	92,001	0.08%	1	25	(24)	
Mining:							
211	Oil and Gas Extraction	86,562	0.07%	20 - 99	22	38	Export
212	Mining (except Oil and Gas)	196,940	0.17%	20 - 99	53	7	Export
213	Support Activities for Mining	96,261	0.08%	20 - 99	25	35	Export
Utilities:							
221	Utilities	633,106	0.54%	175	170	5	Export
Construction:							
236	Construction of Buildings	1,613,063	1.39%	441	437	4	Export
237	Heavy and Civil Engineering Construction	908,222	0.78%	871	245	626	Export
238	Specialty Trade Contractors	4,260,042	3.66%	1,284	1152	132	Export
Manufacturing:							
311	Food Manufacturing	1,469,730	1.26%	170	396	(226)	
312	Beverage and Tobacco Product Manufacturing	154,233	0.13%	0 - 19	41	(31)	
314	Textile Product Mills	163,675	0.14%	0 - 19	44	(31)	
321	Wood Product Manufacturing	555,942	0.48%	20 - 99	151	(92)	
322	Paper Manufacturing	453,966	0.39%	100 - 249	123	52	Export
323	Printing and Related Support Activities	657,759	0.57%	91	179	(88)	

324	Petroleum and Coal Products Manufacturing	101,505	0.09%	20 - 99	28	32	Export
325	Chemical Manufacturing	810,368	0.70%	6	220	(214)	
326	Plastics and Rubber Products Manufacturing	902,109	0.78%	85	245	(160)	
327	Nonmetallic Mineral Product Manufacturing	469,151	0.40%	525	126	399	Export
331	Primary Metal Manufacturing	450,811	0.39%	0 - 19	123	(114)	
332	Fabricated Metal Product Manufacturing	1,519,845	1.31%	859	412	447	Export
333	Machinery Manufacturing	1,107,285	0.95%	96	299	(203)	
334	Computer and Electronic Product Manufacturing	148,300	0.13%	20 - 99	41	19	Export
335	Electrical Equipment, Appliance, and Component Manufacturing	426,822	0.37%	250 - 499	116	259	Export
336	Transportation Equipment Manufacturing	1,636,111	1.41%	250 - 499	444	(70)	
337	Furniture and Related Product Manufacturing	547,859	0.47%	195	148	47	Export
339	Miscellaneous Manufacturing	688,239	0.59%	138	186	(48)	
Wholesale Trade:							
423	Merchant Wholesalers, Durable Goods	3,365,466	2.89%	480	909	(429)	
424	Merchant Wholesalers, Nondurable Goods	2,289,266	1.97%	179	620	(441)	
425	Wholesale Electronic Markets and Agents and Brokers	314,197	0.27%	39	85	(46)	
Retail Trade:							
441	Motor Vehicle and Parts Dealers	1,947,916	1.67%	730	525	205	Export
442	Furniture and Home Furnishings Stores	575,629	0.49%	309	154	155	Export

443	Electronics and Appliance Stores	469,248	0.40%	165	126	39	Export
444	Building Material and Garden Equipment and Supplies Dealers	1,262,662	1.09%	448	343	105	Export
445	Food and Beverage Stores	2,937,918	2.53%	914	796	118	Export
446	Health and Personal Care Stores	1,037,354	0.89%	247	280	(33)	
447	Gasoline Stations	908,818	0.78%	364	245	119	Export
448	Clothing and Clothing Accessories Stores	1,555,928	1.34%	2357	422	1935	Export
451	Sporting Goods, Hobby, Book, and Music Stores	631,095	0.54%	280	170	110	Export
452	General Merchandise Stores	2,670,710	2.30%	651	724	(73)	
453	Miscellaneous Store Retailers	819,903	0.70%	349	220	129	Export
454	Non-store Retailers	521,491	0.45%	113	142	(29)	
Transportation & Warehousing:							
481	Air Transportation	486,355	0.42%	20 - 99	132	(73)	
484	Truck Transportation	1,478,299	1.27%	168	400	(232)	
486	Pipeline Transportation	148,674	0.13%	0 - 19	41	(32)	
488	Support Activities for Transportation	543,666	0.47%	52	148	(96)	
492	Couriers and Messengers	547,255	0.47%	20 - 99	148	(89)	
493	Warehousing and Storage	578,040	0.50%	250 - 499	157	218	Export
Information:							
511	Publishing Industries (except Internet)	1,032,273	0.89%	87	280	(193)	
512	Motion Picture and Sound Recording Industries	314,396	0.27%	84	85	(1)	
517	Telecommunications	1,226,536	1.05%	416	330	86	Export
518	Internet Service Providers, Web Search Portals, and Data Processing Services	452,159	0.39%	20 - 99	123	(64)	
519	Other Information Services	54,052	0.05%	0 - 19	16	(7)	
Finance and Insurance:							

522	Credit Intermediation and Related Activities	3,201,715	2.75%	417	865	(448)	
523	Securities, Commodity Contracts, and Other Financial Investments and Related Activities	860,384	0.74%	48	233	(185)	
524	Insurance Carriers and Related Activities	2,323,045	2%	147	629	(482)	
Real estate & rental & leasing:							
531	Real Estate	1,480,040	1.27%	308	400	(92)	
532	Rental and Leasing Services	634,901	0.55%	100 - 249	173	2	Export
533	Lessors of Nonfinancial Intangible Assets (except Copyrighted Works)	29,136	0.03%	0 - 19	9	1	
Professional, scientific, & technical services:							
541	Professional, Scientific, and Technical Services	7,689,366	6.61%	1,469	2080	(611)	
Management of companies and enterprises:							
551	Management of Companies and Enterprises	2,856,418	2.46%	344	774	(430)	
Admin., support, waste mgt., remediation services:							
561	Administrative and Support Services	8,946,939	7.69%	1,103	2420	(1317)	
562	Waste Management and Remediation Services	333,343	0.29%	53	91	(38)	
Educational services:							
611	Educational Services	2,879,374	2.48%	476	780	(304)	
Health care and social assistance:							
621	Ambulatory Health Care Services	5,422,574	4.66%	1,549	1466	83	Export
622	Hospitals	5,321,600	4.58%	500 - 999	1441	(692)	
623	Nursing and Residential Care Facilities	2,959,571	2.54%	1412	799	613	Export
624	Social Assistance	2,321,402	2%	1,000 - 2,499	629	1121	Export
Arts, entertainment, & recreation:							

711	Performing Arts, Spectator Sports, and Related Industries	412,146	0.35%	0 - 19	110	(101)	
712	Museums, Historical Sites, and Similar Institutions	120,908	0.10%	0 - 19	31	(22)	
713	Amusement, Gambling, and Recreation Industries	1,403,430	1.21%	212	381	(169)	
Accommodation and food services:							
721	Accommodation	1,854,499	1.59%	333	500	(167)	
722	Food Services and Drinking Places	9,171,410	7.88%	4427	2480	1947	Export
Other services (except public administration):							
811	Repair and Maintenance	1,294,783	1.11%	486	349	137	Export
812	Personal and Laundry Services	1,337,443	1.15%	360	362	(2)	
813	Religious, Grantmaking, Civic, Professional, and Similar Organizations	2,758,728	2.37%	751	746	5	Export
Unclassified establishments:							
99	Unclassified establishments	31,153	0.03%	4	9	(5)	
TOTAL EMPLOYMENT		116,317,003	97.99%	31,466	30,829	9228	
For non-specific employment figures, calculations were made using the mean							

Appendix B

Appendix Purpose

The purpose of Appendix B is to provide empirical data to support the conclusions of the SSA portion of this research project. The data listed below has been uniformly assembled and organized according to the column titles and NAICS identification. Further elaboration on the construction and organization of the table is outlined below.

Column Identification

Identification and explanation of the columns in this spreadsheet:

I. The first two columns – (1) and (2) - express the North American Industrial Classification System (NAICS) code used by *County Business Patterns* and give a description of the industry code. For the purposes of this research, two and three digit NAICS codes were used to perform the shift-share analysis. A minor variation in NAICS digits was necessary due to the unavailability of a small number of three digit employment codes. There are four 2 digit NAICS categories are 1) Forestry, fishing, hunting, and agriculture support; 2) Construction; 3) Wholesale Trade; and 4) Information.

II. Columns three and four are representative of 2000 and 2005 national employment figures and the corresponding percentage difference between the two variables. If the difference between the two columns is positive, then the figure indicates national industrial growth and is represented in the table as a normal integer. If the difference between the two columns is negative, then the figure indicates a national industrial decline and is represented in the table as a red colored integer enclosed in parentheses.

III. Columns five and six represent similar employment figures as described in paragraph II above, with the exception that the figures represent Hays County instead of the national economy. Additionally, it should also be noted that non-specific local employment estimates were calculated according to the mean of the two variables given, as similarly computed in the EBA above.

IV. Column seven signifies local employment changes related to national growth; this component measures a county's potential growth, assuming its economy was configured exactly the same as the national economy. In order to determine the

national growth, the percentage difference between the 2000 national employment level (114,064,976) and 2005 level (116,317,003) must first be determined; in this case, the national economy grew 1.97%. The national growth percentage is then multiplied according to each local employment classification in 2000 to determine what the county growth should have been if the local economy had kept pace with the national economy for the given time period.

V. Column eight signifies the employment changes related to industrial mix. To determine this figure, the percentage in column four is subtracted from the national growth percentage – 1.97%. The resulting percentage is then multiplied for each local employment level in 2000. If the product of the two columns is positive, then the resulting decimal represents a faster than average growth in the given area. If the product of the two columns is negative, then the resulting decimal represents a slower than average growth in the given area and is distinguished on the table as a red colored decimal enclosed in parentheses.

VI. Column nine is representative of the amount of employment increase or decrease in a given industry for Hays County. This figure is determined by subtracting the county percentage change in column six from the national percentage change in column four. The difference of these two columns is then multiplied by the 2000 county employment estimate in column five. If the product of the two columns is positive, then the resulting figure

VII. Column ten indicates the total change for each NAICS code and is determined by adding the figures in column seven, eight, and nine. The resulting figure in

column ten, when added with the 2000 Hays County employment figure, will equal the 2005 employment figure.

The national employment figures are provided by County Business Patterns, United States, 2000 and County Business Patterns, United States, 2005, published by the United States Census Bureau. Local employment figures for Hays County are provided by County Business Patterns, United States, 2000 and County Business Patterns, Texas, 2005, also published by the U.S. Census Bureau. The format for this shift-share analysis spreadsheet is based a similar worksheet by Galambos and Schreiber (1978, 35-36).

Shift-Share Analysis Worksheet: Hays County, TX – 2000 - 2005

Shift-Share Analysis for Hays County, TX – 2000 – 2005											
******For non-specific employment figures, calculations were made using the mean******											
(1)	(2)	(3)		(4)	(5)		(6)	(7)	(8)	(9)	(10)
		U.S. Employment			**Hays County Employment**						
NAICS Code	Description	2,000	2,005	% Change	2,000	2,005	% Change	Nat. Growth	Ind. Mix	Comp. Share	Total Change
Forestry, fishing, hunting, and agriculture support:											
11----	Forestry, fishing, hunting, and agriculture support	183,565	168,744	(8.07)	0-19	1	(90)	0.197	(1.004)	8.193	7
Mining:											
211	Oil and Gas Extraction	83,012	86,562	4.28	0-19	20 - 99	500	0.197	0.231	49.572	50

212	Mining (except Oil and Gas)	204,329	196,940	(3.62)	1	20 - 99	5,900	0.02	(0.056)	59.036	59
213	Support Activities for Mining	168,787	96,261	(42.97)	0-19	20 - 99	500	0.197	(4.494)	54.297	50
Utilities:											
221	Utilities	655,230	633,106	(3.38)	84	175	108.33	1.655	(4.494)	93.836	91
Construction:											
23----	Construction	6,572,800	6,781,327	3.17	2,035	2,596	27.57	40.09	24.42	496.54	561
Manufacturing:											
311	Food Manufacturing	1,468,254	1,469,730	(0.1)	20-99	170	183.33	1.182	(1.242)	1.834	2
312	Beverage and Tobacco Product Manufacturing	169,230	154,233	(8.41)	0-19	0 - 19	0	0.197	(1.038)	0.841	0
314	Textile Product Mills	215,669	163,675	(24.11)	1	0 - 19	900	0.02	(0.261)	8.759	9
321	Wood Product Manufacturing	597,684	555,942	(6.98)	100-249	20 - 99	(65.71)	3.448	(15.662)	(102.78)	(115)
322	Paper Manufacturing	553,943	453,966	(18.05)	205	100 - 249	(14.63)	4.039	(41.041)	5.985	(31)
323	Printing and Related Support Activities	813,389	657,759	(19.13)	93	91	(2.15)	1.832	(19.623)	15.791	(2)
324	Petroleum and Coal Products Manufacturing	109,223	101,505	(7.06)	100-249	20 - 99	(65.71)	3.448	(15.803)	(102.64)	(115)
325	Chemical Manufacturing	885,848	810,368	(8.52)	0-19	6	(40)	0.197	(1.049)	(3.148)	(4)
326	Plastics and Rubber Products Manufacturing	1,056,507	902,109	(14.61)	79	85	7.59	1.556	(13.098)	17.538	6
327	Nonmetallic Mineral Product Manufacturi	523,698	469,151	(10.41)	290	525	81.03	5.713	(35.902)	265.176	235

	ng										
331	Primary Metal Manufacturing	601,627	450,811	(25.06)	0-19	0 - 19	0	0.197	(2.703)	2.506	0
332	Fabricated Metal Product Manufacturing	1,790,817	1,519,845	(15.13)	849	859	1.18	16.725	(145.18)	138.472	10
333	Machinery Manufacturing	1,377,950	1,107,285	(19.64)	100	96	(4)	1.97	(21.61)	15.640	(4)
334	Computer and Electronic Product Manufacturing	1,557,087	1,058,992	(31.99)	20-99	20 - 99	0	1.182	(20.376)	19.194	0
335	Electrical Equipment, Appliance, and Component Manufacturing	589,406	426,822	(27.58)	553	250 - 499	(32.18)	10.894	(163.412)	(25.438)	(178)
336	Transportation Equipment Manufacturing	1,872,630	1,636,111	(12.63)	250-499	250 - 499	0	7.387	(54.750)	47.363	0
337	Furniture and Related Product Manufacturing	640,444	547,859	(14.45)	107	195	82.24	2.108	(17.569)	103.458	88
339	Miscellaneous Manufacturing	732,200	688,239	(6)	83	138	66.27	1.635	(6.615)	59.984	55
Wholesale Trade:											
42----	Wholesale Trade	6,112,029	5,968,929	(2.34)	489	698	42.74	9.633	(21.076)	220.441	209
Retail Trade:											
441	Motor Vehicle and Parts Dealers	1,866,293	1,947,916	4.37	491	730	48.68	9.673	11.784	217.562	239
442	Furniture and Home Furnishings	549,184	575,629	4.81	295	309	4.75	5.812	8.378	(17.7)	(4)

	Stores										
443	Electronics and Appliance Stores	407,321	469,248	15.20	236	165	(30.08)	4.649	31.223	(106.861)	(71)
444	Building Material and Garden Equipment and Supplies Dealers	1,235,387	1,262,662	2.21	356	448	25.84	7.19	0.854	84.123	92
445	Food and Beverage Stores	3,004,410	2,937,918	(2.21)	687	914	33.04	13.534	(28.717)	242.168	227
446	Health and Personal Care Stores	913,896	1,037,354	13.51	161	247	53.42	3.172	18.579	64.255	86
447	Gasoline Stations	937,083	908,818	(3.02)	366	364	(0.01)	7.21	(18.263)	11.017	(0)
448	Clothing and Clothing Accessories Stores	1,368,665	1,555,928	13.68	1,210	2,357	94.79	23.837	14.169	98.143	136
451	Sporting Goods, Hobby, Book, and Music Stores	616,237	631,095	2.41	109	280	156.88	2.147	0.480	168.372	171
452	General Merchandise Stores	2,526,107	2,670,710	5.72	560	651	16.25	11.032	21	58.968	91
453	Miscellaneous Store Retailers	849,661	819,903	(3.50)	401	349	(12.97)	7.899	(21.935)	(37.975)	(52)
454	Nonstore Retailers	566,531	521,491	(7.95)	70	113	61.43	1.379	(6.944)	48.566	43
Transportation & Warehousing:											
481	Air Transportation	615,605	486,355	(20.99)	20-99	20 - 99	0	1.182	(13.776)	12.594	0
484	Truck Transportation	1,415,794	1,478,299	4.41	115	168	46.09	2.266	2.806	47.932	53
486	Pipeline Transportation	52,960	38,053	(28.15)	1	0 - 19	900	0.02	(0.301)	9.282	9
488	Support Activities for Transportatio	472,372	543,666	15.09	51	52	1.96	1.005	6.691	(6.696)	1

	n										
492	Couriers and Messengers	619,313	547,255	(11.64)	0-19	20 - 99	500	0.197	(1.361)	51.164	50
493	Warehousing and Storage	135,898	578,040	325.35	0-19	250 - 499	3,650	0.197	32.338	332.465	365
Information:											
51----	Information	3,545,731	3,402,599	(4.04)	469	629	34.12	9.239	(28.187)	178.970	160
Finance and Insurance:											
522	Credit Intermediation and Related Activities	2,753,190	3,201,715	16.29	349	417	19.48	6.875	49.978	13.302	70
523	Securities, Commodity Contracts, and Other Financial Investments and Related Activities	866,222	860,384	(0.01)	20-99	48	(20)	1.182	(1.188)	(11.994)	(12)
524	Insurance Carriers and Related Activities	2,290,162	2,323,045	1.44	94	147	56.38	1.852	(0.498)	51.644	53
Real estate & rental & leasing:											
531	Real Estate	1,279,547	1,480,040	15.67	100-249	308	76	3.448	23.975	105.578	133
532	Rental and Leasing Services	636,037	634,901	0	20-99	100 - 249	191.67	1.182	(1.182)	115.002	115
533	Lessors of Nonfinancial Intangible Assets (except Copyrighted Works)	26,462	29,136	10.11	0-19	0 - 19	0	0.197	0.814	(1.011)	0
Professional, scientific, & technical services:											
541	Professional, Scientific, and Technical Services	6,816,216	7,689,366	12.81	612	1,469	140.03	12.056	66.341	778.586	78
Management of companies and enterprises:											
551	Management of Companies and Enterprises	2,873,521	2,856,418	(0.01)	544	344	(36.76)	10.717	(10.771)	(199.920)	(200)

Admin., support, waste mgt., remediation services:											
561	Administrative and Support Services	8,846,617	8,946,939	1.13	1,128	1,103	(2.22)	22.222	(9.475)	(37.788)	(25)
562	Waste Management and Remediation Services	291,483	333,343	14.36	106	53	(50)	2.088	13.133	(68.221)	(53)
Educational services:											
611	Educational Services	2,532,324	2,879,374	13.70	366	476	30.05	7.21	42.932	59.841	110
Health care and social assistance:											
621	Ambulatory Health Care Services	4,566,196	5,422,574	18.75	852	1,549	81.81	16.784	142.966	537.271	697
622	Hospitals	5,014,641	5,321,600	6.12	500-999	500 - 999	0	14.775	31.125	(45.9)	0
623	Nursing and Residential Care Facilities	2,592,119	2,959,571	14.18	500-999	1,412	88.27	14.775	91.575	555.675	662
624	Social Assistance	1,935,699	2,321,402	19.93	1,352	1,000 - 2,499	29.44	26.634	242.819	128.575	398
Arts, entertainment, & recreation:											
711	Performing Arts, Spectator Sports, and Related Industries	351,919	412,146	17.11	20-99	0 - 19	(83.33)	1.182	9.084	(60.264)	(50)
712	Museums, Historical Sites, and Similar Institutions	110,380	120,908	9.54	20-99	0 - 19	(83.33)	1.182	4.542	(55.722)	(50)
713	Amusement, Gambling, and Recreation Industries	1,279,198	1,403,430	9.71	181	212	17.13	3.566	14.009	13.430	31
Accommodation and food services:											
721	Accommodation	1,767,782	1,854,499	4.91	250	333	33.20	4.925	7.350	70.725	83
722	Food Services and Drinking Places	8,113,141	9,171,410	13.04	3,297	4,427	34.27	64.951	364.978	699.953	1,130
Other services (except public administration):											

811	Repair and Maintenance	1,334,206	1,294,783	(2.95)	289	486	68.17	5.693	(14.219)	205.537	197
812	Personal and Laundry Services	1,293,215	1,337,443	3.42	217	360	65.90	4.275	3.147	135.582	143
813	Religious, Grantmaking, Civic, Professional, and Similar Organizations	2,665,978	2,758,728	3.48	513	751	46.39	10.106	7.746	220.128	238
Unclassified establishments:											
99----	Unclassified establishments	143,600	31,153	(78.31)	53	4	(92.45)	1.004	(42.548)	(7.494)	(49)
TOTAL U.S. Employment		114,064,976	116,317,003	1.97	24,040	31,466	30.89	475.87	460.97	6,109.32	7,057.60

***Obtained by dividing ending year employment by beginning year employment , then subtracting one and moving decimal two places to the right

******For non-specific employment figures, calculations were made using the mean******