

A Reprint from *Tierra Grande*

Side by Side

By Ali Anari

U.S. AND TEXAS BUSINESS CYCLES CLOSELY TIED

What economic forces are behind the comovement of U.S. and Texas employment growth rates? Some economic variables drive the U.S. and Texas economies in the same direction while others drive them in opposite directions.

Higher growth rates in consumption and gross domestic product in the nation generate more demand for labor to produce goods and services, leading to higher employment growth rates in both the U.S. and Texas economies. In this case, growth in consumption and output are common factors driving regional and national employments.

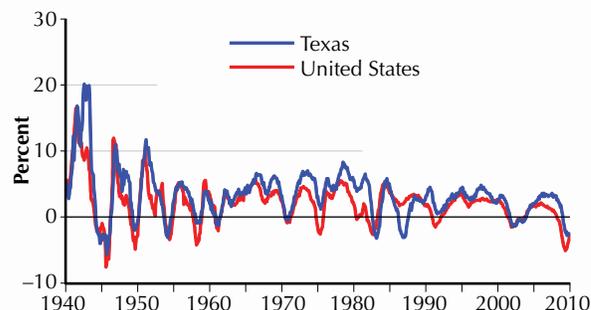
By contrast, changes in oil prices drive the economies of oil-producing states such as Texas and Louisiana in a direction opposite to non-oil-producing states. On the supply side, higher oil prices generate more profits for oil-producing firms and more tax revenues for oil-producing states, leading to higher employment growth rates. On the demand side, higher oil prices lead to higher costs and prices of goods and services, resulting in lower demand for goods and services.

In oil-producing states, the adverse impacts of higher oil prices on the demand side can be offset by their positive impacts on the supply side. But non-oil-producing states suffer from the demand side adverse impacts of higher oil prices without the supply side benefits. The price of oil is an important factor that drives the U.S. and Texas economies in opposite directions, weakening the degree of comovement of the two economies.

Comovement of Employment Growth Rates

Three distinct periods illustrate the relationships between the Texas and U.S. employment rate time series (Figure 1). In the first period, from 1940 to 1986, the two time series of employment growth rates experienced strong comovement.

Figure 1. Texas and U.S. Employment Growth Rates, 1940–2010



Sources: Bureau of Labor Statistics and Real Estate Center at Texas A&M University

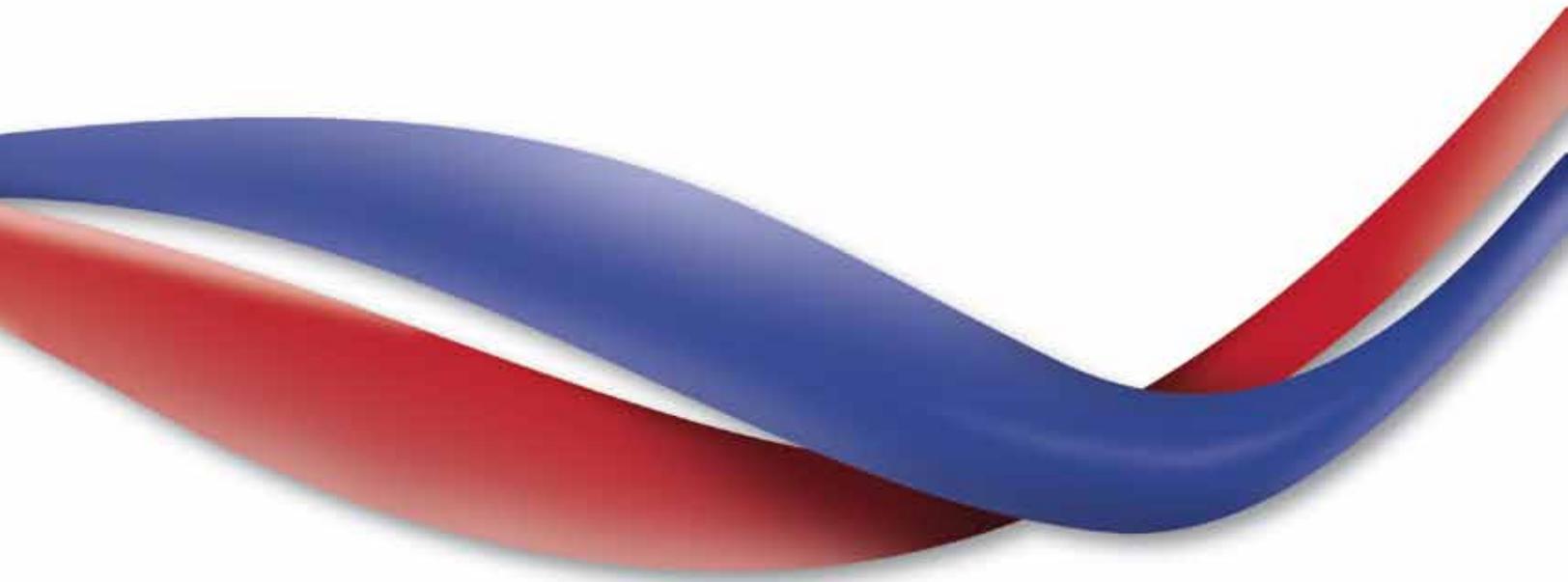


Table 1. Texas and U.S. Employment Growth Rates and Correlation Coefficients in Selected Periods

Period	Annual Growth Rates		Correlation Coefficient
	Texas	U.S.	
Jan/1940-Dec/1949	5.8	3.8	0.87
Jan/1950-Dec/1959	3.2	2.0	0.82
Jan/1960-Dec/1969	3.7	2.8	0.87
Jan/1970-Dec/1979	4.6	2.5	0.85
Jan/1980-Dec/1989	2.1	1.9	0.21
Jan/1990-Dec/1999	3.0	1.8	0.74
Jan/2000-Dec/2008	1.5	0.5	0.74
May/2005-Dec/2009	2.5	0.6	0.92

Sources: Bureau of Labor Statistics and Real Estate Center at Texas A&M University

During the second period, from 1987 to 1991, employment growth rates exhibited weak comovement and even moved in opposite directions in some years. Since 1991, employment growth rates have moved more closely together.

Measuring comovement between the Texas and the U.S. employment growth rates in terms of the correlation coefficient for selected periods provides more useful information about the degree of time-varying correlation between the two economies (Table 1). Average correlations between Texas and U.S. employment growth rates for the period from 1940 to 1979 are positive and high at more than 0.82. The correlation fell to 0.21 for the 1980s but recovered to 0.74 for the 1990s. From May 2005 to December 2009, the correlation coefficient for measuring comovement of the Texas and the U.S. economies was 0.92, an all-time high.

Oil prices were the main culprit behind the cooling of the intimate relationship between the Texas and U.S. economies in the 1980s. Fueled by higher international oil prices initiated by the Organization of Petroleum Exporting Countries, the Texas economy experienced rapid economic expansion in the 1970s. The result was an average annual employment growth rate of

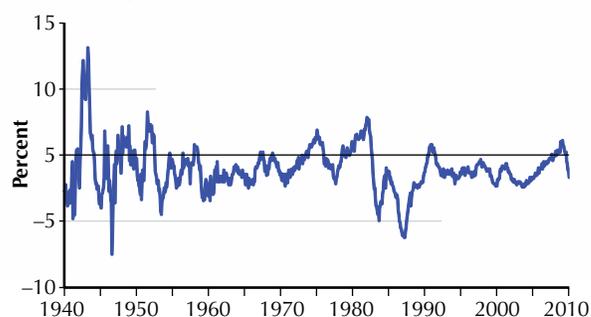
4.6 percent for Texas compared with 2.5 percent for the United States during that decade.

As the price of West Texas intermediate crude oil climbed to \$38 per barrel in 1981, the state's economic expansion accelerated and reached "bubble" proportions. When oil prices collapsed to less than \$12 in 1986, the Texas economy fell into a recession, while the U.S. economy was recovering from the adverse impact of higher energy prices.

Since 2000, the Texas economy has been more integrated with the nation's economy because of the diversification of the state's economy, expansion of the state's service-providing sector, and shrinking of the state's oil and natural gas industry. Output of this industry as a percentage of the Texas gross domestic product (GDP) decreased from 19 percent in 1981 to less than 8 percent in 2008.

Despite varying degrees of comovement between the Texas and U.S. employment growth rates, the state's economy has generated higher employment growth rates than the national average during most periods since 1940. The difference between

Figure 2. Gap between Texas and U.S. Employment Growth Rates, 1940–2010



Sources: Bureau of Labor Statistics and Real Estate Center at Texas A&M University

Figure 3. Texas Nonfarm Employment as Percentage of U.S. Nonfarm Employment, 1940–2010

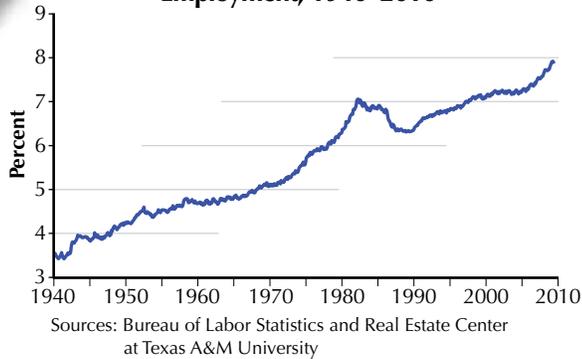
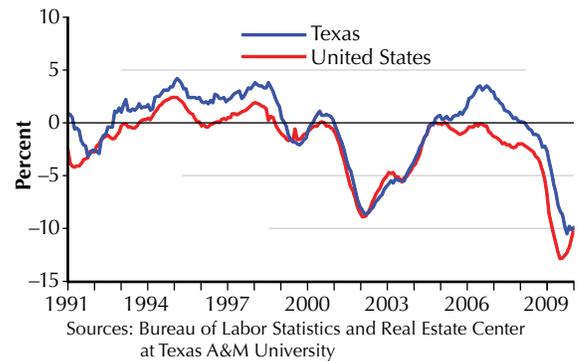


Figure 5. Employment Growth Rates Texas and U.S. Manufacturing Industries



Texas and United States employment growth rates (that is, the Texas employment growth rate minus the U.S. employment growth rate), has been positive except from 1983 to 1988, when Texas experienced low or negative employment growth rates in the aftermath of falling oil prices (Figure 2).

As a result of higher than national average employment growth rates, Texas' share of the nation's employment has increased from 3.5 percent in 1940 to 7.9 percent in 2009 (Figure 3). It took 15 years, from 1982 to 1997, for Texas to recover its earlier share of the nation's employment. Texas' growing share of the nation's employment is another reason for increased comovement between the Texas and the U.S. business cycles.

Comovement by Industry

More information comes to light when we look at the relationships between employment time series by industry. Doing so reveals that some industries contribute more to the comovement of the Texas and the U.S. economies.

Figure 6. Employment Growth Rates Texas and U.S. Construction Industries

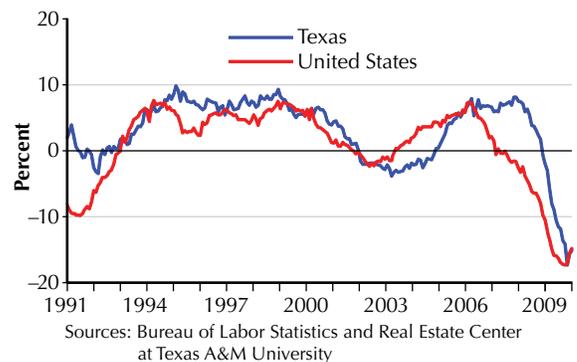


Figure 4. Employment Growth Rates Texas and U.S. Mining Industries

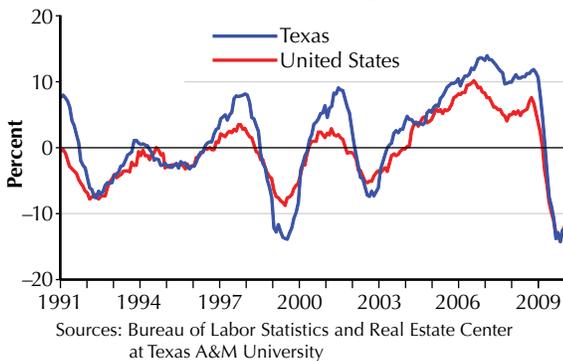


Figure 7. Employment Growth Rates Texas and U.S. Trade, Transportation and Utilities Industries

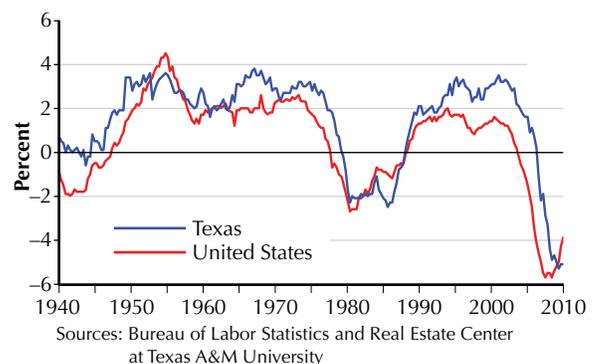


Figure 8. Employment Growth Rates Texas and U.S. Financial Activities Industry

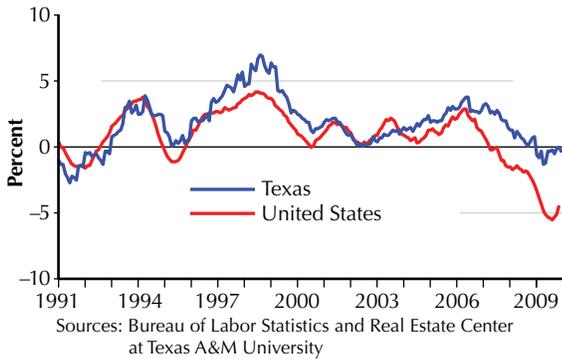


Figure 9. Employment Growth Rates Texas and U.S. Information Industry

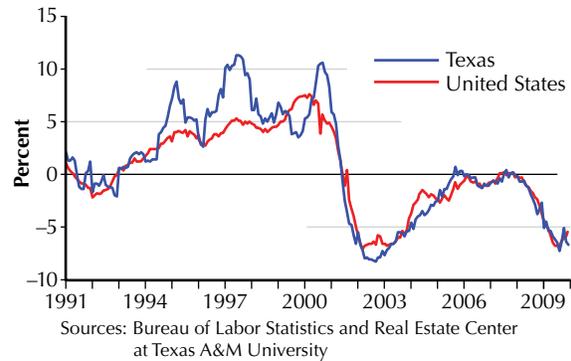


Figure 10. Employment Growth Rates Texas and U.S. Education and Health Services Industries

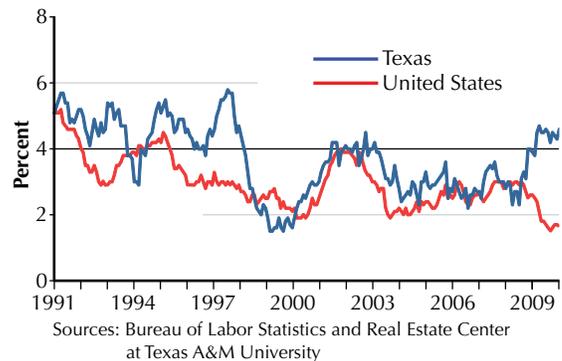
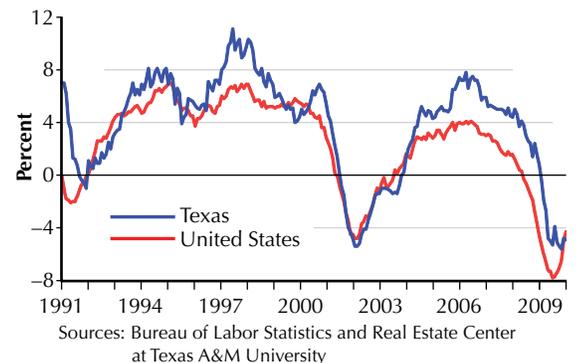


Figure 11. Employment Growth Rates Texas and U.S. Professional and Business Services Industries



Annual employment growth rates by industry for Texas and the United States since 1991 based on monthly employment data are shown in Figures 4 through 13. Annual growth rates are based on data from January of one year to January of the next year, February to February, and so forth. The estimated average correlation coefficients between employment growth rates for Texas and the United States in each industry reveal that employment growth rates in the information industries of Texas and the United States are highly correlated, with a correlation coefficient of 0.94, suggesting a high degree of comovement (Table 2). The U.S. mining and logging industry exhibits the next highest degree of comovement, with a correlation coefficient of 0.93, followed by manufacturing employment at 0.92.

Table 2. Correlation Coefficients for Employment Growth Rates Texas and U.S. Industries

Industry	Annual Growth Rates		Correlation Coefficient
	Texas	U.S.	
Mining and logging	1.7	-0.3	0.93
Manufacturing	-0.5	-2.0	0.92
Construction	3.0	0.9	0.74
Trade, transportation, utilities	1.5	0.5	0.88
Financial activities	1.8	0.9	0.75
Information	0.9	0.3	0.94
Education and health services	3.7	3.0	0.58
Professional and business services	3.8	2.3	0.88
Leisure and hospitality	2.9	1.8	0.69
Government	2.0	1.1	0.28

Sources: Bureau of Labor Statistics and Real Estate Center at Texas A&M University

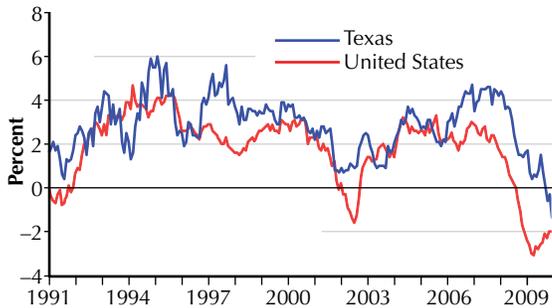
The degree of employment comovement falls to 0.88 for the professional and business services industry, and trade, transportation and utilities, followed by financial activities industry (0.75), construction (0.74), leisure and hospitality (0.69), and education and health services (0.58). The weakest employment comovement is in the government sectors of the state and the nation (0.28).

The degree of employment comovement for industry pairs is a time-varying variable. That is, in some periods Texas

and U.S. employment growth rates may move together more closely than in other periods.

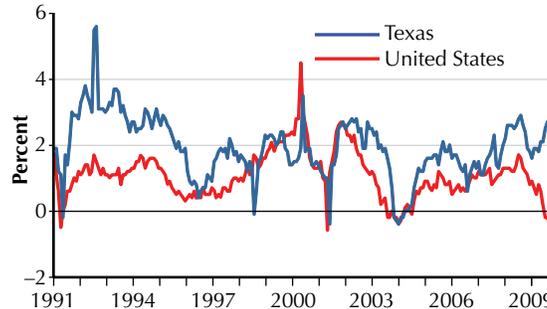
For forecasting purposes, the degree of employment comovement in the more recent periods is important. Employment growth rates in Texas and U.S. industries have been falling together in recent months in all industries except the education and health services industry (Figures 4 to 13). Since mid-2008, the state's education and health services industry has experienced growing employment at increasing rates while the U.S. growth rate has been falling (Figure 10).

**Figure 12. Employment Growth Rates
Texas and U.S. Leisure and Hospitality Industry**



Sources: Bureau of Labor Statistics and Real Estate Center at Texas A&M University

**Figure 13. Employment Growth Rates
Texas and U.S. Government Sectors**



Sources: Bureau of Labor Statistics and Real Estate Center at Texas A&M University

Texas government employment has been growing at increasing rates while the rate has been falling in the U.S. government sector in recent months (Figure 13). Growing employment in the Texas education and health services industry and the state's government sector, which account for 13.3 percent and 18.2 percent, respectively, of the state's nonfarm employment in December 2009, have helped the state's economy experience a less severe recession than the nation as a whole.

Center research shows that the Texas economy is now well integrated with the U.S. economy. The two economies are expected to recover jointly from the current recession.

Despite close comovement of the Texas and U.S. economies, Texas is not expected to experience heavy job losses compared with the United States thanks to growing employment

in the state's education and health services industry and government sector. ➤

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THE TAKEAWAY

Studying the relationship between Texas and U.S. employment growth rates over the past few decades allows Center economists to offer more informed predictions of regional economic trends. The recession that has hit the nation so hard has been less severe in Texas because of employment growth in the education and health services industries and the government sector.

Comovement of Economic Time Series

Merriam-Webster's Collegiate Dictionary defines time series as "a set of data collected sequentially usually at fixed intervals of time."

Comovement is a concept developed by economists for studying relationships between two or more time series of economic variables, such as employment growth rates for the United States and Texas over a selected period. More specifically, it is used to describe a tendency in time series economic variables to move together over time.

Why study the comovement between national and regional time series economic variables? Analyses of comovement and lead-lag relationships between national and regional time series economic variables enable researchers to use information contained in national economic data for predicting regional economic data. Comovement analysis allows for more informed responses to questions such as "When is the

state's economy expected to recover once the nation's economy begins to recover?"

Generally, nonfarm employment growth rates for Texas and the United States moved together from 1940 to 2009 (Figure 1). But the degree of comovement has varied over the past six decades.

While the concept of comovement is easy to grasp by looking at Figure 1, testing for the existence of comovement between time series and measuring the degree of comovement are complex issues requiring advanced mathematics.

However, a simple measure called correlation coefficient between two time series economic variables can provide a reasonably good measure of comovement between variables. The value of the correlation coefficient for two variables ranges from plus one to minus one. The closer the correlation coefficient to one, the stronger the correlation between the variables.



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