Do Higher Oil Prices Still Benefit Texas?

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Texas and oil. These two words have gone hand in hand since 1889, when the state started producing oil. Since then, the Texas economy has often been driven by volatile energy prices—suffering with low oil prices and benefiting with high oil prices.

The effects of energy prices on the Texas economy were particularly evident during the 1970s and 1980s (*Chart 1*). As energy prices rose, the Texas economy expanded at a rapid pace, with strong employment and income growth. Although the Texas economy continued to expand until 1986, the oil and gas sector began to slip as energy prices slid from their 1981 heights. The oil price collapse in July 1986 touched off a statewide recession and significant job losses.

Since the early 1980s, however, the Texas energy industry has shrunk and other sectors of the Texas economy have grown. Despite these changes, Texas remains the top oil and natural gas producer in the United States and exports most of its production of these two commodities to other states. Consequently, the energy industry remains an important driver of the state economy.

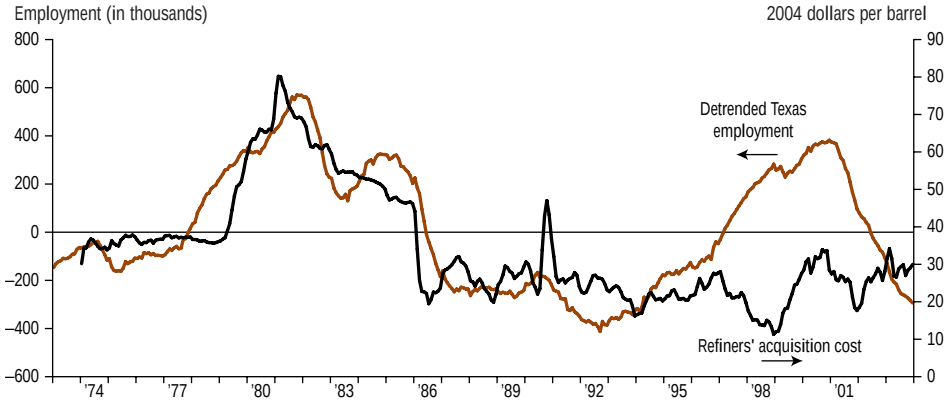
The diversification of the Texas economy away from energy and this sector's continuing importance to the state prompt us to consider: How much do swings in energy prices affect the Texas economy today? How much has that relationship changed since the energy boom years of the 1970s and 1980s?

Oil Production in Texas: A Brief History[1]

The first economically significant oil in Texas was discovered in Corsicana in 1894. Discoveries in Navarro County followed. By 1901 the Spindletop oil field was producing 75,000 barrels per day and had contributed to the first Texas oil boom.

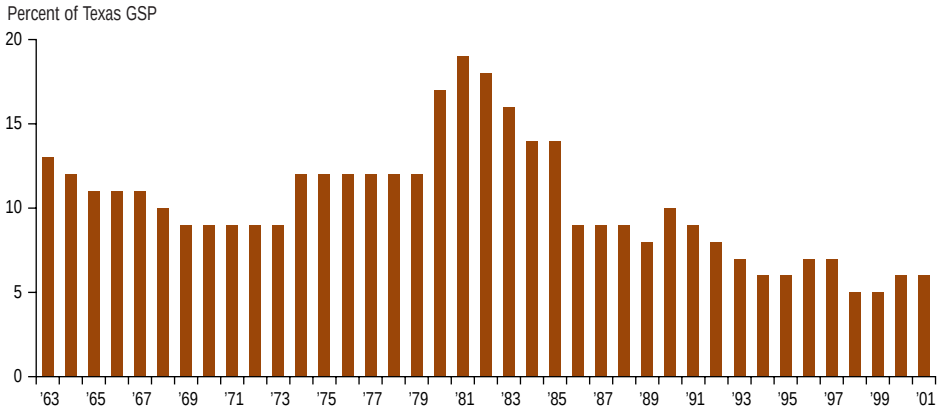
In the early 1900s, Texas produced relatively little oil and gas—crude oil pro-

Chart 1
Texas Employment Tracks Oil Prices in 1970s and 1980s



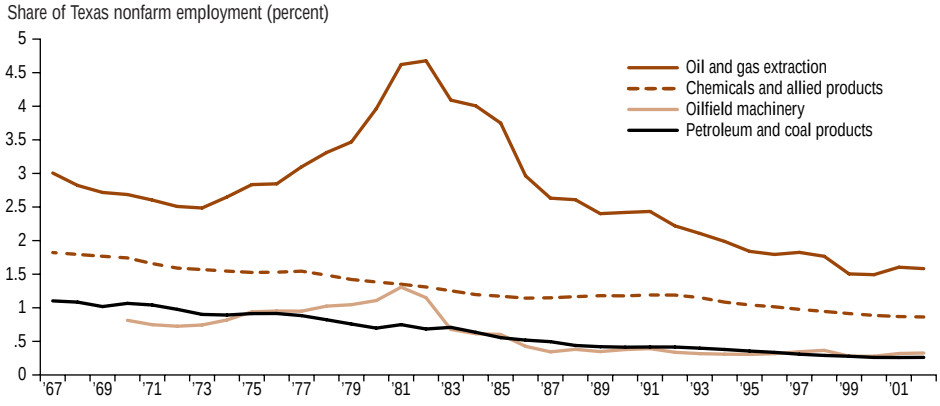
SOURCES: Bureau of Labor Statistics; Federal Reserve Bank of Dallas; Energy Information Administration; authors' estimates.

Chart 2
Oil and Gas Extraction's Share of Texas Output Peaks in 1981



SOURCE: Federal Reserve Bank of Dallas.

Chart 3
Energy Sector Employment Declines After Early 1980s



SOURCES: Bureau of Labor Statistics; Federal Reserve Bank of Dallas.

duction was only about 1.3 percent of total U.S. production, and natural gas was 0.1 percent of U.S. production. By 1952, Texas' shares of total U.S. crude oil and natural gas production peaked at 45 and 52.2 percent, respectively. Crude oil and natural gas production continued to increase in the state, with the peak for both coming in 1972.

As oil and gas production increased in Texas, so did their importance to the state economy. The creation of OPEC in 1960 and subsequent oil price increases in the 1970s and early 1980s gave rise to a boom in the Texas economy. Oil and gas output became an increasing share of Texas output (*Chart 2*). In 1981, at the height of world oil prices, oil and gas extraction was about 20 percent of total Texas gross state product.

After reaching $38 per barrel in 1981, oil prices began softening. Gradually sliding during the next few years, prices finally collapsed to $11.82 per barrel in July 1986. This led to a recession in Texas that lasted 17 months and had a devastating effect on state employment.

The number employed in the Texas mining industry (which is mostly oil and gas extraction) rose from about 7,000 in 1900—0.7 percent of total state employment—to 90,000 by 1950—a 3.1 percent share. At the oil and gas industry's peak in 1981, Texas employment in oil and gas extraction and oilfield machinery reached 366,200—6 percent of total nonfarm employment in the state (*Chart 3*). By the time the oil industry bottomed out in 1987, 175,000 jobs had been lost in the oil and gas extraction and oilfield machinery sectors.

Refining and Petrochemicals

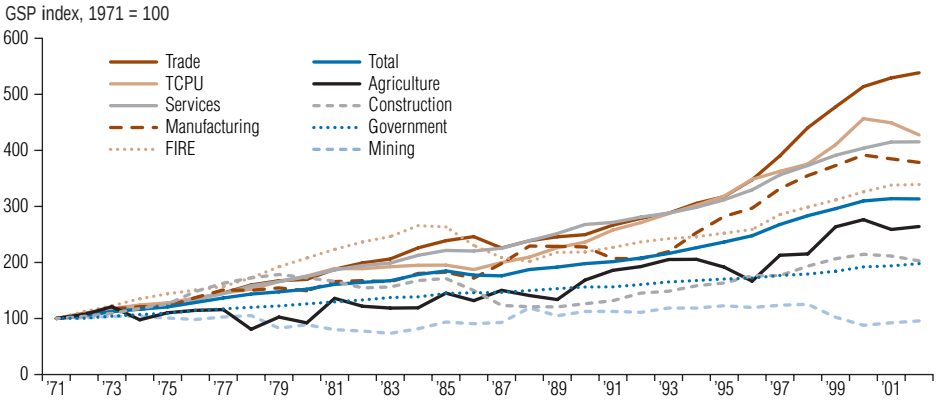
After the first Texas refinery opened in the Corsicana oil field in 1898, the petroleum refining and petrochemical industries flourished in the state. In 1939 (the earliest data available from the U.S. Census of Manufacturers), the chemical industry employed about 6,800 production workers, and the petroleum refining industry employed 19,000 (accounting for 5.5 and 15 percent of total manufacturing employment, respectively). Refining's share of state output was highest in 1939 at 28 percent of total manufactured goods. By 1958, the Texas petroleum refining industry reached its zenith with 43,000

employees.

Today, the refining industry contributes about 11 percent of Texas manufacturing output and 1.5 percent of total Texas output. Employment has also steadily declined to less than 0.3 percent of total Texas employment (*Chart 3*). The petrochemical industry provides about 12 percent of Texas manufacturing output, 1.6 percent of total Texas output and less than 0.9 percent of total Texas employment.

The refining and petrochemical industries provide some counterbalance to the effects of changing energy prices on the Texas economy. These two industries generally are hurt by rising oil and natural gas prices.

Chart 4
Texas Economy Diversifies Away from Mining After Mid-1980s



NOTE: TCPU is transportation, communications and public utilities; FIRE is finance, insurance and real estate.

SOURCES: Bureau of Labor Statistics; Federal Reserve Bank of Dallas.

Diversification of the Texas Economy

As output in the Texas mining industry shrank, output in other Texas industries continued to grow after the mid-1980s. Texas saw output gains in manufacturing, construction, agriculture and the service-producing sectors—wholesale and retail trade; transportation, communications and public utilities (TCPU); services; finance, insurance and real estate (FIRE); and government (*Chart 4*). Growing at a faster rate than total Texas gross state product, manufacturing, trade, TCPU, services and FIRE accounted for increasing shares of Texas output. In contrast, agriculture, construction and government posted decreasing shares.

A similar picture emerges for Texas employment since the mid-1980s. Services, construction and trade grew faster than total employment and accounted for increasing shares of Texas nonfarm employment (*Chart 5*). Employment shares for TCPU and FIRE remained relatively constant, while those for manufacturing and government decreased along with mining.

Oil and the Texas Economy

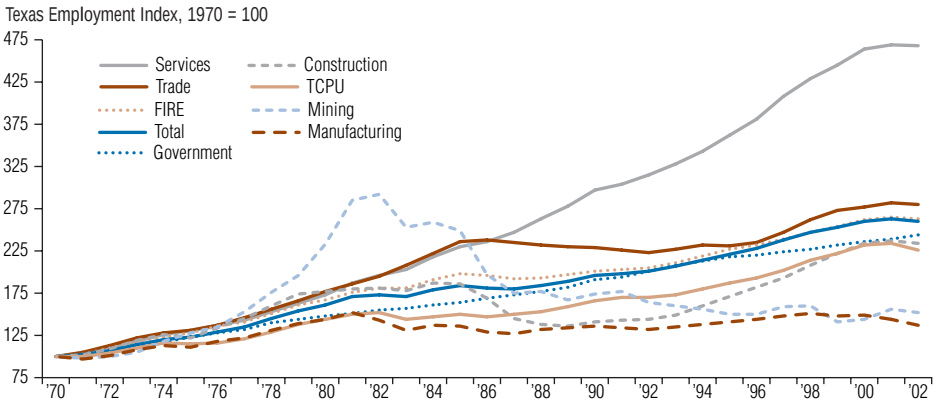
Even without a rigorous analysis, it's evident the relationship between energy prices and the Texas economy has changed since the 1980s. Oil and gas production accounted for 19.4 percent of Texas output in 1981 and only 6 percent in 2002. Similarly, output and employment in energy-related industries, such as oil and gas field machinery, claim a smaller share of the Texas economy today than in the early 1980s.

To examine in more detail how the Texas economy's diversification away from energy-producing industries has affected its response to volatile energy prices, we developed an econometric model that captures the effects of oil price shocks on the Texas economy for the period 1970–2002.[2] We find that the relationship between oil prices and the Texas economy is considerably different today than it was during the oil boom and bust years of the 1970s and 1980s.

Our analysis reveals that the relationship between oil prices and the Texas economy breaks between 1987 and 1988, which indicates that the effects of changing oil prices on the economy were different in 1970–87 than in 1988–2002. To determine just how this relationship differed across the two periods, we analyze the data in two different ways. We examine how much of the actual fluctuation in Texas output and employment arose from oil price shocks and other causes in each of the two periods. We also estimate and compare by how much Texas output and employment would have responded to a 10 percent oil price shock in each of the two periods.

We find changes in oil prices accounted for a much higher percentage of fluctuations in the Texas economy in 1970–87 than in 1988–2002. In the earlier period, nearly half the fluctuation in Texas output (46 percent) arose from changing oil prices. In the latter period, however, less than 10 percent of Texas output fluctuations arose from oil price shocks. In

Chart 5
Texas Employment Shifts Away from Mining After Early 1980s



NOTE: TCPU is transportation, communications and public utilities; FIRE is finance, insurance and real estate.

SOURCES: Bureau of Labor Statistics; Federal Reserve Bank of Dallas.

contrast, the fluctuations in U.S. GDP accounted for about 40 percent of the fluctuations in Texas output in the latter period.

The Response to Oil Price Shocks

The Texas economy's response to an oil price shock is significantly different in the two periods (*Table 1*). For 1970–87, we estimate that an oil price increase would have led to sustained gains in both output and employment. In particular, a 10 percent increase in oil prices would have led to a 2.6 percent increase in Texas gross state product and about a 1 percent increase in employment.[3] An oil price increase of 10 percent also would have temporarily boosted the growth rate of the Texas economy, with output growing 1 percent faster during the next few quarters and employment growing 0.1 percent faster over the next three to four months, then a little slower thereafter.

The economy was much less responsive to oil prices in the period 1988–2002, and the nature of the response was different. In the second period, a 10 percent increase in oil prices would have led to only about a 0.4 percent gain in gross state product. The net response of employment to a rise in oil prices is basically nil. The negligible result in employment may arise from the energy sector's greatly muted response to oil price fluctuations in the latter period and the inability or reluctance of oil companies to hire new employees as energy prices rose.

To further examine the channels through which oil price shocks affect the Texas economy, we examined the effects of oil price shocks on the rig count and oil and gas employment in both periods. We found that the rig count responded much more strongly to oil price increases in the first period than in the second. For 1970–87, we estimate that a 10 percent increase in oil prices would have boosted the rig count by 20 percent. In contrast, the same percentage increase in oil prices in 1988–2002 would have yielded only a 6.6 percent increase in the rig count.

Table 1
Effect of a 10 Percent Increase in Oil Prices on Texas Economy

	Texas GSP	Texas nonfarm employment	Rig count	Oil and gas employment
1970–1987	+2.6%	+1.0%	+20%	+9.5%
1988–2002	+0.4%	0	+6.6%	+1.1%

Our estimates confirm the Texas economy has become less sensitive to oil price fluctuations, but it still responds favorably to higher energy prices.

Similarly, oil and gas employment showed a much smaller response in the second period. We estimate that a 10 percent increase in oil prices would have generated a 9.5 percent increase in Texas oil and gas employment for 1970–87 but only a 1.1 percent employment increase in 1988–2002.

One reason for the weaker response in the rig count and employment may be changes in technology. After the 1986 crash in oil prices, companies improved oilfield technology and produced more oil with fewer rigs. Therefore, the same rise in oil prices brings forth fewer rigs and oilfield workers in the latter period. In addition, contacts in the industry say there are fewer prospects for new drilling in Texas, and companies are increasingly shifting their drilling overseas.[4]

Oil Price Effects on the Texas Economy

Over the past 20 years, the Texas energy industry has shrunk while other sectors of the Texas economy have grown. Nonetheless, Texas produces more oil and gas than any other state in the nation. Texas accounts for 20 percent of crude oil and 26 percent of natural gas production in the United States (excluding federal offshore). Texas also exports oil and natural gas to the rest of the nation. Consequently, higher energy prices still benefit the state—even if it is by less than in the boom years of the 1970s and early 1980s.

Our estimates confirm the Texas economy has become less sensitive to oil price fluctuations, but it still responds favorably to higher energy prices. During the 1970–87 period, a 10 percent increase in oil prices would have boosted Texas gross state product by 2.6 percent and employment by 1 percent. During the 1988–2002 period, a 10 percent increase in oil prices would have raised Texas gross state product by 0.4 percent with no significant net effect on employment.

We find evidence for two ways in which the Texas economy has become less sensitive to fluctuations in oil prices than it was in the 1970s and 1980s. The first is that oilfield activity has become less sensitive to fluctuations in energy prices. The second is that the energy industry makes up a smaller share of the Texas economy than it used to. Together these factors have meant that Texas output is about 15 percent as sensitive to oil price fluctuations as it was from 1970 to 1987. Texas nonfarm employment no longer seems to be affected by oil price fluctuations.

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Notes

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1 See "Oil and Gas Industry," *The Handbook of Texas Online*, www.tsha.utexas.edu/handbook/online.

2 We use a vector-autoregressive model with oil prices, U.S. GDP, Texas gross state product, Texas nonfarm employment, Texas employment in oil and gas extraction, and the Texas rig count as variables.

3 These results are similar to those found in "Energy Prices and State Economic Performance," by Stephen P. A. Brown and Mine K. Yücel, Federal Reserve Bank of Dallas *Economic Review*, Second Quarter 1995. Using input–output analysis, Brown and Yücel estimate that a 10 percent increase in oil prices would have boosted Texas employment by 1.37 percent in 1982 and by 0.3 percent in 2000.

4 Drilling has shifted toward natural gas in the United States and Texas, but because natural gas prices generally moved with oil prices during the estimation periods, the shift may not alter the rig count's weakening response to oil prices.