

Made in Texas: The Natural Selection of Manufacturing

By Fiona Sigalla and Danielle DiMartino

The U.S. manufacturing sector conjures up images of Michigan's auto plants, Pennsylvania's gritty steel mills and the iconic smokestacks that stand today as artifacts of a time when the U.S. economy and its manufacturing sector were one and the same. Mention manufacturing, and the furthest thing from most people's minds might be Texas—long renowned for its cattle ranches, oil derricks and cowboy-booted bankers.

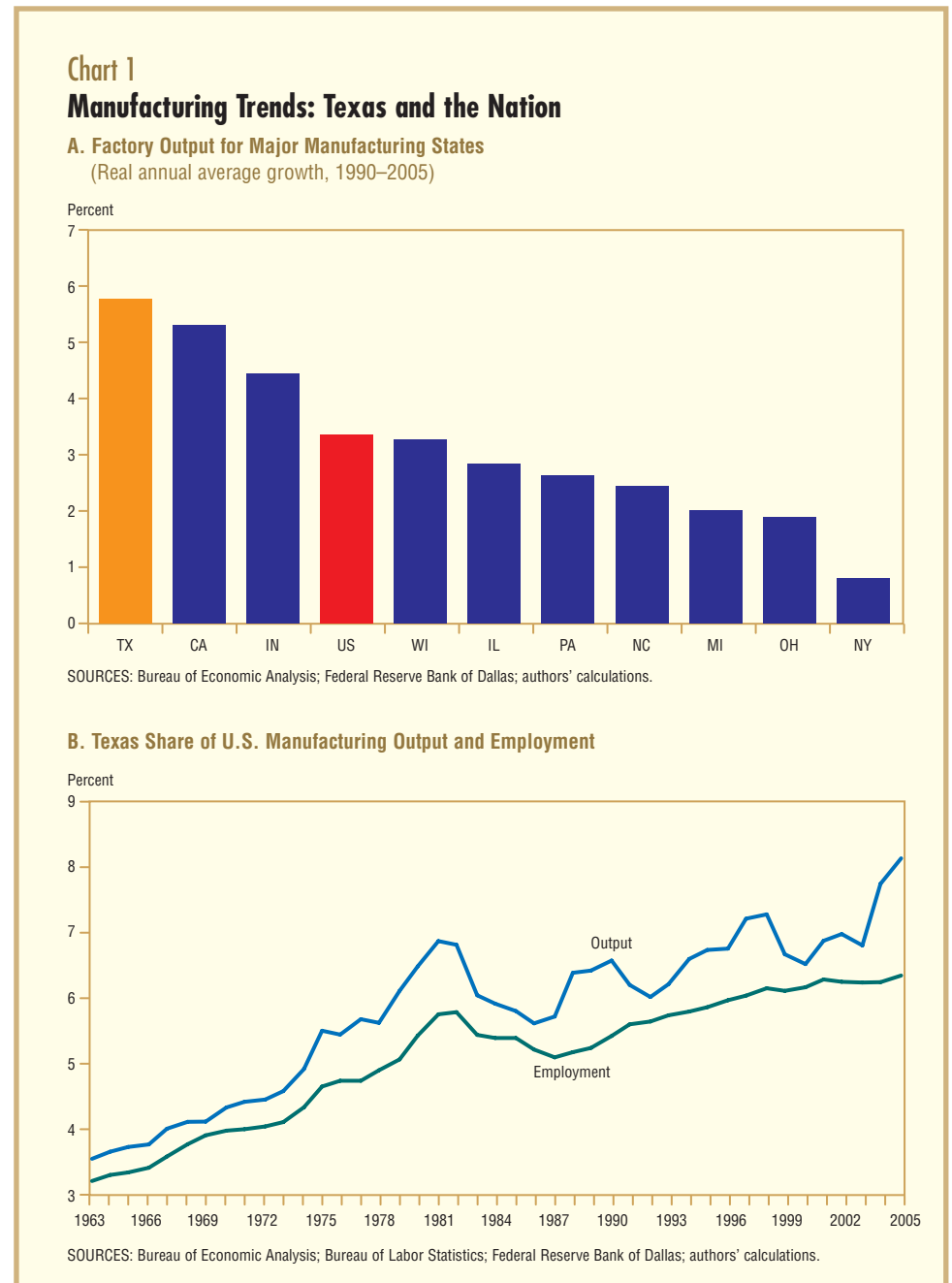
Yet, Texas has emerged as one of the nation's fastest-growing manufacturing hubs. Between 1990 and 2005, a time frame long enough to encompass an entire business cycle, the state's factory output grew an average of 5.8 percent a year, eclipsing all other major manufacturing states (*Chart 1A*).¹ A longer-run perspective shows that Texas' share of the nation's manufacturing base has been rising for at least four decades—with a particularly pronounced output jump in the past year or so (*Chart 1B*).

In 2005, Texas' manufacturing production reached \$126.8 billion, or 8.2 percent of the U.S. total. The state ranked second in output after California—another nontraditional manufacturing center—and led all states in exports, with 14.5 percent of the U.S. total.

What's behind the rise of manufacturing in the Lone Star State?

In Texas, factory operators can check off many of the prerequisites they need to prosper in a highly competitive, rapidly globalizing business environment:

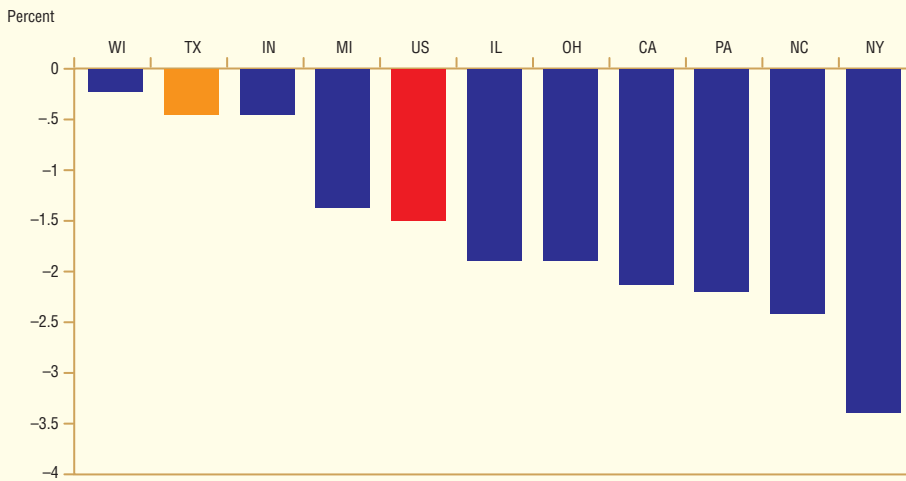
- A central location within North America.
- Good distribution facilities that include one of the world's largest sea-ports.
- A fast-growing and flexible labor market.
- A relatively low cost of living and an attractive business climate.
- Low land and construction costs compared with other parts of the U.S.



• The presence of Mexico and its maquiladora plants just over the Rio Grande, providing manufacturers with a nearby partner for globalizing supply chains and finishing production in the U.S.² These advantages have encouraged

companies to expand Texas operations, build new plants and relocate from other states. The payoff extends beyond increases in factory output. The state's manufacturing job base has also held up better than that of most other states

Chart 2
Manufacturing Employment
 (Average annual growth, 1990–2005)



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

amid a nationwide decline in factory employment.

Manufacturing's Evolution

The past half century has brought many changes to the nation's manufacturing sector. New technologies and globalization have given consumers a greater variety of products at lower prices, but these forces also have ratcheted up competitive pressures on firms to increase efficiency and lower costs. In the U.S., the result has been decades of declining factory employment as companies invest in productivity-enhancing equipment and outsource labor-intensive assembly to workers in other countries.

Nationwide, manufacturing payrolls contracted an average of 1.5 percent a year between 1990 and 2005, but this masks a deep disparity among states (*Chart 2*). New York shed factory jobs at an annual average of 3.4 percent, more than double the U.S. rate. Meanwhile, Texas' manufacturing employment declined an average of 0.4 percent—or less than a third the U.S. rate.

Two broad factors explain states' diverse experiences. First, manufacturing firms in some states have outperformed similar firms in other parts of the country. Second, some states have larger shares of fast-growing or rapidly declining industries than others.

Decomposing these two influences determines how they've affected employ-

ment in the top 10 manufacturing states. The height of the bars (*Chart 3*) reflects each state's decline in manufacturing jobs relative to that of the nation from 1990 to 2005.³ Purple bars are above zero when the state's firms grew faster or contracted more slowly than similar firms in the same industry nationwide. Green bars are

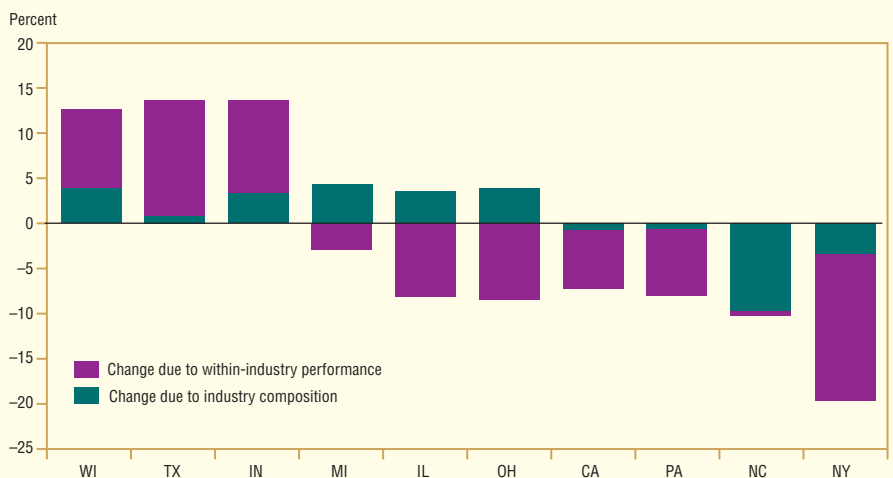
above zero when a state had a mix of industries that did better than the overall manufacturing sector during this period. *Chart 3* also lists the job performance of manufacturing industries relative to the sector as a whole.

Manufacturing employment outperformed the overall U.S. in Wisconsin, Texas, Indiana and Michigan. All four states benefited from having a relatively large share of industries that fared better than manufacturing overall. Texas, for example, is home to a significant number of firms producing chemicals and fabricated metals, industries that did quite well from 1990 to 2005.

Firm-level forces weren't kind to Michigan, but companies outperforming their peers was the biggest factor contributing to relatively healthy manufacturing in Texas, Wisconsin and Indiana.

In the furniture industry, for example, Texas increased employment 51.9 percent over the 15-year period, compared with a 12.2 percent contraction nationwide. In electrical equipment, employment was up 11 percent at Texas firms but down nearly 30 percent in the U.S. Other relatively strong Texas industries have been food, machinery and nonmetallic minerals. In all these industries, Texas firms added work-

Chart 3
Employment Growth for Top 10 Manufacturing States
 (Compared with U.S., 1990–2005)



Steeper job losses than overall manufacturing: Apparel, primary metals, computer and electronics, electrical equipment, petroleum and coal, paper and printing.

Less severe job losses than overall manufacturing: Transportation equipment, machinery, chemicals, furniture, nonmetallic minerals, fabricated metals, food and beverages.

Net job creators: Wood and plastics.

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

ers, while businesses in the rest of the country reduced employment on net.

New York, North Carolina, Pennsylvania, California, Ohio and Illinois didn't do as well as the nation as a whole in retaining manufacturing employment. All six states had a large share of producers that performed below their industry benchmarks. For example, employment in North Carolina's relatively large furniture industry fell 36.2 percent, almost triple the U.S. decline.

New York, North Carolina, Pennsylvania and California were also hurt by their industry composition. They entered the 1990s with a disproportionately high share of industries with shrinking employment. North Carolina suffered the greatest relative job loss due to the composition of its industrial base. In 1990, the state had a larger-than-average share of apparel and textile mills. These industries had more severe job contractions than manufacturing as a whole.

While painful for affected workers, job losses don't necessarily signal industry

contraction. Table 1 breaks down industry performance by output and employment for the U.S. and Texas over a shorter period, 1997–2004. Some industries, such as computer and electronic product manufacturing, had sizable increases in output that were accompanied by employment losses. Other industries, such as paper and printing, suffered declines in output and employment.

Productivity's Role

Despite job losses, all of the top 10 manufacturing states produced more goods in 2005 than they did in 1990. This can mean only one thing—productivity gains.

Average real manufacturing output per U.S. worker rose from \$52,000 in 1990 to \$108,000 in 2005. Once again, the performance was disparate across states. Real output per worker rose rapidly in Texas—from \$57,000 in 1990 to \$141,000 in 2005, the highest among the 10 states. Wisconsin posted the weakest gains, remaining under the U.S. average throughout the period. Its

output per worker was \$88,000 in 2005.

Texas' output per worker was on par with the rest of the nation and other leading manufacturing states a decade ago (*Chart 4*). By the end of 2005, its manufacturing productivity was running 30 percent above the national average.

Texas' productivity gains derive from two major sources: efficiency-enhancing technologies adopted by manufacturers, and shifts in the types of goods produced.

Demand has surged the past few years for chemicals and machinery—two of the state's most productive sectors—resulting in increased output in these relatively capital-intensive industries.

Texas also outperforms the nation in such industries as computers and electronics. In recent years, output per worker has been higher in Texas than in the U.S. and the high-tech mecca of California.

Texas' factory sector has mirrored a broader national trend of manufacturers moving less-productive operations to

(Continued on back page)

Table 1
Industry Performance for U.S. and Texas, 1997–2004

United States	Percent change		Texas	Percent change	
	Output	Employment		Output	Employment
Output increases with fewer workers			Output and employment increases		
Chemical manufacturing	14.2	-11.1	Furniture and related product manufacturing	18.9	5.1
Computer and electronic product mfg.	292.2	-28.5	Nonmetallic mineral product manufacturing	38.1	9.3
Electrical equipment and appliance mfg.	6.0	-25.0			
Furniture and related product manufacturing	5.9	-8.5	Output increases with fewer workers		
Miscellaneous manufacturing	34.3	-10.0	Chemical manufacturing	16.1	-16.3
Nonmetallic mineral product manufacturing	12.0	-3.9	Computer and electronic product mfg.	305.5	-27.6
Plastics and rubber products	16.6	-14.5	Electrical equipment and appliance mfg.	35.3	-19.5
Primary metal manufacturing	2.8	-27.6	Fabricated metal product manufacturing	2.4	-11.2
Wood products	10.6	-7.4	Food manufacturing	16.5	-0.8
			Machinery manufacturing	40.8	-12.6
Output and employment declines			Miscellaneous manufacturing	14.6	-13.7
Fabricated metal product manufacturing	-2.4	-12.6	Plastics and rubber products	7.3	-9.3
Food manufacturing	-0.5	-4.6	Primary metal manufacturing	38.9	-16.9
Machinery manufacturing	-1.8	-24.2	Wood products	5.5	-17.0
Paper manufacturing	-16.4	-22.2			
Petroleum and coal products	-18.8	-18.7	Output and employment declines		
Printing and related support activities	-6.0	-20.8	Paper manufacturing	-16.3	-25.3
Total manufacturing	22.6	-18.7	Petroleum and coal products	-4.4	-9.4
			Printing and related support activities	-7.4	-22.3
			Total manufacturing	44.1	-15.9

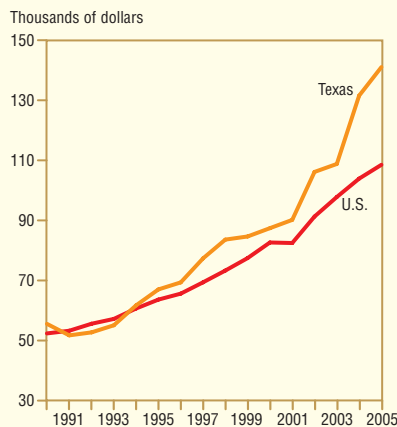
NOTE: This table has a different time period from the other analyses because comparable output data by industry are unavailable prior to 1997.

SOURCES: Bureau of Economic Analysis; Bureau of Labor Statistics; Federal Reserve Bank of Dallas; authors' calculations.

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Chart 4
Real Manufacturing Output per Worker: Texas and the U.S.



SOURCES: Bureau of Economic Analysis; Bureau of Labor Statistics; Federal Reserve Bank of Dallas; authors' calculations.

lower-cost countries, leaving the higher-value-added production at home. A more recent development may be even more telling: Foreign auto and semiconductor manufacturers are establishing new production facilities in the state.

In 2006, Texas reversed its decline in manufacturing employment. The state added 26,300 jobs, an increase of 2.9 percent, while the nation's manufacturing sector continued to shed positions, down 84,000, or 0.6 percent.

Manufacturing remains an important driver of the Texas and U.S. economies. Since 2004, the Dallas Fed has been collecting data from key Texas manufacturers to better understand the economy. The responses are tabulated monthly in the Texas Manufacturing Outlook Survey (see related article on page 15).

While the survey is still very young in the world of economic indicators, preliminary statistical analysis suggests this tool will help provide insights into the Texas and national economies.

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Notes

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¹ The states of Texas, California, Indiana, Wisconsin, Illinois, Pennsylvania, North Carolina, Michigan, Ohio and New York represent 53 percent of employment and 55 percent of output in manufacturing.

² For more about maquiladoras and their effect on the Texas economy, see "A Decade of Change: El Paso's Economic Transition of the 1990s," by Jesus Cañas, Federal Reserve Bank of Dallas *Business Frontier*, Issue 1, 2002.

³ A shift-share analysis was used to break down the difference between each state's employment growth by industry and the performance of the same industry in the U.S.

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