

Texas Maintains Top Exporter Standing While Its Trade Remains Concentrated

By Janet Koech and Mark A. Wynne

ABSTRACT: While Texas has become the nation's top-exporting state, benefiting from trade of intermediate goods to Mexico and a global presence as an energy hub, its export activity remains concentrated relative to the U.S. and other states.

Texas exports more goods than any other state and is a big recipient of foreign investment. The state is the third-most globalized in the U.S. based on foreign-owned companies' employment and export-based manufacturing, according to globalization scorecards.¹

Texas has become increasingly integrated with the rest of the world and dependent on foreign markets for its economic growth. Exports equal 17 percent of Texas' total output, almost twice the nation's average of 9 percent. Manufactured goods exports supported more than 1 million jobs in Texas in 2014—about 17 percent of all export-related jobs in the nation.²

With greater international linkages comes greater international exposure. Increased interconnectedness of world economies means that the effects of economic booms as well as slowdowns spread across geographical boundaries. Dependence on a few export partners and products can make exports and exporting states sensitive to developments in the recipient countries. A state with a diverse range of export products and export destinations is typically more likely to withstand shocks to particular industries or countries.

Diversification of Texas' trade with the rest of the world may be viewed along two dimensions. The diversity of Texas export destinations provides one guide. Do most of our exports go mainly to our neighbor to the south or do we trade with a range of countries? The composition of the state's export basket is another measure. Are Texas' exports comprised primarily of energy and related products, or are a range of products involved?³

State's Largest Trade Partners

Texas, after surpassing California as the top exporting state in 2002, sold \$288 billion worth of goods overseas in 2014.⁴ From 2000 to 2014, the state's real (inflation-adjusted) exports increased

at an average annual rate of about 7 percent, faster than the nation's annual average of 4 percent.

Perhaps not surprisingly given Texas' geographic proximity to Mexico and preferences under the North American Free Trade Agreement, the state heavily exports south of the border. Mexico accounts for about 36 percent of Texas' foreign sales (*Chart 1*). Much of this trade involves intermediate goods; U.S. companies have plants in Mexico that manufacture and assemble products from the intermediate inputs for reexport to the U.S. By one estimate, the U.S. content in imports from Mexico is 40 percent.⁵

Texas' top three foreign markets accounted for more than half its total exports in 2014 compared with 42 percent for the U.S. and 35 percent for California. Over the past decade, however, Texas expanded its sales abroad to new destinations including to rapidly growing emerging market economies. Real exports to China increased 17 percent on average in 2000–14, while those to Brazil expanded at an average annual rate of about 14 percent during that period. Emerging markets' demand for petroleum and coal products has been a boon for Texas exports.

Trade Activity Index

For the purpose of comparing Texas' trade patterns with other states and the U.S. as a whole, it is useful to summarize them in a single number. The Herfindahl index is a widely used measure of industry concentration and is calculated as the sum of the squares of export shares of each country constituting a state's total exports. High values indicate that a state's exports are highly concentrated; low values suggest that a state exports to a wide variety of countries.

This measure of the degree of concentration of Texas exports has evolved over time (*Chart 2*). Perhaps not surprisingly, Texas' exports are highly

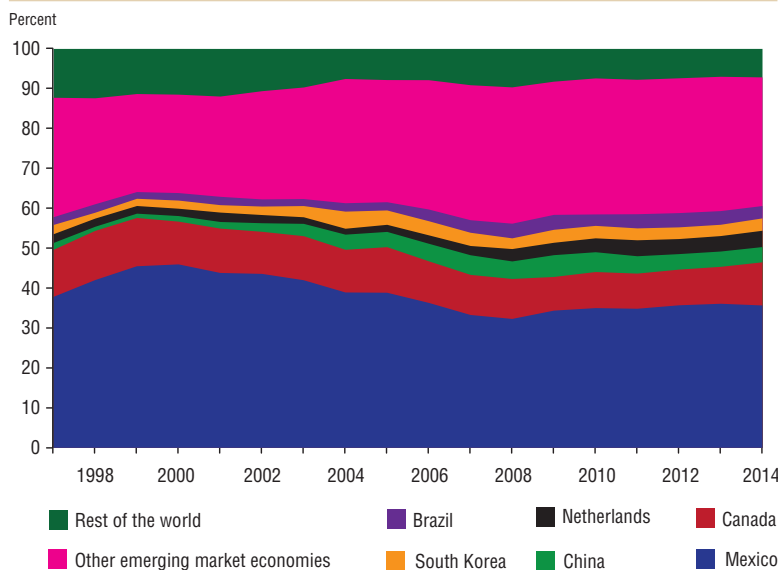
concentrated, much more so than the national average or No. 2 exporter, California. The increase in diversification in the 2000–07 period is notable. Texas’ diversification by export destination index decreased to 0.13 in 2007 from 0.23 in 2000 (a decline in the index implies an increase in diversification). This coincides with the state’s increased exports to many emerging market economies. Since 2007, the diversification index has mostly held steady because of the Texas boom in shale oil, which led to addi-

tional exports to Latin American countries. Mexico is the single biggest market accounting for more than one-fifth of the state’s petroleum product exports.

Texas ranked 37th among the states in terms of diversification of trading partners in 2014, compared with California at No. 6. Florida is the most diversified state, while North Dakota is the least diverse. Texas and California both inched up one spot in the diversification ranking between 1997 and 2014 (Table 1).

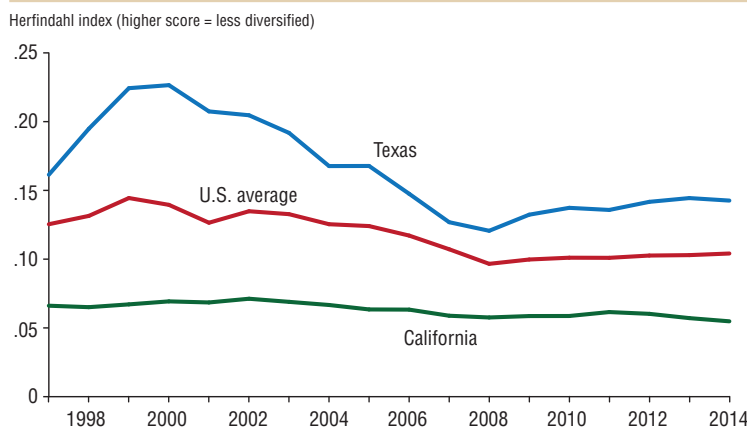
► Texas ranked 37th among the states in terms of diversification of trading partners in 2014, compared with California at No. 6. Florida is the most diversified state, while North Dakota is the least diverse.

Chart 1 Mexico Is Texas’ Main Export Destination



SOURCES: World Institute for Strategic Economic Research (WISER) state export data; authors’ calculations.

Chart 2 Export Destinations More Concentrated in Texas than U.S.



NOTE: The average U.S. index is computed as the export-weighted average of all states’ Herfindahl indexes.
SOURCES: World Institute for Strategic Economic Research (WISER) state export data; authors’ calculations.

► *Strong growth in emerging economies, especially in Asia, generated demand for energy products, which now account for a much larger share of the state's exports than a decade ago.*

	2014 state ranking	State	2014 Herfindahl index	2014 total state exports (billions of U.S. dollars)	1997 state ranking	1997 Herfindahl index	1997 total state exports (billions of U.S. dollars)
Most diversified states	1	Florida	0.027	57.30	1	0.036	23.23
	2	Maryland	0.043	11.97	4	0.058	5.21
	3	Louisiana	0.043	65.05	2	0.036	18.73
	4	Georgia	0.046	38.75	9	0.067	12.95
	5	Massachusetts	0.053	27.22	14	0.081	16.53
	6	California	0.055	170.72	7	0.066	99.16
	37	Texas	0.143	287.60	38	0.161	76.18
Least diversified states	46	New Mexico	0.218	3.71	41	0.190	1.78
	47	Michigan	0.248	55.64	48	0.359	32.25
	48	South Dakota	0.249	1.59	39	0.165	0.52
	49	Maine	0.303	2.73	36	0.157	1.72
	50	North Dakota	0.631	5.26	47	0.310	0.78

NOTE: An increase in the index shows a decrease in export diversification.

SOURCES: World Institute for Strategic Economic Research (WISER) state export data; Haver Analytics; authors' calculations.

Products Sold

The types of goods Texas exports provide another measure of diversification. The state's largest exports are petroleum and coal products (19 percent), computers and electronics (17 percent) and chemicals (16 percent).⁶ Petroleum products and chemicals use oil and gas as inputs and are highly sensitive to oil price changes.

After the 1980s oil price collapse and ensuing recession, Texas diversified its economy away from oil and gas, marked by the rise of the high-tech and telecommunications industries in the 1990s. By 2000, computers and electronics constituted 29 percent of Texas exports and petroleum and coal products had fallen to 4 percent. Since then, as a result of oil prices that were rising and technological innovations in drilling, the energy sector reappeared as a major driver of Texas growth. Moreover, strong growth in emerging economies, especially in Asia, generated demand for energy products, which now account for a much larger share of the state's exports than a decade ago.

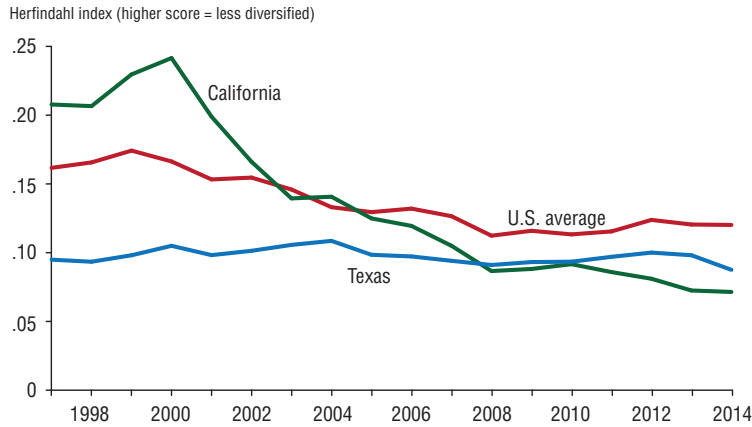
The Herfindahl index can also quantify the degree of concentration of

Texas' exports in particular products. Texas' exports are less concentrated in particular product categories than the nation's average (*Chart 3*). The degree of product concentration has remained remarkably constant over time. While California's exports are more diversified in terms of destinations, they are more concentrated in terms of products, at least until recently. In 1997, computer and electronic products accounted for 48 percent of California's total exports. In 2014, that share had fallen to 25 percent, and the combined export shares of the state's top three products in that year amounted to 45 percent of total exports.

Virginia and Pennsylvania are the most diversified states in terms of product composition of their export baskets, while Wyoming and Vermont, which admittedly have very few exports, are the most specialized (*Table 2*). While Washington state exported more than \$90 billion worth of merchandise in 2014, exports of transportation and equipment (primarily aircraft, engines and parts assembled by Boeing) accounted for 57 percent of total exports, making its export mix one of the nation's most concentrated. Texas ranked 18th

Chart 3

Export Products Less Concentrated in Texas than U.S.



NOTE: The average U.S. index is computed as the export-weighted average of all states' Herfindahl indexes.
 SOURCES: World Institute for Strategic Economic Research (WISER) state export data; authors' calculations.

Table 2

Diversification Rankings by Export Products

	2014 state ranking	State	2014 Herfindahl index	2014 total state exports (billions of U.S. dollars)	1997 state ranking	1997 Herfindahl index	1997 total state exports (billions of U.S. dollars)
Most diversified states	1	Virginia	0.043	19.04	11	0.081	12.76
	2	Pennsylvania	0.048	40.09	5	0.064	16.07
	3	North Carolina	0.050	31.14	2	0.041	16.40
	4	Maine	0.057	2.73	15	0.096	1.72
	5	Illinois	0.058	67.85	19	0.102	26.45
	8	California	0.071	170.72	37	0.207	99.16
	18	Texas	0.087	287.60	14	0.094	76.18
Least diversified states	46	New Mexico	0.277	3.71	49	0.672	1.78
	47	Washington	0.305	90.48	46	0.333	32.75
	48	Alaska	0.348	5.15	33	0.158	2.72
	49	Wyoming	0.363	1.75	50	0.753	0.56
	50	Vermont	0.410	3.64	48	0.658	3.81

NOTE: An increase in the index shows a decrease in export diversification.
 SOURCES: World Institute for Strategic Economic Research (WISER) state export data; Haver Analytics; authors' calculations.

in the country, performing better than most U.S. states.

Diversification or Specialization

Lack of diversification of export products and destinations can expose a state to increased export earnings volatility. Plunging oil prices, for example, have

contributed to a 10 percent decline in Texas exports over the last year.

Export volatility can be mitigated by expanding the variety of products and countries. However, there are also gains from specializing in products in which a state has comparative advantage and can produce most efficiently. Indeed, the

data suggest a small but negative correlation between the importance of exports to a state's economy and the level of product diversification.⁷ Exports tend to be less diversified for those states where foreign sales account for a larger share of state output.

Research shows that Texas' comparative advantage in energy-related industries has increased in recent years, which is consistent with the shale oil and gas boom that dominated state economic growth. The state has also increased competitiveness in heavy machinery and transportation equipment industries.⁸ The state's comparative advantage in select industries might explain why the products Texas exports have remained fairly concentrated.

Texas Trade Arrangements

Rapid internationalization of the U.S. economy has spread unevenly across regions and states. Similarly, diversification of states' exports varies across the nation, evolving over time. While Texas is one of the most globalized states, it is also one of the least diversified in terms of with whom it trades.

Mexico is the destination for more than one-third of the state's total exports. Increased mobility for goods, labor and capital generally entails greater exposure to global economic pressures and risks.

However, U.S. exports to Mexico are largely intermediate goods, assembled or processed into final goods and reimported back to the U.S. for consumption.

Studies show that trade flows associated with such production sharing tend to be closely related to the economic activity in the source country of intermediate goods.⁹ U.S. exports to Mexico are, therefore, more tied to U.S. demand than to changes in demand in Mexico, and Texas exports to Mexico may be sheltered from economic fluctuations in Mexico.

Texas export products are more diversified than the national average but more concentrated than California and 16 other states. The state largely relies on exports of chemicals, computers and electronic products and petroleum and coal products, which collectively account for over half of total Texas exports.

(Continued on back page)

Texas Maintains Top Exporter Standing While Its Trade Remains Concentrated

(Continued from page 19)

Koech is an assistant economist and Wynne is a vice president and associate director of research in the Research Department at the Federal Reserve Bank of Dallas.

Notes

¹ See "The 2014 State New Economy Index: Benchmarking Economic Transformation in the States," by Robert D. Atkinson and Adams B. Nager, Information Technology and Innovation Foundation, June 2014.

² Data on jobs supported by state exports are produced by the U.S. Department of Commerce's International Trade Administration.

³ For a similar analysis of Texas exports see "Globalizing Texas: Exports and High-Tech Jobs," by Anil Kumar, Federal Reserve Bank of Dallas *Southwest Economy*, September/October 2007.

⁴ State exports data are from the Census Bureau's Origin of Movement exports series. These data measure exports based on where the goods began their journey of exit from the United States. The transportation origin of exports is not always the same as the location where the goods were produced, so data should be interpreted with caution.

⁵ "Give Credit Where Credit is Due: Tracing Value Added in Global Production Chains," by Robert Koopman, William Powers, Zhi Wang, Shang-Jin Wei, National Bureau of Economic Research, Working Paper no. 16426, September 2010.

⁶ Values for second quarter 2015.

⁷ The correlation between the diversification of state exports as measured by the Herfindahl index and the shares of exports in total state output is -0.26.

⁸ For more details on Texas comparative advantage, see "Texas Comparative Advantage and Manufacturing

Exports," by Jesus Cañas, Luis Bernardo Torres Ruiz, and Christina English in *Ten-Gallon Economy, Sizing Up Economic Growth in Texas*, Palgrave Macmillan, 2015.

⁹ "Trade, Production Sharing, and the International Transmission of Business Cycles," by Ariel Burstein, Christopher Kurz, and Linda Tesar, National Bureau of Economic Research, Working Paper no. 13731, January 2008.

DALLAS FED



Southwest Economy

is published quarterly by the Federal Reserve Bank of Dallas. The views expressed are those of the authors and should not be attributed to the Federal Reserve Bank of Dallas or the Federal Reserve System.

Articles may be reprinted on the condition that the source is credited and a copy is provided to the Research Department of the Federal Reserve Bank of Dallas.

Southwest Economy is available on the Dallas Fed website, www.dallasfed.org.

Federal Reserve Bank of Dallas
2200 N. Pearl St., Dallas, TX 75201

Mine Yücel, Senior Vice President and Director of Research

Pia Orrenius, **Keith R. Phillips**, Executive Editors

Michael Weiss, Editor

Kathy Thacker, Associate Editor

Dianne Tunnell, Associate Editor

Ellah Piña, Graphic Designer