



Southwest Economy

A composite image showing three different energy sources: solar panels on the left, a wind turbine in the center, and an oil pumpjack on the right, all set against a clear blue sky.

▶ Once-Oil-Dependent Texas Economy to Keep Growing as Renewable Energy Expands

PLUS

- ▶ Federal Support Keeps State Budgets (Including Texas') Healthy amid Tumult from COVID-19-Induced Economic Ills
- ▶ On the Record: Technology Displaced Workers in Pandemic; Retraining Must Expand
- ▶ Spotlight: Missteps Along U.S.–Mexico Border Hinder Movement of COVID-19 Biomedical Trade
- ▶ Go Figure: Birth Rates Falling Faster in Texas than U.S.



President's Perspective

Rob Kaplan, president and CEO of the Dallas Fed, regularly speaks and writes on the factors that affect economic growth in the nation and Eleventh District. Here are some of his recent thoughts on key issues:

On Excesses and Imbalances

“My concern is, as a result of the [Fed’s] asset purchases [of mortgage-backed securities and Treasuries], we are seeing unintended side effects and excess risk taking, particularly in the credit markets ... that I think are going to need to get normalized. We are also seeing impacts on the housing market. ... I think we’ll be a lot healthier if we can soon wean off of these purchases, and it will put us in a much better position going forward.”

Interview with CNBC—Aug. 26, 2021

On Asset Purchases and the Federal Funds Rate

“I think it is important to divorce discussions of the fed funds rate from discussions of our purchases [of mortgage-backed securities and Treasuries]. My comments on purchases are not intended to suggest I want to take more aggressive action on the federal funds rate.”

Interview with Reuters—Aug. 4, 2021

Supply/Demand Imbalances to be Longer Lasting

“My contacts are telling me that supply/demand imbalances for materials are going to last longer than people may be expecting. Certain material imbalances are going to get resolved, but my contacts in the semiconductor industry are telling me that it could take much longer to see those imbalances resolved.

The one area where I see these imbalances being even more persistent is labor supply/demand. We’ve had 3 million retirements since February 2020, and [roughly] another 1 million people leaving the workforce to be caregivers and/or [due to] fear of infection. As a result, businesses are becoming resolved to the idea that it will be harder to attract labor; they are going to have to pay more. ... I think these labor supply imbalances are going to be with us for an extended period.”

Interview with Bloomberg—Aug. 27, 2021



Once-Oil-Dependent Texas Economy to Keep Growing as Renewable Energy Expands

By Christopher Slijk and Keith R. Phillips

ABSTRACT: The negative environmental impacts of global warming have motivated the beginnings of a global transition from traditional fossil fuels to renewable energy. History suggests that the Texas economy likely will continue to perform well even if there is a long-term decline in the state's oil and gas sector.

The energy industry is confronting a quickly evolving transition to renewable resources from CO₂-emitting fossil fuels. Reducing such emissions is important because CO₂ is a greenhouse gas that traps heat in Earth's atmosphere. The burning of fossil fuels contributed substantially to a 40 percent net increase in atmospheric CO₂ from 1750 to 2011.¹

The "greening" of the U.S. and its electrical grid has accelerated with the increased use of solar and wind power—a trend that could profoundly change Texas and its powerful oil and gas sector.² Despite its deep ties to the oil and gas industry, the state is increasingly turning to wind—and more recently, solar—for power production.³

The historically prominent Texas energy industry is at a crossroads—and not for the first time. From the early 1980s to the early 2000s, the Texas oil and gas sector experienced a steady decline in production. Yet the

state economy continued to outperform the nation.

This experience suggests that the relative strength of the Texas economy could persist in coming decades even if the upstream oil and gas sector experiences a long-term decline due to the energy transition.

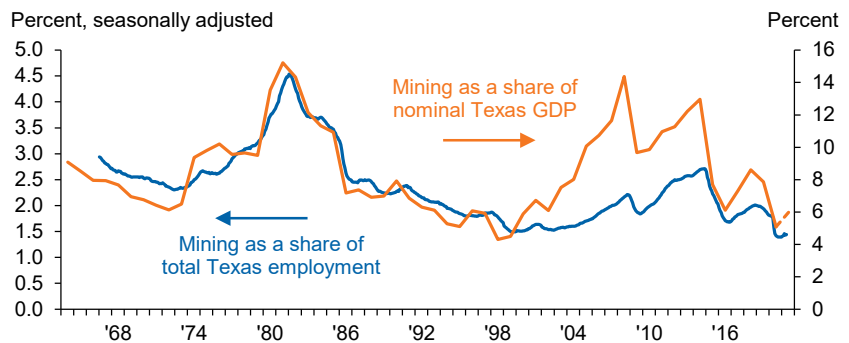
Oil and Gas Prominence

The oil and gas sector has historically been a pillar of the Texas economy. With the first discoveries of major deposits—notably, Spindletop near Beaumont in 1901—the oil industry rapidly expanded. By the 1940s, Texas was the largest oil-producing state in the U.S. and among the largest oil-producing regions in the world. (If Texas were a country, its current oil production would rank fourth globally, behind the U.S., Russia and Saudi Arabia and ahead of Mexico and Canada.)

In the early 1980s, the oil and gas industry directly accounted for

CHART
1

Oil and Gas Share of Texas Jobs, Output Peaked in 1980s

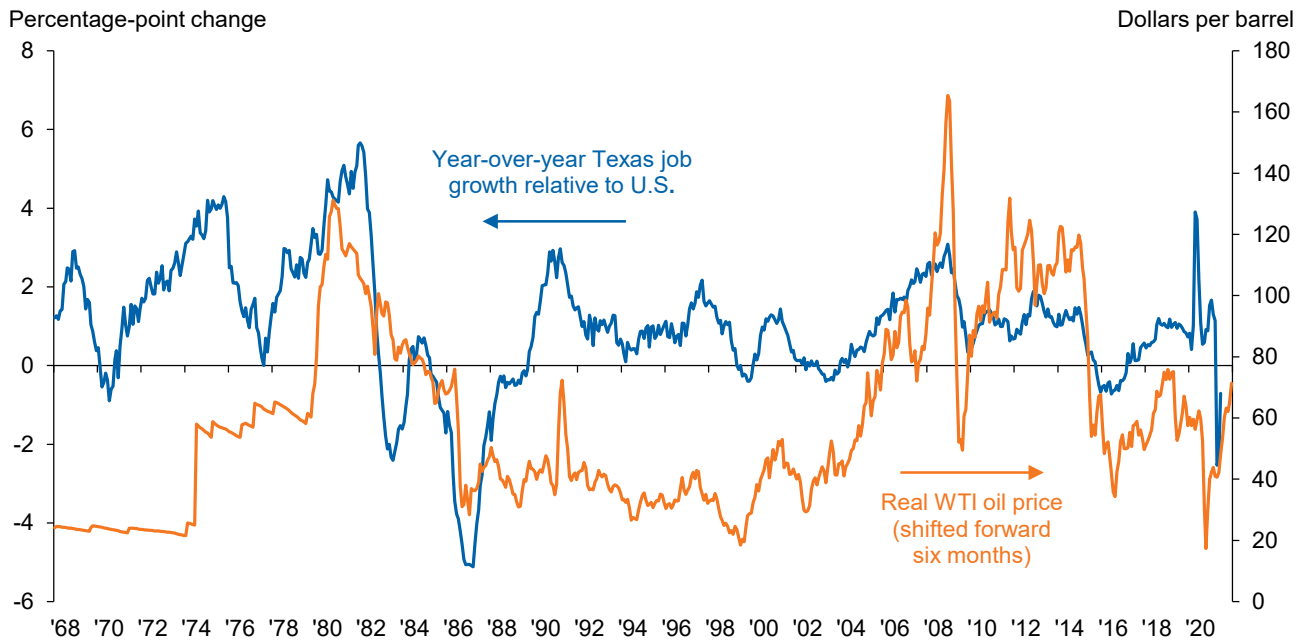


NOTE: Values prior to 1997 extrapolated from Standard Industrial Classification system coded data. "Mining" includes oil and gas extraction and support activities for mining, which account for over 95 percent of activity in the category in Texas. 2021 gross domestic product (GDP) data are through the first quarter.

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

CHART
2

Energy Price Swings Impact State's Job Growth Premium over U.S.



NOTES: Relative job growth is calculated as year-over-year percentage change in Texas payroll employment subtracted by year-over-year percentage change in U.S. payroll employment. WTI refers to West Texas Intermediate crude oil.
SOURCES: Bureau of Labor Statistics; *Oil and Gas Journal*.

more than 15 percent of state gross domestic product (GDP) and nearly 5 percent of state employment (*Chart 1*). A national recession in 1981 and the oil-price collapse in 1986 diminished state oil and gas production and employment, setting in motion a decades-long decline in both.

The sector’s relative prominence steadily slipped during the 1990s as fewer new oil deposits were found and the largest oil fields were in long-term decline. Increasingly, the industry turned to stripper wells, which produce 10 or fewer barrels of oil per day and operate at a cost disadvantage relative to global competitors.

Oil imports began to substitute for declining Texas production. The fall coincided with a shift in activity to the downstream sector. Billions of dollars in refining capacity and petrochemical manufacturing infrastructure grew along the Gulf Coast.

The shale boom in the mid-2000s reversed this production trend. Begin-

ning with the Barnett Shale formation in North Central Texas, the new technologies and methods of hydraulic fracking and horizontal drilling reinvigorated the sector, extracting oil and gas from tight rock formations at a time of rising oil prices.

This oil and gas resurgence became most evident in the Permian Basin of West Texas and eastern New Mexico, where the sector had traditionally operated, and in new drilling areas in the Eagle Ford formation in South Texas.⁴

Texas Economic Impact

Historically, swings in the energy sector have materially affected the state’s economy, with sudden, sharp declines depressing broader activity. Texas employment growth fell below its long-term average and weakened to below the U.S. rate as oil prices abruptly declined in 1986, the late 1990s and during the shale oil bust of 2015–16 (*Chart 2*).

While the large oil price swings clearly affected the Texas economy

in the short term, the effect of the longer-term sectoral decline from the early 1980s to the mid-2000s was more muted.⁵ For example, during the 1990s, despite oil and gas sectoral weakness, the state’s economic growth continued to outpace the nation’s.

At that time, the share of economic output and employment attributable to oil and gas fell to the lowest levels on record going back to the 1960s, even as Texas experienced nearly 3 percent annual job growth and 4.7 percent annual GDP growth. By comparison, U.S. employment increased 1.8 percent and GDP expanded 3.3 percent, representing a slightly higher growth premium for Texas than the long-term average.

Texas Growth Sectors

The nation underwent a surge in output and productivity due to the tech boom beginning in the 1990s, with tech activity in Texas increasing more than in many other states. Even as fracking took hold, cresting in 2014, the oil and gas sector’s share of the state

economy remained below its peak of the early 1980s.

Diversification of the overall Texas economy, including expansion into downstream energy operations such as petrochemicals and refining, has been pivotal. While gasoline and diesel account for a majority of current global oil demand, a growing share is due to petrochemical feedstocks such as ethane, naphtha and liquefied petroleum gas.

Petrochemicals are expected to account for one-third of the nearly 10 million barrel-per-day increase in oil demand during the next 10 years.⁶ This should disproportionately benefit downstream activity along the Texas Gulf Coast even as oil and gas production's impact becomes less prominent.

Most recently, in 2015–16—when oil prices declined over 70 percent from their 2014 peak—diversification, particularly from the growth of petrochemicals and refining, helped Texas' employment grow even though its rate slipped below that of the U.S.⁷ Low prices for natural gas, used in the manufacture of petrochemicals, provided a global competitive advantage for their production. Today, the state accounts for nearly one-third of

▶ *The industry structure in Texas remains much more diversified than it was in the early 1980s, when the energy sector began its first major long-term decline.*

total U.S. refining capacity and three-quarters of petrochemical output.

Professional, scientific and technical services employment has also grown. The share of jobs in this sector, which includes IT services such as computer systems design and computer programming as well as legal and accounting services, increased from under 4 percent in 1990 to 6.5 percent in 2019.

Calculating State Changes

It's possible to quantify the evolution of industry diversification and how Texas differs from the nation.

The measure is calculated as 1 minus the squared sum of the absolute differences in job shares across 20 broad industry classifications—representing industries categorized with two-digit North American Industry Classification System codes.

If a region has the exact same job shares as the nation, the value of the

measure is 1. If most of a region's jobs are in one or two key industries, the value will be closer to zero. This measure is depicted in Chart 3, where the differential between Texas and the U.S. average narrowed from the mid-1980s to the mid-2000s and then widened following the fracking boom and energy sector resurgence.

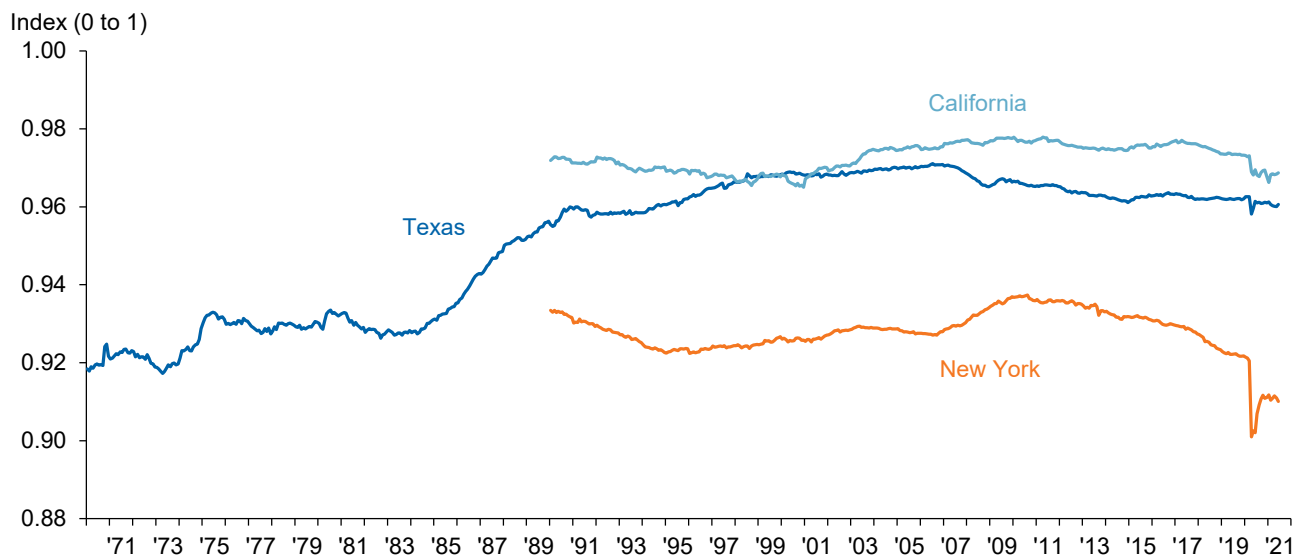
By this measure, the industry structure in Texas remains much more diversified than it was in the early 1980s, when the energy sector began its first major long-term decline. By comparison, California is more diversified than Texas, while New York is less so, primarily due to a low share of manufacturing employment and the high share of jobs in private education and health services industries in recent years.

Energy Sector Redefined

While the oil and gas share of employment and output may decline in

CHART
3

Texas Industry Mix More Similar to U.S. Today than Before the 1990s

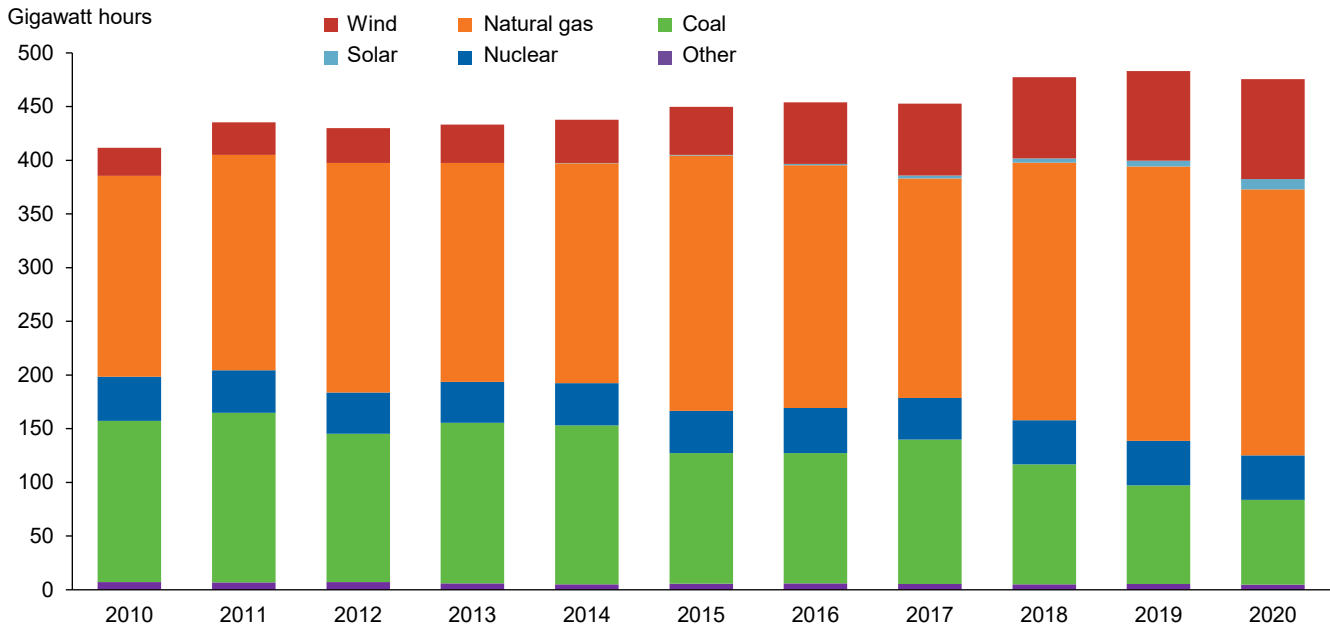


NOTES: The index is calculated based on the squared difference of the percentage share of state-level and national employment by industry for two-digit North American Industry Classification codes. Higher values denote a regional industry mix that more closely resembles the national industry mix.

SOURCES: Bureau of Labor Statistics; seasonal and other adjustments by the Federal Reserve Bank of Dallas.

CHART
4

Renewables Provide Second-Largest Source of Texas Electric Power Generation



SOURCE: U.S. Energy Information Administration.

Texas over the next several decades, the renewable energy sector is likely to grow significantly. This is not a recent phenomenon in Texas, although only in recent years have renewables grown into meaningful contributors to total power production.

Total electricity generation from renewable sources—primarily wind—has risen fourfold during the past 10 years, with its share of total power production increasing from 8 percent to 25 percent (*Chart 4*).

Wind and solar are expected to grow further, with new solar installations expected to make up nearly half of total electric generation capacity additions in Texas. While solar accounted for less than 0.5 percent of total electricity generation as recently as 2016, it now makes up 2 percent of the state’s energy portfolio.

The installation of an additional 10 gigawatts of solar capacity is planned in Texas in 2022—one-third of the total projected solar expansion in the U.S.—potentially doubling the state share. But solar must overcome the lack of a state-level net metering requirement, preventing residential

customers from selling excess power back into the power grid, and no specified renewable energy target for solar capacity.⁸

Additionally, traditional fossil-fuel producers have shown little interest in renewables. The second quarter 2021 Dallas Fed Energy Survey suggests that fewer than 20 percent of oil and gas firms are currently producing or planning to invest in wind or solar power over the next four years.

Then again, renewable power is not a substitute for oil, natural gas or natural gas liquids in industries such as petrochemical and plastics production or for the global stock of equipment that relies on liquid fuels, a category likely to come under pressure from electrification of the auto industry as combustion-engine vehicles become largely obsolete over the coming decades.

Path of Transition

The greatest impediment to renewable energy—apart from policy constraints—is the intermittency of solar and wind power. Unlike typically consistent and dispatchable sources

such as natural-gas- and coal-powered electrical plants and fuels such as gasoline, renewables are contingent on weather conditions that vary significantly throughout the day, month and year.

Thus, a switch to renewable energy with no change in total power capacity is unfeasible. Rather, a more likely scenario would be a gradual but consistent expansion of the state’s renewable energy capacity, which is expected to account for a majority of new power production over the next 30 years.

During the next three decades, the technology and infrastructure to better store and distribute renewable power to businesses and homes will likely become available. Even so, the demand for power at times when solar or wind are inadequate will necessitate that a significant share of capacity remains in dispatchable sources such as natural gas.

Battery storage can mitigate some of the shortcomings of intermittent power, though the scale and expense of these solutions remain challenges. Only 230 megawatts of battery capacity

exists in Texas, representing less than 1 percent of the state's average daily energy consumption.

Overcoming this challenge may slow the growth in renewables' share of power production. Even with new technologies continually reducing the cost of battery storage, the enormous scale of installation needed to substitute for a meaningful share of the state's dispatchable power production suggests that fossil fuels, particularly natural gas, will occupy a central role in power production for years to come.

At the same time, public and political support to reduce CO₂ emissions will likely help pressure a more rapid shift toward renewable power. Broadening demand for environmental-, social- and governance-based investment will further incentivize the movement of capital flows from traditional oil and gas activity to clean energy.

This is particularly true for the transportation sector, in which automakers have boosted investment in the development and production of electric vehicles. However, owing to the size of the existing fleet of gasoline-based vehicles, projections by the International Energy Agency suggest electric vehicles will account for only 5 to 12 percent of the total vehicle stock in the U.S. by 2030.

Similarly, other industries seeking to shift to renewable sources of energy will have to rotate their capital stock, which may last for decades more. This supports a projection of a gradual, rather than sharp, decline in the oil and gas sector.

Long-Term Outlook

Based on precedent, the Texas economy could continue to outperform the national average despite a persistent decline in oil and gas production. A high-tech boom and increased industry diversification in the 1990s produced strong overall job and output growth despite oil and gas sector weakness.

Net migration into Texas has remained strong in recent years as people have moved to the state to take advantage of job opportunities and a

cost of living well below the national average. Growth in industries outside of oil and gas drew migrants at a disproportionate rate relative to other parts of the U.S., a trend that has persisted.⁹

This deepened the pool of high-skilled labor for regional firms, spurring additional growth. Firms also moved to the state to take advantage of a relatively lower cost of doing business.¹⁰ Texas has led other states by a large margin in firm relocations since 2000, and despite the massive economic disruption brought about by the COVID-19 pandemic beginning in 2020, there are signs that this trend will continue or even accelerate.¹¹

While the oil and gas sector has played an important role in the history of the Texas economy—creating booms and busts along the way—a gradual transition to renewables is unlikely to alter the state's long-term trajectory. Over the next several decades, the enduring factors that have drawn people and businesses to Texas are likely to continue to play an outsized role in determining the state's growth premium relative to the U.S.

Slijk is an associate economist in the Research Department at the Federal Reserve Bank of Dallas.

Phillips is an assistant vice president and senior economist in the San Antonio Branch of the Federal Reserve Bank of Dallas.

Notes

¹ See U.S. Global Change Research Program, Fourth National Climate Assessment, vol. II, 2018, p. 39, <https://nca2018.globalchange.gov/downloads/>. Also see the Intergovernmental Panel on Climate Change, Climate Change 2014 Synthesis Report Summary for Policymakers, p. 4, www.ipcc.ch/sr15/chapter/spm/.

² "Texas' Energy Base Drives Climate Concerns as Renewables Expand," by Emma Marshall and Jesse Thompson, Federal Reserve Bank of Dallas *Southwest Economy*, Third Quarter, 2019, www.dallasfed.org/-/media/documents/research/swe/2019/swe1903c.pdf.

³ "Wind Power a Growing Force in Oil Country," by Justin J. Lee and Kelvinder Virdi, Federal Reserve Bank of Dallas *Southwest Economy*, Second Quarter, 2017, www.dallasfed.org/-/media/documents/research/swe/2017/swe1702e.pdf.

⁴ "Oil Boom in Eagle Ford Shale Brings New Wealth to South Texas," by Robert W. Gilmer, Raul Hernandez and Keith R. Phillips, Federal Reserve Bank of Dallas *Southwest Economy*, Second Quarter, 2012, www.dallasfed.org/-/media/documents/research/swe/2012/swe1202b.pdf. Also, "Permian Basin Booms as New Techniques Resurrect Old Sites," by Robert W. Gilmer and Jesse B. Thompson III, Federal Reserve Bank of Dallas *Southwest Economy*, Second Quarter, 2012, www.dallasfed.org/-/media/documents/research/swe/2012/swe1202d.pdf.

⁵ "The Impact of Changing Energy Prices on the Texas Economy," by Mine Yücel, Michael Plante, Amy Jordan and Nicole Lake, in *Ten Gallon Economy: Sizing Up Economic Growth in Texas*, Palgrave Macmillan, 2015, pp. 139–56.

⁶ "Net Zero by 2050: A Roadmap for the Global Energy Sector," International Energy Agency, May 2021, www.iea.org/reports/net-zero-by-2050.

⁷ "Diversified Houston Spared Recession ... So Far," by Jesse Thompson, Federal Reserve Bank of Dallas *Southwest Economy*, Third Quarter, 2015, www.dallasfed.org/-/media/documents/research/swe/2015/swe1503f.pdf.

⁸ "Abundant Sunshine Not Enough to Power Texas Residential Solar Energy," by Benjamin Meier and Jesse Thompson, Federal Reserve Bank of Dallas *Southwest Economy*, First Quarter, 2019, www.dallasfed.org/-/media/documents/research/swe/2019/swe1901e.pdf.

⁹ "Gone to Texas: Migration Vital to Growth in the Lone Star State," by Pia Orrenius, Alexander Abraham and Stephanie Gullo, Federal Reserve Bank of Dallas *Southwest Economy*, First Quarter, 2018, www.dallasfed.org/-/media/documents/research/swe/2018/swe1801b.pdf.

¹⁰ "Why Texas Grows Faster: The Role of Smaller Government," by Jason Saving, in *Ten Gallon Economy: Sizing Up Economic Growth in Texas*, Palgrave Macmillan, 2015, pp. 33–45.

¹¹ "Texas Top-Ranked for Firm Relocations," by Anil Kumar and Alexander Abraham, Federal Reserve Bank of Dallas *Southwest Economy*, Fourth Quarter, 2018, www.dallasfed.org/-/media/documents/research/swe/2018/swe1804b.pdf.

A Conversation with Tamar Jacoby

Technology Displaced Workers in Pandemic; Retraining Must Expand

Tamar Jacoby is president of Opportunity America, a Washington-based nonprofit that promotes economic mobility and is focused on workforce education and training. The organization's forthcoming survey of community college administrators explores their workforce programs and employer relationships. Jacoby discusses the pandemic, worker mobility and job training.

Q. What is the future of work? Is the American dream still attainable?

The American dream has been under scrutiny for a while. There's a lot of debate about economic mobility—has it shrunk or decelerated in the last decades? We don't know for sure. What we do know is that technology has been transforming the economy.

We all talk about the future of work. The automation and business restructuring we call the "future of work" has been with us since the 1950s and gathering steam in recent years. But the pandemic sharply accelerated it [workplace change]. Someone summed it up well during the first lockdown [in April 2020]: "Things about the future of work that we thought would take a decade happened in a week during the pandemic."

Some companies automated to replace people who weren't coming to work for safety reasons. Others automated because it was an opportunity to do something more cheaply—to use a machine instead of a worker.

Some of the workers who lost jobs will find new positions; others won't. Some of this will sort itself out, like the supply-chain problems [affecting manufacturing]. But the important long-term trend is the accelerating future of work, and it

will have a disproportionate impact on low- and middle-income Americans.

The jobs at the bottom of the skills ladder are more likely to involve routine tasks, so they are more likely to be transformed or eliminated by automation. Automation will also create jobs, maybe as many [as are lost], maybe not. But either way, many workers will have to learn new skills to keep their old jobs or get new jobs.

Q. You've done a lot of work recently looking at community colleges. What role are they playing educating students on their way to four-year universities while providing workforce education and skills training?

Community colleges are like a Swiss Army knife; they do lots of different things. Many students who are intimidated by a four-year school or can't afford a four-year school or don't have the grades for a four-year school go to community college. If they make the right choices and work hard, they eventually transfer to a four-year college and get a bachelor's degree. And it's a much cheaper bachelor's degree because community colleges are much cheaper than four-year schools.

The challenge is that the graduation rate at community colleges nationwide is below 40 percent. The transfer rate is even worse—80 percent of community college students show up saying they want a bachelor's degree, but only 15 percent make it. We need to do better; we need to improve these graduation rates. But we also need better options for students who probably aren't going to get a four-year degree.

That's what some of the other tools on the Swiss Army knife are for—preparing learners for the workforce. Some people don't need or want degrees. What they're looking for are certifications. Think of a certified nursing assistant. A certified nursing assistant doesn't necessarily need a degree. He or she can get a good job with a certification.

Most community colleges have a separate, stand-alone division devoted to serving learners who don't need or want degrees. It's called the noncredit division, and it accounts for more than one-third of all community college students nationwide. But many people have never even heard of it. That's why it's sometimes called the "hidden college."

Almost every community college has both a credit division and a noncredit division, and on some campuses, they're like two separate institutions. The side that's preparing people for transfer is one kind of institution, and it's very distinct from the noncredit side. A noncredit student might need just eight or 12 weeks to complete a certified nursing assistant program. These students don't have to take any English or history, and they leave with a certification rather than a degree.

When the manufacturing worker loses his job at age 32, he needs to go someplace to learn a new skill for a new job. And often the perfect place is a community college.

Q. It seems that especially in the pandemic, skills training is increasingly important, right?

Yes, and community college noncredit programs are ideally suited to provide that training for two reasons. First, the noncredit side doesn't need faculty ap-



▶ *Even in the best scenario, less-skilled people will have the hardest time. Their jobs are more likely to be routinized and more likely to be changed or eliminated by automation, and the answer for people in that situation will be training.*

proval or an accreditor's approval to launch a course. So, if I'm Tamar's Widget Co., and I show up at the college and say, "I need welders. Can you train some welders?" The credit side is going to say, "Come back in two years. We need to get program approval; we need to run it by our accreditor. We probably need to run it by the state."

The noncredit side is going to say, "Yesterday? Tomorrow? How many people? What kind of welding?" They're much more flexible and adaptable and close to the labor market, and that's obviously good for students and employers and, by extension, the economy.

Second, the noncredit side of the college can make courses as short or long as they need to be, and it doesn't have all those other requirements—English, history, social studies. So, it's ideal for students in a hurry to get back to the labor market.

The challenge is that most noncredit programs aren't accredited, so some people worry about quality control. What the colleges will tell you is, "We have market discipline." If students weren't taking the programs and employers weren't hiring the graduates, these programs wouldn't exist. I think that's true to a large extent, but we don't yet have the data to prove it.

Q. How do community colleges in Texas compare with those in the rest of the nation?

Texas is doing some really interesting things. In many ways, it's on the cutting edge of innovation.

It's a very centralized system. That's both good and bad. But it can help with

quality control and also make it easier for noncredit students who come back to college later in life to get credit for what they learned in a noncredit program.

Most courses taught anywhere in the state are in one of two central course catalogs. There's a state course catalog for academic courses and a state course catalog for workforce courses.

So, the basic construction safety course at Brazosport College is mostly the same as the construction safety course at San Jacinto College. That makes it easier for students who start their education in one place to finish someplace else.

Even more important, when the unemployed construction helper comes back to college at age 30 to get an industrial construction management degree, he's much more likely to be able to leverage what he learned in the basic safety course for college credit.

Texas also provides funding for the programs or program components in that central catalog, whether they're on the credit or noncredit side. Most states provide little if any funding for noncredit programs.

A second great innovation is at Texas State Technical College. It is one of the best two-year institutions in the country, and it has a really interesting financial model.

Most community colleges get funded on the basis of "butts in seats." How many students do you have, and how many hours have they put in? At Texas State Technical, the college gets reimbursed based on what graduates earn—how much more than the minimum wage. The subsidy is geared to out-

comes as opposed to inputs. That should be a model for the nation.

Q. What's the future of the American worker and what can we do to make it better?

Automation and the accompanying business restructuring are coming at us at a million miles per hour. And there's a big debate—there has been for many decades—about whether that's going to be a good thing or a bad thing.

Some people are apocalyptic—they say it's going to destroy all the jobs. Other people take a more hopeful view. They anticipate creative destruction. Some jobs will be lost, but other jobs will take their place.

I fall on the creative destruction side of the debate. But even in the best scenario, less-skilled people will have the hardest time. Their jobs are more likely to be routinized and more likely to be changed or eliminated by automation, and the answer for people in that situation will be training.

The future will not be kind to low-skilled Americans unless they get skills. Workforce training is going to become more and more important. More people will need it.

The Southwest Economy Podcast features an extended, two-part conversation with Tamar Jacoby. Find it at dallasfed.org/research/swe/podcast.

Federal Support Keeps State Budgets (Including Texas') Healthy amid Tumult from COVID-19-Induced Economic Ills

By Jason Saving

ABSTRACT: An unprecedented federal fiscal response to the COVID-19-induced recession in early 2020 helped prop up state government finances even among states whose tax and finance structures put them at particular risk during a downturn. A variety of programs helped individuals, firms and jurisdictions avoid what some feared would be a catastrophic collapse. However, there will be a cost for all that help.

The nation suffered a historic, broad-based two-month economic decline—beginning in late February 2020—across all regions. A variety of indicators went into a freefall from which they have yet to fully recover. It seemed likely that many of the jobs and firms lost to the impacts of COVID-19 would never return.

Many states began planning for fiscal disaster. With fewer people working and fewer firms in business, there would be less income and revenue coming in, and thus, less spending going out. Forecasts pointed to impending fiscal shortfalls for 2020–21 that would be comparable to, or even surpass, those experienced during the Great Recession, from December 2007 to June 2009.

These forecasts largely didn't pan out.

Instead, many states find themselves awash in revenue, expanding services and paying down debt. New Jersey met its yearly pension-funding obligations for the first time since the 1990s; California is disbursing cash to two-thirds of its residents; and even perennially cash-strapped Illinois received a credit

rating upgrade for the first time since 2000. Illinois also ended the 2021 fiscal year with a \$2 billion surplus.

How were state budgets able to sustain themselves so well during this recession?

In broad terms, the answer is twofold. First, state tax revenue held up better than expected, especially in areas where business-cycle fluctuations normally affect receipts. Second, the federal government hugely increased its spending during the recession, providing an unprecedented amount of grants and loans to prop up state budgets, as well as direct aid to individuals and businesses.

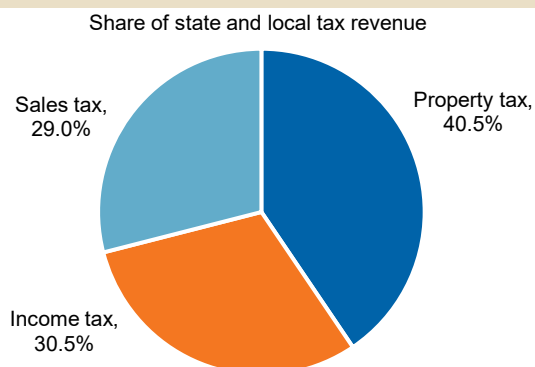
Funding State Budgets

Typically, recessions are accompanied by declines in personal income as people lose their jobs or find themselves working fewer hours.

These reductions in personal income affect state tax revenue—but not in a uniform way. In the aggregate, state and local governments raise revenue through a combination of sales, income and property taxes. While

CHART
1

States' Tax Revenues Flow from Property, Income and Sales Taxes



NOTE: Data are from the 2019 calendar year.

SOURCES: Census Bureau; Annual Survey of State Government Tax Collections.

revenue shares of each of these can differ sharply, the sum across states is roughly in equal proportion (*Chart 1*). While not every state chooses to emphasize revenue diversity, those that do are less dependent on any single revenue source.

A broad mix of taxation also helps insulate states and localities from macroeconomic developments. Real-estate busts can depress home values at double-digit rates, affecting property tax revenue. Heightened uncertainty can cause people to save more and consume less, reducing sales tax revenue. And during economic downturns, lost jobs, wage declines and fewer hours worked contribute to diminished income taxes.

Risking Lower Revenues

However, while all of these tax instruments pose risks at different times, they are not equally volatile as an economy enters recession. Real estate boom-bust cycles can sometimes occur during expansions, and it is possible for home prices to keep rising in a recession, as they did in 2020.

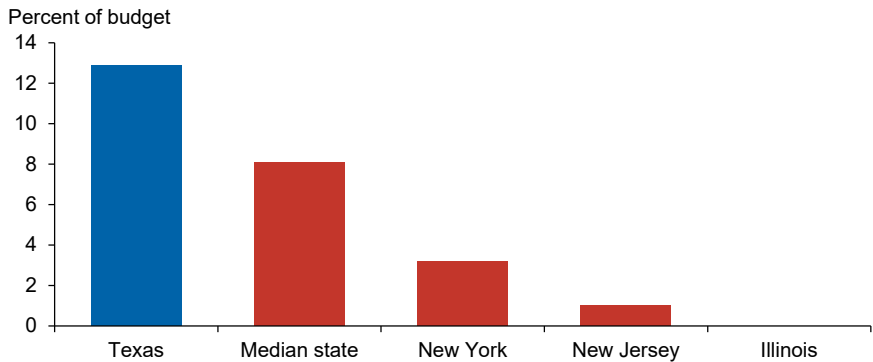
Despite early forecasts that people would abandon central cities in the wake of COVID-19 and work remotely, property values continued rising rapidly in urban cores, though the rate of increase was even greater in suburbs/exurbs.¹

Still, real estate prices can be highly volatile, especially in metro areas where natural barriers (such as mountains) or zoning laws constrain construction or, conversely, where construction occurs at an especially rapid pace, leading to speculative supply bubbles. But these situations don't pose a particular vulnerability during recession.

Income tax revenue on the other hand is much more vulnerable to recession because incomes tend to take a large hit during a recession. As businesses fail, people lose their jobs or are forced to work fewer hours or for lower wages, reducing income earned and income taxes paid.

The more severe a recession, the more severe the income drop, with

CHART 2 Income-Tax-Dependent States Maintain Modest Rainy-Day Funds



NOTES: Red bars denote states dependent on income taxes for more than one-third of their tax revenue. Rainy-day funds as a share of the budget are depicted.

SOURCE: Fiscal Survey of States, 2020.

especially large declines triggering yawning budget shortfalls in states such as California and Illinois that rely on income taxes for a disproportionate share of revenue.

Sales taxes typically occupy a middle ground, tied to the business cycle but not especially vulnerable to it. Numerous economic studies have found that consumption is more stable than income.

The intuitive reason for this is that when someone loses their job and their income falls, they must still spend on necessities such as food, clothing and shelter. Often this is done by drawing on savings, borrowing from friends or family members and running up credit card debt. This, in turn, tempers any surge in consumption that might accompany an economic recovery when jobs are regained.²

Funding for States

One important implication is that income-tax-reliant states will be significantly more vulnerable to business-cycle fluctuations. On the plus side, such states may experience massive budget surpluses during good economic times that can be used to expand government services for vulnerable populations. On the other hand, these states are nearly assured of large budget shortfalls during recessions.

This matters because of the constitutional limitations under which states

and localities generally operate. When individuals (or the federal government) spend more than they receive, they can cover the resulting shortfall with debt.

However, states and localities are generally required to balance their budgets and cannot deficit-spend. As a result, government leaders often must cut budgets or enact tax increases during a recession.

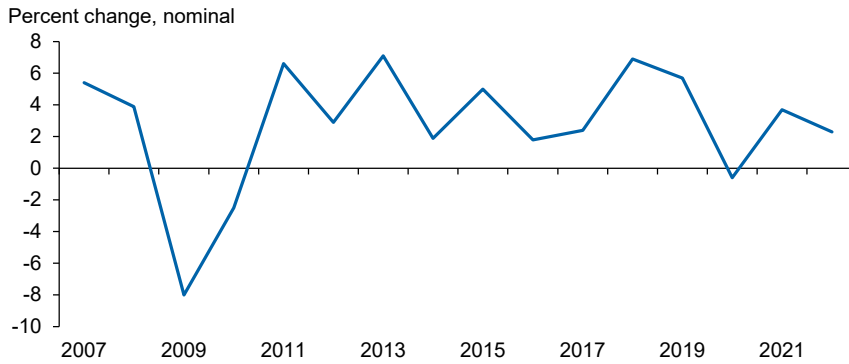
The discomfort of such fiscal adjustments depends on the fiscal mix on which a state relies for its revenue. At one extreme are the seven states—including Texas—that impose no income tax and are, thus, least vulnerable to business-cycle fluctuations. At the other extreme is a group of states—including California, New Jersey and Illinois—that rely disproportionately on income-tax revenue to fund operations.

The good news is that because this vulnerability to recession can be assessed well in advance of when a downturn begins, states that choose to rely on business-cycle-dependent revenue sources can compensate by carrying above-average rainy-day fund balances.³

Often, they fail to fully deploy such measures. In the year before COVID-19, New York's rainy-day fund balance of 3.2 percent of its budget was less than half the national average of 8.1 percent (*Chart 2*). Yet even that was triple New Jersey's 1.0 percent balance and infinitely larger than Illinois' 0.0 percent.

**CHART
3**

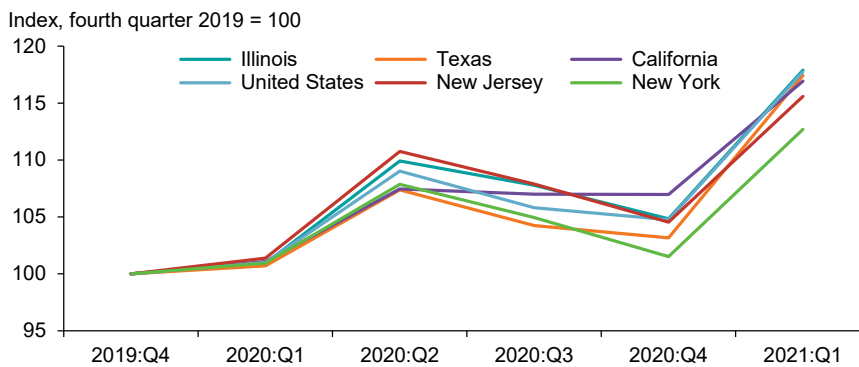
State Revenue Growth Plunged in 2009-10, Dipped During COVID-19



NOTE: Data are for fiscal years and include fiscal 2022.
SOURCE: Fiscal Survey of States.

**CHART
4**

Personal Income Remained Above Pre-COVID Levels in 2020



NOTE: Data are quarterly, through first quarter 2021.
SOURCE: Bureau of Economic Analysis.

This combination of high business-cycle vulnerability and a low rainy-day fund balance nearly guarantees tough times when recession strikes.

Texas, on the other hand, carried an above-average rainy-day fund balance of 12.9 percent of its budget, though there is no state income tax. This stems in part from its large oil and gas production, a sector that is a major contributor to the fund and is notoriously volatile.⁴

COVID-19’s Unusual Impact

As people lost their jobs and firms ceased operations during the last major downturn, the Great Recession, state budgets faltered. State revenue, after rising 3.9 percent in 2008—the first full year of the recession—fell 8 percent in

2009 and an additional 2.5 percent in 2010, necessitating significant cuts to social services at precisely the time they were most needed (Chart 3).

Shaped by this experience, states expected a similarly severe budget crunch in the COVID-19 era. But something different happened. While revenue in 40 of the nation’s 50 states didn’t meet pre-COVID-19 expectations for fiscal 2020–21, it shrank by a relatively modest 0.6 percent in 2020 and actually grew 3.7 percent in 2021.⁵ State revenue is expected to expand an additional 2.3 percent in 2022, according to recent estimates.

To be sure, there are many differences between the Great Recession and COVID-19 eras. Chief among them is what has happened to personal

income. In 2009, for example, personal income dropped in 49 of the 50 states.

During second quarter 2020, personal income for the U.S as a whole soared 8 percent, even as COVID-19 knocked millions of Americans out of work and reduced work hours for millions more (Chart 4). Personal income remained above prepandemic levels for the rest of the year and into first quarter 2021.

This was also true for large states—Texas, New York and even Illinois. By first quarter 2021, personal income in Texas was 17.4 percent above where it had been in fourth quarter 2019. If this remarkable performance were due solely to factors such as accommodative state policy toward business, housing availability and a relatively young demographic, then one might expect other states that lack some of those characteristics to experience slower personal income growth.

Yet other large states experienced broadly similar personal income patterns from the onset of COVID-19 through first quarter 2021—exceeding fourth quarter 2019 levels by 12.7 to 17.9 percent.

This behavior of personal income ensured that even income-tax-reliant states would not face sizable fiscal shortfalls in 2021–22 despite beginning the crisis with what were in many cases notably low rainy-day fund balances.

Federal Fiscal Support

Personal income held up because of a historically unprecedented (in peacetime) federal spending increase. Among the many measures taken by the federal government to bolster personal income were direct stimulus payments to individuals and augmented unemployment insurance benefits for people who lost their jobs. In some cases, the program provided a higher weekly stipend than recipients’ past wages.⁶

There were also grants and loans to firms through the Paycheck Protection Program (PPP), primarily intended to ensure that businesses could meet payrolls.⁷ This support came through an array of legislative action in 2020, including the Coronavirus Preparedness and Response Supplemental Appropria-

tions Act (March 6), the Families First Coronavirus Response Act (March 18), the CARES Act (March 27), a liberalization of the PPP (April 24), the Consolidated Appropriations Act (Dec. 21), and in 2021, the American Rescue Plan (March 11). All helped improve state fiscal outlooks by averting layoffs and firm closures.

The federal government also provided sizable direct grants to states such as Texas.⁸ While it is not yet known how all of these funds will be spent, Texas' timely publication of state revenue information illustrates just how substantial these grants have been.

Historically, state taxes (such as the sales tax) provide about half of total Texas revenue compared with one-third from federal transfers (*Chart 5*).

But the pandemic-era surge in federal support for state budgets boosted federal transfers by about \$16 billion in 2020. They have remained elevated in 2021, making the federal government the single largest revenue source for Texas in both years.⁹

Federal transfers accounted for 33 percent of state revenue in 2019, 42 percent in 2020 and 43 percent in 2021.

Future Recession Aid

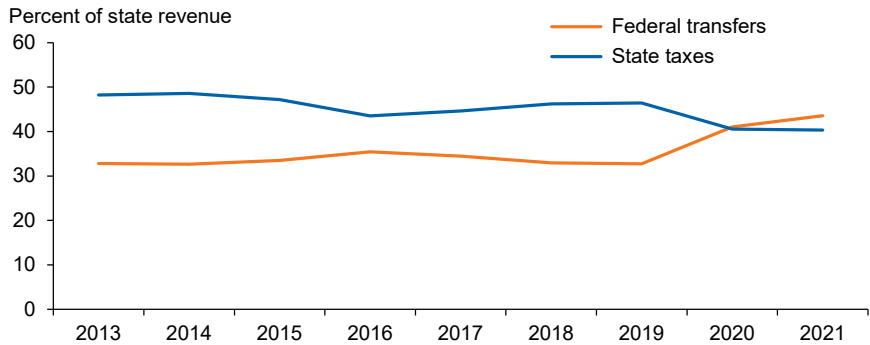
Will future recessions be addressed with equally stimulative fiscal policy, or will the response follow more conventional lines?

The answer has special resonance for the optimal configuration of state fiscal policy. State sales taxes are more regressive than income taxes but have also historically offered more stability than income taxes because income is so volatile over the course of the business cycle.¹⁰

To the extent the federal government will now more readily intervene to reduce income volatility, we may see states such as California and New York fare better than they typically would during a recession; however, at least indirectly, such support would likely help states such as Texas, too, by bolstering consumption.

Longer term, the unprecedented peacetime debt accumulated by the federal government in 2020 and 2021

CHART 5 Texas' Tax Revenue Normally Exceeds Federal Transfers, Except in 2020-21



NOTE: Data are annual, through fiscal year 2021.
SOURCE: Texas Comptroller of Public Accounts.

could have consequences. Research has shown that a large and expanding debt load constrains countries' abilities to handle future crises and risks imposing burdensome repayment obligations—higher taxes—on future generations.

For now, though, federal stimulus appears to have helped keep both personal income and state government budgets growing during difficult economic times.

Saving is a senior economist and director of the Research and Studies function in the Communications and Outreach Department at the Federal Reserve Bank of Dallas.

Notes

¹ "COVID-19 Fuels Sudden, Surging Demand for Suburban Housing," by Laila Assanie and Yichen Su, Federal Reserve Bank of Dallas *Southwest Economy*, Fourth Quarter 2020, www.dallasfed.org/research/swe/2020/swe2004/swe2004b.aspx.

² See the Fed's yearly survey on household economics and decision-making for more on how households respond to financial stress, "Report on the Economic Well-Being of U.S. Households in 2019—May 2020," Board of Governors of the Federal Reserve System, accessed Aug. 17, 2020, www.federalreserve.gov/publications/2020-economic-well-being-of-us-households-in-2019-dealing-with-unexpected-expenses.htm.

³ "Lingering Energy Bust Depresses, Doesn't Sink State Budgets," by Jason Saving, Federal Reserve Bank of Dallas *Southwest Economy*, Fourth Quarter 2016.

⁴ Disagreements over the intended purposes—and legitimate uses—of the rainy-day fund have also played

a role in its growth. For more on how these issues have come into play in the COVID-19 era, see "Texas Has Billions in Its Rainy-Day Fund, But Legislators Say They Won't Use It Until January," by Clare Proctor, *Texas Tribune*, May 11, 2020, www.texastribune.org/2020/05/11/texas-economy-rainy-day/.

⁵ 2020 "Fiscal Survey of States," National Association of State Budget Officers, accessed Aug. 17, 2021, www.nasbo.org/reports-data/fiscal-survey-of-states.

⁶ "Pandemic Unemployment Benefits Provided Much-Needed Fiscal Support," by Anil Kumar, Federal Reserve Bank of Dallas *Southwest Economy*, Fourth Quarter 2020, www.dallasfed.org/research/swe/2020/swe2004/swe2004c.aspx.

⁷ "Small Business Hardships Highlight Relationships with Lenders in COVID-19 Era," by Wenhua Di, Nathaniel Pattison and Chloe Smith, Federal Reserve Bank of Dallas *Southwest Economy*, Second Quarter 2020. For details on how PPP funds were allocated across states, see "Who Benefited from the Paycheck Protection Program? Our Texas Analysis Offers an Early Look," by Emily Ryder Perlmeter, Federal Reserve Bank of Dallas *Dallas Fed Communities*, Sept. 4, 2020, www.dallasfed.org/cd/communities/2020/0904.

⁸ The federal government also made grants on a smaller scale to other government entities such as cities and school districts.

⁹ The various federal income-support programs also likely boosted state revenue by, for example, enabling consumers to make more purchases than they otherwise could. Thus, the chart may understate the impact of federal stimulus on state revenue in the 2020–21 period.

¹⁰ "Texas Taxes: Who Bears the Burden?" by Jason Saving, Federal Reserve Bank of Dallas *Southwest Economy*, Third Quarter 2017, www.dallasfed.org/-/media/documents/research/swe/2017/swe1703.pdf.

Missteps Along U.S.–Mexico Border Hinder Movement of COVID-19 Biomedical Trade

By Keighton Hines and Roberto Coronado

The Paso del Norte region—the cities of El Paso and Ciudad Juárez—is a hub of binational trade and manufacturing. While most activity is concentrated in automotive parts and electronic components, a cluster of biomedical manufacturers has emerged in Juárez in recent years.

The region's biomedical device manufacturing industry produces a wide range of equipment, including electromedical apparatuses, laboratory instruments, surgical devices, pharmaceuticals and medicines, optical instruments and lenses, and irradiation units.

In 2020, Mexico exported \$11.38 billion in biomedical manufactured goods to the United States. Almost a third of these biomedical goods, worth about \$3.58 billion, passed through the El Paso Trade District last year, ranking it second behind San Diego.

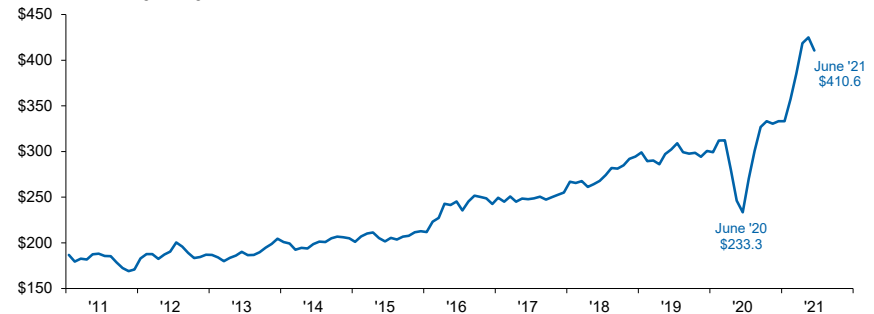
Despite heightened demand for biomedical goods as COVID-19 began spreading, the sector's supply chain was interrupted when the border was closed for nonessential activities on March 21, 2020. Ten days later, the Mexican government nationally suspended all "nonessential activities," without initially defining "essential." As a result, manufacturing plants that supplied such products to U.S. companies closed.

Disjointed coordination between the U.S. and Mexico from the outset of the pandemic also hampered the full and timely renewal of vital supply-chain trade. Even with such disruptions, the Juárez manufacturing sector pivoted to produce respirators, ventilators and personal protection equipment, much of it for export to the U.S.¹

Soon after the U.S.–Mexico border was closed to nonessential crossings, Mexico's federal and state governments' imposed limitations on manufacturing with little explanatory guidance. Manufacturing business contacts

CHART 1 COVID-19-Related Disruption Creates Volatility in Biomedical Imports Through El Paso

Real U.S. dollars (millions), three-month moving average



NOTES: Data are seasonally adjusted biomedical import values from Mexico to the El Paso Trade District from North American Industry Classification System codes 3254, 3333, 3414, 3345, 3410, 3345, 3416, 3345, 3417 and 3391, as defined by StatsAmerica. These imports are "Customs General Import Value" in U.S. dollars.

SOURCES: U.S. Import and Export Merchandise trade statistics, Census Bureau; adjustments by the Federal Reserve Bank of Dallas.

said these mandates were confusing, unclear and inconsistently enforced.

Moreover, the decrees failed to specify if plants integrated into supply chains that supported essential U.S. sectors could continue operations. Because of cross-border interdependencies, work stoppages interrupted the production and export of critical goods.

Additional plants temporarily closed in April 2020 amid general protests and strikes as the COVID-19 case count rapidly rose. When they were allowed to operate, these manufacturers were also required to scale back production, reduce on-site employment and send home workers who were pregnant or had high-risk comorbidities—diabetes, obesity and hypertension—and individuals age 60 and older.

Following these interruptions, the three-month moving average of biomedical imports from Mexico through El Paso to the U.S. plunged 10.3 percent (-\$32.1 million) in April 2020 and then a record 12.1 percent (-\$33.8 million) in May. The following month, U.S. biomedical import volumes through El Paso from Mexico reached their lowest levels since March 2016, amounting to just \$233.3 million (Chart 1).

The Mexican government began issuing clarifying guidelines in April 2020 that allowed essential businesses to expand operations. Many plants subsequently reopened and began manufacturing biomedical items.

Despite unprecedented production constraints in 2020, biomedical imports from Mexico via El Paso rose 1.1 percent above 2019's import volume of \$3.54 billion. The three-month moving average reached a record-high \$424.9 million in May 2021.

With the pandemic ongoing and as more variants are discovered, clarity and uniformity in public health orders in Mexico and sustained collaboration with the U.S. government are necessary to manage the flow of people and trade.

Binational, coordinated public health measures are needed to keep the border open to critical supplies and equipment and ultimately ensure economic recovery.

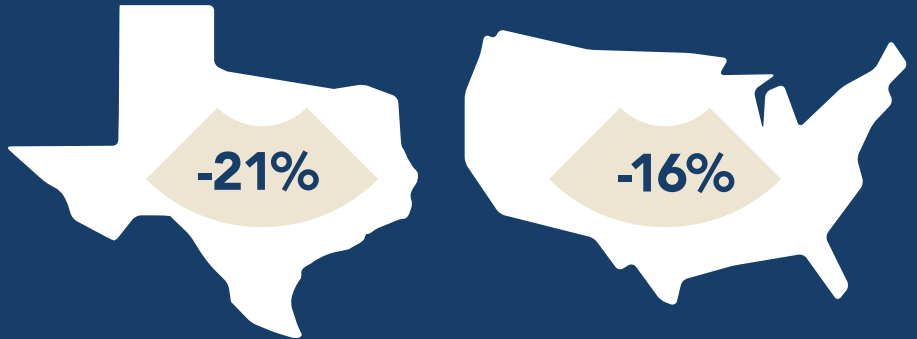
Note

¹ "COVID-19 Crisis: Juárez Maquiladoras Pivot to Manufacturing Ventilators, Face Masks," by Veronica Martinez, *El Paso Times*, April 15, 2020.

Birth Rates Falling Faster in Texas than U.S.

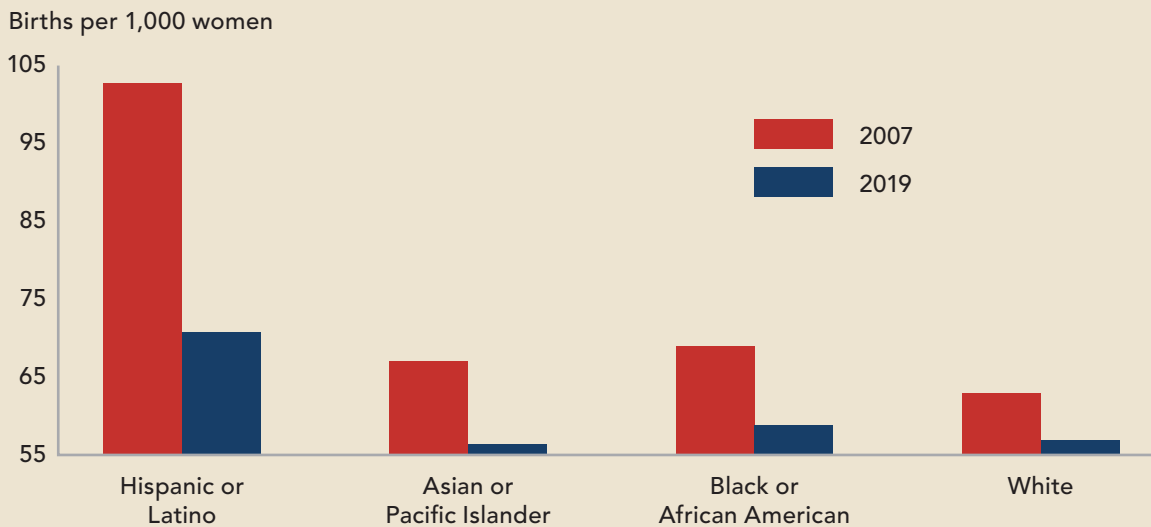
Design: Olu Eseyin; Content: James Lee, Pia Orrenius, Ana Pranger

Although birth rates in Texas remain higher than in the U.S., their decline since 2007 has been particularly noteworthy.



Drop in birth rates from 2007 to 2019

Hispanic women, who make up 42% of women in Texas but only 21% in the U.S., contributed most to Texas' faster birth-rate decline.



Why are women having fewer children?



Higher educational attainment



Economic recessions



Declining marriage rates



Availability of contraception

Fewer births can slow economic growth by reducing population growth and hastening the aging of the workforce. This can slow productivity growth and strain government programs such as Social Security and Medicare.

NOTES: Birth rate is births per thousand females ages 15–44 during the calendar year. White, Black and Asian race groups are non-Hispanic. Hispanics can be of any race. SOURCES: United States Department of Health and Human Services, Centers for Disease Control and Prevention; National Center for Health Statistics, Division of Vital Statistics.

SNAPSHOT U.S. Recessions Test Latino Advances

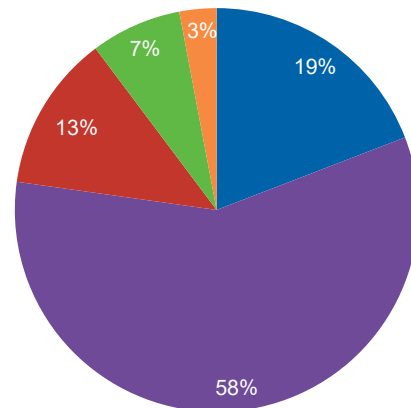
Latinos make up the largest ethnic minority in the U.S. (Chart 1). The majority are U.S. born, making their progress and well-being no longer just a question of immigrant assimilation but also of the effectiveness of U.S. educational institutions and labor markets in equipping young Latinos to move from the working class into the middle class and beyond.

One significant headwind to progress is recessions. Economic outcomes of Latinos are far more sensitive to the business cycle than are outcomes for non-Hispanic whites. Latinos also have higher poverty rates than whites, although the gap narrowed before the onset of the COVID-19 pandemic in early 2020.

Deep holes in the pandemic safety net further imperiled Latino progress in 2020 and almost surely will in 2021 as well. Policies that would help working-class and poor Latinos include immigration reform and education reform and broader access to affordable health care.

—Adapted from “How Foreign- and U.S.-Born Latinos Fare During Recessions and Recoveries,” a research paper by Pia M. Orrenius and Madeline Zavodny, <https://doi.org/10.24149/wp2104>.

CHART 1 Latinos Are Largest U.S. Minority Group



■ Latino ■ White ■ Black ■ Asian ■ Other (incl. multiracial)

NOTE: Shown are prime-age adults (24–54).

SOURCES: Annual Social and Economic Supplement of the Current Population Survey from IPUMS, 2020; authors' calculations.



Federal Reserve
Bank of Dallas

Southwest Economy

is published 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 to the Federal Reserve Bank of Dallas.

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

Marc P. Giannoni, 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
Justin Chavira, Digital Designer
Olumide Eseyin, Digital Designer
Emily Rogers, Digital Designer
Darcy Taj, Digital Designer

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