



TEXAS

“Economic activity in Texas continued to recover in August after plummeting during the second quarter. The jobless rate decreased to 6.8 percent while labor force participation inched up. **Almost all of the state's nonfarm hiring was concentrated in the service-providing sector,** but both overall and service-providing payrolls were more than 5 percent below year-end levels. Increased construction employment supported the goods-producing industry amid ongoing energy-related layoffs despite modest improvements in oil prices. The Real Estate Center's Texas weekly leading economic activity index rose in September, although **the pace of the recovery continues to be hindered by the ongoing pandemic and its impact on business operations.**” – Oct 2020 – Outlook for Texas Economy – Real Estate Center – Texas A&M University

AUSTIN

“The Austin economy continued to improve in August. The Austin Business-Cycle Index accelerated. While jobs and the unemployment rate improved in June, July and August, neither metric has returned to its March level. **Regional consumer spending since mid-July held at pre-COVID-19 levels.** Existing-home sales dipped but remained strong, and building permits rose.” – Oct 2020 – Austin Economic Indicators – Dallas Fed

UNITED STATES

“Growth of consumer spending slowed some in August. Real expenditures on services increased solidly, but real spending on durable goods was flat and that on nondurable goods fell modestly.”

“Real business equipment spending plunged in 2020Q2, reflecting disruptions linked to the COVID-19 pandemic.”

“Single-family housing starts, new and existing home sales all continued to rise with signs of more momentum in the short term; uncertainty about the longer-term outlook remains high.”

“Payroll employment grew at a slower pace in September. **The unemployment rate fell, mainly due to a further decline in temporary layoffs.**”

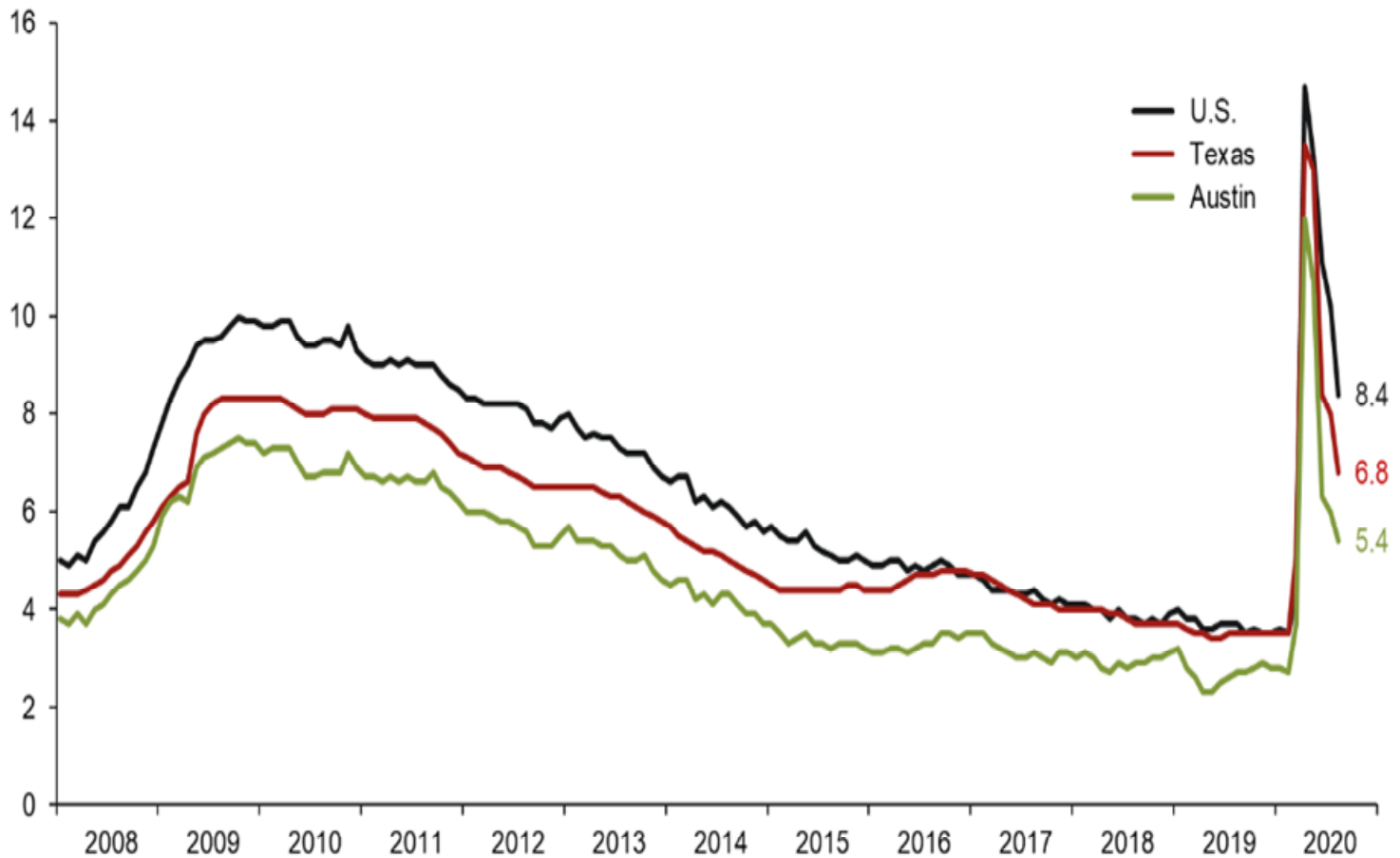
“U.S. equity indices rose slightly over the last month, amid significant volatility.” – Oct 2020 – U.S. Economy in a Snapshot – NY Fed

JOBS - UNEMPLOYMENT RATES – AUSTIN MSA, TEXAS, U.S.

“Austin’s unemployment rate fell further to a still-elevated 5.4 percent in August. The jobless rate ticked down to 6.8 percent in Texas and 8.4 percent in the nation.” – Oct 2020 – Dallas Fed

Unemployment Rate

Percent*



*Seasonally adjusted.

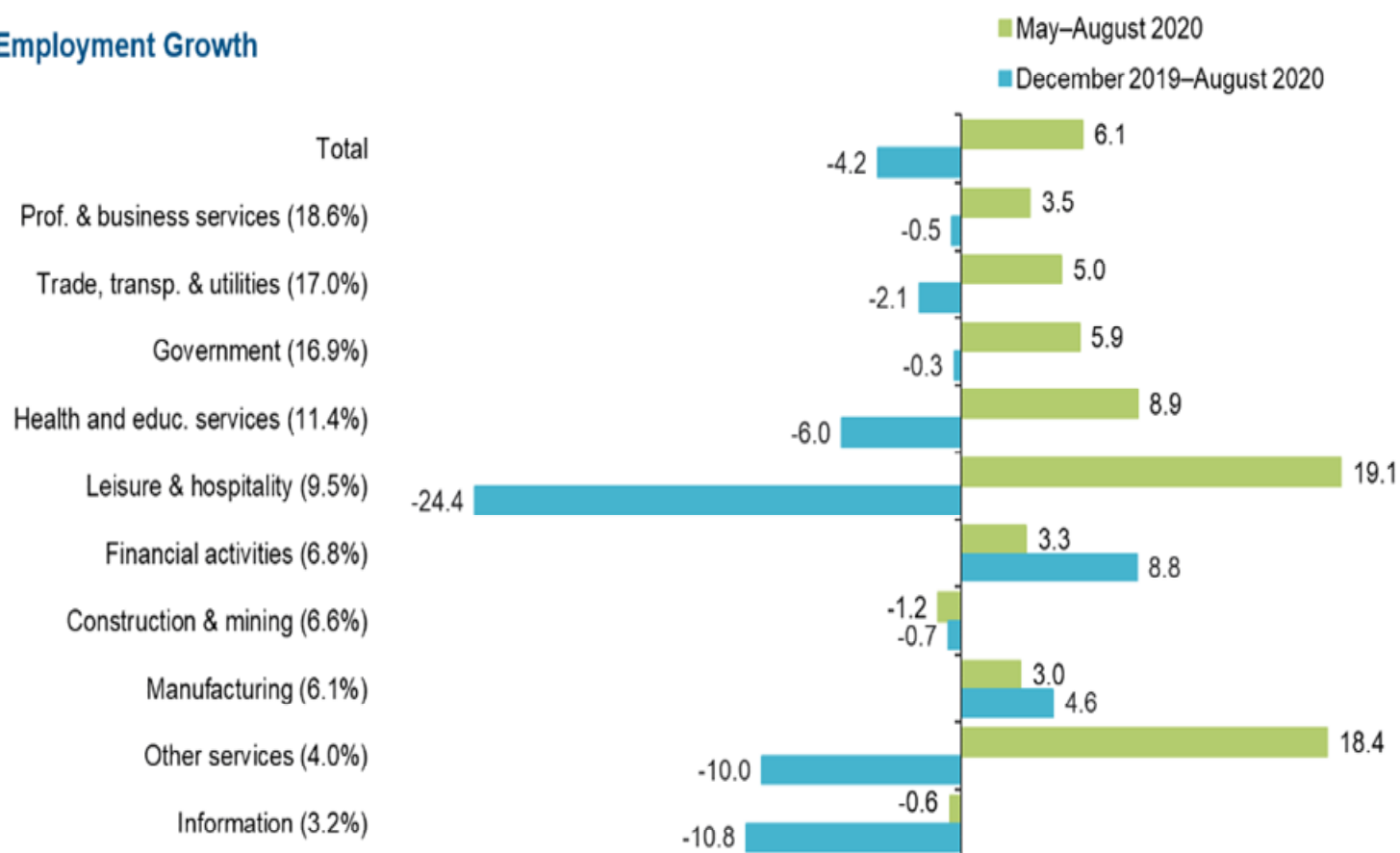
SOURCE: Bureau of Labor Statistics.

Provided by Federal Reserve of Dallas – Austin Economic Indicators – Oct 2020

JOBS – EMPLOYMENT GROWTH RATE – AUSTIN

“Austin payrolls expanded 6.1 percent (non-annualized), or by 62,620 net jobs, in the three months ending in August. Leisure and hospitality led the expansion with a 19.1 percent increase, or 16,570 jobs. This was followed by other services (18.4 percent, or 6,750 jobs), health and private education services (8.9 percent, or 10,150 jobs) and government (5.9 percent, or 10,310 jobs). Sectors that experienced losses were construction and mining (-1.2 percent, or 840 jobs) and information (-0.6 percent, or 210 jobs). Manufacturing and financial activities were the only sectors to post positive job growth for the first eight months of the year.” – Oct 2020 – Dallas Fed

Employment Growth



NOTE: Data show seasonally adjusted and nonannualized percentage employment growth by industry. Numbers in parentheses represent the share of total employment and may not sum to 100 due to rounding.

SOURCE: Bureau of Labor Statistics; Texas Workforce Commission; adjustments by the Dallas Fed.

Provided by Federal Reserve of Dallas – Austin Economic Indicators – Oct 2020

JOBS – MAJOR TEXAS METRO WEEKLY UNEMPLOYMENT CLAIMS

“The number of Texans filing initial unemployment insurance claims fell by nearly one-third to 256,200 in August despite weekly fluctuations (Figures 1 and 2). Average weekly continued unemployment insurance claims ticked down except for the last week of August, ending the month at 1.05 million. Claims, however, remained four and six times greater than pre-pandemic levels in February on an initial and continued basis, respectively.”

– Oct 2020 – Outlook for the Texas Economy

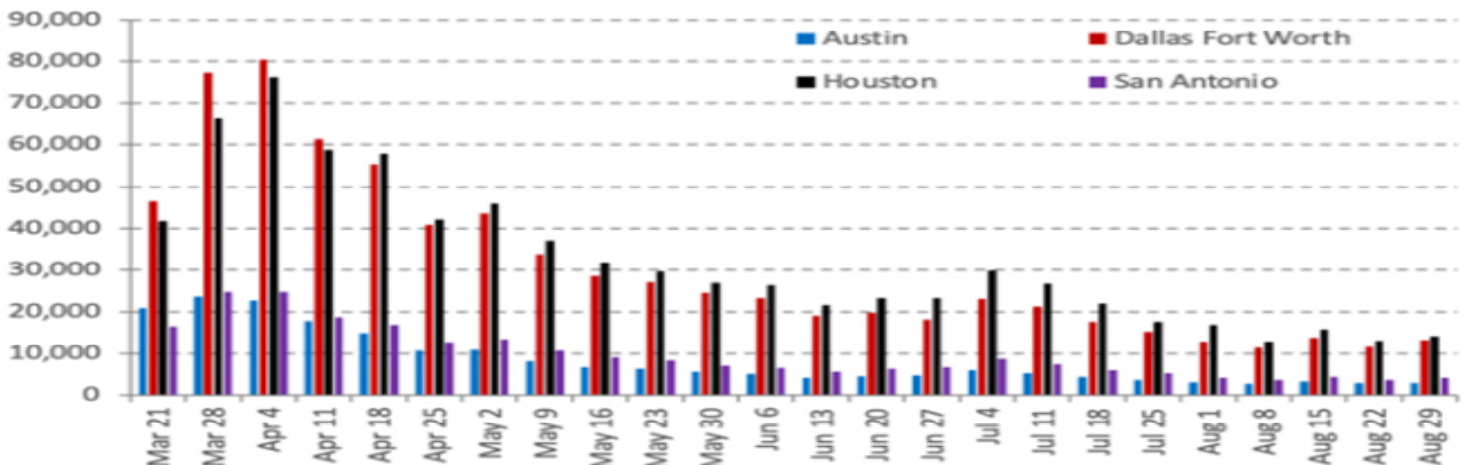
Figure 1. Texas Weekly Initial Unemployment Claims and New COVID-19 Cases (2020)



Note: Initial unemployment claims are seasonally adjusted.

Sources: Texas Workforce Commission, U.S. Department of Labor Employment and Training Administration, Real Estate Center at Texas A&M University calculations, and <https://github.com/nytimes/covid-19-data/blob/master/us-counties.csv>.

Figure 2. Major Metro Weekly Initial Unemployment Claims (2020)



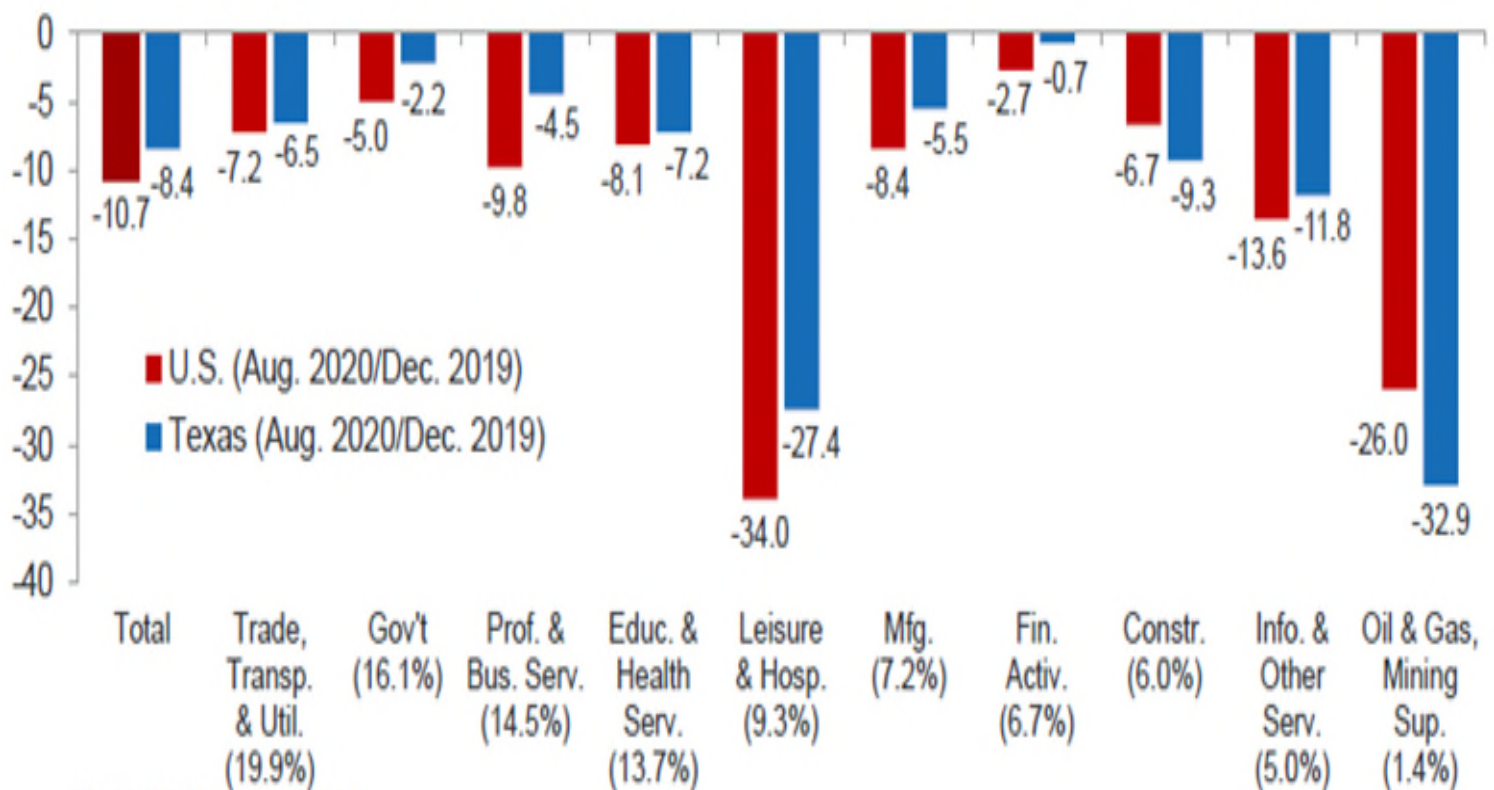
Note: Seasonally adjusted.

Sources: Texas Workforce Commission, U.S. Department of Labor Employment and Training Administration, and Real Estate Center at Texas A&M University calculations

JOB LOSSES ACROSS INDUSTRIES – U.S. AND TEXAS

2020 Job Losses Broad-Based Across Industries

Job growth 2020 YTD (percent)*



*Seasonally adjusted, annualized rate.

NOTE: Numbers in parenthesis indicate share of total state employment for most recent monthly data.

SOURCES: Bureau of Labor Statistics; Texas Workforce Commission; seasonal and other adjustments by FRB Dallas.

DATA: <https://www.dallasfed.org/research/econdata/tx-emp-ind.aspx>

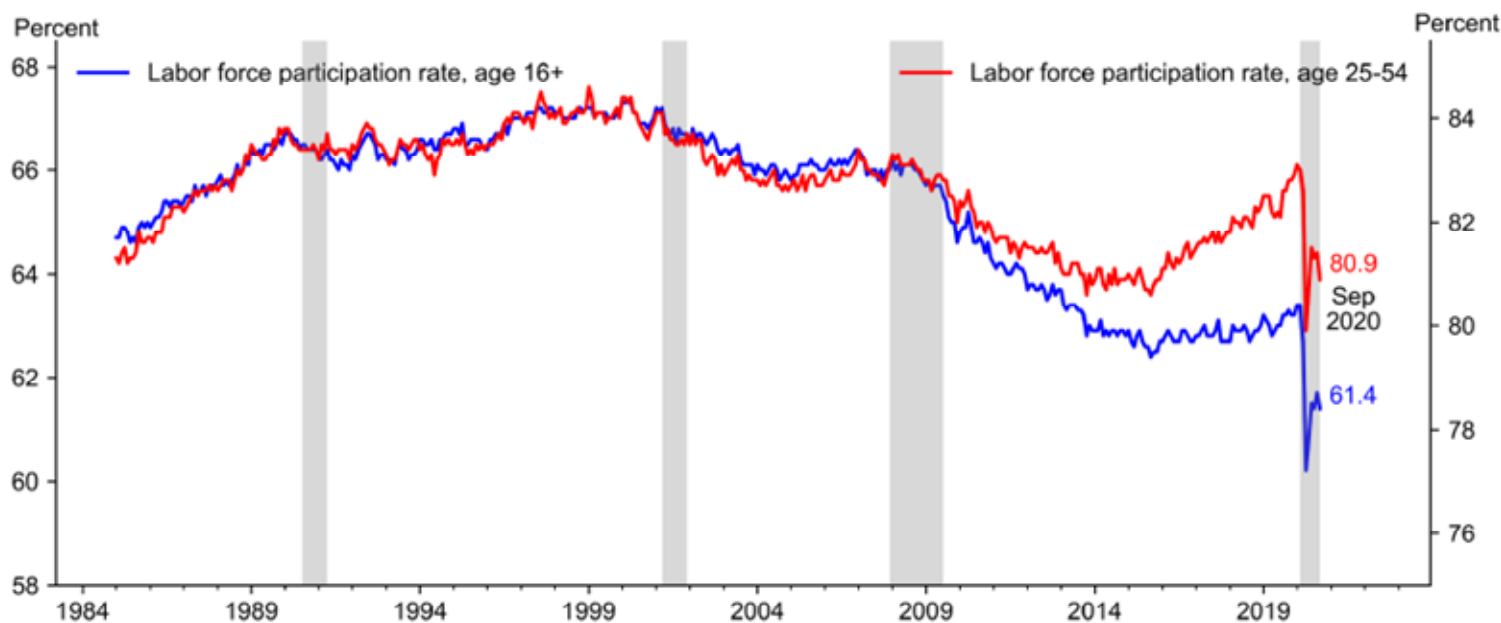
Provided by Federal Reserve of Dallas – Your Texas Economy– Sep 2020

JOBS – LABOR PARTICIPATION RATE IN THE U.S.

“The labor force is made up of the employed and the unemployed. The remainder -- **those who have no job and are not looking for one -- are counted as ‘not in the labor force,’ and in a troubling sign, this number increased in September by 879,000 to 100,599,000** from 99,720,000 in August. [Bureau of Labor Statistics] notes that this number has been steadily increasing in recent years as more baby boomers retire, and certainly the COVID-related business closures have accelerated the increase as more people drop out of the workforce.

In September, the civilian non-institutional population in the United States was 260,742,000. That included all people 16 and older who did not live in an institution, such as a prison, nursing home or long-term care facility. Of that civilian non-institutional population, 160,143,000 were participating in the labor force, meaning they either had a job or were actively seeking one during the last month. This resulted in a **labor force participation rate of 61.4 percent in September, a deterioration from the 61.7 percent in August, and well below the Trump-era high of 63.4 percent set this past January and February.**” – Oct 2020
– cnsnews

Labor Force Participation



SOURCES: Bureau of Labor Statistics.

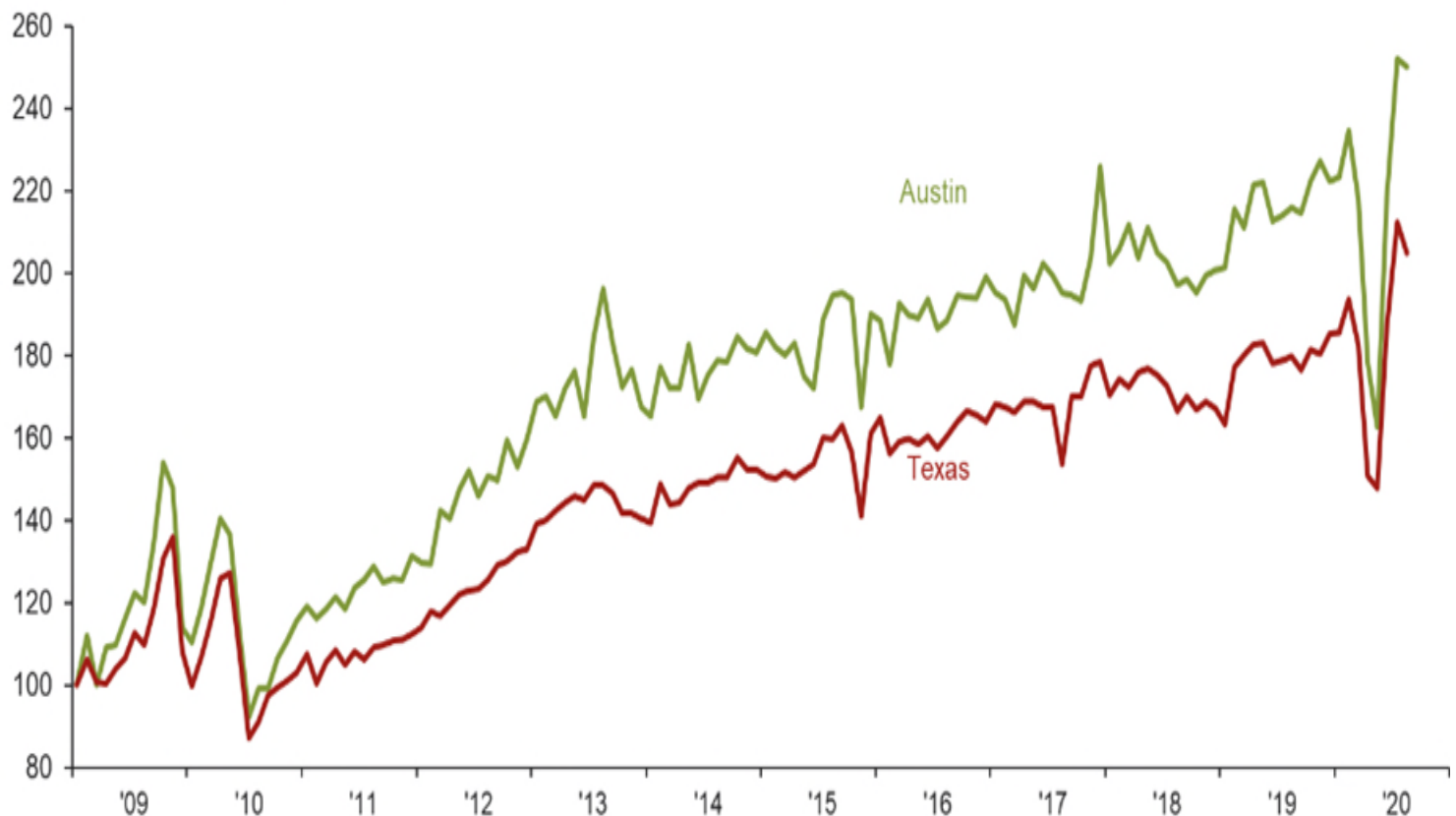
The **labor force participation rate**, as defined by the Bureau of Labor Statistics (BLS), is “the percentage of the population [16 years and older] that is either employed or unemployed [that is, either working or actively seeking work].” “A lower labor force participation rate is associated with lower gross domestic product (GDP) and lower tax revenues. It is also associated with larger federal outlays, because people who are not in the labor force are more likely to enroll in certain federal benefit programs” – Congressional Budget Office

HOUSING – EXISTING HOME SALES – AUSTIN MSA

“Existing-home sales in August contracted 0.8 percent in Austin and 3.6 percent in the state. However, the metro’s home sales are up 1.4 percent during the first eight months of the year relative to the same period in 2019; Texas sales increased 2.9 percent. The median price of homes sold in August was \$347,765 in the metro, a 9.7 percent rise year over year, compared with \$260,226 in Texas, a 6.6 percent gain.” – Oct 2020 – Austin Economic Indicators – Dallas Fed

Existing-Home Sales

Index, January 2009 = 100*



*Seasonally adjusted.

NOTE: Data measure sales of residential units (single family, condominiums and townhomes).

SOURCE: Multiple Listing Service; Real Estate Center at Texas A&M University; adjustments by the Dallas Fed.

Provided by Federal Reserve of Dallas – Austin Economic Indicators – Oct 2020

HOUSING – PERMITS AND INVENTORY – AUSTIN

“From July to August, the five-month moving average of total housing permits (single family and multifamily) strengthened 4.8 percent in Austin while decreasing 1.0 percent in the state. Austin’s existing-home inventories ticked down to 1.2 months, the lowest since the data series began in 1990 and considerably below the six months of supply considered to be a balanced market.” - Oct 2020 – Austin Economic Indicators – Dallas Fed

Housing Permits

Index, January 2005 = 100*



*Seasonally adjusted; five-month moving average.

SOURCE: Census Bureau.

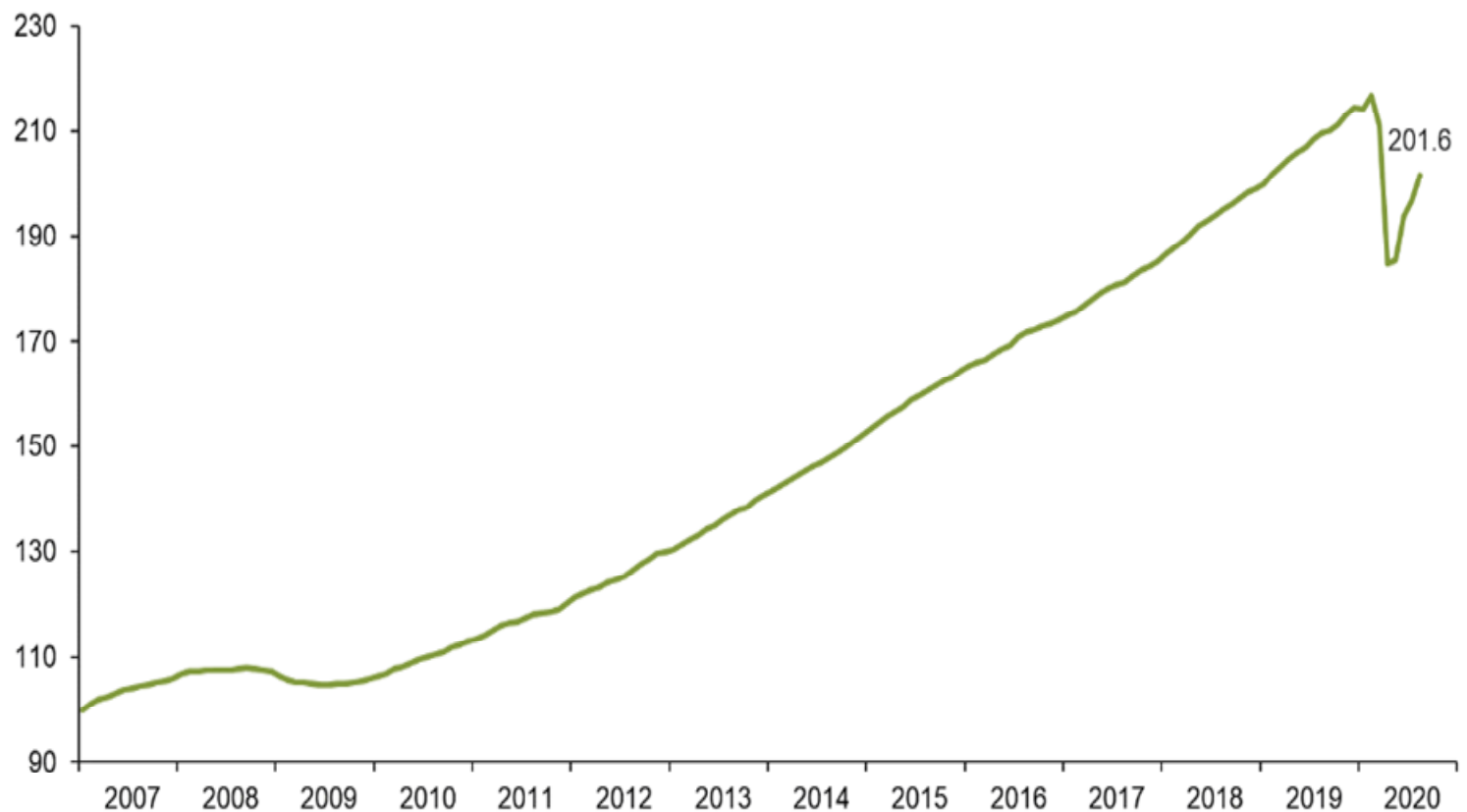
Provided by Federal Reserve of Dallas – Austin Economic Indicators – Oct 2020

BUSINESS CYCLE INDEX – AUSTIN MSA

“The Austin Business-Cycle Index—a broad measure of economic activity in the metro – **increased for the fourth consecutive month at a 34.4 percent** (non-annualized 2.5 percent) rate in August, indicating continued improvement in the Austin economy.” – Oct 2020 – Austin Economic Indicators – Dallas Fed

Austin Business-Cycle Index

Index, January 2007 = 100



SOURCE: Dallas Fed.

Provided by Federal Reserve of Dallas – Austin Economic Indicators – Oct 2020

Business Cycle Indexes are meant to reflect broad movements in local economic conditions. The Dallas Fed states that “the [local area] indexes are constructed based on the aggregated movements in the local area unemployment rate, nonagricultural employment, inflation-adjusted wages, and inflation-adjusted retail sales. The weights of the components are statistically optimized for each metropolitan area in order to best capture the underlying cyclical movements in the local area economy.”

LEADING INDEX – TEXAS

“The Texas Leading Index, which is used to estimate the Dallas Fed’s Texas Employment Forecast, sheds light on the future of the state’s economy. In April, the index bottomed out at a level comparable to the trough during the Great Recession. **The steep March and April declines were followed by four months of robust growth; the index averaged 2.9 percent growth per month from April to August.** In September, growth faltered to 0.5 percent. The leading index remains 11.0 percent below its December 2019 reading.” – Oct 2020 – Texas Economic Indicator

Texas Leading Index

Index, 1987 = 100*



*Seasonally adjusted.

NOTE: Gray bars show U.S. recessions. The latest value is estimated.

SOURCE: Dallas Fed.

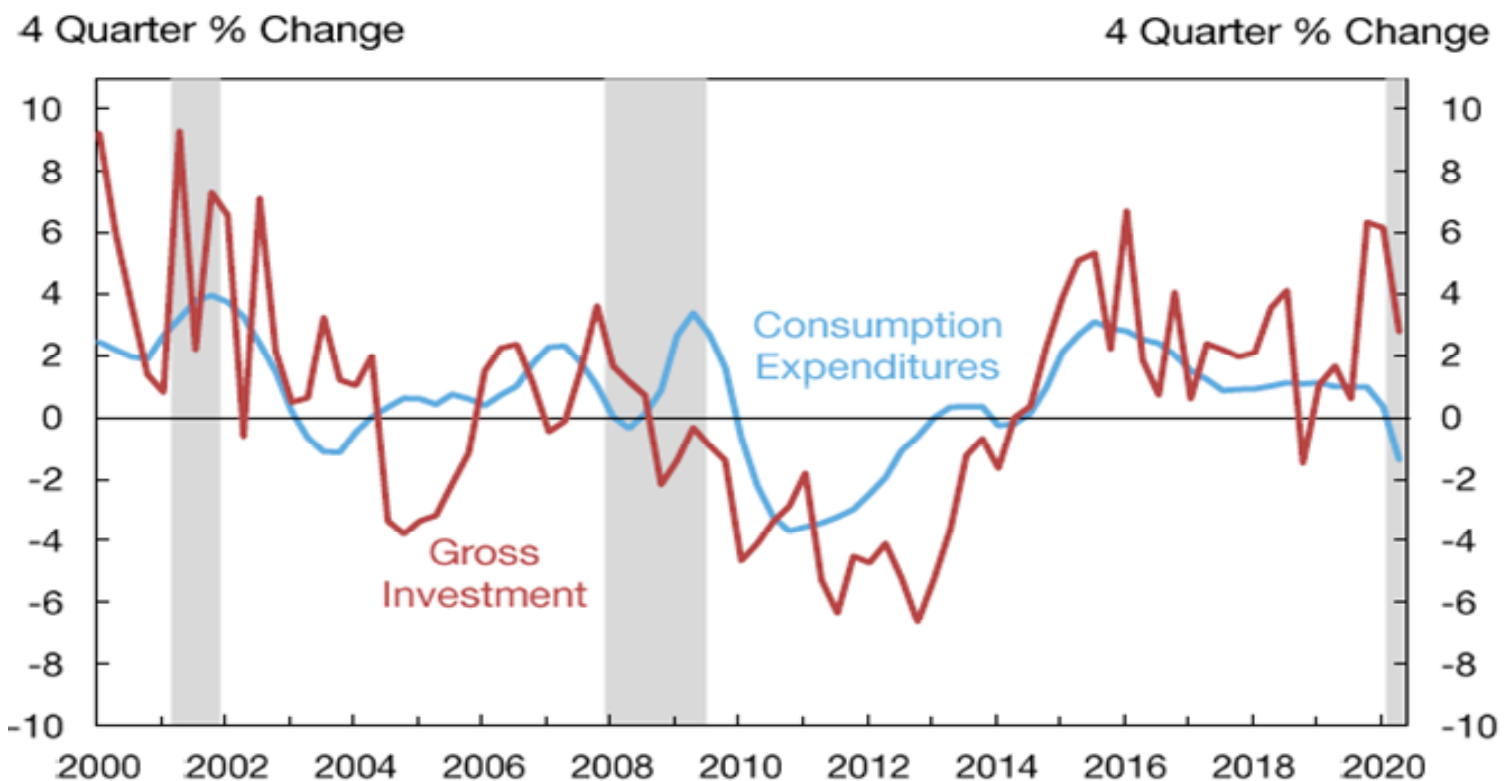
Dallas Fed has defined the **Texas Leading Index** as the “single summary statistic that sheds light on **the future of the State’s economy.**” The Texas Leading Index is made up of eight leading indicators that have been shown to change direction – up or down – before the overall economy. The eight indicators used by the Dallas Fed are the Texas value of the dollar, U.S. leading index, real oil price, well permits, initial claims for unemployment insurance, Texas stock index, help-wanted index and average weekly hours worked in manufacturing.

STATE AND LOCAL CONSUMPTION AND GROSS INVESTMENT

“Over the four quarters ending in [2020 Q2], growth of real consumption at the state and local level turned negative to -1.38%, a rate of decline not seen since 2012. Consumption expenditures consist largely of employee salaries and made up over 80% of the sector’s total spending.

State and local gross investment spending growth declined sharply to about 2.73% over the four quarters ending in Q2. In order of importance, the categories of gross investment are new equipment (such as computers), intellectual property products (such as software), and public works and infrastructure projects.” – Aug 2020 – U.S. Economy in a Snapshot – NY Fed

Real State & Local Consumption & Gross Investment



Source: Bureau of Economic Analysis
via Haver Analytics

Note: Shading shows NBER recessions.

Provided by Federal Reserve of New York

CONSUMER CONFIDENCE AND SENTIMENT – U.S.

“Consumer Confidence increased sharply in September, after back-to-back monthly declines, but remains below pre-pandemic levels,” said Lynn Franco, Senior Director of Economic Indicators at The Conference Board. **“A more favorable view of current business and labor market conditions, coupled with renewed optimism about the short-term outlook, helped spur this month’s rebound in confidence.”** Consumers also expressed greater optimism about their short-term financial prospects, which may help keep spending from slowing further in the months ahead.” – Sep 29, 2020 – The Confidence Board

Surveys of Consumers, Chief economist, Richard Curtin, commented **“Consumer sentiment continued to improve in late September, with the Sentiment Index reaching its highest level in six months.** The gains were mainly due to a more optimistic outlook for the national economy. While consumers have anticipated gains in the national economy ever since the April shutdown, the September survey recorded a significant increase in the proportion that expected a reestablishment of good times financially in the overall economy. **The recent gains are encouraging even though they were largely due to upper income households. Indeed, the data indicate that lower income households face continued income and job losses compared with the modest gains expected by upper income households.”**

Consumer Confidence



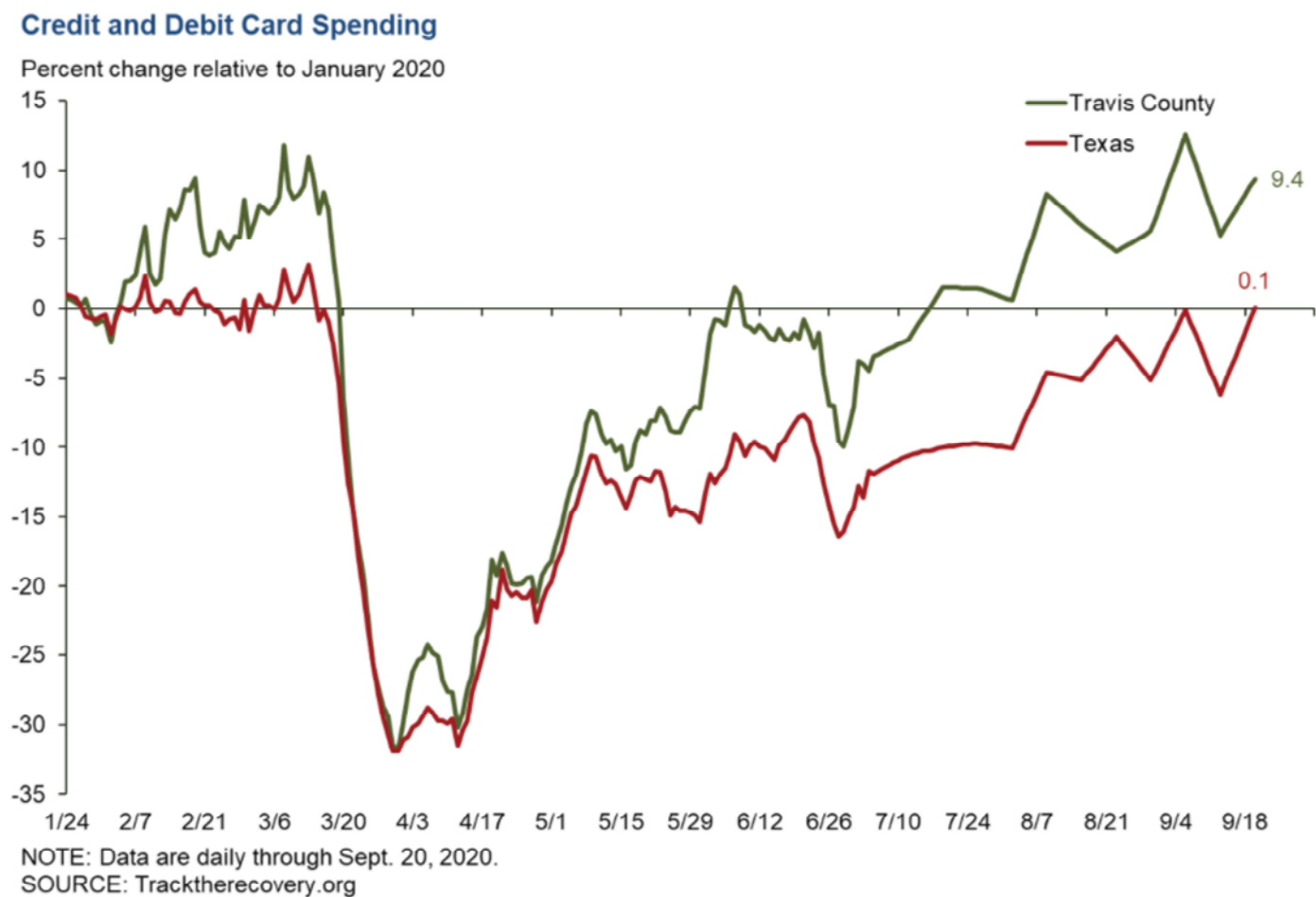
Provided by Federal Reserve of Dallas – U.S. Economy Charts– Oct 2020

U.S. consumer **confidence** index (CCI) is defined as **“the degree of optimism on the [current] state of the economy that consumers are expressing through their activities of savings and spending.”** – Wikipedia

U.S. consumer **sentiment** is defined as **“the indicator of the future course of the national economy.”** – Investopedia

CREDIT AND DEBIT CARD SPENDING – TRAVIS COUNTY vs. TEXAS

“Since mid-July, consumer spending (measured by credit and debit card spending) in Travis County has remained above January 2020 levels. As of Sept. 20, spending in the county was up 9.4 percent relative to January, whereas spending in Texas was up 0.1 percent over the same period.” – Oct 2020 – Austin Economic Indicators – Dallas Fed

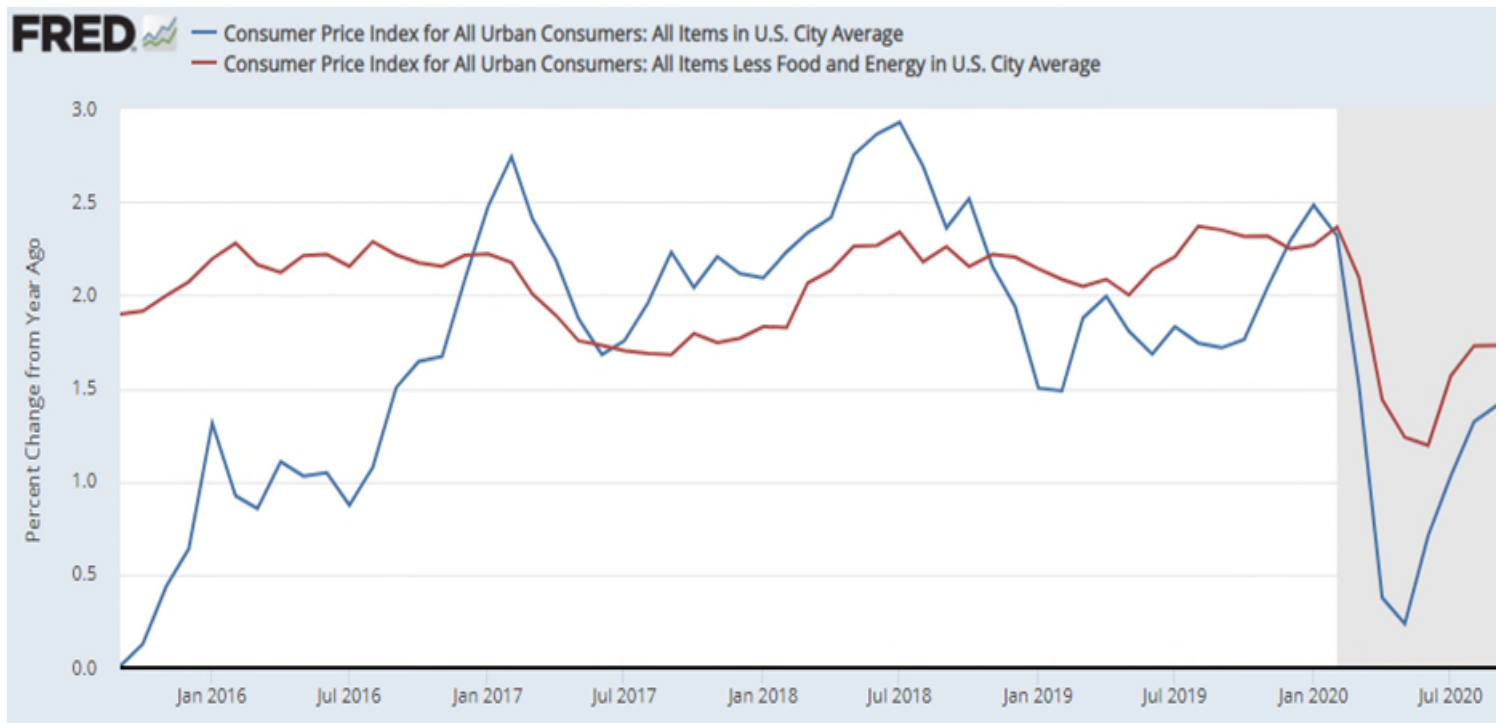


Provided by Federal Reserve of Dallas – Austin Economic Indicators – 2020

CONSUMER PRICE INDEX

“**The all items index rose 1.4 percent** for the 12 months ending September, a slightly larger increase than the 1.3 percent rise for the 12-month period ending August. **The index for all items less food and energy rose 1.7 percent** over the last 12 months, the same increase as the period ending August. The food index increased 3.9 percent over the last 12 months, while the energy index declined 7.7 percent.” – Bureau of Labor Statistics – Oct 2020 – Economic News Release

Consumer Price Index - 12 Month Percentage Change

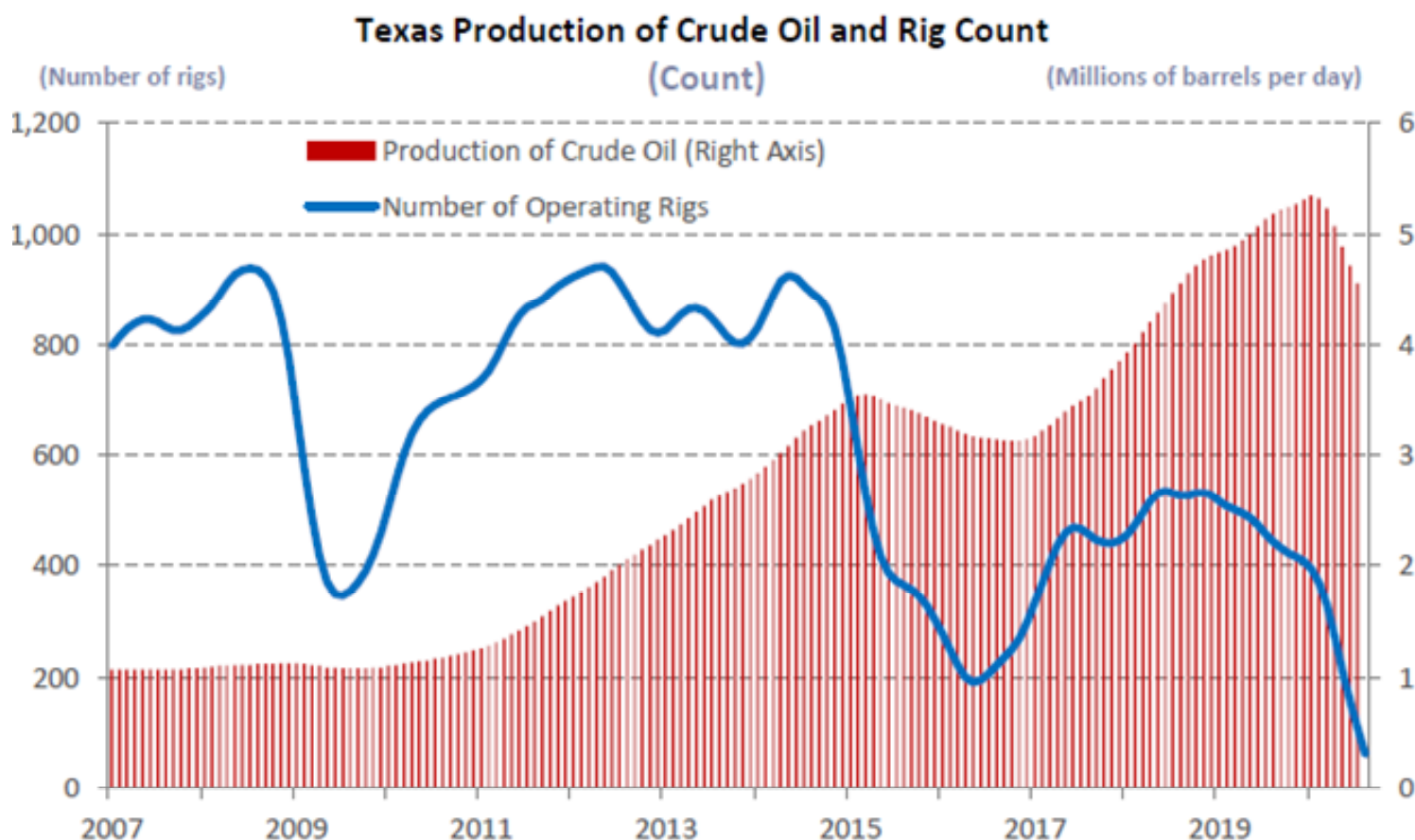


Source: Bureau of Labor Statistics, not seasonally adjusted, 1982-84=100 Provided by the St. Louis Fed

According to the Bureau of Labor Statistics (BLS), “There are a variety of CPI numbers generated each month. In the graph above, two numbers are compared. The first is the **Official CPI Number** that is reported to the media. It is the broadest and most comprehensive CPI and is called the **All Items CPI for All Urban Consumers**. The second one is called the **All items less food and energy**.” The BLS mentions that “Some users of CPI data use this index because food and energy prices are relatively volatile, and these users want to focus on what they perceive to be the ‘core’ or ‘underlying’ rate of inflation.”

OIL AND NATURAL GAS

“The West Texas intermediate (WTI) crude oil spot price moved above \$43 as OPEC production cuts put downward pressure on global inventories. Texas' active rig count flattened at 105, but crude oil production ticked up to 4.8 million barrels per day in July, although levels remained down one-tenth YTD. On the natural gas front, the Henry Hub spot price rose to its highest reading since September 2019 at \$2.37 per million British Thermal Units (BTU) as demand increased after reduced output this summer when storage is typically built up.” – Oct 2020 – Outlook for the Texas Economy – Texas A&M Real Estate Center



Note: Trend-cycle component. For more information, see [Texas Production of Crude Oil and Rig Count](#).

Sources: Baker Hughes and U.S. Energy Information Administration

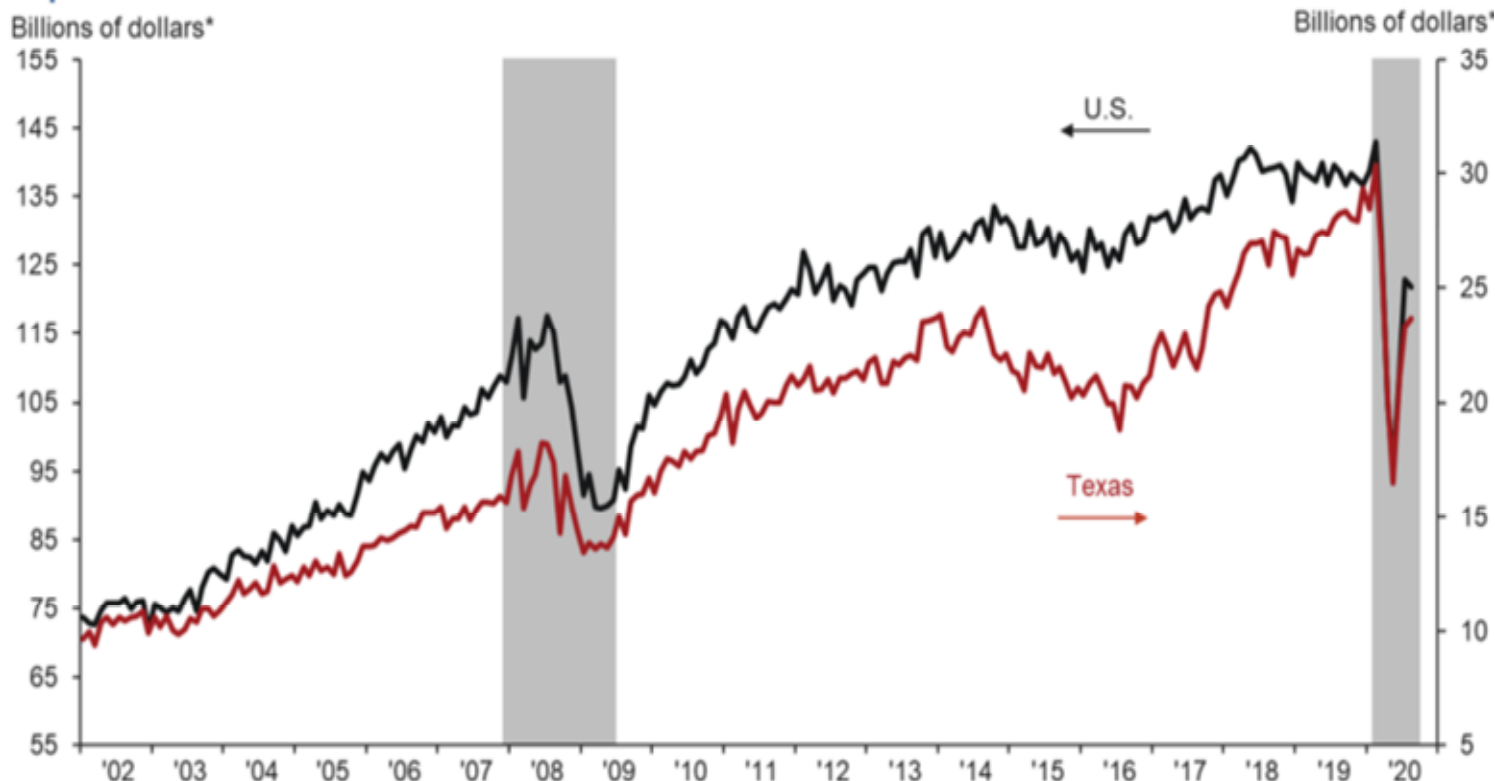
Provided by Texas A&M Real Estate Center – Oct 2020 - Outlook for Texas Economy

EXPORTS – TEXAS AND U.S.

“In August, Texas exports inched up 1.7 percent, continuing their climb from the lows reached in May. Moderate growth in the most recent month came after two months of robust increases. In the months immediately following the May trough, U.S. exports also saw record growth, though they slipped in August. Texas exports through August remain 12.7 percent below their 2019 levels. U.S. exports are 12.9 percent short.

Both agriculture and mining exports increased, while manufacturing exports dipped in August for the U.S. and Texas. Exports in all major categories year to date through August were below those in the same period in 2019. Most impacted were manufacturing exports, which lagged 13.8 percent behind 2019 levels for the U.S. and 15.1 percent for Texas.”– Oct 2020 – Texas Economic Indicators – Dallas Fed

Exports



*Seasonally adjusted, real 2018 dollars.

NOTE: Gray bars show U.S. recessions.

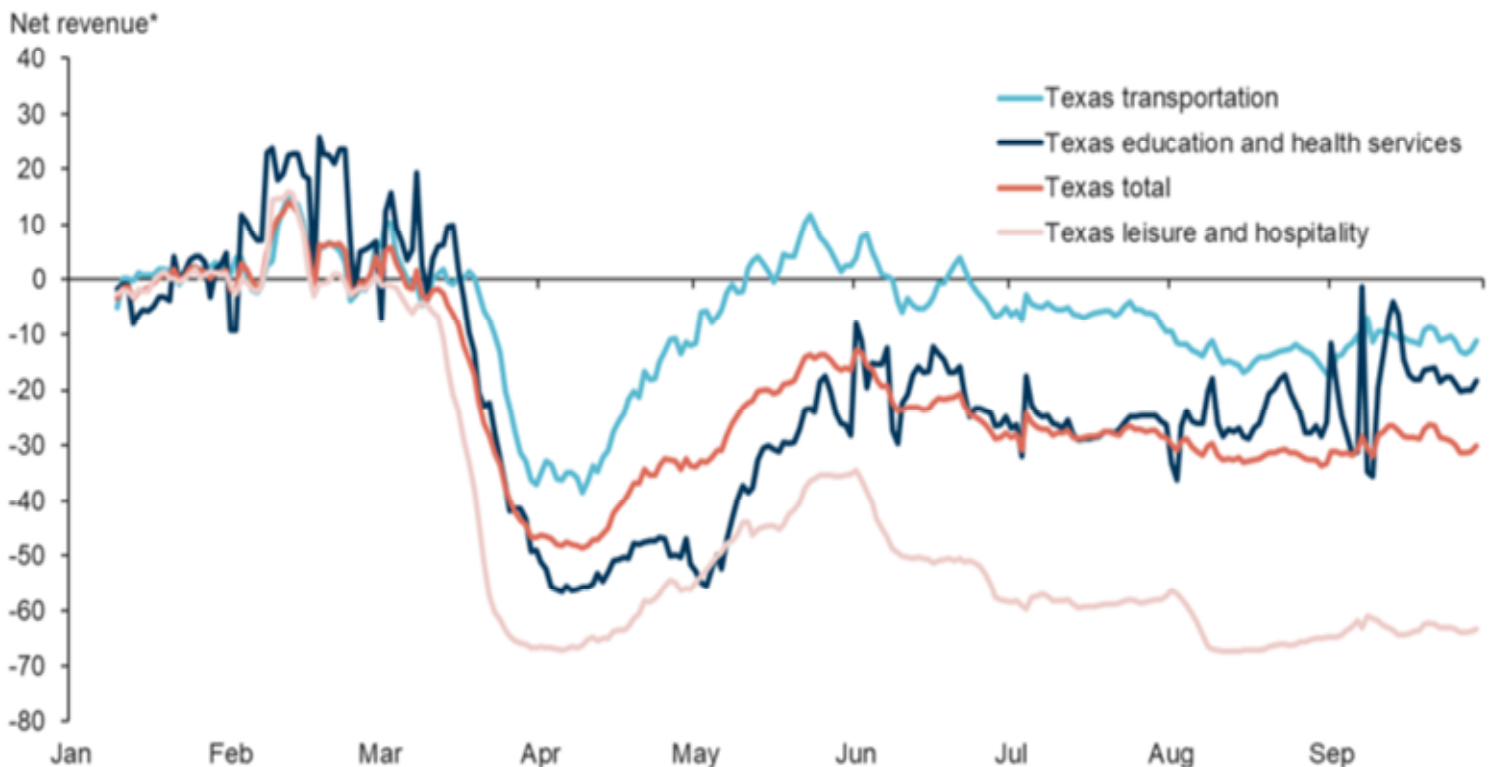
SOURCE: Census Bureau; WISERTrade; Bureau of Labor Statistics; adjustments by the Dallas Fed.

Provided by Federal Reserve of Dallas – Texas Economic Indicators – Oct 2020

SMALL BUSINESS REVENUE

“In mid-to-late March, net revenue for Texas small businesses plummeted across industries. Small businesses in the transportation industry were least impacted and recovered most quickly, surpassing the January revenue baseline in mid-May. The index has since dropped back below the baseline and measured 11.2 percent short of prepandemic revenue as of Sept. 29. The industry hardest hit was leisure and hospitality, which had fallen to 67.1 percent below its baseline by April 5. While small business revenues in transportation and education and health services have mostly recovered from their respective troughs in the spring, leisure and hospitality revenues saw a brief climb before beginning to slip again in early June. As of Sept. 29, net revenue for leisure and hospitality small businesses remained 63.4 percent short of the prepandemic baseline.” – Oct 2020 – Texas Economic Indicators – Dallas Fed

Small Business Revenue



*Percent change relative to Jan. 4–31, 2020; seven-day moving average.

NOTE: Data are through Sept. 29.

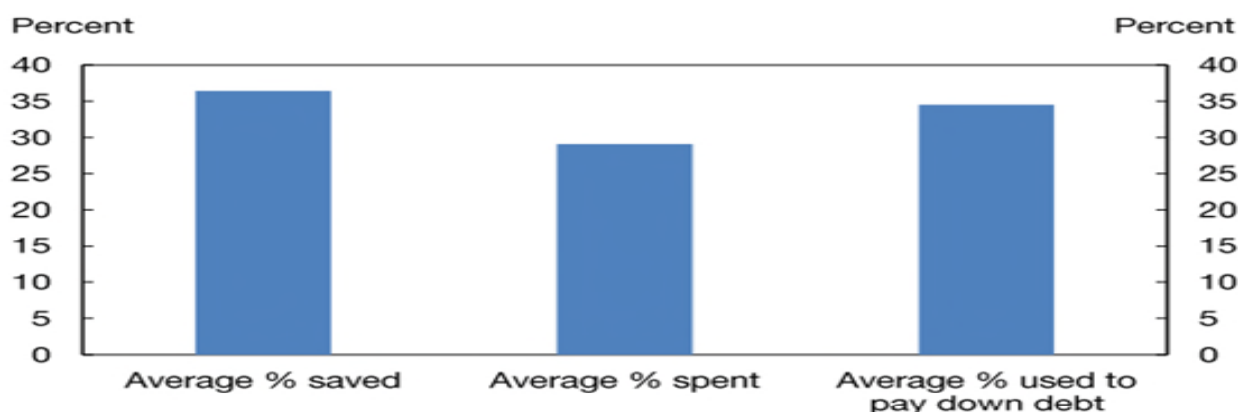
SOURCE: Womply; Opportunity Insights.

Provided by Federal Reserve of Dallas – Oct 2020 - Texas Economic Indicators

STIMULUS PAYMENTS

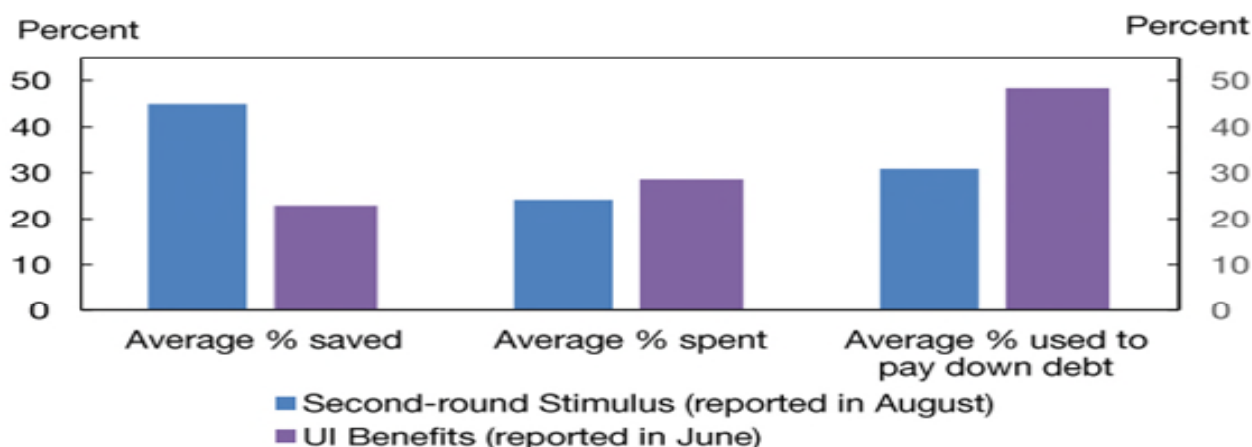
“As of the end of June 2020, a **relatively small share of stimulus payments was used for consumption (29%)**, with 36% saved and 35% used to pay down debt.” – Oct 2020 – U.S. Economy in a Snapshot – NY Fed

Uses of Stimulus Checks by Households



Source: New York Fed Survey of Consumer Expectations (SCE)

Intended Use of Potential Second-Round Payment



Source: New York Fed Survey of Consumer Expectations (SCE)

“Reported expected uses for a **potential second stimulus payment suggest an even smaller marginal propensity to consume**, with households expecting to use more of the funds to pay down their debts.” – Oct 2020 – U.S. Economy in a Snapshot – NY Fed

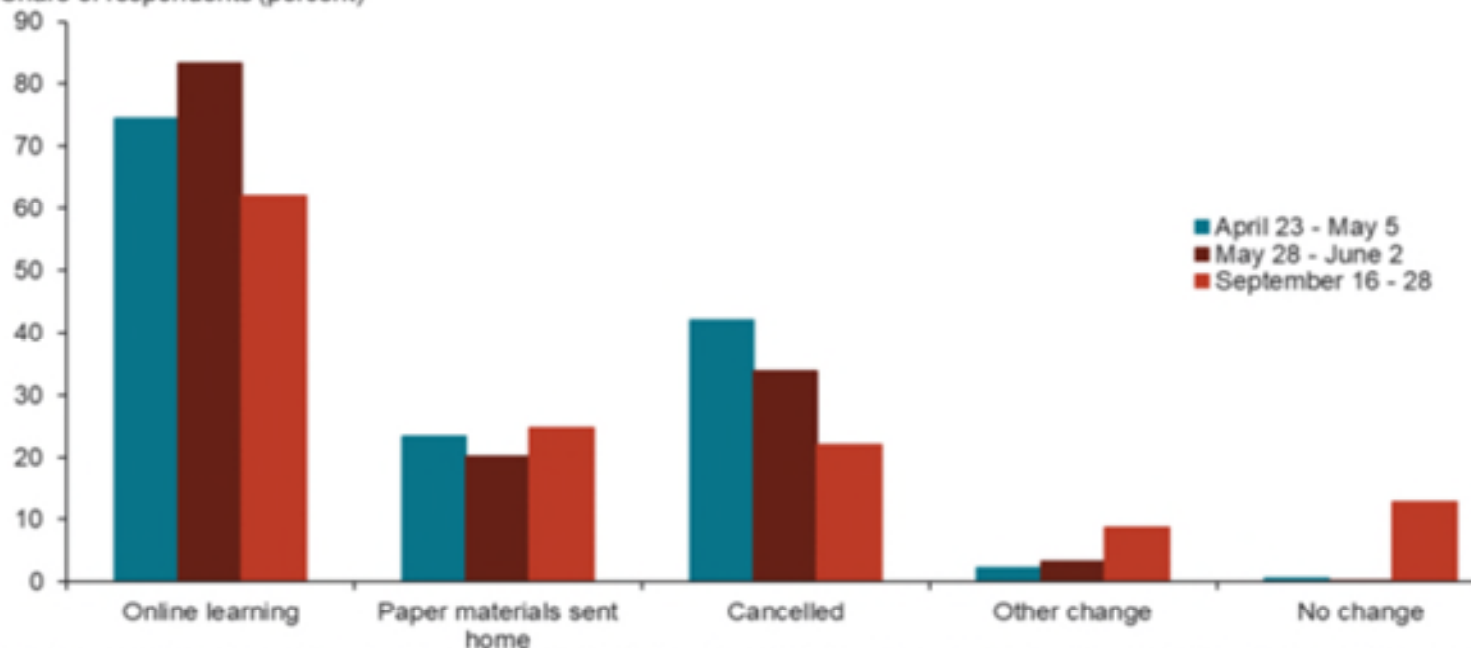
EDUCATION

“In the spring semester of the 2019–20 academic year, schools had to determine how to operate amid the coronavirus pandemic. **Between April 23 and May 5, the majority of students found themselves completing coursework online**, according to the Census Bureau’s Pulse survey. That share increased by the end of the semester as more in-person classes moved online. Since the start of the 2020–21 school year, many campuses across the state have reconfigured their classrooms and introduced new procedures to be able to offer face-to-face learning. The timing of when students were allowed back on campus differed across the state, but **as of Sept. 28, 96.2 percent of Texas independent school districts had reported to the Texas Department of State Health Services that at least some students were back on campus.**

As students switched from virtual to in-person learning, the number of households reporting no change in schooling methods rose more than 20-fold from early May to late September. Over the same period, **the share of those learning online dropped, though it remained the most common response** (survey respondents were able to select more than one answer, thus the shares do not add to 100).” – Oct 2020 – Texas Economic Indicators – Dallas Fed

Impact of COVID-19 on Education

Share of respondents (percent)



NOTE: Plotted are the first week of the survey, week during the end of the spring semester, and most recent week of the survey. Shares don't add to 100 because respondents were able to select multiple answers.

SOURCE: Census Bureau, Household Pulse Survey.

Provided by Federal Reserve of Dallas – Texas Economic Indicators – Oct 2020

IN-DEPTH – DEEP-SEA MINING

INTRODUCTION

“One of the most high-stakes races in history is underway, with colossal riches waiting for the winners. It's a race to a little known frontier: the bottom of the sea. Around the world, thousands of engineers and scientists are in fierce competition to build the first undersea robot that can mine the ocean floor. The explosion of interest in deep sea mining is driven by the demands of our high-tech economy. **The deep ocean is the El Dorado that contains metals like nickel, cobalt and rare earth elements, essential for use in cell phones, supercomputers and electric cars. They're also critical for a green future of solar and wind power.**”

“The deep sea metals are estimated to be worth as much as \$16 trillion. They're found in lumps of black rock called nodules, and there are trillions of them strewn across a vast, muddy desert in the Clarion Clipperton Zone [CCZ], in the middle of the Pacific between Hawaii and Mexico. It's sunken treasure because every nodule contains nickel, copper, cobalt, manganese and traces of rare earth elements. It's estimated there are more metals on the bottom of the ocean than anywhere on the planet.” – Nov 2019 – 60 Minutes



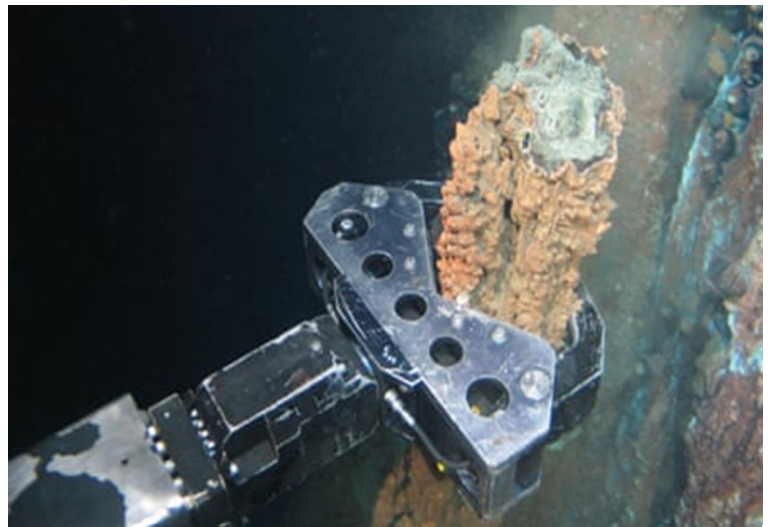
Source: NOAA Office of Ocean Exploration and Research - Polymetallic nodules on the ocean floor off the U.S coast 2019 Southeastern U.S. Deep-sea Exploration) Provided: Radio Canada international

IN-DEPTH – DEEP-SEA MINING

WHAT IS DEEP SEA MINING?

“Deep-sea mining is the process of retrieving mineral deposits from the deep sea – the area of the ocean below 200 m which covers about 65% of the Earth’s surface.

There is growing interest in the mineral deposits of the deep sea. This is largely due to depleting terrestrial deposits for metals such as copper, nickel, aluminum, manganese, zinc, lithium and cobalt, coupled with rising demand for these metals to produce high-tech applications such as smartphones and green technologies such as wind turbines, solar panels and electric storage batteries.” – International Union for Conservation of Nature



Source: Nautilus Minerals - A robotic arm breaks off a chunk of mineral-rich rock for sampling deep underwater off the coast of Papua New Guinea. Provided by The Guardian

WHERE IS THE FOCUS OF ACTIVITY?

“As of January 2020, the International Seabed Authority (ISA) has issued permits and entered into 30 contracts for exploration for polymetallic nodules, polymetallic sulphides and cobalt-rich ferromanganese crusts in the deep-seabed with 21 contractors.

Eighteen of these contracts are for exploration for polymetallic nodules in the Clarion-Clipperton Fracture Zone, Indian Ocean and Western Pacific Ocean.

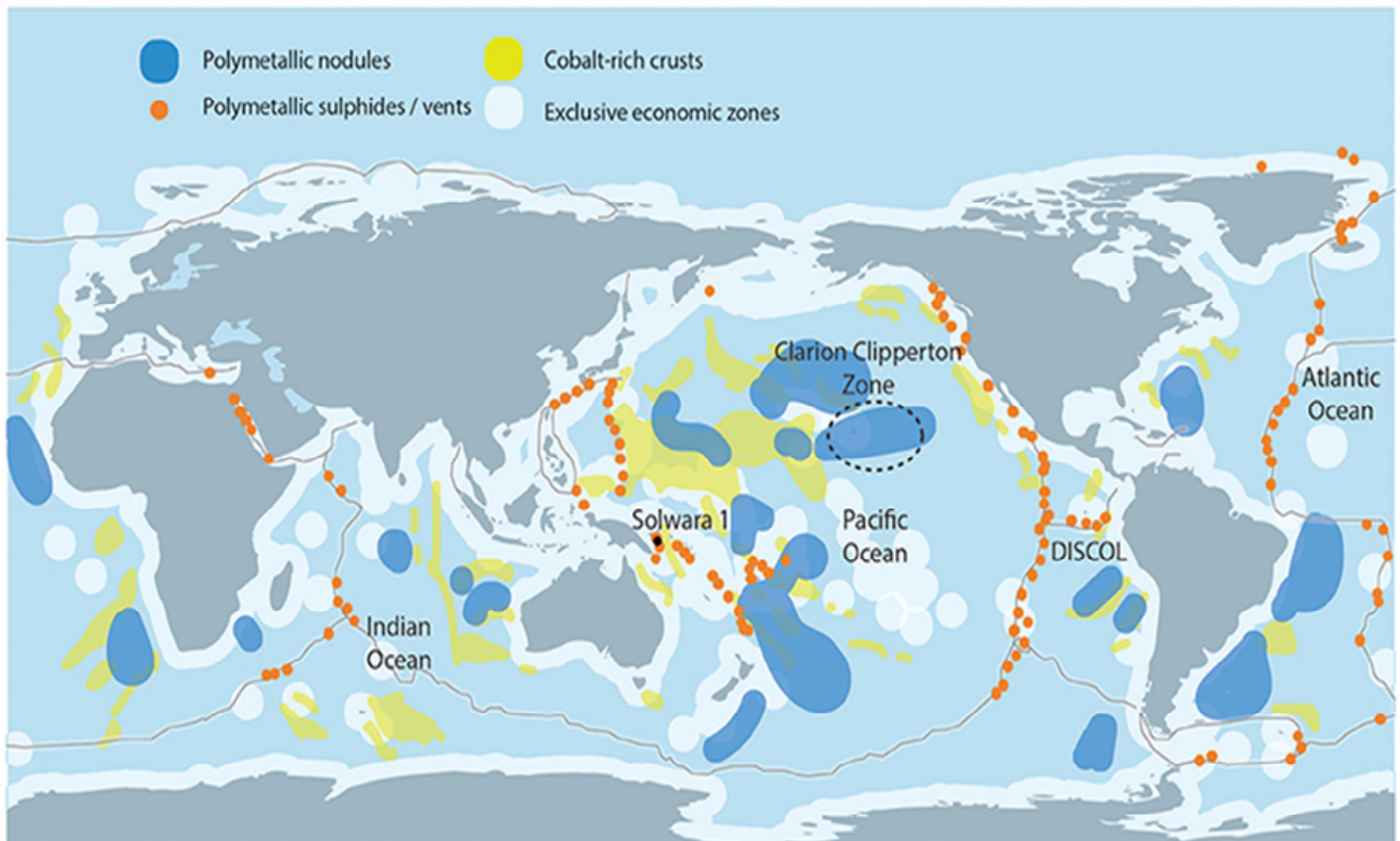
There are seven contracts for exploration for polymetallic sulphides in the South West Indian Ridge, Central Indian Ridge and the Mid-Atlantic Ridge and five contracts for exploration for cobalt-rich crusts in the Western Pacific Ocean and the South West Atlantic.” – Deepsea Conservative Coalition

IN-DEPTH – DEEP-SEA MINING

WORLD MAP OF MINERAL DEPOSITS

Below is a “world map showing the location of the three main marine mineral deposits: polymetallic nodules (blue); polymetallic or seafloor massive sulfides (orange); and cobalt-rich ferromanganese crusts (yellow).” – *Frontiers in Marine Science*

“The Clarion-Clipperton Zone (CCZ) spans 4.5 million square kilometers (1.7 million square miles) between Hawaii and Mexico, an abyssal plain as wide as the continental United States and punctuated by seamounts. Lying atop the muddy bottom or embedded just beneath it are trillions of potato-size polymetallic nodules. These rocklike deposits contain nickel, manganese, copper, zinc, cobalt, and other minerals.” – Pew Trusts



Source: *Frontiers in Marine Science* – 2018

IN-DEPTH – DEEP-SEA MINING

TYPES OF MINERAL DEPOSITS AND THEIR ASSOCIATED METALS

Deep-sea mineral deposits and the metals they contain



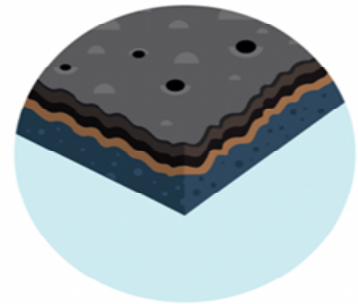
Polymetallic nodules

Source of nickel, cobalt,
copper and manganese



Polymetallic sulfides

Copper, lead, zinc, gold
and silver



Cobalt-rich crust

Cobalt, vanadium, molybdenum,
platinum and tellurium

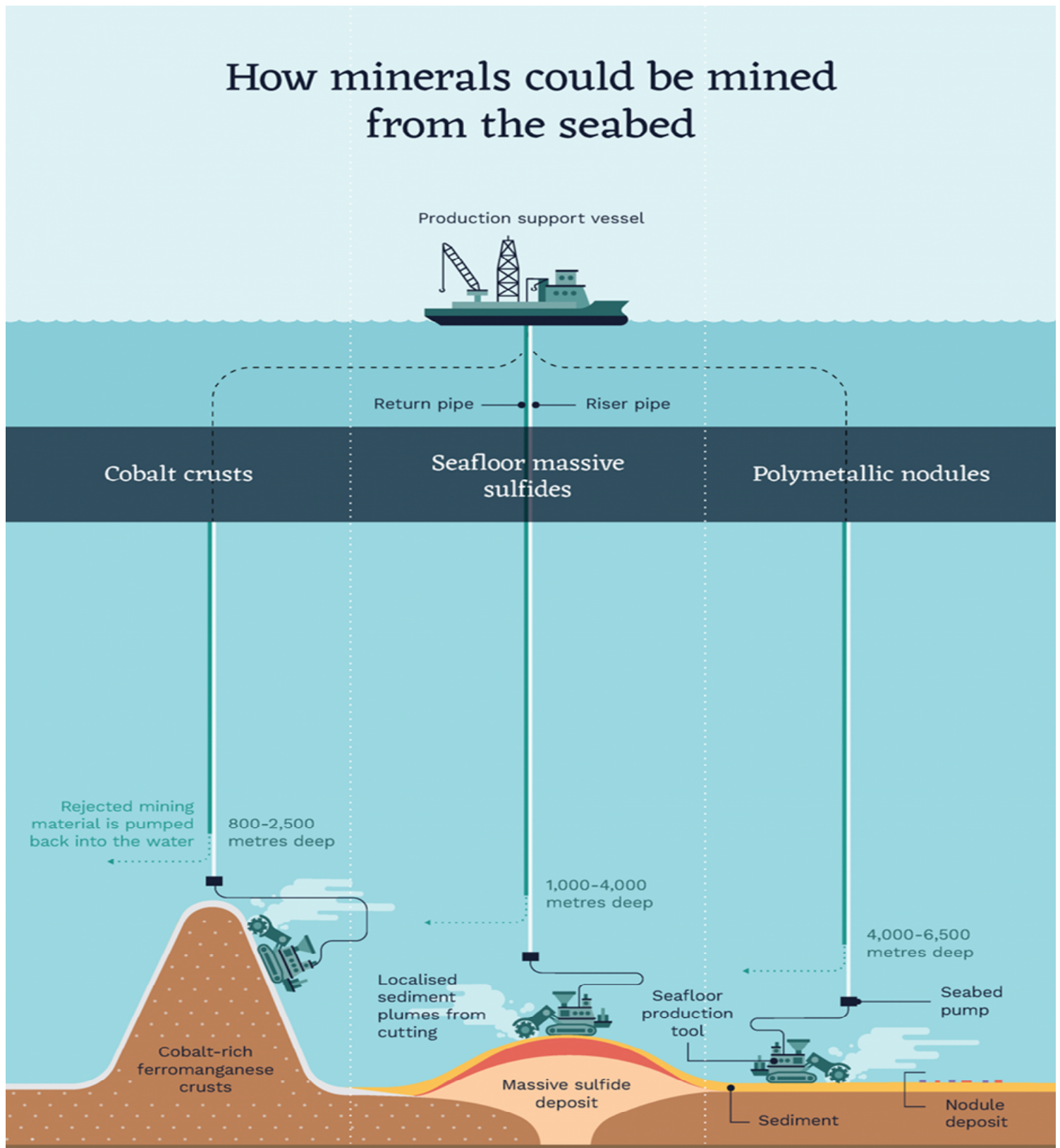
Source: China Dialogue Ocean – Feb 2019

“Polymetallic nodules, consisting mainly of manganese, are bumpy, usually potato-sized balls suspended in mud on the floors of the deep abyss. They’re found in an exploration zone of the eastern Pacific known as Clarion-Clipperton. This is the area of greatest commercial interest, estimated to hold more nickel, cobalt and manganese than all known terrestrial deposits combined. A recent MIT cost-benefit analysis found that mining these nodules would be profitable, with annual revenues of up to US\$2.2 billion a year.

Polymetallic sulphides are formed through hydrothermal activity when hot water, discharged from the earth’s crust, hits the cold water and deposits a ‘heap’ of minerals including iron, silver and gold. These vents look like smokestacks, and are mostly located on the top of steep, semi-active volcanoes deep in the Pacific and Atlantic.

Cobalt crusts are found on underwater mountains, mostly in the Pacific, at depths of 400 to 7,000 metres, and contain rare earths.” – Feb 2019 – China Dialogue Ocean

IN-DEPTH – DEEP-SEA MINING



IN-DEPTH – DEEP-SEA MINING

THE PROCESS OF MINING

“At full capacity, these companies expect to dredge thousands of square miles a year. Their collection vehicles will creep across the bottom in systematic rows, scraping through the top five inches of the ocean floor.

Ships above will draw thousands of pounds of sediment through a hose to the surface, remove the metallic objects, known as polymetallic nodules, and then flush the rest back into the water. Some of that slurry will contain toxins such as mercury and lead, which could poison the surrounding ocean for hundreds of miles. The rest will drift in the current until it settles in nearby ecosystems.

An early study by the Royal Swedish Academy of Sciences predicted that **each mining ship will release about 2 million cubic feet of discharge every day, enough to fill a freight train that is 16 miles long. The authors called this ‘a conservative estimate’ since other projections had been three times as high.** By any measure, they concluded, ‘a very large area will be blanketed by sediment to such an extent that many animals will not be able to cope with the impact and whole communities will be severely affected by the loss of individuals and species.’” – Feb 2020 - The Atlantic



*Source: Nautilus Minerals - Deep seabed mining machines manufactured by Nautilus Minerals
Provided by China Dialogue Ocean – Feb 2019*

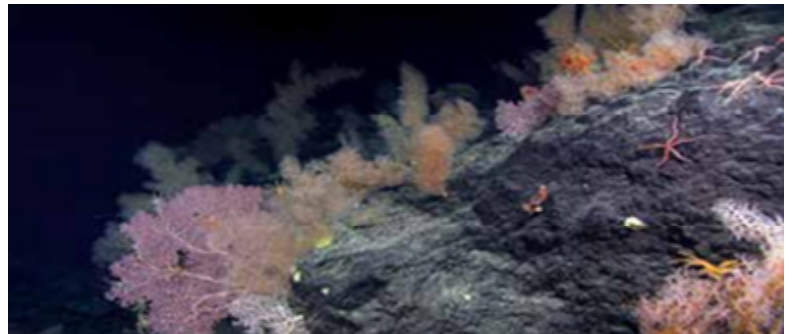
IN-DEPTH – DEEP-SEA MINING

THREATS TO UNIQUE SPECIES AND ECOSYSTEMS

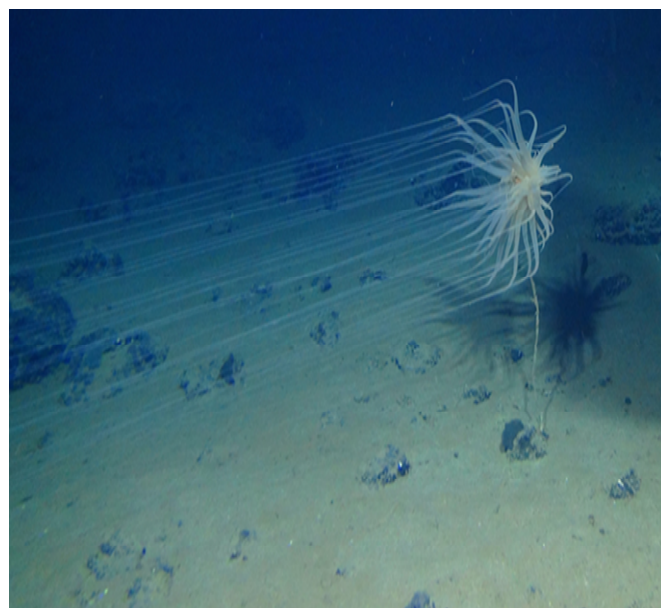
“There are three broad types of deep-sea habitats where metal-rich mineral deposits are formed: abyssal plains; seamounts; and hydrothermal vents. Mining activities would have different impacts from site to site depending on the unique species and ecosystems in each of these habitats. The main threats are:

Destruction of deep-sea species, ecosystems and habitats

While the technology to extract metal-rich mineral deposits is still under development, **all methods currently being explored to extract crusts from seamounts are expected to destroy the bottom habitat** and ecosystems around seamounts, including corals and sponges that may have taken thousands of years to grow.



Source: NOAA Office of Ocean Exploration and Research – Garden of coral, Sibelius Seamount, at a depth of 2,465 meters Provided by Save the High Seas



In deep abyssal plains, **each mining operation for so-called polymetallic nodules is expected to effectively strip mine 8,000 to 9,000 square kilometers of seabed** over the course of a 30-year license – equivalent to an area a third the size of Belgium. This would destroy most of the creatures that live on, or just below, the seabed.” – Jun 2020 – Deepsea Coalition – Deep-sea mining: fact sheet 1

Image by Craig Smith and Diva Amon, ABYSSLINE Project / NOAA. – A new species (Relicanthus sp.) from a new order of Cnidaria collected at 4,100 meters in the Clarion-Clipperton Fracture Zone (CCZ) that lives on sponge stalks attached to nodules. Provided by Mongabay – Jun 2020

IN-DEPTH – DEEP-SEA MINING

THREATS TO UNIQUE SPECIES AND ECOSYSTEMS – (continued)

Sediment disruption

“In the deep abyssal plains, mining would stir up sediment that has lain on the seabed for many thousands of years. The sediment plumes could drift far from the actual mining sites themselves, potentially smothering or killing filter feeders and other deep-sea denizens. It is thought that the animals dependent on the nodules may take millions of years to recover and that even partial recovery of the animals living in the disrupted sediment ‘may take hundreds to thousands of years’.

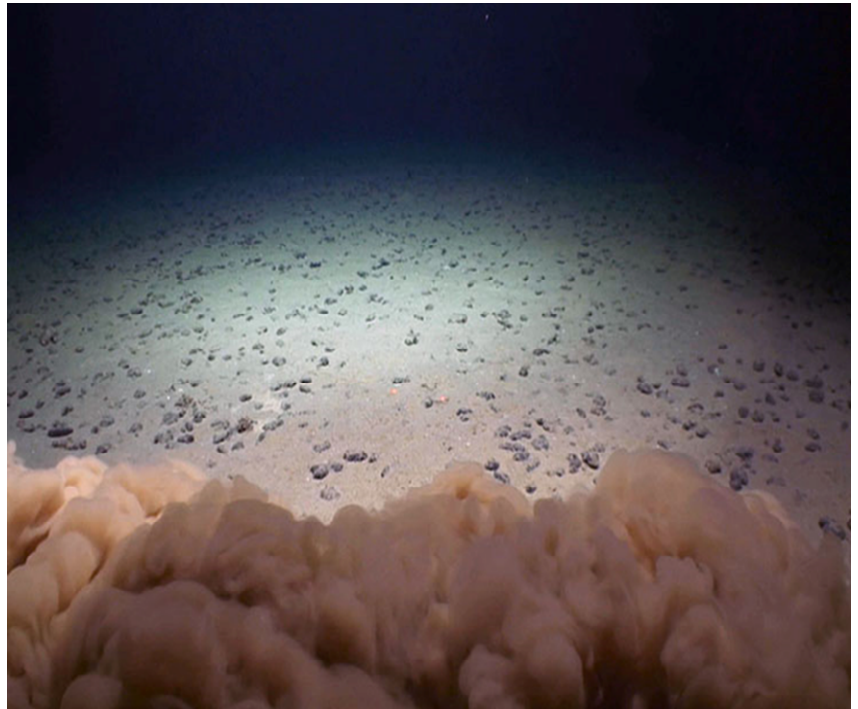


Image Credit: (MIT)

Wastewater

Modeling by scientists indicates that the plumes of wastewater, sediment and residual metals discharged from ships during mining could flow hundreds of kilometers away from the mining sites. These plumes could impact ocean ecosystems at various depths. The metals they contain could prove toxic to some forms of marine life and could, potentially, get into the marine food chain.

Noise and light pollution

This would affect thousands of meters of the water column from the seabed to the surface. It could impact whales and other deep-diving or deep-dwelling animals that use noise and echolocation to communicate and find prey in the ocean’s depths.” – Jun 2020 – Deepsea Coalition – Deep-sea mining: fact sheet 1

IN-DEPTH – DEEP-SEA MINING

REGULATION

“Deep-seabed mining in the international areas of the world’s ocean is controlled by the International Seabed Authority (ISA). The ISA was established in 1994 by the United Nations Convention on the Law of the Sea (UNCLOS) to control deep sea mining in the international areas of the world’s ocean.

Comprised of 167 Member States plus the European Union, it is **explicitly charged with ensuring the ‘effective protection’ of the marine environment from seabed mining activities and with preventing damage to the flora and fauna of the seabed.”** - Jun 2020 – Deepsea Conservation Coalition – fact sheet 1



Photo Credit: NOAA A meeting of the ISA.

WHO IS SUPPOSE TO BENEFIT FROM DEEP SEA MINING?

“Ultimately, the economic advantages of deep seabed mining, most likely in the form of royalties paid to the Authority, are to be shared for the ‘benefit of mankind as a whole’, with particular emphasis on the developing countries that lack the technology and capital to carry out seabed mining for themselves.” – United Nations

WHO HAS BEEN ISSUED EXPLORATORY CONTRACTS?

“The contractors are a mix of corporate enterprises and state-owned companies, with several governments keen to establish the rights to mine and to gain a foothold on the international seabed. Of the thirty exploration contracts the ISA has issued to date, at least eighteen are held by only seven countries – China, France, Germany, India, Japan, Russia and South Korea – through their state owned companies or government agencies and ministries. Another seven contracts are effectively in the hands of three private companies: DeepGreen, a privately held Canadian company; UK Seabed Resources, a subsidiary of US based Lockheed Martin; and Global Sea Mineral Resources, a subsidiary of the Belgium company DEME Group.” – Jan 2020 - Deepsea Conservation Coalition

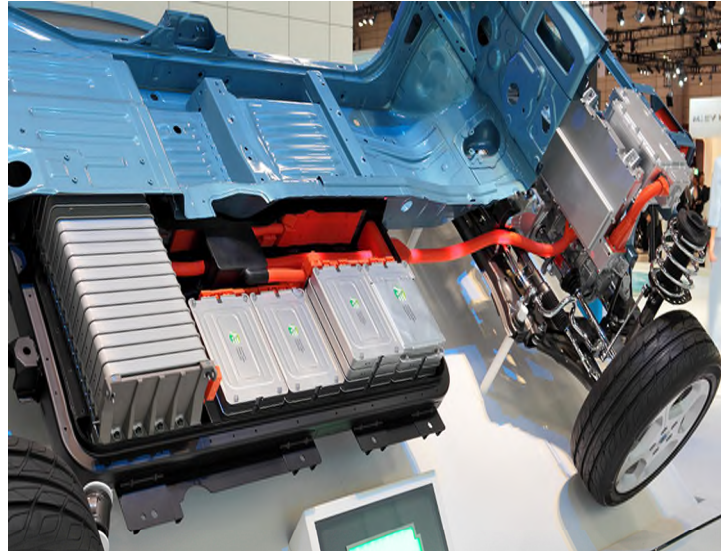
IN-DEPTH – DEEP-SEA MINING

DECARBONIZATION REQUIRES BATTERIES

“[Gerald Barron’s, CEO of DeepGreen] believes that the world will not survive if we continue burning fossil fuels, and **the transition to other forms of power will require a massive increase in battery production.**”

He points to electric cars: the batteries for a single vehicle require 187 pounds of copper, 123 pounds of nickel, and 15 pounds each of manganese and cobalt. On a planet with 1 billion cars, **the conversion to electric vehicles would require several times more metal than all existing land-based supplies**—and harvesting that metal from existing sources already takes a human toll.

Most of the world’s cobalt, for example, is mined in the southeastern provinces of the Democratic Republic of Congo, where tens of thousands of young children work in labor camps, inhaling clouds of toxic dust during shifts up to 24 hours long. Terrestrial mines for nickel and copper have their own litany of environmental harms.” – Feb 2020 – The Atlantic



Provided by Wikipedia - Nissan Leaf cutaway showing part of battery

“An investment of over \$1 trillion will be needed in key energy transition metals – aluminium, cobalt, copper, nickel and lithium – over the next 15 years just to meet the growing demands of decarbonisation.” – Oct 20 – Mining.com

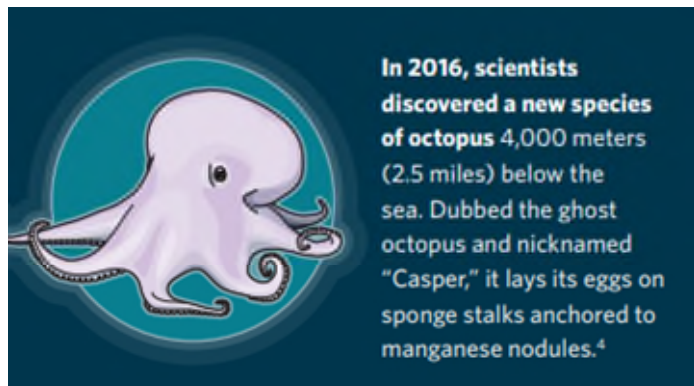
“One can argue about both the pace and scale of the energy transition but the criticality of metals to its [realization] is without question,” says Julian Kettle, Wood Mackenzie’s Vice Chairman of Metals and Mining. **“Put simply, the energy transition starts and ends with metals. If you want to generate, transmit or store low/no-carbon energy you need [aluminum], cobalt, copper, nickel and lithium.”** – Oct 20 – Mining.com

IN-DEPTH – DEEP-SEA MINING

LIFE IN THE DEEP SEA

“UNTIL RECENTLY, marine biologists paid little attention to the deep sea. They believed its craggy knolls and bluffs were essentially barren.”

“That theory capsized in 1977, when a pair of oceanographers began poking around the Pacific in a submersible vehicle. While exploring a range of underwater mountains near the Galápagos Islands, they spotted a hydrothermal vent about 8,000 feet deep. No one had ever seen an underwater hot spring before, though geologists suspected they might exist. As the oceanographers drew close to the vent, they made an even more startling discovery: A large congregation of animals was camped around the vent opening. These were not the feeble scavengers that one expected so far down. They were giant clams, purple octopuses, white crabs, and 10-foot tube worms, whose food chain began not with plants but with organic chemicals floating in the warm vent water.” – Feb 2020 – The Atlantic



Source: Pew Trusts

“...scientists have recently discovered that the CCZ is unusually flush with life. ‘It’s one of the most biodiverse areas that we’ve ever sampled on the abyssal plains,’ a University of Hawaii oceanographer named Jeff Drazen told [The Atlantic]. Most of those microbes, he said, live on the very same nodules that miners are planning to extract.”



Source: Pew Trusts

“[O]cean microbes produce radically different compounds from those on land. ‘There are more than a million microbes per milliliter of seawater,’ [Craig Venter, a genetic scientist] said, ‘so the chance of finding new antibiotics in the marine environment is high.’ [Matt] McCarthy, an infectious-disease specialist] agreed. **‘The next great drug may be hidden somewhere deep in the water,’** he said. ‘We need to get to the deep-sea organisms, because they’re making compounds that we’ve never seen before.’”

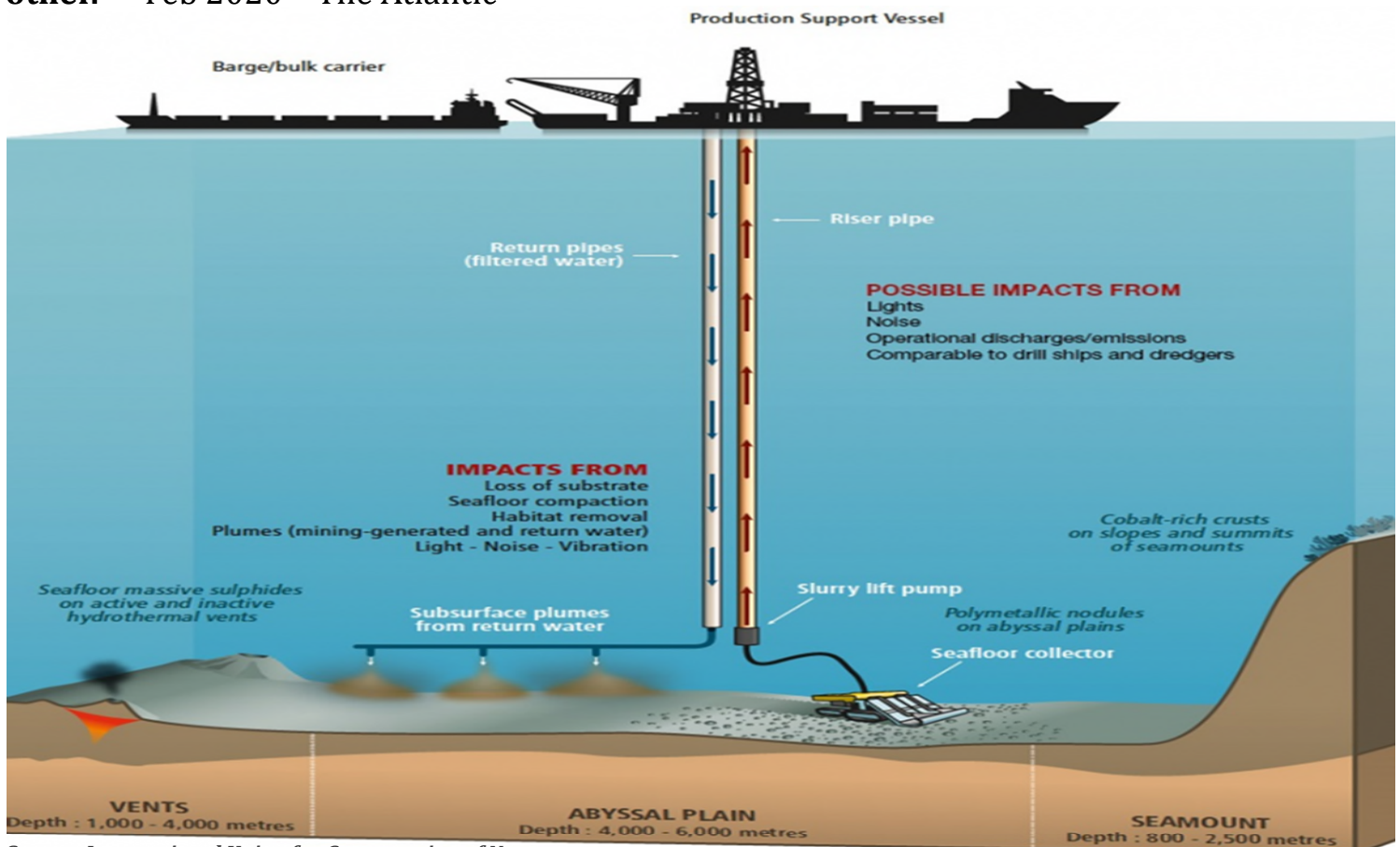
– Feb 2020 – The Atlantic

IN-DEPTH – DEEP-SEA MINING

SUMMARY

“There is growing interest in the mineral deposits of the deep sea. This is largely due to depleting terrestrial deposits for metals such as copper, nickel, aluminum, manganese, zinc, lithium and cobalt, coupled with **rising demand for these metals to produce high-tech applications such as smartphones and green technologies** such as wind turbines, solar panels and electric storage batteries.” – International Union for Conservation of Nature

“The harms of burning fossil fuels and the impact of land-based mining are beyond dispute, but the cost of plundering the ocean is impossible to know. What creatures are yet to be found on the seafloor? How many indispensable cures? Is there any way to calculate the value of a landscape we know virtually nothing about? **The world is full of uncertain choices, of course, but the contrast between options is rarely so stark: the crisis of climate change and immiserated labor on the one hand, immeasurable risk and potential on the other.**” – Feb 2020 – The Atlantic



Source: International Union for Conservation of Nature

IN-DEPTH TOPICS LOCATED ON THE COUNTY AUDITOR'S WEBPAGE

• 5G Network	4 th Qtr 2018
• Alibaba	3 rd Qtr 2017
• Bitcoin	4 th Qtr 2016
• Cashless Society	4 th Qtr 2017
• Chatbots	1 st Qtr 2019
• Deep Sea Mining	3 rd Qtr 2020
• Facial Recognition	1 st Qtr 2018
• Labor Participation Rate	4 th Qtr 2015
• Libra, Calibra, Facebook	2 nd Qtr 2019
• Money Market Fund Reform – New Rules	3 rd Qtr 2016
• Natural Gas – U.S. 3 RD Largest Exporter of LNG	4 th Qtr 2019
• Negative Interest Rate Policy (NIRP)	2 nd Qtr 2016
• New Silk Road	2 nd Qtr 2017
• Pandemic – Possible Impact	1 st Qtr 2020
• Quantitative Easing	1 st Qtr 2016
• Repurchase Agreements – Repo Market in Crisis	3 rd Qtr 2019
• Small Business Reorganization Act	2 nd Qtr 2020
• Texas Imports and Exports	2 nd Qtr 2018
• Universal Postal Union	3 rd Qtr 2018

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