



TEXAS

“Texas’ economic expansion continued but lost some steam. A drop in oil prices and housing sales combined with weaker hiring in the service sector weighed on momentum. The overall outlook, however, remains positive. Crude oil production hovered around historic levels, and low unemployment pushed wages upward. The number of homes in foreclosure held at its lowest level in decades as Texans’ employment and earnings prospects improved. The manufacturing sector created a record-high 9,100 jobs despite trade tensions and price pressures. While survey data reinforced optimism for both consumers and producers, several risk factors are growing. The **combination of rising interest rates, oil-price volatility, and a slowdown in the global economy provide challenges** to the current business-cycle expansion.”– Outlook for the Texas Economy - Real Estate Center – Texas A&M (REC)

AUSTIN

“The Austin economy grew at a strong pace in November. The Austin Business-Cycle Index expanded and remained above its long-term trend. Employment growth by sector was mixed, with the health and education services sector continuing its surge and financial activities declining. Hourly wages were unchanged, while home construction permits weakened and housing affordability improved.” - January 2019 – Austin Economic Indicators



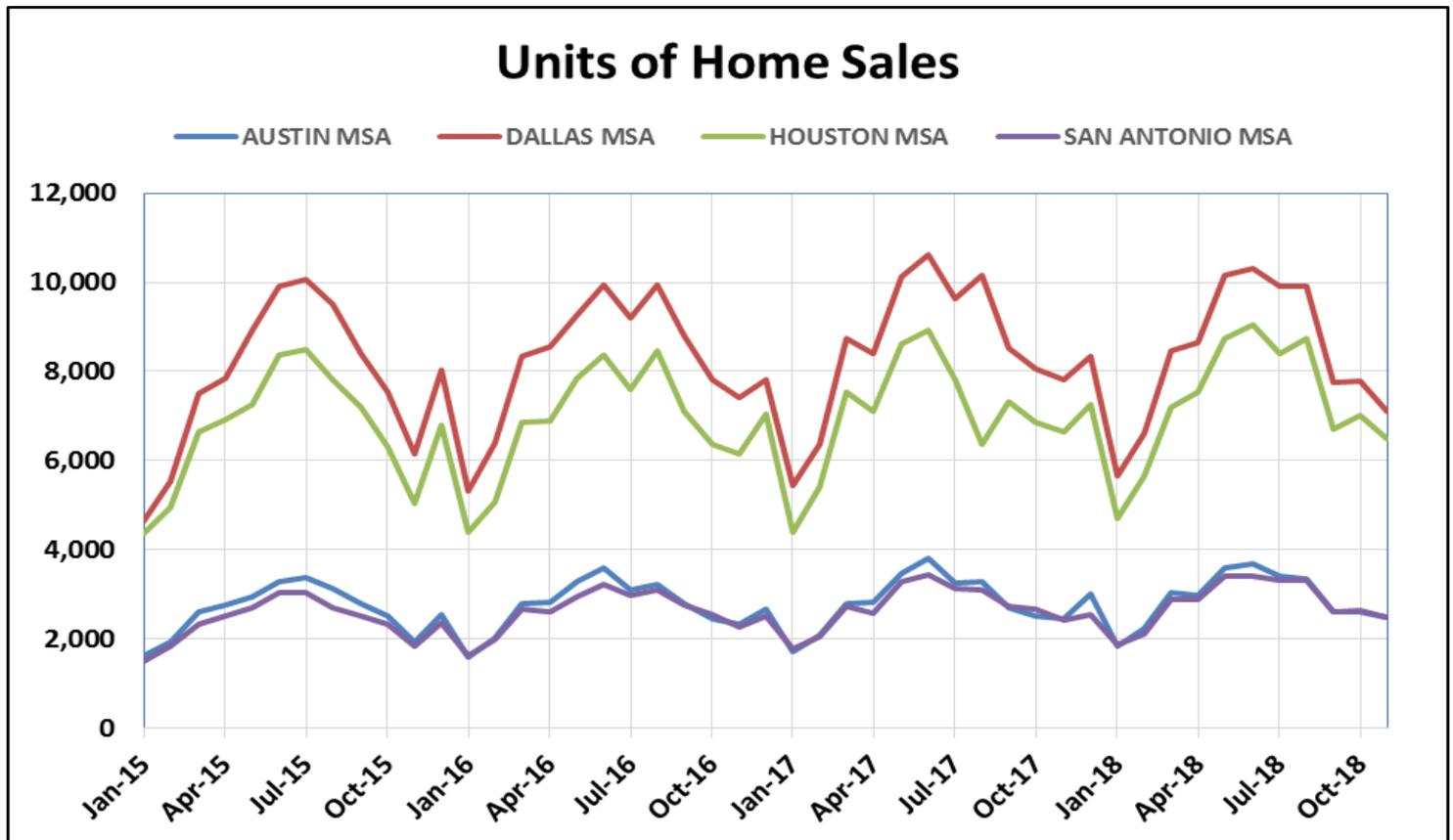
UNITED STATES

“The U.S. economy has now expanded for 112 consecutive months, the second-longest stretch on record, and recent data point to continued growth due to strong consumer spending, robust employment growth and elevated business and consumer confidence. The unemployment rate remains at a historical low of 3.7 percent, and various inflation measures are at the Federal Reserve's 2 percent target.” – November 2018 - Research Department at the Federal Reserve Bank of Dallas

HOUSING – HOME SALES

“Texas housing sales ticked down 1.1 percent in November and remained on a flat trajectory. The shortage of homes priced below \$300,000 and **rising interest rates continued to weigh on overall activity**. Listing inventories inched forward but still remained tight relative to demand.

Housing demand showed signs of normalizing, particularly in North Texas, after a multiyear period of unsustainable growth. Steady population and job growth, however, suggest healthy demand for the duration of the current economic expansion. The recent pause in sales activity calmed home price appreciation, but rising interest rates hindered affordability across the state.” – Texas Housing Insight - January 9, 2019 (reporting November data)

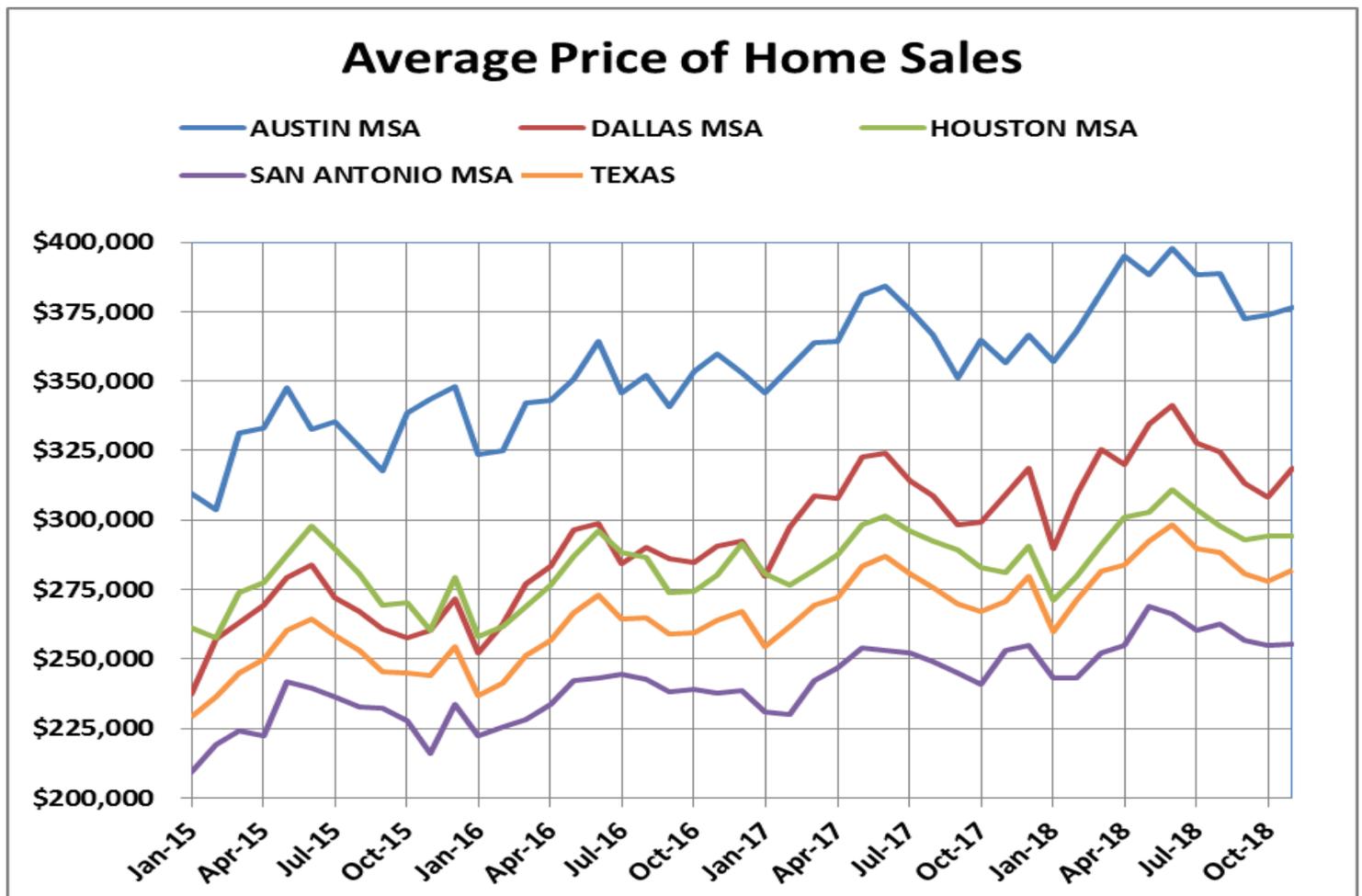


Source: Real Estate Center at Texas A&M University

HOUSING – AVERAGE SALES PRICE

For a single-unit of residential housing in the Austin MSA, the average November sales price increased [year-over-year] from \$356,699 to \$376,468.

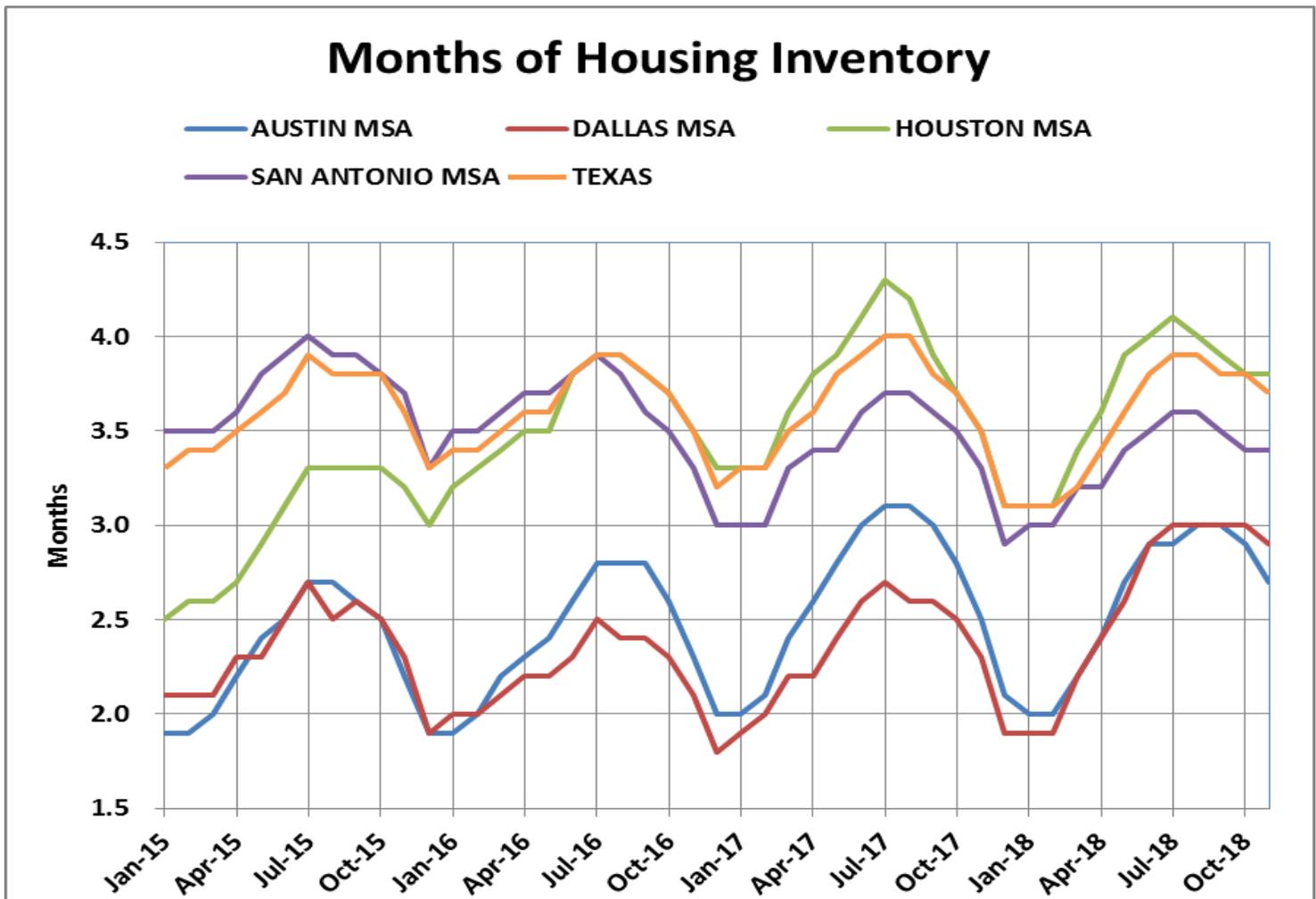
“Consumer preferences shifted toward smaller homes to combat affordability constraints, pushing the median price per square foot up across the major metros relative to last year. Until wage growth catches up to home-price appreciation, the market will shift toward higher-density housing in the form of reduced lot and home sizes or toward multifamily units.” – Texas Housing Insight – January 9, 2019 – REC



Source: Real Estate Center at Texas A&M University

HOUSING – MONTHS OF INVENTORY

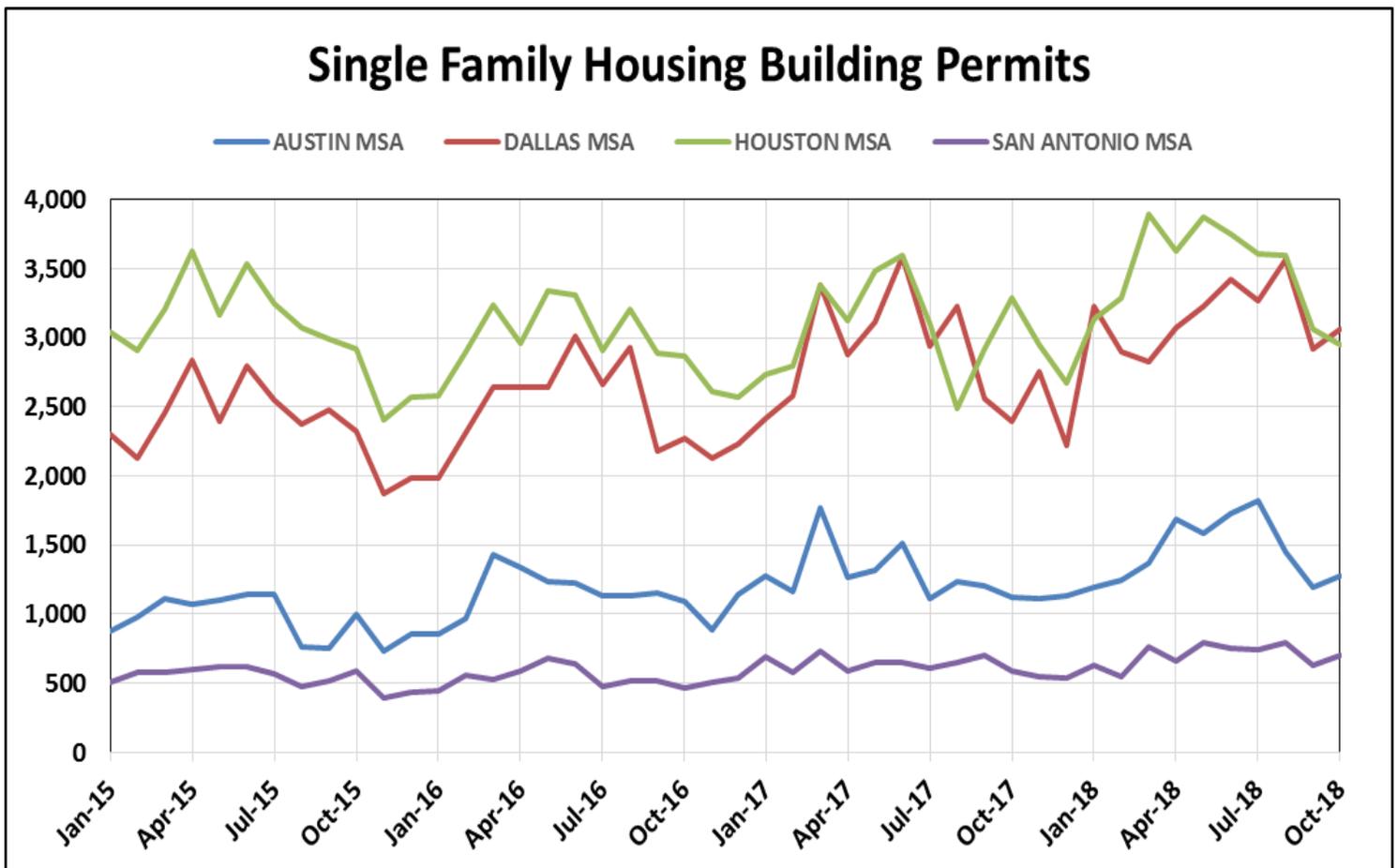
In November 2018, the Austin MSA's had 2.7 months of housing inventory. The Real Estate Center has estimated that “seasonally adjusted; around 6.5 months of inventory is considered a balanced housing market in which neither sellers nor buyers dictate prices.”



Source: Real Estate Center at Texas A&M University

HOUSING – SINGLE FAMILY BUILDING PERMITS

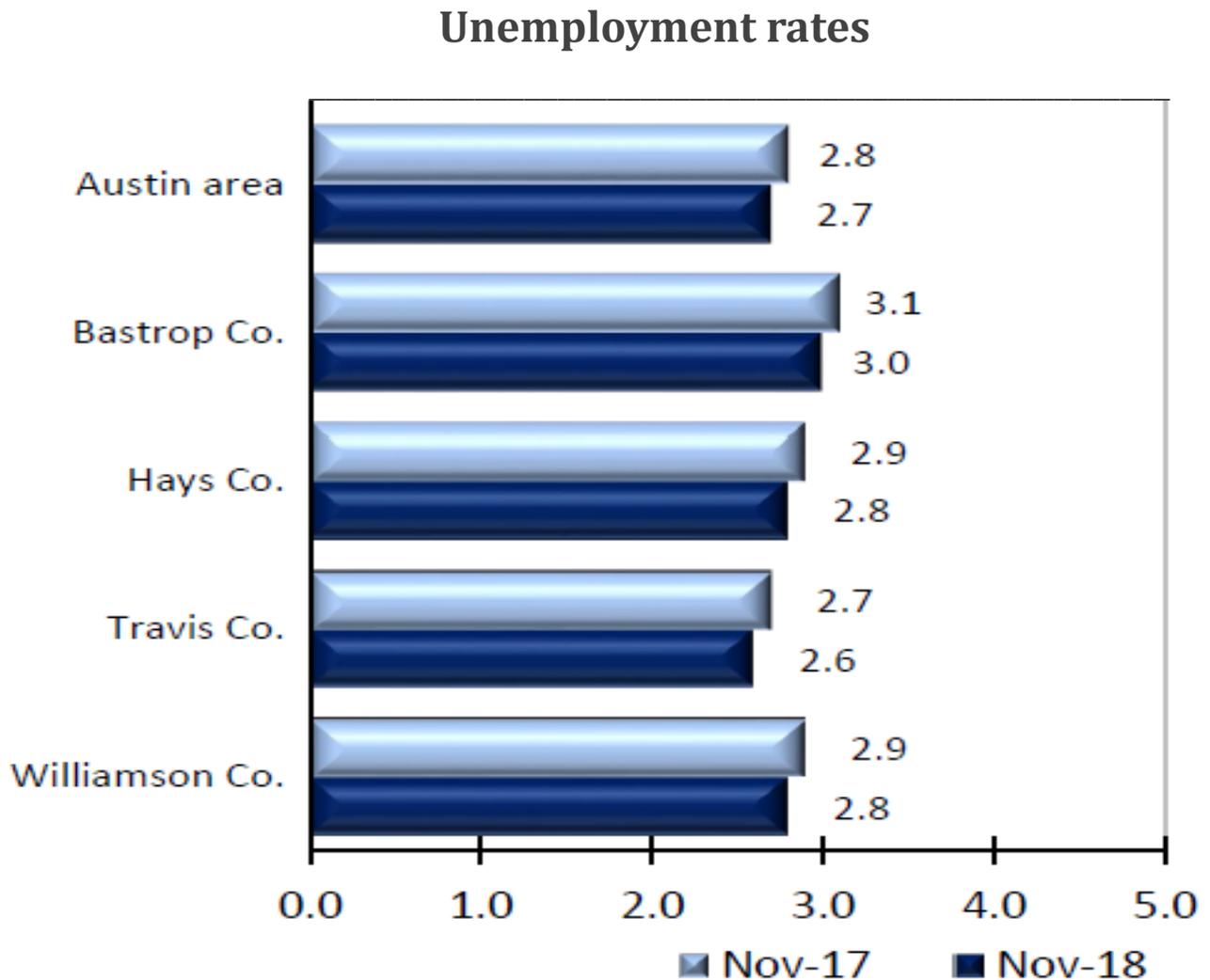
“Due to ongoing Federal government shutdown, the release of building permit data has been delayed. New data are currently unavailable.” – Texas A&M (REC)



Source: Real Estate Center at Texas A&M University

JOBS - UNEMPLOYMENT RATE – AUSTIN AREA

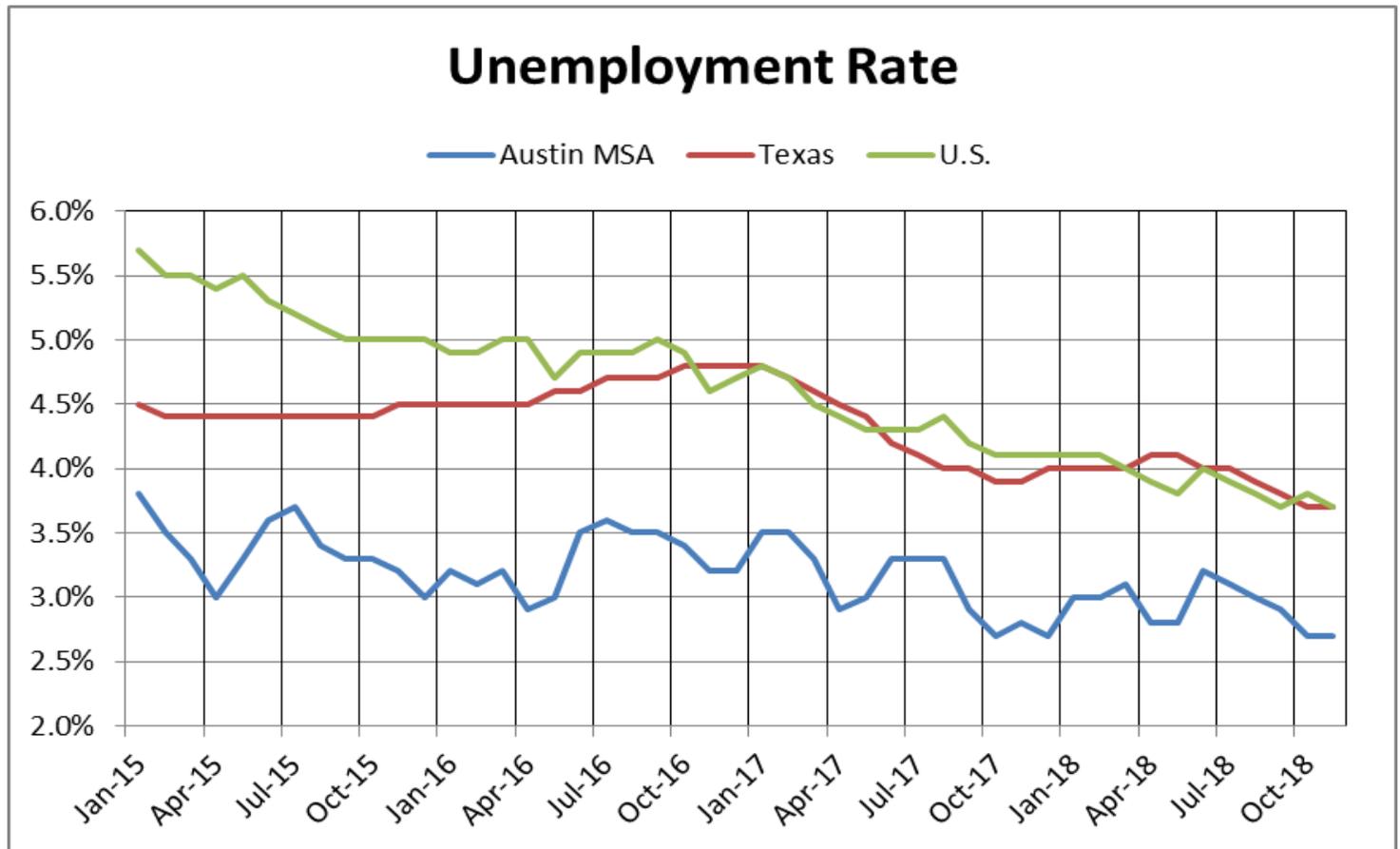
Below is a chart taken from the January 8, 2019, Austin Area Economic Summary prepared by the U.S. Bureau of Labor Statistics. It illustrates that unemployment rates have fallen slightly throughout the Austin area compared to prior year.



Source: U.S. BLS, Local Area Unemployment Statistics.

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

The preliminary Austin MSA unemployment rate was 2.7 percent in November. The Texas and U.S. rates were both 3.7 percent indicating continued labor market tightness. **The Texas unemployment rate of 3.7 percent was “the lowest since the series began in January 1976.** Changes in initial claims for unemployment insurance, which tend to lead changes in the unemployment rate by three months, suggest the Texas unemployment rate will fall even further.” – Texas Economic Update – Federal Reserve Bank of Dallas – December 26, 2018

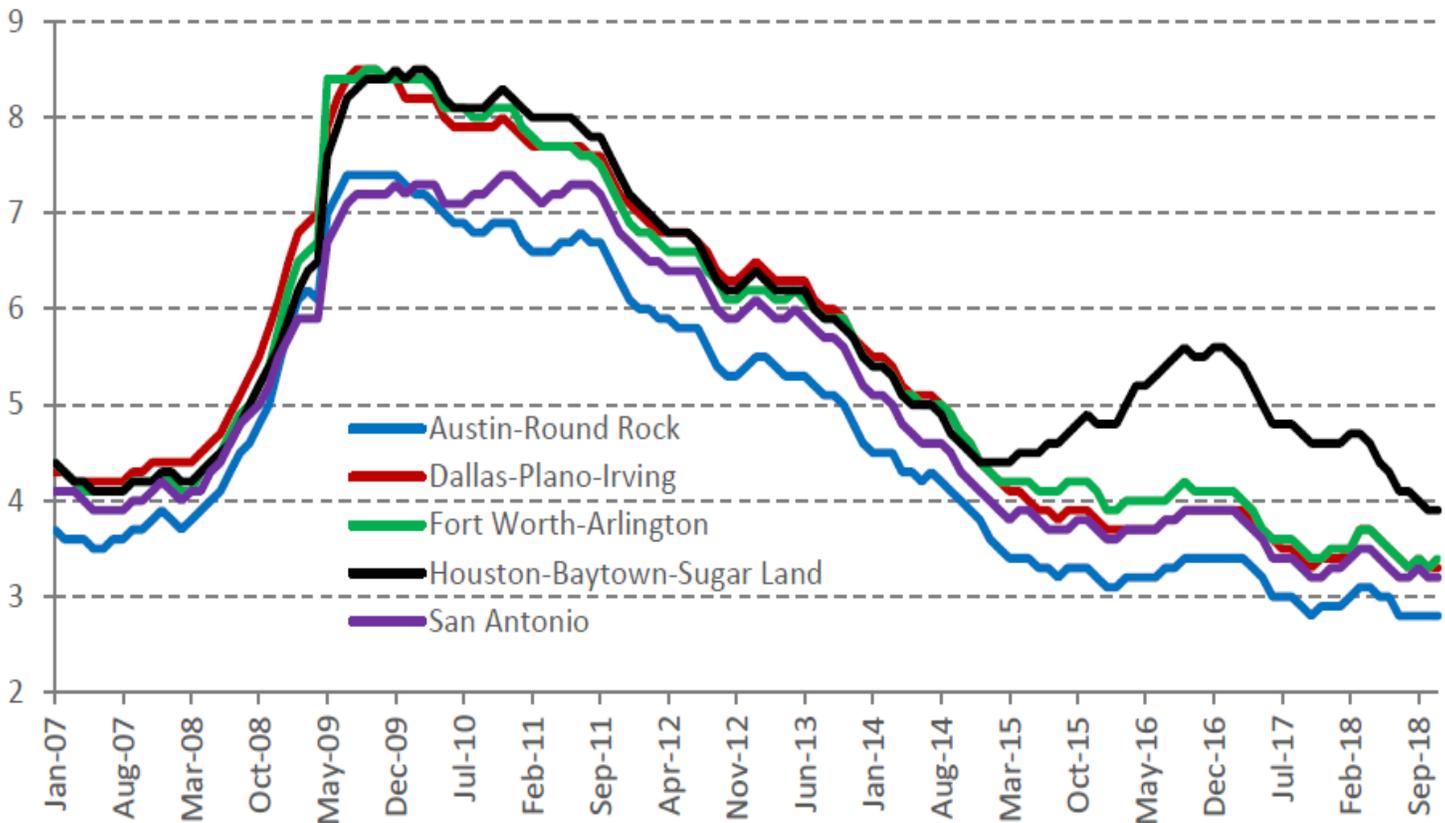


*Note: U.S. and Texas seasonally adjusted, Austin MSA not seasonally adjusted.
Source: Bureau of Labor Statistics*

JOBS - UNEMPLOYMENT RATES – MAJOR METROS

“Rates were unchanged in all the major metros except Fort Worth, where the rate ticked up. Jobless rates are significantly below post-recession averages in all major metros.” - Texas Economic Indicators – Federal Reserve Bank of Dallas – December 27, 2018

Major Metros Unemployment Rate
(Percent)

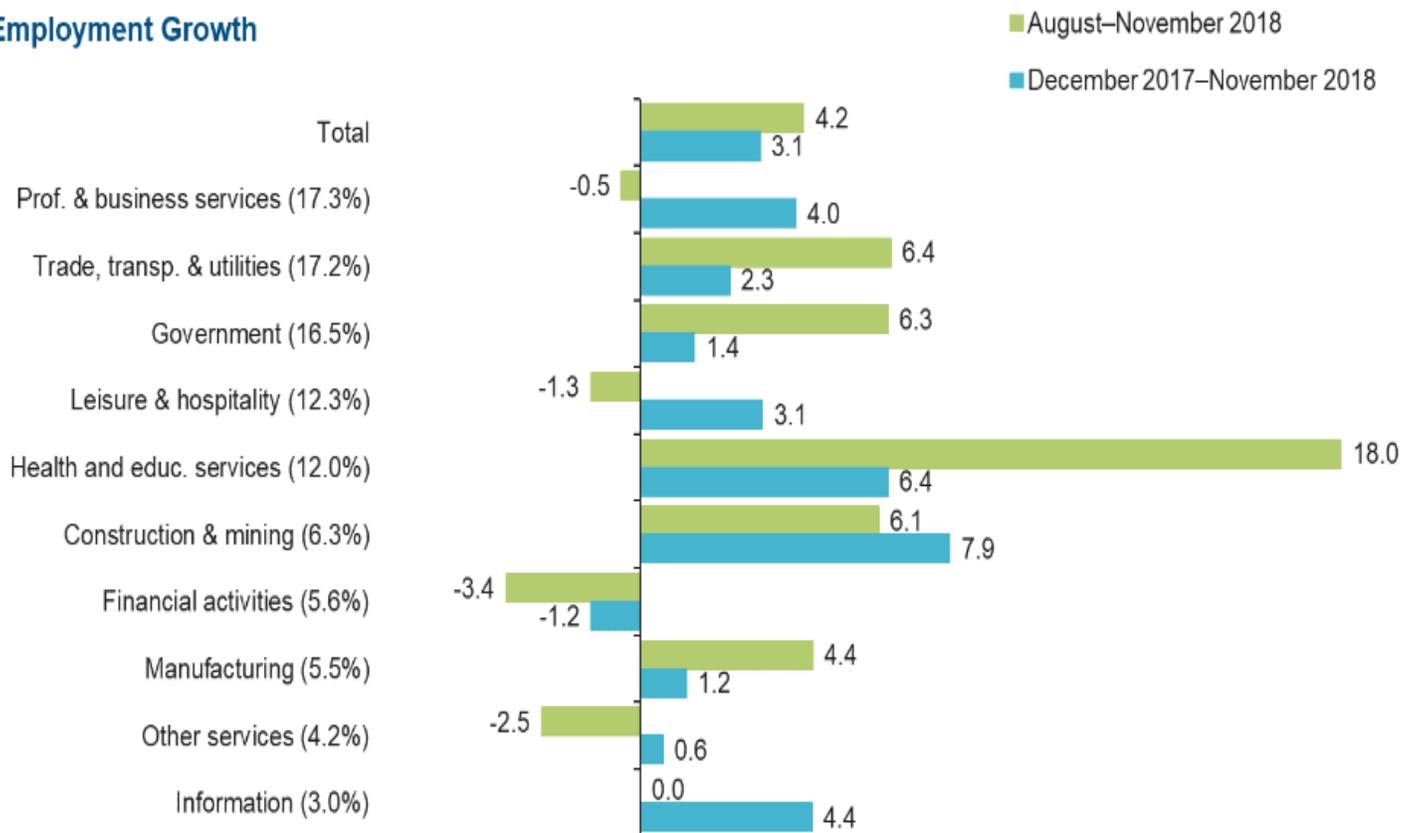


Source: Federal Reserve Bank of St. Louis
 Provided by: Real Estate Center at Texas A&M University

JOBS – GROWTH RATE – AUSTIN

“Austin employment expanded at a strong annualized rate of 4.2 percent from August to November. Performance by sector was mixed. Growth was primarily led by health and education services, which accelerated at a blazing annualized rate of 18 percent and created an additional 5,200 positions. Professional and business services and leisure and hospitality experienced small contractions after growing earlier in the year. Financial activities continued to decline and shed approximately 530 jobs during the three-month period.” - Austin Economic Indicators - Dallas Fed – January 10, 2019

Employment Growth



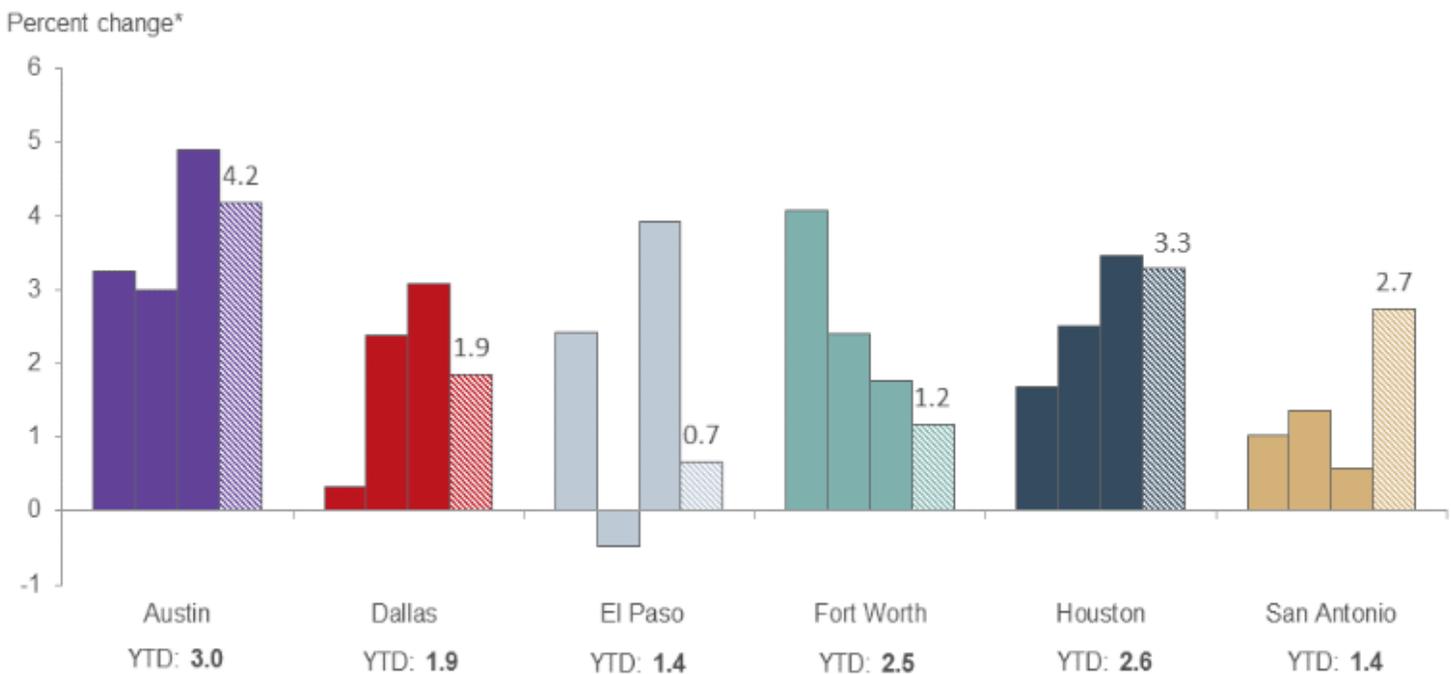
NOTES: Data show seasonally adjusted and annualized percentage employment growth by industry. Numbers in parentheses represent share of total employment and may not sum to 100 due to rounding.

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

JOBS - GROWTH RATE – MAJOR METROS

“Among the largest metro areas, Austin, Houston and San Antonio led job growth over the three months through November. In particular, Austin experienced a significant boost from hiring within three sectors—health and education services; trade, transportation and utilities; and government. Job gains in El Paso remained soft over the same period as expansion within the trade, transportation and utilities; construction, mining and natural resources; and information industries were somewhat offset by sharp declines in the professional and business services and leisure and hospitality sectors. Growth in Dallas and Fort Worth moderated as well relative to the third quarter.” – Texas Economic Update - Dallas Fed – December 26, 2018

Growth Broad Based Across Large Metro Areas in 2018



*Quarterly annualized growth, seasonally adjusted.
 NOTE: The striped bars represent partial fourth quarter 2018; figures are based on November/August 2018 three-month annualized growth.
 SOURCES: Bureau of Labor Statistics; Texas Workforce Commission; seasonal and other adjustments by the Federal Reserve Bank of Dallas.

Provided by: San Antonio Branch of the Federal Reserve Bank of Dallas

JOBS – TEXAS UNEMPLOYMENT vs. OTHER STATES

In November 2018, Texas' unemployment rate ranked 26th in the country tying Montana.

State	November 2018 (p)	Rank
Hawaii	2.4	1
Iowa	2.4	1
New Hampshire	2.5	3
Idaho	2.6	4
Vermont	2.7	5
Minnesota	2.8	6
Nebraska	2.8	6
North Dakota	2.8	6
Virginia	2.8	6
Missouri	3.0	10
South Dakota	3.0	10
Wisconsin	3.0	10
Kansas	3.2	13
Utah	3.2	13
Colorado	3.3	15
Florida	3.3	15
Oklahoma	3.3	15
South Carolina	3.3	15
Maine	3.4	19
Massachusetts	3.4	19
Georgia	3.5	21
Arkansas	3.6	22
Indiana	3.6	22
North Carolina	3.6	22
Tennessee	3.6	22
Montana	3.7	26

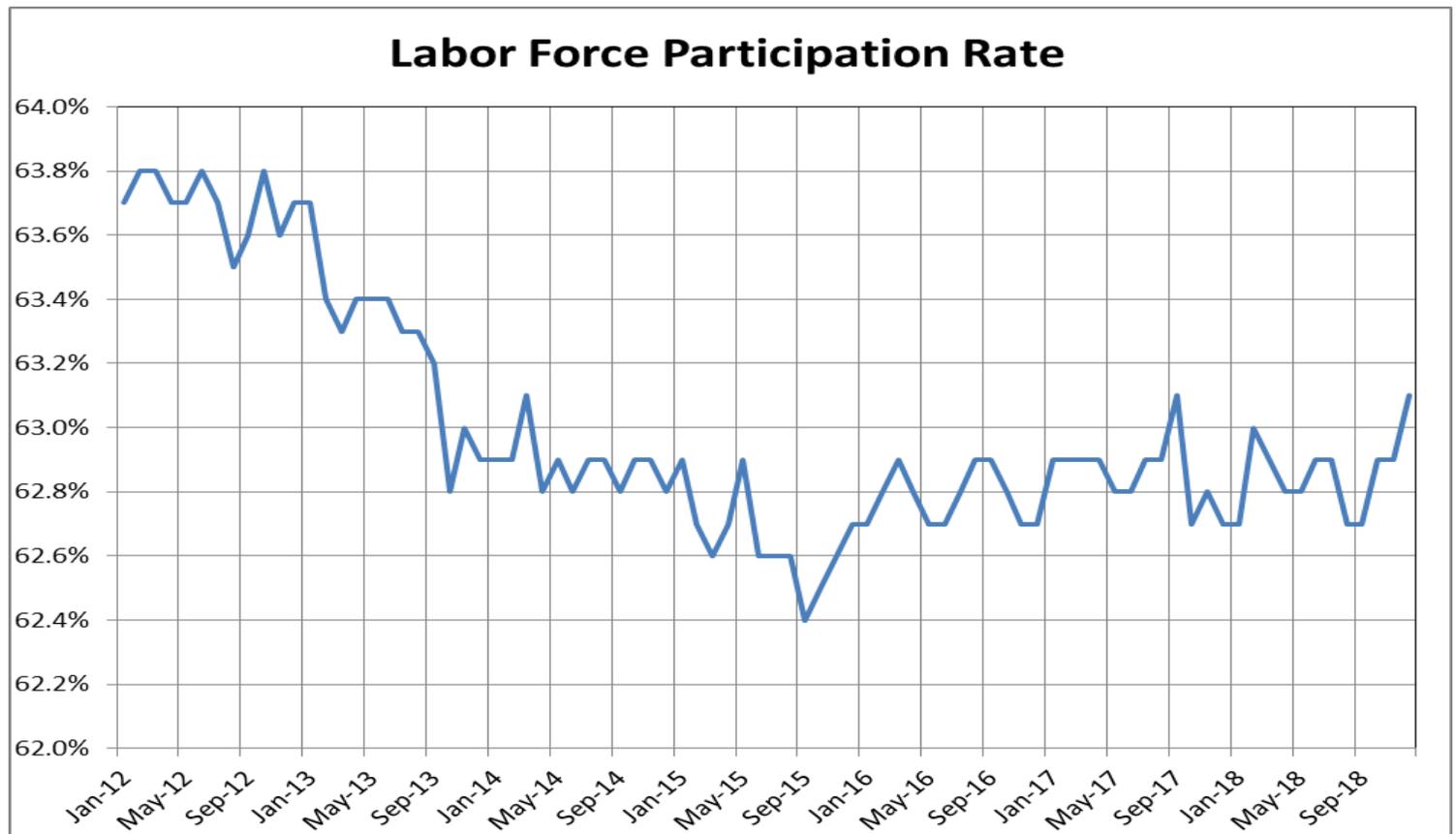
State	November 2018 (p)	Rank
Texas	3.7	26
Delaware	3.8	28
Rhode Island	3.8	28
Michigan	3.9	30
New York	3.9	30
Oregon	3.9	30
Alabama	4.0	33
Maryland	4.0	33
New Jersey	4.0	33
California	4.1	36
Connecticut	4.1	36
Wyoming	4.1	36
Illinois	4.2	39
Pennsylvania	4.2	39
Washington	4.3	41
Nevada	4.4	42
Kentucky	4.5	43
New Mexico	4.6	44
Ohio	4.6	44
Arizona	4.7	46
Mississippi	4.7	46
Louisiana	5.0	48
West Virginia	5.2	49
Alaska	6.3	50
Footnotes		
(p) Preliminary		

Source of Data: Bureau of Labor Statistics

JOBS – LABOR PARTICIPATION RATE

“The Labor Department's Bureau of Labor Statistics said on Friday **the economy added an impressive 312,000 jobs in December**, which was a month of strong retail sales; and the nation's unemployment rate increased two-tenths of a point to 3.9 percent, which is still an 18-year low... [In] January 2017, 152,076,000 Americans were employed. Last month, that number grew to a record 156,945,000, a gain of 4,869,000 in two years.”

“In December, the nation’s civilian noninstitutionalized population, consisting of all people age 16 or older who were not in the military or an institution, reached 258,888,000. Of those, 163,240,000 participated in the labor force by either holding a job or actively seeking one. The 163,240,000 who participated in the labor force equaled 63.1 percent of the 258,888,000 civilian noninstitutionalized population.” – January 2019 CNS News



Source of Data: 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].”

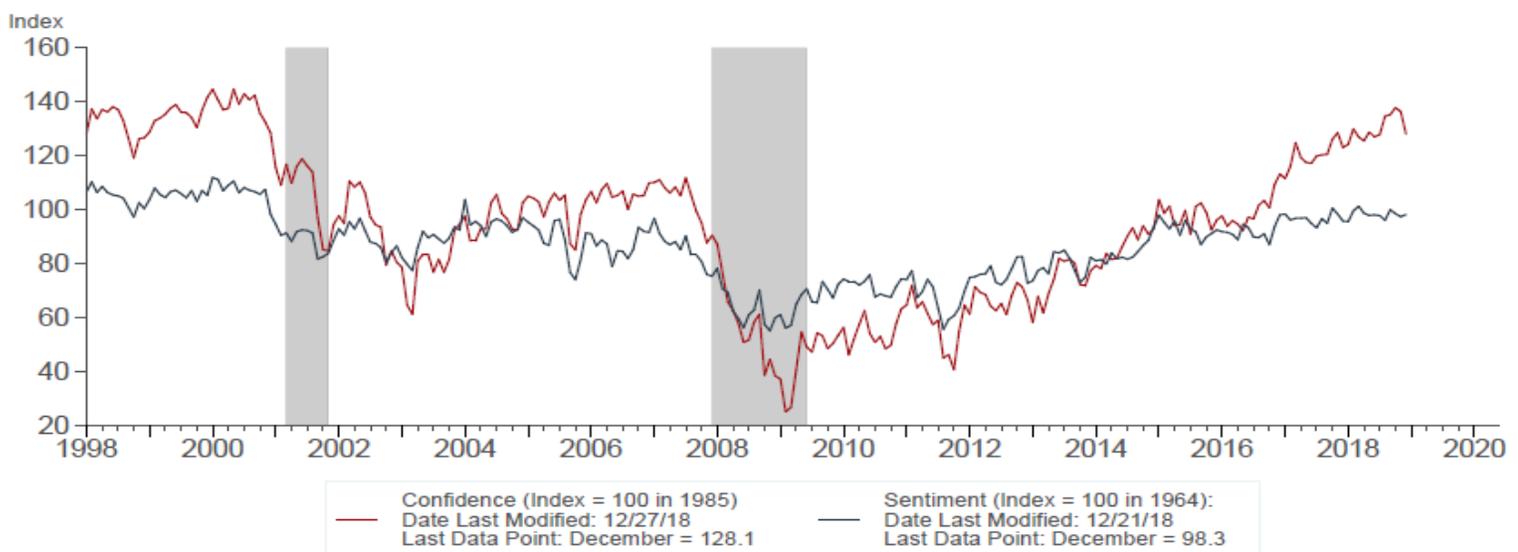
CONSUMER CONFIDENCE AND SENTIMENT – U.S.

“The **Index now stands at 128.1** (1985=100), down from 136.4 in November. ‘Consumer Confidence decreased in December, following a moderate decline in November,’ said Lynn Franco, Senior Director of Economic Indicators at The Conference Board. **Expectations regarding job prospects and business conditions weakened, but still suggest that the economy will continue expanding at a solid pace in the short-term.**” - The Conference Board – December 2018

Surveys of Consumers, Chief economist, Richard Curtin, commented “The Sentiment Index averaged 98.4 in 2018, the best year since 107.6 in 2000. **Over the past half century, sentiment was higher in only two other time periods: 1964-65 and 1997-2000.** These periods correspond to the two longest prior expansions since the mid 1800's. If the current expansion lasts past mid-2019, as is likely based on current data, it will become the longest expansion ever recorded.

While the plunge in stock prices has recently garnered the most attention in the national press, consumers have focused more on their concerns about income and job prospects. **Consumers reported more negative than positive news about job prospects for the first time in two years, with the shift widespread across socioeconomic subgroups.”**

Consumer Confidence and Sentiment



NOTE: Gray shaded areas indicate NBER recessions.

SOURCES: The Conference Board; Survey of Consumers; Survey Research Center; U. of Michigan.

Provided by Federal Reserve of Dallas – U.S. Economy Charts– December 2018

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

BUSINESS CYCLE INDEX – AUSTIN MSA

“The Austin Business-Cycle Index expanded at a 7.4 percent annualized rate in November, well above the long-run average of 6.0 percent. Jobs grew at a steady pace in November, while the unemployment rate lingered at a low 2.8 percent.”– Austin Economic Indicators - Dallas Fed

Austin Business-Cycle Index

Percent, month/month*



*Seasonally adjusted, annualized rate.

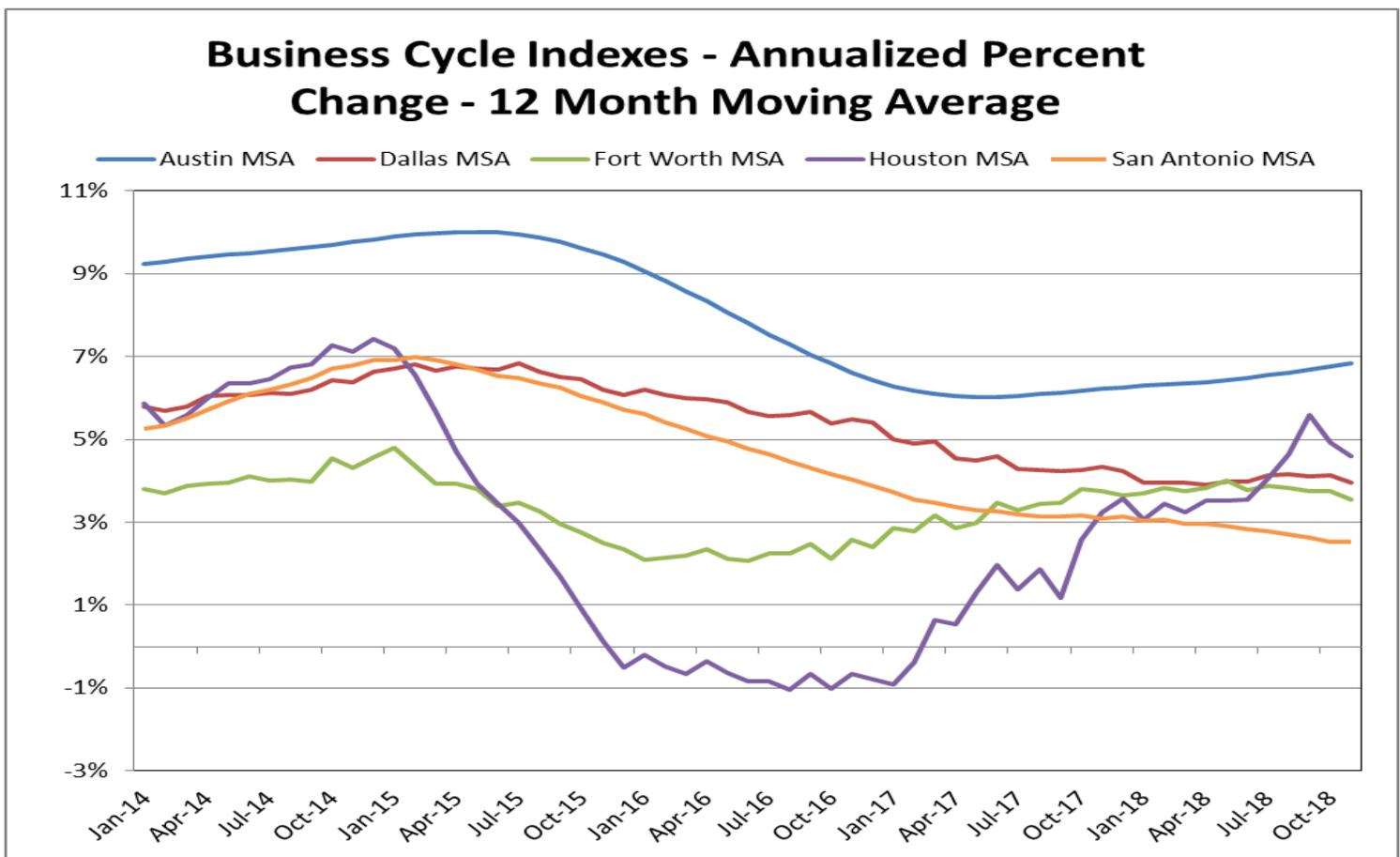
SOURCE: Dallas Fed.

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.”

BUSINESS CYCLE INDEX – MAJOR METROS

For November 2018, “[t]he Austin and Houston business-cycle indices boomed at 7.4 and 6.4 percent, respectively, but activity decelerated in North Texas. The Dallas and Fort Worth indices slowed to 4.0 and 2.7 percent growth, respectively. San Antonio’s index surpassed 3 percent for the first time in 2018 as employment numbers recovered from a sluggish summer.” – Outlook for the Texas Economy - January 10, 2019 – REC

In the chart below, a twelve month moving average was incorporated to smooth out short-term fluctuations and highlight longer-term cycles.

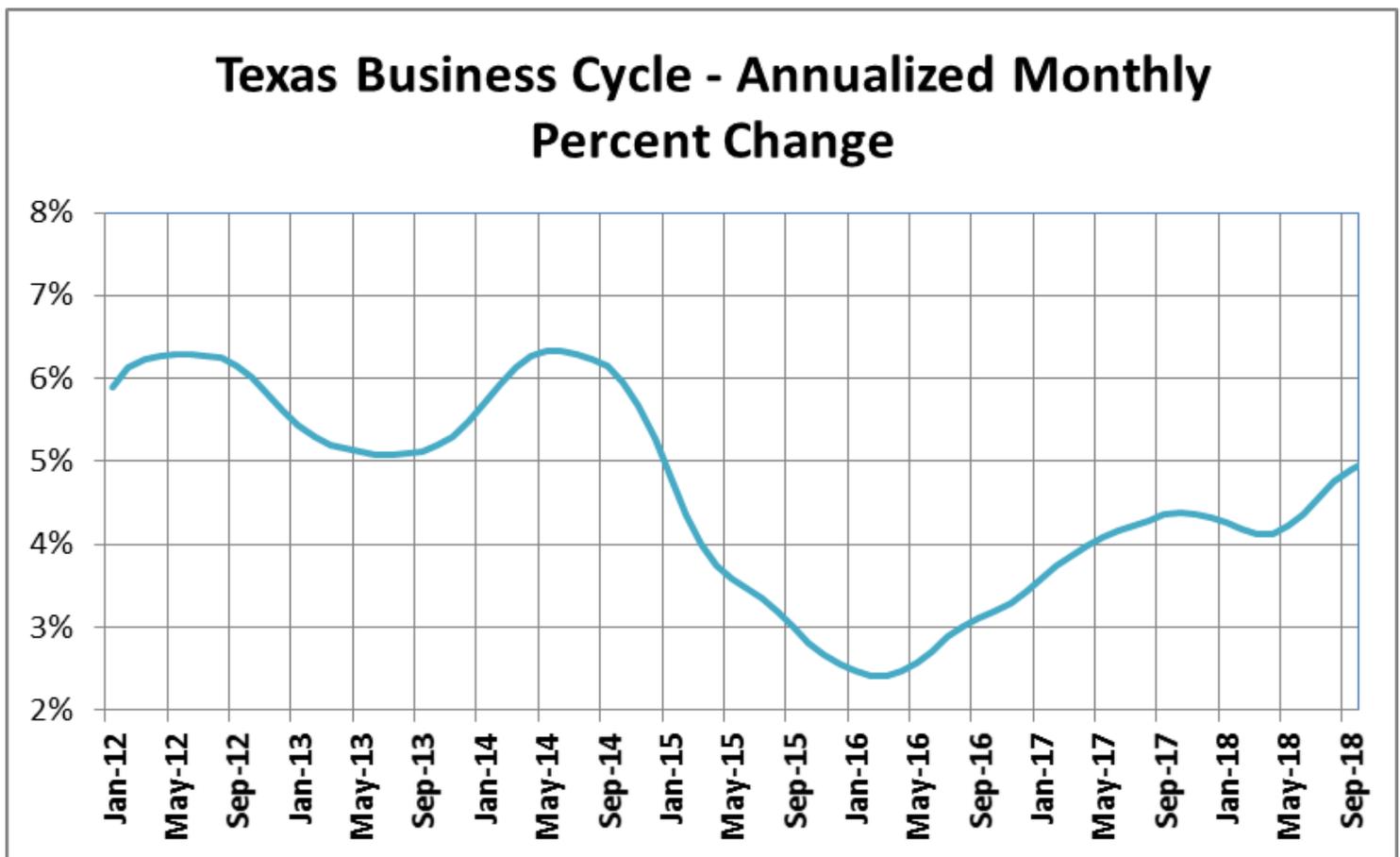


Source: Federal Reserve Bank of Dallas – Index 1980 = 100

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.”

BUSINESS CYCLE INDEX – TEXAS

“Ongoing economic activity pushed the Dallas Fed’s Texas Business-Cycle Index up 5 percent on a seasonally adjusted annualized rate (SAAR) for the first time since January 2015. Historically low unemployment and eight years of payroll expansions continued to carry the economy.” – Outlook for the Texas Economy - January 10, 2019 - REC

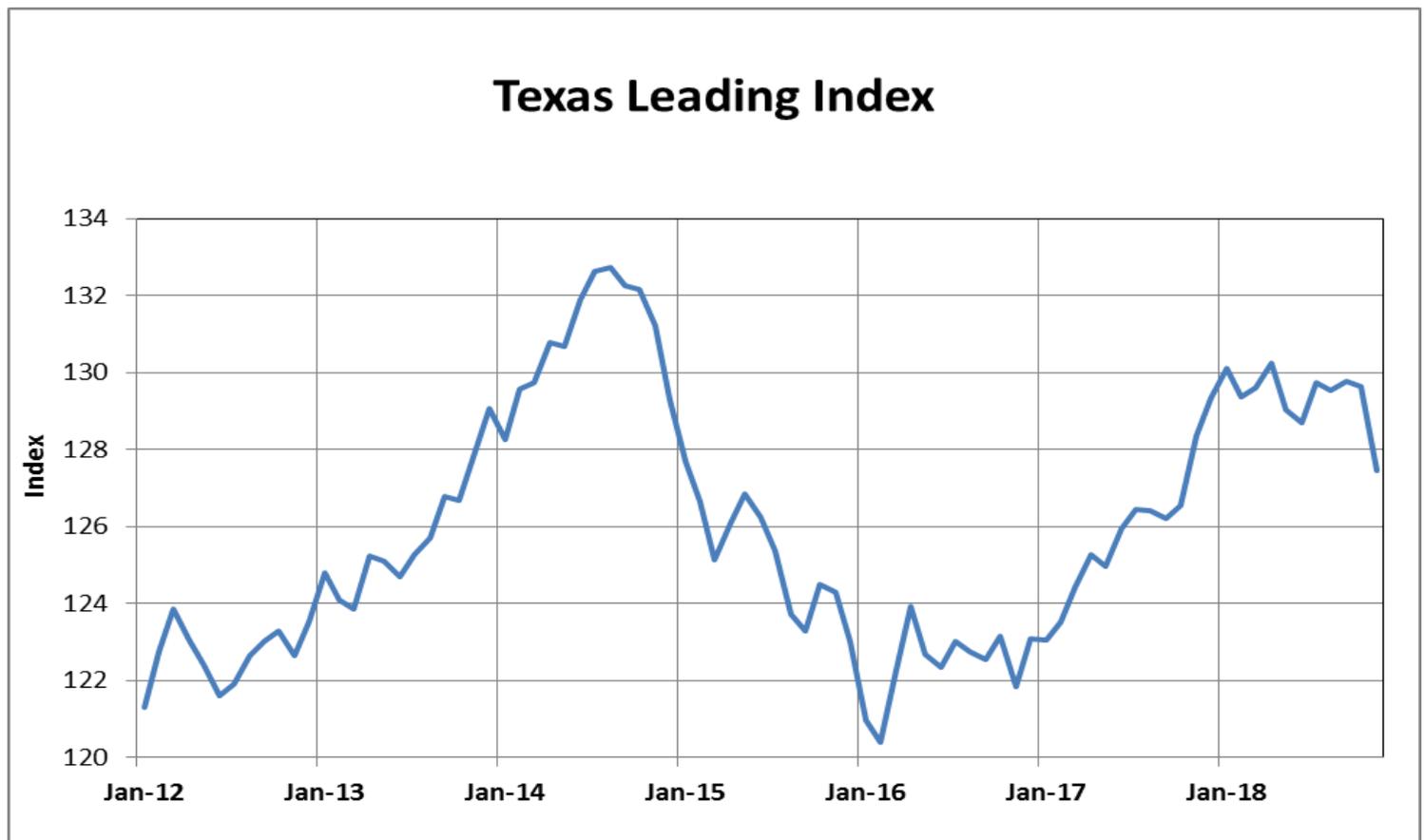


Source: Federal Reserve of Dallas - Index, 1987 = 100

“The **Texas Business-Cycle Index** is a single economic statistic that helps gauge the **current state** of the Texas economy. The Texas Business-Cycle Index is constructed using payroll employment, gross state product and the unemployment rate.” – Dallas Fed

LEADING INDEX – TEXAS

“Strength in the Texas value of the dollar and sliding oil prices pulled the Texas Leading Economic Index (a measure of future directional changes in the business cycle) down 1.7 points, the largest decrease since 2009.” - Outlook for the Texas Economy - January 10, 2019 - REC

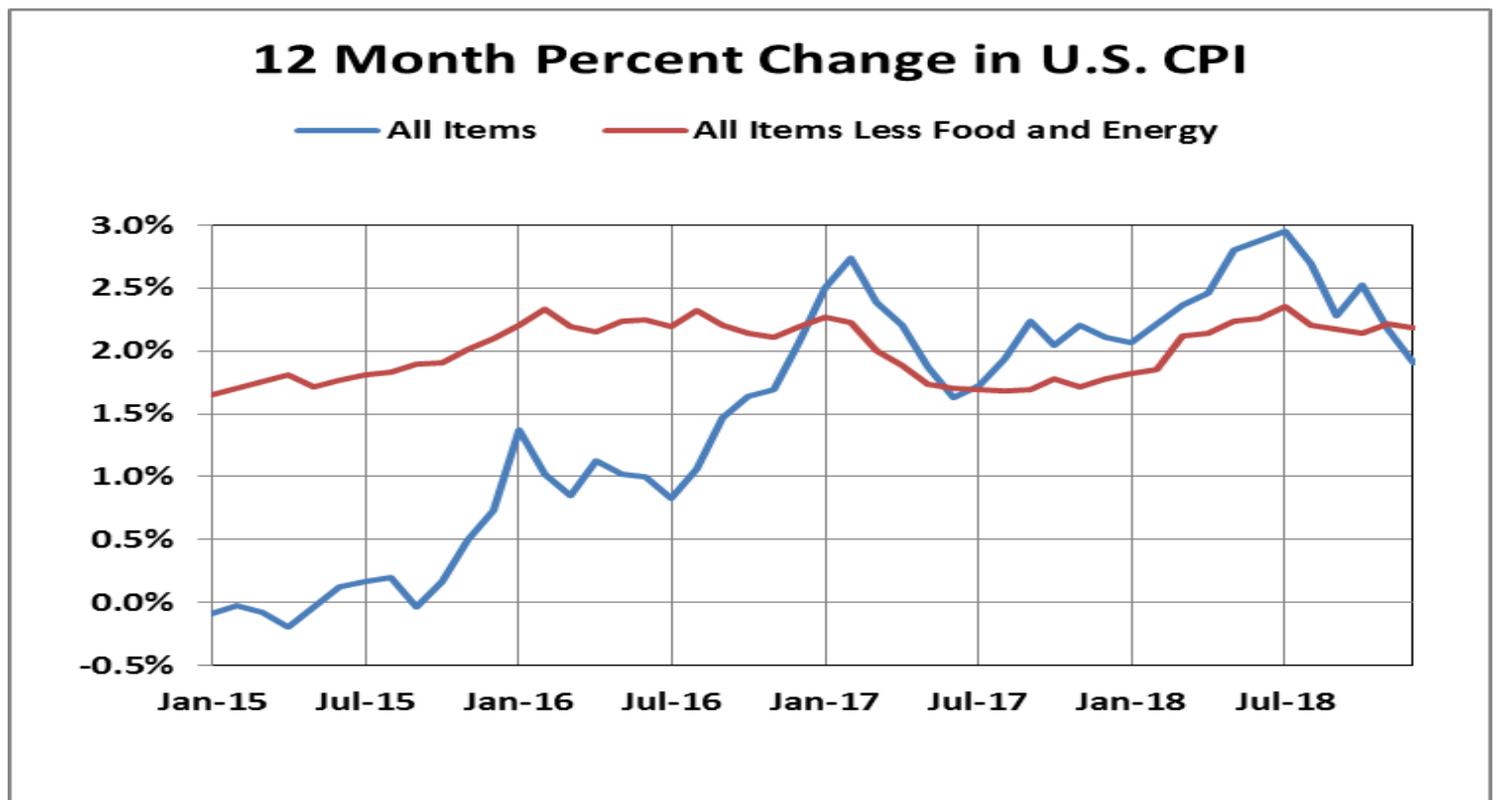


Source: Federal Reserve of Dallas - Index, 1987 = 100

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.

CONSUMER PRICE INDEX

“The all items index increased 1.9 percent for the 12 months ending December; this was the first time the 12-month change has been under 2.0 percent since August 2017. The index for all items less food and energy rose 2.2 percent over the last 12 months, the same increase as for the 12 months ending November. The food index rose 1.6 percent over the past year, while the energy index declined 0.3 percent. - BLS – December 2018 - Economic News Release



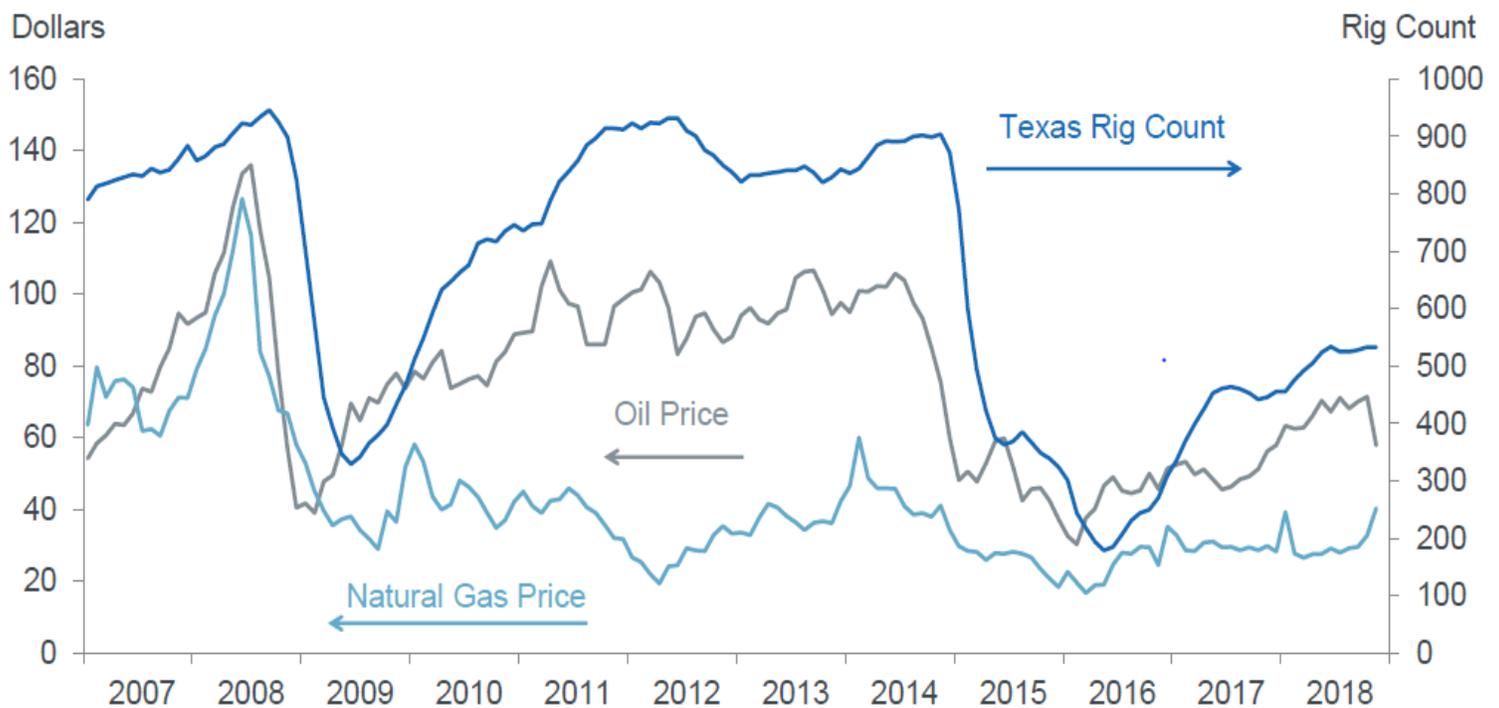
Source: Bureau of Labor Statistics, not seasonally adjusted, 1982-84=100

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 average West Texas intermediate crude oil spot price slid below \$60 per barrel with more downward pressure expected in coming months due to decreased global demand and rising U.S. production. Supply conditions remained stable with Texas’ active rig count holding at 528. Crude oil production balanced above 4.7 million barrels per day in October after eight consecutive monthly increases. On the natural gas front, unseasonably cold weather and low inventories forced the Henry Hub spot price above \$4 per million BTU (British thermal units) for the first time since 2014. The Permian Basin’s Waha Hub spot price, however, sank below \$2 due to continued pipeline constraints. - REC

Rig Count Flattens After Rising in the First Half of 2018



NOTES: Oil price is dollars per barrel. Natural gas price is dollars per million Btu, multiplied by 10. Data through November 2018.
 SOURCES: *Wall Street Journal*; Baker Hughes; U.S. Energy Information Administration; Haver Analytics.

IN-DEPTH – 5G NETWORK



IMAGE SOURCE: GETTY IMAGES PROVIDED BY MOTLEY FOOL.

WHAT IS 5G?

5G is the fifth generation of wireless networking technology. “[It] will eventually replace, or at least augment, your 4G LTE [long term evolution] connection. With 5G, you’ll see **exponentially faster** download and upload speeds. **Latency**, or the time it takes devices to communicate with each other wireless networks, **will also drastically decrease.**” – Dec. 2018 Digital Trends

“5G technology will utilize a higher-frequency band of the wireless spectrum called millimeter wave that **allows [a larger quantity of] data to be transferred** much more rapidly than the lower-frequency band dedicated to 4G.” – Motley Fool

IN-DEPTH – 5G NETWORK

WHAT DEFINES EACH GENERATION OF WIRELESS TECHNOLOGY?

Each generation of wireless technology is distinguished by technological advancement.

1G - The first generation refers to the original **cellular networks** of the early 1990s that used analog technology. It was about voice and the ability to use a phone in a car.

2G - The second generation began when wireless networks started allowing **text messages** to be sent.

3G - The third generation added the ability for people to access the **internet on mobile devices**. Higher data transfers allowed the sending of images.

4G - The fourth generation expanded upon the third generation's abilities, particularly in terms of **increased speed**. This allowed live video to be transported to smart devices on wireless broadband. “The introduction of 4G technology fundamentally changed how people used their wireless devices. **Apps such as Uber or Snapchat wouldn't exist without it, and forget streaming music or videos in HD without the leap forward in speed provided by 4G.**” – Sept. 2018 - Motley Fool

5G - “But 5G holds the potential for yet another significant leap forward, allowing developers to build on the technology with **applications for the Internet of Things, cloud gaming, augmented reality, virtual reality, and autonomous vehicles**. 5G speeds may also allow carriers to challenge cable companies with in-home broadband, providing consumers with an alternative source for high-speed internet.” – Sept 2018 - Motley Fool

IN-DEPTH – 5G NETWORK

HOW IMPORTANT IS 5G?

5G has the potential to change the world.

“The long-term vision is that 5G will lead to the invention of thousands of new products, technologies and services, increase productivity and allow for new industries to emerge. A global 5G network would unify mobile communication and connect individuals or devices to everything through the Internet of Things (IoT). 5G technology can connect vehicles, ships, buildings, meters, machines and other items with electronics, software, sensors and the Cloud, while embedded 5G technology would allow machines to exchange information and integrate computer-based systems in the physical world.” - Dec. 2018 - iam media

5G dominance will determine which country or countries will control the next generation of new technology and create millions of jobs.

[W]ireless providers will invest \$275 billion over the next decade in next-generation wireless infrastructure deployments, which should generate an expected three million new jobs and boost [the U.S.’s] GDP by half a trillion dollars.” – Federal Communications Commission (FCC)

“By 2035, 5G will enable \$12.3 trillion of global economic output and support 22 million jobs worldwide. Much of that growth will come from the digitization of transportation, agriculture, manufacturing and other physical industries.” – Verizon

5G is a national security concern.

Qualcomm Inc. is an American corporation which makes wireless chips and is one of the largest patent owners of 5G wireless technology. Qualcomm Inc. is also at the forefront of 5G research.

In March 2018, an executive order was issued to block the biggest tech merger in history. Citing national security concerns the planned takeover of San Diego’s Qualcomm Inc. by Broadcom Ltd., a Singaporean chipmaker was stopped because the Committee on Foreign Investment in the United States warned the deal would leave “an opening for China to expand its influence on the 5G standard-setting process.”

IN-DEPTH – 5G NETWORK

WHAT ARE THE MAJOR 5G COMPANIES?



Qualcomm. - This telecommunications giant holds 15 percent of all 5G patents, and surpasses every competitor by a wide margin. From smartphones to small cells, Qualcomm is involved in just about every facet of 5G.

Huawei – Once thought to be the initial frontrunner in the 5G race, until it hit some serious obstacles in 2018. The U.S. blocked the Chinese telecoms giant over security concerns, and it has reportedly been lobbying Germany, Italy, Canada, and Japan to follow suit. So far the U.S., India, and Australia have banned Huawei from providing 5G equipment over security concerns. Still, Huawei has 22 commercial 5G contracts around the world.

Nokia - Finnish telco giant Nokia is one of the big players in the 5G market. The company is partnering with carriers and countries around the world to provide 5G network equipment. Earlier in the year, T-Mobile signed a \$3.5 billion deal with Nokia to build out its nationwide 5G network on its 600MHz and 28GHz spectrum.

Ericsson - Swedish telecom Ericsson is also looking to get into 5G. While the carrier doesn't have as big of a footprint in the U.S. as other 5G providers, it is working with major Chinese carriers on field trials.

Samsung - When people think of 5G and Samsung, smartphones may come to mind, but the company provides network solutions for carriers as well. In 2018, Samsung was tapped by Verizon to provide fixed 5G network solutions for the carrier's first commercial rollout.

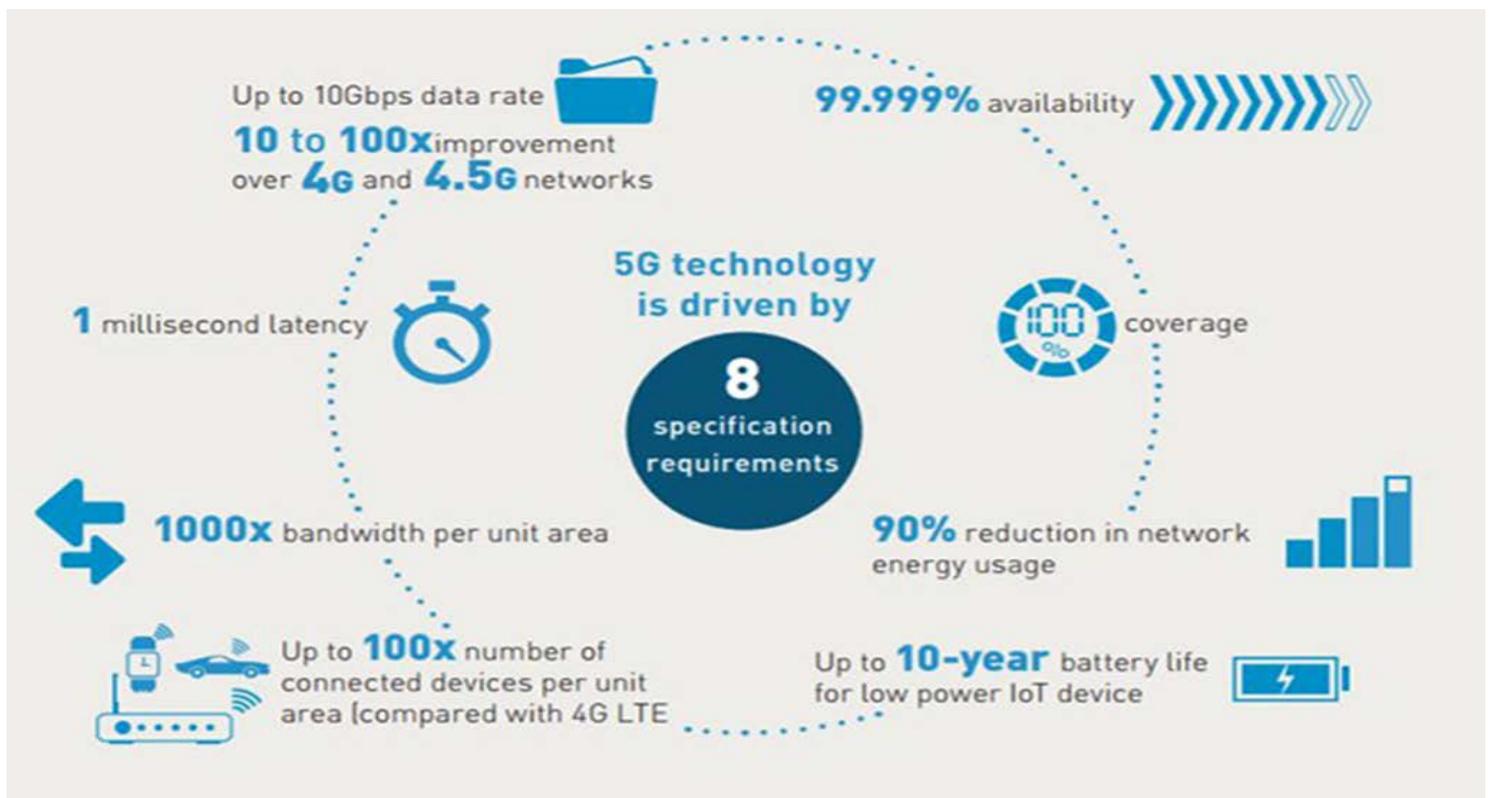
ZTE - Chinese telecom ZTE wants to become one of the big names in 5G as well. In 2018 the company worked with the Chinese government in mid-band and core 5G testing. The company also inked a deal with Qatari-based carrier Ooredoo Group to provide consumer solutions for its 164 million customers." December 2018 – Digital Trends

IN-DEPTH – 5G NETWORK

WHAT ARE THE SPECIFICATIONS FOR 5G?

5G technology is driven by 8 specification requirements

- Up to 10Gbps data rate - > 10 to 100x improvement over 4G and 4.5G networks
- 1-millisecond latency
- 1000x bandwidth per unit area
- Up to 100x number of connected devices per unit area (compared with 4G LTE)
- 99.999% availability
- 100% coverage
- 90% reduction in network energy usage
- Up to 10-year battery life for low power IoT devices



IN-DEPTH – 5G NETWORK

WHAT ARE THE PRIMARY DIFFERENCES BETWEEN 4G AND 5G?

SPEED

“Globally, most people see maximum 4G speeds of about 16.9 megabits per second (Mbps)” – Fortune – Sept. 2018

“5G will offer significantly faster data speeds. Peak data rates can hit 20Gbps downlink and 10Gbps uplink per mobile base station. Mind you, that’s not the speed you’d experience with 5G (unless you have a dedicated connection), its the speed shared by all users on the cell.

While the peak data rates for 5G sound pretty impressive, actual speeds won’t be the same. The spec calls for user download speeds of 100Mbps and upload speeds of 50Mbps.” – Dec. 2018 Digital Trends

“**Feature-length HD movies can be downloaded faster than you can read this sentence.**” – Verizon

CONNECTION DENSITY

“5G should be able to support many more connected devices than [4G] LTE. The standard states **5G should be able to support 1 million connected devices per square kilometer.** That’s a huge number, which takes into account the slew of devices that will power the Internet of Things (IoT). – Dec. 2018 Digital Trends

“Today, there are some 8.4 billion connected “things” in use—up 31% from 2016. With 5G, that number will grow to more than 20.4 billion by 2020.” – Verizon



Source: Gemalto

IN-DEPTH – 5G NETWORK

WHAT ARE THE PRIMARY DIFFERENCES BETWEEN 4G AND 5G?

LATENCY

“Latency, the time it takes data to travel from one point to another, should be at 4 milliseconds in ideal [5G] circumstances, and at 1 millisecond for ... mission critical tasks like remote surgery, autonomous vehicle interaction, and industry automation.” – Dec. 2018 Digital Trends



Source: PC Magazine

“... latency could drop to just 1 millisecond or less, which would make lag times nearly impossible to detect.” – Verizon

“Today, latency is about 9 milliseconds (ms). With 5G, that will drop to 1ms. Latency is particularly critical in automotive applications. Think about the distance a car travels at 60mph in 9 ms compared to in 1 ms. That distance can be the difference between life and death. Latency is also key to providing good experiences when exploring new worlds in virtual reality, or stomping through the latest online multiplayer video game.” Sept. 2018 – Fortune

IN-DEPTH – 5G NETWORK

WHAT ARE THE PRIMARY DIFFERENCES BETWEEN 4G AND 5G?

SMALL CELLS

The higher frequency bands used for 5G do not travel far and do not penetrate buildings as well as the large, lower-band cell towers used for 4G. As a result, “rather than the huge, geographically dispersed cell towers that characterize 4G networks, much of **the 5G networks will likely to be composed of small cells**. Consumers should expect to see ubiquitous 5G antennas, even in their own homes.” – SDX Central



Source: Circa

HOW MANY OF THESE SMALL CELLS WILL BE INSTALLED?

“It’s expected that 300,000 will be installed in the next three to four years, according to an estimate developed for CTIA, a wireless trade group.” – Bloomberg

“**Small Cell Forum forecast total deployments of small cells in North America to reach 849,000 by 2025**, or 10% of global deployments.” – RCR Wireless News

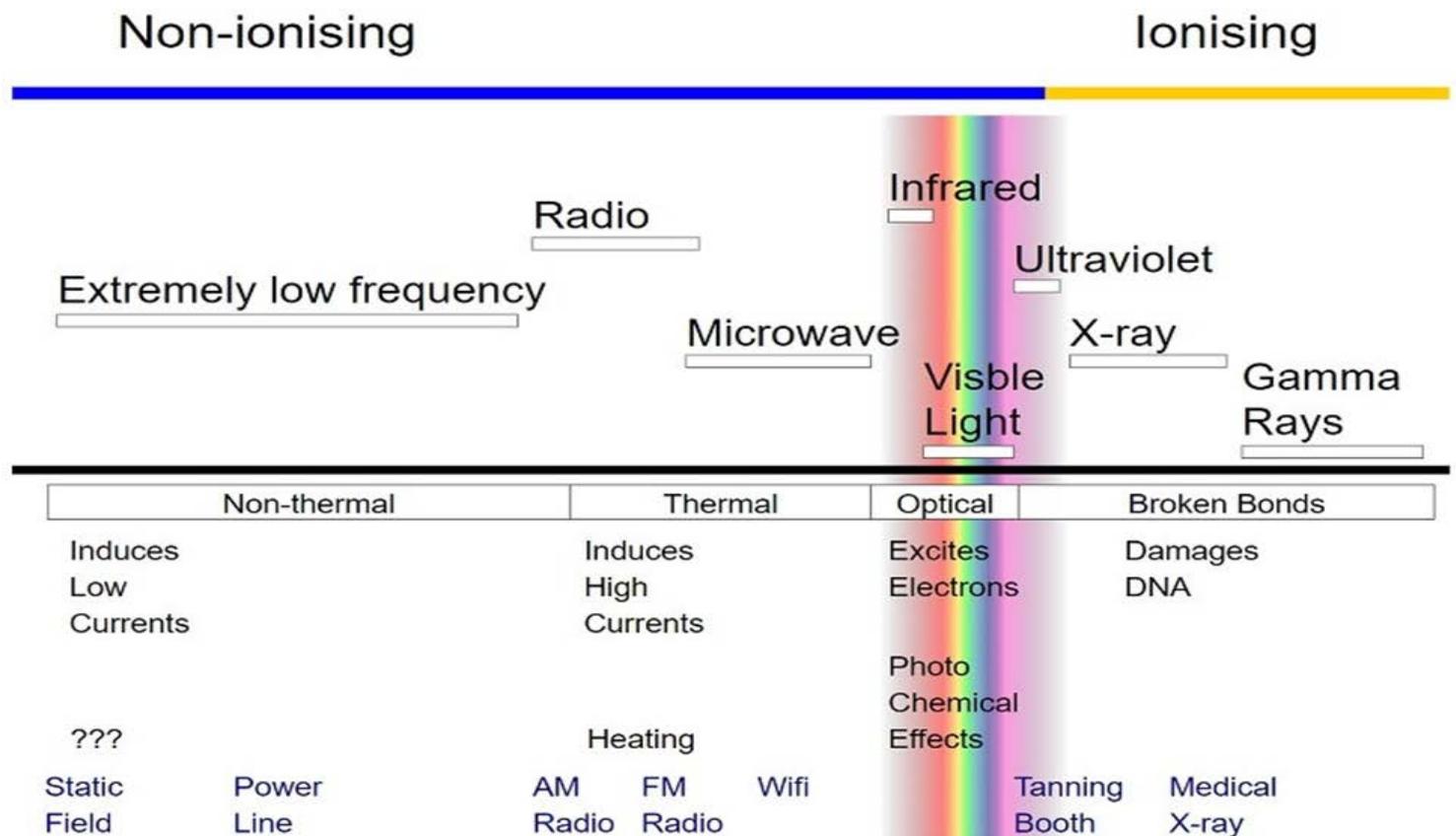
“[5G] technology will depend on thousands of fixed ‘small cell’ antennae throughout cities and residential neighborhoods, about 300 meters (~1000 feet) apart. In order to function, these short wavelength radio frequencies (6-100 Gigahertz or GHz) will be pulsing at billions of times a second (1GHz=1 Billion cycles /sec) and will be continuously emitting radiation 24 hours a day.” – Physicians for Safe Technology

IN-DEPTH – 5G NETWORK

IS IT SAFE TO LIVE WITH HUNDREDS OF THOUSANDS OF SMALL CELLS?

The safety of cell phones and cell phone towers is an on-going discussion. **The debate centers on whether non-ionizing radiation is really safe.**

According to Android Authority, “There’s a major difference between safe radiation and the bad type associated with places like Chernobyl or X-ray machines. This is the difference between ionizing and non-ionizing radiation. Ionizing radiation appears at wavelengths above ultraviolet light, aka X-rays and gamma rays. These can damage your DNA by knocking electrons out of the base molecules, leading to tumors and cancer.” 5G technologies will not reach “ionizing wavelengths”. “Therefore, energy absorption is confined to the surface layers of the skin rather than deeper tissue touched by lower frequencies. Penetrating bones or the skull is out of the question, so you can throw out those brain tumor arguments.”



IN-DEPTH – 5G NETWORK

IS IT SAFE TO LIVE WITH HUNDREDS OF THOUSANDS OF SMALL CELLS?

“The technology appears to be safe, and the current FCC and global regulations already have these [5G] frequencies covered. Despite this, 180 scientists from around the world signed a petition in September 2017 requesting a delay to 5G network deployment in the European Union until the health effects have been studied in more detail.” – Android Authority

Physicians for Safe Technology noted that **“There has been no pre market testing of 5G. It is assumed safe if it does not burn the skin.** Like prior 2G, 3G and 4G networks, they are considered dangerous only if they heat the body. FCC guidelines are only based on heat. There has been no consideration for adverse biological effects found at non thermal levels in a multitude of studies on 2G, 3G or 4G. In addition, 5G technology has a disturbing data gap with regards to research on human or environmental safety, that is even admitted by industry. No studies done, no harm seen.”

WHAT IS THE FCC’S STANCE ON INSTALLING SMALL CELL NETWORKS?

5G is being fast tracked by the federal government. **The FCC stated that it “is committed to doing [their] part to help ensure the United States wins the global race to 5G to the benefit of all Americans.”**

In addition, **the FCC is committed to removing “regulatory barriers** that would unlawfully inhibit the deployment of infrastructure necessary to support these new services.”

IN-DEPTH – 5G NETWORK

WHAT REGULATORY BARRIERS DID THE FCC REMOVE FOR 5G CARRIERS?

The FCC identified state and local governments as a potential barrierS that would slow down the rollout of a 5G network.

According to Bloomberg, “The carriers wanted cheaper, quicker approval for new gear on public poles, and for putting installations on public medians, in park land and at scenic waterfronts.” The FCC accommodated by passing FCC order 18-133.

Under FCC order 18-133 local governments no longer have the ability to negotiate fees for placement of towers on public property. The fee is limited to the costs of processing applications and managing the right of way. The FCC estimated this cost at \$270 per tower.

“That’s far short of charges in some cities. New York City charges as much at \$5,100 a year in Manhattan south of 96th Street, and as little as \$148 annually in places where it’s trying to encourage deployment.” - Bloomberg

FCC order 18-133 also tightened the time limit of the review process for small cells on existing structures from 90 to 60 days. For new installations the review period was shortened from 150 days to 90 days.

The FCC estimated their action would save companies \$2 billion in unnecessary costs.

IN-DEPTH – 5G NETWORK

WHEN WILL 5G BECOME AVAILABLE?

“It has been nearly a decade in the making, but 5G is finally becoming a reality. Carriers started rolling out fixed 5G to select cities in 2018, and mobile 5G will start making appearances in cities around the U.S. in 2019, with much more comprehensive rollouts expected in 2020.” – December 2018 – Digital Trends

“The various carriers have promised 5G deployments in cities around the country. This map shows some of the announced locations.” – December 2018 - PC Magazine



Source - PC Magazine

IN-DEPTH TOPICS COVERED IN PREVIOUS ISSUES – SEE AUDITOR WEBPAGE

- 5G Network 4th Qtr 2018
- Alibaba 3rd Qtr 2017
- Bitcoin 4th Qtr 2016
- Cashless Society 4th Qtr 2017
- Facial Recognition 1st Qtr 2018
- Labor Participation Rate 4th Qtr 2015
- Money Market Fund Reform – New Rules 3rd Qtr 2016
- Negative Interest Rate Policy (NIRP) 2nd Qtr 2016
- New Silk Road 2nd Qtr 2017
- Quantitative Easing 1st Qtr 2016
- Texas Imports and Exports 2nd Qtr 2018
- Universal Postal Union 3rd Qtr 2018

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