BAUER
COLLEGE OF BUSINESS
UNIVERSITY of HOUSTON

INSTITUTE FOR
REGIONAL FORECASTING

The Outlook for Houston's Economy as We Approach the End Game for COVID-19

American Society of Appraisers: Houston Chapter

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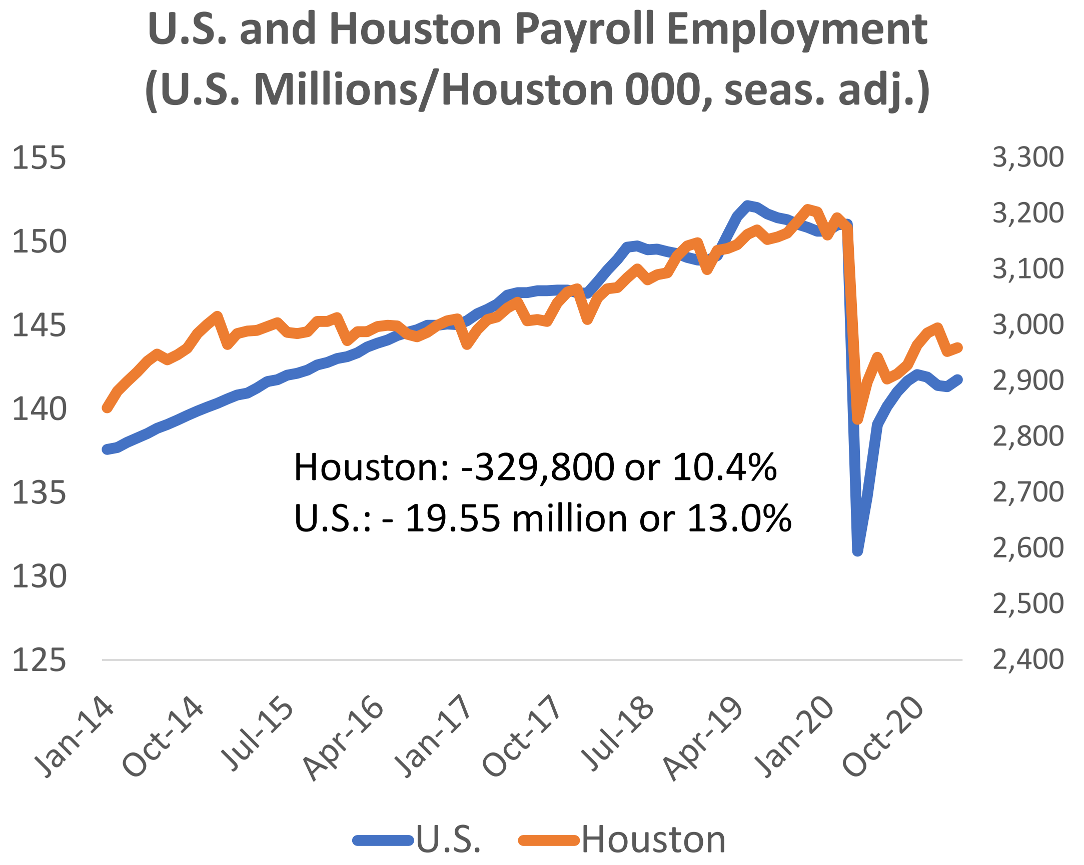
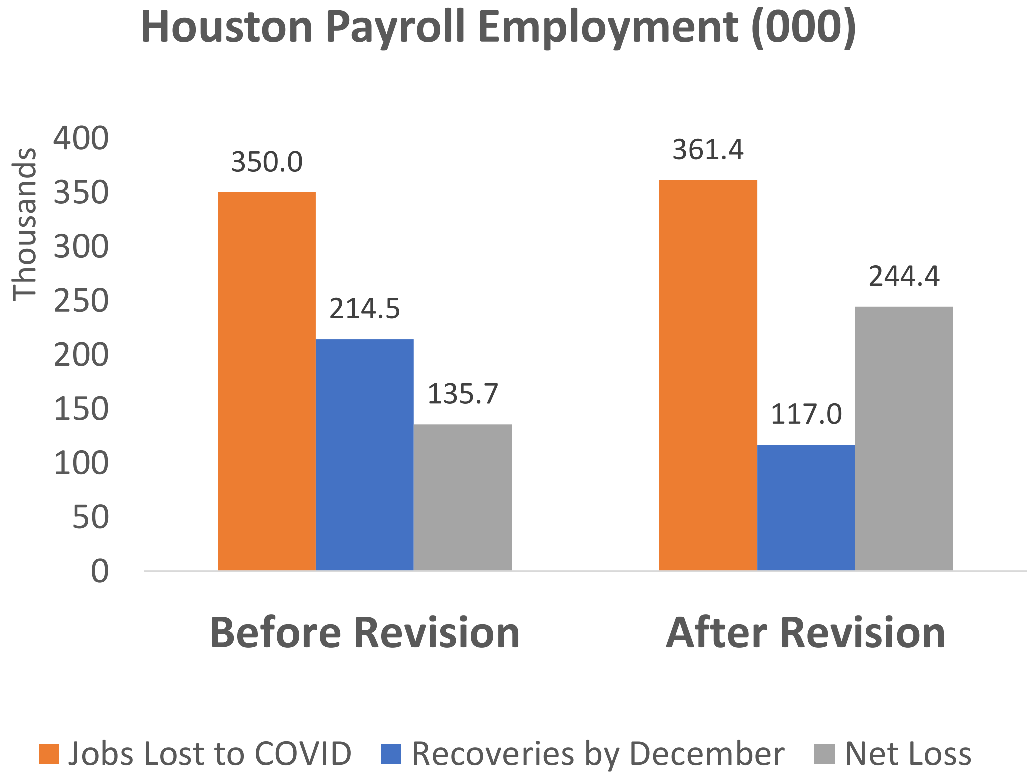
How Does COVID-19 Affect Economic Conditions? Some Definitions

- In past pandemics, this disease not had been left uncontrolled – but certainly with less public intervention that now. Past pandemics have created more *widespread illness, labor shortages, and supply chain disruptions* as economic activity is disrupted. More economic impacts stemmed from the virus than from prevention and cure
- *Reactive social distancing* by the public has been part of every past pandemic as the fear of the virus forces us to avoid crowds, stores, bars and restaurants, public transportation, and travel
- In many cities, *mandatory public orders* were used to control the disease in past epidemics: limits to crowd size, closing of bars and restaurants, closing schools, travel restrictions, etc.
- The widespread and coordinated use of *mandatory stay-home orders and closing all nonessential businesses* was a new feature in the pandemic. These restrictions pulled economic damage to a point early in the pandemic but were meant to ease later infection rates. Once stay-home orders were lifted, the reactive social distancing and other mandatory public health orders continue if COVID is active
- As the vaccine arrives it will be contact-sensitive unemployment and continued public health impacts of COVID disappear during 2021

COVID and the Houston Economy

COVID-19 Shock Plays Out With Deep Job Losses And Little Recovery Through February

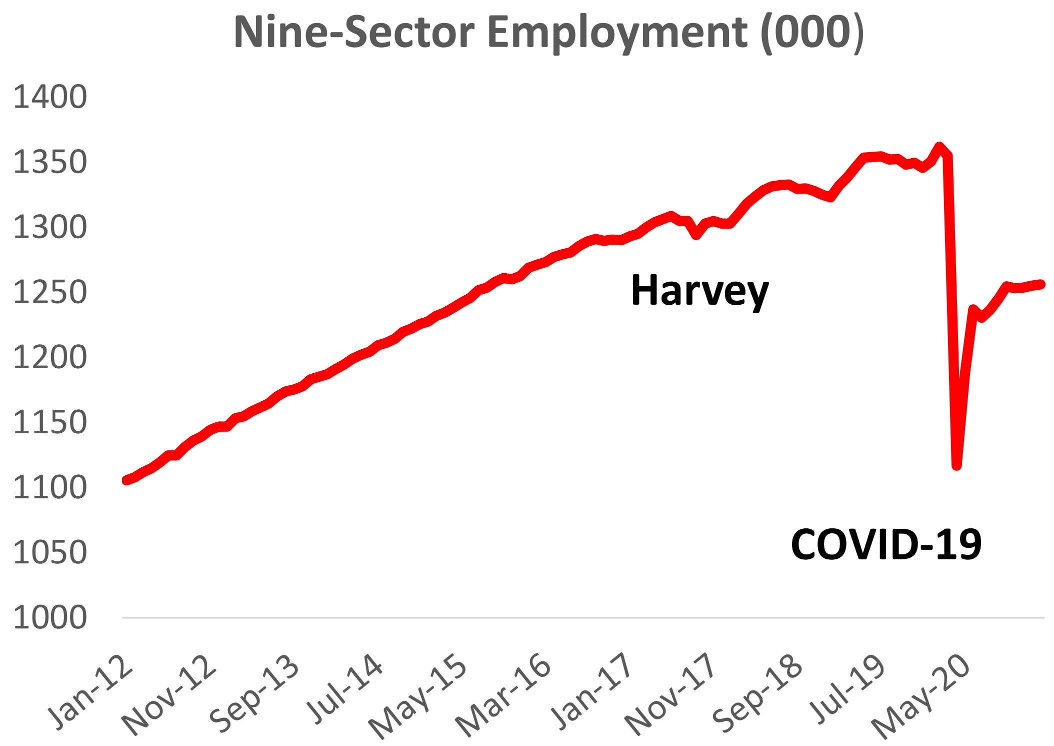




Not seasonally adjusted

Nine Local Service Sectors Account for 42% of Houston's Jobs in 2020, But Contributed 74% of March/April Job Losses

Nine Service Sectors Lost 245,100 Jobs Or 74.3% of Houston's April Losses



Sectors Sensitive to Close Contact Made Up 41.9% of Local Jobs in 2019

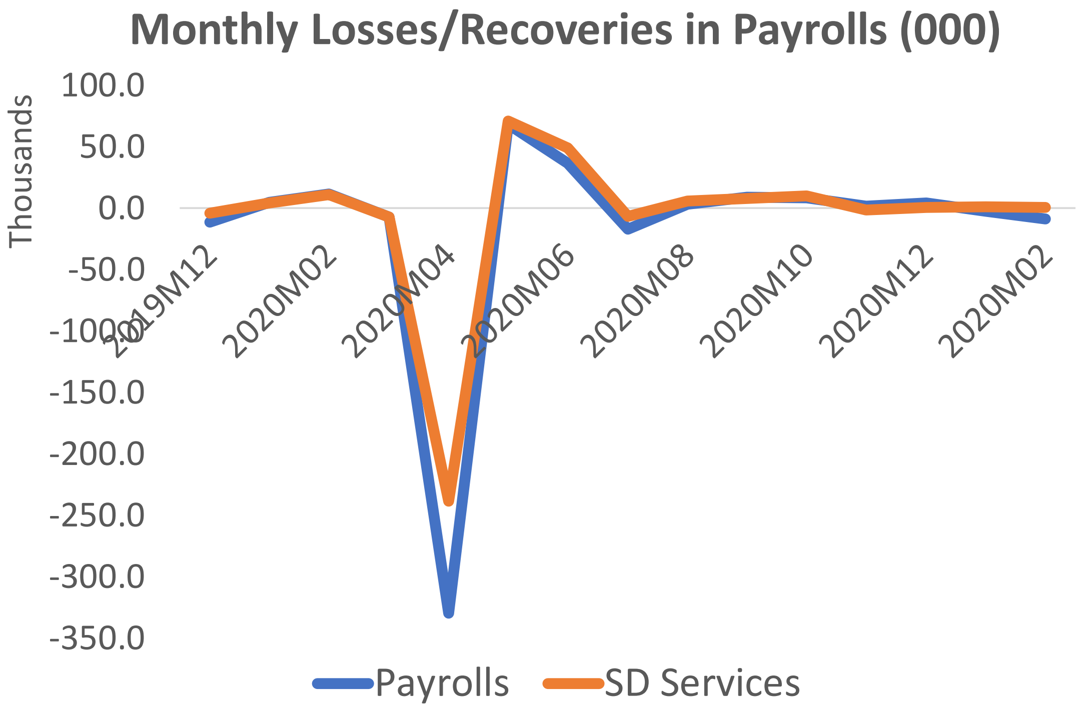
- 341,200 Health Care
- 304,200 Retail
- 268,400 Food Service
- 166,600 Finance
- 88,300 Other Services
- 63,200 Private Education
- 37,200 Arts and Entertainment
- 28,800 Accommodation

20,000 Air Transportation

- *1,325,500 All 9 sectors*
- *3,160,100 Total Payrolls*

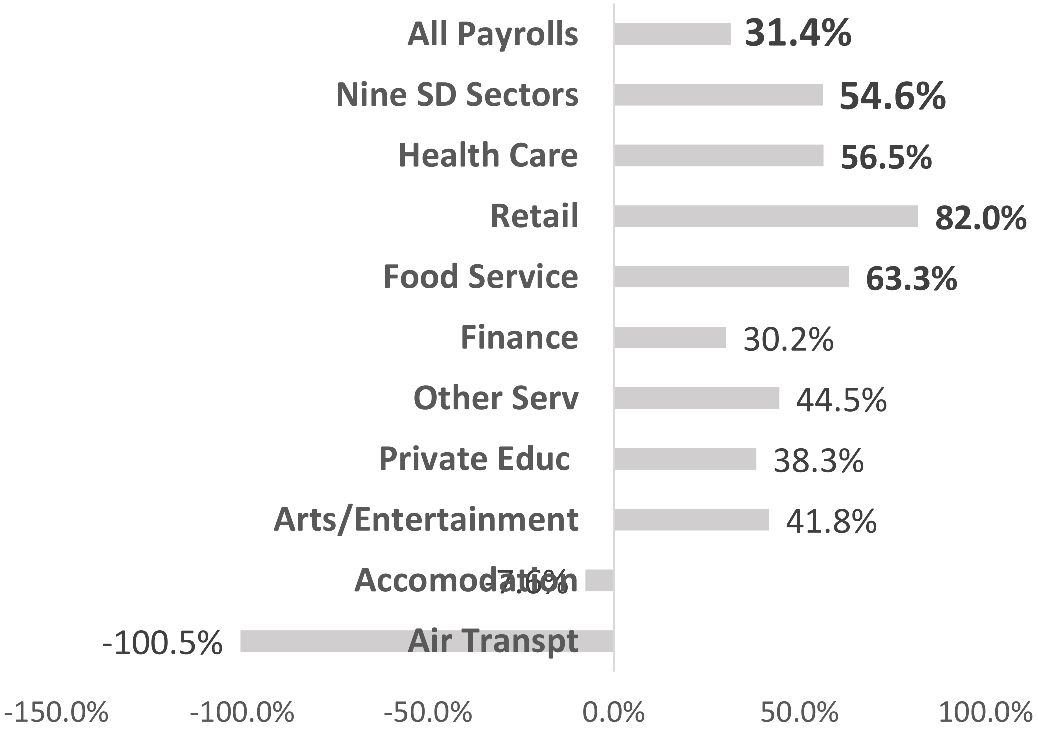
Houston Has Recovered Only 31.4% of March/April Losses And Virtually No Jobs Returned After last Summer

Close-Contact Services Fell in March/April And Recovered 56.9% By This Feb 2021



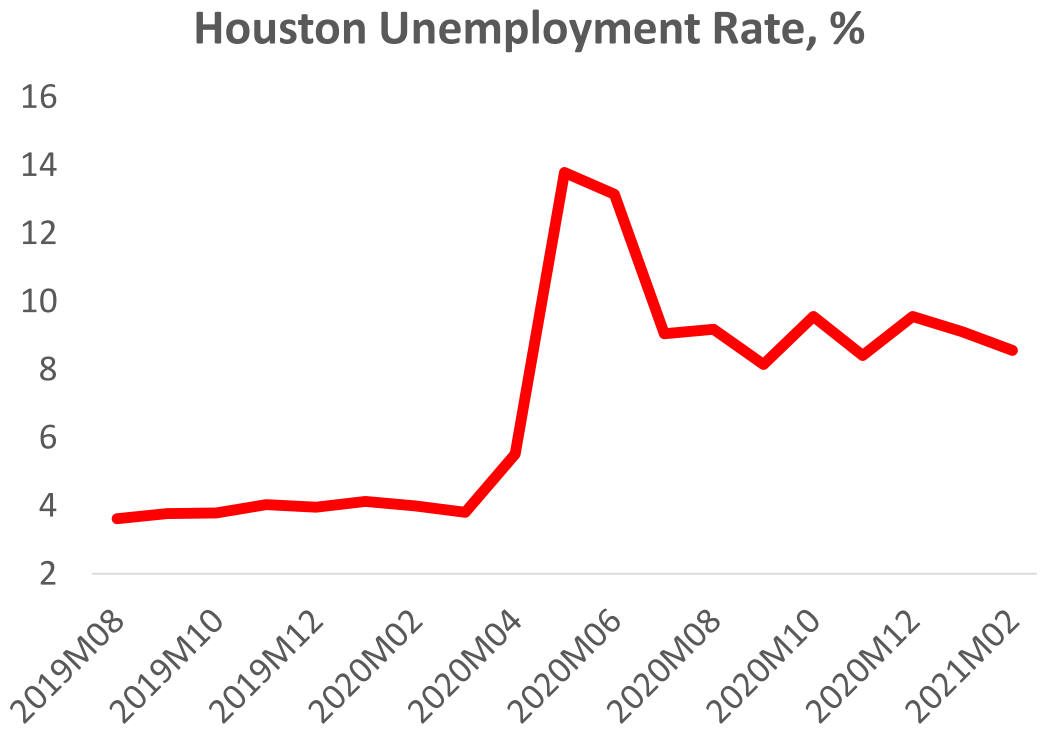
Social-Distanced Services:

Percent Recovery By Sector Since April

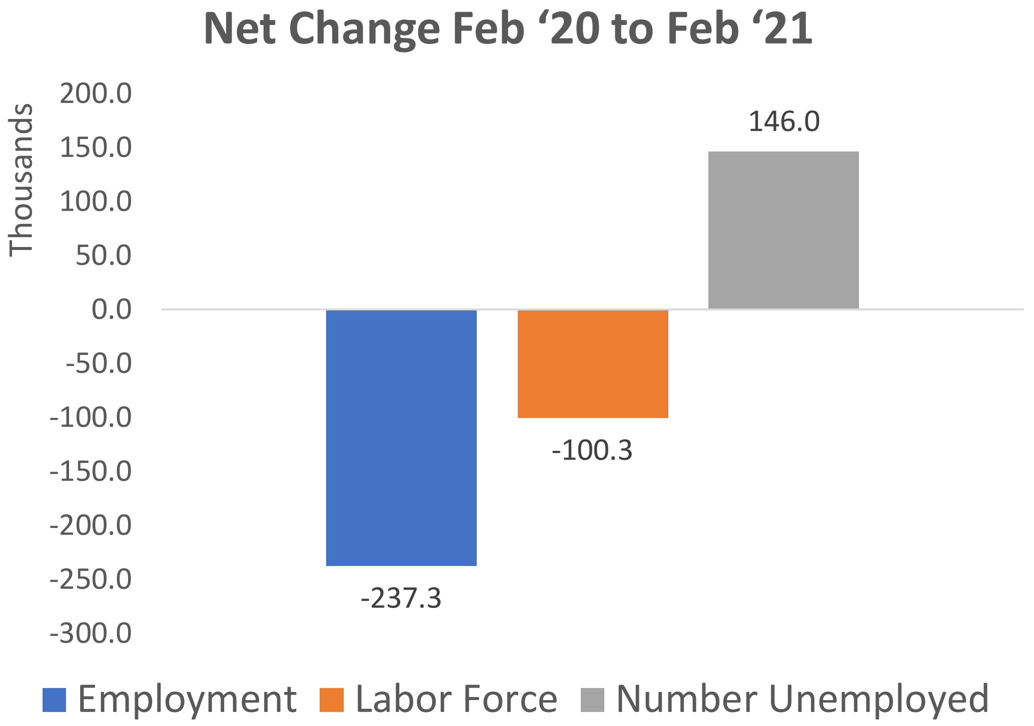


Houston's Unemployment Rate Spikes and Shows Initial Turnaround Then Little Progress

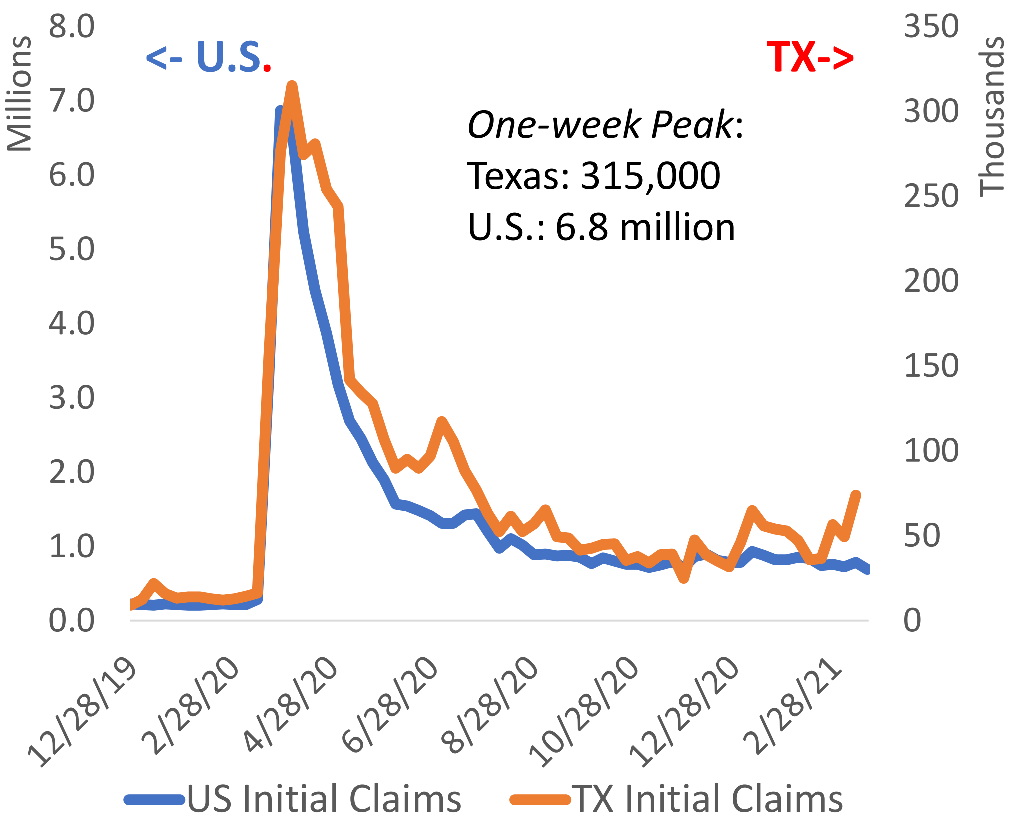
Houston' Unemployment Rate Peaks at 14.3% in April, Falls to 8.2% by Sept

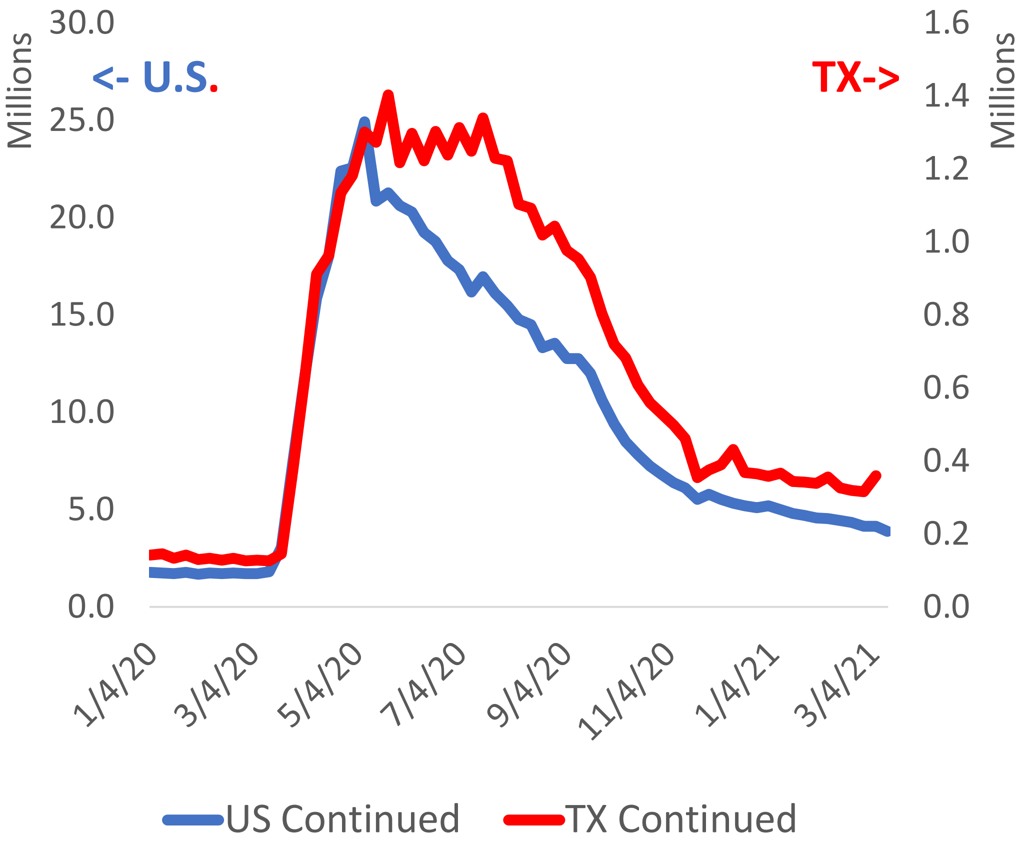


Still 146,000 Local Workers Unemployed in March, Labor Force Is Shrinking



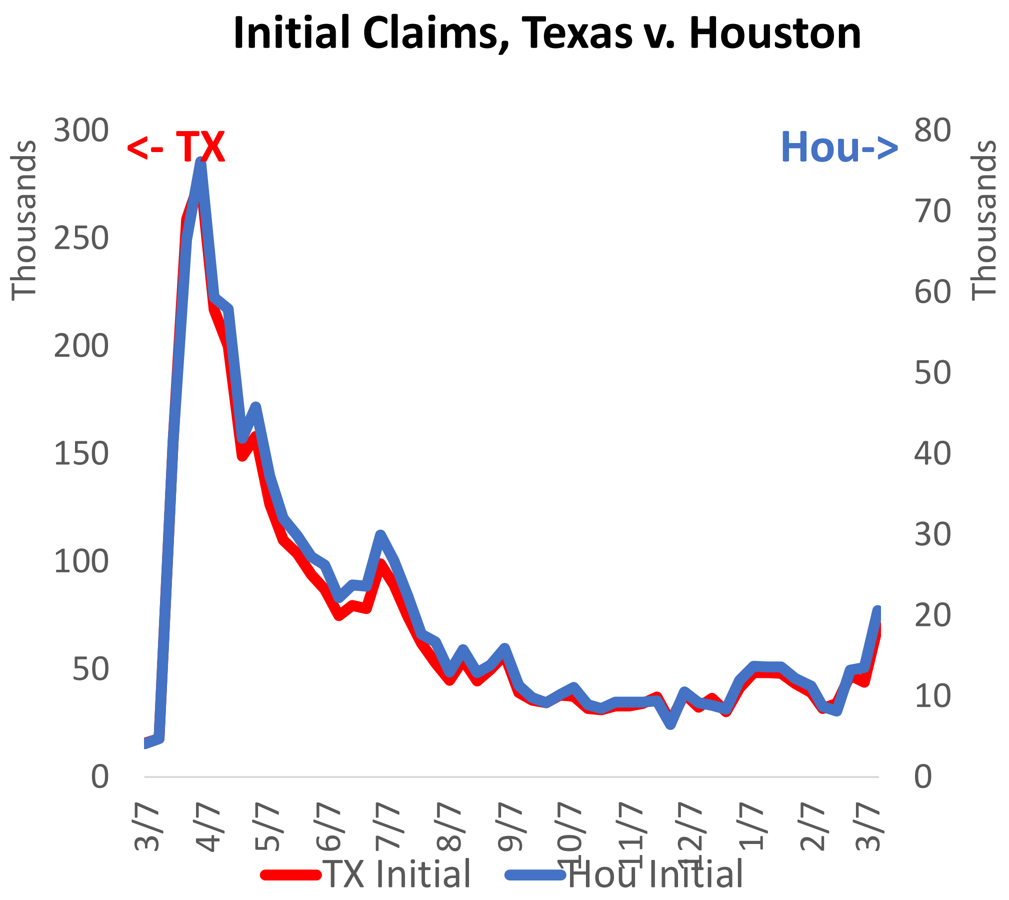
Initial and Continued Claims for Unemployment: A Similar March/April Response in Texas vs. U.S.

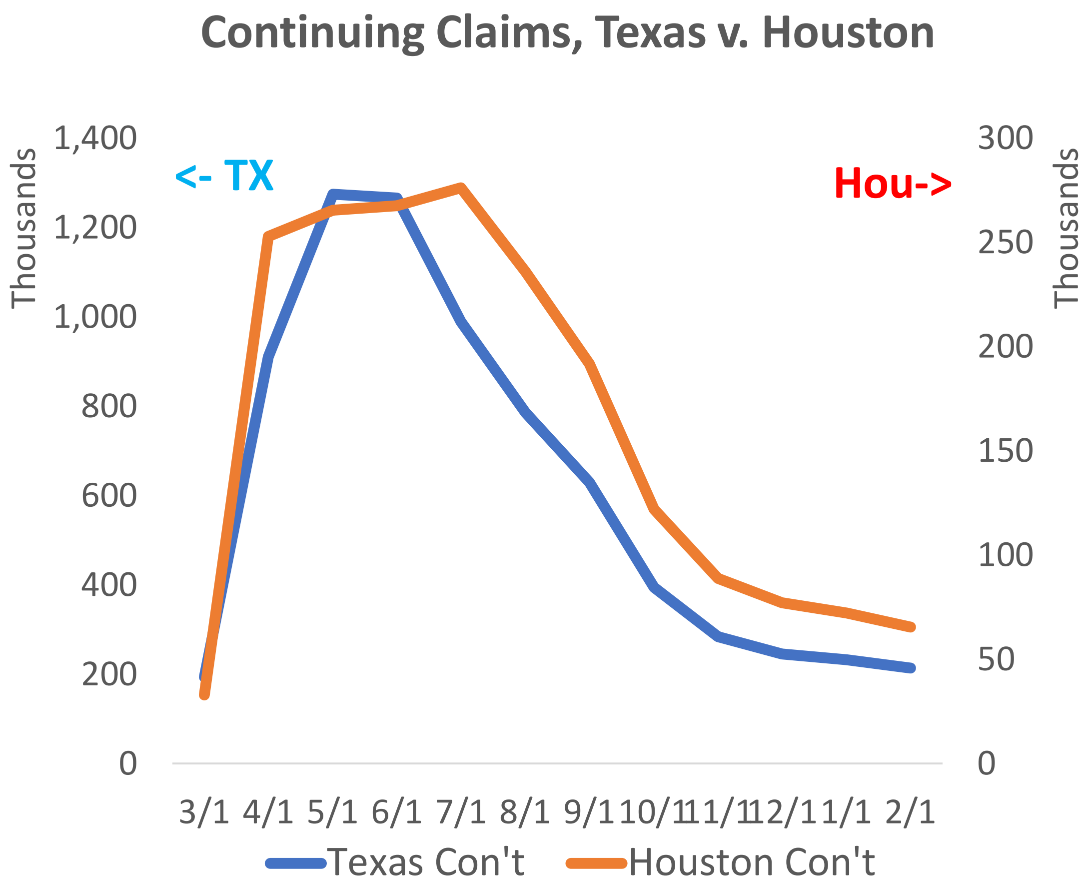




FRED, St Louis Federal Reserve Bank. State unemployment programs under the Unemployment Compensation Program

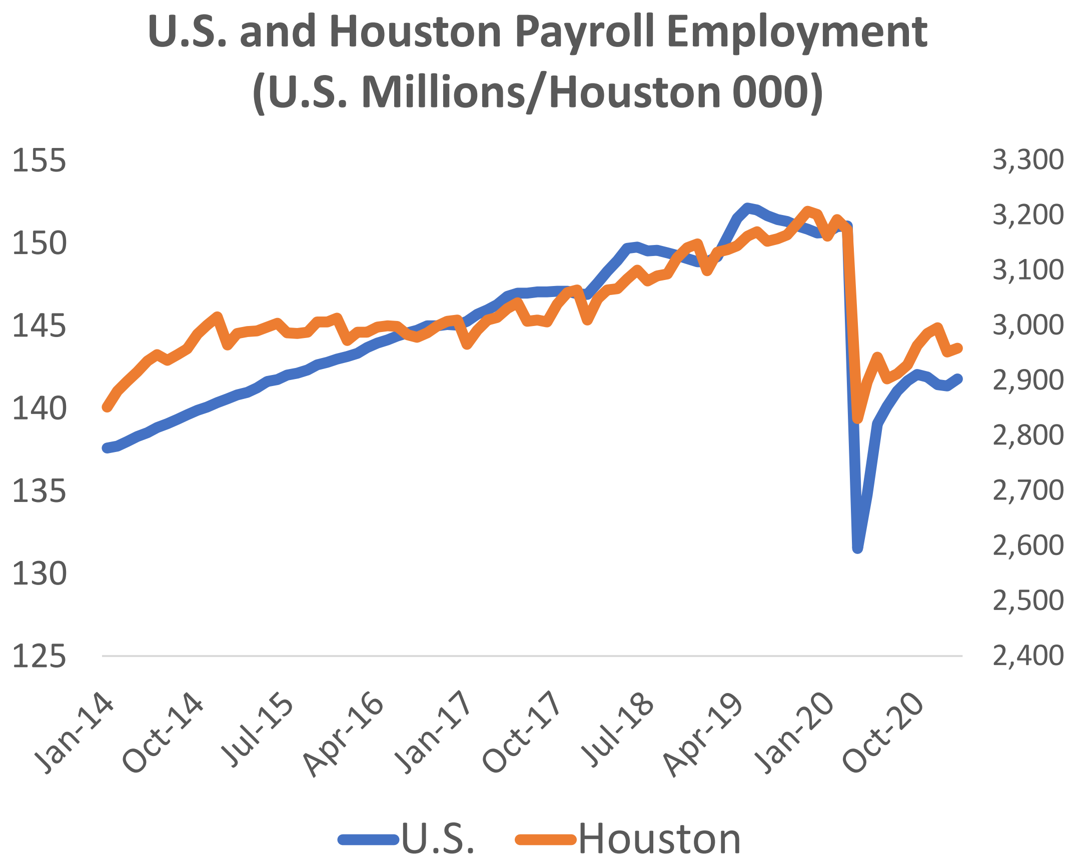
Initial Claims in Texas and Houston Mirror Each Other, Local Continued Claims Lag the State By a Month

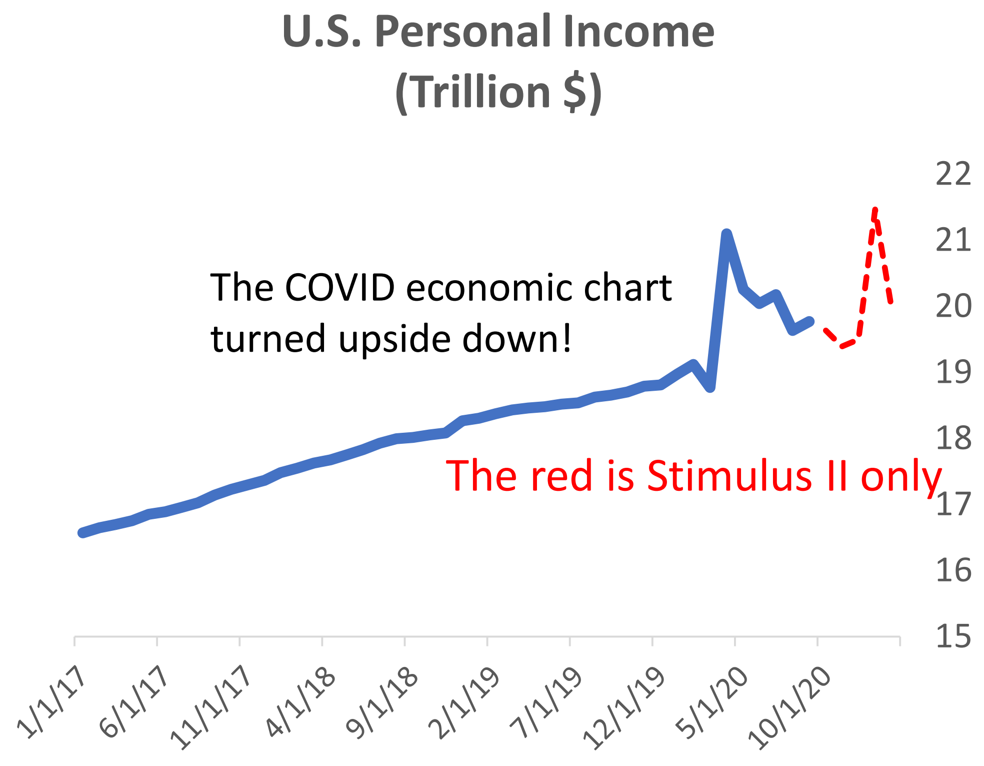




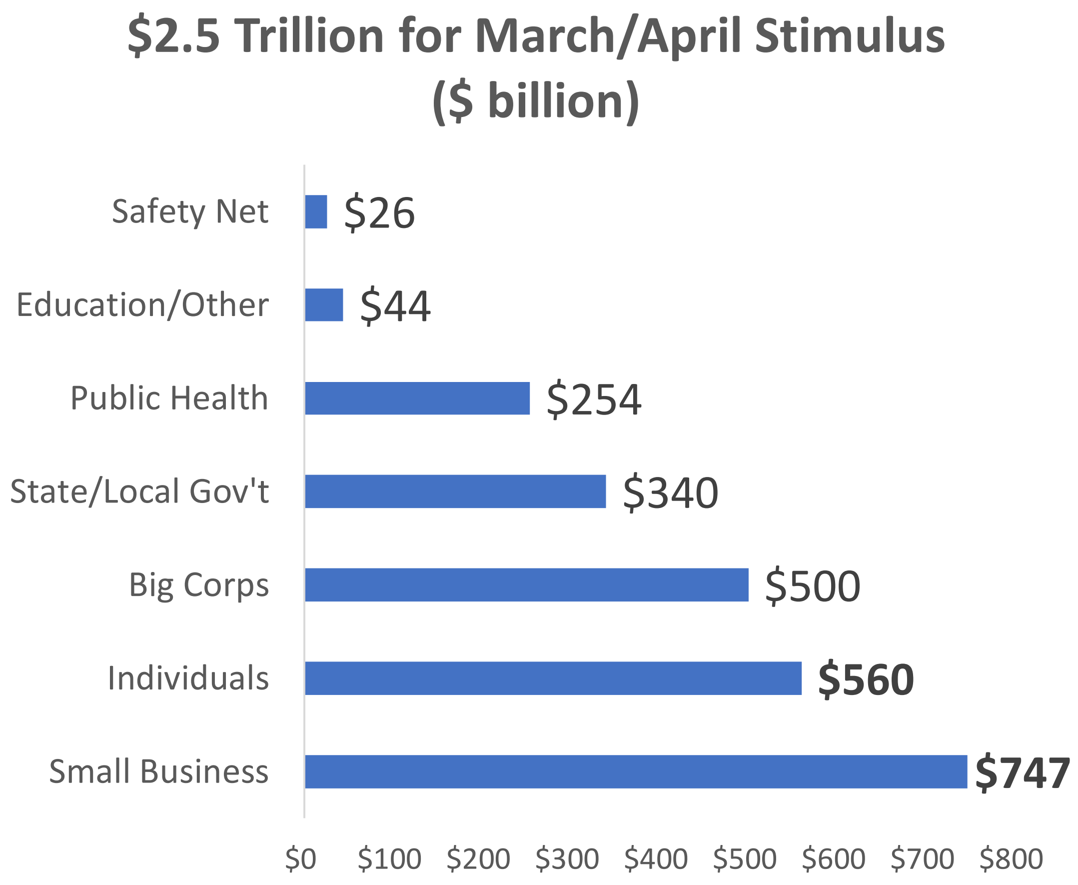
TWC Initial claims for Houston are the 9-county metropolitan area; continued claims for Houston are for the 13-county Gulf Coast Workforce Development Board, including the metro area plus four small counties with less than 2% of 13-county claims

Stimulus I: Brought a Large *Positive* COVID-19 Shock to the U.S. Economy In March/April: Now Stimulus II & III





Stimulus I: Trillions of Dollars Poured Into COVID-19 Programs to Support the Economy in March/April



Federal Reserve Stimulus

- Return of zero rates, QE2, forward guidance
- Fed/Treasury emergency facilities now closed or scheduled to close
  - Return of 2008 credit facilities: primary dealers, money market funds, commercial paper, etc.
  - Major corporations with investment grade credit for up to $750 billion lending expansion
  - Paycheck Protection program RENEWED
  - Mid-Size/Main Street makes up to five years 5-years and $600 billion
  - Treasury to absorbs $75 billion in losses from each of the corporate lending programs

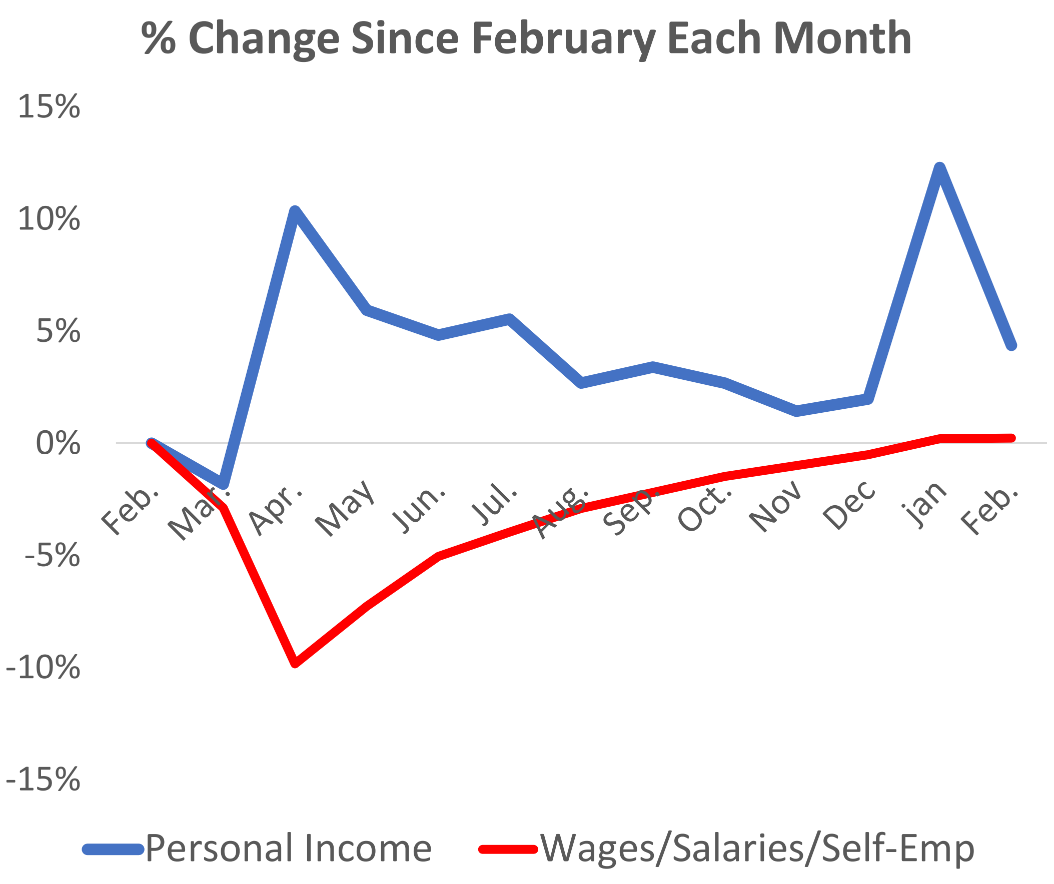
Includes $470 in additional stimulus from April supplemental appropriation for the Paycheck Protection Program and Public Health

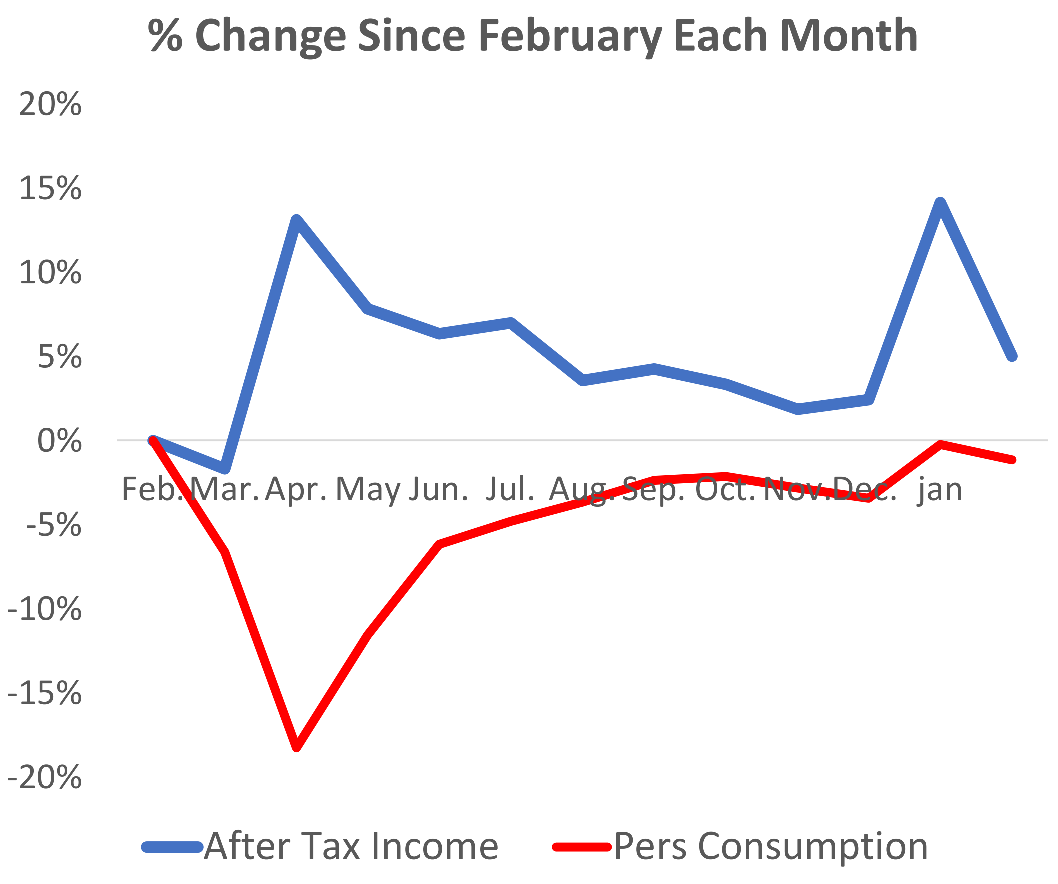
Stimulus II & III: December and January Packages Total Another $2.7 Billion in Fiscal Stimulus

- These federal payments follows on the $2.4 trillion in total spending from March and April. Like these earlier payments, about half go directly to individuals
- *Payments to Individuals and Small Business*
  - Economic Impact Payments in payments directly to individuals: $700 Billion
  - Expanded Unemployment Insurance: $240 Billion
  - Small Business/Payroll Protection: $385
- *Other*
  - State and Local Government Aid: $400 Billion
  - Education/Public Health: $420 Billion
  - Children/Housing/Health Insurance: $250 Billion
  - Other: $300 Billion

Press and other reports. Categories are rough approximations to reconcile the contents of two different bills.

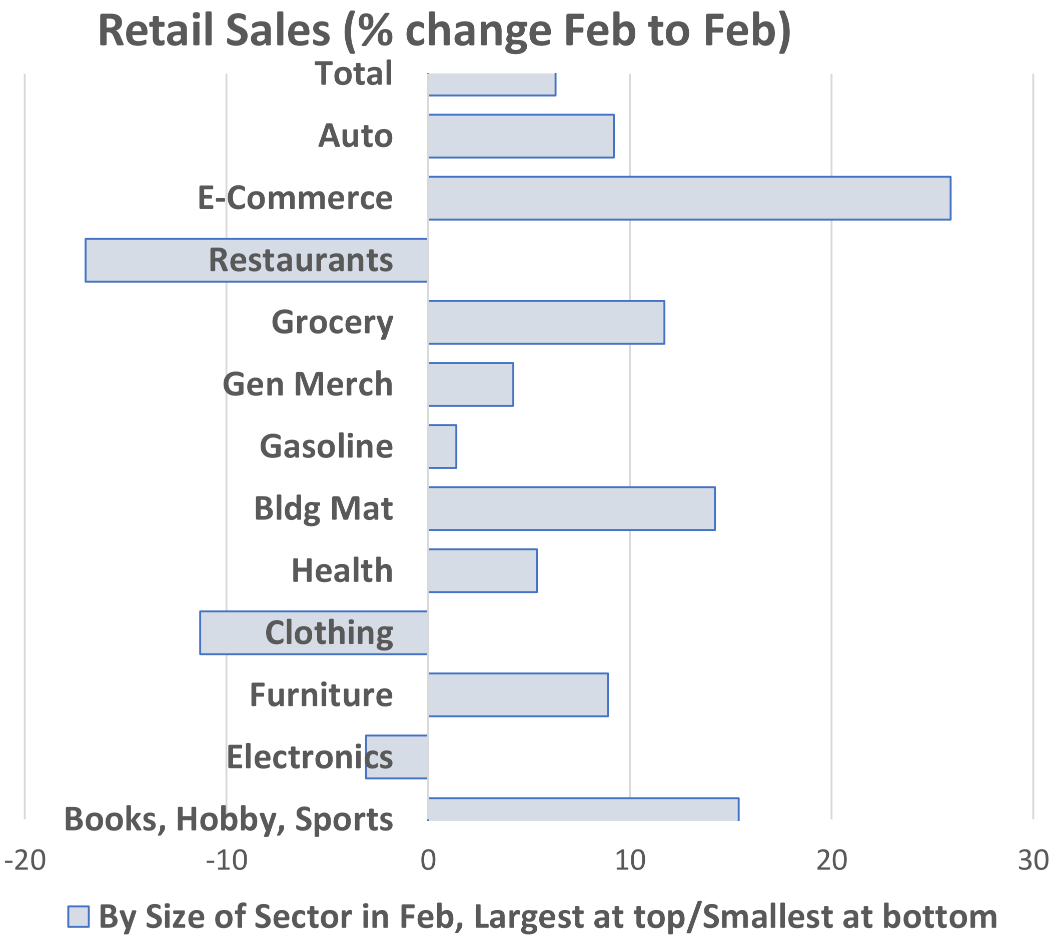
Changes in Income-Related Activity: Compared Each Month to February 2020





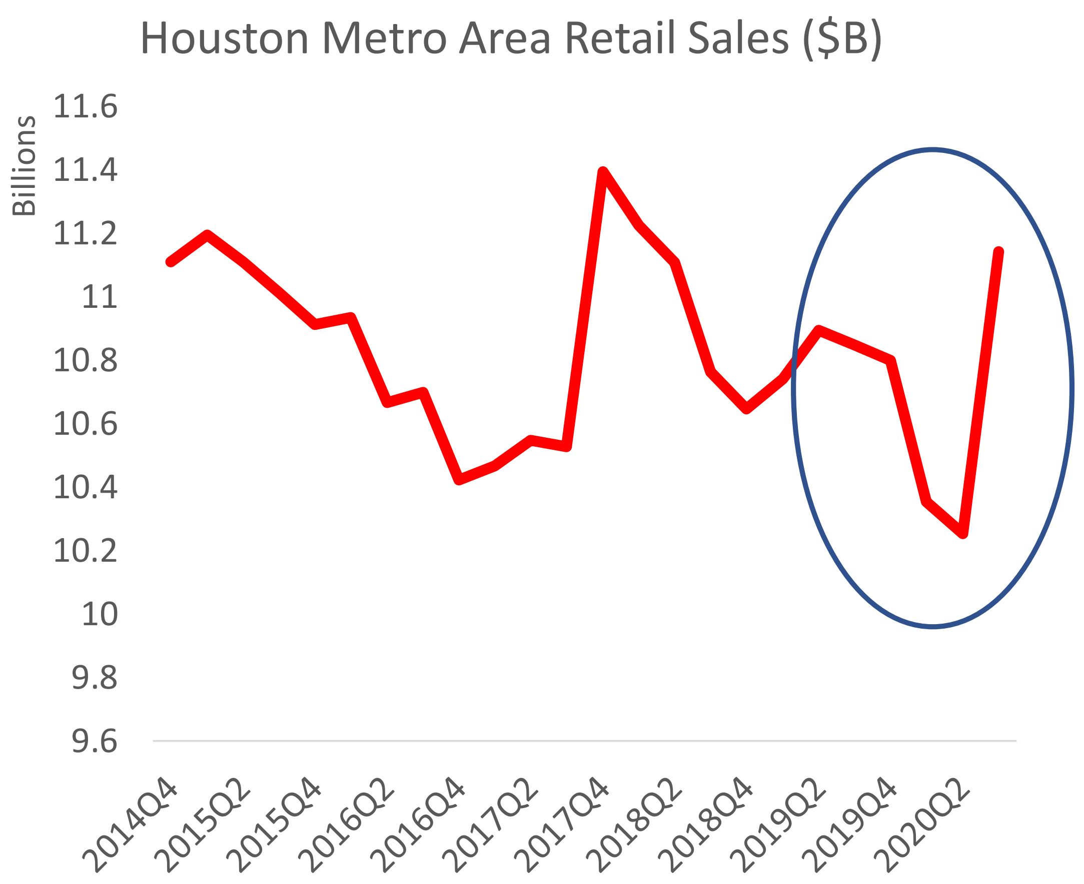
More Fiscal Support, Cheap Money, and E-Commerce Drive U.S. Retail Sales Past Pre-COVID Levels to Record Highs

- Income support pushed July/August retail sales past February pre-COVID levels and to all-time highs. The two largest sectors (autos and e-commerce) are also the big winners in percentage terms
- A distinctive COVID pattern sees e-commerce, food and beverage stores, books and hobbies, and home improvement fill in for restaurants, clothing, electronics, and gasoline.
- E-commerce is up an extraordinary 25.9 percent as consumers avoid in-person purchases
- Trends in stimulus payments and easy credit also drive the push to high levels of home sales, including a turnaround in sales of autos and existing homes in Houston



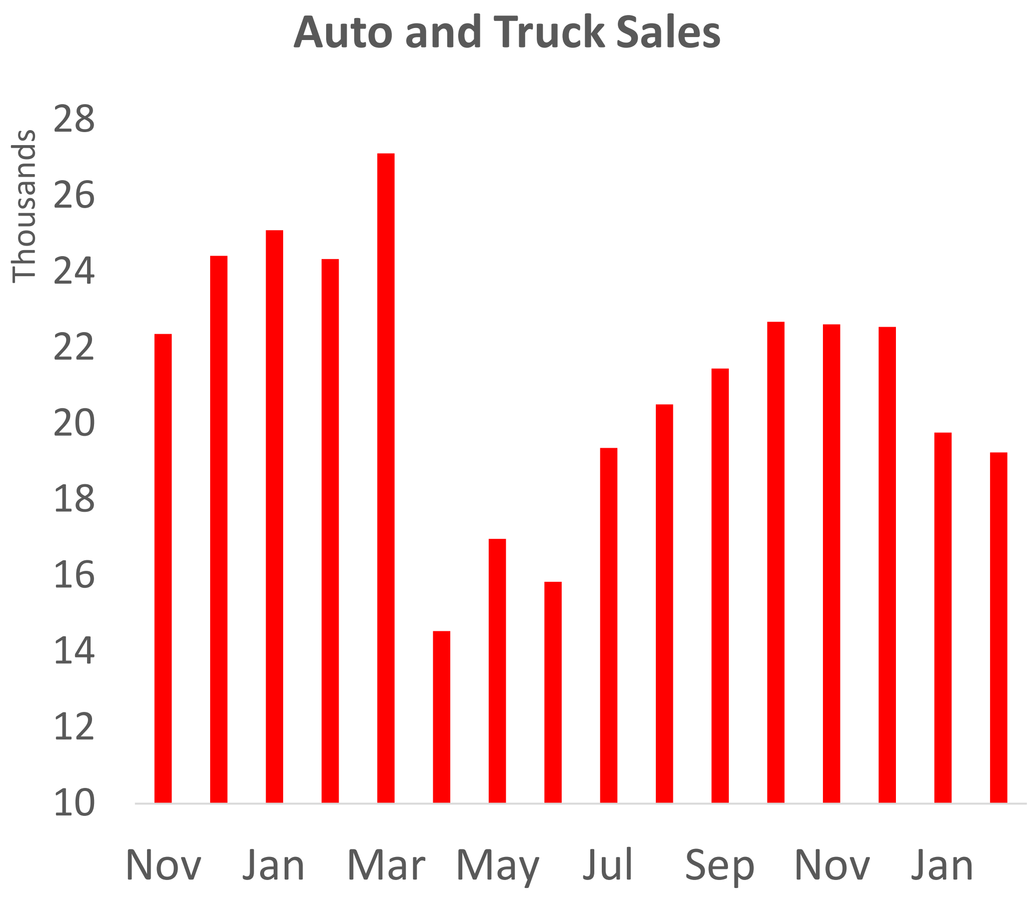
U.S. Census Bureau, March 16, 2021

After Falling 5.1% in Q1 and Q2, Houston Retail Sales Bounce Back By 8.7% in 2020Q3



- Local retail sales jump 8.7% as stimulus arrives after a big drop
- Consumer ingenuity in working around social distancing issues were an important key and e-commerce is counted here in goods purchases
- Laggards in spending including bars and restaurants, entertainment, and other non-goods activities. Much smaller bounce here.
- Big ticket items like autos and home sales joined in the local sales surge

Houston Metro Area Auto Sales and Pricing Show the COVID Dip and Stimulus-Driven Recovery



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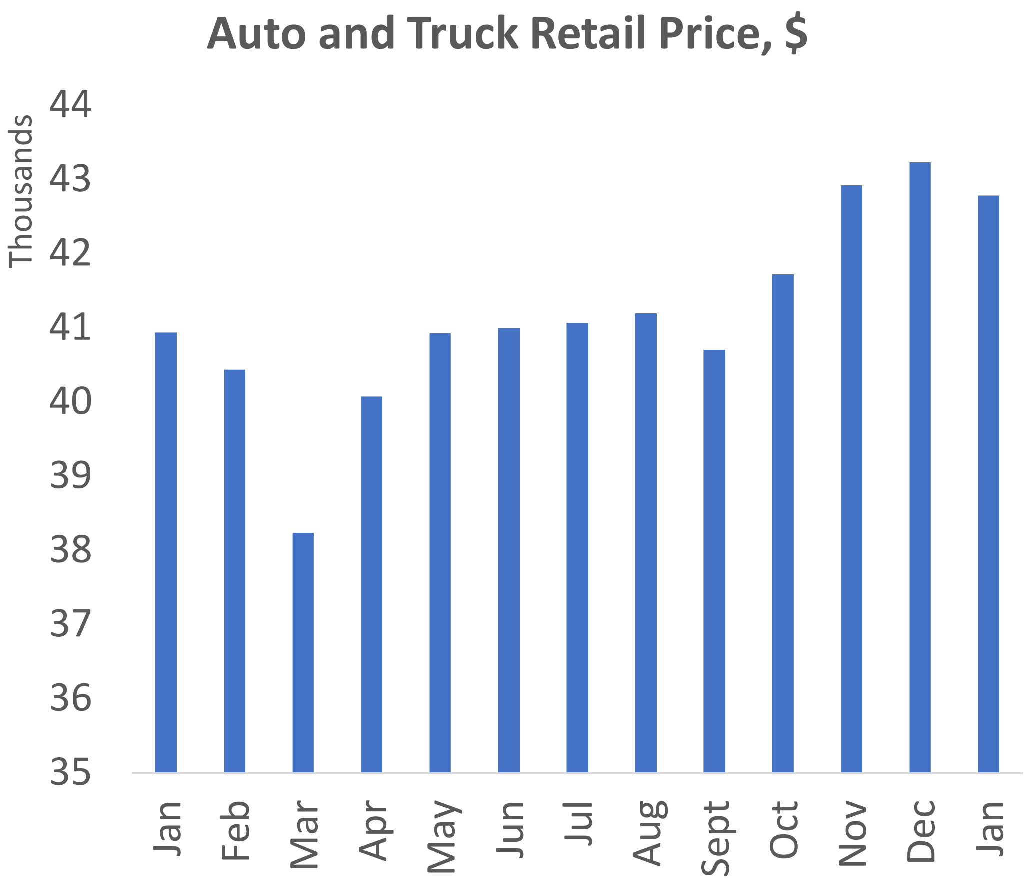
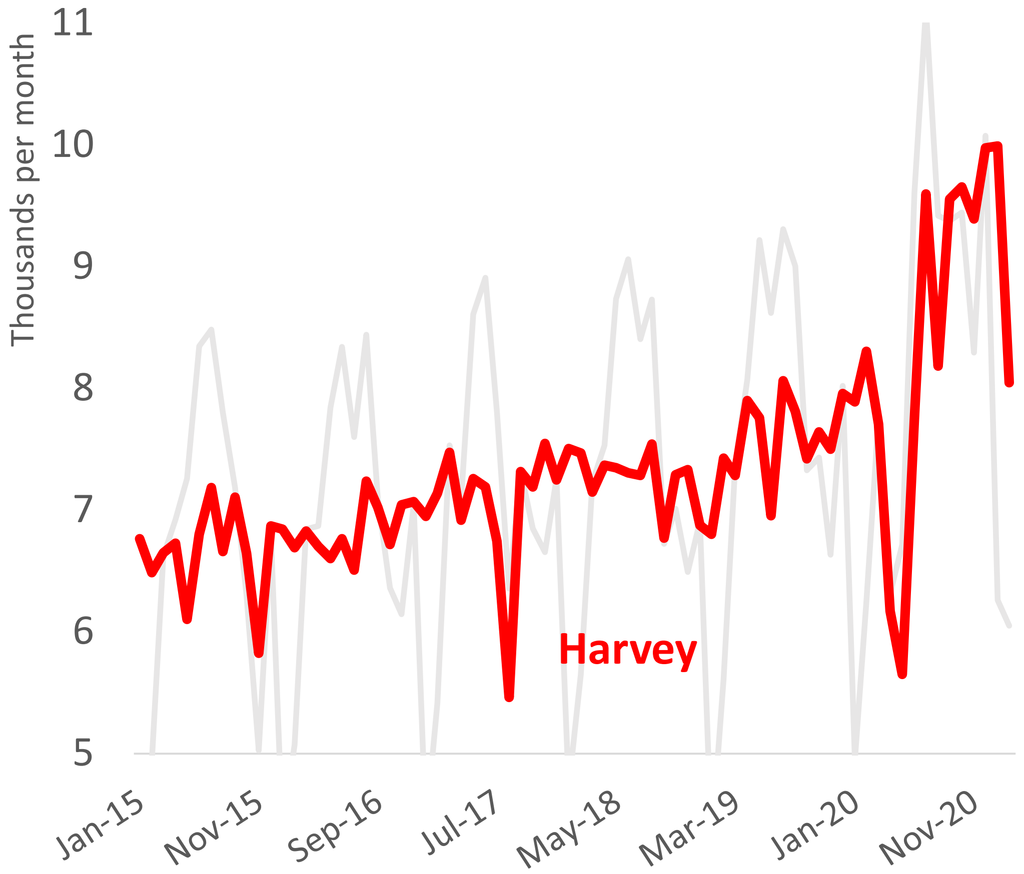


Houston Existing Home Sales Soar in Stimulus-Driven Pandemic

(Houston MLS sales, s.a.)

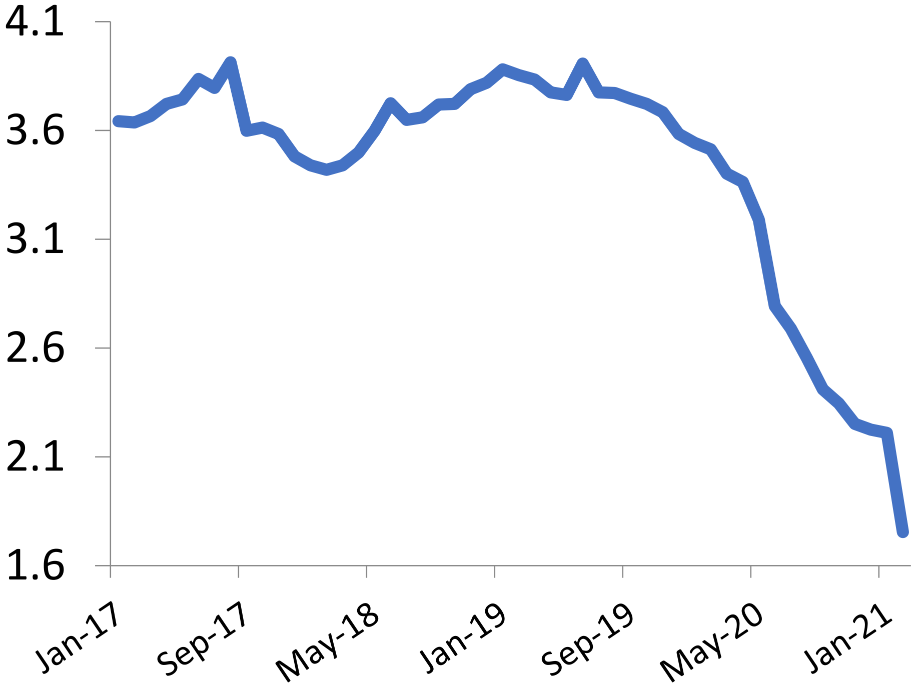


- Houston existing home sales had picked up a little in 2019 as the Fed paused in its push to raise interest rate
- The initial response to the pandemic was a sharp pull-back in sales due to the stay-home orders and nonessential business closings
- Then a sharp drop in interest rates and a check from the federal government ignited a sharp increase in sales
- Sales through January were still strong and up 15% from pre-pandemic levels despite a lack of inventory. The Cold snap hit in February

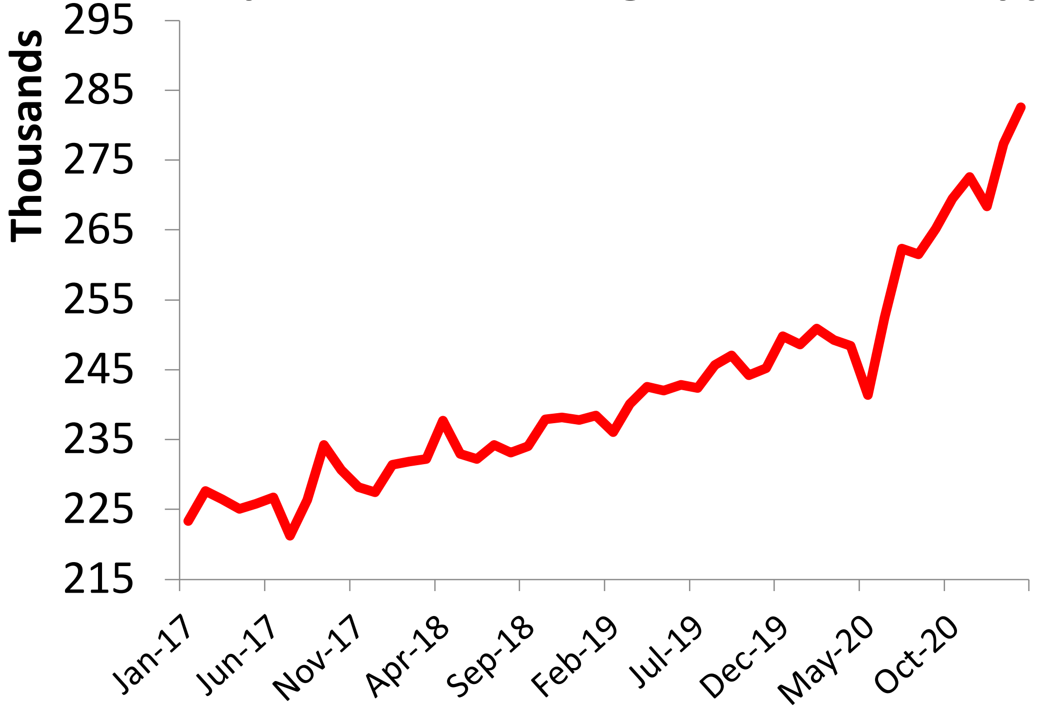
Source: Texas A&M Real Estate Center, seasonally adjusted by IRF

Houston Existing Home Sales: Pandemic Shrinks Inventory and Raises Prices

Months Supply: 3.6 mo. in Dec 2018
Falls to 1.8 mo. in Feb 2021



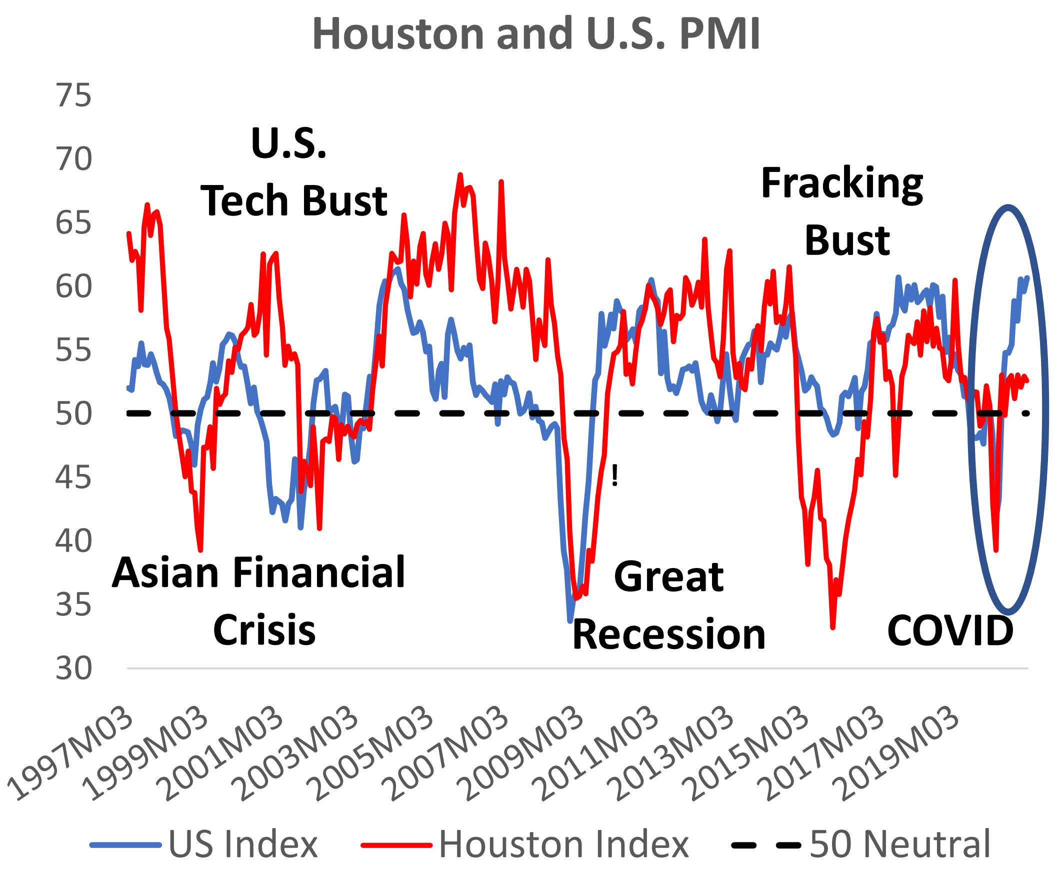
Home Prices Absorb Pandemic Shock,
And Jump 11.3% on Strong Demand/No Supply

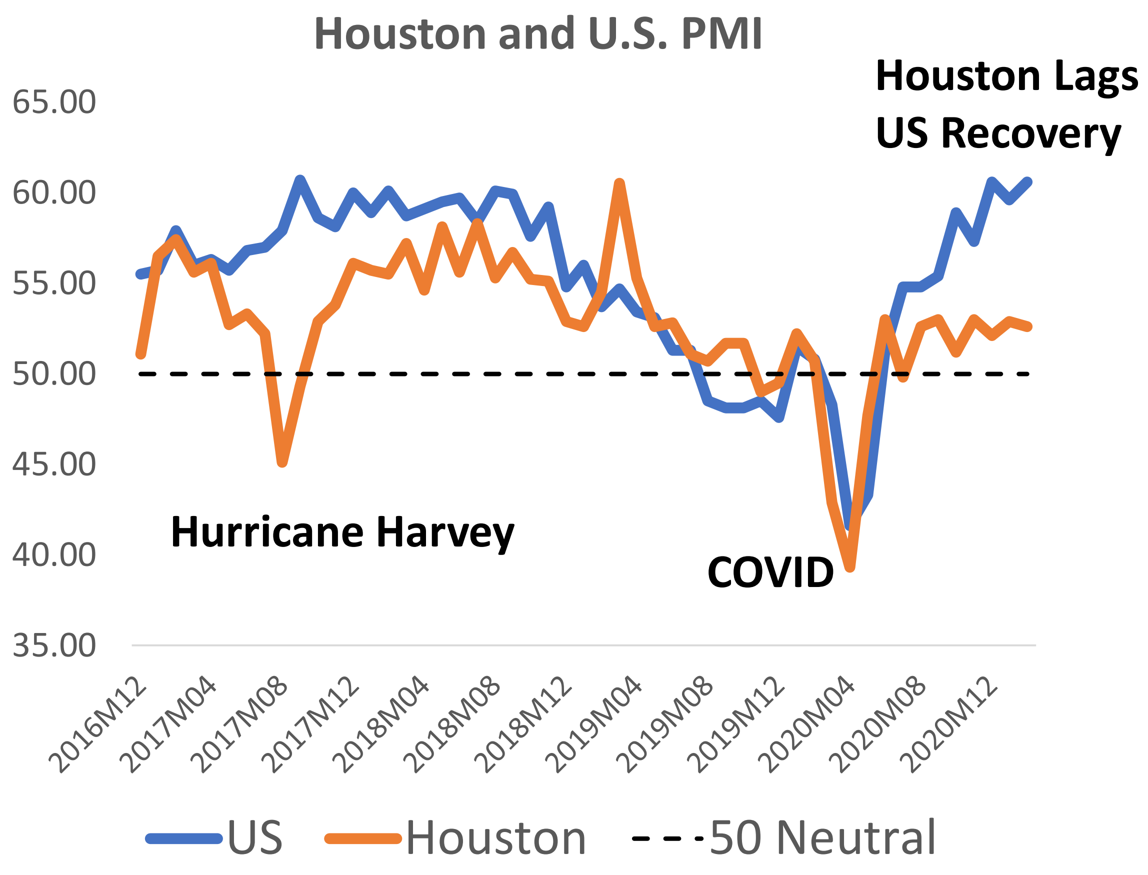


Source: Texas A&M Real Estate Center, seasonal adjustment by IRF

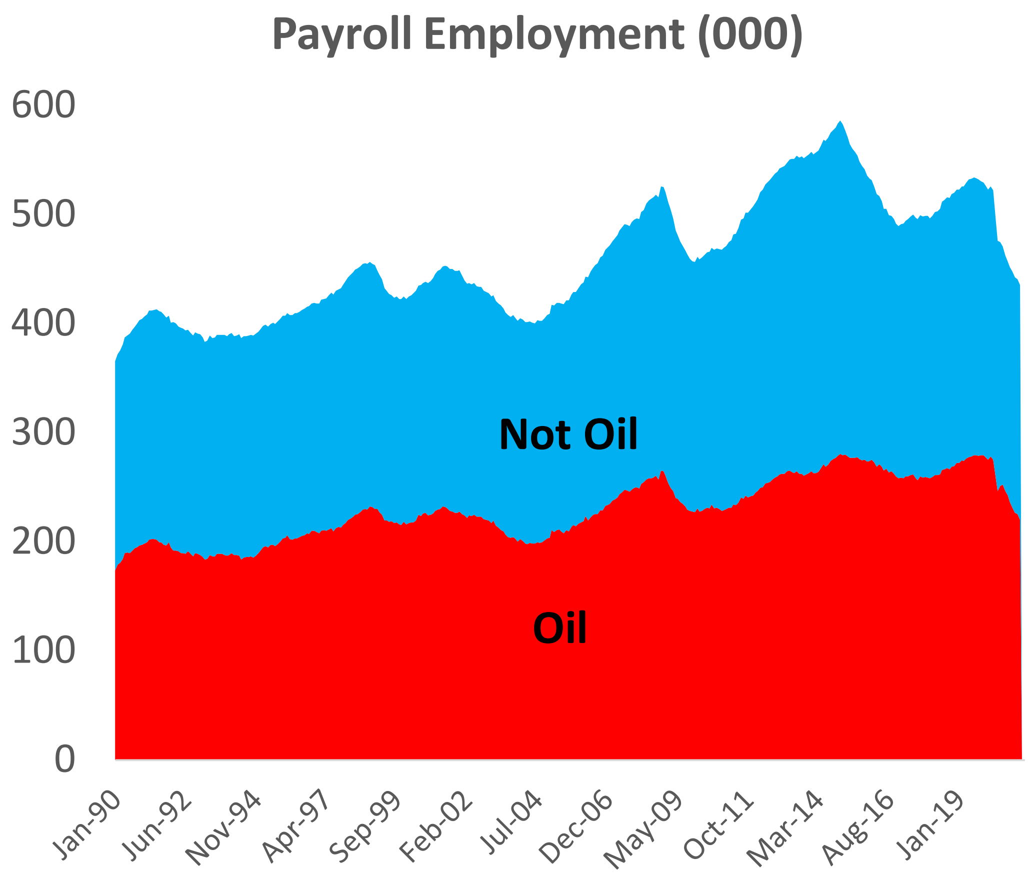
How Bad Is This Downturn?
Even With the Positive Shock from Stimulus.
It’s Still Bad ... Maybe Just Not as Bad as Advertised

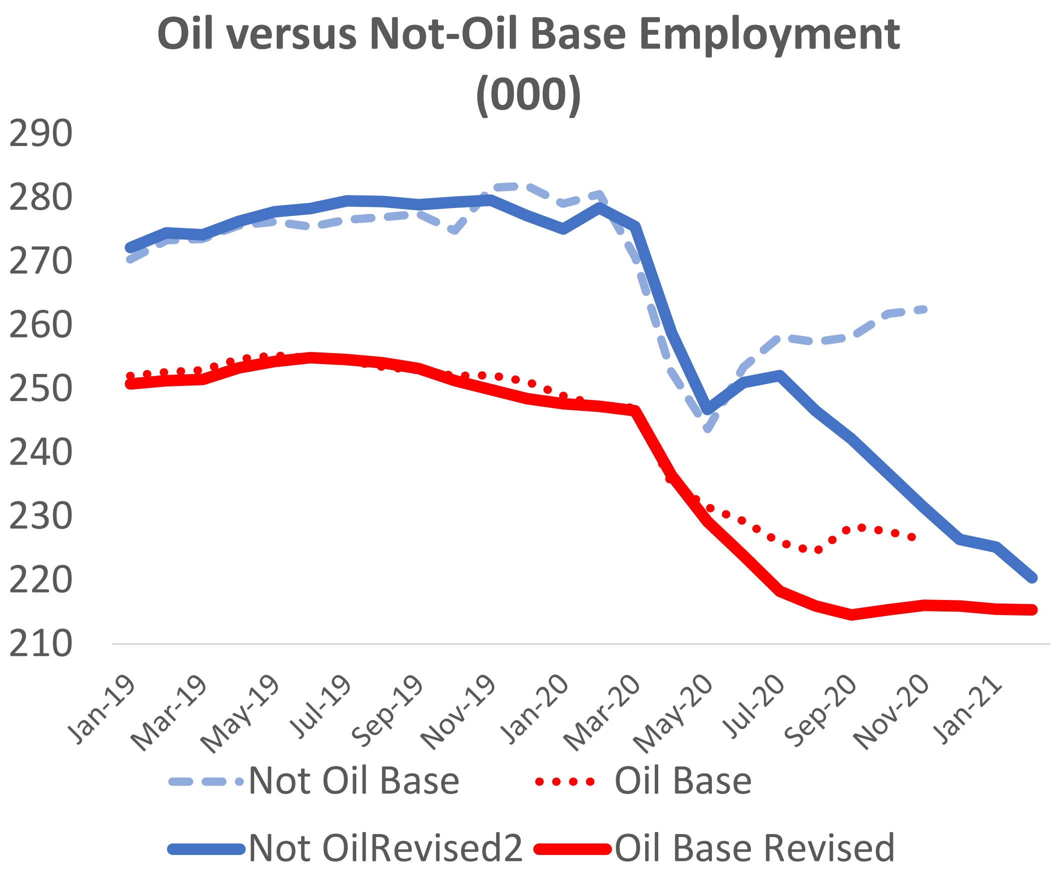
Purchasing Managers' Index Sees U.S. and Houston Briefly Contract and Quickly Move to Expansion



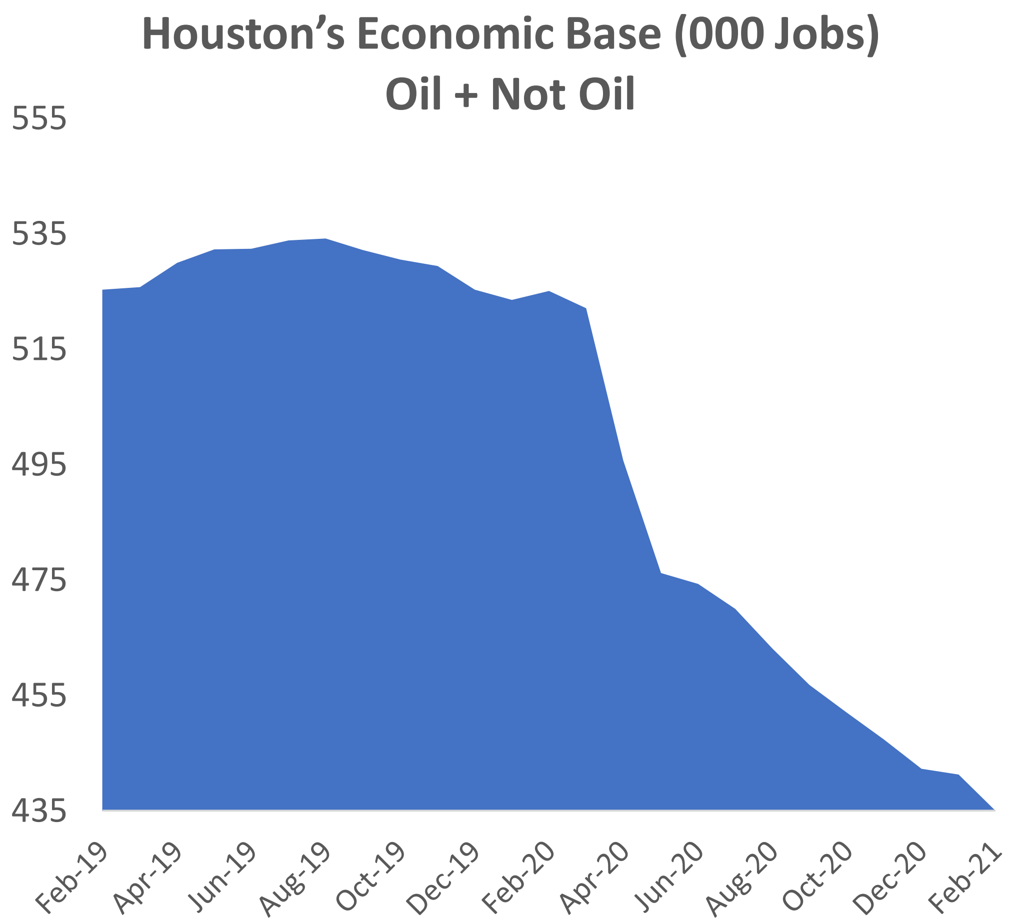


Revisions to Payroll Data Say Houston's Economic Base Has Fallen Further and Is Performing Much Worse than Previously Thought





Houston's Overall Economic Base Has Yet to Stabilize Pointing to Still-Deepening Recession



- This is Houston's economic base since early 2019 counting both oil and not-oil, i.e., the part driven by US growth
- Oil may have finally stabilized this fall after continued decline
- *The non-oil part continues to fall and is still should be pulling down overall growth*
- *We have seen downturns this severe before … but the bottom is not in sight by this measure*
- *How bad is this recession compared to others in Houston's past?*

Current Losses in Houston's Economic Base Point So Far? Now Serious, But We Have Seen It Before

Houston's Economic Base in Five Recessions

Years	Downturn in Economic Base: Jobs Lost (000)	Downturn in Economic Base: % Fall	Oil's Part of Base Losses %
1991-93	30.1	7.3	36.4
1998-99	34.0	7.4	51.8
2001-04	52.2	11.5	34.1
2008-09	68.8	13.1	44.9
2014-16	97.0	16.6	76.3
Average	56.4	11.2	48.7
2020-21	***87.6***	***16.6***	***32.1***

***The oil base losses stabilized in the fall, but non-oil base activity is still falling The non-oil base tied to U.S. growth includes non-oil manufacturing and parts of wholesale trade, air transportation, construction, and professional and business services.**

- *1990-93:* A U.S. recession, Iraq invades Kuwait, First Gulf War and oil price collapse
- *1998-99: The* Asian Financial Crisis saw the global economy collapses along with oil prices, while the U.S. stayed strong
- *2001-04:* U.S. recession, 9/11 Attack, and the Second Gulf War
- *2008-09:* The Great Recession brought both economic and oil collapse
- *2015-2016:* The Fracking Bust was mix of a massive speculative collapse in oil and the U.S. economy staying very strong

How Could We Say There Is Only A Moderate to Serious Recession Underway in the U.S. and Houston?

- What is the *net effect of huge jobs losses PLUS massive stimulus that replaced all the income lost* to the downturn? How does it average out?
- The use widespread stay-home orders and closing of nonessential businesses pulled much economic damage forward to early months of the pandemic -- in ways not seen before. The lockdown in March/April generated a shock and partial panic. This subsided quickly with help from the stimulus
- Severe pandemics from the past -- without the swift and coordinated public health interventions – brought or were expected to result in moderate U.S. recession
  - A 2003 pre-COVID paper by the Congressional Budget Office used a historical/bottom-up approach to pandemic impacts and concluded that a severe pandemic like the Spanish-Flu would cause a moderate U.S. recession. Extraordinary use of stay-home orders was not considered
  - A recent paper by Barro, Ursúa, and Weng (2020) found that the Spanish flu probably caused a moderate U.S. recession. Barro and Ursúa have studied many such "macroeconomic catastrophes" including WWI and the Great Depression
- ***Do recent events change the perspective? Probably not. THIS IS NOT NEARLY AS BAD AS THE RAW JOBS DATA WOULD SAY. And now, we simply add new and massive stimulus to additional negative news on the employment side. And hope they net out in a similar way.***

What I Assume About Houston's Near-Term Economic Future?

- Just as it does everywhere, COVID-19 continues to affect Houston's economic future until the vaccine is widely distributed
- Large job losses continue in contact-sensitive industries until relief from the virus is in place by mid-year and we see COVID job losses begin to disappear
- With COVID gone, and losses in the large service industries falling behind us, *we still will have a hang-over of a moderate to serious recession and face several quarters of recovery from that downturn*
  - This recession was caused by losses in Houston's base industries – by our inability to sell goods and services outside the region -- because of COVID-driven losses outside Houston and in the rest of the state and nation
  - Recovery in the non-basic, low-multiplier industries like retail, bars and restaurants, barber shops, etc. will be easier than widely advertised
- *Oh, and don't forget our oil problem … it now looks better in the short-run but worse in the years to come.*

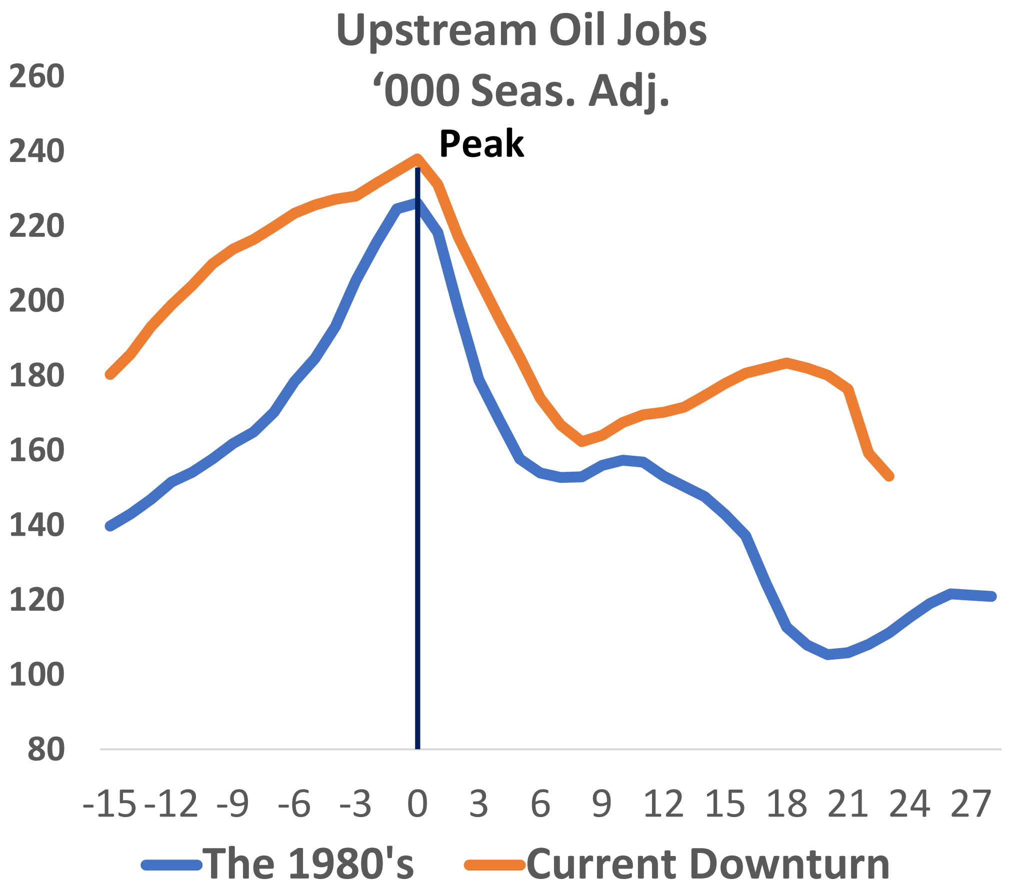
Recovery Underway for the Latest Oil Downturn …
But Then A Smaller Oil Industry Going Forward

Oil and Houston: Difficult Times Since 2014

- From 2011-14, Houston enjoyed *an oil boom that rivaled the 1980's*, averaging 100,000 or more new payroll jobs each year
- But the *fracking bubble burst in November* 2014 when OPEC withdrew as swing producer and let the price of oil collapse. While the local oil sector lost 77,300 jobs, the U.S. economy grew strongly.
- A moderate recovery in oil prices in 2017-18 brought a partial recovery of local oil employment, but by 2018 *an industrywide credit crunch had set in*. Oil jobs were in decline again in Houston by mid-2019
- Then comes the *COVID-19 pandemic and the Saudi-Russian oil war*, resulting in complete collapse in oil markets in May
- We now see a *nascent recovery underway*, with movement in drilling and the rig count, but with better growth in fracturing and completion of a backlog of uncompleted wells.

Perspective Since 2014: All the Speculative Excesses Wrung Out in 2015-16 as the Fracking Bubble Burst

(Houston Oil Jobs '000)



--The 2015-16 Fracking Bust was a speculative bubble that burst, and initially looked much like the early 1980's

-- We saw oil prices fall from $100 to $30 in 2015-16; the rig count fell from 2000 to 400; local upstream job losses were 77,300.

-- *Only 22,700 of those Houston lost oil jobs returned by 2019Q2 or about 30 percent*

-- The industry was lean as we enter this downturn, with few speculative excesses to wring out.

-- If we see smaller losses in 2020 it is because the industry has right-sized itself

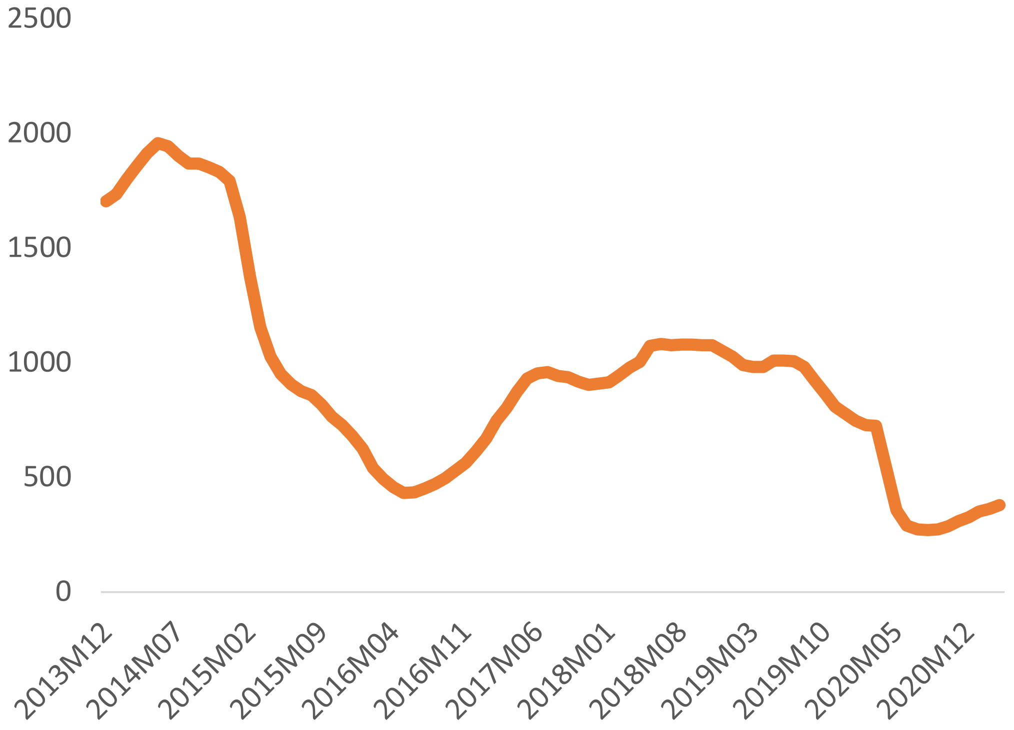
*Texas Workforce Commission estimates. Upstream Jobs = Oil Producers and Services, Machinery, and Fabricated Metal

The COVID Collapse In Oil Demand and Saudi-Russian Oil War Bring April/May Capitulation in the Oil Fields

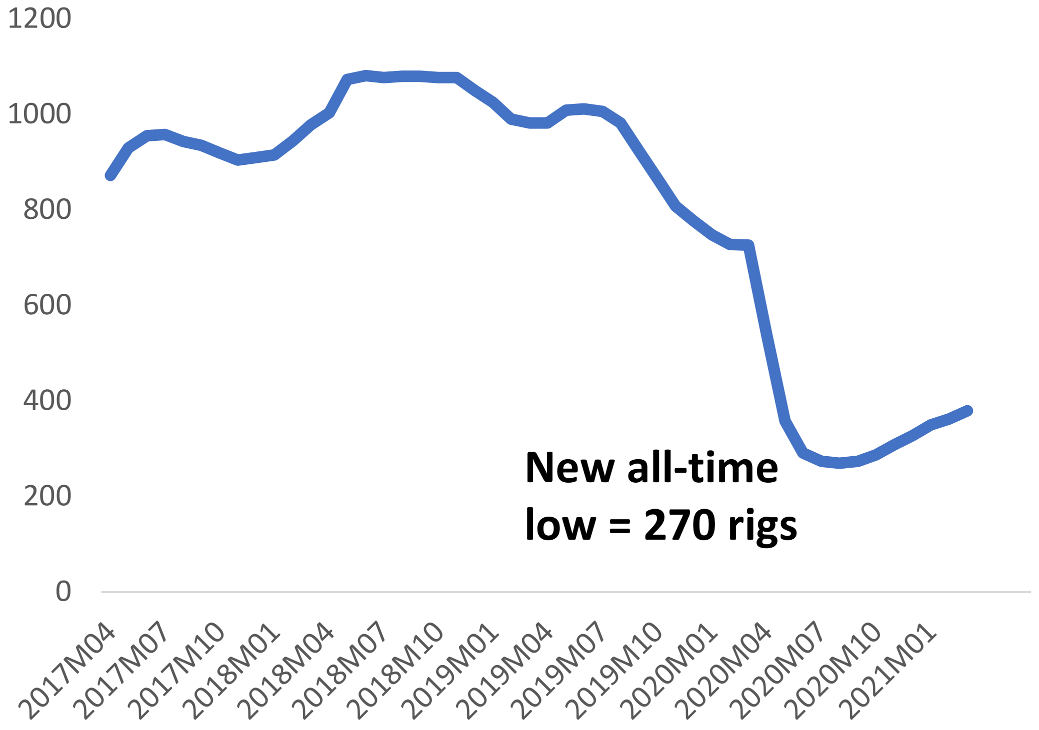
- *Lockdowns lead to a global oil demand collapse and far too much product being produced and headed to market*
  - A mismatch of supply and demand lead to storage filling rapidly
  - Storage at NYMEX settlement point in Cushing, OK runs out of capacity, forcing some futures contact holders to pay others to take their oil, i.e., a negative price
  - US oil production fell hard as producers were forced to find emergency storage or to shut in production
  - Rig count and oil-field activity fall to all-time lows as producers face low prices and great uncertainty. This adds heavily to the loss of oil jobs in Houston
- *Recovery in the oil fields remains slow and partial*
  - Oil price has returned to $60 per barrel – *but only with a lot of help from the Saudis*
  - Current higher prices having little effect. One decision by Saudis and price is back to $40. Also, most of the industry is hedged at $50-$55 for the rest of this year
  - As a number to be trusted, count on oil prices near $50 per barrel for the rest of this year. The Saudis won't prop up the Russians forever.

The Rig Count Fell by 276 Rigs Beginning in 2018, Before COVID and the Oil War Piled On More Losses

The Rig Count's Wild Ride Since 2014, Number of Working Rigs, seas adj.

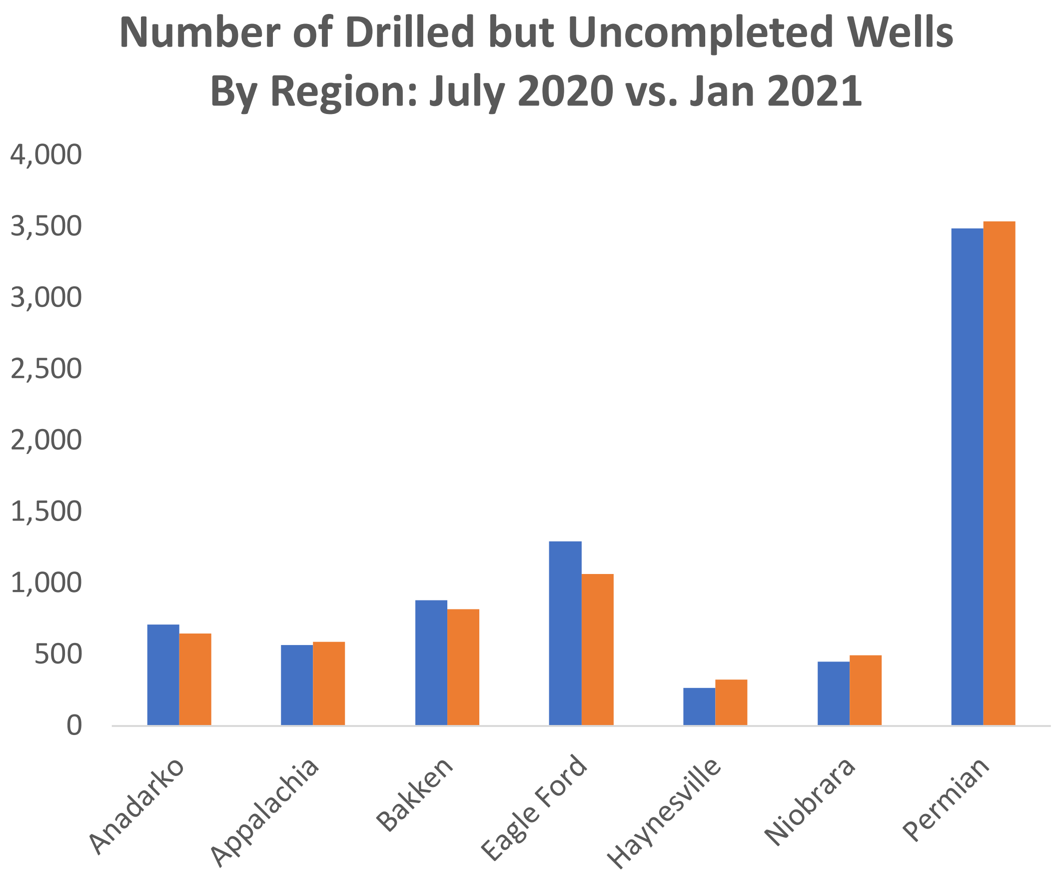


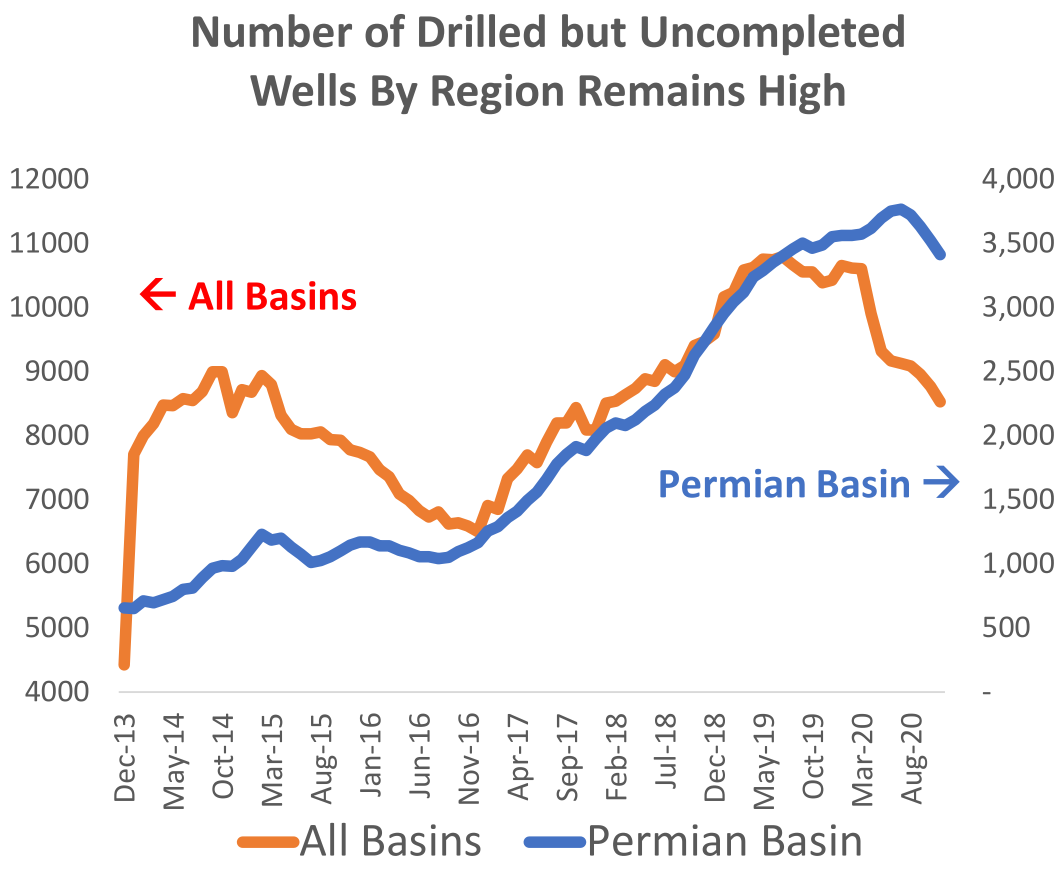
Recent Losses in Rig Count, Number of Working Rigs, seas. adj.



Baker Hughes Rig Count

Drilled But Uncompleted Well Inventory Still High, But Now Leading the Early Recovery in the Oil Fields

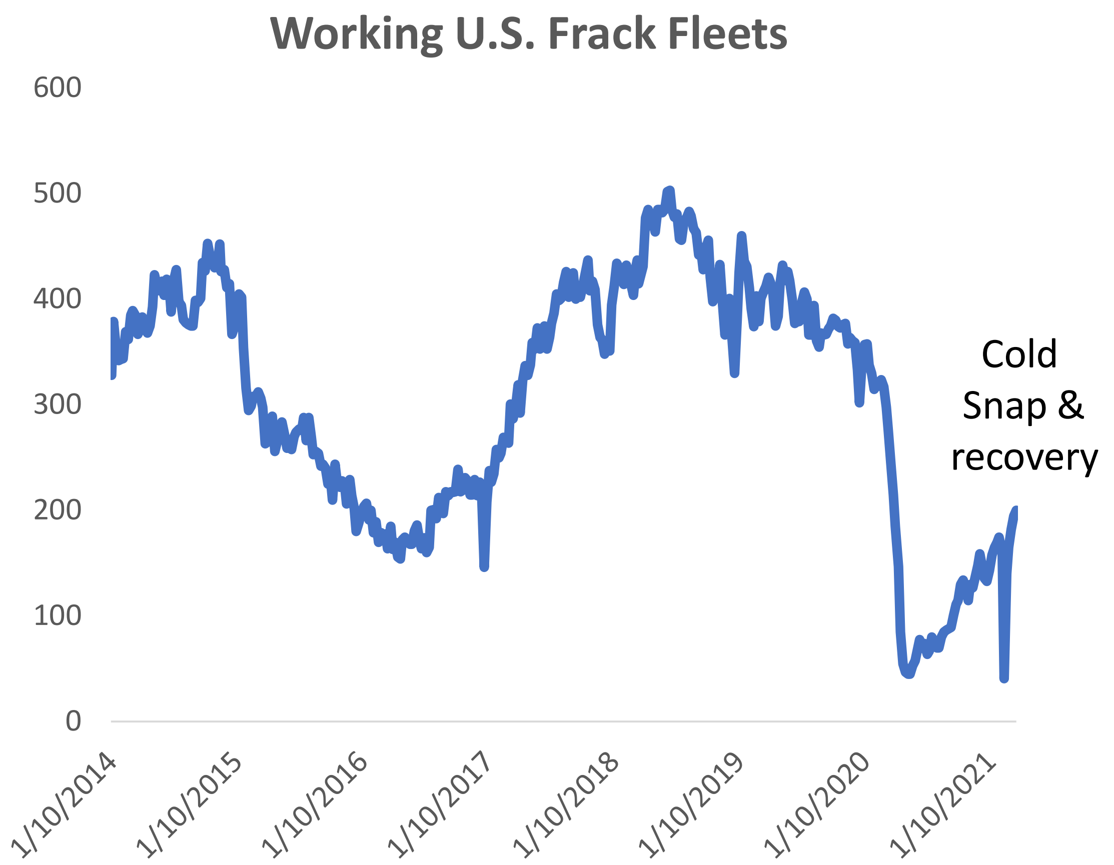




DOE/EIA, *Drilling Productivity Report*, March 15, 2021

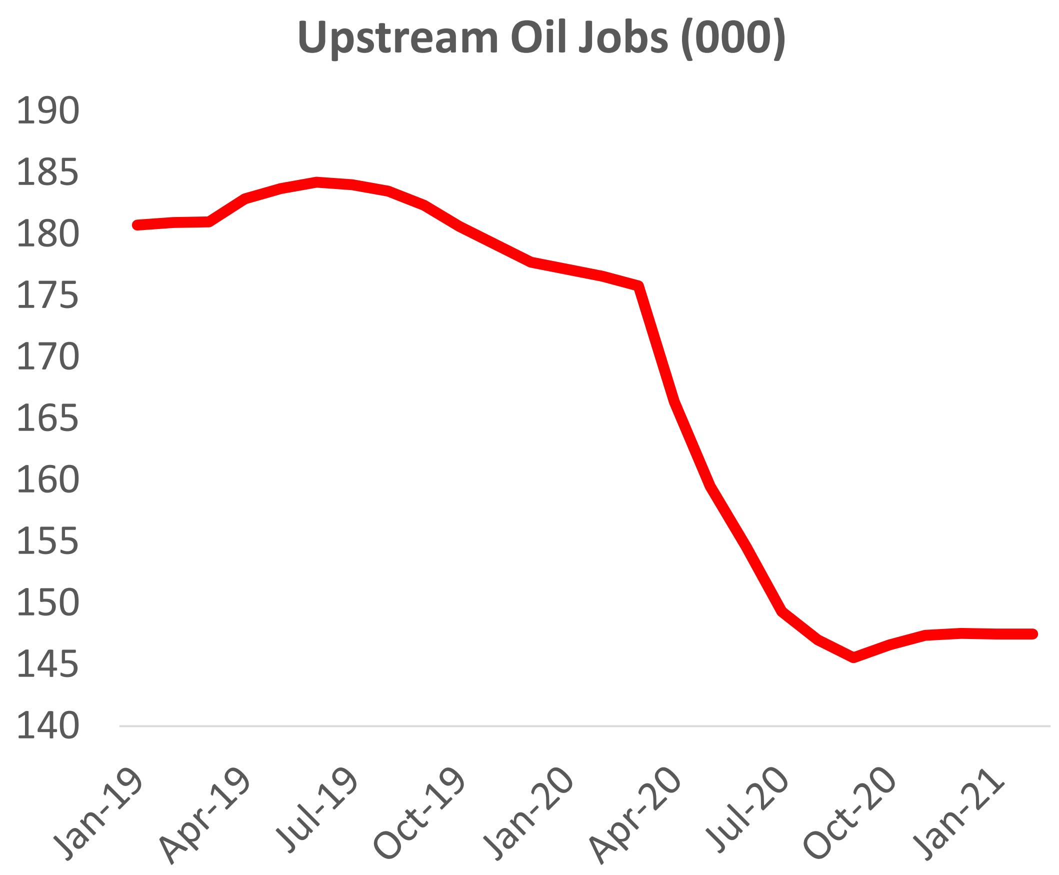
Fracturing and Completion Is the Quickest Way to Replace Reserves and Earn Cash

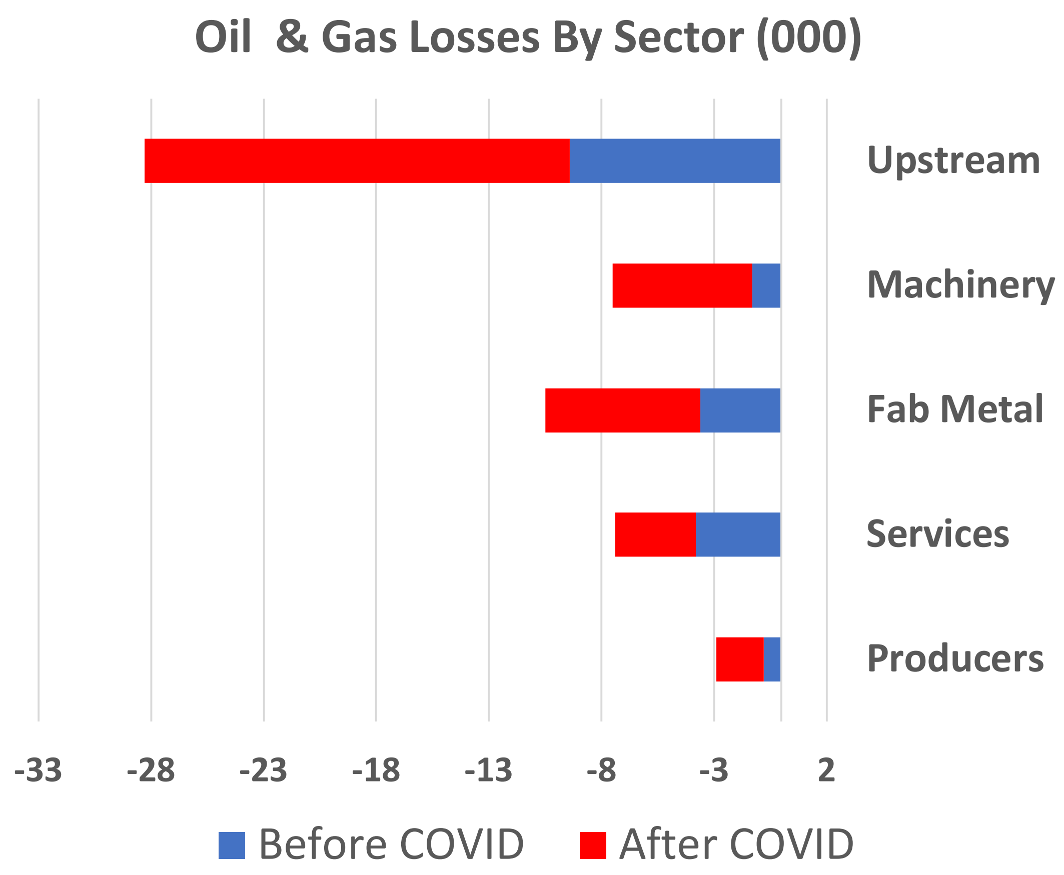
- To the right, you see the number of fracking fleets at work to fracture and complete wells that have already been drilled
- The first meaningful signs of oil-field recovery were in early June as the number of fracking fleets rose from 45 to 187 by March of this year
- Drilling is a separate process from fracking and completion and incurs costs that are like drilling
- Sunk cost of drilling makes this the quickest and least costly avenue for producers to replace reserves and earn cash



Primary Vision data through March 26, 2021

Houston Has Lost 36,400 Upstream Jobs Since Peaking in June 2019, Or 47 Percent of Losses Seen in 2015-16





Texas Workforce Commission, calculations of IRF

Boom and Bust for Fracking Followed by Bust, Bust, Bust …

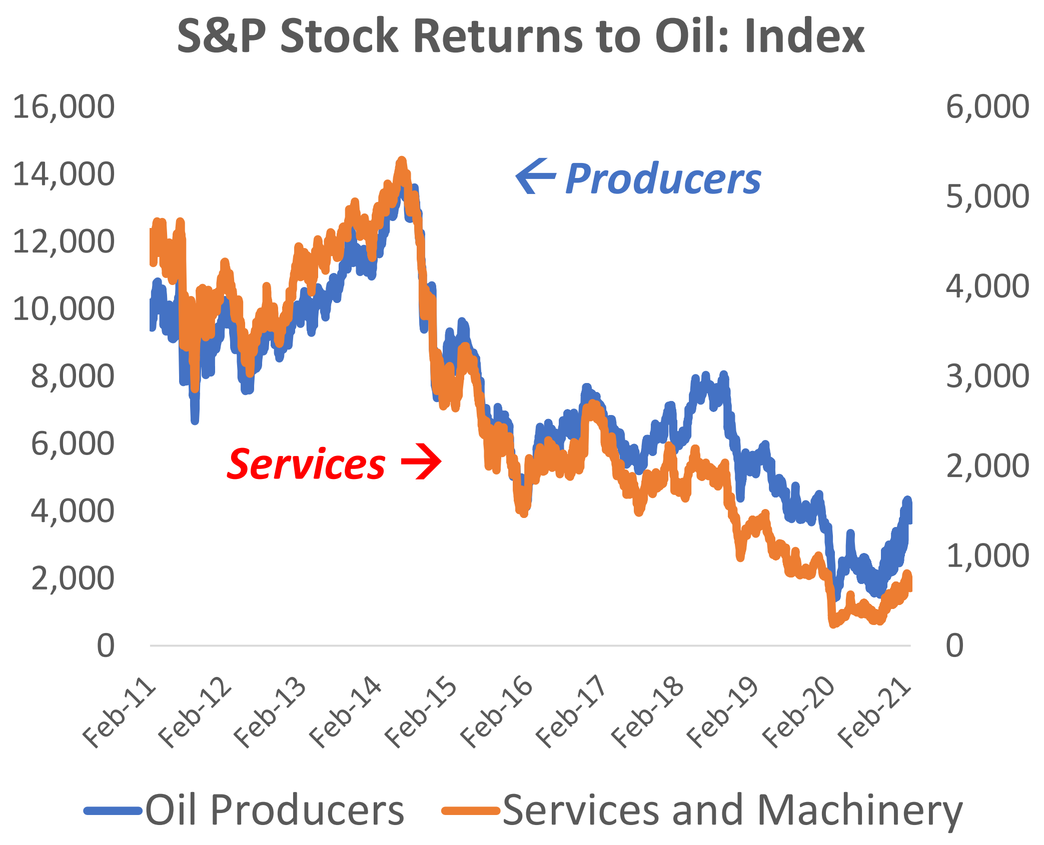
Fracking Is a New Model for Oil Production

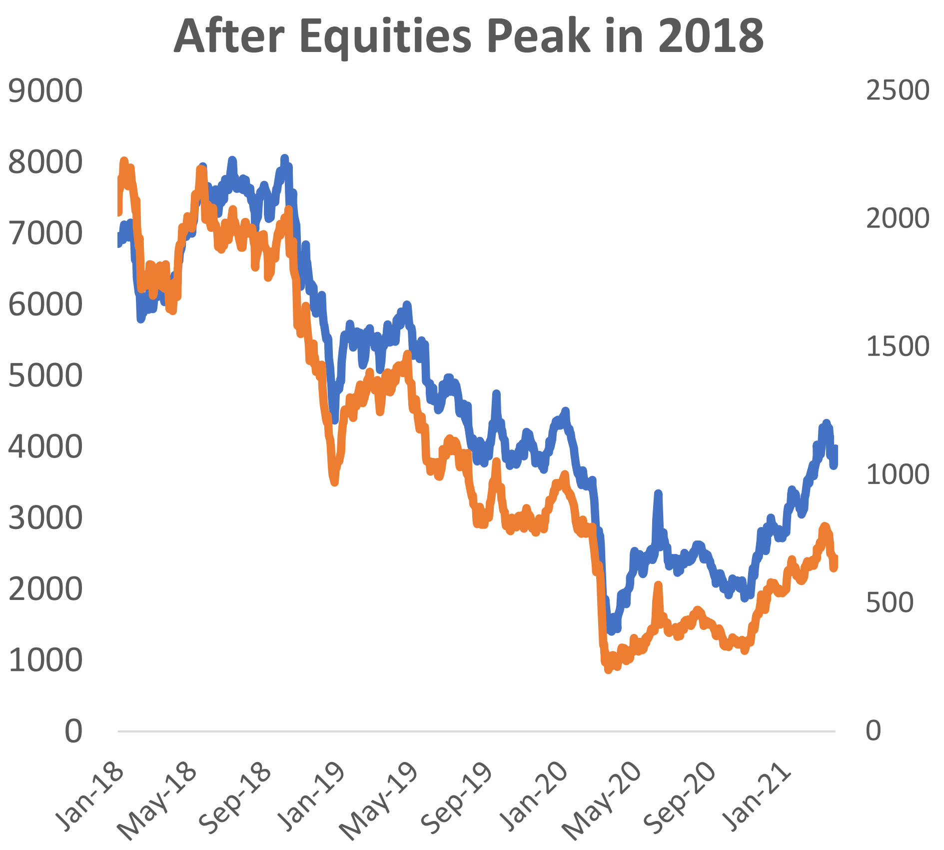
- Looks more like a competitive industry. Many small and medium-sized operators, price-takers, and assembly-line production
- Low barriers to entry for new producers, i.e., capital, some geology, leases, and a hire a service company. Today a hedge fund, tomorrow an oil producer
- Traditional exploration risk is gone, production costs are understood, and the oil is there
- Get a quick and certain rise or fall in oil production in response to changing oil price incentives
- The industry was born in an era of $100 oil and cheap money from the central bank, and tight oil production grew at 24% per year from 2005 to 2014. Investors sought the industry out …

Fracking's Problems Now?

- Fracking is a high-cost source of oil and needs $65 to thrive. Even $55 oil hurts many companies, and $2 natural gas is lethal for others
- Too many companies used low interest rates and a rising stock market to try for a quick killing – instead of building a viable oil business
- Many producers struggled in 2019 to deliver steady income and growth to impress the stock market, which has now turned its back on the industry
- A first wave of bankruptcies hit in 2015-16, followed by wave of bankruptcies, delistings, forbearance, etc. hit hard in 2019-20
- Investors are hard to find after $175 billion in assets go through the bankruptcy courts. Producers are diverting cash flows from the oil fields to potential investors back

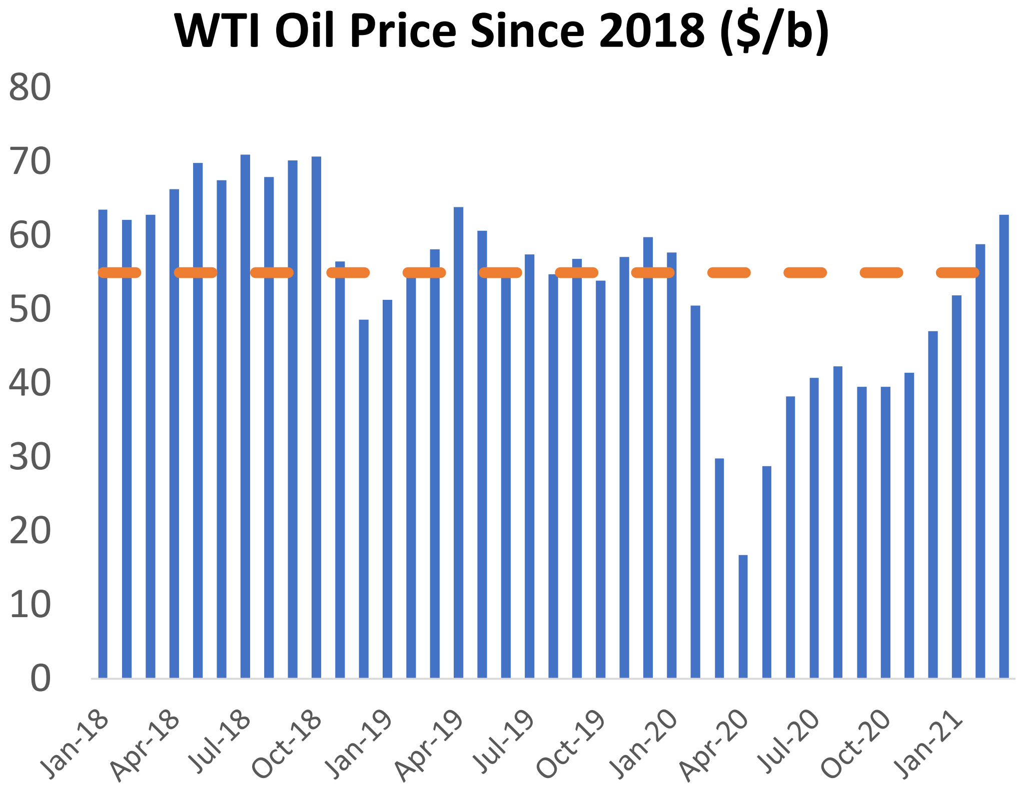
Lower Oil Prices and Poor Performance Pressures Fracking Profits, Leads to Lower Stock Prices and a Credit Squeeze





S&P Dow Jones Producer and Oil Service Indexes to March 24, 2021

Moderate Oil Prices and a Serious Squeeze on Fracking Industry Credit Generate Bankruptcies in 2018-19



DOE/EIA and Haynes and Boone *Bankruptcy Monitor*

Oil-Related Bankruptcies in 2019-20: Number and Secured & Unsecured Debt

	Producers		Oil Services	
	Number	Debt ($B)	Number	Debt ($B)
2019Q1	5	1.62	3	0.01
2019Q2	13	4.67	11	7.77
2019Q3	15	6.70	2	0.00
2019Q4	10	12.81	7	0.26
2020Q1	5	1.39	6	10.58
2020Q2	18	32.74	11	12.66
2020Q3	17	16.82	19	10.48
2020Q4	6	2.46	25	11.42

Summary Impact of a New Financial Model for Fracking: It Will Be Smaller Industry Doing Less in the Oil Fields and Houston

	Percent Cut to Cash Flow			
	10%	**20%**	**30%**	**40%**
Rig Count				
$65	25	60	92	120
$55	80	140	165	188
Local Oil Jobs				
$65	2,000	4,400	6,400	8,700
$55	4,200	8,200	10,000	12,000
Houston Payrolls				
$65	6,000	14,300	20,600	28,600
$55	11,600	24,000	30,100	37,000

For each variable, the number is the reduction required by a percentage cut to industry cash flow relative to no cuts being necessary. Losses measured in 2024Q4.

What It Means for Houston

- It is surprising that a change the financial model for one industry could influence the growth of a metro area of 7.1 million people and 3.3 million workers
- But oil has a special place in Houston. For the last 30 years, Houston has seen jobs grown at 2.0 percent per year, with 1.2 percentage points from shared national growth, 0.6% from oil, and 0.2% from demographic advantages and the Texas Growth formula
- The cuts to fracking mean a loss of one-third to half of the growth contribution from oil for the next five years or more
- It is the first cut to Houston’s long-term rate I have made in 32 years of studying the Houston economy. *Houston’s growth is still much stronger than the U.S. and still impressive at 1.7% versus 1.1%.*

The Global Economy?
It Is Mostly About COVID, Too

IMF Says World Growth Fell 3.5% in 2020 With Recovery of 5.5%/4.2% in 2021/22

Percent GDP Growth, Year-Over-Year

	2018	2019	2020	2021	2022
World	3.5	2.8	-3.5	5.5	4.2
Advanced Economies	2.2	1.7	-4.9	4.3	3.1
U.S.	2.9	2.2	-3.4	5.1	2.5
Euro Area	1.8	1.3	-7.2	4.2	3.6
Germany	1.3	0.6	-5.4	3.5	3.1
France	1.8	1.5	-9.0	5.5	4.1
Italy	0.8	0.3	-9.2	3.0	3.6
United Kingdom	1.3	1.5	-10.0	4.5	5.0
Japan	0.3	0.7	-5.1	3.1	2.4
Emerging/Developing	4.5	3.7	-2.4	6.3	5.0
Brazil	1.3	1.1	-4.5	3.6	2.6
Russia	2.3	1.3	-3.6	3.0	3.9
India	6.8	4.2	-8.0	11.5	6.8
China	6.6	6.1	2.3	8.1	5.6

IMF, *World Economic Outlook*, update as of January 2021

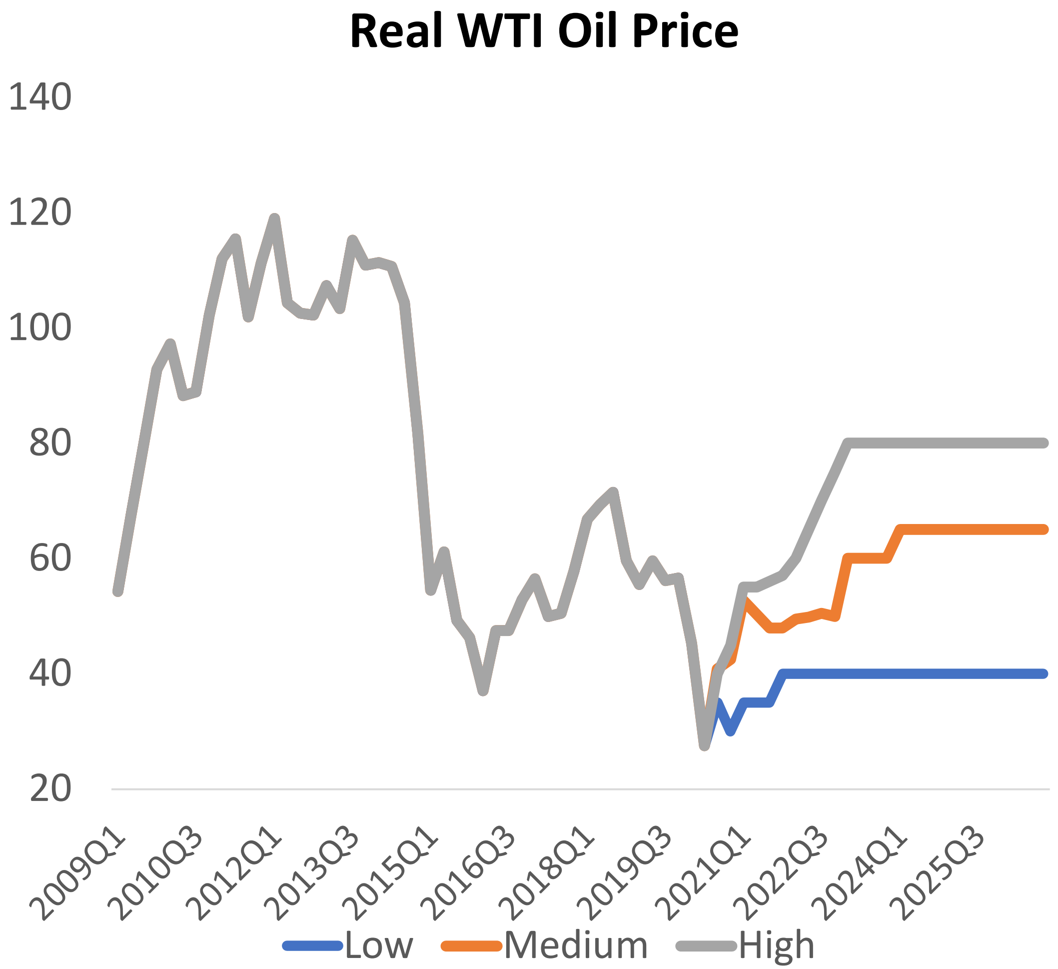
The Global Economy: COVID-19 Dominates the Outlook

- Country-to-country differences in economic performance around the world mostly reflect COVID and the timing and duration of lockdowns.
- The IMF forecasts a global GDP growth turnaround of 5.5 percent in 2021 and 4.2 percent in 2022
  - On the IMF's list of major economies shown earlier, China stands alone with growth in 2020 at 2.3 percent, followed by a strong 8.1 percent next year
  - As bad as it is, the -3.4% decline for the U.S. is among the best among large developed countries. The projected recovery puts the U.S. on a strong growth path.
  - Developing and emerging economies are a mixed bag: China, South Korea, and Indonesia defeated the virus early and lead recovery; the poor with limited or no access to a vaccine and poor public health systems will continue to suffer and slow global growth
- The initial global fiscal response was $12 trillion dollars, with a near-universal monetary response with deep rate cuts, massive liquidity injections, and central bank asset purchases. The U.S., Japan, and other countries continue to add to the total fiscal response
- The IMF predicted a dark winter as new strains of the virus emerged, and in Europe a slow roll-out of the vaccine and continued lockdowns have allowed it to turn into a spring with little economic progress

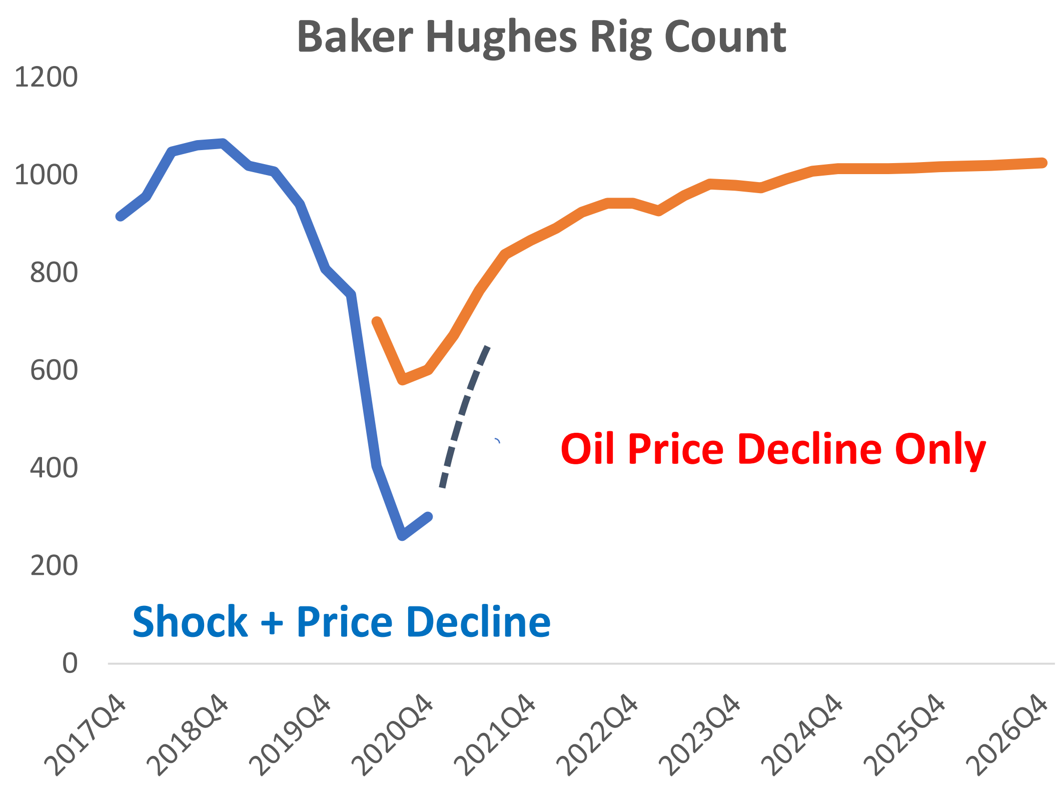
Outlook for Houston:
All the Guesswork Pulled Together

COVID and Moderate Recession End By Early 2022 -- and Oil Prices Drive Differences in the Low, Medium, and High Forecasts

- After the big swings in U.S. and Houston employment in 2020 driven by COVID and public health orders, the U.S. economy emerges from moderate recession in 2021 and returns to growth.
- The primary differences in our high, medium, and low forecast are driven by oil prices. Our medium forecast is based on Energy Information Administration's February 2021 forecast
- A producer diversion of 30% of cash flows is assumed, having biggest effects after 2022
- The high projection accelerates the EIA forecast and has oil prices rise as high as $80 per barrels and stay there to 2026. Perhaps driven a collapse of U.S. oil tight oil production and OPEC back in control
- The low projects of a long period of $40 per barrel as weak global growth in oil demand depresses price

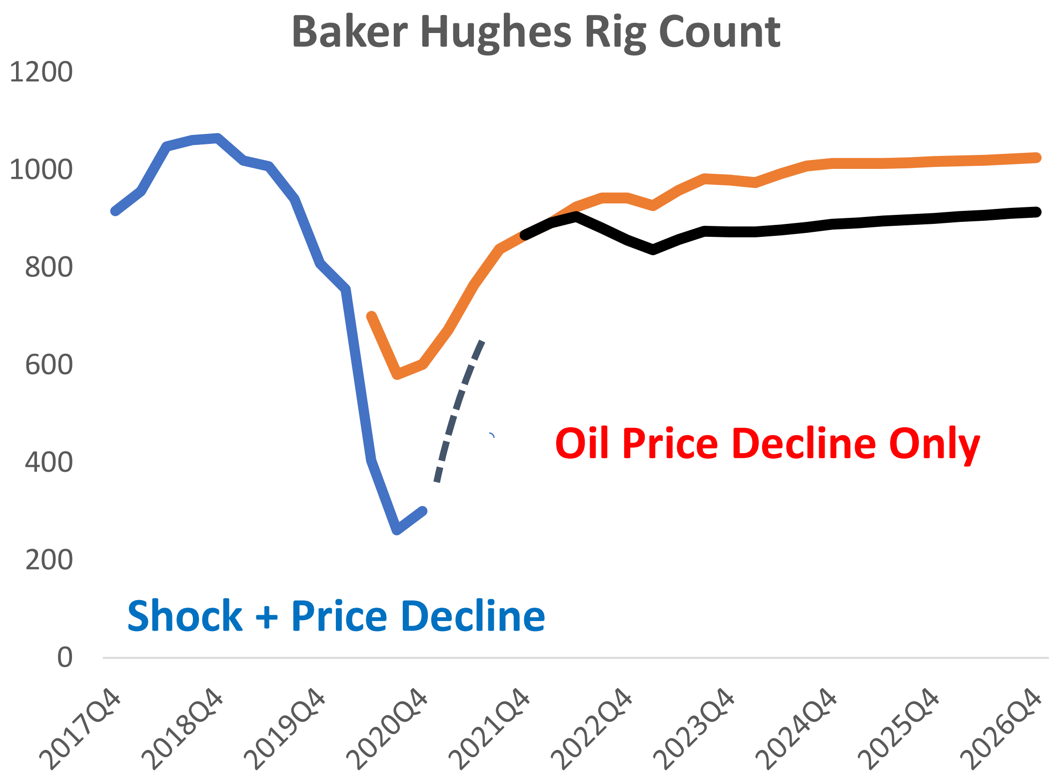


Near-Term Recovery Is Uncertain and Return to a Pre-Pandemic Oil and Rig Count Near 1000 Only By late 2024



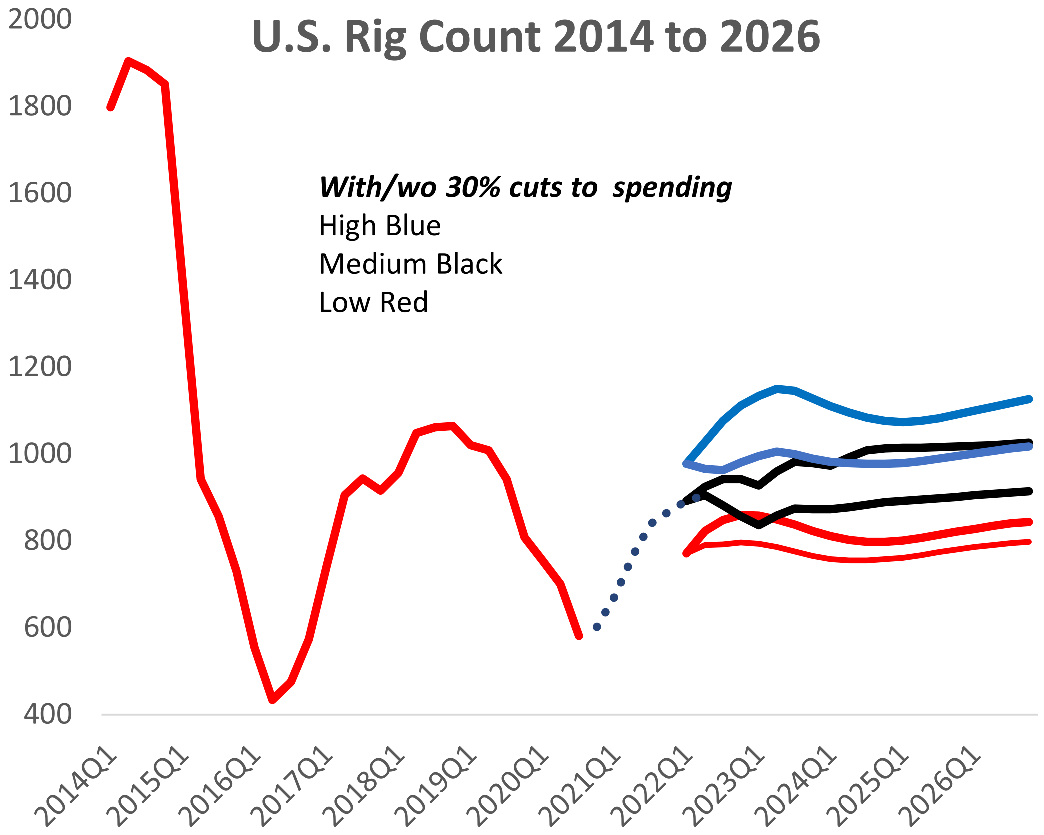
- Analytically, there are things we can know and others we can't. Need to separate them out
- The second quarter shock to the rig count from COVID and the oil war pushed it down to 262 rigs in 2020Q3 (Blue Line). This is the data.
- Oil prices collapsed, but price fundamentals alone only would have pushed the rigs count down to only 700 in 2020Q2, then to 581 in Q3 (Red Line). The difference (Blue to Red) is the COVID shock
- At some point, price fundamentals reassert themselves and we return to the Red Line. Where? When? BUT we can say nothing analytically about the recovery period along the broken line
- Post-COVID recoveries in oil price and U.S. growth push the rig count back to 1000 by late 2024; *this assumes oil producers simply return to pre-COVID spending*

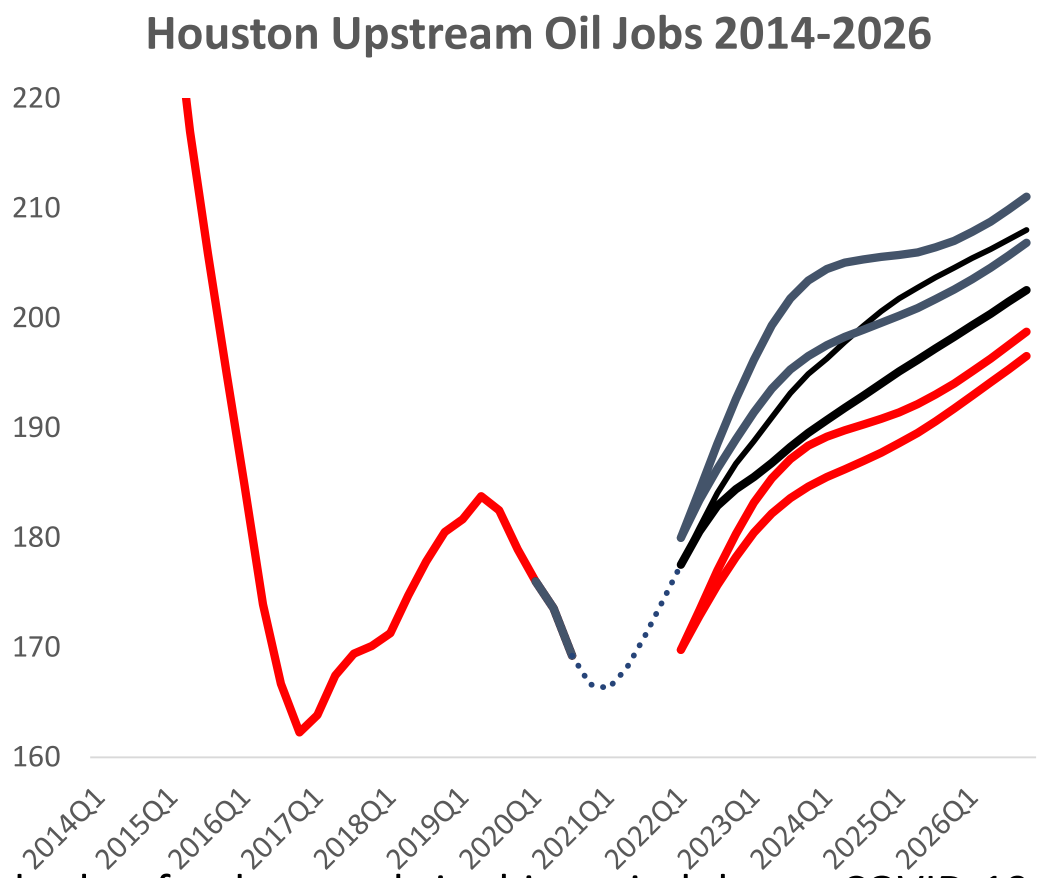
Producers Don’t Return to Pre-COVID Spending and the New Base Case See the Rig Count Recover to Fewer than 850 Rigs



- *Pre-pandemic Case* or no financial issues (Red) compared to *a new Base case including 30% cut to cash flows (Black)*
- The same COVID results as before:
  - A second quarter shock pushes rig down to 262 rigs in 2020Q3 (Blue Line)
  - Price fundamentals alone only would have pushed the rig count down to 700 in 2020Q2, then to 581 in Q3 (Red Line).
  - The difference (Blue to Red) is the COVID shock
  - Price fundamentals reassert themselves and we return to the Red Line. Where? When?
- The difference shows up in the recovery period as 30% to previous Cash Flows are diverted to producers
- The rig count levels out at 888 in 2024

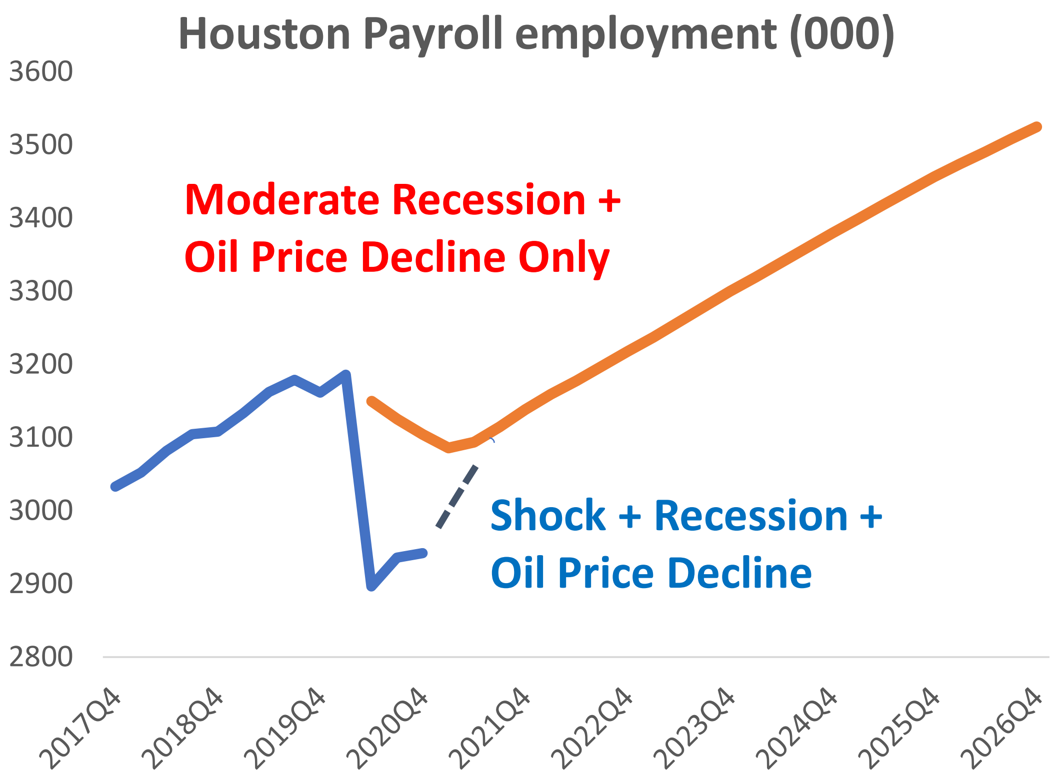
Changes in the Rig Count: Base Case Versus Cut in Cash Flows for High Medium and Low





The broken line indicates we have lost track of price and other fundamentals in this period due to COVID-19 and worldwide stay-home orders. By early 2022, fundamentals return to oil markets.

A Similar Chart for Recovery of Payroll Employment By 2022, With the Exact Timing and Path to Recovery Unknown



- The 2020Q2 shock to Houston's payroll employment from COVID and the oil war pushed it down by 273,800 jobs in 2020Q2 and it was still down ***187,200*** jobs in Q3 (Blue Line)
- Employment collapsed, *but a moderate U.S. recession and oil fundamentals alone would* account for only 12,400 lost jobs 2020Q2 and another 23,100 in Q3. The difference – again -- is the COVID shock
- At some point, business cycle fundamentals (including oil, the U.S. economy, and the retreat of COVID) reassert themselves and we return to the Red Line. Where? When?

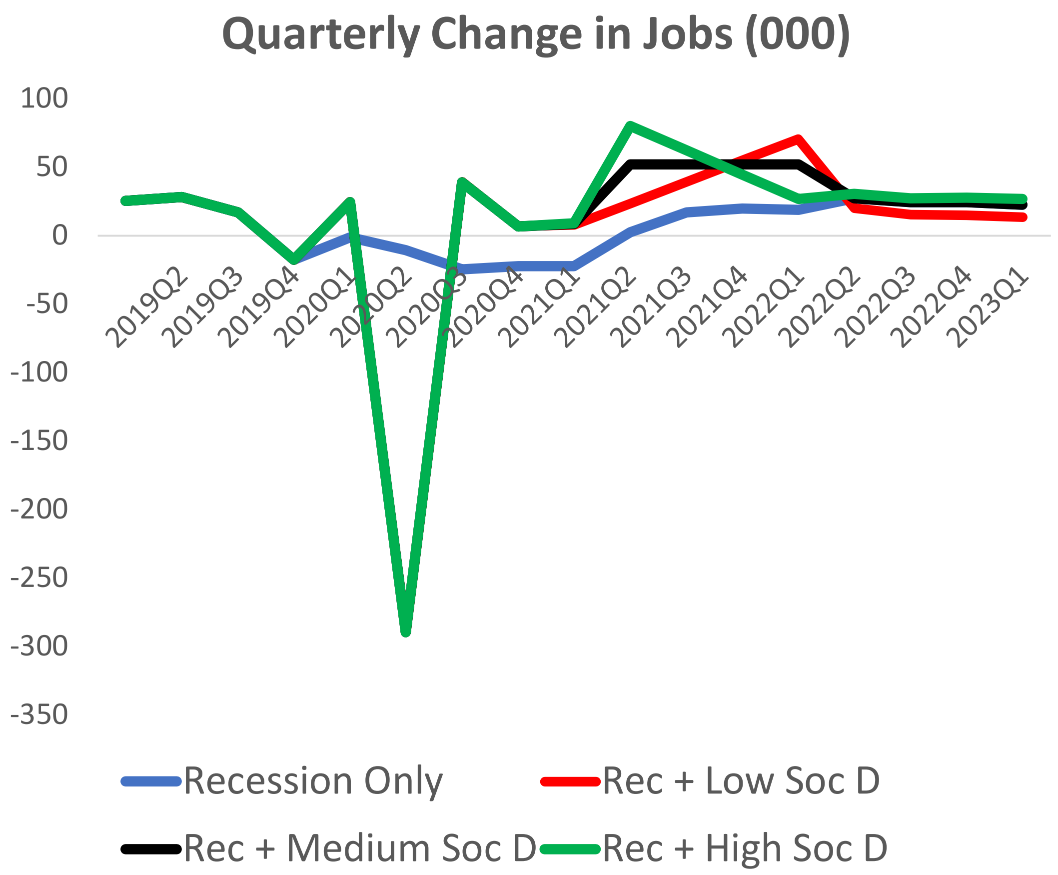
Making Up the Story About Getting from Here to There

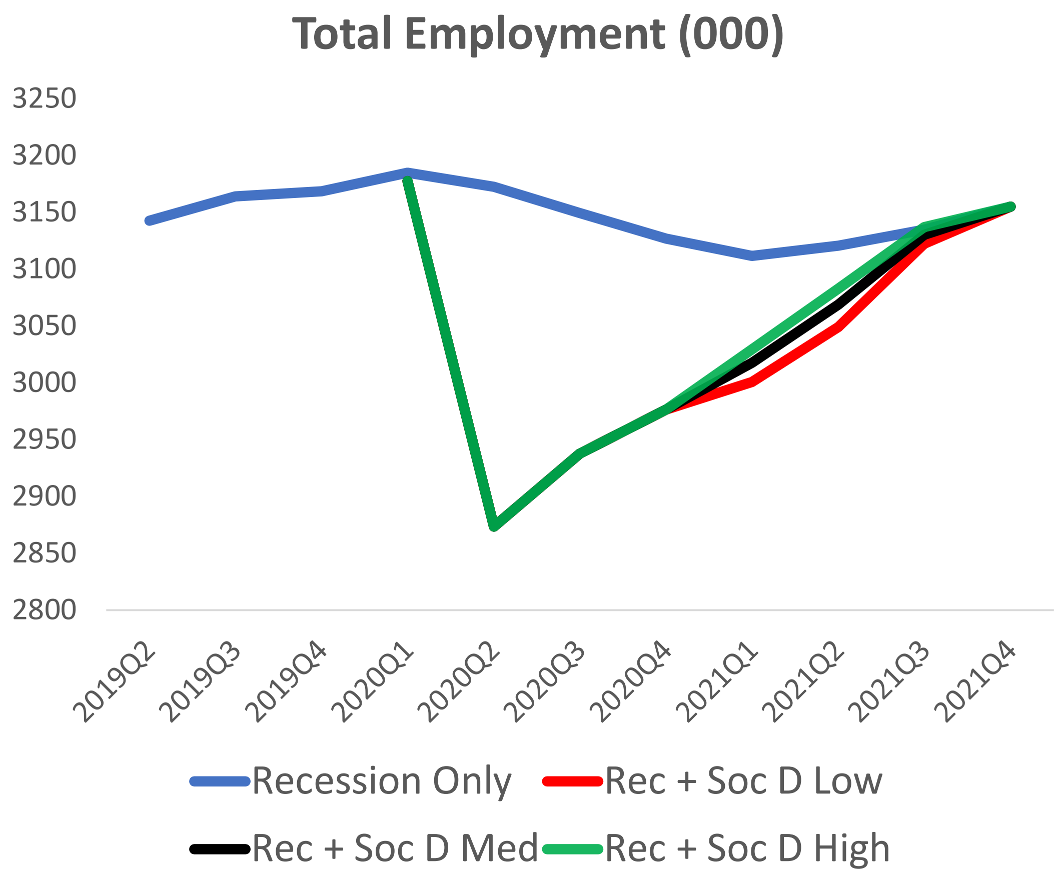
- *We know where we are now …*
- *We know where we are going …* Social distancing disappears by 2022Q2 with the arrival of a vaccine, and Houston is left at the bottom of a moderate recession that is the hangover from COVID and the oil war
- We cannot know what path takes us back from 2020Q4 to 2022Q1. *I would have to know how bad will the virus be this summer and the public health response*
- Beginning this quarter, I need to fill that gap with 217,200 jobs left from the COVID shock in the medium outlook. See below for timing and low and high outlook. It is a hypothetical example. Not a forecast!

Thousand Jobs

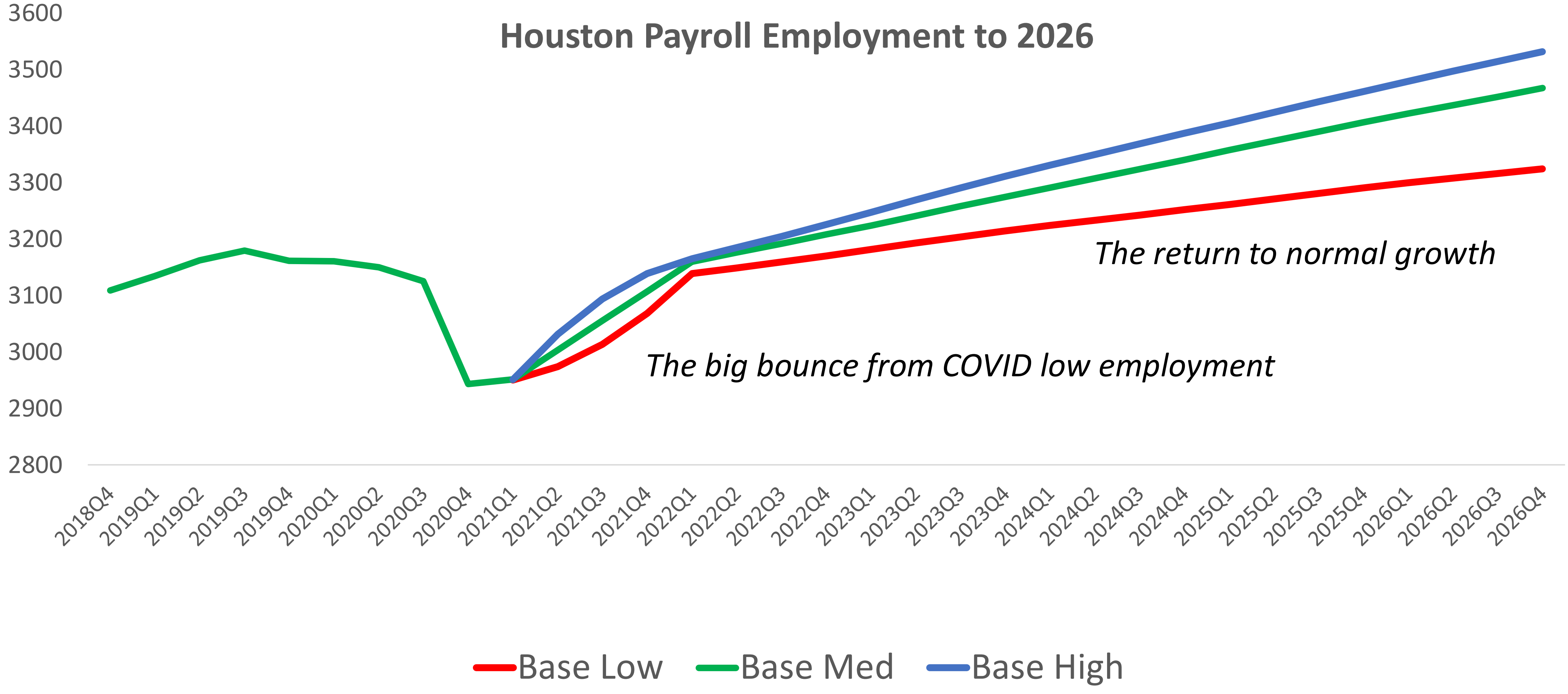
	Worst	Medium	Best
2020Q2	-279	-279	-279
2020Q3	64	64	64
2020Q4	29	27	28
2021Q1	30	27	27
2021Q2	21	44	72
2021Q3	22	30	40
2021Q4	35	28	19
2022Q1	52	32	4

This Is How The End Game for COVID-19 Might Look as Houston Moves Forward



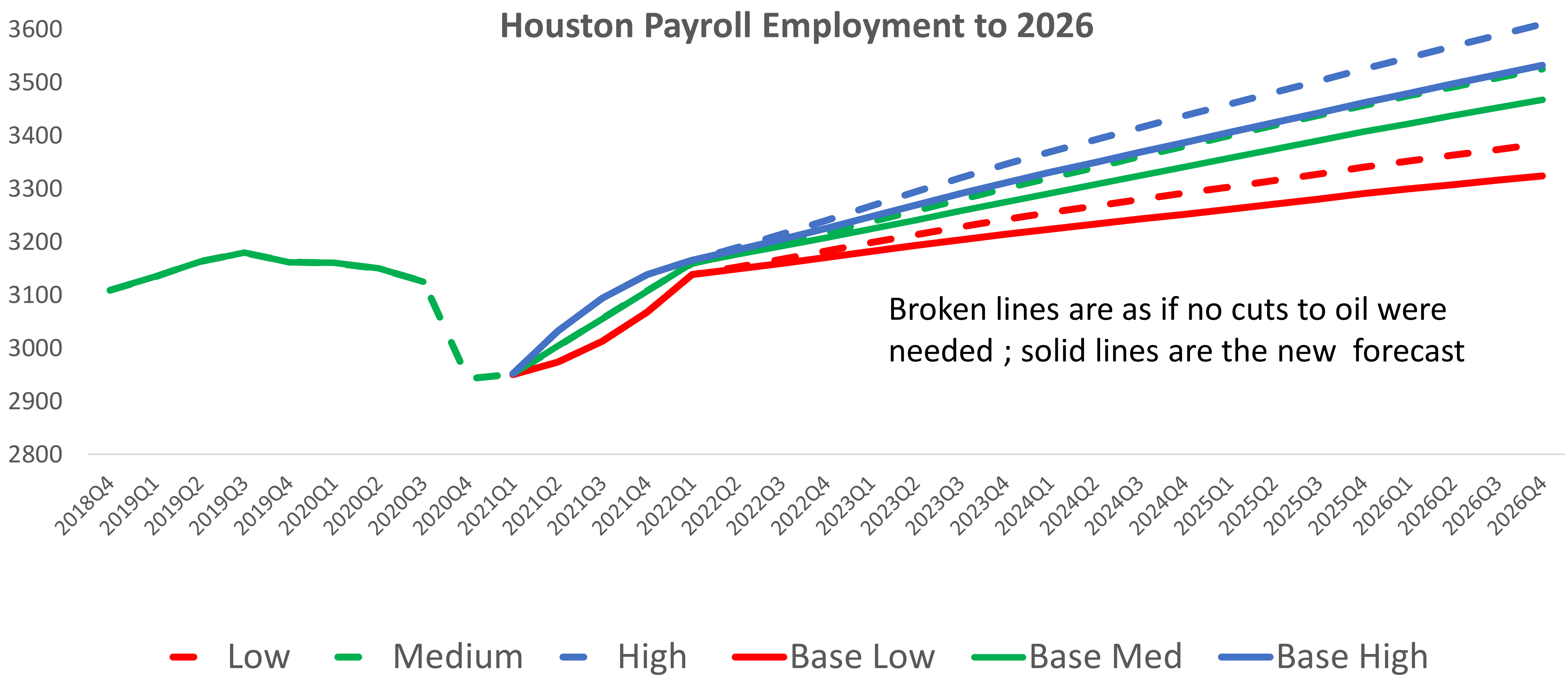


Houston Payroll Employment to 2026 Including the Last of Social Distancing: With Adjustment for Oil



The Base Medium and the High with a new oil financial model lie on top of each other

Houston Payroll Employment to 2026 Including the Last of Social Distancing: Without and With Adjustment for Oil



Contributions to Houston Job Growth 2020 to 2027: Payroll Employment

('000 Q4/Q4)

	Change in Payrolls			Business Cycle Change			Social Distancing			Payroll Growth Rate		
	Low	Medium	High	Low	Medium	High	Low	Medium	High	Low	Medium	High
2019	52.7	**52.9**	52.9	52.7	**52.9**	52.9				1.7	**1.7**	1.7
2020	-218.7	**-219.3**	-219.5	-58.7	**-57.3**	-57.5	-160	**-162**	-162	-6.9	**-6.9**	-6.9
2021	125.8	**164.5**	196.5	16.8	**34.5**	38.5	109	**130**	158	4.0	**6.0**	5.9
2022	102.6	**101.1**	87.0	50.6	**69.0**	83.0	52	**32**	4	3.9	**6.6**	3.6
2023	43.8	**66.8**	85.1	43.8	**66.8**	85.1				1.4	**2.1**	2.6
2024	37.7	**65.7**	76.1	37.7	**65.7**	76.1				1.2	**2.0**	2.3
2025	38.5	**66.3**	74.5	38.5	**66.3**	74.5				1.2	**2.0**	2.2
2026	33.7	**60.2**	70.5	33.7	**60.2**	70.5				1.0	**1.8**	2.0
2027	32.5	**61.0**	73.4	32.5	**61.0**	73.4				1.0	**1.7**	2.0

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Houston and COVID-19:
Nearing the End-Game … But Where Now?

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