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Is Oil Price a Barometer for Houston's Commercial Real Estate?

Shocks to oil prices ripple unevenly throughout the economy. Households feel the pinch, allocating what was once discretionary spending to rising prices while the impact on firms varies. If macroeconomic conditions remain stable, profits may remain unchanged for firms passing along costs while prospects brighten for others, like oil suppliers.

Commercial real estate is similarly nuanced. Households and firms suffer as space demand dwindles while soaring prices plague owners and developers through operating expenses and construction costs. But not all is dreary in a higher oil price environment. Rising tides for oil suppliers lift at least some boats. Some local economies and real estate markets reap the benefits of a strong oil market. Houston comes to mind here. Long known as a major energy hub, Houston's economy heavily relied on the sector as a substantial part of its economic engine in years past.

Given recent geopolitical concerns and whiplashing demand tied to the COVID-19 pandemic, oil prices spiked and should remain elevated for some time. What impact will this have on Houston's commercial real estate? Is the metro's economy in for a boon period? Or, given Houston's growth and diversification into other industries, does oil price and production still sway the market the way it once did?

Analyzing a mix of proprietary and external data, **Houston's booming economy beyond oil appears to buttress it from turmoil in energy prices.** An extended period of elevated oil prices will lead to some gains for commercial real estate, but likely subtly and substantially varied by property type. Hotel and industrial performance follow the oil market closely, while multifamily, retail, and office remain unphased.

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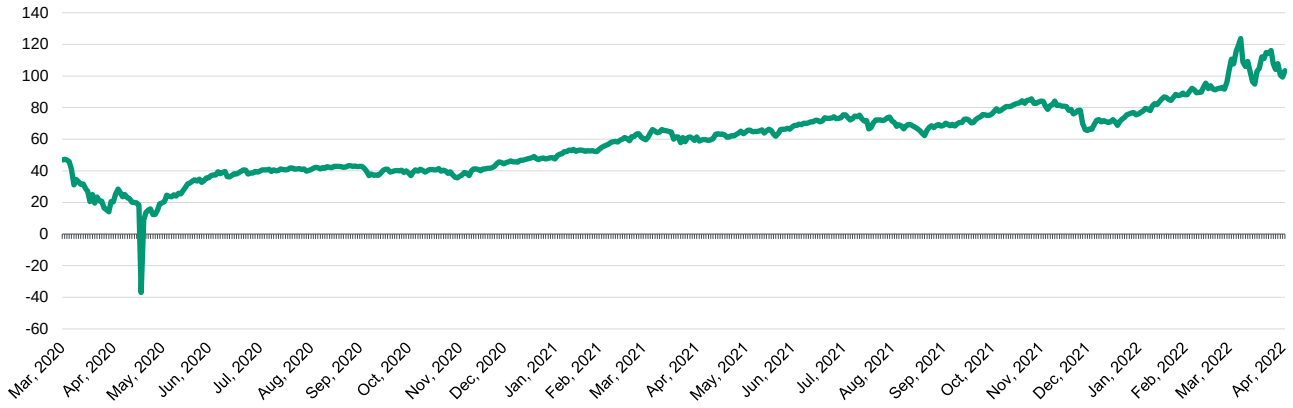
Households are paying $120 more per month to fill their tanks compared to last year

In March, the U.S. inflation rate hit a new 40-year high and half was attributable to the gasoline index[1], a result of the steady climb in the price of crude oil. For every $10-per-barrel increase, regular unleaded gas rises by 30 cents. This costs the typical household $30 more per month to fill their tanks and, collectively, about $35 billion more over a year[2].

As shown in Figure 1, West Texas Intermediate (WTI), the US benchmark for Spot Crude Oil Price, has been on the rise since its quick dip in April 2020 due to nationwide lockdowns at the onset of the COVID-19. The Russia-Ukraine military conflict triggered further disruption and uncertainty in energy supply, intensifying the crude oil price hike at its onset in February. WTI peaked at $123.64/bbl[3] on March 8, 2022, and that was roughly twice of its level from a year ago and 4 times higher than 2020's.

Figure 1 Cushing, OK WTI Spot Price DOB (Dollars per Barrel) 2-year History



Source: Thomson Reuters, U. S. Energy Information Administration

While elevated oil prices weigh heavily on households and the economy as a whole , Houston and other energy markets may actually benefit.

In general, we estimate between $50-$70/bbl oil prices are needed to support industry reinvestment to continuously replace reserves. Late last year, that range increased by 10% due to inflation, rising regulatory, and capital costs.[4] WTI has persistently surpassed the upper end of that range, signaling improvement in financial conditions for reinvestment. The latest Dallas Fed Energy Survey shows oil and gas sector activity accelerated in the first quarter of 2022 and oil production sped up even more.[5]

If these conditions hold steady, is a boom ahead for Houston's economy and commercial real estate? Does a spike in occupancy and rent growth occur alongside subsequent spikes in oil prices? Is this relationship similar for each property type? The relationship is broadly weak, but nuanced. We investigated this phenomenon and highlight five particularly valuable commercial property types.

Past oil and economic patterns

The Federal Reserve estimates that every $10-per-barrel rise in oil prices slashes GDP growth by 0.1% and increases inflation by 0.2%. In the past, oil price surges were often linked to recessions such as the 1973-74 OPEC embargo, 1978-79 Iranian Revolution, 1980 Iran-Iraq war, and Saddam Hussein's invasion of Kuwait in 1990. It may even contribute, partially, to the Great Recession in

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1 Bureau of Labor Statistics, U.S. Department of Labor, The Economics Daily, ***CPI for all items rises 1.2% in March; gasoline, shelter, food indexes rise:*** https://www.bls.gov/news.release/cpi.nr0.htm

2 Moody's Analytics, *Flying Through the Business Cycle, Fed Needs to Land the Plane,* March 24, 2022: https://www.moodys.com/researchdocumentcontentpage.aspx?docid=PBC_1323358

3 The abbreviation 'bbl' refers to a barrel of crude oil. In the oil industry, an oil barrel is 42 U.S. gallons.

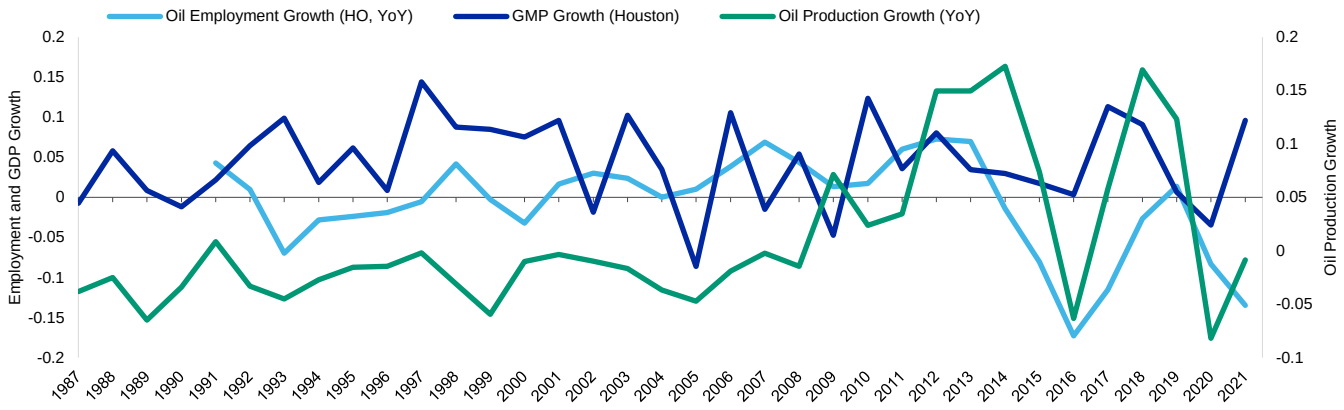
4 Moody's Investors Service, ***Underinvestment and geopolitical tensions pose high risks to oil prices***. https://www.moodys.com/researchdocumentcontentpage.aspx?docid=PBC_1319794

5 Federal Reserve Bank of Dallas, ***Dallas Fed Energy Survey - Oil and Gas Expansion Accelerates as Outlooks Improve Significantly, March 2022:*** https://www.dallasfed.org/research/surveys/des/2022/2201.aspx#tab-report

2007-08[6]. While a persistently high price of oil will hurt the general economy, lower-income households feel the burden most. Low-income households often have less tolerance for price hikes at the pump, as well as indirect costs associated with transportation and shipping, and for oil byproducts such as plastic and nylon. High oil prices also sow economic doubt and insecurity in consumers' minds and undermine overall demand[7].

Zeroing in on oil-producing metros paints a different picture. Theoretically, the higher the oil price and production, the greater employment and local economic performance. Arguably the Energy Capital of the World, nearly every segment of the energy industry calls Houston home, including exploration, production, transmission, marketing, supply, and technology[8]. As shown in Figure 2, domestic oil production rate variations positively correlate to the metro's economic expansion and employment growth historically.

Figure 2 U.S. Crude Oil Production and Houston's Economy



Source: Thomson Reuters, U.S. Energy Information Administration (EIA), Bureau of Labor Statistics, Federal Reserve Bank of St. Louis, Moody's Analytics

However, the relationship between the average annual price of oil and oil production isn't always perfect. Since the mid-2000's, oil production gradually ramped up as oil prices exceeded its reinvestment range (Figure 3).

Recent price shocks may potentially push up U.S. oil production further in the short run, but by how much is still subject to various considerations, including:

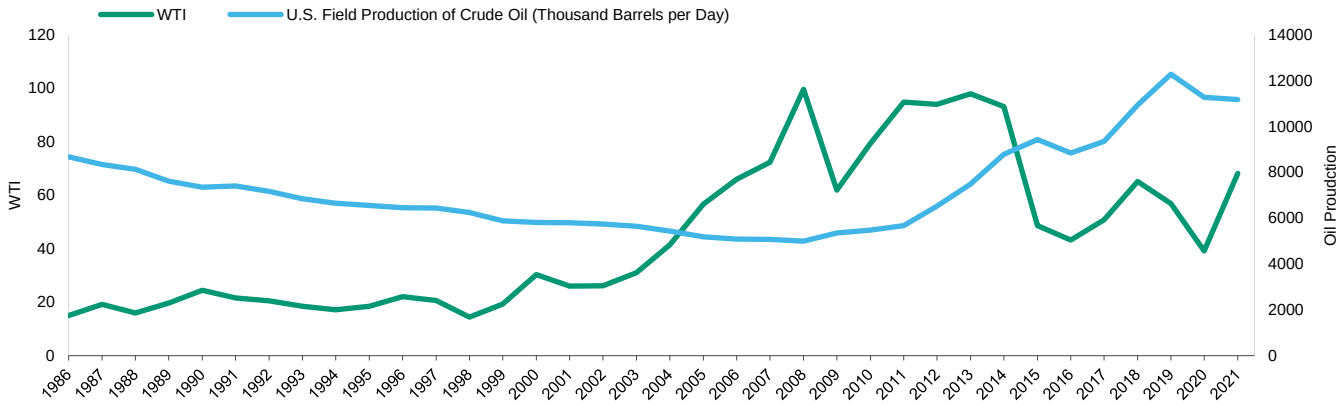
1. The labor and material costs associated with oil exploration and production were already high. It has become even more burdensome due to supply chain constraints, labor shortages, and inflation caused by COVID-19. Rising interest rates also spurred the cost of capital to become more expensive.
2. Since it takes up to a year from decision-making to drilling and finally to supply increases, price shocks must be perceived as somewhat long-lasting or even permanent before oil drilling companies can strategically respond with higher production. If that price shock may be relieved rather quickly, then it may not trickle down to a longer-term production decision. The release of 1 million barrels of oil per day from the U.S.'s strategic reserves over the next six months already dropped oil prices from highs seen earlier in the year.
3. Many oil-drilling companies suffered 'near-death' experiences during the oil price plunge in 2015 and 2016 (later referred as the 'Fracking Bust'). Unnerved by that experience, a conservative approach to prioritize profitability without risking short-term plans in production became popular.

[6] The Hill: ***Does the spike in oil prices presage an economic downturn? March, 2022***: https://thehill.com/opinion/finance/597311-does-the-spike-in-oil-prices-presage-an-economic-downturn/

[7] Federal Reserve Bank of San Francisco: ***What are the possible causes and consequences of higher oil prices on the overall economy?*** https://www.frbsf.org/education/publications/doctor-econ/2007/november/oil-prices-impact-economy/

[8] https://www.houston.org/why-houston/industries/energy

Figure 3 Annual Average WTI and U.S. Crude Oil Production



Source: Thomson Reuters, U.S. Energy Information Administration (EIA)

Given the imperfect relationship between oil price and production, both must be factored into our commercial real estate study.

Fracking and the 'Fracking Bust'[9]

Hydraulic Fracturing, also known as Fracking, is the oil drilling technique to extract oil and natural gas from shale rock.

The history of fracking technology dated back to the Civil War when 'Exploding Torpedo' was first placed close to the oil spot down the well and borehole was filled water. This invention increased production by 1,200% for some wells within a week of implementation. Commercialized fracking that used pressurized treatment was invented in the 1940's and was further combined with horizontal drilling in the 1990's. The innovation and development of fracking technology helped the U.S. become the world's largest oil and gas producer and less dependent on foreign oil.

Booming U.S. shale oil production, however, played an undeniable role in the oil price plunge from mid-2014 to early 2016. While the supply of oil became increasingly abundant, global demand for oil was decreasing. In addition, a strong dollar, OPEC's decision to retain production levels, Iran's nuclear deal, and weakening economies of Europe and developing countries have eventually developed a perfect storm in the oil industry. By the first quarter of 2016, oil prices were teasing below $30 per barrel, lower than its 2009 levels.

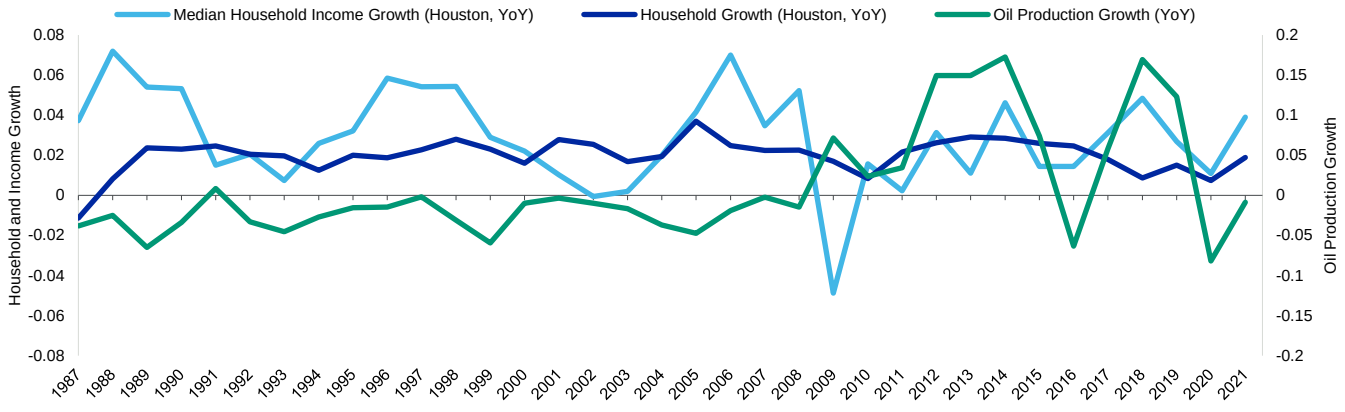
How oil production impacts Houston commercial real estate (CRE)

As the 2010's came to a close, higher oil prices and hydraulic fracturing technology break-throughs made oil production in the U.S. more profitable, and domestic production took off after decades of negative growth. New oil towns like Williston in western North Dakota boomed as the local economy and CRE performance became intertwined with oil price and production[10]. New oil towns detracted from Houston, despite its well-established and diversified economy and development. Especially since the Great Recession, Houston's median household income growth and, to some degree the household growth, were in lockstep with the oil production growth (Figure 4). During this time, the general economy was well in its recovery and expansion period so oil shock such as the Fracking Bust in 2016 could steer Houston's demographic changes. The same relationship held through COVID: oil production synchronized with pandemic-induced supply and demand fluctuations.

[9] John Manfreda, ***The origin of fracking actually dates back to the Civil War***, April 2015: https://www.businessinsider.com/the-history-of-fracking-2015-4

[10] Tad Philipp, Dwayne McNicholas, Kevin Fagan, Moody's Investors Service, March 2014: ***Apartment Rents Gush in North Dakota Energy Boom Towns to Well Above Sustainable Levels***: https://www.moodys.com/researchdocumentcontentpage.aspx?docid=PBS_SF359326

Figure 4 Houston Household and Income Changes in Response to Oil Production



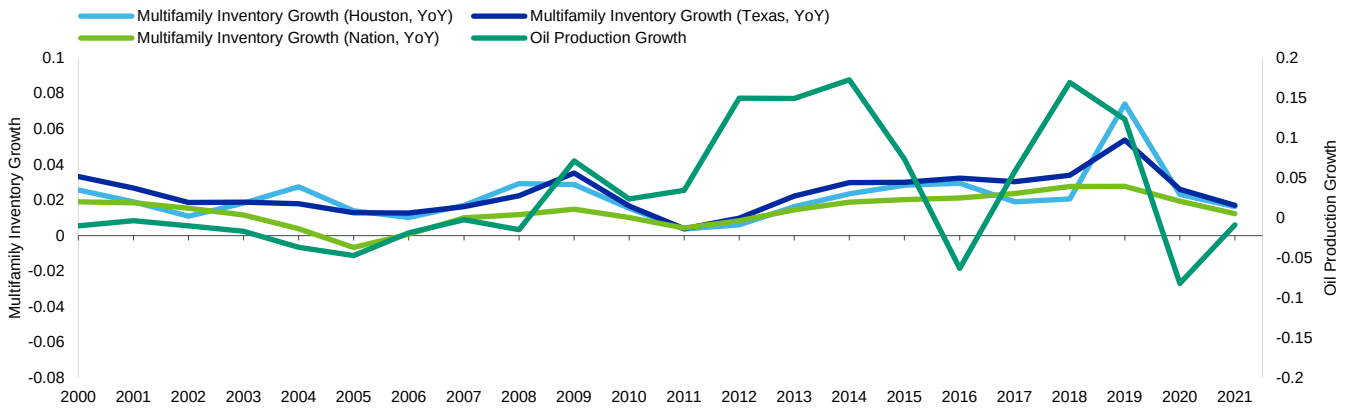
Source: U.S. Energy Information Administration (EIA), Moody's Analytics

Does oil impact Houston's multifamily market?

Multiple economic and demographic factors drive multifamily construction, such as existing inventory, Gross Metro Product (GMP), household formation, employment growth, and more. But by and large, national multifamily growth generally tracks the economic cycle. Houston development typically follows the national economic trends, but the data does show subtle and lagged sensitivity to oil production shocks.

Houston and Texas multifamily inventory growth usually outperform the nation during economic recoveries and expansions due to its large swaths of expansive, undeveloped land ripe for speculative construction (Figure 5). These are also at work during localized economic events such as major oil production swings. The Fracking Bust of 2016 and subsequent recovery is the most recent example of this sensitivity. At first, the bust cooled down Houston's multifamily construction activities, but as production rebounded, so did inventory build up in the following years.

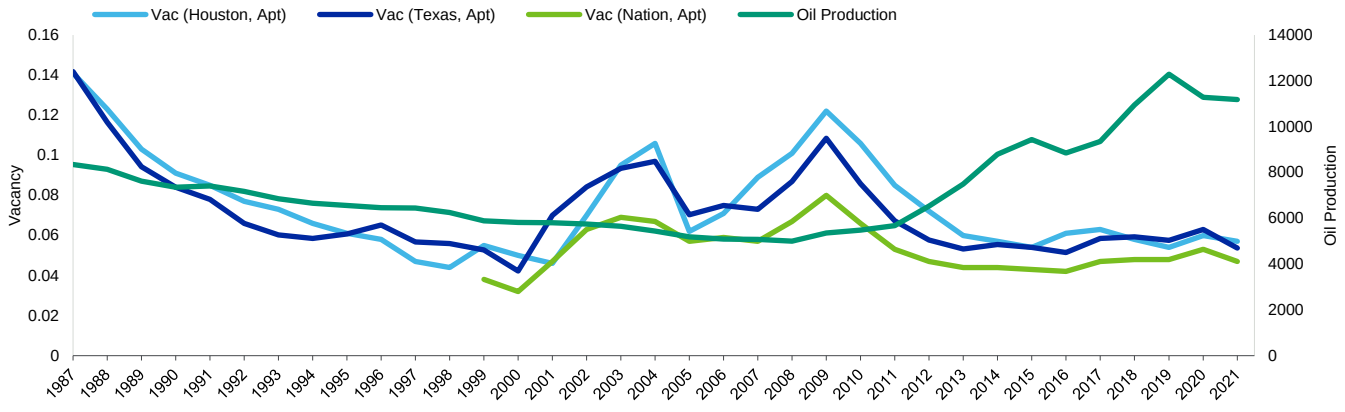
Figure 5 Multifamily Inventory Growth and U.S. Crude Oil Production Growth



Source: U.S. Energy Information Administration (EIA), Moody's Analytics CRE

Multifamily vacancy, a direct result of supply and demand, also showed its cyclicity with the general economy (Figure 6). Over the most recent decade and in light of the rise in oil production, the nation lagged behind Houston's multifamily performance and the Texas average. Houston's vacancy hovered over Texas' average – an average of Austin, Dallas, Houston, and San Antonio – and the national average since the Great Financial Crisis, has been on a steady decline. Vacancy gaps are noticeably shrinking between Texas and U.S. averages and Houston's partly from an extended period of high domestic oil production and market demand creating a favorable local economy.

Figure 6 Multifamily Vacancy and U.S. Crude Oil Production



Source: U.S. Energy Information Administration (EIA), Moody's Analytics CRE

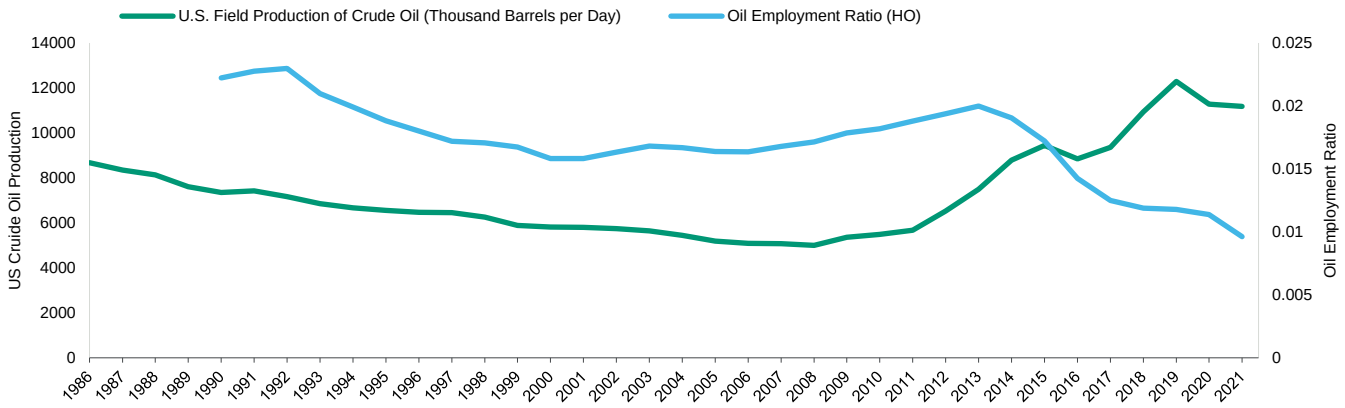
Do oil and office go hand in hand?

Figure 1 highlights how employment growth in Houston directionally moves with oil production.

While a link still remains, Houston broadened its horizon beyond oil. Once a city solely reliant on a single trade much like Detroit was to auto manufacturing, Houston's economy diversified and, in turn, diminished its need for oil. This extended to commercial real estate as well. Today, health care and social assistance, retail trade, food services, finance and insurance, education, and others support the Energy Capital of the World as it shifts away from its dependence on its famed industry.

According to Greater Houston Partnership's calculation, Houston's energy sector only accounted for 7.9% of the region's employment and 3.5% of its firms as of 2020. As shown in Figure 7, even as oil production has ramped up in the last decade, industry employment hasn't. The ratio between oil industry employment and total non-farm employment in Houston area has been steadily declining. The metro's total non-farm employment growth generally exceeded the national average, even during some of the economy downturns. A notable exception was the Fracking Bust which had more unique metro impact on Houston's labor market. Even in this situation, though, employment growth did not turn negative.

Figure 7 Oil Employment Ratio Response to U.S. Crude Oil Production

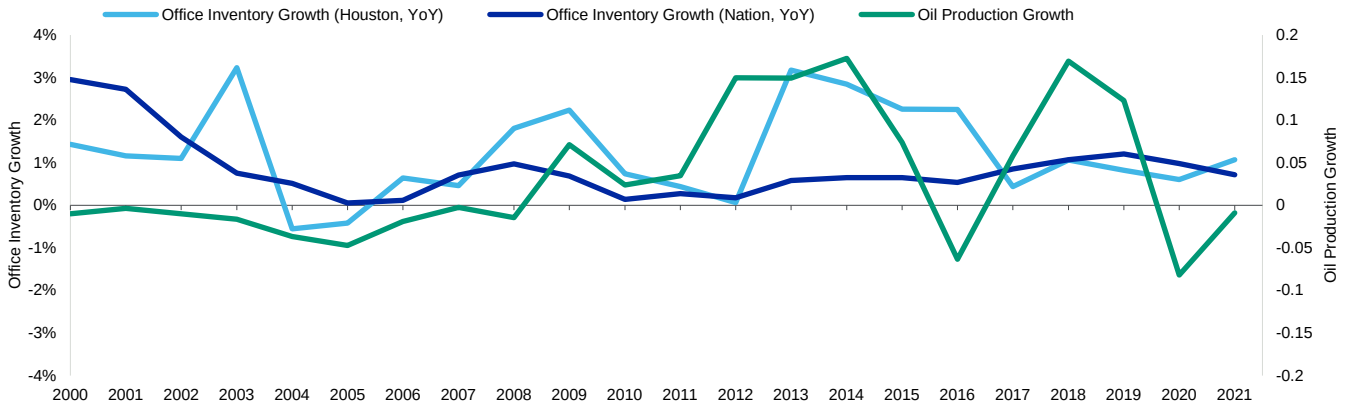


Note: Oil Employment Ratio is author calculated and equal to Oil Employment / Total Non-Farm Employment. Oil Employment data comes from the Oil and Gas Extraction Employment of Houston published by the Bureau of Labor Statistics and Federal Reserve Bank of St. Louis.

Source: Bureau of Labor Statistics, Federal Reserve Bank of St. Louis, U.S. Energy Information Administration (EIA)

Over the past two decades, Houston's office market has shown greater resilience than that of the rest of the nation (Figure 8). While domestic production growth remains salient, economic diversity both props up growth and smooths variability in the office market and construction.

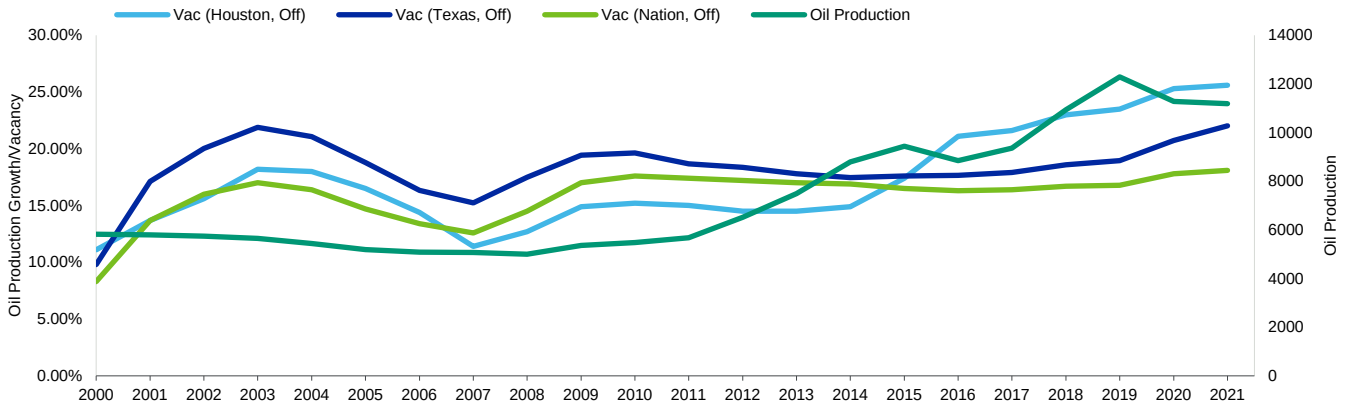
Figure 8 Office Inventory Growth and Oil Production



Source: U.S. Energy Information Administration (EIA), Moody's Analytics

Vacancy is no different. Since the Fracking Bust, oil extraction/service firms consolidated, leaving the office inventory which was built out speculatively more difficult to fill (Figure 9). Houston's office vacancy is ticking up and exceeding Texas or national averages thereafter.

Figure 9 Office Vacancy and the U.S. Oil Production

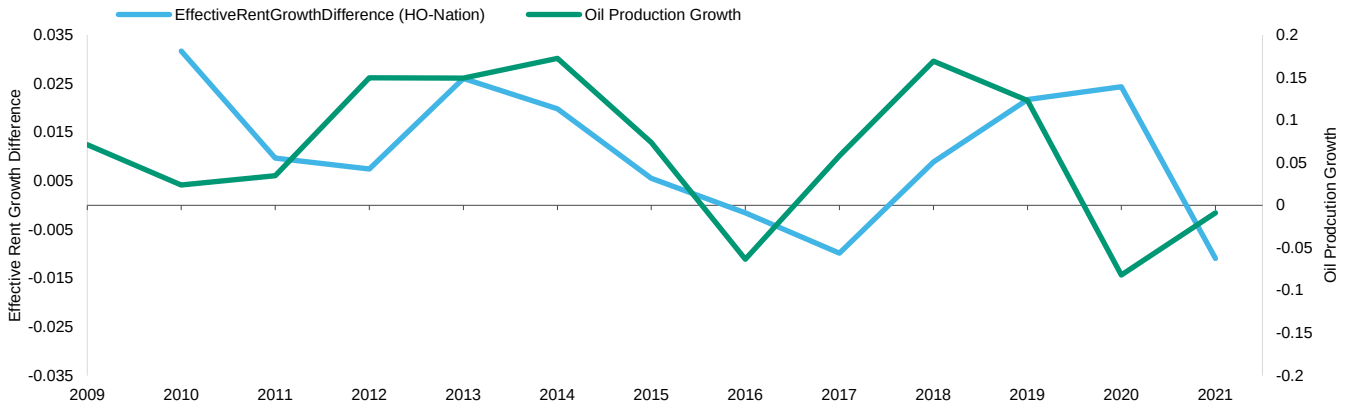


Source: U.S. Energy Information Administration (EIA), Moody's Analytics

What oil production means for industrial

The logistics industry serves as one of the backbones of Houston's economy due to its strategic location at the Gulf Coast of Texas. Much like other commercial real estate sectors, effective rent growth for Houston's warehouse and distribution centers closely follows the nation and has been overall trending up over the past decade. A closer look into differences revealed that Houston has been notably outperforming Texas or the national average nearly every year over the previous decade (Figure 10). Immediately after the two oil production shocks in 2016 and 2020, that marginal effective rent growth (Houston effective rent growth – national effective rent growth) has dipped below zero, indicating a closer bond between oil and industrial than oil and office performance.

Figure 10 Warehouse and Distribution Center Rent Growth vs U.S. Crude Oil Production Growth



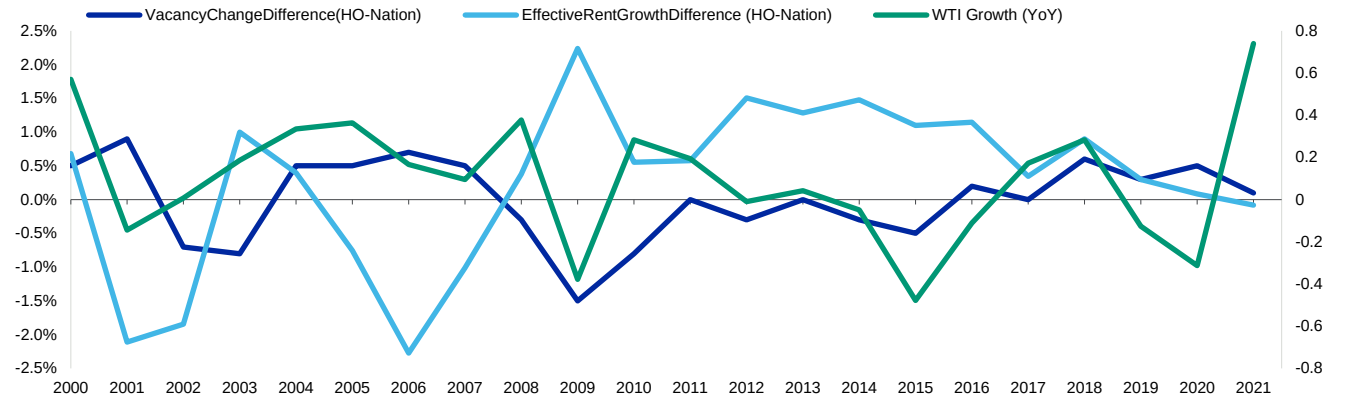
Source: U.S. Energy Information Administration (EIA), Moody's Analytics

Where retail fits in

Houston's retail market outshined the national average since the Great Recession (Figure 11), supported by local consumer spending. According to the latest outlook published by the Bauer College of Business at University of Houston, the sales tax collection from the consumer spending (on retail, food service, accommodation, arts and entertainment, and other services), versus the business spending (by oil, manufacturing, construction, wholesale trade, professional services, etc.) has been evenly split in Houston. Comparing the two, consumer sales has been far more stable apart from during COVID, while business spending showed volatility as a direct result of oil-industry cycle.[11]

However, a subtle transformation emerged since the Fracking Bust in 2016. Increasing pressures from e-commerce and gradual changes in consumer's shopping and dining preferences served as headwinds for the sector's future growth. Oil's booms and busts, and the subsequent wealth changes for local stakeholders will continue to have a moderate effect on consumer spending in Houston. Given the economic diversification in the metro, though, overall shifts in spending habits and the more general economic conditions will be the lead factor in the local retail environment.

Figure 11 Houston Retail Market Performance and WTI



Source: U.S. Energy Information Administration (EIA), Moody's Analytics

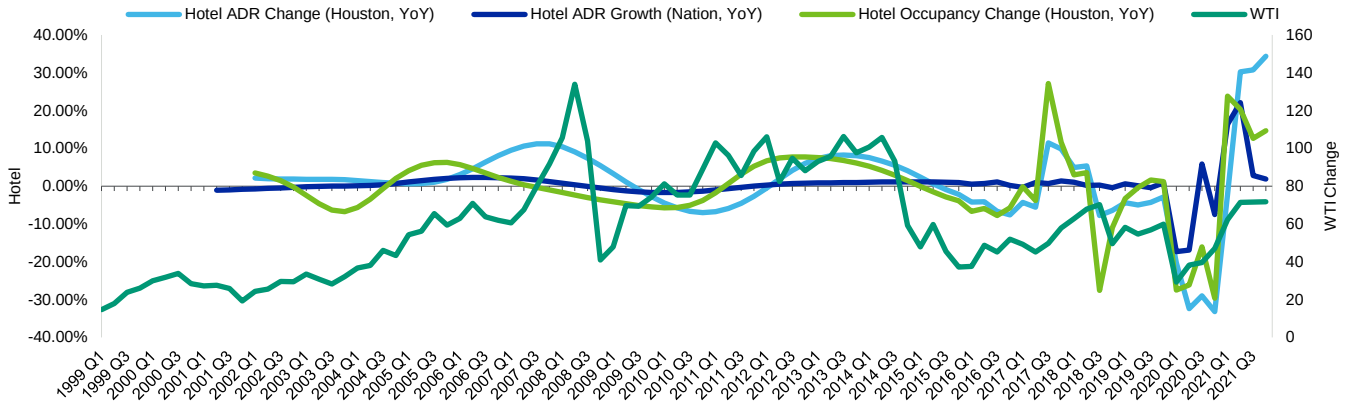
How about hotels?

Houston's hotel data suggests that it is still highly driven by the ups and downs of the WTI oil price (Figure 12). When the oil price dropped, the need for training, meeting, and other business travel in Houston area also dropped. Hotel Average Daily Rate (ADR) and occupancy rate have fallen as a natural outcome. When oil prices rose, business travel and increases in transient labor gained

[11] Robert W. Gilmer, Ph.D., Institute for Regional Forecasting, University of Houston, ***The Economic Outlook for Houston After the Pandemic***, March 2022: https://www.bauer.uh.edu/centers/irf/houston-updates.php

momentum for hotels. Overall, given the high variability of the oil market, temporary lodging for changing labor demand is quite important. Houston's hotel ADR and occupancy deviated from the national average due to oil.

Figure 12 Hotel Performance and WTI



Source: U.S. Energy Information Administration (EIA), Moody's Analytics

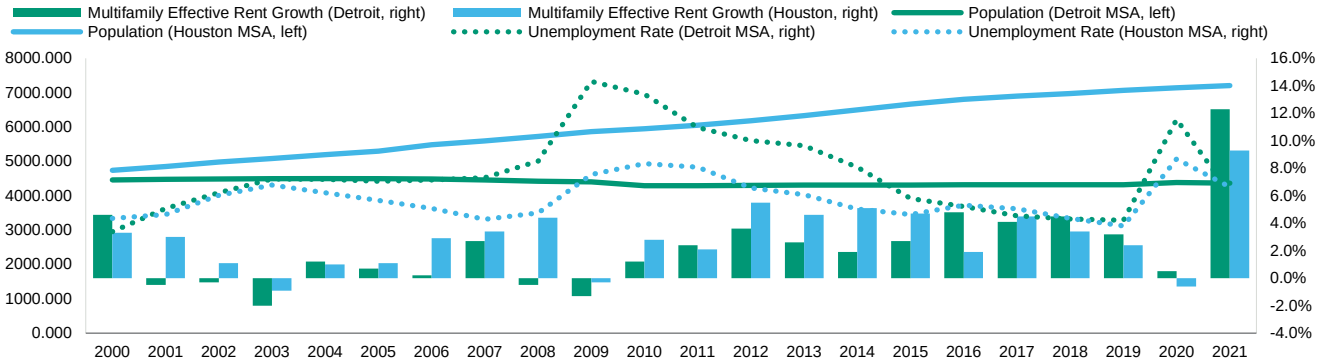
What all this means for Houston

Oil is the lifeblood of Houston, but the metro's fate is no longer solely determined by the oil industry. Population growth and city development attracted corporations from various sectors to either operate or even headquarter in the Houston area. Future downturns in the oil industry are no longer the death knell for the rest of Houston due to its diversified economy.

On the flip side, though, elevated oil prices don't automatically equal a boom to the metro. This contrasts the late 20th and early 21st century experience of cities such as Detroit. Detroit's high reliance on the auto industry as domestic automaker market share was declining coupled with migration away from the Midwest proved to be too much to sustain economic vibrancy, a challenge that plagues the city to this day (Figure 13).[12]

Contrast this with Houston's now diversified economy. It is also home to one of the highest concentrations of engineers in the nation, covering all disciplines including civil, mechanical, petroleum, industrial, electrical, and chemical. This relevant talent pool will act as fuel to the long-term transformation of the oil industry to meet higher ESG standards, as well as attract innovating firms and industries in need of such skilled labor.

Figure 13 A Tale of Two Cities: Houston and Detroit



Sources: U.S. Bureau of Labor Statistics, U.S. Census Bureau, Moody's Analytics

Today, half of Houston's local economy is closely correlated with oil and gas related industries, while the other half is influenced by national business cycle. Each local commercial real estate sector has shown different resilience to the oil price changes and the crude oil production. Hotels are the most sensitive to changes in the oil price, followed by industrial. Retail was the most insulated from oil shock, as many other factors are also reshaping its fundamentals. Multifamily and office do exhibit higher volatilities during each oil boom and bust, but the relationship is fading, especially for the office sector where long leases require more long-term planning that a short-lived fluctuation in oil price may not move the needle.

Further, oil prices and oil production have never had an exact linear relationship and the relationship may weaken further moving forward. With the ongoing campaign on decarbonization and the constant technology innovation, there will be more uncertainties around oil price, its impact on the oil production and oil industry related employment. These uncertainties will affect Houston, but as expressed in this paper, the now much more diversified economy in the metro will prevent significant oil related variability to commercial real estate in the area.

Finally, it is also important to contemplate how changing oil, and more generally energy prices, are not isolated events. Higher oil cost usually works into other parts of the economic puzzle and lead to higher cost for logistics, construction, agriculture, petroleum byproduct, and so on. Its impact will quickly ripple across the supply chain and affect multiple economic sectors. **Elevated oil prices can have continuous and profound impact by lengthening the COVID recovery timeline, worsening an already heightened inflation, escalating geopolitical conflicts, leading to more hawkish Federal Reserve monetary policy, and even influencing the world's energy policy decision.** So the direction and lead time for each commercial real estate sector's performance reaction remained fluid in Houston.

[12] When industries are more diversified in Detroit over the recent years, its labor market is revitalized and multifamily market started to recover and even weathered through the pandemic.