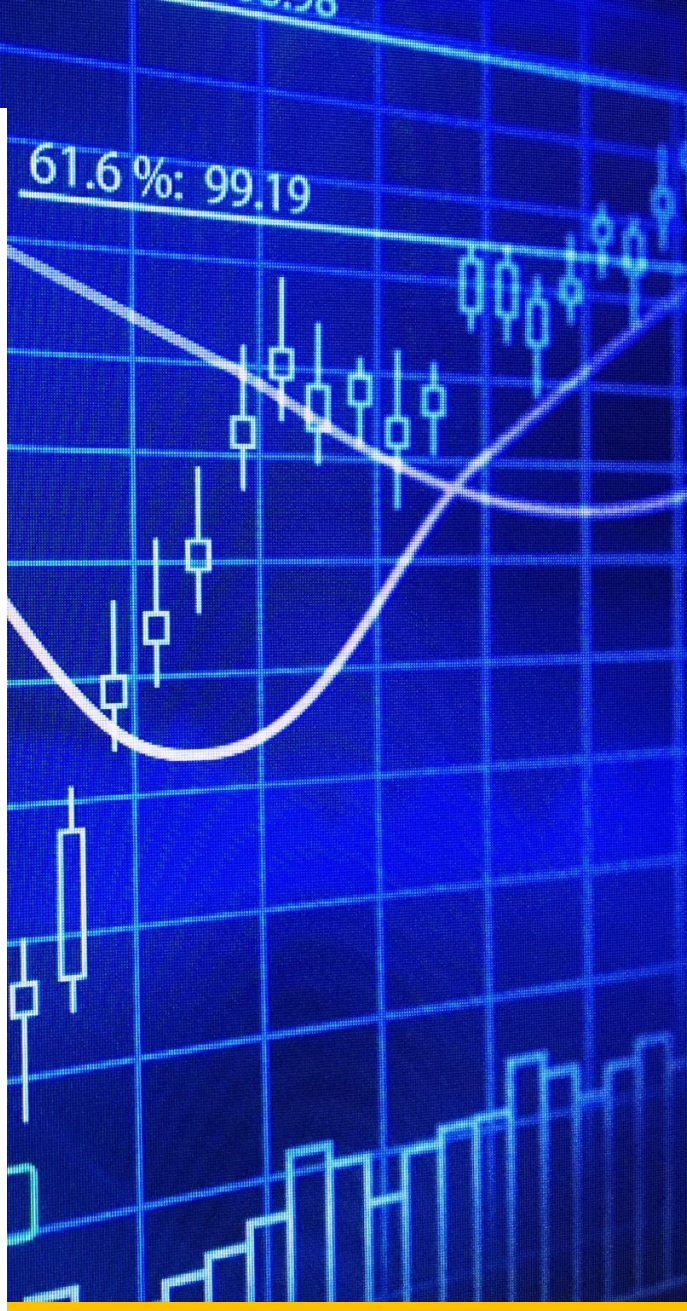

Crude Price Swings

The struggle to balance the market

AIA Global
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Introduction

Crude oil is one of the most actively traded commodities in the world, and its price impacts prices of many other commodities, including gasoline and natural gas. The ripple effect of crude oil prices also impacts the price of stocks, bonds, and currencies around the globe. Crude remains a major source of energy for the world, despite increased interest in the renewable energy sector. Crude oil prices have recently shown signs of increasingly larger fluctuations, or volatility. The Global Energy Institute states that,

> Price volatility refers to the degree to which prices rise or fall over a period of time. In an efficient market, prices reflect known existing and anticipated future circumstances of supply and demand and factors that could affect them. Changes in market prices tend to reflect changes in what markets collectively know or anticipate. When market prices tend to change a lot over relatively a short time, the market is said to have high volatility. When relatively stable prices prevail, the market is said to have low volatility. (Global Energy Institute)

Factors that influence the oil markets include geopolitical and economic events, OPEC and non-OPEC supply, petroleum product markets, and economic growth, particularly in emerging markets or non-OECD countries. Due to the increasing price fluctuations, crude is extremely difficult to forecast, but approached in this paper by finding correlations in historical data. More specifically, crude inventory and price data. To foresee where the market is headed, it is crucial to understand today's petroleum industry and its historical context. Furthermore, this paper covers several eras to provide insight on oil fundamentals, industry shocks and responses, and price swings.

A Brief Introduction to Crude Oil

Crude oil, petroleum, or "black gold" is a fossil fuel that is formed beneath the Earth's surface. It is the result of organic compounds that are subjected to intense heat and pressure for millions of years. In the oil industry, the "upstream" sector is in charge of extracting petroleum from the ground. The majority of the world uses conventional drilling to extract oil, whereas the U.S. uses hydraulic fracturing. This method includes injecting water, sand, and chemicals underground at high pressures to split open rock layers and

release oil. It is essentially valueless in its raw state, yet it is the leading commodity in world trade. It is most useful once it is processed by petroleum refineries.

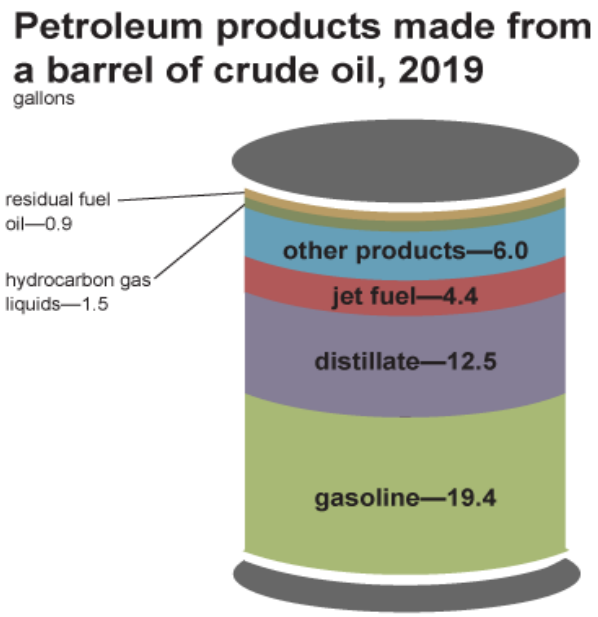


Figure 1
Petroleum Supply Monthly (2020)
Source: U.S. Energy Information Administration

The "downstream" sector transforms crude oil into profitable petroleum products through a 3-step process which includes distillation, conversion, and treatment. The first stage for all refineries focuses on the initial distillation in which the barrel of crude oil is heated and separated into its component parts. The following processes focus on transforming lower-valued products, such as bunker fuel suited for ships, into higher-value products, such as gasoline for automobiles. They also remove sulfur and other impurities, as well as various chemical transformations performed under specific temperature and pressure conditions. Oil refineries vary greatly depending on local crude availability and desired product output. Some undertake particular steps of the process exclusively and some produce consumer products.

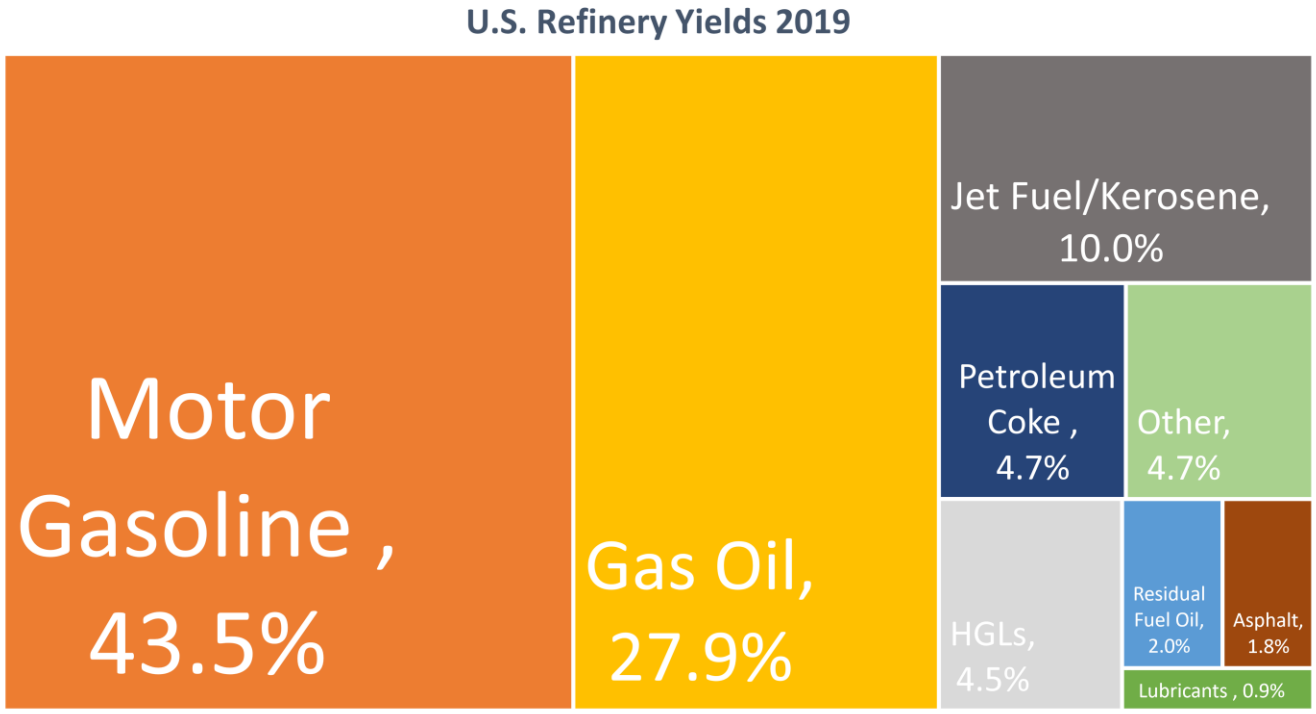


Figure 2
U.S. Supply and Disposition (2019)
Source: U.S. Energy Information Administration

Originally, crude oil's most important consumer product was kerosene. It was cheaper, brighter, and less explosive than competing fuels, so it was perfect for lighting the dark. Today the majority of crude oil goes into making gasoline, diesel, jet fuel, and home heating oils as shown in Figure 2, but in total there are over 2,000 products made to individual specifications.

Crude oil is one of the most heavily traded commodities globally, a favorite amongst traders because of its high volatility. Storage plays a key role in balancing the supply and demand levels in the market. We will discuss the impact of storage levels on crude prices in further detail later.

History's First Major Price Swings

As mentioned before, during the 1850's kerosene was used for lighting and lubrication because it illuminated the dark more safely and efficiently than coal and turpentine. However, the industry was still trying to figure out how to produce large amounts. In 1855, Benjamin Silliman Jr., a chemist from Yale University, released a report confirming the use of petroleum as an illuminant and lubricant. His findings were so influential it changed the scenery of Titusville. Still, crude oil was difficult to produce. To put it into perspective, the United States burned nearly 500,000 barrels of whale oil and 600,000 barrels of lard and tallow oil in 1858. Meanwhile, only 1,183 barrels of crude oil were burned during this time. It was in short supply and considered a luxury until James Townsend recommended applying a technique used by salt producers, known as the boring process. With the help of Edwin Laurentine Drake, Townsend founded the Seneca Oil company and in 1859 they finally struck oil. Production escalated from six gallons per day to 40 barrels. The word quickly spread, and investors flocked to Titusville. Landowners in the area who struck oil became rich instantly. Contrarily, wells that came up dry left investors in disarray. Investors also faced risk due to the misconceptions about the geology of oil. Landowners believed that by quickly drilling, they could capture more of the oil pool than their competitors. This misbelief led to overproduction and manic drilling. So, when new gushers were discovered there was often not enough storage to contain the oil. This resulted in a major price bust. From January 1860 to January 1862 oil prices crashed from $20/bbl to as low as $0.10/ bbl. By 1864, demand increased thanks to the civil war, and prices were back up to $10/bbl.

This boom-bust cycle continued as global demand expanded and wells were discovered or shut down. The extreme price swings of crude price can be seen since the birth of the industry and its volatility is a common theme for eras to come. The crash of 1862 is evident in Figure 3 below.

By 1878, John D. Rockefeller's company, Standard Oil, controlled 90% of the nation's refining capacity. His massive influence on the market led to the stabilization of prices between 1880 and 1911. Demand greatly increased because of World War I, and by 1919 gasoline replaced kerosene as product leader of the American petroleum industry. Prices soared from $0.40/bbl in 1915 to $3.50/bbl in 1920. Consequently, the price boom attracted investors, and production increased. To everyone's disappointment, the oversupply caused prices to fall to $1.00/bbl in 1921. Without a dominant control of supply, prices continued to rise and fall, and the second large volatility era pursued. Prices fell even further to $0.10/bbl in 1931 after the discovery of the "Black Giant," an enormous well at Rust County in East Texas.

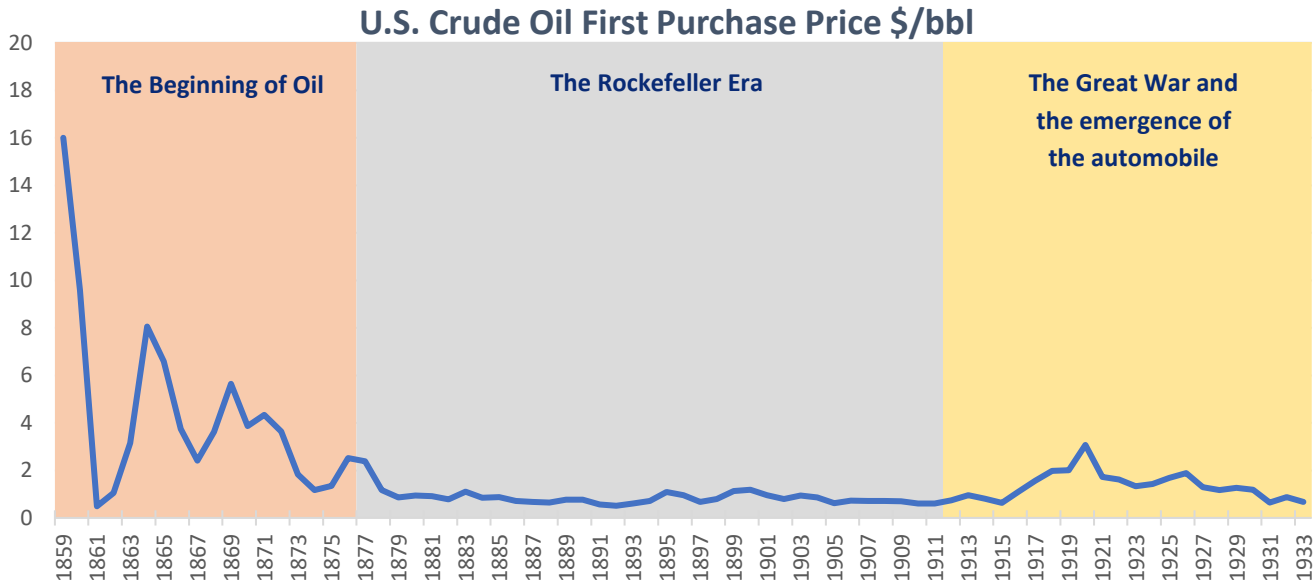
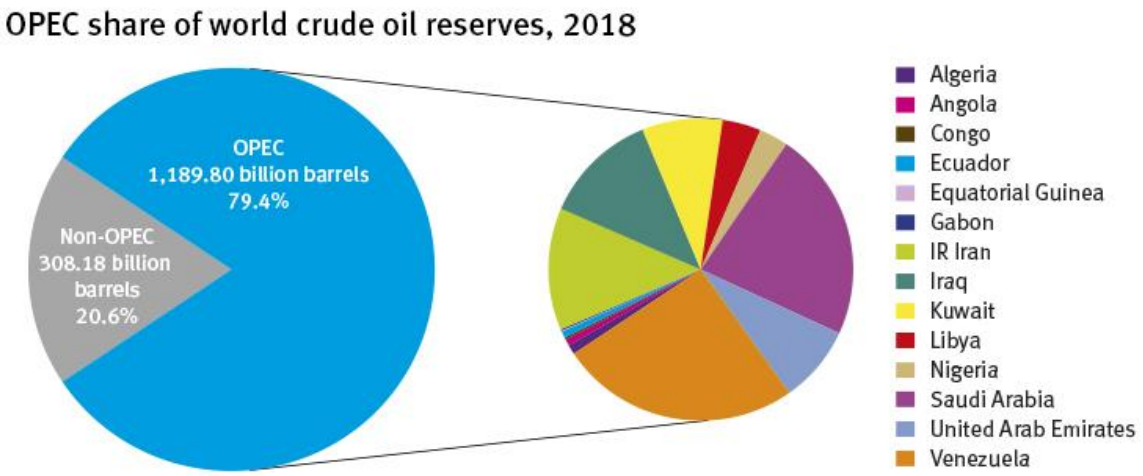


Figure 3
U.S. Crude Oil Prices
Source: U.S. Energy Information Administration

Along with the U.S., the rest of the world had an immense amount of oil in stock after fears of peak oil spread in the early 1920s. So, in 1928, the continuous crude price swings proved to be an international issue when a kerosene price war in India threatened the global oil market. To prevent any further damage, Mobil, Shell, and British Petroleum (BP) ultimately split the market. Soon after, BP, Exxon, and Shell collaborated to create a cartel in the Middle East. By 1932, Mobil, Gulf, Texaco, and Atlantic partnered up with them, to form what is now known as the "Seven Sisters". The cartel reigned over the worldwide oil market for decades until the rise of OPEC.

The Rise of OPEC

The Organization of the Petroleum Exporting Countries, or OPEC, is an international cartel that “coordinates and unifies the petroleum policies of its Member Countries and ensure the stabilization of oil markets in order to secure an efficient, economic and regular supply of petroleum to consumers, a steady income to producers, and a fair return on capital for those investing in the petroleum industry." OPEC was created in 1960 after the Seven Sisters, dominated the global petroleum market for decades. The U.S. domestic energy sector felt threatened by the cheap oil flooding from the Middle East. Even as the nation transitioned into importing oil, they didn’t want to rely on cheap oil imports. To prevent this, they placed quotas to limit the number of oil imports. Other major oil countries also had similar fears. Accordingly, Venezuela, Libya, Iran, Saudi Arabia, and the Soviet Union entered agreements with nonmajor or independent producers. By the late 1950s the Seven Sisters began to lose market power. With so much competition, prices began to fall and from September 1959 to August 1960, prices fell a total of 15%. As a result, Saudi Arabia, Venezuela, Iran, Kuwait, and Iraq united to manage the supply of oil an in attempt to stabilize price volatility. Thus, OPEC was formed.



OPEC proven crude oil reserves, at end 2018 (billion barrels, OPEC share)

Venezuela	302.81 25.5%	Kuwait	101.50 8.5%	Algeria	12.20 1.0%	Gabon	2.00 0.2%
Saudi Arabia	267.03 22.4%	UAE	97.80 8.2%	Ecuador	8.27 0.7%	Equatorial Guinea	1.10 0.1%
IR Iran	155.60 13.1%	Libya	48.36 4.1%	Angola	8.16 0.7%		
Iraq	145.02 12.2%	Nigeria	36.97 3.1%	Congo	2.98 0.3%		

Figure 4
OPEC share of world crude oil reserves, 2018
Sources: OPEC Annual Statistical Bulletin (2019)

Today, OPEC consists of 14 nations and together supplies about 79.4% of world crude oil reserves. Likewise, OPEC+ generally refers to an unofficial collective group led by Saudi Arabia, Russia, and Iraq. Together they account for about 36% of the world's exported oil.

Whether or not OPEC has managed to stabilize prices is up for debate, however, their influence is evident. In 1973, during the Yom Kippur War, five Arab OPEC representatives and Iran raised oil prices 70% in two months. They threatened to cut production by 5% per month until Israeli forces left territory. Additionally, Saudi Arabia and other Arab nations embargoed the U.S. after they announced a major aid program for Israel. Although the U.S. didn't change its policy, together the members of OPEC exceedingly accelerated oil price increases, sent domestic gasoline prices skyrocketing, and rattled America. In response to the embargo and higher domestic gasoline prices, Congress passed the 1975 Energy Policy and Conservation Act, which directed the president to ban crude oil exports except for select types of oil.

In 1990, Iraq invaded Kuwaiti and prompted the Persian Gulf War. With Kuwaiti and Iraq out of the market, oil was in short supply and prices doubled from $17/bbl to $36/bbl. OPEC managed to stabilize prices with its spare oil capacity and increase in production. In like manner, the U.S. released its emergency petroleum reserves and prices fell back to its original levels. More recently, during the 2008 Global Financial Crises, WTI crude prices fell from a high of $145.31/bbl in July 2008 to a low of $30.28/bbl in late December that same year. OPEC responded by cutting output in early December. After prices persisted, in January 2009, OPEC made the largest production cuts in its organization's history. By the end of the year, prices rebounded to $79.39/bbl. OPEC's alliance has been eminently productive and beneficial, to say the least. In times of uncertainty, their coordination has proven to be reliable. However, since 2011 or the beginning of the shale revolution, OPEC's control of oil prices has diminished. In fact, we can quantify fluctuations of crude prices by taking the standard deviation of monthly price changes from different periods. From, 1960-2010, the standard deviation of price changes was 23.7%. Meanwhile, 2011-2020 data shows a standard deviation of 24%. In other words, after the recession crude price changes tended to be further from the average price change than before, suggesting a lack of control of supply.

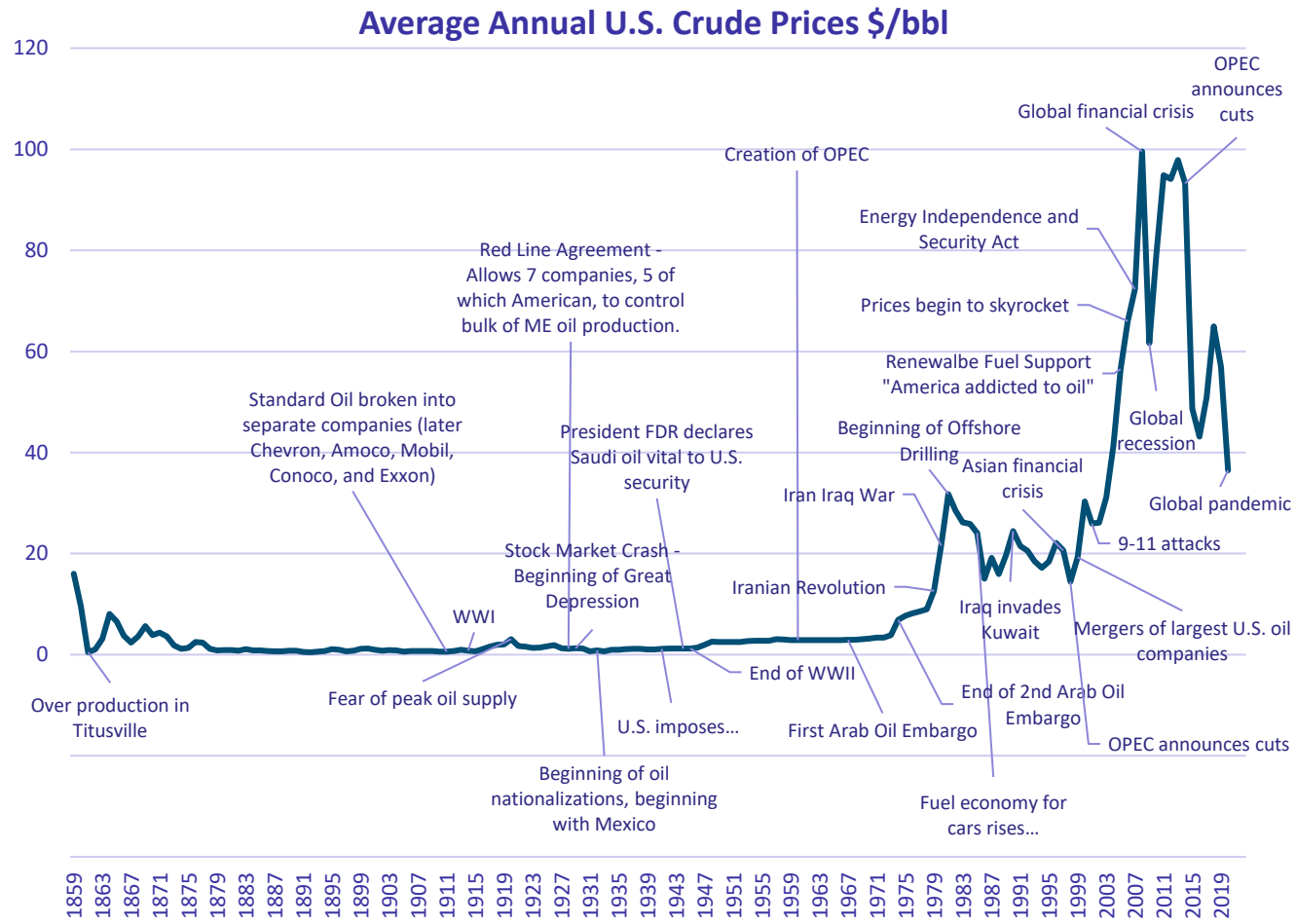


Figure 5
Average U.S. Crude Price (1859-2020)
Sources: EIA

The U.S. Shale Revolution

In the last decade, oil prices have plummeted twice. Prices reached over $100/bbl for the first time since the Great Recession, in March 2011. It seemed as if the industry was recovering, up until 2014. While the U.S. began to increase oil shale production, China and Europe's demand for oil began to fall. OPEC members appealed for production cuts from Saudi Arabia, but to protect market share, they did not comply. On Thursday, November 27, 2014 (U.S. Thanksgiving Holiday), OPEC members met at Vienna and announced that they would keep current production in place amid a growing surplus of crude in the global market. Brent prices fell from $78/bbl the day prior to the meeting on November 26th to $60/bbl by mid-December. OPEC had to make a strategic decision. If OPEC would have cut production to keep prices from falling, then the U.S. shale producers would have likely continued to produce and flood the market. As a result, amid tepid demand at the time, prices would have softened and eventually fallen again. This would have certainly given

the U.S. more market share. Leaving production rates at the same level with tepid global demand however, would cause prices to fall to the point where the marginal producer has to curtail production, and perhaps shut down operations. If we look at the global crude production cost curve in 2014, as shown in Figure 6 below, we can see that the U.S. shale producers are amongst the marginal cost producers on the right side of the curve. Producers on the furthest right of the cost curve are at risk of shutting down if demand declines, supply increases, or a combination of both. The only downside for OPEC producers is lower revenue from crude exports and enduring budget deficits. Many speculated that OPEC believed their competitors in the west would go bankrupt if prices were driven down by an increase in production.

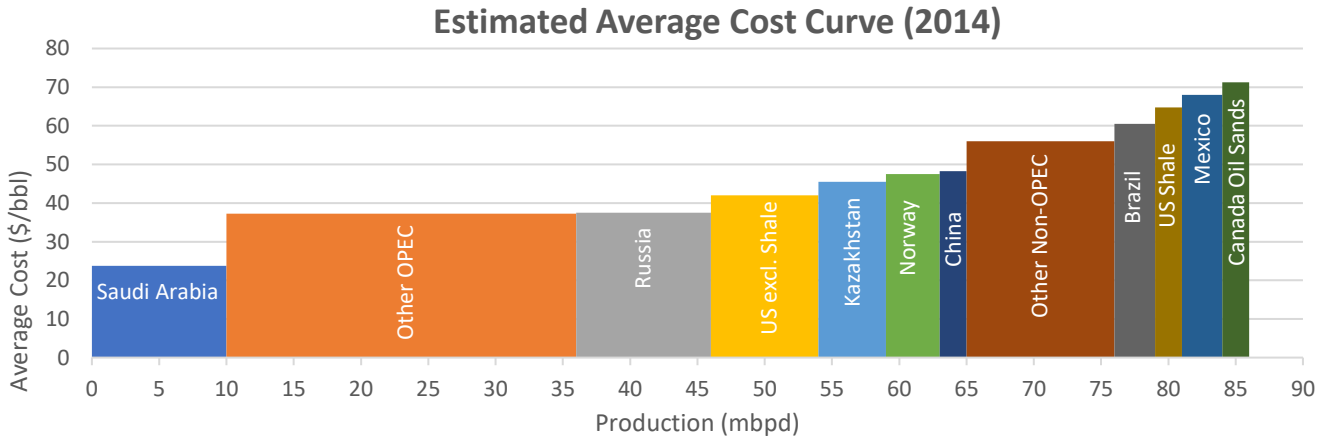


Figure 6
Estimated Average Crude Production Cost Curve (2014)
Sources: AIA Global Research

The U.S. House of Representatives voted on October 9, 2015, to lift the crude oil export ban driven by a boom in U.S. drilling. Congress voted in December to lift the 40-year-old ban on crude oil exports as part of a broader spending bill that averted the possibility of a government shutdown. Ironically, the same low crude prices that generated momentum for lifting the crude export ban slowed drilling activity in response.

Larger producers in the U.S. remained resilient by lowering production costs, but Saudi's tactics caused smaller firms to go bankrupt. The huge oversupply and falling demand caused oil prices to fall to $50.05/bbl by January 2015 and hit a low of $26.19/bbl in February 2016.

In November 2016, OPEC announced that 11 of its members and 11 non-OPEC countries, led by Russia, would reduce crude oil production starting the next January. The drop in crude prices forced U.S. tight oil producers to seek ways to cut costs. The new technological

methods employed to lower shale production costs included high-tech equipment, data analytics to determine the most strategic locations for new wells as well as the precise amounts of sand, water, and chemicals needed to maximize the amount of oil a well produces. Additionally, producers were able to increase productivity from new wells by drilling longer laterals. Declining oil prices eventually stabilized, and by October 2018 prices were back up to $73.18/bbl.

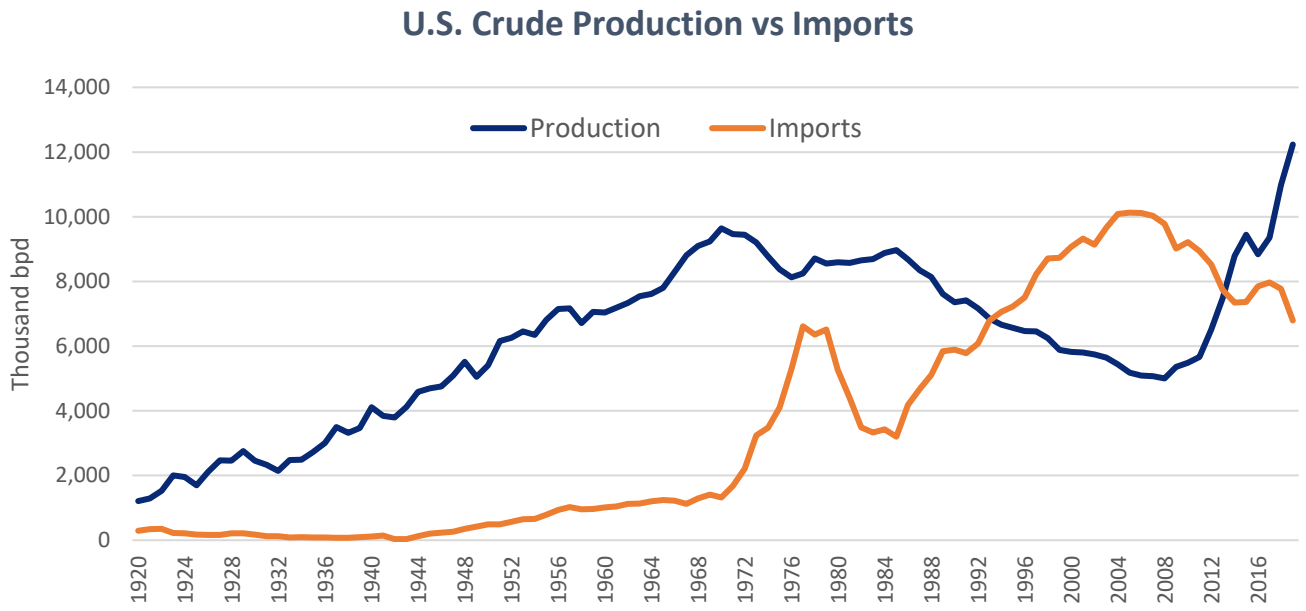


Figure 7
U.S. Crude Production and Imports
Source: U.S. Energy Information Administration

In 2019, the U.S. imported the least amount of crude oil in 23 years, and at the same time domestic production surged to over 12.1 mbpd. The fall in imports was a result of falling Venezuelan oil shipments to the U.S. due to sanctions against the government, as well as curtailed cargoes from Saudi Arabia in an effort to reduce the supply glut in America. Crude output in the U.S. more than doubled over the past decade, and America surpassed Saudi Arabia and Russia to become the world's leading producer.

The Perfect Storm

Petroleum prices nosedived again in the first quarter of 2020. During the COVID-19 pandemic, the world was advised to stay indoors. China, Italy, the U.S., and more closed large portions of their nation to prevent further spread of the pandemic. With so many planes on the ground and drivers off the road, refineries slowed oil purchases. Needless to say, factory output and fuel demand fell dramatically. Consequently, oil prices dropped to

$44.83/bbl at the end of February. In response, OPEC called for members of OPEC+ to make additional cuts to reduce supply. Instead, Saudi Arabia and Russia engaged in a price war, and oil prices free fell. On March 31, oil fell to $20.51/bbl, declining for the fifth straight week. When the Trump administration considered interfering, expectations of production cuts increased, and prices had its biggest percentage increase in a single day ever. Nonetheless, the decreasing demand was overwhelmingly greater than the decreasing production. As a result, petroleum prices were negative for the first time in history. On April 20, 2020, crude oil reached -$36.98/bbl.

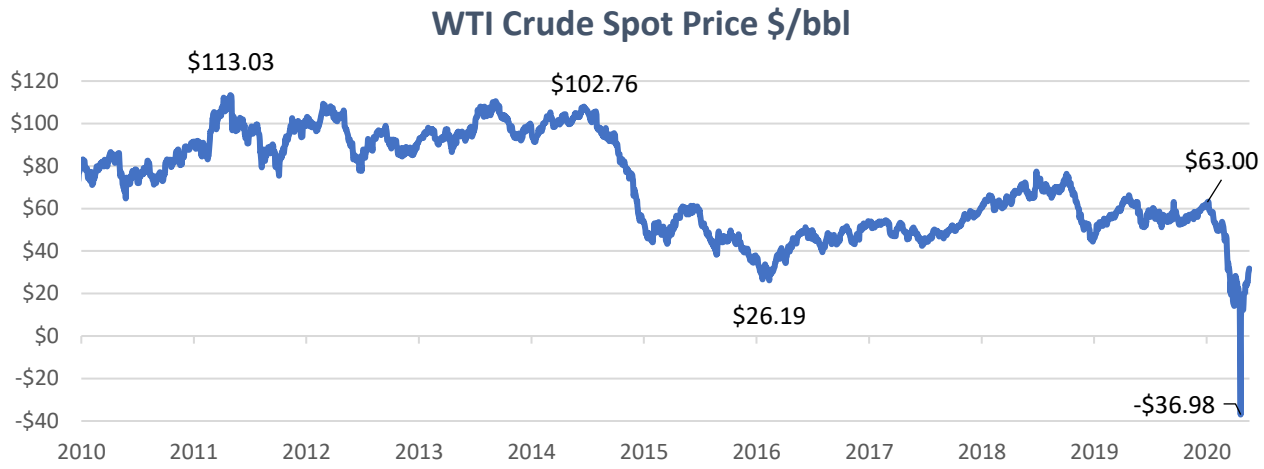


Figure 8
WTI Crude Spot Prices
Source: U.S. Energy Information Administration

The Significance of Cushing, OK

In 1912, Thomas B. Slick and C.B Shaffer completed a well near Cushing, Oklahoma that produced 400 bpd. Through 1919, new production came online and many small refineries and plants were built in the area by the field. Pipelines were also built to move crude from the oil fields in Oklahoma to refineries located in the U.S. Gulf Coast. However, after 1916, production in Cushing began to decline rapidly. Many of the refineries in the area began to shut down as a result. Fortunately, Cushing was centrally located between other prolific fields in Oklahoma, and between refineries in the U.S. Gulf Coast and emerging refineries in the U.S. Midwest around the Chicago area. Once the crude reserves declined, Cushing became a storage depot and hub to transport crude to domestic demand centers. Later, more efficient and larger pipelines with higher integrity, such as electric welding and seamless pipes, were built to deliver crude to Texas, Louisiana, and Midwest refineries. The hub in Cushing has been the largest and most active hub in the U.S. Cushing is often

called “The Pipeline Crossroads of the World”. Other major hubs in the U.S. include the Houston Ship Channel; St. James, Louisiana; Patoka, Illinois; and Guernsey, Wyoming.

Cushing, Oklahoma is the delivery location for the NYMEX benchmark Light Sweet Crude Oil futures contract. Light Sweet Crude Oil futures contract specifies delivery of a common stream of light sweet crude U.S. oil grades, which are referred to as West Texas Intermediate (WTI). WTI crude is sourced mainly from Texas, Louisiana, and North Dakota. Investments in infrastructure, along with increased U.S. crude oil production, and the repeal of the oil export ban have strengthened the role of WTI as the leading global benchmark.

As shown in Figure 9 below, commodity storage plays an important role in balancing supply and demand in the market. Crude oil is generally stored in tanks with varying designs depending on the usage. Supertankers, like very large crude carriers (VLCC) and Ultra Large Crude Carriers (ULCC), are occasionally used as storage facilities, particularly when there is an oversupply in the market.

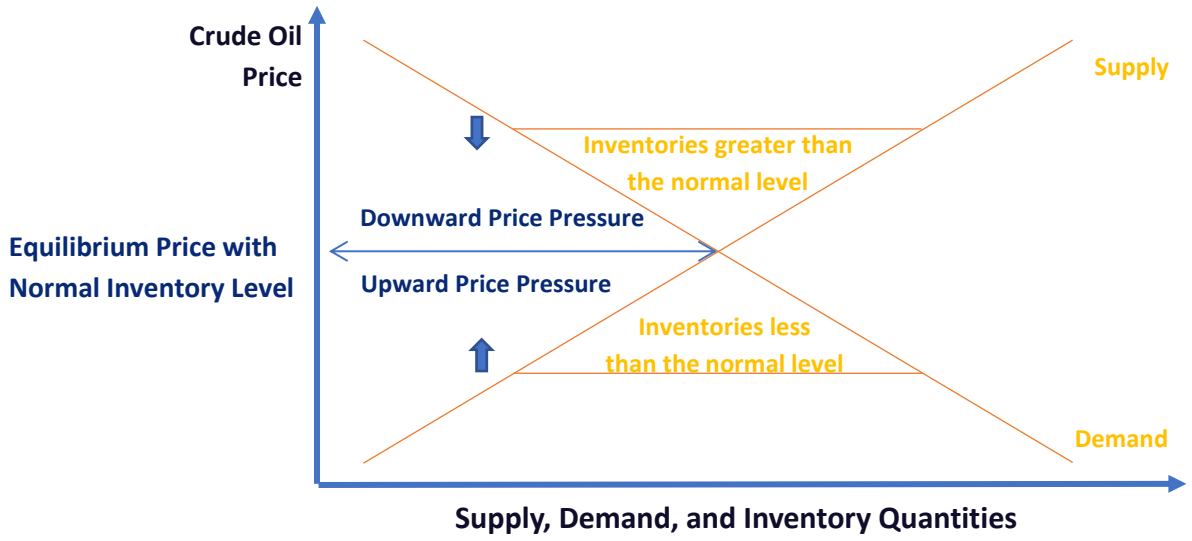


Figure 9
Crude Oil Supply and Demand Fundamentals

In a surplus market, storage is needed to absorb the extra supply, which drives up the costs for storage. This causes the structure of the forward curve to be in a contango, futures contracts that trade at a premium to the spot price. Physical delivered futures contracts may be in a contango because of increasing costs for storage, financing, and insurance. If the spot price is higher than future prices and has generated a downward sloping forward, the curve is in backwardation. The futures forward curve may become

backwardated in physically-delivered contracts because there may be a benefit to owning the physical material, such as keeping a production process running.

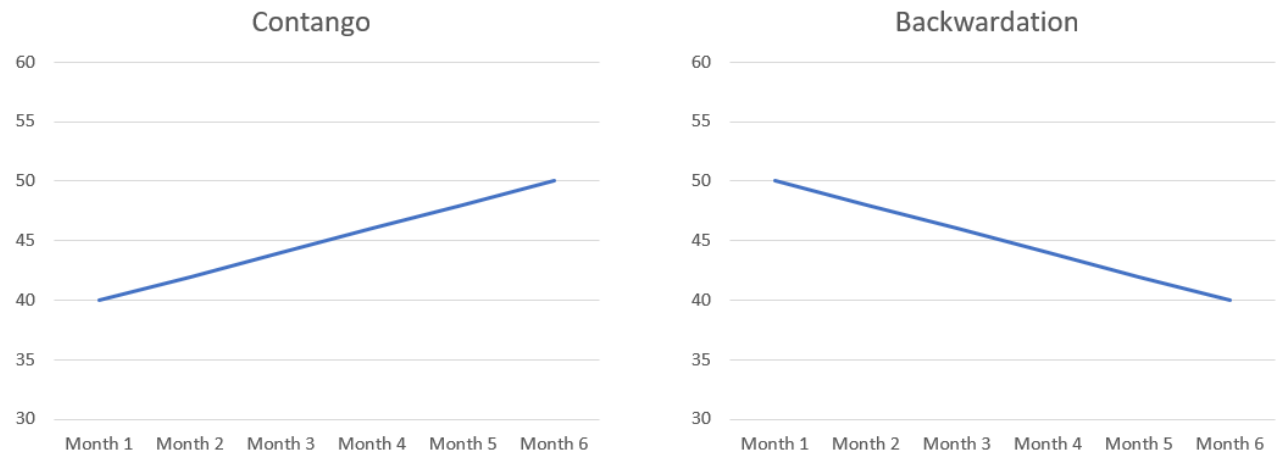


Figure 10
Contango vs Backwardation

While the structure of the forward curve is an extremely important concept in crude trading we will only focus on the inventory change impact on the crude spot price. However, we will revisit the concept of the contango forward curve when we explain the historic low price recorded for WTI crude that occurred on April 20th in detail.

Trading WTI

Crude oil is one of the better commodities to trade on a futures contract because the market is highly active, and it is well known to traders globally. Crude prices respond with any news that can impact pricing, which makes it a favorite for traders to make money on price swings. The volatile environment for crude provides solid trading opportunities but can be frustrating for economists and analysts forecasting prices based on fundamentals. One key indictor used by analysts to forecast prices is inventory levels, which gives the market a sense of supply and demand imbalances.

Globally crude is traded in the form of oil benchmarks, such as WTI and Brent. WTI is traded through the NYMEX, CME, and Intercontinental Exchange (ICE). Most physical U.S. crude trades are linked to crude futures. A NYMEX WTI futures contract must occur at Cushing, OK in a pipeline or storage facility. Brent is more ubiquitous, and therefore most global crudes are priced using Brent as the benchmark. Brent is produced from oil fields in the North Sea between the Shetland Islands and Norway.

The most widely traded spread in the global oil market is the Brent-WTI spread. The spread has implications on global crudes and refined products in the U.S. domestic and export markets. The majority of all the crudes in the world are priced against Brent and WTI. The spread itself can also be traded in the NYMEX futures market. The fundamentals that drive the spread include U.S. crude production levels, crude inventories in Cushing, North Sea operations, and geopolitical issues. Any geopolitical issues will cause Brent prices to surge, while WTI prices are usually unaffected. Prior to the shale revolution, WTI and Brent prices tracked closely - with WTI generally having a slight premium over its international rival – reflecting the freight cost to ship Brent to the U.S. During this time, Brent and similar light sweet crude grades were regularly imported at the USGC because domestic supply was not enough to meet local refinery needs. During the beginning of the shale revolution WTI began to trade at a discount to Brent because of a buildup of crude inventory at Cushing. Moreover, the export ban that stemmed from the oil embargo in the 1970s was in place at the time. Growing crude production in North Dakota and Western Canada overwhelmed Midwest refinery needs and was kept in Cushing because of inadequate pipeline capacity to refineries in the USGC. Figure 11 below shows the highest average Brent-WTI spreads during the beginning of the shale revolution. Even after the export ban in the U.S. was lifted in 2016, record U.S. crude production kept the Brent-WTI average spread to a relatively high level.

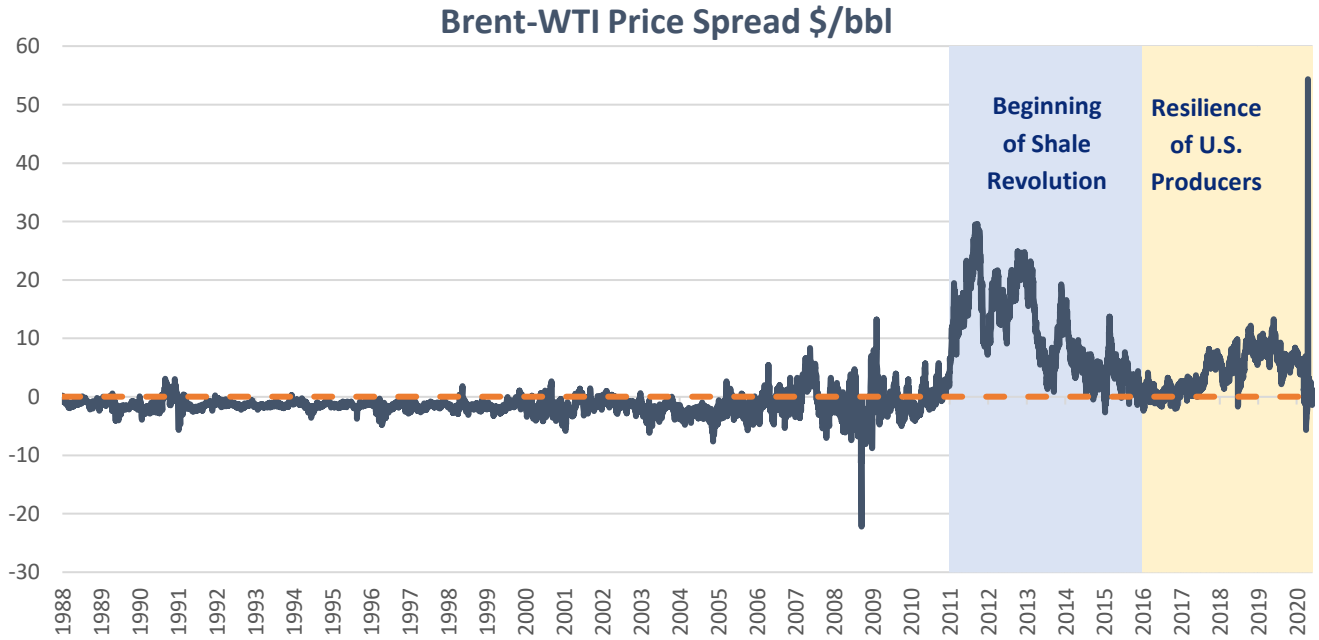


Figure 11

WTI – Brent Price Spreads

Source: U.S. Energy Information Administration

For refineries in the USGC area, a high USGC price spread can indicate higher margins for the refined products export market. U.S. domestic refineries purchase regional crudes priced off WTI but will sell refined products in the global market that compete with products produced with crudes priced off Brent. A high Brent-WTI spread will also incentivize new capital investment for crude export terminals in the U.S. Gulf Coast.

A Perfect Relationship?

Oil spot prices reflect how much the market believes oil is worth right now, and every week the Energy Information Administration's (EIA) releases crude oil inventory reports. These reports measure the change in the number of barrels of commercial crude oil held by U.S. firms. The EIA Weekly Status Petroleum Report provides data on stocks of crude oil by PADD (Petroleum Administration for Defence Districts) and is released at 10:30 am (Eastern Time) on Wednesdays. *For reference, the U.S. is divided into five Petroleum Administration for Defense Districts, or PADDs, created during World War II under the Petroleum Administration for War to help organize the allocation of fuels derived from petroleum products, including gasoline and diesel.* The API Weekly Statistical Bulletin also provides data on inventories and is published at 4:30 pm (Eastern Time) on Tuesdays. Traders react to the given information because companies build or draw inventories based on expectations and changes in production and demand. Therefore, crude traders and trading analysts are constantly estimating and forecasting crude inventory levels.

This relationship can also be seen in other commodities. Inventory changes and oil price changes have an inverse relationship. So, if demand is lower than expected, there will be greater stock of inventory (stock builds) and a lower crude spot price. Conversely, when demand is higher than expected, there will be fewer barrels of oil in inventory (stock draws) and a higher market price.

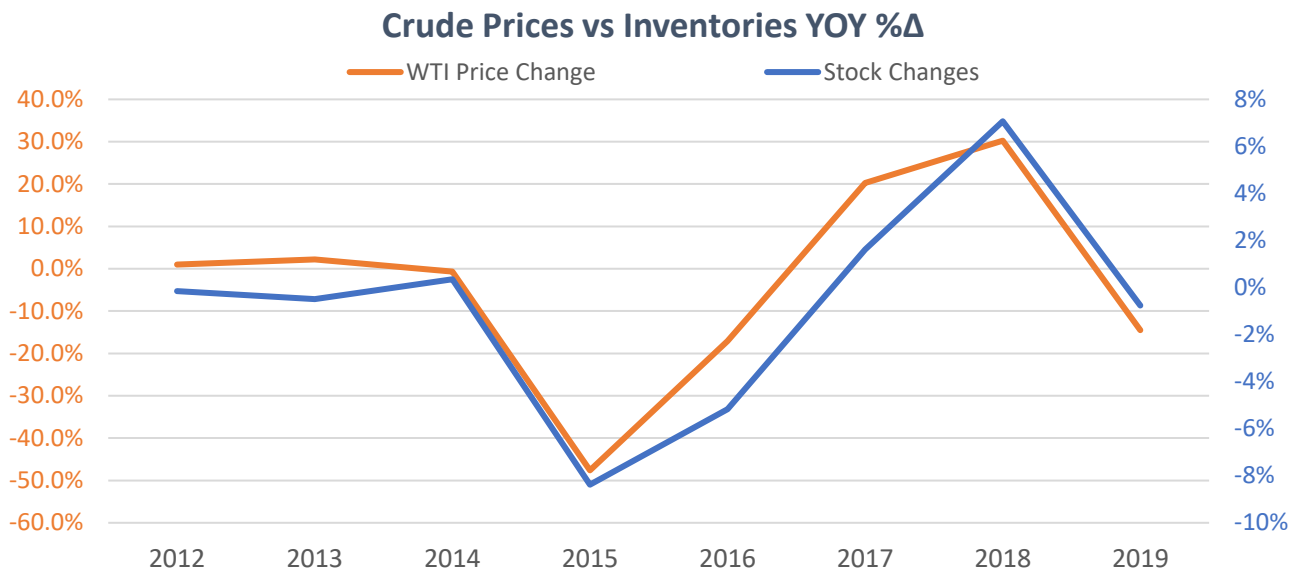


Figure 12
Annual percent change of crude stocks and WTI price, 2012-2019
Source: U.S. Energy Information Administration

Figure 12 above illustrates the strong relationship between the percent change of crude stocks and prices. The nominal WTI crude oil spot price is used because it is considered the U.S. marker crude oil spot price. The daily spot prices and crude oil stocks at Cushing, OK were obtained from the EIA website. The data was averaged out on an annual basis and calculated to percent changes. In addition, the percent changes of crude stock were multiplied by negative 1 to account for the inverse correlation and placed on the secondary axis.

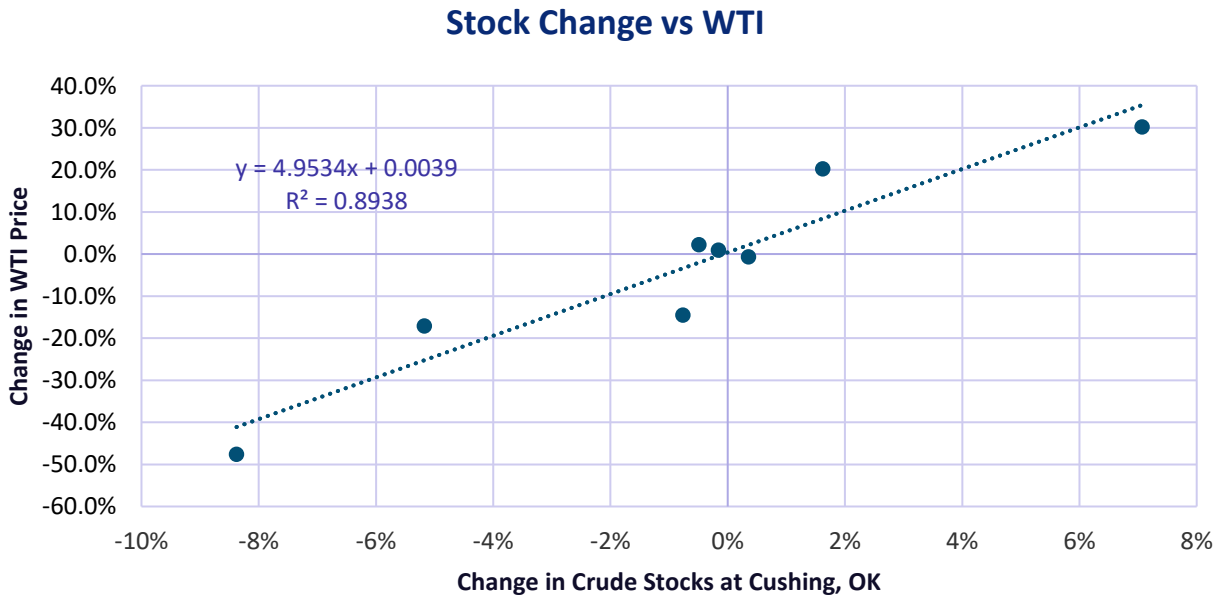


Figure 13
Annual percent change of crude stocks and WTI price, 2012-2019
Source: U.S. Energy Information Administration

Using data from 2012 through 2019, the 'Shale Revolution', was enough to point out the clear relationship between crude stocks and prices. The model in Figure 13 measures the relationship between crude inventories and prices using regression analysis. The regression was ran using the percent change of stock as the independent variable and percent change of WTI crude oil spot price as the dependent variable. R^2 measures the strength of the relationship between the model and the dependent variable on a 0-100% scale. The model shows an R^2 of 0.8938 which indicates a strong relationship. Furthermore, the standard error measures the average distance that the observed values fall from the regression line representing how wrong the regression model is on average. This model's standard error of regression is 0.0921 percentage points. The percentage change in stock has a coefficient of 4.95. So, if stock increases by 1 percentage point, the price of crude will decrease by 4.95 percentage points. The p-value is 0.0012, a lot less than the alpha level 0.05, so it is significant at the 95 percent confidence level. Though not perfect, this regression model is a simple way to show that there is a strong relationship between crude prices and stock inventories in the long term and can be used to forecast prices given supply/demand fundamentals or inventory changes. However, the further a forecast dives into the future, the more prices follow a random walk.

It is important to note that the model only works when we average the inventory levels and crude prices on an annual basis. This is because crude supply and demand are insensitive to short term price changes. Large price swings in the longer term are likely to change buying and traveling patterns due to the high cost of transportation fuels, thus, impacting demand for crude. On the supply side, only large price swings in crude prices in the long term will impact capital investment in new production, resulting in supply swings. Drilling is capital intensive, therefore, declines in crude prices in the short term will not change production rates for operators. The initial capital investment is considered a sunk cost, so operators will produce at maximum capacity to generate cash flow. With that, it is not surprising that models using daily or even monthly data show little to no relationship in crude inventory level and price changes.

Negative Prices?

WTI prices fell to below zero for the first time in history, since recordkeeping began in March 1983, in late April on the NYMEX crude oil futures contract as traders unloaded positions ahead of the May contract's expiration. WTI crude oil futures for May delivery

tanked by 305% to -$36.73/bbl. At a price below zero, buyers paid to take delivery as there are costs associated with transportation and storage.

During this time, the movements in the market prompted WTI crude oil prices to enter contango, meaning oil contracts for future delivery are more expensive than spot prices. The WTI crude price market was in “super contango”, encouraging traders to store oil at the same time signaling that storage may reach it’s capacity soon. The historic contango was a reflection of physical barrels unable to find a home and were being sold at distressed prices.

According to the International Energy Administration (IEA), demand for crude oil was projected to fall by 29 million bpd in April, as COVID-19 forced countries around the world to issue “stay-at-home” orders to slow the spread of the disease. Demand for crude oil and its byproducts, including gasoline and jet fuel, deteriorated with the sharp drop in economic activity. With little demand, storage tanks in Cushing, Oklahoma, a key U.S. oil hub, filled up at an astounding rate. Inventories surged by 48% to approximately 55 million barrels, according to a report from the Energy Information Administration (EIA). Capacity at the Cushing hub is approximately 76 million barrels, according to the EIA.

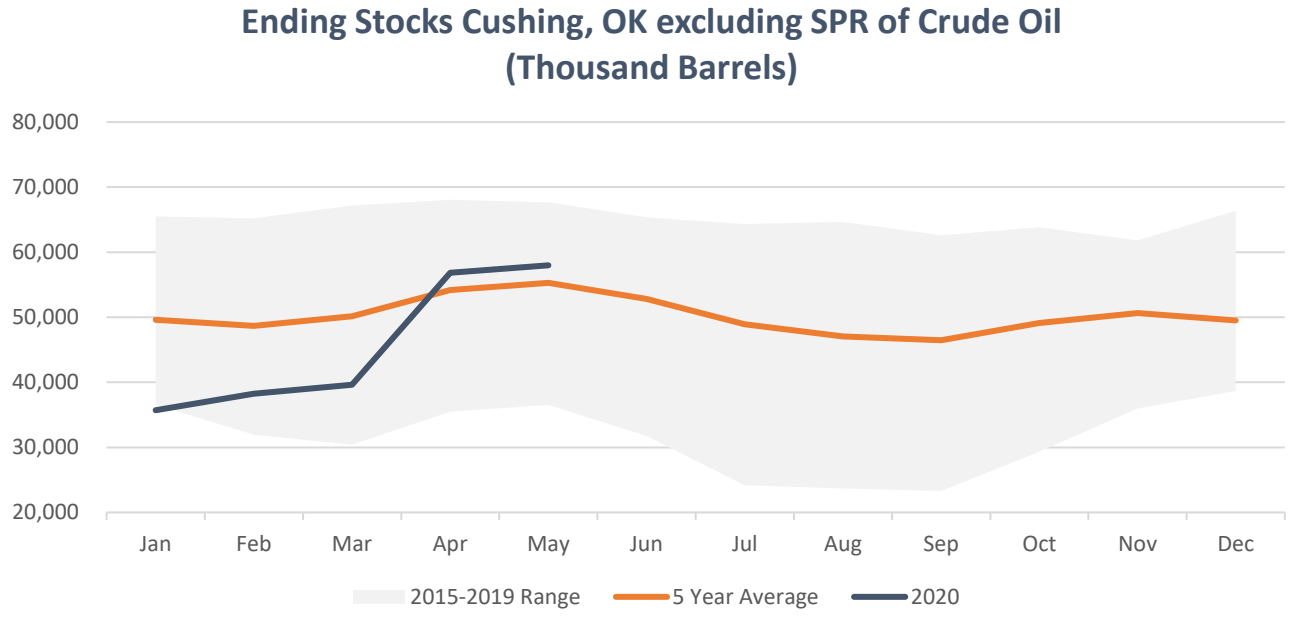


Figure 14
Weekly Cushing, OK Ending Stocks excluding SPR of Crude Oil
Source: Energy Information Administration

"To prevent inventories reaching capacity limits, lower prices are needed to trigger further production shut-ins in North and South America," wrote the chief investment office of the global wealth management arm of Zurich-based investment bank UBS.

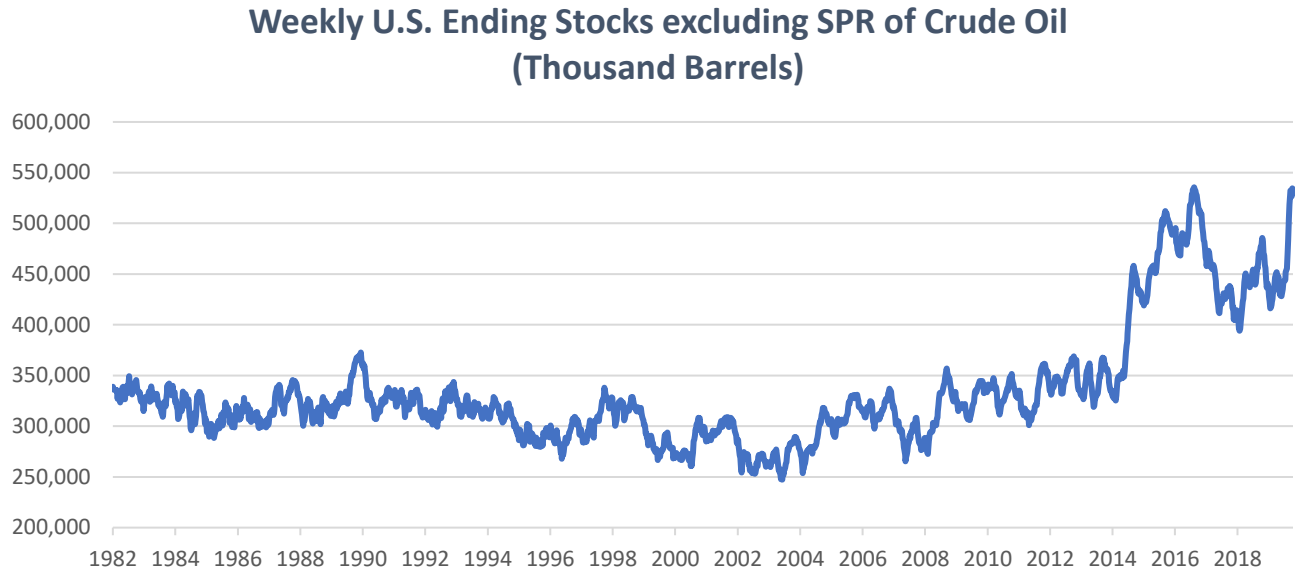


Figure 15
U.S. Ending Stocks excluding SPR of Crude Oil
Source: Energy Information Administration

Storage capacity limits, major cuts in crude runs at domestic refineries, and little to no export activity gave producers no choice but to cut crude production. As of June 5th the number of U.S. rigs fell to 284 (Figure 16), a decrease of 691 rigs compared to the same period in 2019. This is the lowest rig count on record.

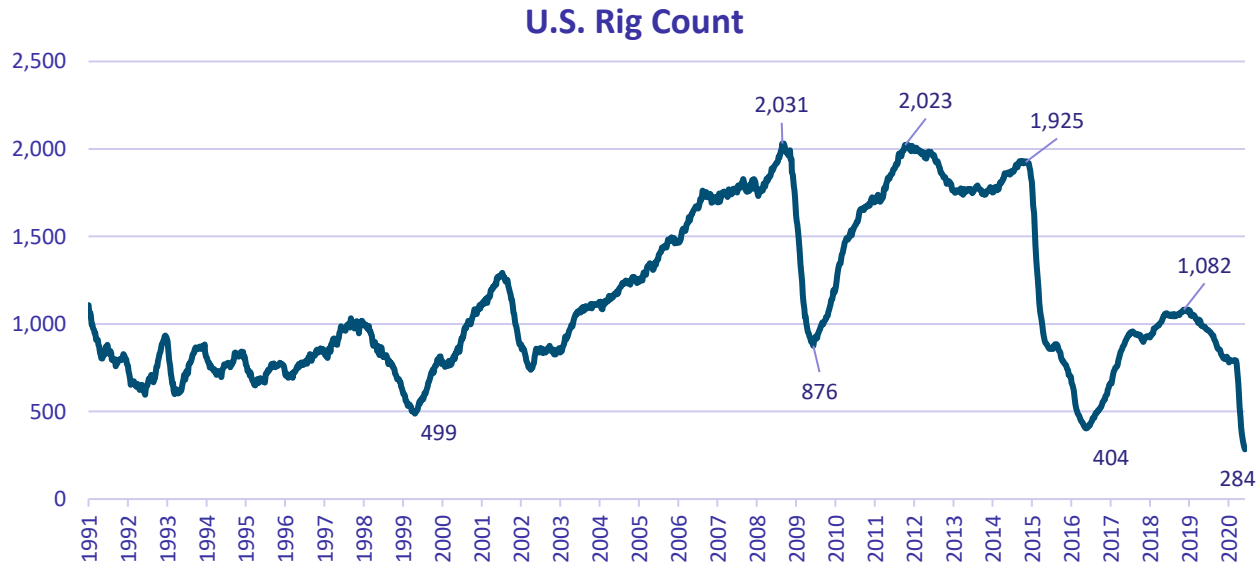


Figure 16
Baker Hughes Rig Count (1991-2020 YTD)
Source: Baker Hughes

Economic Effects of Price Gyrations

Petroleum is one of the largest sources of energy in the United States. In 2019, the U.S. extracted a record high of 4.46 billion barrels of crude oil, more than twice the number of barrels produced in 2009. Undoubtedly, oil will continue to dwell in our society for the next few decades. In its early stages, the oil industry was small enough that its price busts were not significant to the overall economy. Today, price fluctuations influence not only the economy but politics as well, especially in oil-dependent countries such as Venezuela and Russia. Price gyrations primarily affect the fuel industry and manufacturing. For consumers, oil price booms lead to higher gasoline prices, which leaves less to spend on other goods and services. Similarly, the costs of business that rely on fuel to operate will increase. On the same grounds, higher oil prices generally lower supply and demand for the overall economy.

That is not to say, negative oil price shocks will stimulate economic growth. In actuality, the economy responds asymmetrically to oil price increases and decreases. So, the effects of price busts are also harmful, however, they do less damage in comparison. Generally speaking, lower oil prices result in lower production which can afflict employees and nearby businesses that cater to these workers. Furthermore, investors and bankers with money in the oil industry will suffer losses as well. In any event, estimating the ramifications of oil price shocks depends on the causation of the oil price shock, and the underlying macroeconomic conditions before the shock. Of course, the U.S's diverse economy can withstand gyrating oil prices, but its implications shouldn't be underestimated.

Rising oil demand reflects accelerating economic growth, particularly in non-OECD countries or emerging markets. With rapid growth in population and economic growth potential, increasing activities in commercial and personal transportation, manufacturing, and power generation require large amounts of energy and crude oil derivatives. As a result, global oil prices tend to rise when economic activity in emerging markets rise. As shown in Figure 17, a change in GDP in emerging economies heavily impacts a change in global crude prices.

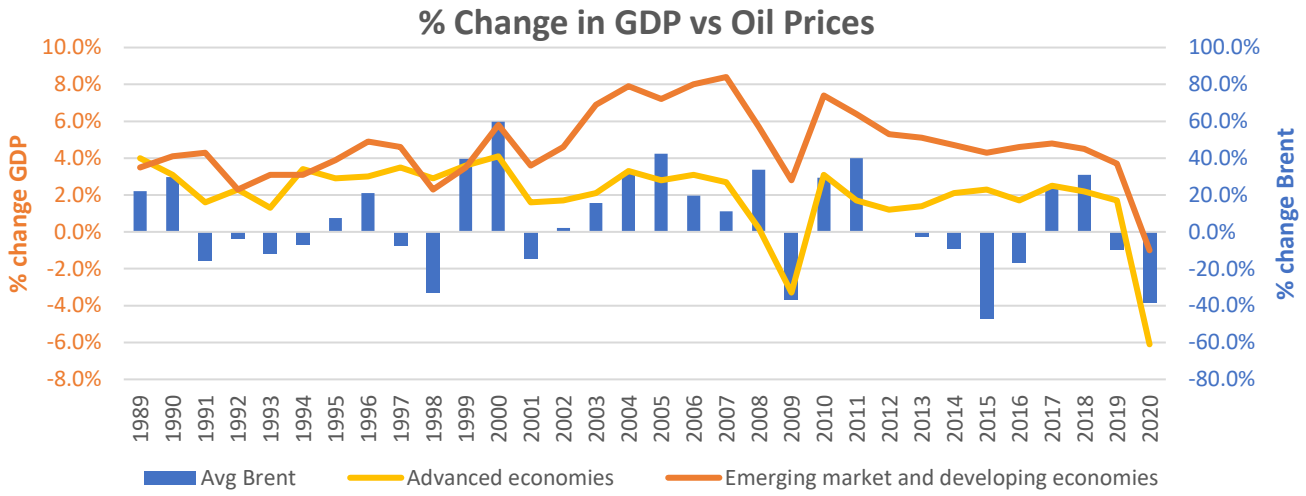


Figure 17
% Change of GDP vs Crude Prices (1989-2020 YTD)
Source: IMF and EIA

Conclusion

In the last fifteen years, oil price volatility has been drastically increasing. Meanwhile, the discovery of shale oil in North America made the United States the largest oil producer in the world. For OPEC, this resulted in less demand in the U.S and a loss of considerable market share in the industry.

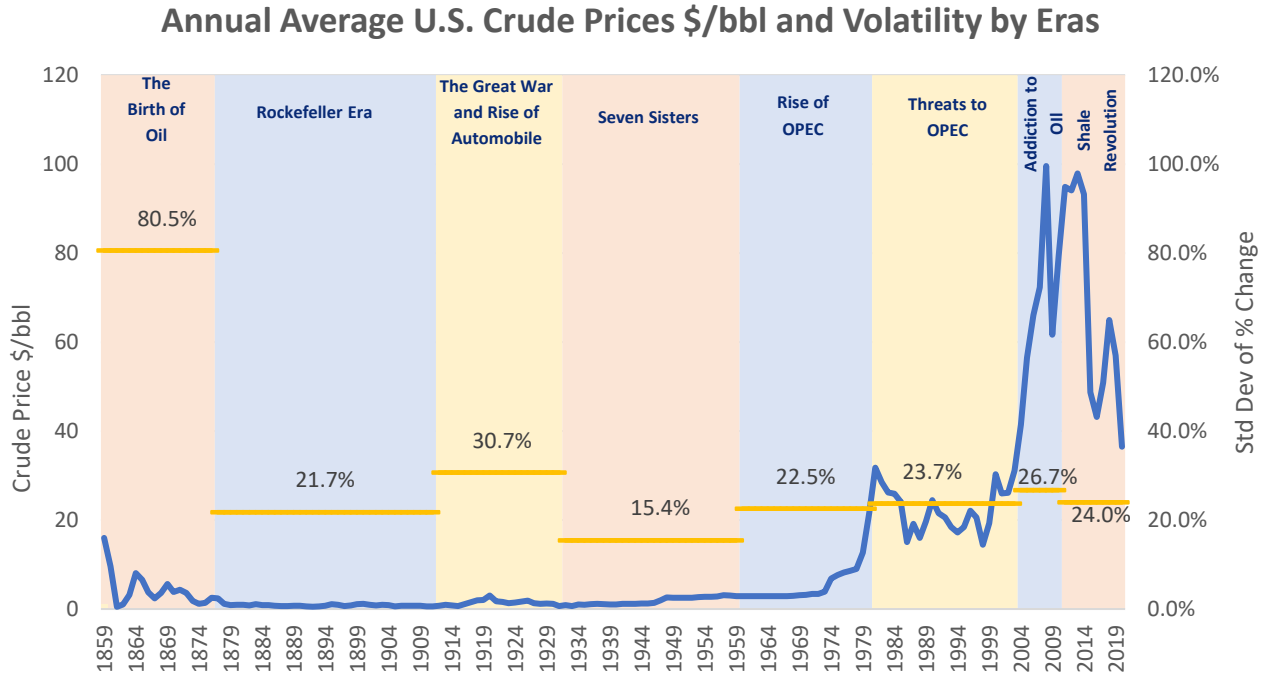


Figure 18
Annual Average U.S. Crude Prices and Volatility by Era
Source: https://www.cfr.org/ and Crude Volatility (McNally)

As OPEC continues to lose control of supply in the future, prices will become even more susceptible to major price swings and volatility. Eventually, economies will take less impact as the world turns to renewables, but for now, crude oil's demand and price gyrations will continue to persist.

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