Positive Year Ends With Warning Signs
2019 U.S. crude market fundamental highlights.

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U.S. Energy Information Administration, CME, Baker Hughes, Commodity Futures Trading Commission, U.S. Census

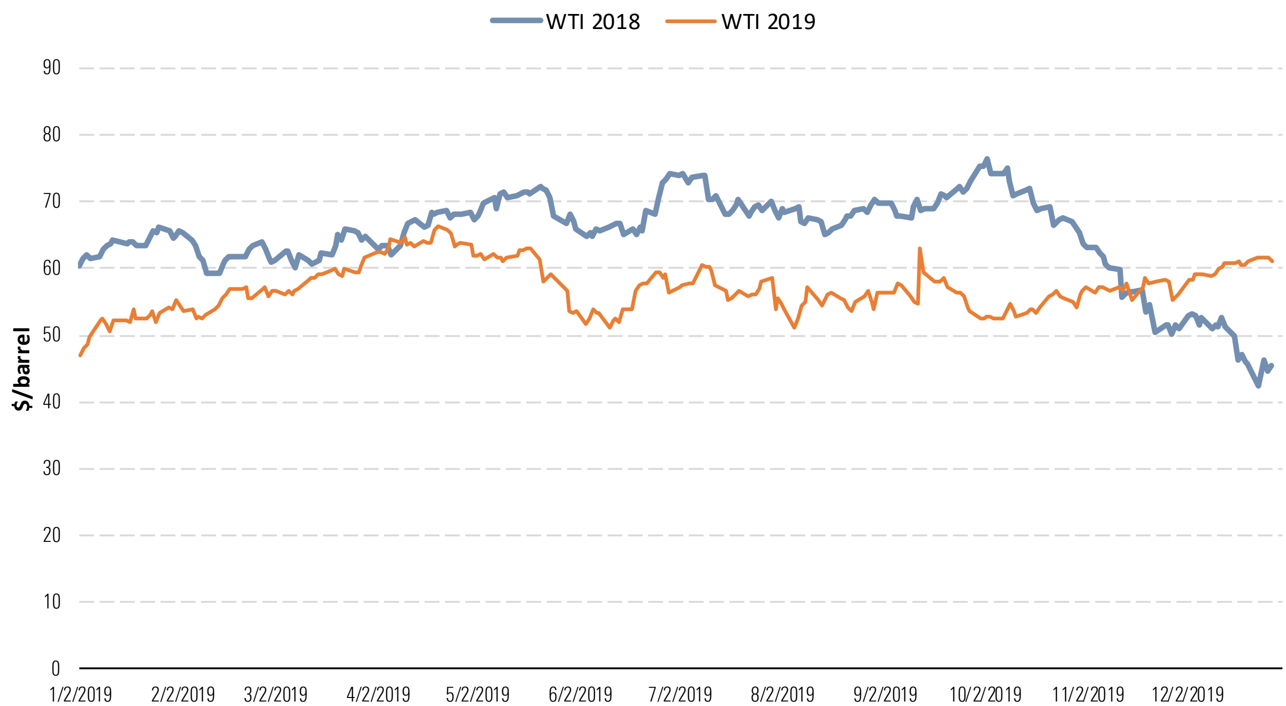
To discover more about the data sources used, click here.

Shale Fatigue
In many respects, 2019 was a positive year for the U.S. crude market. Prices recovered 31% from a low on Jan. 2 to over $61/barrel at year-end. Production marched upward, adding a million barrels a day, and new pipelines unlocked congestion in the Permian engine room. Exports continued their meteoric rise, and Gulf Coast docks handled the flows with few hiccups. Nevertheless, a sense of shale fatigue lingers in the air at the start of 2020, with drilling slowing and a challenging investment environment for producers. While output continues to grow and OPEC and friends protect prices by cutting production, the threat of excess supply has pushed forward markets into a contango structure with December 2021 futures settling $8/barrel below the prompt contract. That leaves U.S. producers and the crude market vulnerable to slower economic growth. This note reviews fundamental U.S. crude trends in 2019.

Crude Prices
The final quarter of 2018 saw a dramatic 44% fall in U.S. crude prices as represented by the CME Nymex front month West Texas Intermediate futures contract. Prices recovered from that crash during the first four months of 2019 from an annual low of $46.54/barrel on Jan. 2 to a high for the year of $66.30/barrel on April 20 before falling back to the $50/barrel range for the summer and recovering slowly to end the year at just over $61/barrel, with a brief spike to just under $63/barrel after an attack on Saudi Aramco facilities in September (Exhibit 1). Prices in 2019 averaged $57.04/barrel, which was $7.86 below 2018's $64.90/barrel. The WTI range in 2019 narrowed by $14/barrel compared to 2018, with the high $10 lower and the low $4 higher. Despite the narrower range, historical price volatility increased 7% in 2019 versus 2018, with the summer months seeing choppy activity that reflected the on-again off-again trade war with China.

Exhibit 1 WTI Crude Prices 2018 and 2019 and Comparative Statistics With 2018

	2018	2019
Average	64.90	57.04
High	76.41	66.30
Low	42.53	46.54
Range	33.88	19.76
Historic Volatility	25.91	32.70



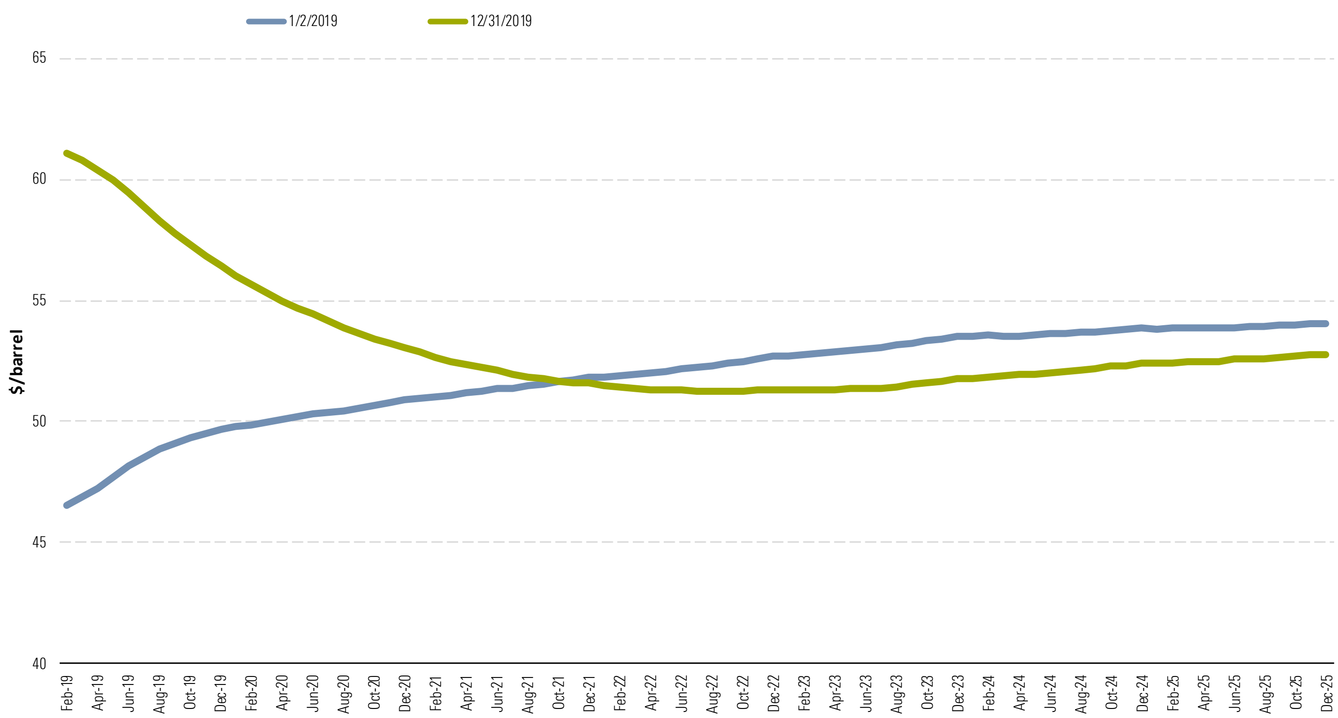
Source: CME Group, Morningstar.

Forward Curve

Exhibit 2 shows CME Nymex WTI forward curves for the first trading day of 2019 (blue line) and the last (green) aligned over the same delivery range. With the year starting at the lowest price for 2019 after tumbling since the start of October 2018, the forward curve for Jan. 2 had a contango pattern with further-out prices higher than the prompt month. This market structure reflected expected recovery from the lows at the end of 2018 in light of OPEC's renewed agreement to continue production, an unexpected decision from the Alberta provincial government to curtail Canadian crude production, and the impact of U.S. sanctions on Iran and Venezuela, all of which kept a lid on supplies. The WTI forward curve contango on Jan. 2 was $3.32/barrel between the prompt February 2019 and the December 2019 contracts. It cooled to $1.25 between December 2019 and December 2020 and less than $1/barrel each subsequent year out on the curve between 2021 and 2023. Price recovery expectations were limited, however, with a continued increase in U.S. production and concerns about the impact of trade disputes on the economy acting as dampers.

By the end of 2019, the WTI forward curve had flipped to a backwardated structure showing prices expected to fall sharply by $8/barrel during 2020 and 2021 before leveling off to end 2026 $1.23/barrel below where the market expected prices to fall at the same distance out on the curve back in January. The steep backwardation reflects uncertainty about oversupply in world markets as well as economic growth rates. The year-end curve suggests prices will retreat to $53/barrel by the end of 2021.

Exhibit 2 WTI Forward Curves

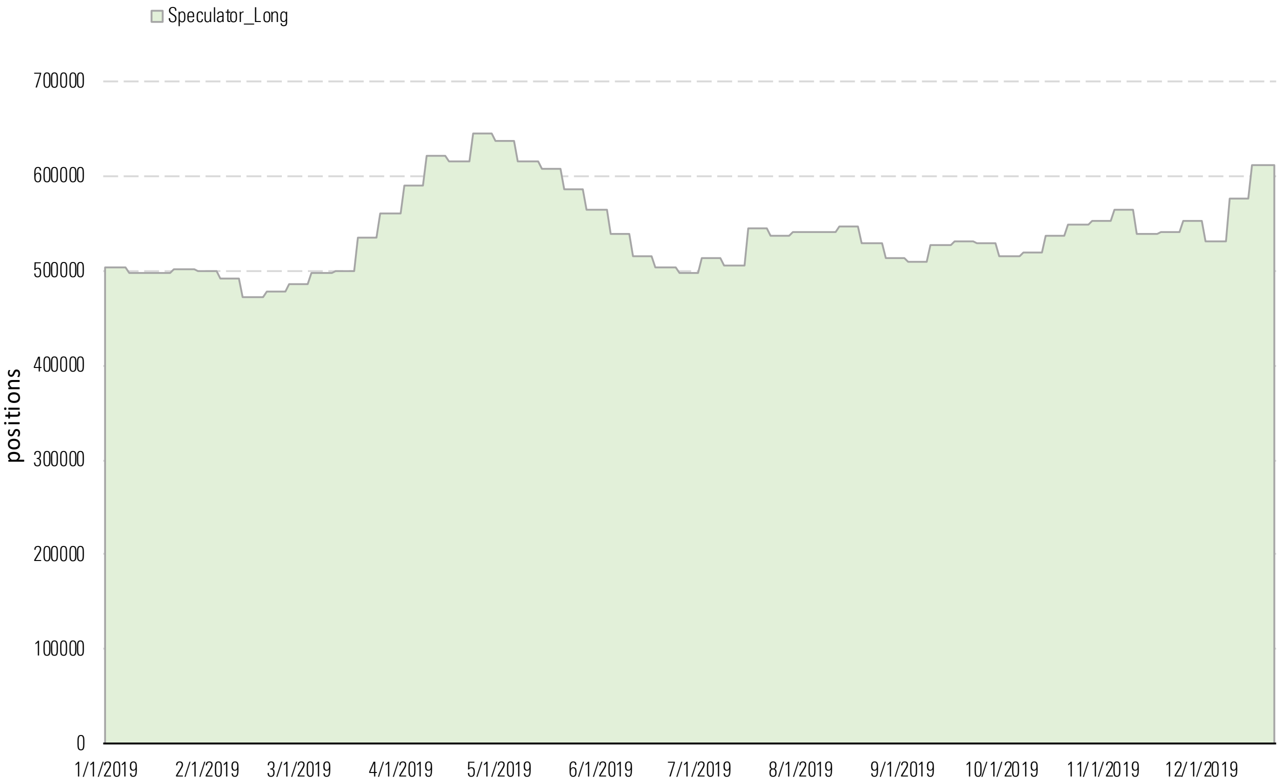


Source: CME Group, Morningstar.

Commitments of Traders: Speculation

Weekly Commodity Futures Trading Commission data provides estimates of open long positions held by financial speculators in the CME Nymex crude contract (Exhibit 3). Long speculators hold WTI positions in hopes of higher prices. The longs had a quieter year in 2019 as prices traded in a narrower range than 2018 with few signs of economic upturn in the Asian market, which underpins demand growth prospects. An early rally in 2019—which was actually a recovery in prices from the collapse at the end of 2018—ran out of steam by the end of April, causing a sell-off in long positions during May, with the rest of the year in a holding pattern. The rally in prices during the final quarter of 2019 was reflected in an uptick in open speculator positions but nothing like the level seen during the first third of 2018 when over 800,000 long contracts were outstanding. The bulls struggled to reach 650,000 in 2019 but ended the year with 612,000 long contracts outstanding. The weakness in the forward curve and uncertainty about supply are undermining bullish sentiment in U.S. crude futures.

Exhibit 3 Speculator Long Positions



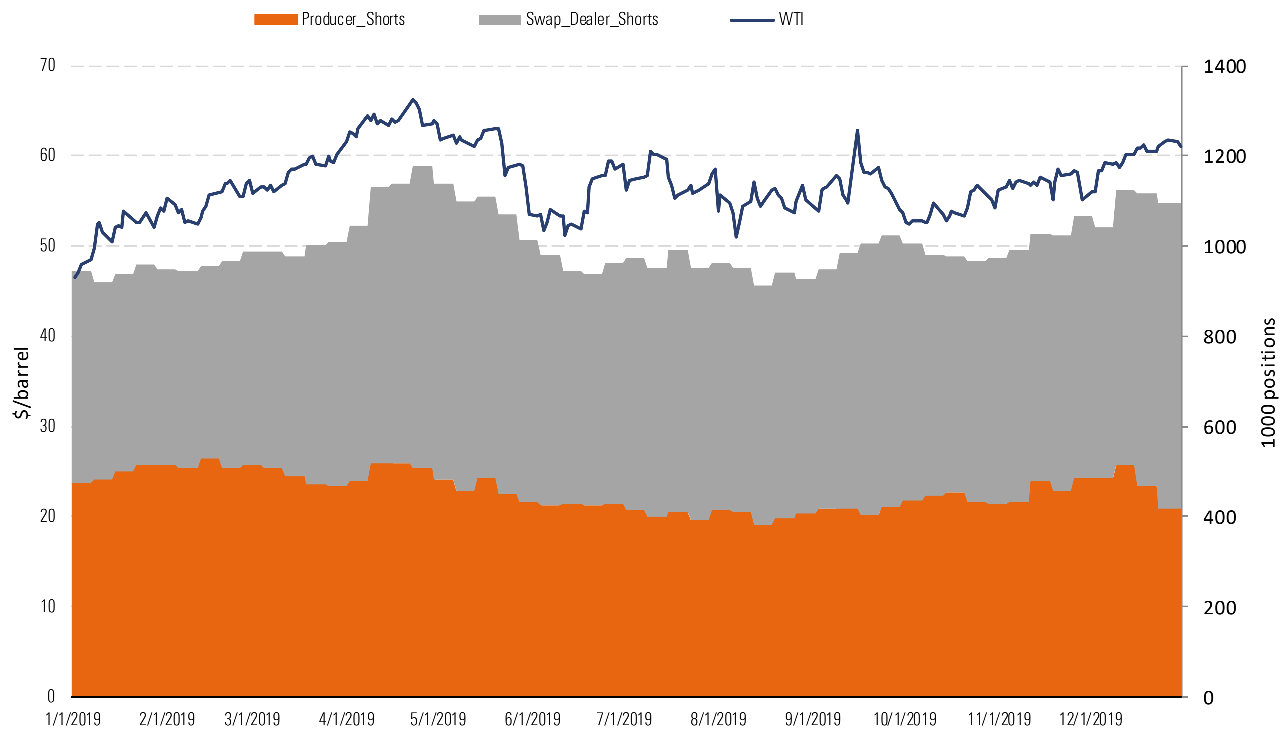
Source: CFTC, Morningstar.

Commitments of Traders: Hedging

Commodity Futures Trading Commission data provides an estimate of U.S. crude hedging based on the number of short contract positions held by the "producer/merchant/processor/user" category—otherwise known as physical hedgers—combined with short contracts held by intermediaries called swap dealers, which reflect producer option purchases. Exhibit 4 shows the number of shorts held by both categories in 2019 as well as prompt WTI crude.

With U.S. crude output continuing to increase in 2019 and producers under the gun from investors to protect earnings for shareholders rather than drill for the sake of it, hedging activity remained lower than during the first-half price rally in 2018. Hedge positions followed prices fairly dogmatically with a flurry around the year's high at the end of April and a gradual build during the slower rally in the final quarter of 2019. By most estimates, $60/barrel crude provides positive returns on investment in the major shale basins, but prices at these levels didn't cause a large increase in hedge bets from the producer side. This isn't surprising, given the backwardated forward curve at the end of the year that provides no upside for hedge bets.

Exhibit 4 Producer and Swap Dealer Short Positions With WTI Prompt

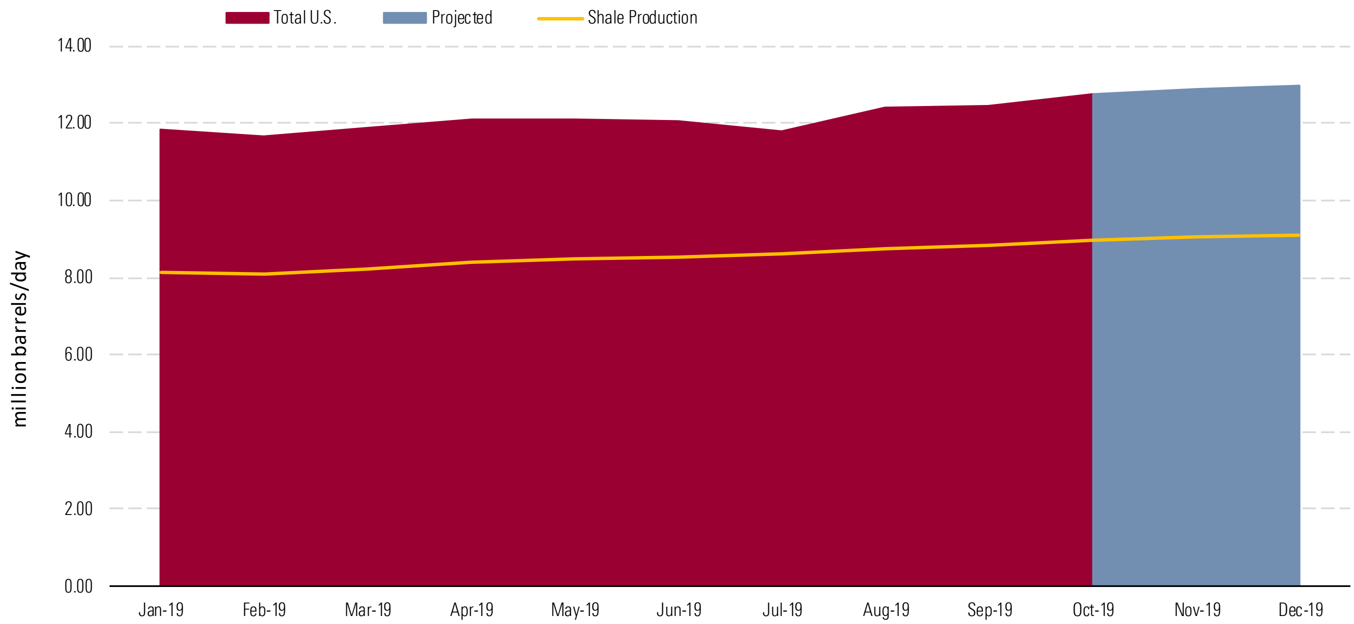


Source: CME Group, CFTC, Morningstar.

Crude Production

During 2018, U.S. domestic crude production grew an unprecedented 1.6 million barrels/day, according to the Energy Information Administration. In comparison, 2019 growth is estimated to be 1 mmb/d, a number that in any other era would have impressed but is now regarded as normal in shale terms. With production doubling between 2010 and 2018, the expectation of continued growth last year was high. However, given infrastructure constraints already holding back Permian growth at the end of 2018, the level of output achieved in 2019 surpassed expectations, with the shale basins—particularly the Permian—again proving to be the engine room. Exhibit 5 shows actual (red shading) and projected (blue shading) U.S. crude production as well as the output from shale basins (yellow line).

Exhibit 5 Total U.S. and Shale Crude Production 2019



Source: EIA, Morningstar.

Producers benefited from relief in the Permian with new transport capacity coming on line in the final five months of the year that reduced price discounts at the Midland, Texas, gathering hub. Stronger domestic prices and lower transport tariffs ensured that higher revenue made it into producers' pockets rather than to marketers in Midland.

Although the pace of growth cooled in 2019, it's important to note that production continues to expand and is expected to do so again in 2020, albeit at a slower pace. Despite speculation of another bust in shale like that seen in 2015 and 2016 and a slow but sustained pullback in drilling rigs this year, the actual numbers indicate a slowdown in growth rather than an impending crash.

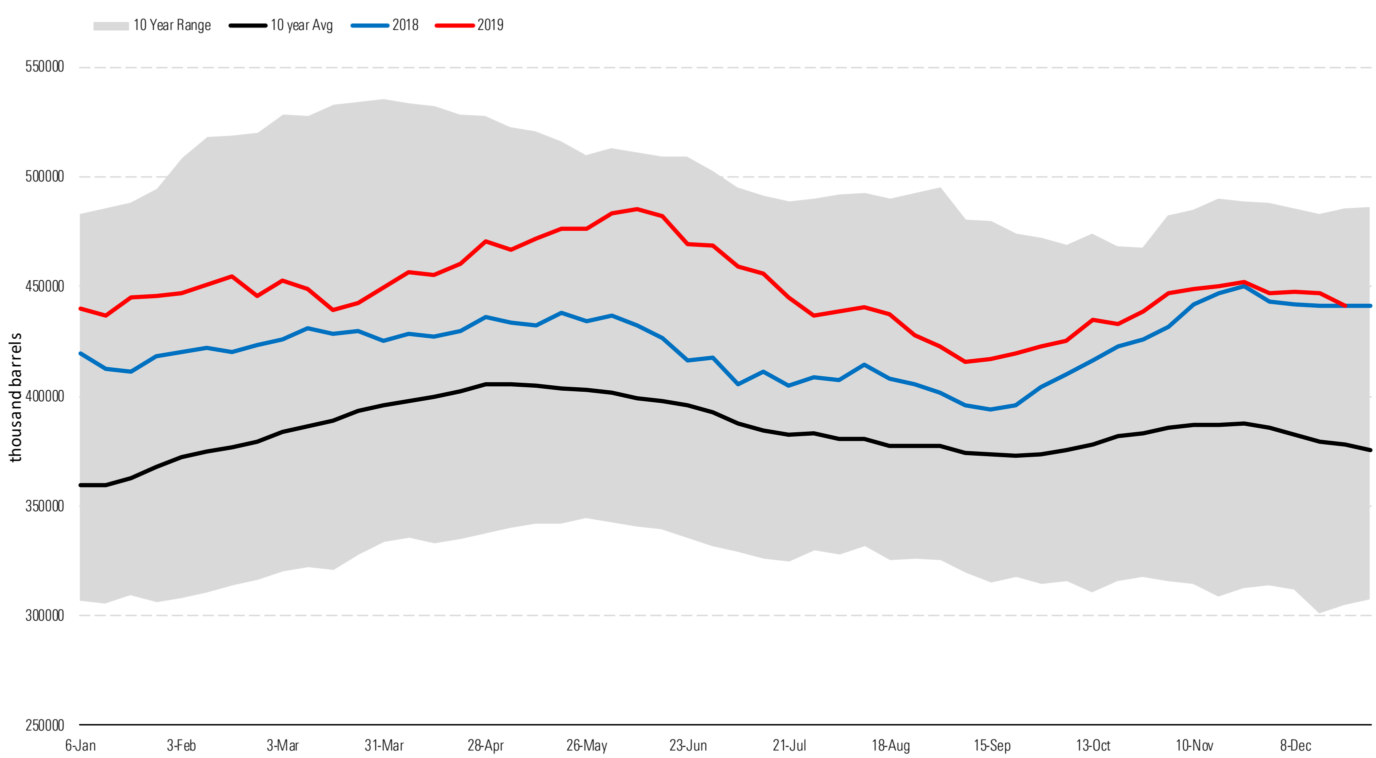
With the United States now a major crude exporter, new production must find a home in world markets. As a result, the international supply/demand balance plays a key role in setting prices and the economics of new shale drilling. Thus, while year-end prices above $60/barrel look attractive to drillers today, the backwardation in the forward curve screams uncertainty in the year ahead.

For the exploration and production sector, 2019 was a year of consolidation, topped by Occidental's acquisition of Anadarko for $5 billion in August. The muscling in of supermajors like ExxonMobil and Chevron to the Permian is transitioning shale to a mainstream play and leaves investors and bankers questioning the role of independent producers.

Crude Inventory

Inventory levels were higher throughout 2019 than the year before but remained well below record levels set in 2017 (Exhibit 6). Higher inventory reflected higher production as well as lower refinery throughput, but also followed typical seasonal patterns based on refinery operations ramping up in the summer months and going through maintenance in the spring and fall. Although the year started with a contango market encouraging storage, that only led to a modest uptick in inventory over 2018 levels until summer refining runs called on stocks. At the end of 2019, a sharp market backwardation provided no encouragement to storage strategies even as crude stocks rose well above the seasonal average, suggesting markets are oversupplied. Within the U.S. stocks, levels in the Gulf Coast region tracked close to 2018, but the data disguised a likely shift from the producing region in West Texas to the coast as increased pipeline capacity became available in the last five months of 2019. The change in pipeline capacity out of the Permian also drew down inventory at the Cushing, Oklahoma, trading hub that is partially fed from the Permian as shippers gained access to wider transport options. The last two months of 2019 saw a reversal of a big increase in Cushing crude inventory that occurred during the final third of 2018 on the back of Permian congestion.

Exhibit 6 Total U.S. Crude Inventory



Source: EIA, Morningstar.

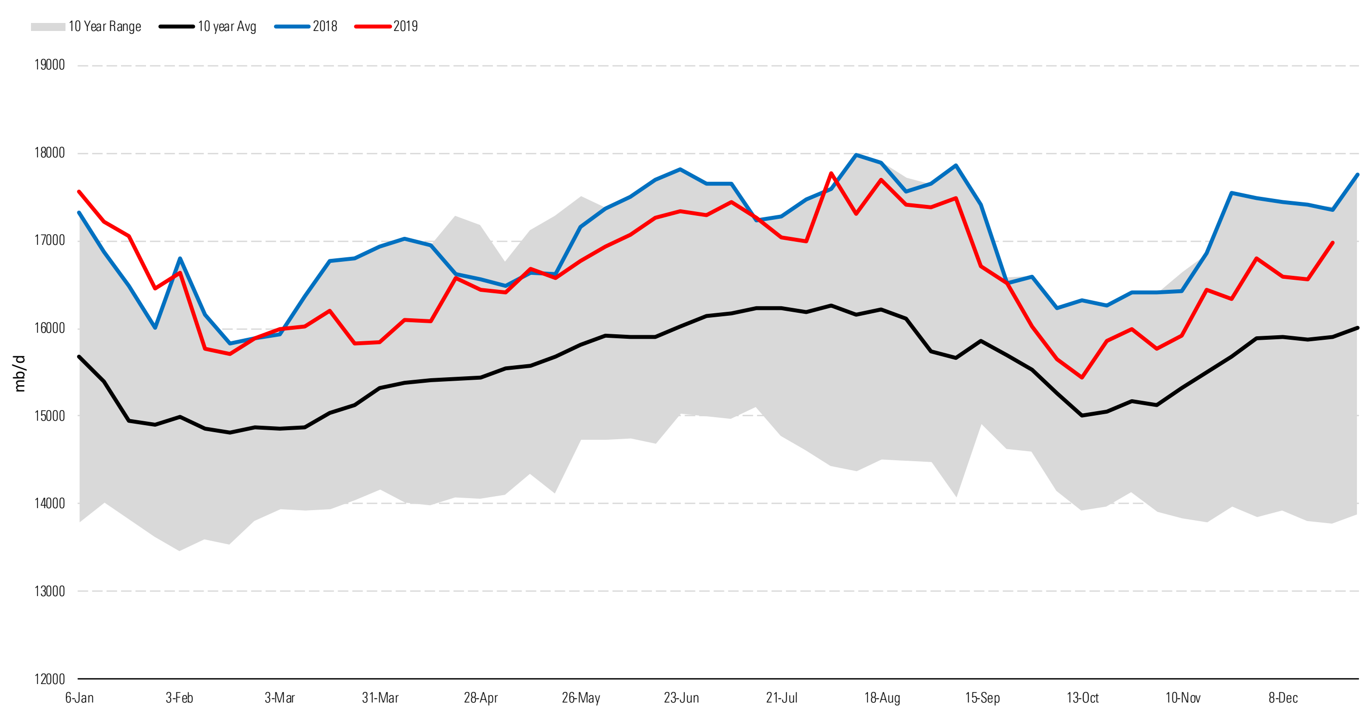
With crude production and exports increasing for the third year in a row, inventory levels now more closely reflect the international supply/demand balance, so a lack of export demand causes stockpiles to grow. Even though crude imports declined in 2019 to new lows, unimpressive refinery throughput still left the heavy work on lowering inventories in the hands of exporters.

Threats to export demand from trade conflicts or uncompetitive pricing underpin crude inventory levels that are still well above 10-year averages.

Refinery Throughput

After a record year of crude input to refineries averaging 17.0 mmb/d in 2018, U.S. refinery runs fell back to average 16.6 mmb/d in 2019. Part of the reason for last year's slump was the shutdown of Philadelphia Energy Solutions' 335 mb/d plant—the largest refinery on the East Coast—after a damaging fire in June (see Central Atlantic Region Most Impacted by PES Closure). That loss and the company's subsequent declaration of bankruptcy left a hole in the already precarious East Coast supply picture that the market appeared slow to repair, leading to a distillate squeeze by the end of October (see PADD 1 Distillate Shortage Threatens Winter Price Spikes) that was averted by a relatively mild start to winter.

Exhibit 7 Refinery Throughput



Source: EIA, Morningstar.

At the end of 2019, refined product inventories show higher-than-normal gasoline stocks and below-average distillate stocks nationwide. Although these numbers suggest vulnerability in distillate supply, they overlook increasing overseas sales of domestic refined products that saw net distillate exports of an estimated average 1.1 mmb/d in 2019, according to EIA monthly and weekly data, as well as net gasoline exports of an average 93 mb/d. In other words, reducing exports would rapidly alleviate any distillate shortage and increase the gasoline glut. Given the choice, refiners in coastal locations prefer to export refined products even as East and West Coast refiners increase imports to balance their needs.

One refining trend we noted in September is plans to add renewable diesel processing capacity by traditional refiners (see Sixfold Increase in Renewable Diesel Capacity Coming!). Unlike its close cousin and rival biodiesel, which is produced by chemical reaction, renewable diesel is manufactured from waste animal and vegetable oils by hydrotreating and isomerizing the feedstock in units like those in oil refineries. Adding renewable diesel capacity allows conventional refiners to protect distillate market share in the face of legislative and public pressure to reduce fossil fuel usage.

Crack Spreads

Although refinery runs in 2019 averaged 0.4 mmb/d less than in 2018, the driver behind the processing slowdown can't be blamed on margins. Average domestic refinery margins as denoted by the 3-2-1 CME Nymex crack spread (based on a refinery producing two barrels of gasoline and one barrel of distillate for every three barrels of WTI crude processed) was $0.247/barrel higher in 2019 at $18.43/barrel than the 2018 average $18.19/barrel (Exhibit 8).

In the decade since 2010, annual average CME Nymex New York Harbor prompt month ultralow sulfur diesel prices have been higher than CME Nymex New York Harbor prompt unleaded reformulated gasoline every year except 2016, with ULSD prices in 2019 averaging $0.21/gallon higher than gasoline. That statistic encourages refiners to increase yields of diesel over gasoline in order to improve returns, moving away from the traditional 3-2-1 formula where gasoline output is double that of diesel. The benefit of higher diesel yields is reflected in the improved margin for 2-1-1 crack spreads that reflect a 50/50 mix of gasoline and diesel from every barrel of crude processed. The annual average 2-1-1 crack spread in 2019 using CME Nymex prices was $19.93/barrel, or $1.50/barrel higher than the 3-2-1 crack. The 2019 average 2-1-1 crack was $0.50/barrel higher than 2018.

Exhibit 8 Crack Spreads

Source: CME Group, Morningstar.

Although crack spreads are generic in nature and based on light sweet crude, refining heavy crude also remained lucrative in 2019 as Canadian heavy crude price discounts continued to benefit margins for Midwest refiners.

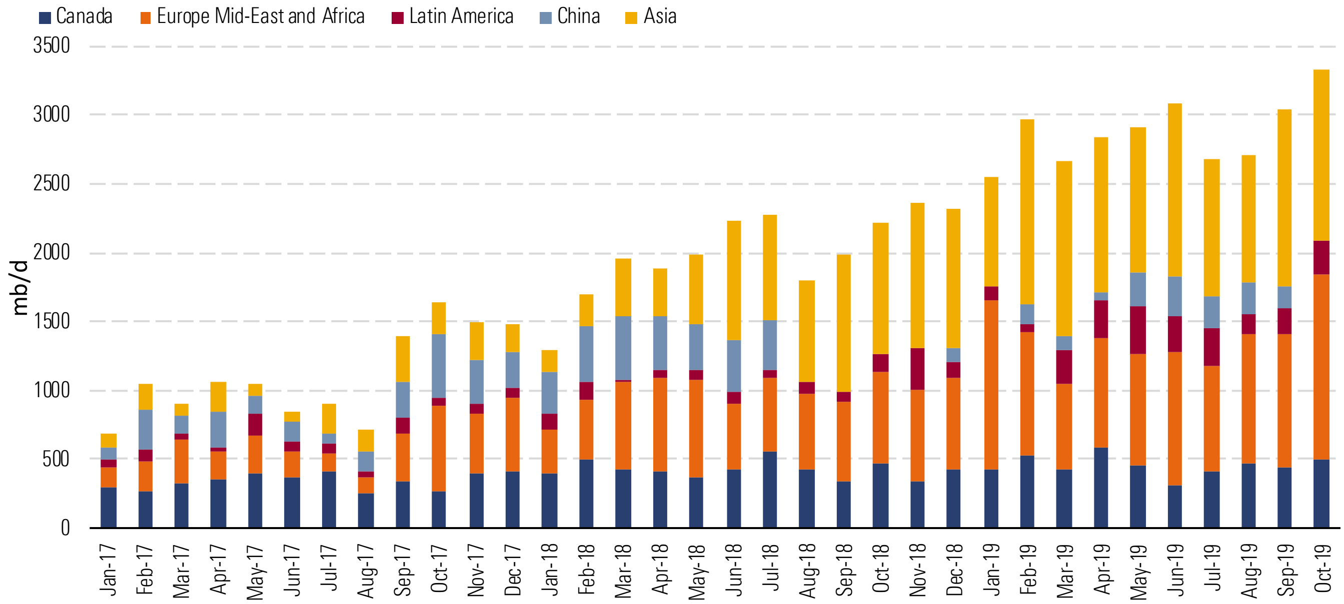
We'll provide a more complete review of 2019 U.S. refining in an upcoming note.

Crude Exports

Since a 1970s ban on U.S. crude exports was lifted in December 2015, the volume of domestic output sent overseas has increased from under 500 mb/d on average in 2015 to 2.9 mmb/d on average between January and October 2019, according to U.S. Census data. Crude exports averaged 2.0 mmb/d in 2018 and are estimated to end 2019 at an average 2.9 mmb/d based on monthly EIA data through October and four-week averages for November and December.

Canada's share of U.S. crude exports has fallen from 31% of the total in 2017 to 16% in 2019 through October even as it remains the largest foreign supplier to U.S. refineries. Over the same period, Europe, the Middle East, and Africa have increased their share from 27% to 32%, while Asia's imports of U.S. crude increased from 35% in 2017 to 45% in 2018 and 43% through October 2019. Within the Asia tally, exports to China have declined with the escalating trade dispute, taking 19% of total imports in 2017 down to 11% in 2018 and 5% in through October 2019. A smaller share of U.S. crude exports has gone to Latin American destinations (Exhibit 9).

Exhibit 9 Crude Exports by Destination



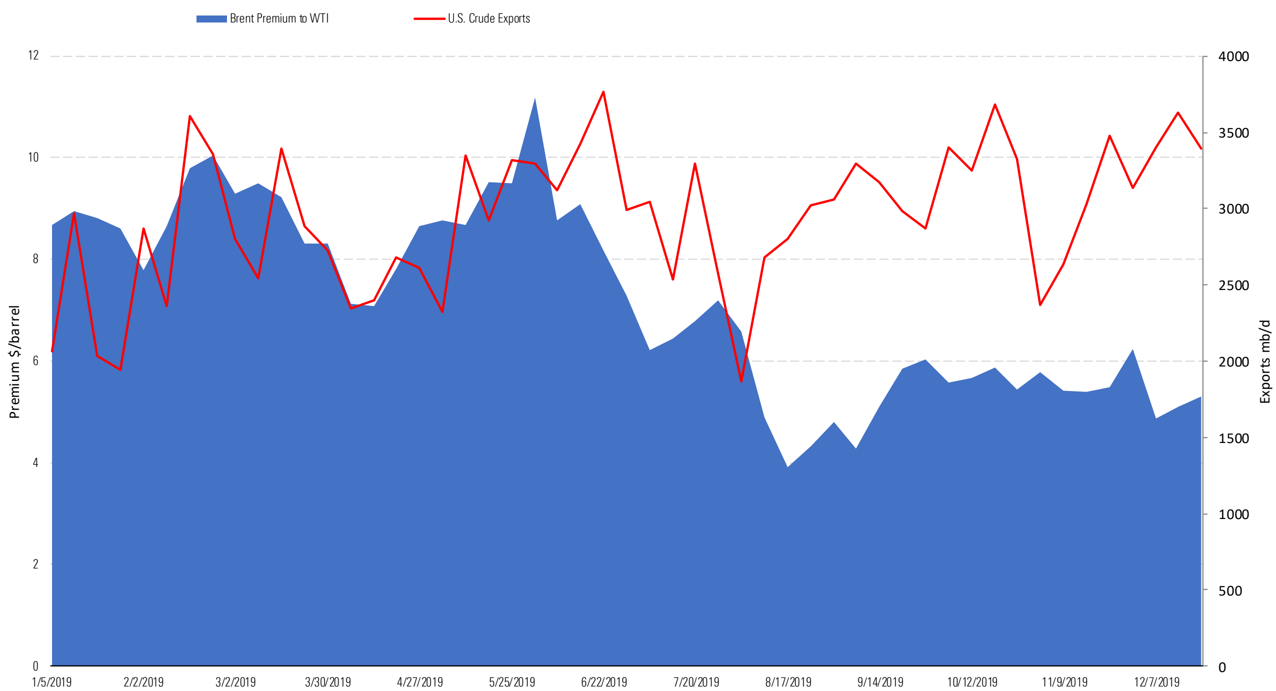
Source: U.S. Customs, Morningstar.

During 2019, the pace of export growth slowed compared with 2018 in part due to slowing production growth as well as congestion in the Permian preventing crude reaching the Gulf Coast. The opening of new pipeline capacity between the Permian and the Gulf Coast in August and September led to a surge in exports during September and October that is expected to continue through year-end. Some concerns that export infrastructure wouldn't be able to handle increased volumes proved groundless as new Gulf Coast dock capacity coped with flows. Several offshore terminals in the Gulf of Mexico are planned to reduce shipping delays caused by a lack of deep-water facilities, and we expect at least one of these to be built—the Enterprise/Enbridge SPOT terminal is expected on line in 2022 assuming it gains permit approvals.

Brent/WTI Differential and Exports

For U.S. crude exports to find a market, they must be competitively priced. That means export WTI crude has to be discounted against international rival North Sea Brent. Since export volumes first took off in 2017, a widening WTI discount to Brent has facilitated growth. Exhibit 10 shows weekly U.S. crude exports (red line, left axis) versus the weekly average Brent premium to WTI Cushing (blue shading, right axis). Brent's premium averaged $8.75/barrel during the first half of 2019 with export levels tracking the spread closely. Then the premium fell to below $4/barrel between June and August in response to the prospect of new pipelines out of the Permian reducing crude congestion in Midland and narrowing the spread between coastal and inland domestic crude prices. The Brent premium recovered to $5-$6/barrel for the remainder of the year, averaging $5.54/barrel in the second half as growing U.S. production faced increased competition for overseas markets. Importantly, apart from a temporary fall in exports during June and July, the volume of overseas shipments continued to increase in the second half of 2019 and was boosted by increasing Permian volumes arriving at the Gulf Coast on new pipelines.

Exhibit 10 Crude Exports and Brent Premium



Source: CME Group, EIA, Morningstar

Although the relationship between Brent and WTI Cushing—the world's light sweet marker crudes—has had a strong influence on exports, a more critical relationship is that between Brent and WTI priced at the Gulf Coast (as assessed at Magellan's East Houston terminal). The Brent premium to WTI MEH remained more consistent throughout the year, averaging $2.41/barrel. A $2.41 discount for WTI MEH offsets shipping costs to Europe or Asia and allows U.S. crude to compete in these markets. When freight costs jumped in October 2019 as a result of U.S. restrictions on a Chinese shipper accused of helping Venezuela evade sanctions, crude exports dipped by a million barrels/day as the arbitrage disappeared.

Besides the WTI discount to Brent opening up international markets for U.S. light sweet shale crude, a similar WTI discount to Asian crude marker Dubai has opened up that market to both shale crude and heavier sour offshore Gulf of Mexico barrels, which are preferred by Far East buyers.

We expect a preference for lighter crude grades by Asian refiners in the wake of International Maritime Organization regulations restricting sulfur content in ship fuel from Jan. 1, 2020. The new regulation penalizes refiners without tertiary capacity to remove sulfur from fuel oil, making them more likely to buy low-sulfur shale crudes.

New output in 2020 from a massive offshore Guyana basin and Norway's North Sea Johan Sverdrup field will compete directly with light sweet U.S. shale, crowding the market opportunity for export expansion.

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