Goldman Sachs | Commodities Research

6 January 2019 | 3:55PM EST

Oil

Back in the New Oil Order

- After the precipitous and volatile late-2018 oil decline, exacerbated by low liquidity, prices are starting 2019 with their first meaningful rally in three months. Despite this rebound, we believe that price levels and term structure remain undervalued relative to both current and forward fundamentals.
- The oil market is still pricing-in a sharp slowdown in global growth despite our economists' forecast for resilient growth and robust late-2018 oil demand data. Absent such a large slowdown, we expect prices to recover further, although growth uncertainty will likely require strengthening physical oil markets to drive this rally, with encouraging evidence that the OPEC cuts are starting.
- Even if physical markets prove robust, we continue to expect that the hiatus of the New Oil Order that we had forecast for 2018-1H19 will come to an end as new pipelines release the low-cost Permian basin into the global oil market. In addition, we expect that the oil market will balance at a lower marginal cost in 2019 given: (1) higher inventory levels to start the year, (2) the persistent beat in 2018 shale production growth amidst little observed cost inflation, (3) weaker than previously expected demand growth expectations (even at our above consensus forecasts) and (4) increased low-cost production capacity.
- This leaves us taking two views here: first that spot prices will continue to recover with Brent backwardation set to return by summer as inventories eventually revert to 5-year average levels; second, that long-dated WTI deferred prices will gradually decline to $50/bbl as low-cost US production becomes unconstrained and producers resume hedging.
- Our 3 and 6-mo Brent price forecasts are now $62.5/bbl and $67.5/bbl, down from $70.0/bbl previously but still above market forwards. Our 2019 average forecasts are $62.5/bbl for Brent and $55.5/bbl for WTI with our 2020 respective forecasts unchanged at $60.0/bbl and $54.5/bbl.

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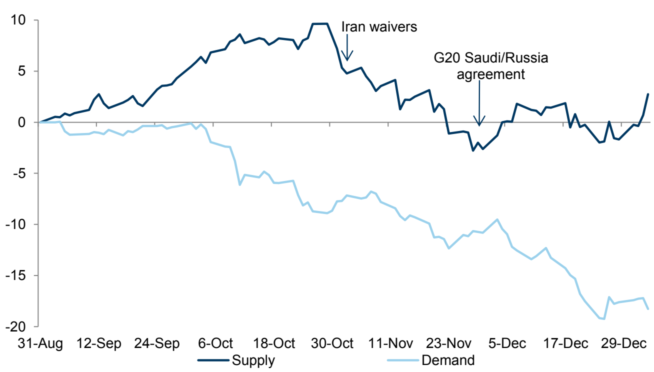
A macro and liquidity driven December collapse...

After the early November repricing of a more gradual decline in Iran exports, we view the subsequent collapse in oil prices as entirely driven by global growth concerns and exacerbated by low trading liquidity. With growth expectations still weak, the recent rally has in turn been driven by tighter supply expectations and recovering trading volume.

- Our strategists' decomposition of asset pricing shows that the Brent decline since December 1 was driven by a downward revision in global growth expectations, with oil supply instead turning supportive with the announcement of the OPEC production cuts and WTI reaching levels that suppress US production growth. With no improvement in demand expectations so far in 2019, the recent rally has instead been driven by supply, likely on evidence that the cuts have started.
- We believe that the volatility and magnitude of the sell-off were exacerbated by technical trading factors. Through $60/bbl Brent prices, the decline was driven by negative gamma effects. Beyond that, the move was driven by trend following selling flows into a greater than seasonal year-end collapse in liquidity as uncertain fundamentals led to a dearth of corporate and discretionary investor trading. As volumes have recovered this year, so have prices.

Exhibit 1: The Brent sell-off in December was entirely driven by demand concerns

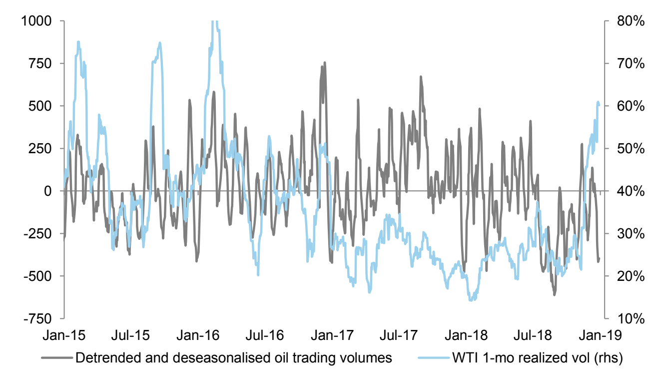
Decomposition of Brent cumulative returns (log-diff, normalized mean 0, SD 1)



Source: ICE, Goldman Sachs Global Investment Research

Exhibit 2: Oil volumes finished 2018 at low levels, with volatility spiking as a consequence

Detrended Brent and WTI trading volumes (LHS) vs. WTI 1-mo realized price volatility (RHS, %)



Source: Goldman Sachs Global Investment Research, Bloomberg, CME, ICE

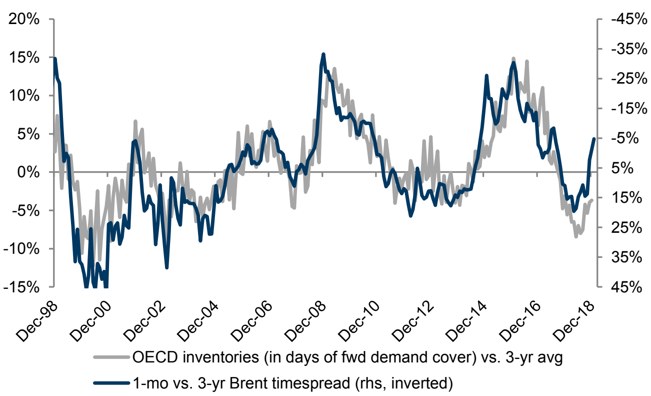
... which has left the oil market pricing-in too weak a growth outlook

At current price levels and term structure, we believe that the oil market sell-off has overshot current and forward fundamentals, even after accounting for the greater growth uncertainty and recent rally:

- We infer this from the sudden shift of the Brent forward curve into contango. The historical Brent timespread-to-inventory relationship provides us with the market's pricing of forward inventories. At our supply forecasts, which is nearly unchanged since our last update which reflected the OPEC+ cut, we estimate that the market is currently only pricing 0.9 mb/d yoy 2019 global oil demand growth, a level historically associated with localized recessions.

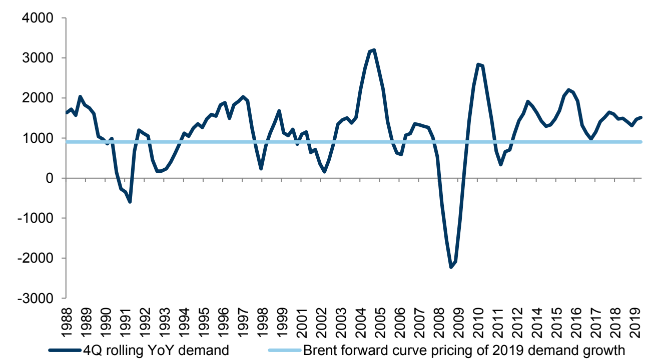
- Leveraging our top-down global oil demand growth model, this is similar to the oil market currently pricing in global GDP growth falling to only 2.5% yoy in 2019. This is well below our economists' 3.5% forecast, the low-end of consensus expectations and excessive even in light of the sequential decline in December activity indicators which still point to 3.2% global growth.

Exhibit 3: Timespreads have overshot recent inventory changes...
Brent 1-mo/3-yr timespreads (%) vs. OECD commercial stocks (in forward demand cover) vs. 3-yr average



Source: IEA, ICE, Goldman Sachs Global Investment Research

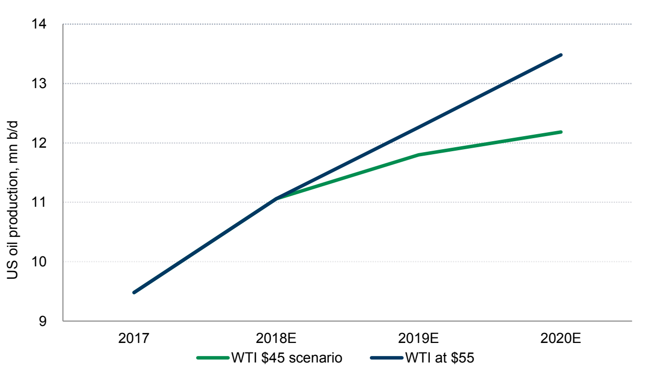
Exhibit 4: ... and reflect a weak demand growth outlook in 2019
Four quarter rolling average of YoY demand growth (kb/d) vs. Brent market pricing of 2019 demand at our supply forecast



Source: Goldman Sachs Global Investment Research, IEA, ICE

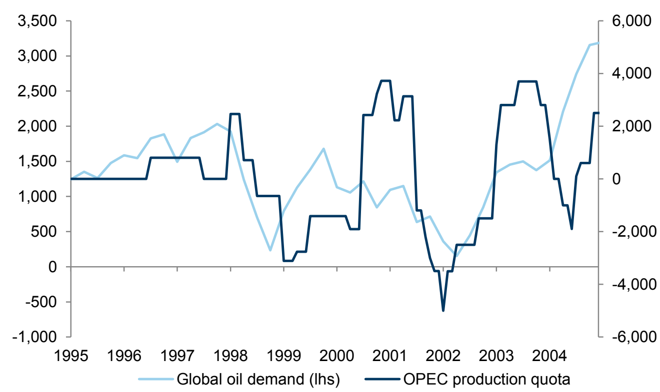
- We come to the same conclusion from current WTI price levels. At $47.5/bbl, our US E&P equity analysts estimate that US production would be 0.3 and 0.7 mb/d below our 2019 and 2020 forecast, equivalent to hits of 0.3% and 0.7% to global GDP growth each year. Such oil price levels would further likely lead to greater cuts in OPEC production given the associated fiscal strains, as already hinted in member comments, leaving current prices implying too much supply and not enough demand.

Exhibit 5: At recent oil prices, US production growth would be sharply lower
US oil production at various WTI prices (mb/d)



Source: Goldman Sachs Global Investment Research

Exhibit 6: In the Exploitation phase of the oil supply cycle, OPEC typically cuts production in low demand environments when there is little competition for market share
yoy change in kb/d

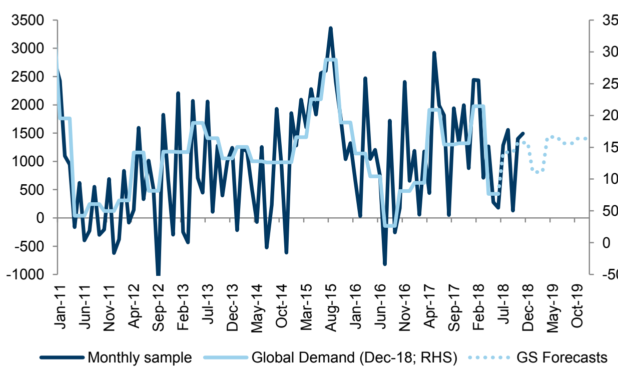


Source: OPEC, IEA, Goldman Sachs Global Investment Research

Net, the oil market has priced in an excessively pessimistic growth outlook. This sets the stage for prices to recover as long as global growth does not slowdown below 2.5%, even if it were to fall short of our forecast. Despite the increased macro uncertainty, we have only made a modest 60 kb/d downward revision to our demand expectations, which we had already reduced in early December. If growth disappoints further, we believe that it would only take a modest sell-off from current levels to incentivize offsetting supply adjustments from OPEC and shale.

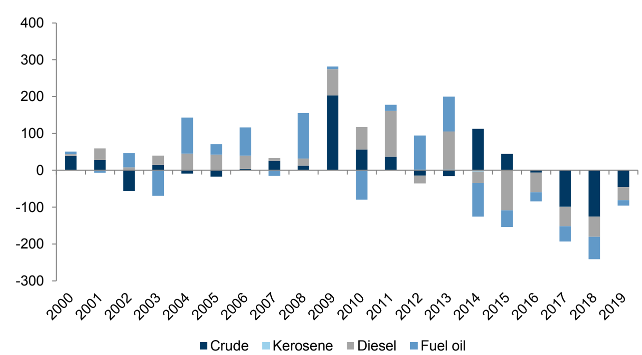
- We estimate oil demand to have increased by 1.5 mb/d in 2018, above consensus expectations due to likely miss-measured EM destocking. We view the November data points as supportive of this view, with robust readings in China, Europe and the US implying global demand growth of 1.6 mb/d yoy. We forecast 2019 global oil demand growth of 1.4 mb/d, reflective of global GDP growth at 3.3% yoy, conservatively below our economists 3.5% forecast, with a 60 kb/d downward revision to Chinese demand growth (offset by a similar revision to US production).
- We expect Chinese demand growth to slow to 350 kb/d yoy from 475 kb/d in 2018, with limited further downside as the political importance of growth targets leaves our economists expecting that policy will continue to ease to offset recent or future weakness. In the US, we incorporate the recent downgrade of our economists but still expect strong growth as new ethane crackers continue to come online and with 2018 demand still surprising to the upside. Finally, we continue to expect EM demand outside of China to recover due to (1) Brazil, Turkey, South Africa and Russia coming out of recessions, (2) a pause in fuel power demand destruction which reached 250 kb/d yoy in 2018, and (3) the supportive combination of lower oil prices, a weakening dollar and a more dovish US Fed.

Exhibit 7: High frequency data continues to point to robust oil demand growth late in 2018
Monthly subsample covering 80% global demand, November datapoint implied from subsample covering 55% global demand (kb/d YoY)



Source: Goldman Sachs Global Investment Research, IEA, JODI, EIA, National Sources, Customs

Exhibit 8: Periods of USD strength have typically led to EM destocking and initially underestimated local demand; 2018 EM demand was further weighed down by large fuel power demand destruction which we don't expect in 2019
Annual YoY change in petroleum product power generation (kb/d) across Saudi, Iran, Iraq, Kuwait, Egypt, Indonesia, and Pakistan

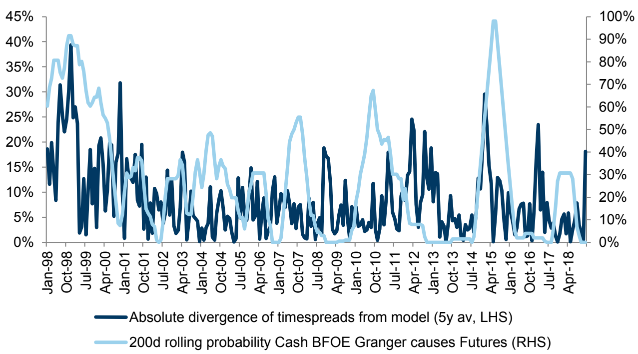


Source: Goldman Sachs Global Investment Research, IEA, JODI, Bloomberg, Reuters

It will take physical strength for oil prices to rally

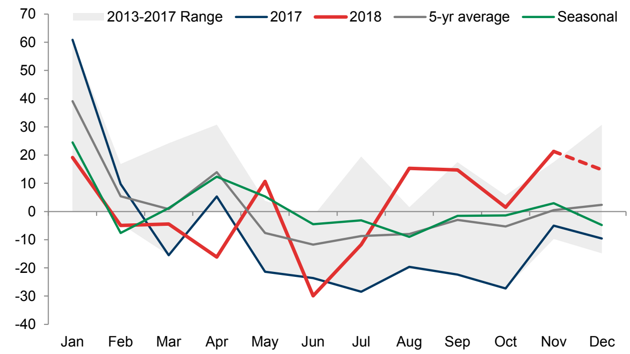
Macro uncertainty will likely leave the price recovery dependent on evidence that global growth is not stalling and that oil fundamentals are not as bad as currently priced in. This will leave physical indicators such as inventories finally reversing their counter-seasonal 2H18 increase and strengthening cash prices and prompt timespreads as likely playing a key role in driving financial futures higher, similar to the pricing environment of past periods of fundamental uncertainty like in 2014-15.

Exhibit 9: During times of large price dislocations (1990s, 2014/15) the physical market will step in and drive the financial market
Absolute divergence of current timespreads from that implied by contemporaneous inventories (LHS) vs. rolling 200d probability that the markets Granger-cause futures markets (null hypothesis rejected, RHS)



Source: Goldman Sachs Global Investment Research, CME, Nymex, IEA

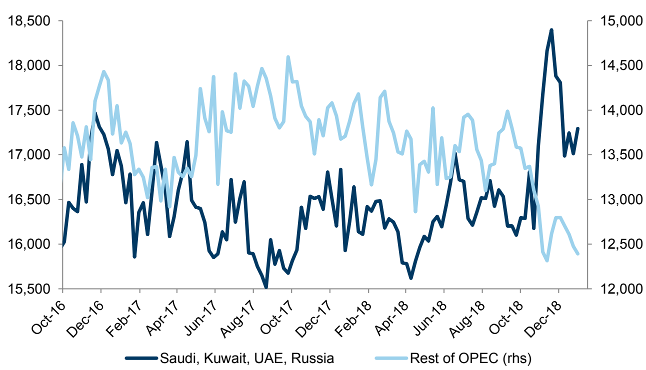
Exhibit 10: An end to the recent large counter-seasonal inventory builds will be necessary for prices to rally significantly
High frequency monthly total petroleum stock changes for the US, Japan, ARA, and Singapore (mb)



Source: EIA, PJK, PAJ, IE Singapore

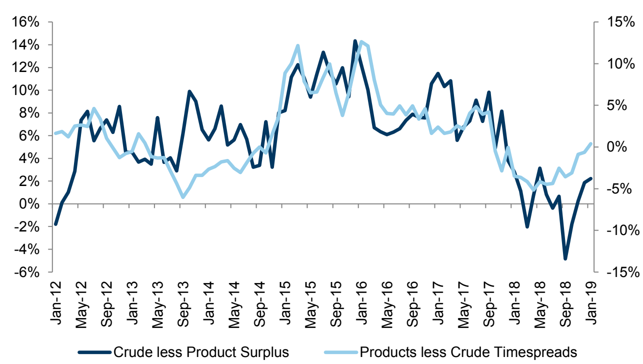
Shipping data already suggests that OPEC is implementing its cut. Encouragingly, nearby Brent timespreads have remained in an only modest contango of c. $0.2/bbl despite deferred timespreads moving into a steep contango, suggesting that the physical imbalance has improved since the large 3Q18 surplus. This supports our view that crude deferred spreads were distorted by the decline in market liquidity, with these timespreads also too weak relative to petroleum product timespreads and respective inventory levels.

Exhibit 11: Core OPEC and Russia have already cut back substantially from November before the cuts are even implemented
Seaborne exports from Saudi Arabia, Kuwait, UAE, Russia (kb/d)



Source: Goldman Sachs Global Investment Research, Kpler

Exhibit 12: Crude spreads still look too weak relative to product timespreads
Crude less Product surplus (vs. 5-yr average, %, LHS) vs. Product less Crude timespreads (1-mo vs. 1-yr, %, RHS)



Source: Goldman Sachs Global Investment Research, IEA, CME

Back in the New Oil Order

Even if physical markets recover, the 2019 supply landscape will change as the hiatus of the New Oil Order that we had forecast in 2018-1H19 comes to an end when new pipelines release the low-cost Permian basin into the global oil market. This return to the

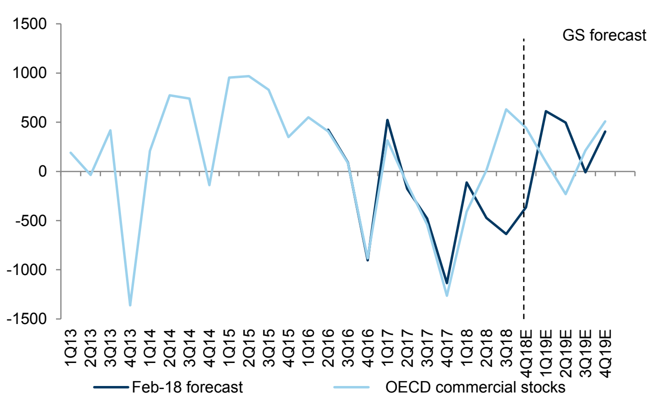
New Oil Order is in fact earlier and more forceful than initially expected, requiring a lower marginal cost to balance the oil market in 2019 than in 2018 given: (1) higher inventory levels to start the year, (2) weaker than previously expected demand growth expectations (even at our above consensus forecasts), (3) the lack of shale cost inflation in 2018 and its persistent beat, (4) a greater than initially expected increase in Permian offtake capacity, (5) increased low-cost production capacity, and (6) the delayed ramp-up of long-cycle projects in Brazil and Canada.

The weakening of oil fundamentals into a surplus in 2H18 and the downward revisions to realized and forward growth expectations - even if not as dire as the market is currently pricing - require less production in 2019-20 than expected a year ago.

- Through 2H18, North America and OPEC production beat expectations, while EM demand disappointed, leaving end-2018 OECD inventories rising counter-seasonally to 140 mb above our expectations from a year-ago.
- While growth concerns are likely excessive, it is now clear that the late-2017 synchronized global growth acceleration was only transient, with the decoupling of the DM and EM growth cycles instead prevailing and dampening demand cyclicality, as we discussed recently. With 2018 realized and 2019-20 forward growth expectations now normalizing near their 5-year average levels of 1.4 mb/d, we estimate that the required global supplies to balance the market through 2019 will be 0.6 mb/d lower than we had forecast a year ago.

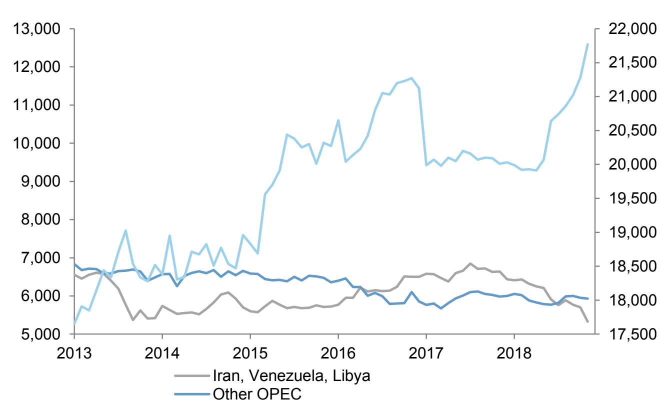
Conceptually, unexpected supply and demand shifts should impact inventories, and hence timespreads, most. The short-cycle nature of shale drilling is however now also part of this repricing mechanism, increasingly driving marginal costs, as was already apparent in May 2017 when prices overshot fundamentals or May 2018 when the announcement of the Iran sanctions required a move up on the shale cost curve.

Exhibit 13: A higher inventory buffer to start 2019...
Quarterly OECD commercial stock changes (kb/d)



Source: IEA

Exhibit 14: ... and greater OPEC+ low cost production capacity
Crude production (kb/d)



Source: IEA

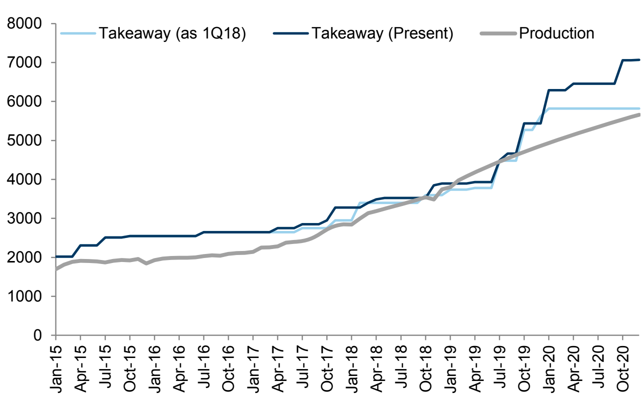
Beyond this shift left on the global supply curve, we also believe that recent shifts in the global cost curve also imply a lower marginal cost of production in 2019 than in 2018:

- **OPEC.** The surge in November OPEC output provided greater evidence that there exists low-cost spare capacity that will rise further with the return of the Neutral

Zone. This implies more identified room for low-cost core-OPEC and Russia production to grow later in 2019 and in 2020, with now evidence that these producers want to increase output. This remains a key pillar of our medium-term supply forecast and our New Oil Order supply framework (and one that points to backwardation returning as well).

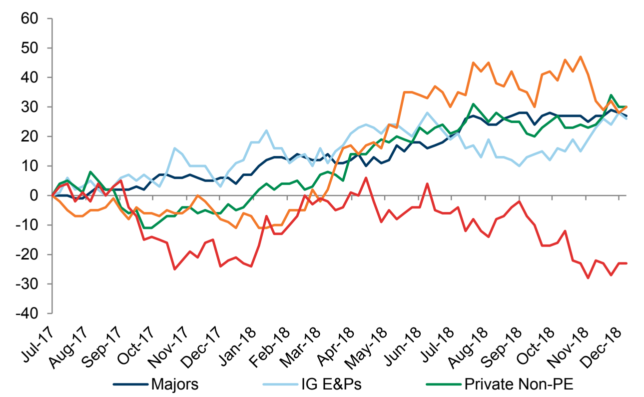
- **Shale.** The logistical constraints that hindered Permian growth will ease by 3Q19 as new pipelines come online, with this capacity increase larger and sooner than expected through most of 2018. This will require less production growth out of higher cost basins like the Bakken and Eagle Ford. Further, shale cost inflation remained modest and lower than our expectations through 2018. In addition, the ramp-up in shale activity in 1H18 was larger than we had expected at the prevailing \$57.5/bbl US producer price environment (including hedges and backwardation and even before indications that the 2H18 Permian constraints would remain modest). Finally, the lower cost oil majors posted surprisingly large increases in production, more than offsetting the large decline in drilling by higher cost HY producers.
- **Long-cycle projects.** The ramp-up in long-cycle projects in Brazil and Canada was delayed through 2018. While offset by higher shale production, these large (sunk cost) projects are now set to ramp-up in 2H19, requiring fewer higher cost barrels.

Exhibit 15: New pipelines will soon debottleneck the Permian basin, with the relief even larger than initially expected
mb/d



Source: EIA, Goldman Sachs Global Investment Research

Exhibit 16: The rig count increase in 2018 beat expectations, with also more rigs operated by majors and fewer by HY producers
US horizontal oil rig count changes since Jul-17 by capital structure



Source: Goldman Sachs Global Investment Research

A return of Brent backwardation but lower long-dated WTI prices

Altogether, these views are consistent with our prior expectations, albeit with greater magnitudes, whether it be the 2H18 surplus, the increase in low-cost capacity, the re-anchoring of long-term prices or the increase in Permian offtake capacity. As the downdraft in prices appears to finally be reversing, we take this opportunity to update our price forecast to reflect two views: first that spot prices will continue to recover with Brent backwardation set to return by summer as inventories revert to 5-year average levels; second, that long-dated WTI deferred prices will decline modestly as low-cost US production becomes unconstrained and producers resume hedging:

- We are lowering our 3-year WTI forward price forecast from \$55/bbl in 1Q19 to \$50/bbl from 2Q19 onwards. Our 2019 US crude production growth forecast is now

1.2 mb/d, only 0.1 mb/d lower than previously, reflecting this expected decline in marginal costs.

- As new pipes come online, we expect the WTI-Brent differential to return to $5.5/bbl in 2H19 and expect long-dated (3-yr) forward Brent prices to reflect that differential with a forecast of $55.5/bbl from 2Q19 onward. Still binding pipeline constraints in 1H19 and a supply push out of the Permian and Bakken will keep the spot differential near $8.5/bbl in 1H19.
- Relative to this long-term Brent anchor, our supply and demand forecasts lead us to forecast the forward curve to return to backwardation on the combination of resilient demand growth, lower core-OPEC and Russia production, moderate declines in Iran/Venezuela and slowing US production growth in 1H19. Admittedly, this normalization in inventories will be gradual, given the weaker starting point of 2019 balances.

Our 3 and 6-mo Brent price forecasts are now $62.5/bbl and $67.5/bbl, down from $70.0/bbl previously, but above current forwards, with 2019 average forecasts of $62.5/bbl for Brent and $55.5/bbl for WTI (our 2020 forecast of $60.0/bbl and $54.5/bbl are unchanged). In essence, we are shifting our market anchor from spot Brent prices in 2018 - when low inventories and constrained supply left the market clearing off demand adjustments - back to deferred WTI prices like in 2015-17, as US production returns to being physically unconstrained.

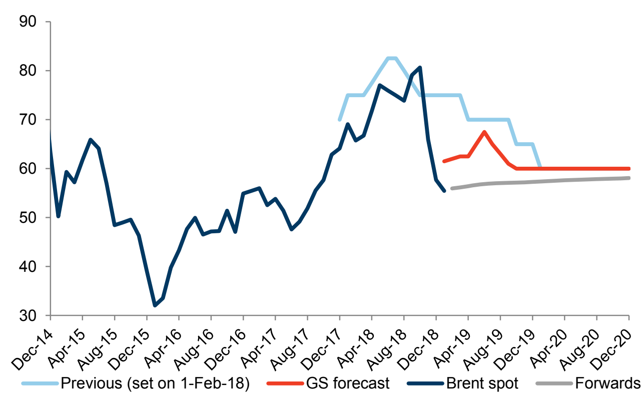
Exhibit 17: We expect prices to recover, albeit less than previously
$/bbl

	GS spot fcst.			Previous			Market forwards*		
	WTI	Brent	diff	WTI	Brent	diff	WTI	Brent	diff
Current							*48.0*	*57.1*	*9.1*
1Q19	53.5	62.0	8.5	69.5	75.0	5.5	*47.4*	*56.0*	*8.6*
2Q19	56.5	65.0	8.5	64.5	70.0	5.5	*48.7*	*56.7*	*8.0*
3Q19	57.5	63.0	5.5	64.5	70.0	5.5	*49.7*	*57.0*	*7.3*
4Q19	54.5	60.0	5.5	59.5	65.0	5.5	*50.3*	*57.2*	*7.0*
2019	55.5	62.5	7.0	64.5	70.0	5.5	*49.0*	*56.7*	*7.7*
2020	54.5	60.0	5.5	54.5	60.0	5.5	*51.0*	*57.7*	*6.7*

** As of 4-Jan-19*

Source: CME, ICE, Goldman Sachs Global Investment Research

Exhibit 18: Our spot forecasts remain above market forwards
$/bbl



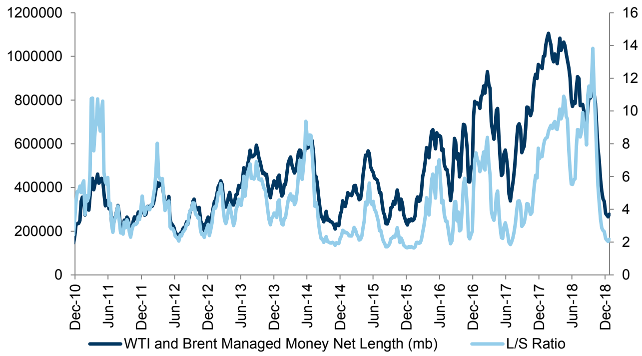
Source: ICE, Goldman Sachs Global Investment Research

If our macro and oil fundamental view prove correct, net speculative long positions will recover from their historically depressed levels. While this could create upside risks to our updated forecasts, we also expect a powerful offset from increased producer hedging, similar to what occurred in early 2017.

In particular, the recent surge in price and macro volatility and the better supplied forward outlook will in our view drive producers to increase hedging to lower earnings volatility, especially given their low 2019 and 2020 coverage. It is this flow that we expect will drive the slight decline in long-dated WTI prices that we forecast for 2Q19.

Exhibit 19: We expect a normalization of net speculative positions from their depressed levels...

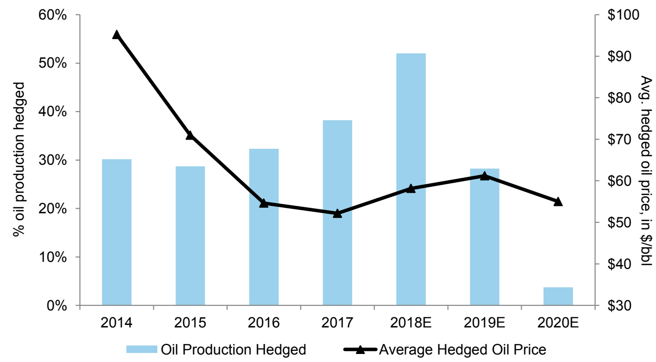
Net speculative positioning: size (in million barrels) vs. long/short ratio



Source: ICE, CFTC, CME

Exhibit 20: ... however, we also expect a return of producer hedging from also low levels

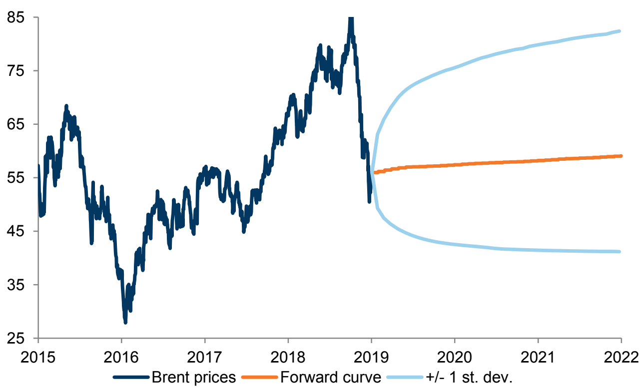
US public E&P crude oil hedging



Source: Company data, Goldman Sachs Global Investment Research

Exhibit 21: Although the surge in implied volatility is excessive, a more uncertain forward outlook should incentivize producers to increase hedges...

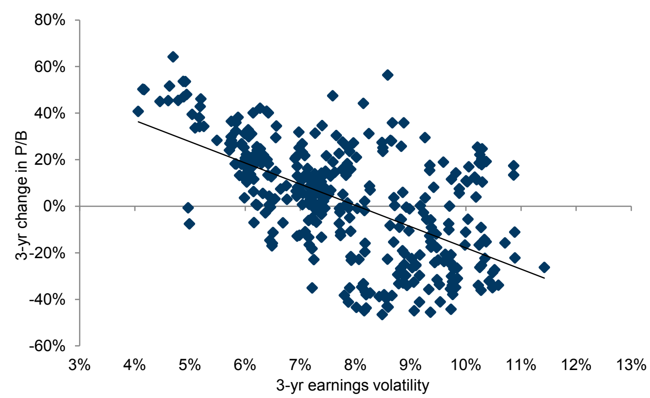
Brent ($/bbl): spot, forward and +/- 1 standard deviation distribution based on implied volatility surface



Source: ICE, Goldman Sachs Global Investment Research

Exhibit 22: ... with producers historically rewarded for lower earnings volatility

3-year rolling change in Price to Book ratio (vertical) vs. 3-yr rolling earnings volatility (horizontal). S&P 500 Oil & Gas subsectors: Integrated, E&P, Refining, Storage. 1979-2015 excluding 1987-1989 & Asian Financial Crisis



Source: Company data, Goldman Sachs Global Investment Research

Disclosure Appendix

Reg AC

We, Damien Courvalin, Jeffrey Currie, Huan Wei and Amber Cai, hereby certify that all of the views expressed in this report accurately reflect our personal views, which have not been influenced by considerations of the firm's business or client relationships.

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