



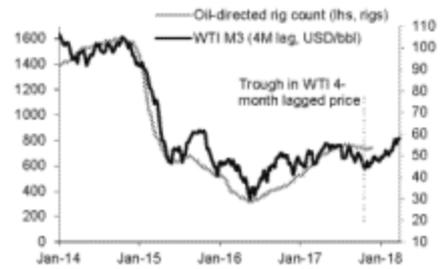
The pessimistic shift in US supply data is ending

- Although US supply has slowly and surely turned back to growth, the extent of this growth is still very much up for debate. The negative warning signs about slower growth are now beginning to turn around. To be sure, we still observe a drag in monthly production data compared to weekly estimates, measuring almost 300kb/d in August. However, we are now seeing the formation of a trough in drilling activity in response to the lagged WTI price. We assume that more frequent mentions of capital discipline will not stand in the way of an uptick in drilling activity through March 2018.
- In addition, rig productivity is likely to recover as it is assisted by the deployment of new frac capacity. The hydraulic fracturing subsector of US oil services is currently undersupplied, according to our US oil services analyst, as a result of a higher penetration of pad drilling, longer laterals, tighter stage spacing, more frac clusters and higher sand loading.
- Our oil services analyst notes that in addition to new capacity totaling 1 million hhp, an orderbook of 0.5-1.0 million hhp could begin to be delivered in the first quarter. This has the ability to raise the completed/drilled ratio from 0.73 in the Permian and 0.86 in all other regions towards 0.95, and lifting productivity. This would be a reversal of the decline in completions since September 2016 which was matched by a decline in rig productivity.
- We believe that the downward shift in US supply growth expectations helps explain stronger oil prices over the second half of 2017, and a rebuilding of these expectations over the next 4 months could be damaging for the oil price.

Estimating the US response function

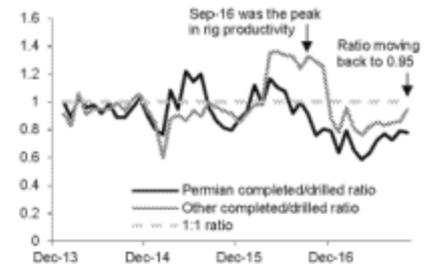
- In order to estimate the response of the US onshore tight oil industry to various levels of average realised WTI price in 2018, we take as a starting point the assumption that the industry is cash neutral with 750 oil-directed rigs active at a lagged WTI price of USD 50/bbl. For every USD 5/bbl above or below this in average 2018 prices, we assume that incremental annual cashflow of USD 11bn funds an additional 100 rigs, with each rig drilling 18 wells per year (the current average for all tight oil regions is 17.77, or 20.54 spud-to-spud days per well).
- These simple assumptions, along with current rig productivity and legacy decline statistics by region, lead to the below sensitivities in supply growth. These figures deal with onshore tight oil regions only (Anadarko, Bakken, Permian, Appalachian, Eagle Ford, Haynesville and Niobrara), excluding some conventional and all offshore production.
- Caveats are that the profile of rig count growth, particularly for the higher priced scenarios, shows an unrealistically sudden jump up from the current level to the 2018 average, but we accept this artificiality as a useful simplification rather than attempt to smooth the ramp-up in activity. Consequently, we accept that the shift in production growth in 2018 would be less dramatic in reality. Also, these scenarios hold legacy decline and rig productivity unchanged over the longer term. Given the so-far steady improvements in productivity, the longer term growth estimates in these scenarios should be regarded as a lower bound.

Figure 7: Drilling response to price is intact



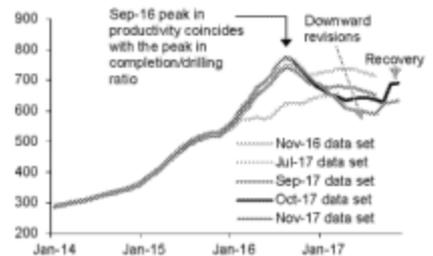
Source: Bloomberg Finance LP, Baker Hughes, Deutsche Bank

Figure 8: Completion/drilling ratio is rising...



Source: US EIA, Deutsche Bank

Figure 9: ...boosting rig productivity



Source: US EIA, Deutsche Bank