Oil

Drilling down on the shale rig response

- The US shale oil drilling response has started, although the increase in the rig count remains modest so far. Beyond the headline rig count, we find that it is the IG producers that have continued to steadily increase their drilling, with HY producers only recently picking up activity and private producers still lagging.
- With the price signal to add rigs materially improving in late December, the historical lag between prices and rig response suggests that drilling may be about to surge in coming weeks. Yet, the just completed 4Q17 earnings season suggests instead that publicly listed E&Ps are exhibiting restraint and being rewarded for it. In particular, companies that chose to return capital to shareholders outperformed, while companies that instead surprised capex expectations to the upside underperformed.
- The restraint exhibited by producers so far leaves us comfortable with our 1.1 mb/d US crude oil production growth forecast for 2018. Combined with our expectation for strong oil demand growth and high OPEC compliance, we reiterate our constructive forecast on oil prices with global inventories set to fall further below their 5-year average levels through 3Q18.

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Investors should consider this report as only a single factor in making their investment decision. For Reg AC certification and other important disclosures, see the Disclosure Appendix, or go to www.gs.com/research/hedge.html.

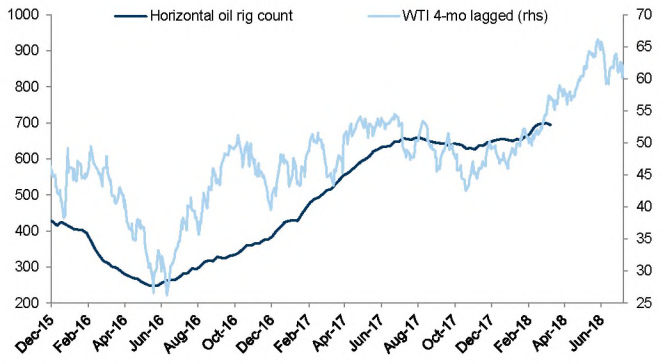
An only gradual shale drilling response so far

The shale drilling response has started with US producers increasing their horizontal oil rig count by 10% over the past six months. The two sources of rig activity that we track, Baker Hughes (BH) and Platts RigData (RD), display similar patterns, with their US oil horizontal rig counts up by 49 and 45 since late November for example (differences in their coverage still leave room for different levels of total rigs in operation).

The timing of this increase, 3 to 4 months after WTI prices rallied above $55/bbl, is consistent with how producers describe their response function as well as their behavior in 2016-17. While the rig count response has only been moderate so far, the price signal to add rigs materially improved in late December, setting up the stage for another potentially large increase in drilling activity in coming weeks.

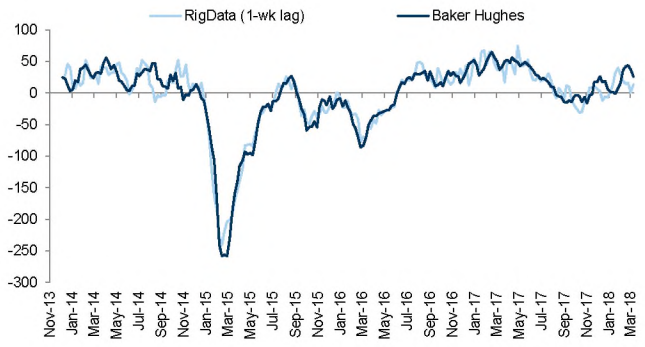
The most recent data is so far inconclusive on such another pick up in drilling: there is indeed an acceleration in the RD rig count, up 11 over the past three weeks, but the BH rig count remains stable instead, in fact posting its first decline in seven weeks this past Friday (3/9). And while the historical pattern of the RD leading the BH rig count by one week suggests rigs may be about to rise again, both measures have often diverged over the past six months, muddying such a signal.

Exhibit 1: The US oil rig count has started to rise, with the sharp rally late last year suggesting this is only the beginning
US horizontal oil rig count (lhs) vs. WTI oil prices (rhs, $/bbl, 4-mo lag)



Source: Baker Hughes, CME

Exhibit 2: The magnitude of the response is consistent between the two series of drilling activity we track
6-week change in rig count (RigData with 1week lag)



Source: Goldman Sachs Global Investment Research, Baker Hughes, Platts

This uncertainty on the path of US drilling as well as recent concerns over the demand outlook have weighed on oil prices, with the XOP (US E&P equity index) declining through the earnings seasons and further underperforming oil prices. As we discussed last week, we believe the oil demand growth outlook remains robust. As we discuss below, the just completed 4Q17 earnings season suggests that publicly listed E&Ps are exhibiting restraint in their drilling response. With some managements commenting on how backwardation justifies not allocating more capital to drilling, we believe OPEC's incentive to comply with the cuts and manage an orderly exit will remain high (see Backwardation is the solution, May 22, 2017). This combination of strong oil demand growth, high OPEC compliance and moderate shale drilling response leaves us reiterating our constructive forecast for oil prices, with global inventories set to fall further below their 5-year average levels through 3Q18.

E&Ps rewarded for announcing restraint in their drilling response

E&Ps have so far guided to a moderate drilling response and have been rewarded for returning capital to shareholders:

- Companies under our US E&P equity analysts coverage have guided for 2018 production 2% below their earlier expectations. Further, the earnings season featured more companies than our analysts had expected announcing measures to return capital to shareholders, either through buybacks or dividend increases.
- While the XOP further underperformed the S&P 500 and oil prices during this earnings season, companies that chose to return capital to shareholders outperformed while companies that instead surprised capex expectations to the upside underperformed. The combined differentiated equity market response and yet overall sector underperformance suggests that management may remain incentivized to improve shareholder value vs. reinvesting in growth in coming months. We have in fact seen such announcements come after earnings were already announced last week (DVN and HES). Finally, companies that announced both higher capex and returning capital to shareholders underperformed as well.

Exhibit 3: E&Ps share prices have continued to underperform, finally encouraging E&Ps to focus on shareholder returns over production growth

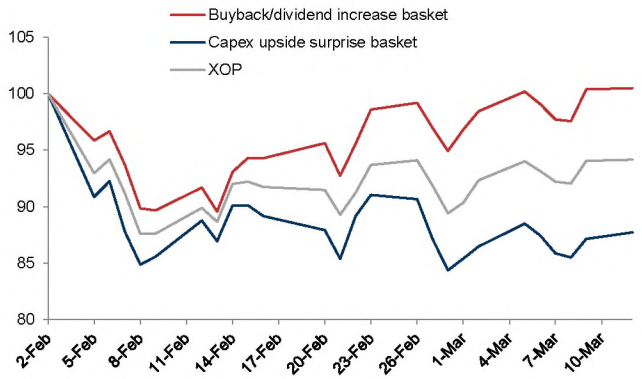
Oil price implied by relative XLE vs. S&P 500 performance vs. WTI 2-yr forward



Source: Goldman Sachs Global Investment Research, CME

Exhibit 4: Companies that chose to return capital to shareholders outperformed while companies that instead surprised capex expectations to the upside underperformed

Returns indexed to 100 as of beginning of earnings season (baskets are constructed from simple average of components' daily returns)

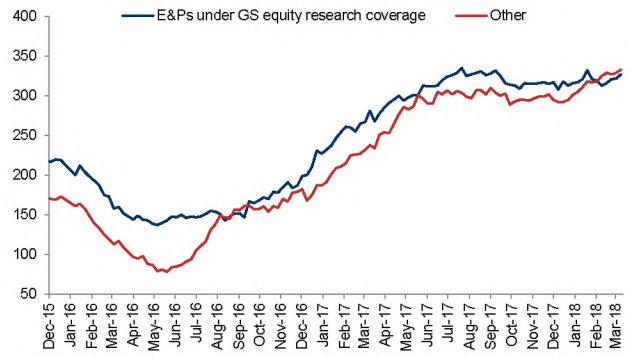


Source: Company data, Goldman Sachs Global Investment Research, Bloomberg

The restraint exhibited by producers so far leaves us comfortable with our 1.1 mb/d US crude oil production growth forecast for 2018, which assumes that another 70 horizontal oil rigs will be added this year. Even though the rig response of companies under our equity research coverage has been lower than expected, we see offsetting signs of greater activity by private producers, limiting the downside risks to our production forecast.

Exhibit 5: Smaller HY and private companies are ramping up more aggressively than the larger companies covered by our equity analysts

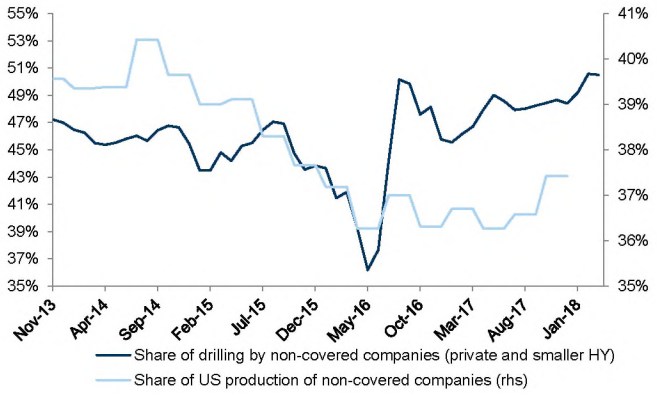
Horizontal rig count of E&Ps under GS equity research coverage vs. other companies



Source: Company data, Goldman Sachs Global Investment Research, Bloomberg, Platts

Exhibit 6: The same pattern in 2016-17 is now contributing to a rising share of US oil production coming from non-covered companies

Shares of rigs and oil production from non-GS equity research covered producers



Source: RigData, Company data, Goldman Sachs Global Investment Research, EIA

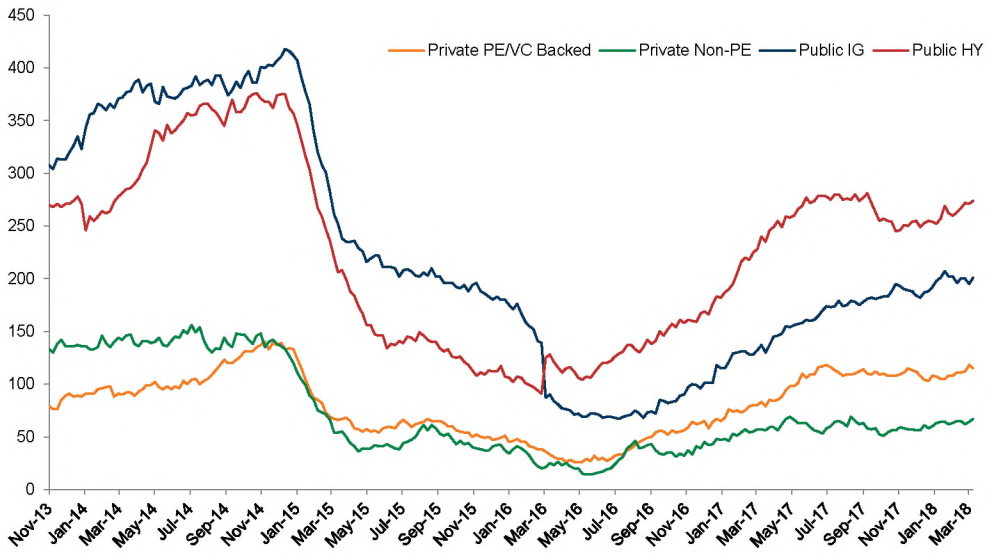
Given our 2018 $72.5/bbl WTI spot price forecast, the upside risks to this shale drilling response will grow over time as producers' returns improve. Completion capacity and midstream bottlenecks will limit this upside in 2018 in our view but new capacity in 2019 could accommodate higher crude production growth than the 1.1 mb/d we are forecasting for next year as well.

From a global oil supply-demand perspective, however, we find offsetting upside risks to our 2019 1.6 mb/d global demand forecast, as well as downside risks to our assumption that OPEC/Russia production will be 0.7 mb/d higher by end-2019 than currently. As a result, our 2019 WTI forecast remains $64.5/bbl.

Drilling down in the rig response

To analyse the ongoing shale supply response, we update our breakdown of US drilling activity by operators, capital structure and basin. While there are many idiosyncratic company level catalysts, we still note a few broad trends with lower cost of capital producers so far leading the rig count increase. At our higher price path, we expect private and more levered producers - which have lagged - to respond as well, although these smaller producers are typically less efficient. Finally, while the IG response remains concentrated in the Permian, HY producers have instead been more active in the Eagle Ford and the Bakken.

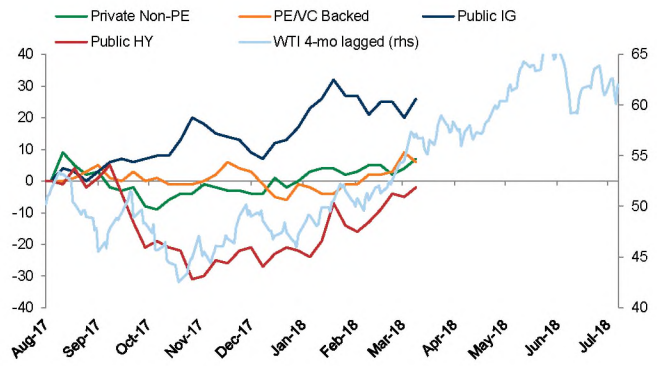
Exhibit 7: The IG rig count has steadily increased while HY producers are only now back near their summer 2017 drilling levels
Oil horizontal rig count by corporate structure



Source: Goldman Sachs Global Investment Research, Bloomberg, Company data, Platts

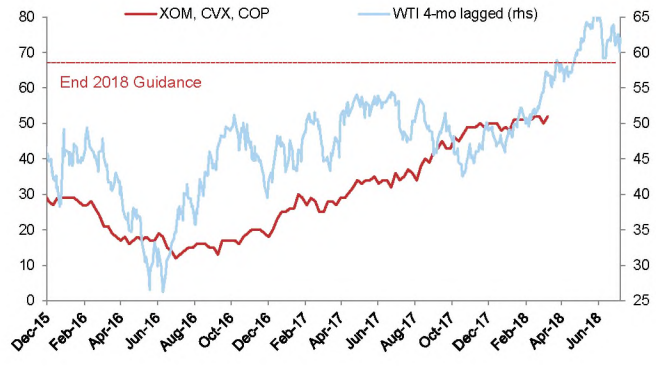
- The increase in the IG producer rig count has continued steadily over the past year, with little sensitivity to gyrations in oil prices. This steady rise is first driven by the majors, with XOM, CVX and COP guiding to add another 15 rigs by year-end.

Exhibit 8: IG is leading the rig count growth since August 2017
Horizontal oil rig count changes since Aug-17 vs. WTI 4-mo lagged prices



Source: CME, Goldman Sachs Global Investment Research, Bloomberg, Company data, Platts

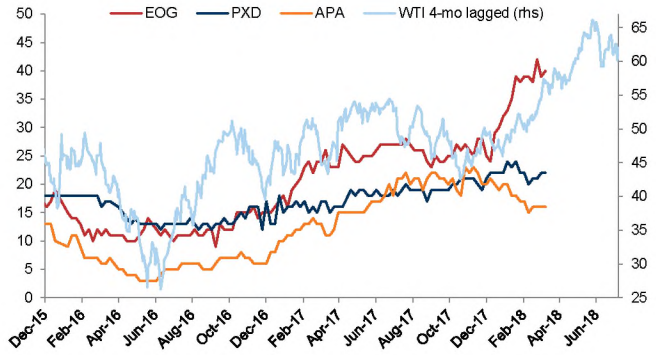
Exhibit 9: The large integrated producers have yet to deploy the rigs to reach their 2018 guidance
Horizontal oil rig count vs. WTI 4-mo lagged prices



Source: Goldman Sachs Global Investment Research, Company data, Bloomberg, Platts

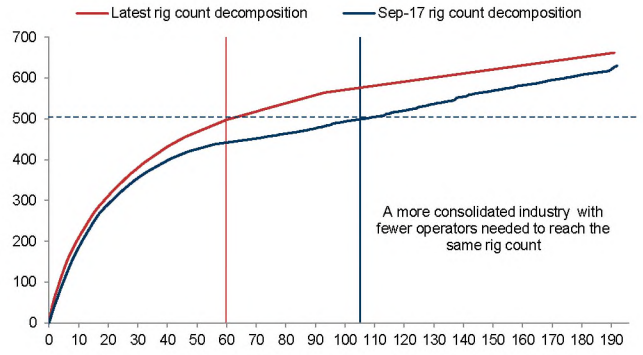
- Among the three largest IG E&Ps, only EOG has meaningfully increased drilling activity, which will likely lead to its production beating its guidance from 2Q onwards. The rise in the rig count of these majors and large E&Ps is leading to a gradual greater concentration of drilling activity over the past year, with more rigs in the hands of fewer operators with a lower cost of capital. A response to higher prices by smaller producers (both HY and private) could temporarily reverse this trend, although we expect it to intensify medium term as the industry consolidates.

Exhibit 10: EOG has ramped up drilling most aggressively among IG E&Ps
E&P companies rig count vs. WTI 4-mo lagged



Source: Goldman Sachs Global Investment Research, Company data, Bloomberg, Platts

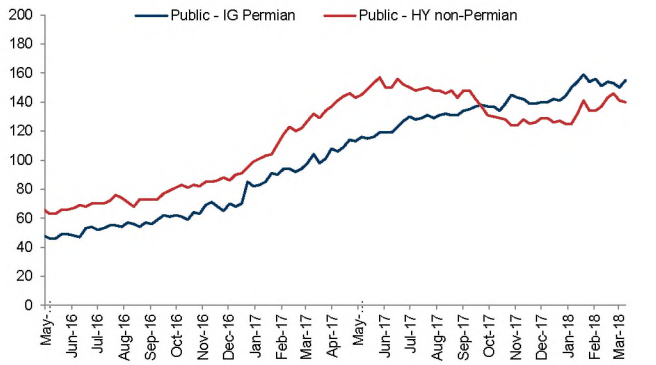
Exhibit 11: Since the rig count stabilized last summer, we have seen a greater concentration in drilling activity
Cumulative horizontal oil rig count (vertical); Cumulative number of operating entities (horizontal)



Source: Goldman Sachs Global Investment Research, Company Data, Bloomberg, Platts

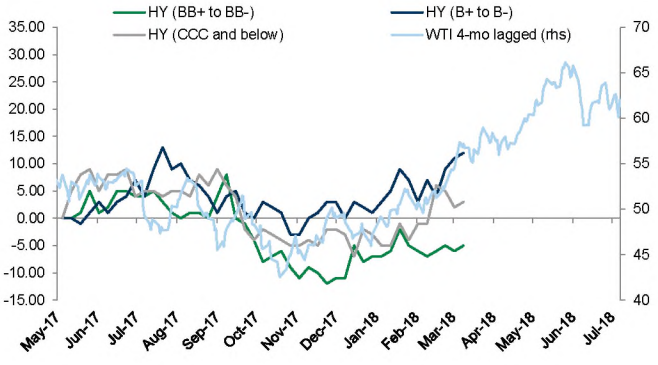
- From a basin perspective, the IG response is primarily in the Permian while the HY response is in other basins, especially the Bakken and the Eagle Ford. We provide further details on these dynamics on pages 10-11 of this report.
- The outperformance of the IG rig count vs. that of HY or private producers is noteworthy, as it stands in sharp contrast to 2016 when readily available external capital led to a surge in drilling by higher cost of capital producers. Drilling by more levered HY companies has nonetheless started to increase over the past few weeks. Among these, the rig response has accelerated most for the most levered operators (B+ credit rating and beyond).

Exhibit 12: IG companies are mainly ramping up in the Permian, while HY companies are ramping up in non-Permian basins
Public IG Permian vs. HY non-Permian horizontal oil rig count



Source: Goldman Sachs Global Investment Research, Company data, Bloomberg, Platts

Exhibit 13: The drilling response has been more modest for highly levered HY E&Ps
HY Rig count vs. WTI 4-mo lagged prices

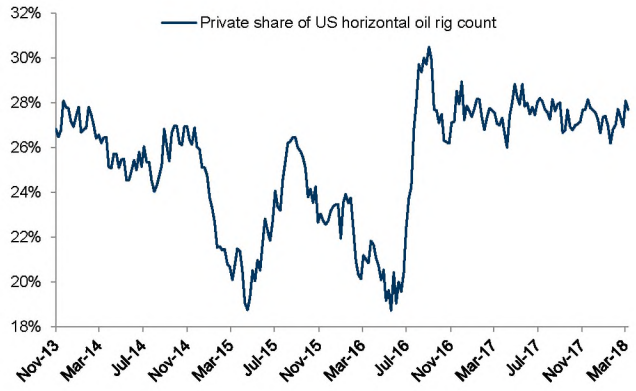


Source: Goldman Sachs Global Investment Research, Company data, Bloomberg, CME, Platts

- The drilling response of private producers, either private equity backed or independent, has lagged so far. Given the offsetting changes in HY and IG rig counts over the past six months, the share of drilling activity by these private operators has remained stable near 27%. With independent private producers having to operate within cashflow (given their lack of external funding) but without the oversight of equity shareholders, we see potential for their rig count to materially rise in coming

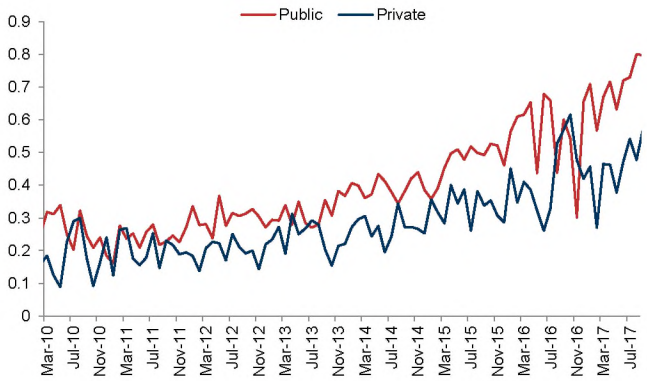
months. While such a response would leave these producers contributing to a greater share of US production, it is important to highlight that these producers are typically 30% less productive than public operators (with this result holding for PE-backed producers as well), leaving their rig count increases 30% less impactful to the path of US production growth.

Exhibit 14: The share of drilling by private operators has remained stable but could be about to pick up as their cash flow increases
Private rigs count share of total



Source: Goldman Sachs Global Investment Research, Bloomberg, Company data, Platts

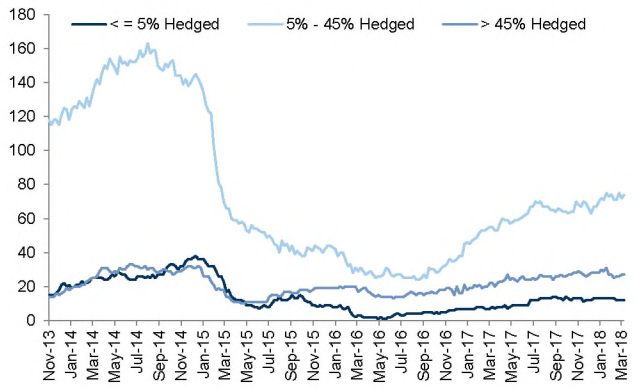
Exhibit 15: The impact of higher drilling by private producers is smaller than for public companies as they are less productive
Initial production (month 1) of Permina wells (private vs. public)



Source: Goldman Sachs Global Investment Research, IHS, Bloomberg, Company data

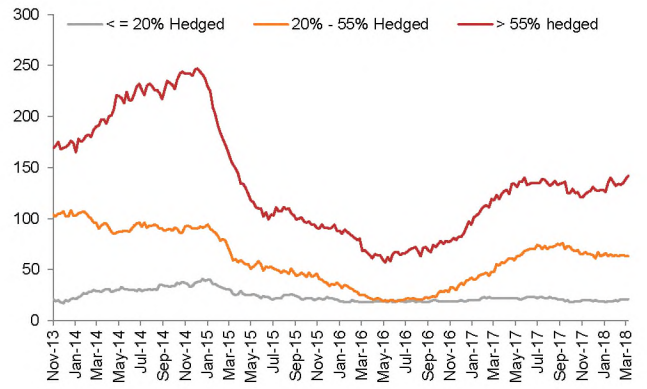
- Finally, we looked at potential drilling patterns at various hedge coverage levels, using the just reported 4Q17 hedge coverage data. We find that for both IG and HY producers, companies with higher hedge coverage are adding rigs more aggressively than companies with low hedge coverage, likely given this existing downside protection. Further, high hedge ratios are likely not in themselves deterrent to higher drilling activity: option-based hedging strategies allow for participation to higher oil prices while shale producers can reduce their hedge coverage by adding more rigs. Finally, this likely reflects dynamic hedging strategies: EOG, for example, had no hedges on for 2018 when it reported its hedge coverage on 2-Nov-17 but had increased its 2018 hedge coverage to 32% by 20-Feb-18, a window of time over which it increased its rig count by 25%.

Exhibit 16: Well-hedged IGs are leading the rig count growth
Oil rig count by 2018 Hedging %



Source: Goldman Sachs Global Investment Research, Company data, Bloomberg, Platts

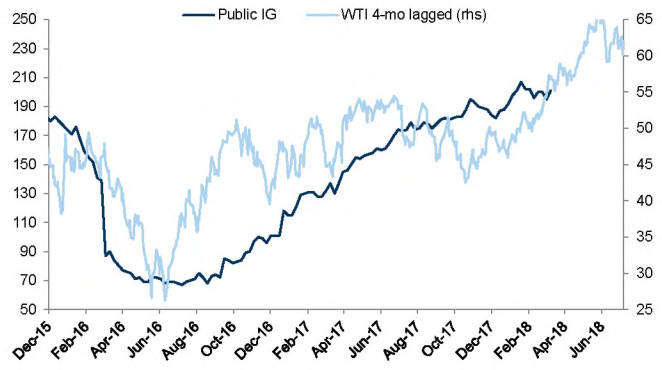
Exhibit 17: Well-hedged HYs are leading the rig count growth
Oil rig count by 2018 Hedging %



Source: Goldman Sachs Global Investment Research, Company data, Bloomberg, Platts

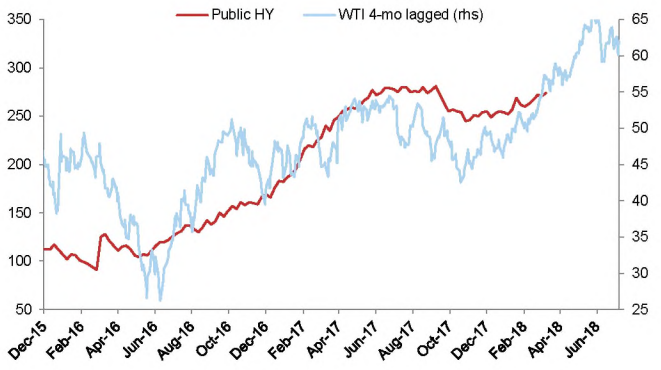
The response to higher oil prices

Exhibit 18: IG horizontal oil rig count vs. WTI prices



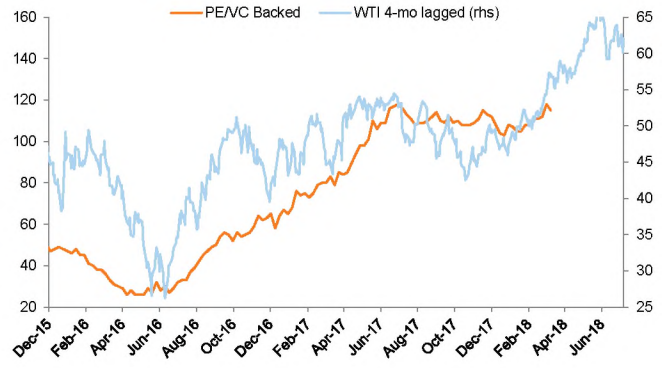
Source: Company data, Goldman Sachs Global Investment Research, Bloomberg, Platts

Exhibit 19: HY horizontal oil rig count vs. WTI prices



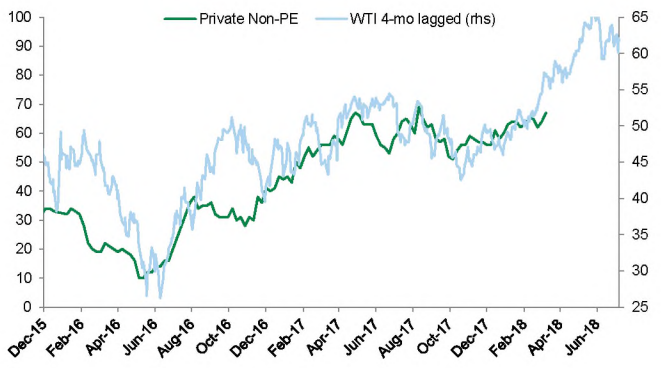
Source: Goldman Sachs Global Investment Research, Company data, Bloomberg, Platts

Exhibit 20: Private PE-backed horizontal oil rig count vs. WTI prices



Source: Goldman Sachs Global Investment Research, Bloomberg, Company data, Platts

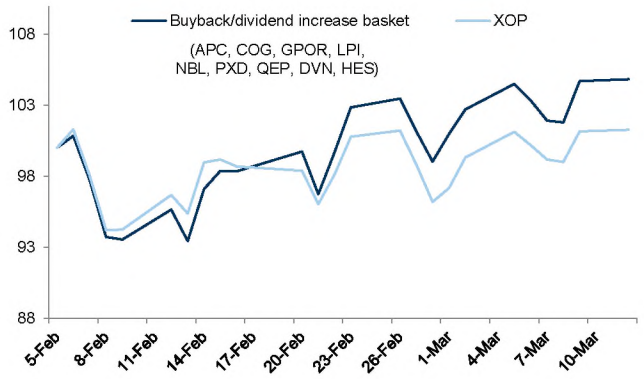
Exhibit 21: Private independent horizontal oil rig count vs. WTI prices



Source: Goldman Sachs Global Investment Research, Bloomberg, Company data, Platts

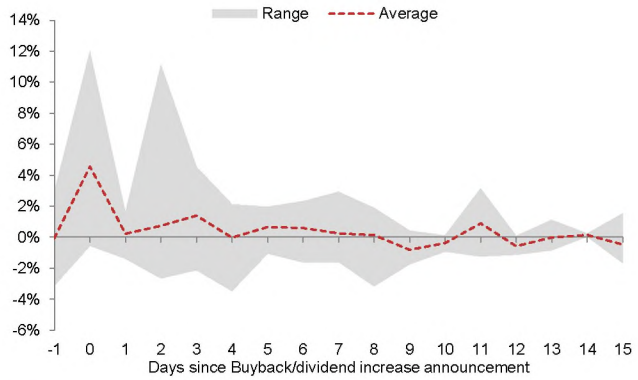
The response to E&P guidance during the earnings season

Exhibit 22: E&Ps that announced either share repurchases or dividend increases outperformed the sector
Returns indexed to 100 as of beginning of earnings season (basket is constructed from simple average of components' daily returns)



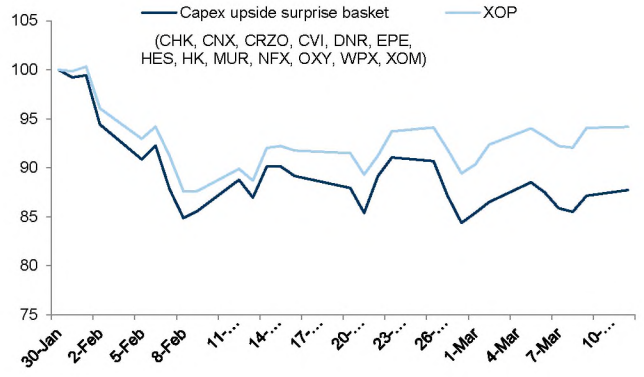
Source: Company Data, Bloomberg, Goldman Sachs Global Investment Research

Exhibit 23: Stocks outperformed on the day of announcement and didn't give these gains back
Average daily returns of companies vs. XOP (0 is announcement day)



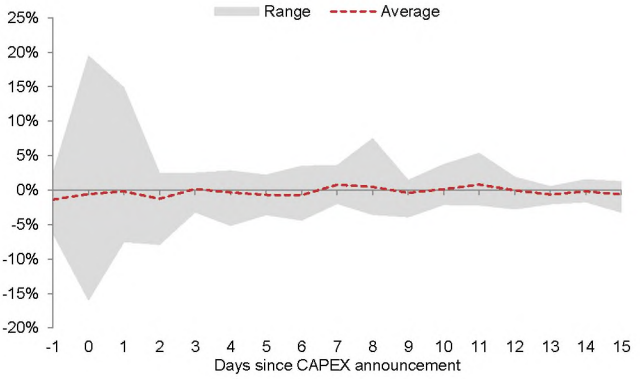
Source: Company Data, Goldman Sachs Global Investment Research, Bloomberg

Exhibit 24: Companies which announced higher-than-expected CAPEX underperformed the sector



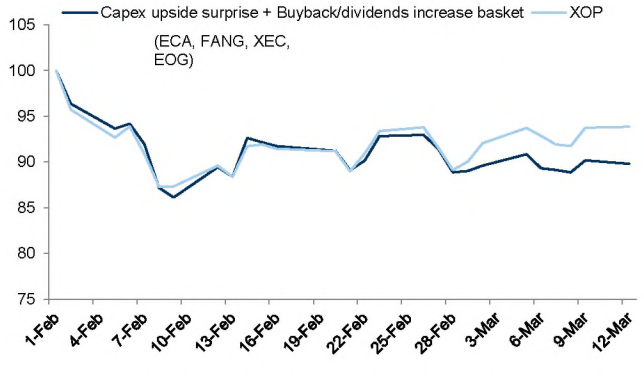
Source: Company Data, Bloomberg, Goldman Sachs Global Investment Research

Exhibit 25: The range of outcomes was large although the average showed steady underperformance



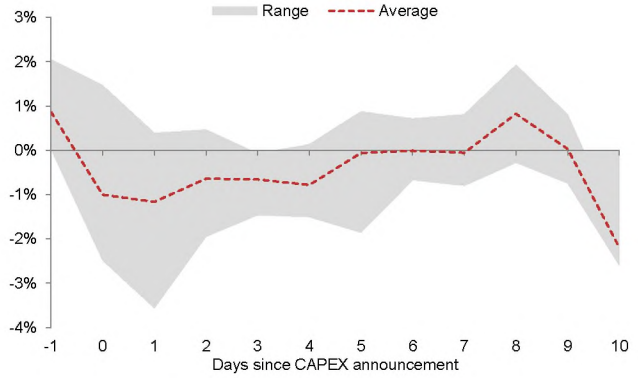
Source: Company Data, Goldman Sachs Global Investment Research, Bloomberg

Exhibit 26: Stocks that announced both higher CAPEX and dividends/buybacks also underperformed



Source: Company Data, Goldman Sachs Global Investment Research, Bloomberg

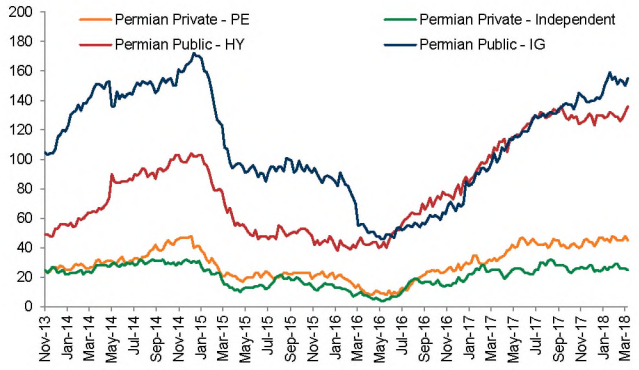
Exhibit 27: This underperformance was steady in the days following announcement



Source: Company Data, Goldman Sachs Global Investment Research, Bloomberg

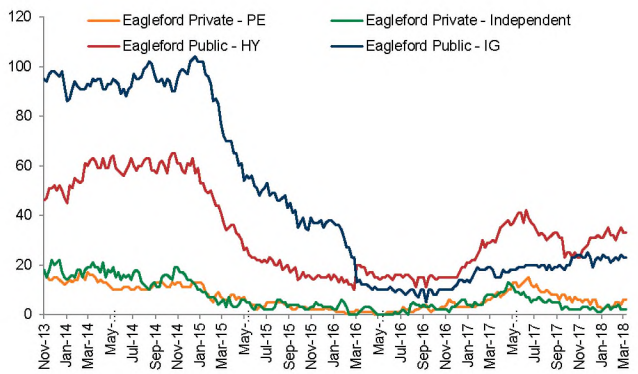
The drilling response by basin

Exhibit 28: Permian oil horizontal rig count by producer type



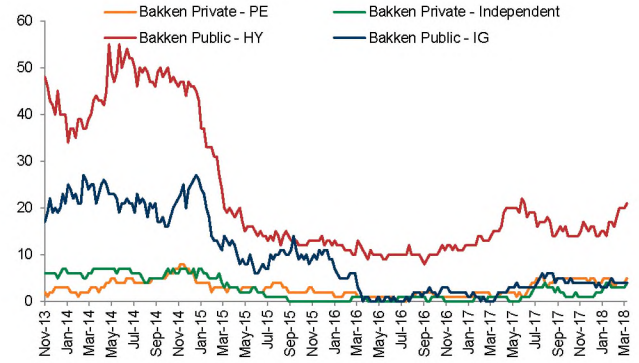
Source: Goldman Sachs Global Investment Research, Bloomberg, Company data, Platts

Exhibit 29: Eagle Ford rig count by producer type



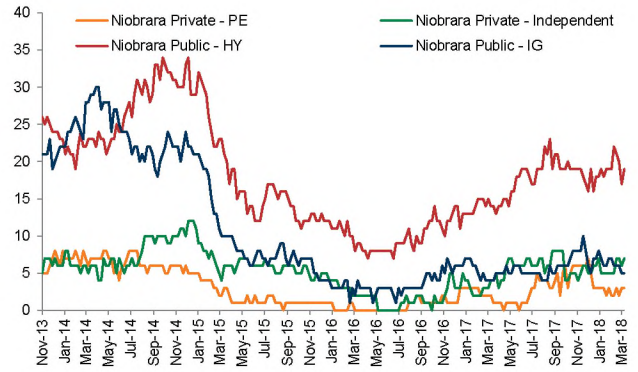
Source: Goldman Sachs Global Investment Research, Bloomberg, Company data, Platts

Exhibit 30: Bakken rig count by producer type



Source: Goldman Sachs Global Investment Research, Bloomberg, Company data, Platts

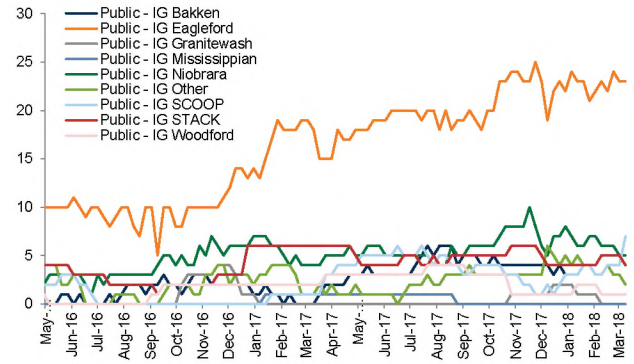
Exhibit 31: Niobrara rig count by producer type



Source: Goldman Sachs Global Investment Research, Bloomberg, Company data, Platts

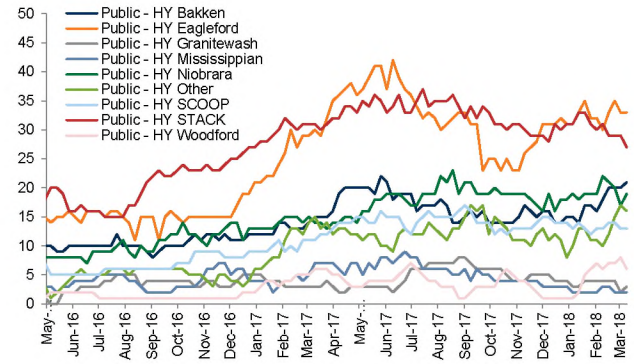
The drilling response by capital structure

Exhibit 32: Public IG rig count by basin



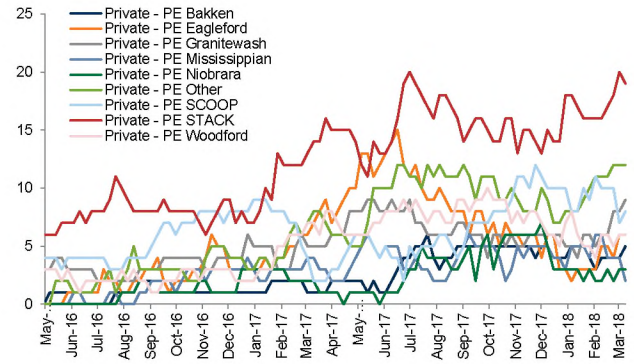
Source: Goldman Sachs Global Investment Research, Bloomberg, Company data, Platts

Exhibit 33: Public HY rig count by basin



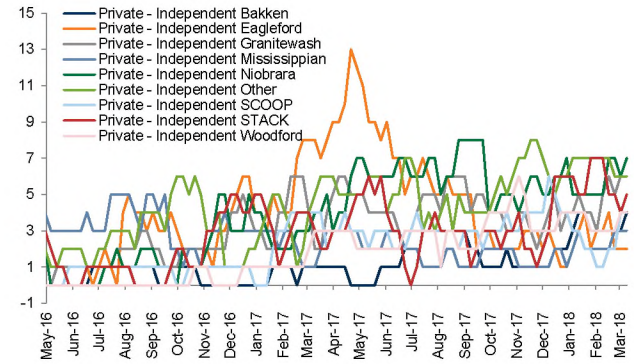
Source: Goldman Sachs Global Investment Research, Bloomberg, Company data, Platts

Exhibit 34: Private PE-backed rig count by basin



Source: Goldman Sachs Global Investment Research, Bloomberg, Company data, Platts

Exhibit 35: Private Independent rig count by basin



Source: Goldman Sachs Global Investment Research, Company data, Bloomberg, Platts