

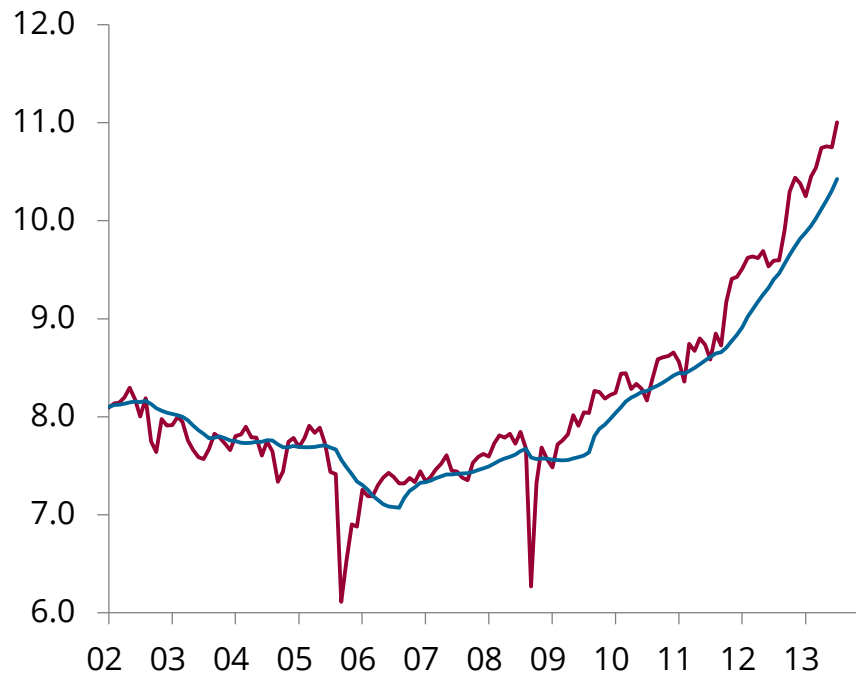


The Persian Gulf's predominance endangered?

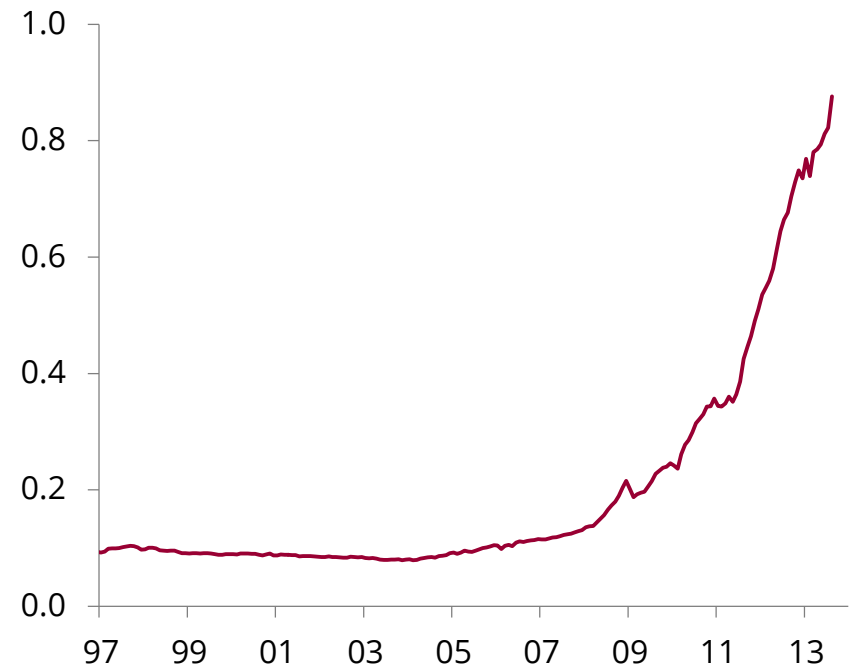
Amrita Sen, 13 November 2013

The sudden burst of shale was viewed as a key threat to OPEC

US oil production
mb/d



North Dakota oil production
mb/d

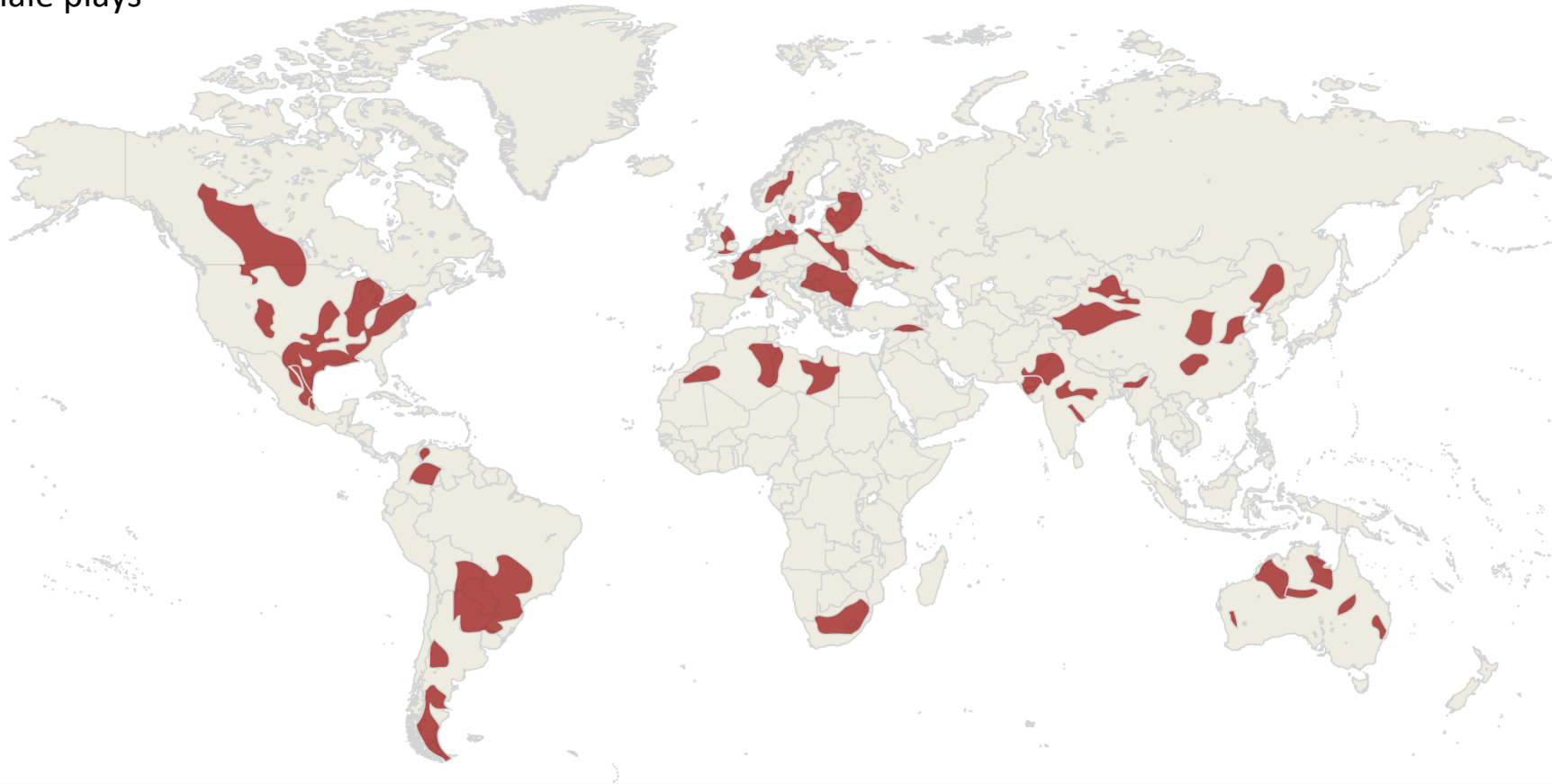


US oil production is scaling record highs, supported by shale output

Bakken and Eagle Ford plays have seen their output soar and are the two most prolific plays of the US

Through higher non-OPEC supplies and lower demand for oil

Global shale plays



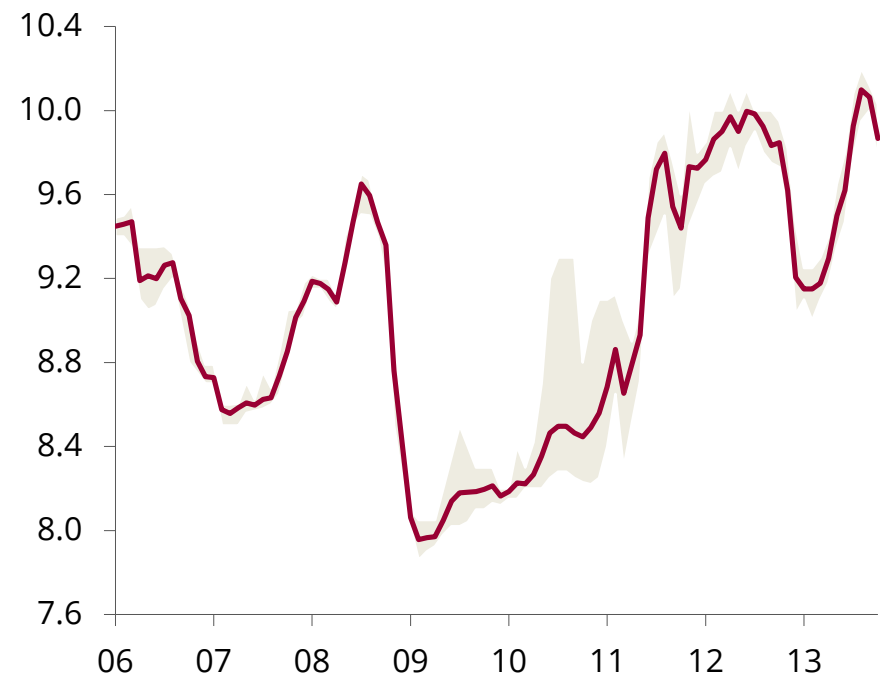
The growth in US shale had fuelled widespread optimism about global shale plays creating an abundance of oil and gas supplies; and resulting in widespread substitution of gas in the transportation sector, which would lower demand for oil as well

But oil prices are still above \$100

OPEC basket price
\$/barrel



Saudi crude output
mb/d

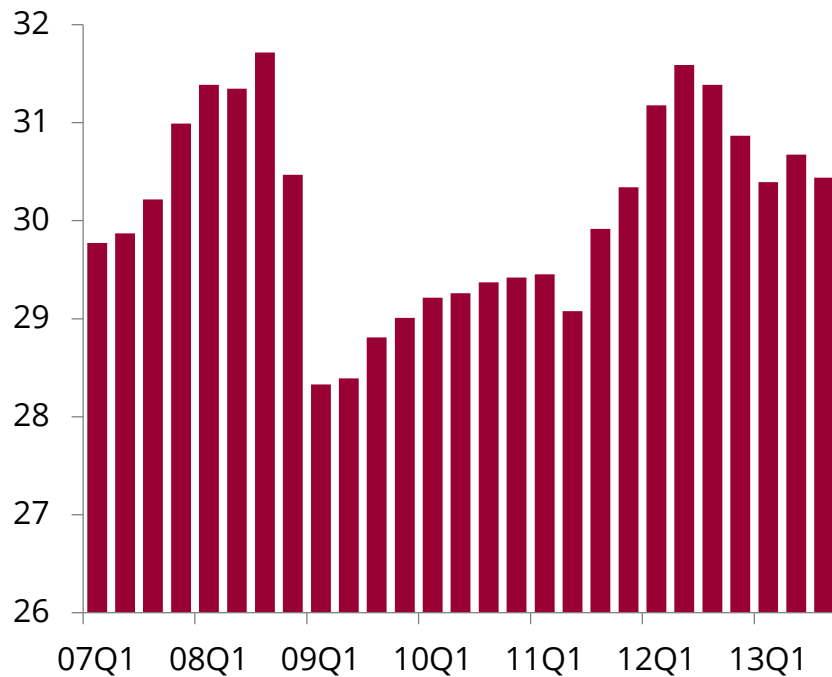


Despite the growth in US tight oils output, Brent prices have averaged above \$100 for the last three years

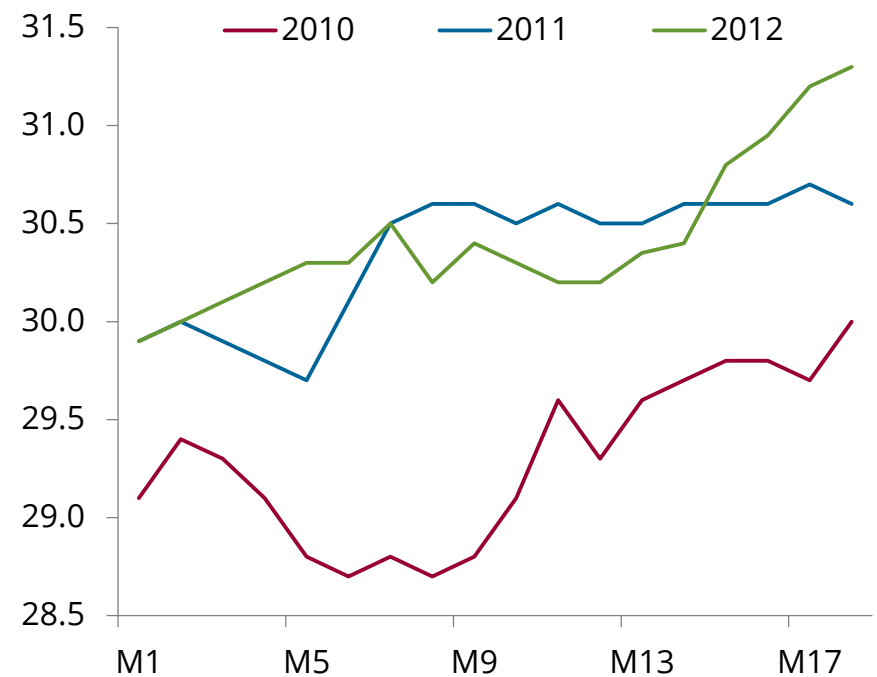
And has required above 10 mb/d of production from Saudi Arabia to balance the market

And the world is still reliant on OPEC's oil

Quarterly OPEC oil output
mb/d



IEA's call on OPEC crude
mb/d

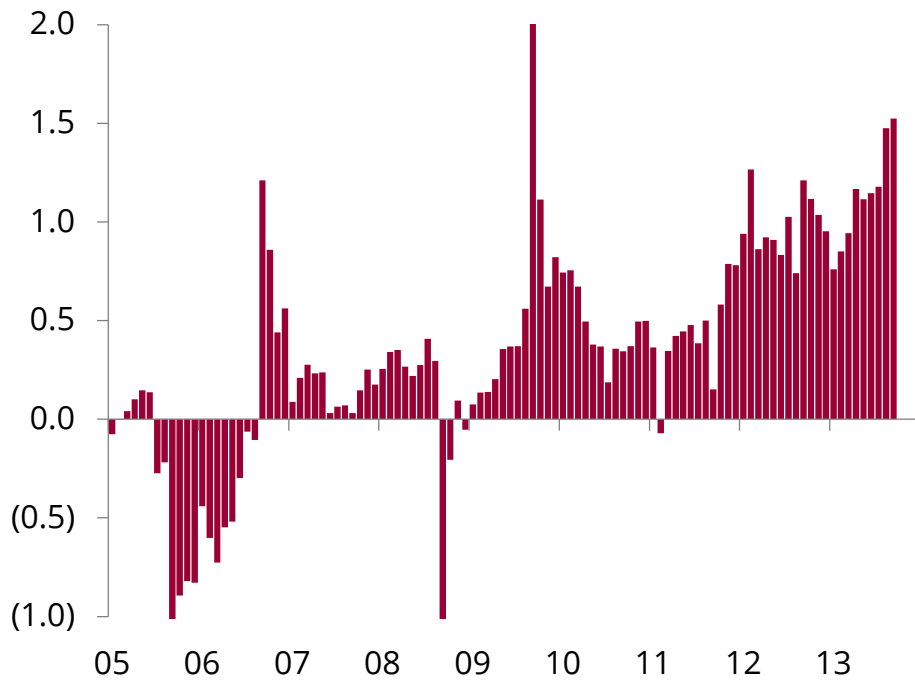


OPEC crude has remained high by historical standards at above 30 mb/d

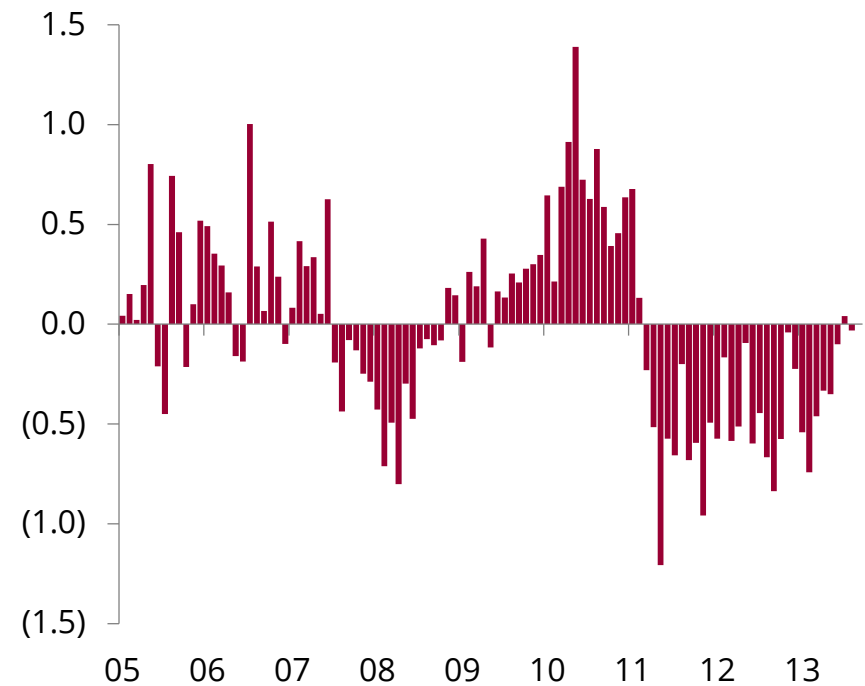
The call on OPEC crude has been systematically underestimated by key agencies such as the IEA

Non-OPEC supplies: it is not all about shale

US oil production, y/y change
mb/d



Rest of non-OPEC oil production, y/y change
mb/d

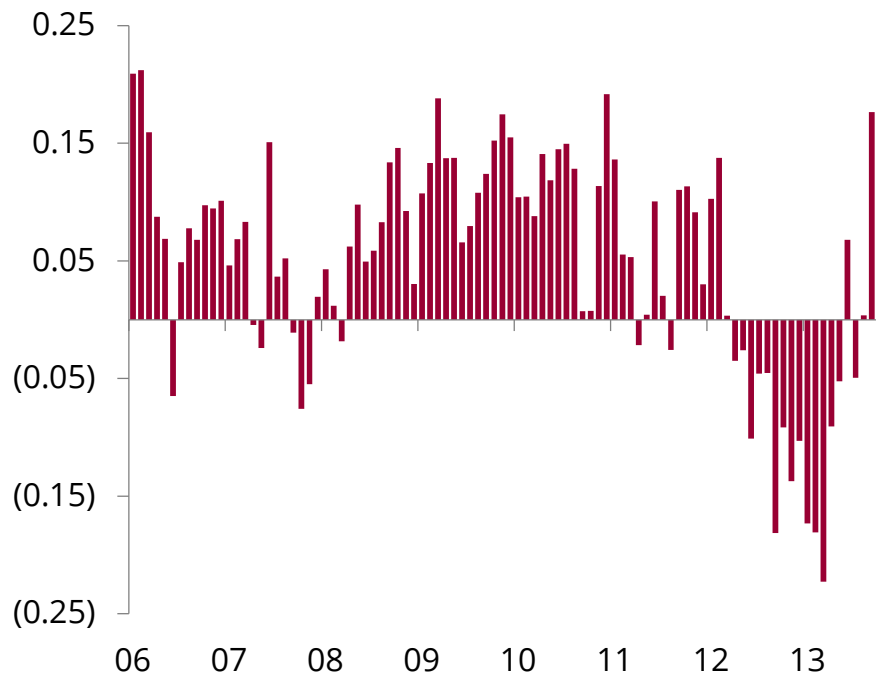


US oil production is scaling record highs, supported by shale output

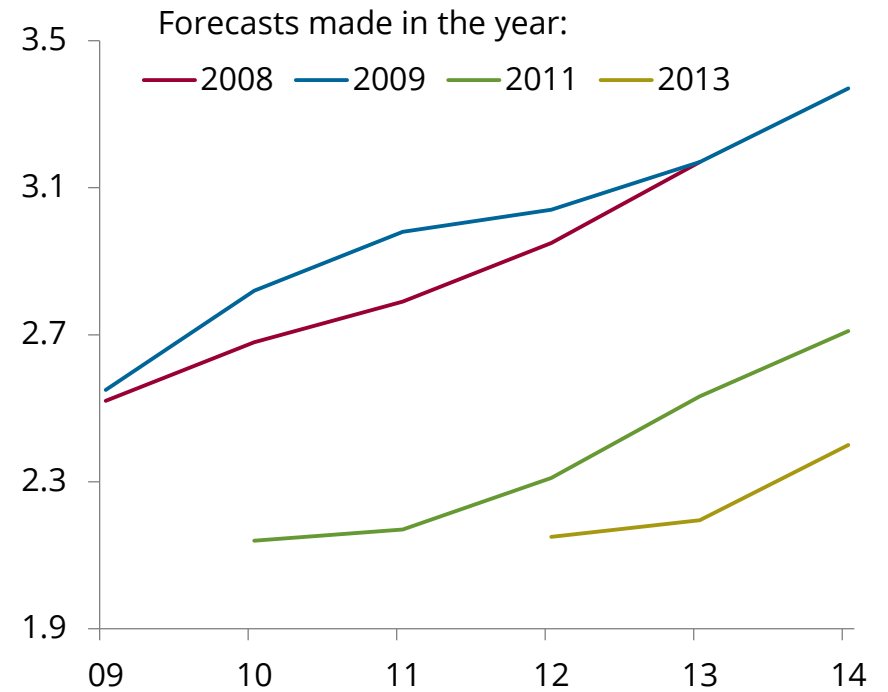
But the rest of non-OPEC production has been weak, declining sharply throughout 2011 and 2012 and into 2013

Centres of growth in the past have started to disappoint significantly

Brazilian oil production, y/y change
mb/d



IEA's Brazilian oil production forecasts
mb/d

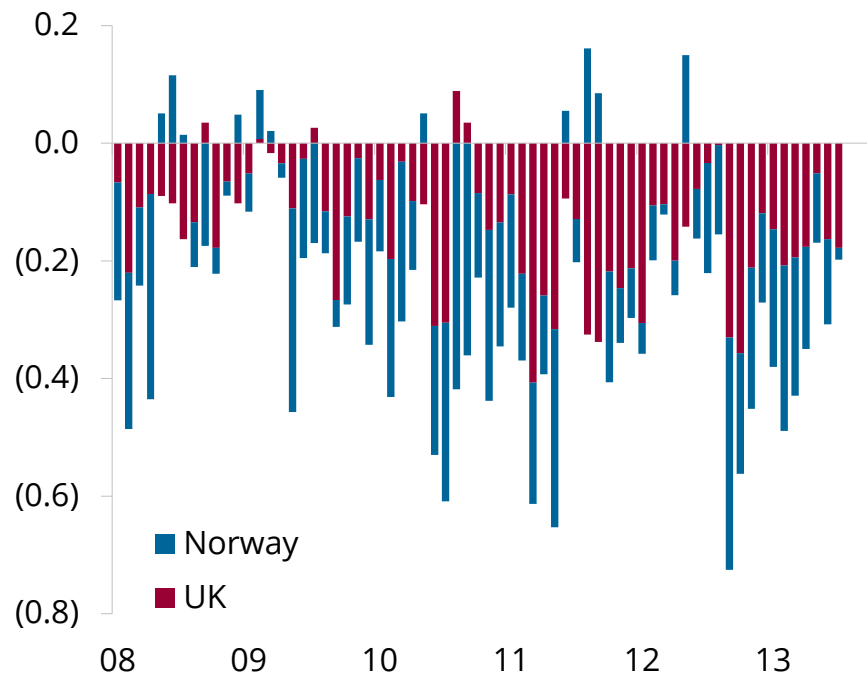


Brazilian oil production has been extremely weak, due to high declines at old oilfields

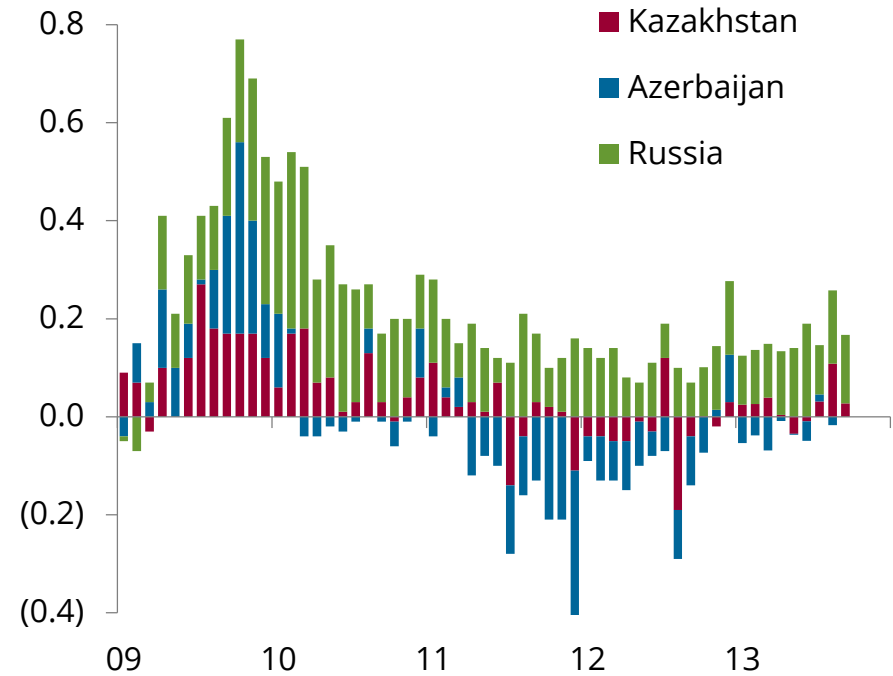
Canada and Brazil, two centres of great promise, have seen their output forecasts cut sharply due to various constraints

Outside North America, crude output has fallen for the last 3 years

North Sea oil production, y/y change
mb/d



FSU oil production, y/y change
mb/d



UK and Norwegian production is on double digit declines, crippled by ageing fields and infrastructure

FSU output, apart from Russia, has also been affected by sharp declines and technical problems

Spending has risen but production is flat

Breakdown of key E&P profitability metrics

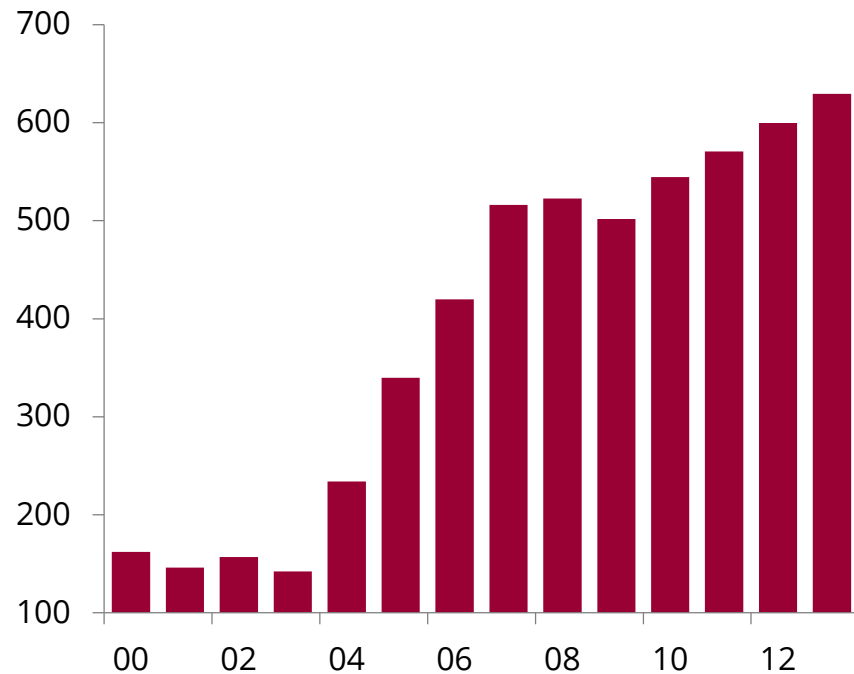
\$/barrel

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	10-yr CAGR
WTI	26.1	31.0	41.5	56.7	66.2	72.4	99.8	62.1	79.6	95.1	94.1	13.7%
Brent	25.0	28.5	38.0	55.3	66.1	72.7	98.5	62.7	80.3	110.9	111.7	16.1%
Revenue	20.6	24.3	30.0	41.1	47.9	51.8	68.0	43.1	52.9	68.2	68.0	12.7%
Production Costs	(3.6)	(3.7)	(4.2)	(5.0)	(6.0)	(7.2)	(8.3)	(8.5)	(8.9)	(11.0)	(12.0)	12.8%
Exploration Expense	(0.8)	(0.8)	(1.0)	(1.1)	(1.5)	(1.8)	(2.1)	(2.1)	(2.1)	(2.3)	(2.7)	13.4%
DD&A	(4.5)	(4.5)	(5.0)	(5.7)	(6.9)	(8.1)	(9.7)	(9.8)	(10.6)	(10.9)	(13.1)	11.3%
Other	(1.6)	(1.6)	(1.5)	(2.5)	(2.2)	(2.6)	(2.5)	(2.2)	(1.4)	(3.5)	(2.8)	5.6%
Income Tax	(3.2)	(4.2)	(6.0)	(9.7)	(14.2)	(14.1)	(19.7)	(8.9)	(13.0)	(17.9)	(20.2)	20.3%
Net Income	4.6	7.4	8.9	13.1	13.5	13.2	18.4	8.1	12.9	15.6	13.5	11.5%
Finding Costs	1.2	0.9	6.3	2.5	5.4	8.4	2.0	2.3	3.7	3.7	6.2	17.6%
F&D Costs	7.1	6.9	19.6	17.6	18.4	26.5	10.5	11.4	23.7	22.2	30.9	15.8%
Exploration Intensity	1.1	1.0	1.2	1.4	2.1	2.5	3.2	3.3	3.3	3.9	4.9	16.5%
Development Intensity	5.6	6.1	6.4	8.1	10.1	11.5	14.0	13.6	15.0	18.2	22.9	15.1%

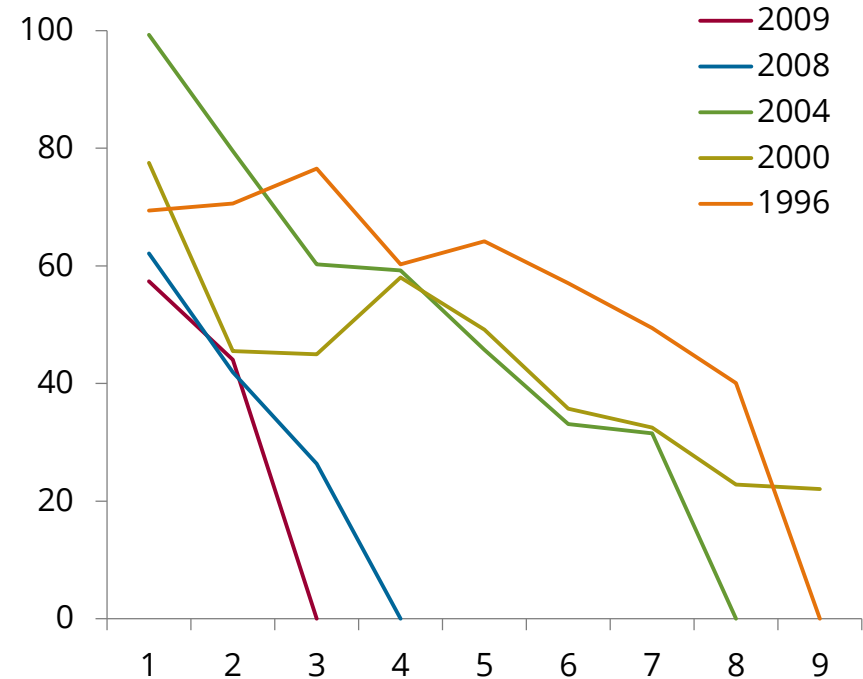
Analysis of the majors indicates continuing sharp cost inflation in the upstream oil sector. Whilst Brent prices increased to \$111.7 in 2012, net income per barrel actually fell y/y by 13%. The increase in costs supports longer-term oil prices around \$100.

Costs of extraction and decline rates are much higher today and rising

Ultra-deepwater rig day rates
\$000 per day



US Gulf of Mexico decline rates
%



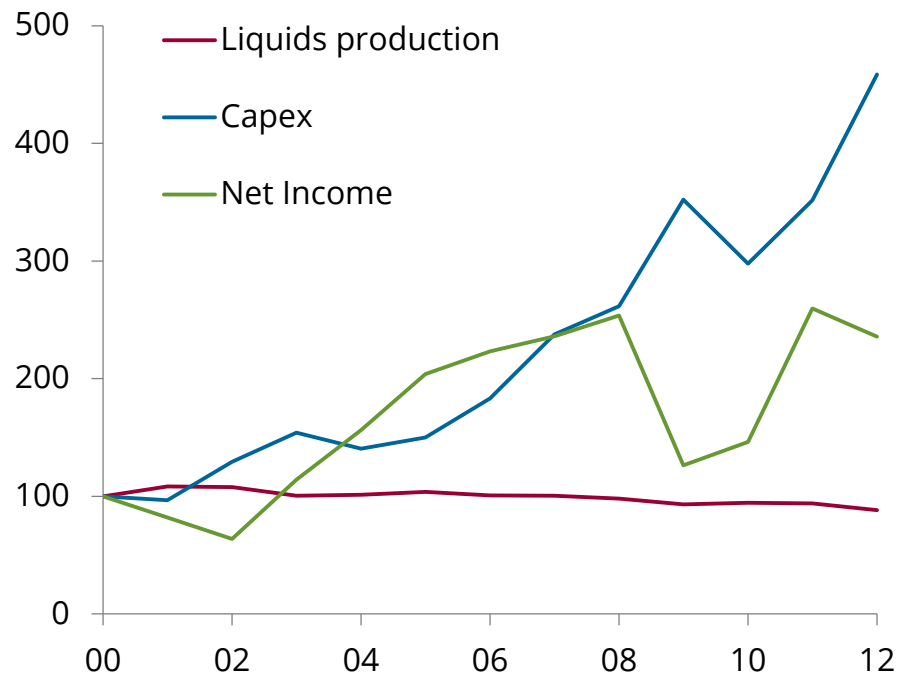
Exploration and production costs have risen substantially over the past eight years

Decline rates have stepped up across key basins such as North Sea, Brazil and US GoM, further adding to costs

And rising exploration costs likely to support \$90 floor

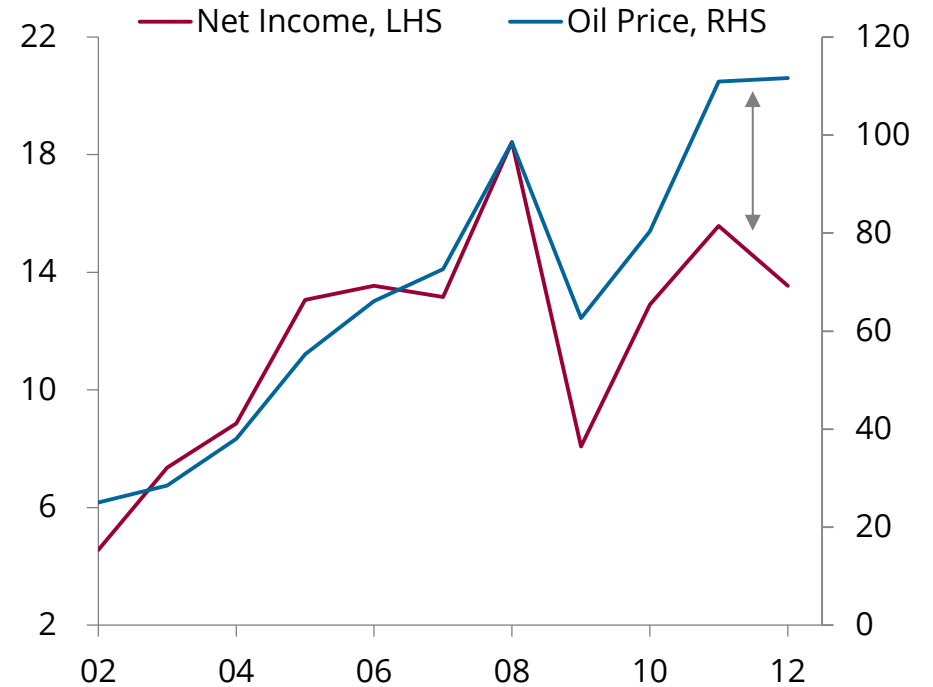
Majors' liquids output, CAPEX and income

Index based on nominal dollars



Net income vs oil price

\$/barrel



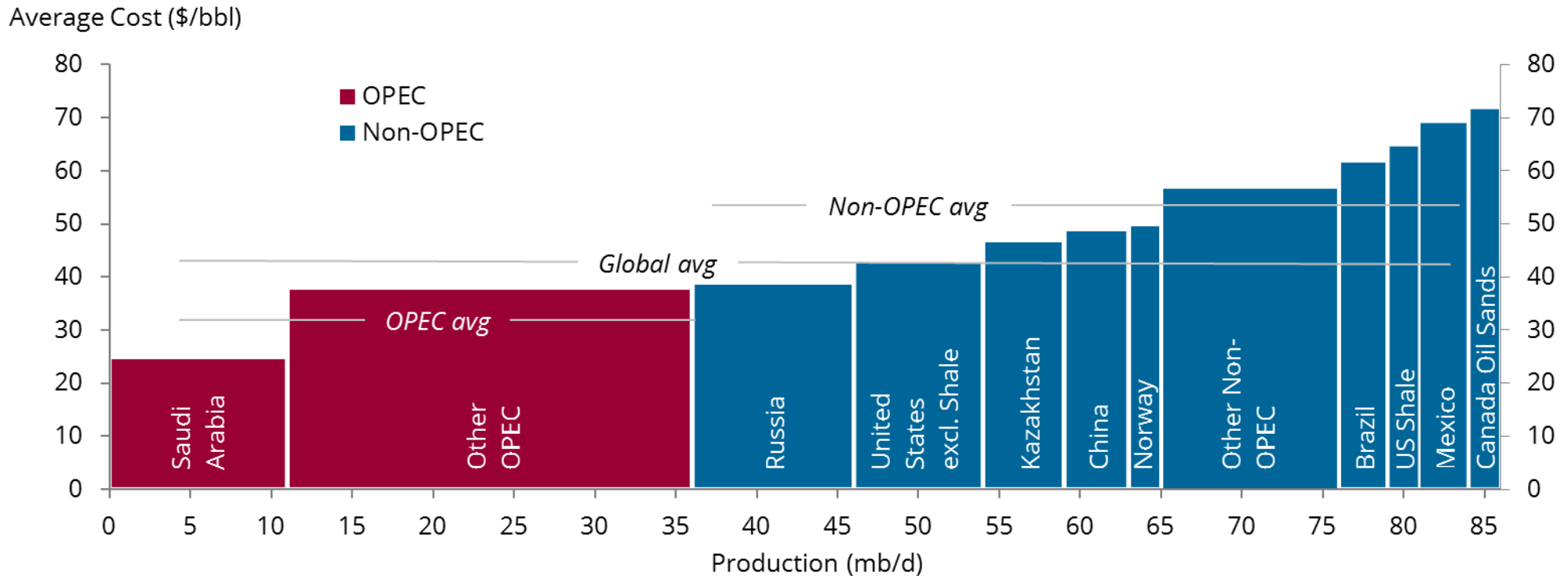
As decline rates have stepped up and terrains have gotten more challenging, oil companies have failed to grow output

Net income per barrel (11.5%) has risen by far less than oil prices (16.1%) over the last 10 years due to rising costs

Source: EIA, Reuters, Energy Aspects analysis

OPEC still has the lowest cost of production globally

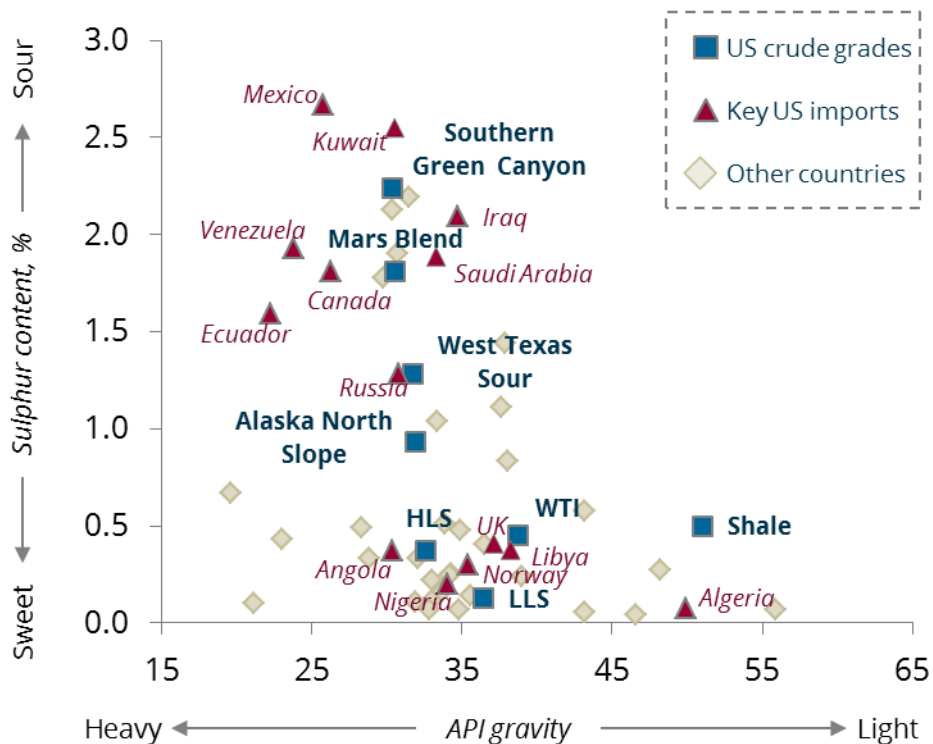
Average cost curve for the oil market
\$/barrel



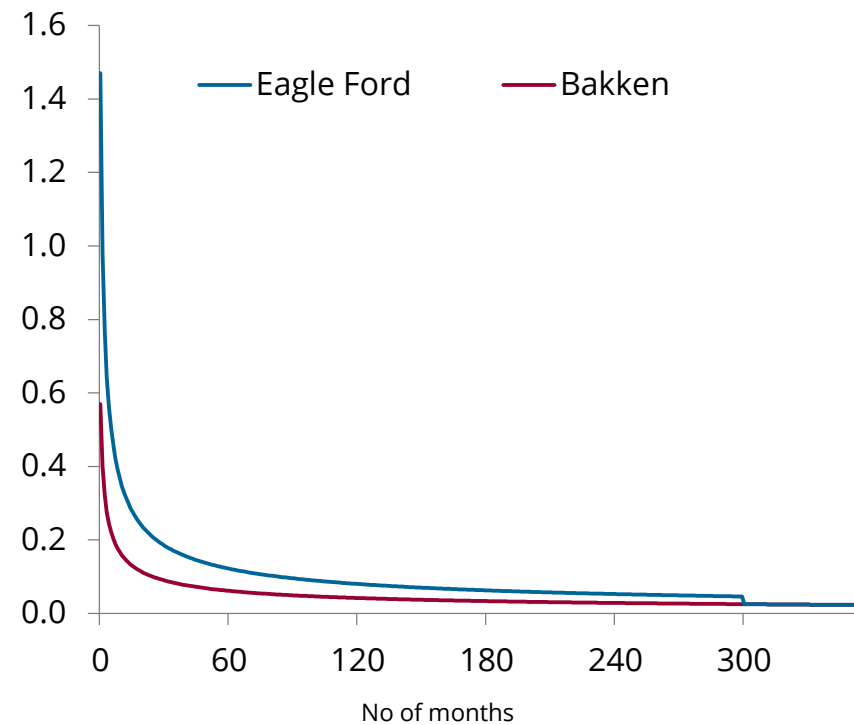
Shale plays lie at the higher end of the non-OPEC marginal cost curve, as infrastructure build-outs, decline rates and high levels of rig activity keep costs high

Moreover, is shale the right quality of oil?

Crude oils by quality characteristics
mb/d



Declines at shale plays
%



The crude oil quality of shale plays is super light, with vast amounts of condensate blended in with crude

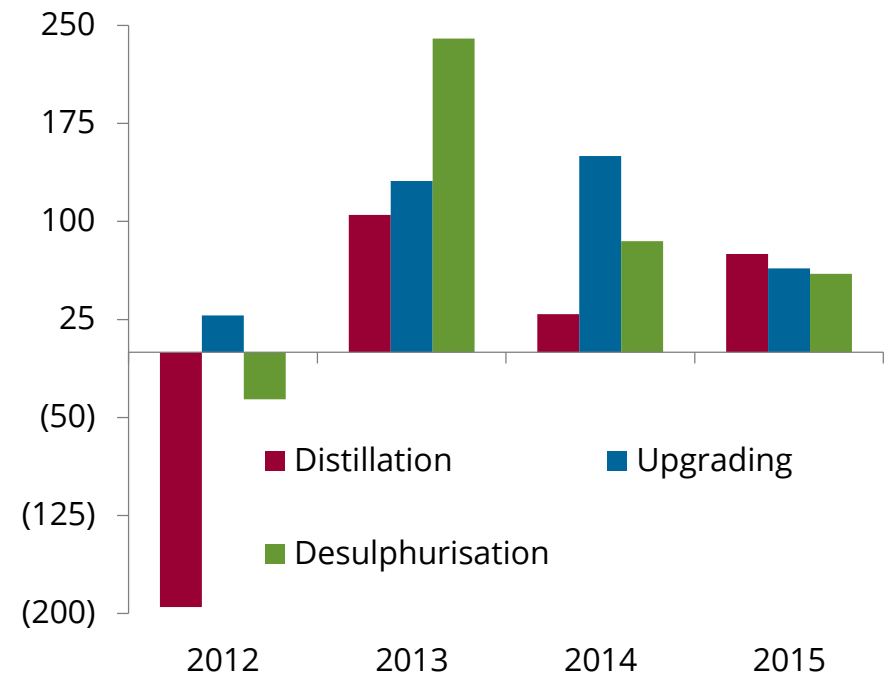
Break-even prices required by producers are above \$80 per barrel, in part due to extremely steep decline rates

When global refining capacity is biased towards processing heavy crudes

Net refining capacity additions
mb/d

	2013	2014	2015	Total
Africa	0.04	0.05	0.10	0.19
Asia	0.84	0.44	2.44	3.71
Europe	(0.45)	(0.05)	--	(0.50)
FSU	0.16	0.05	0.16	0.37
Middle East	0.40	0.96	0.16	1.52
Latin America	0.05	0.40	0.18	0.62
North America	0.07	0.03	0.03	0.12
Global	1.10	1.87	3.05	6.03

US refining capacity additions
thousand b/d

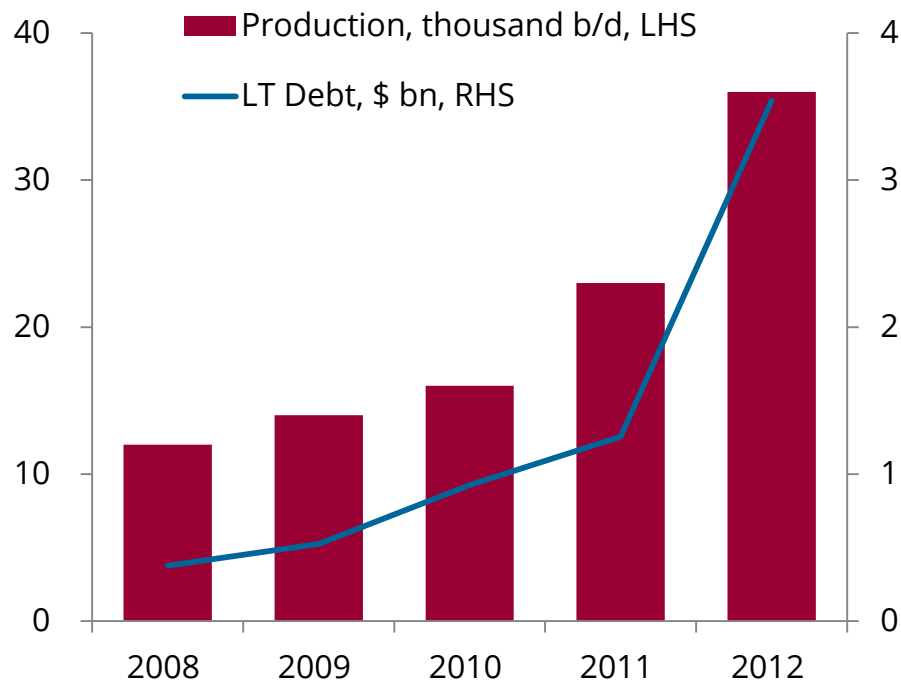


Significant capacity addition in the non-OECD, all biased towards processing heavy crudes

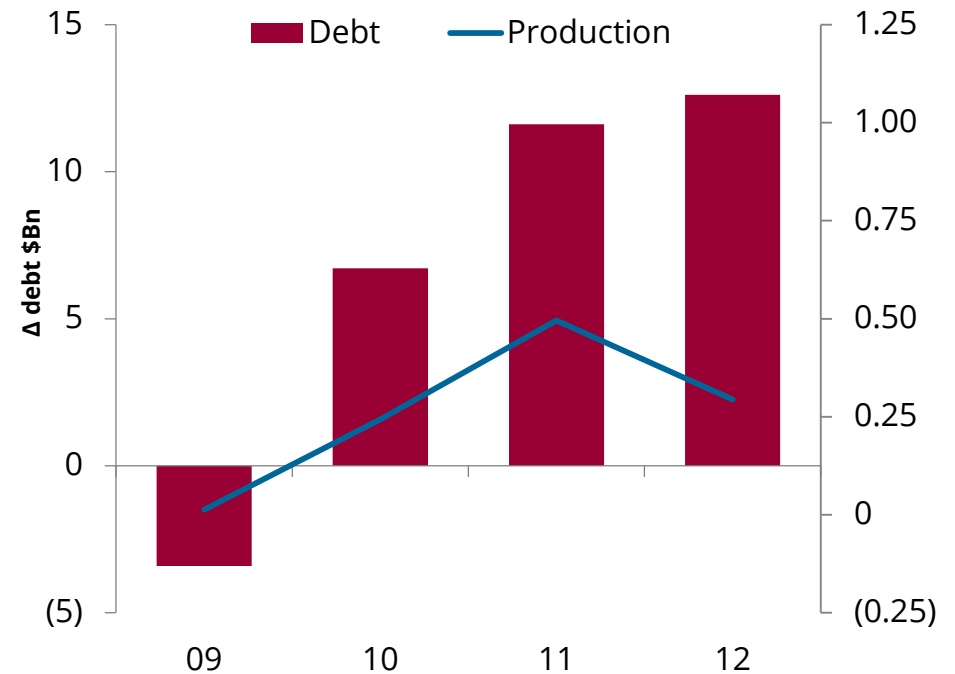
USGC refining capacity has significant upgrading capacity in an attempt to capture high light-heavy differentials

With growth in shale supported by rising debt

Continental Resources, balance sheet output vs debt



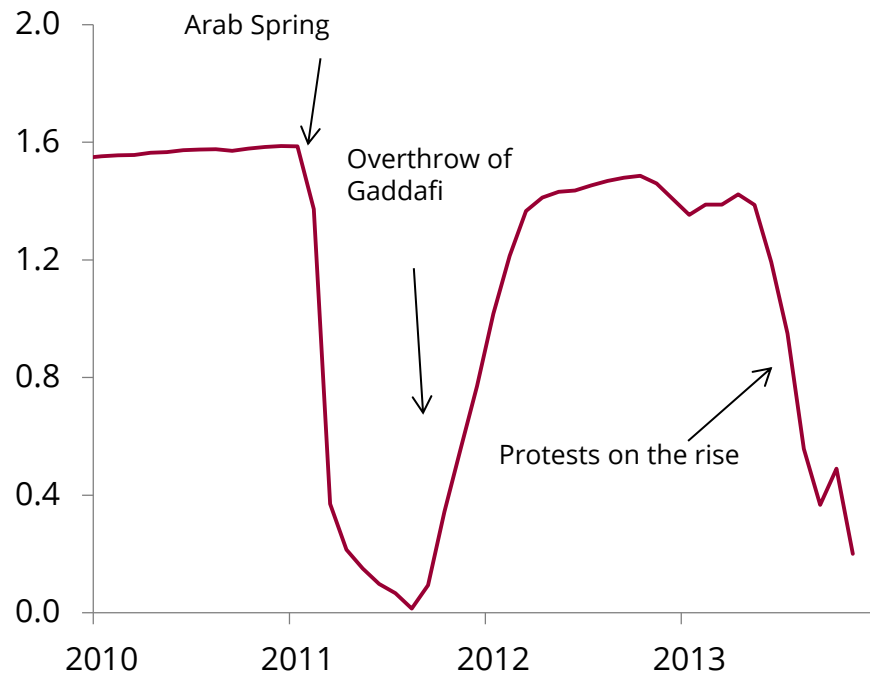
Cumulative debt vs production
35 US independent companies



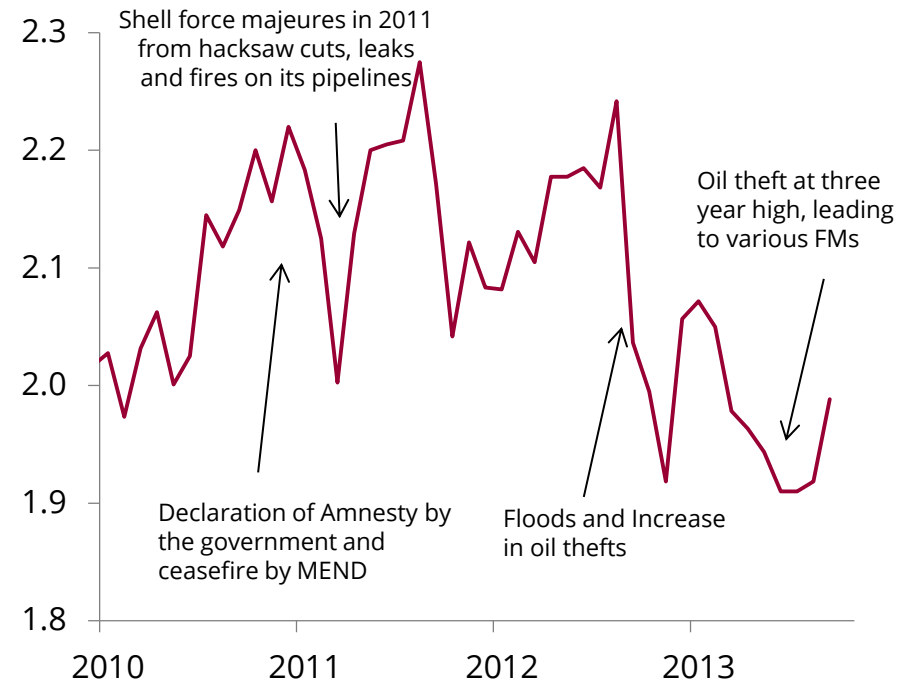
Companies have been able to growth production only with huge debts. This is unsustainable in a rising interest rate environment. For instance, Continental was borrowing \$840 million as of February 2013, meaning a 1% increase in interest rates would result in increased annual interest expense of approximately \$8.4 million and a \$5.2 million decrease annual net income.

And OPEC outside the GCC also under significant pressure

Libyan oil production
mb/d



Nigerian oil production
mb/d

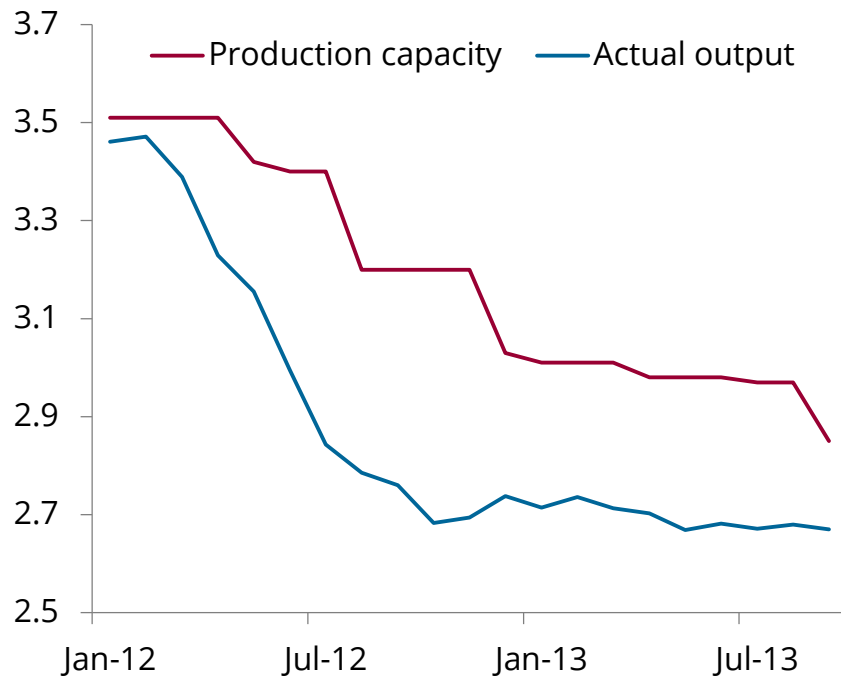


Ongoing unrest is significantly curtailing Libyan production

While increasing oil theft is capping Nigerian output

As a result of which Saudi Arabia has had to fill the gap

Iranian oil production
mb/d



OPEC output ex Saudi Arabia
mb/d



There are various political and technical obstacles to the return of Iranian production to pre-sanction levels

OPEC output from North African nations and from Iran and Iraq have been mired by problems

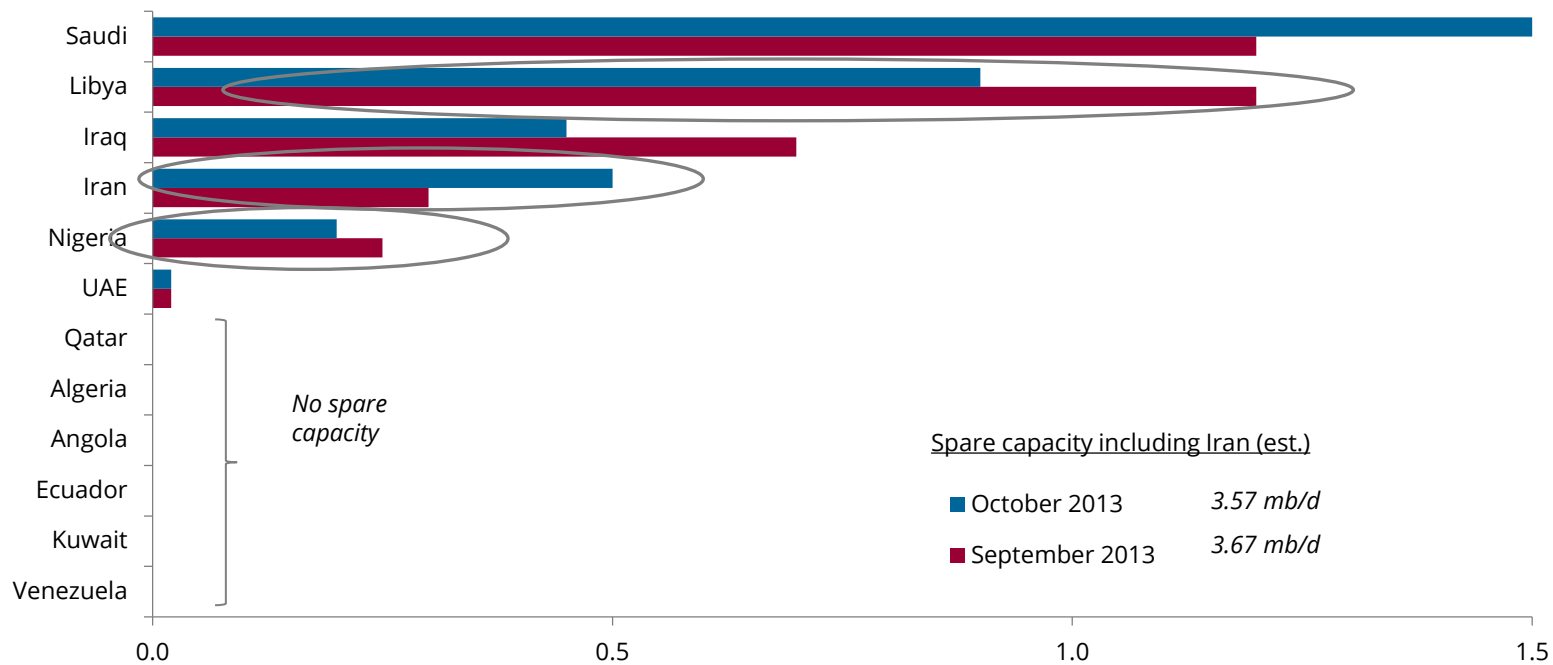
OPEC production marred by geopolitical risks and high declines



The geopolitical backdrop of several key Middle Eastern countries remains extremely fragile. Syria remains unresolved and worsening, Libya's political backdrop remains extremely fragile and Iraq is getting worse with problems between Baghdad and Kurdistan and sectarian violence at the highest levels in five years, partly due to spillover from Syria

Saudi Arabia is the only country with meaningful spare capacity

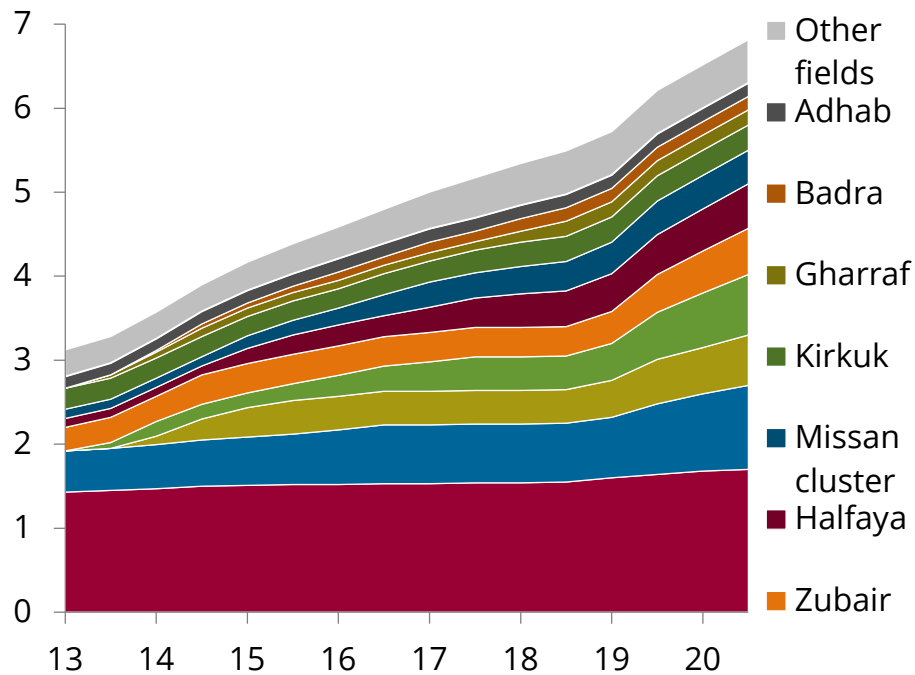
Global spare capacity mb/d



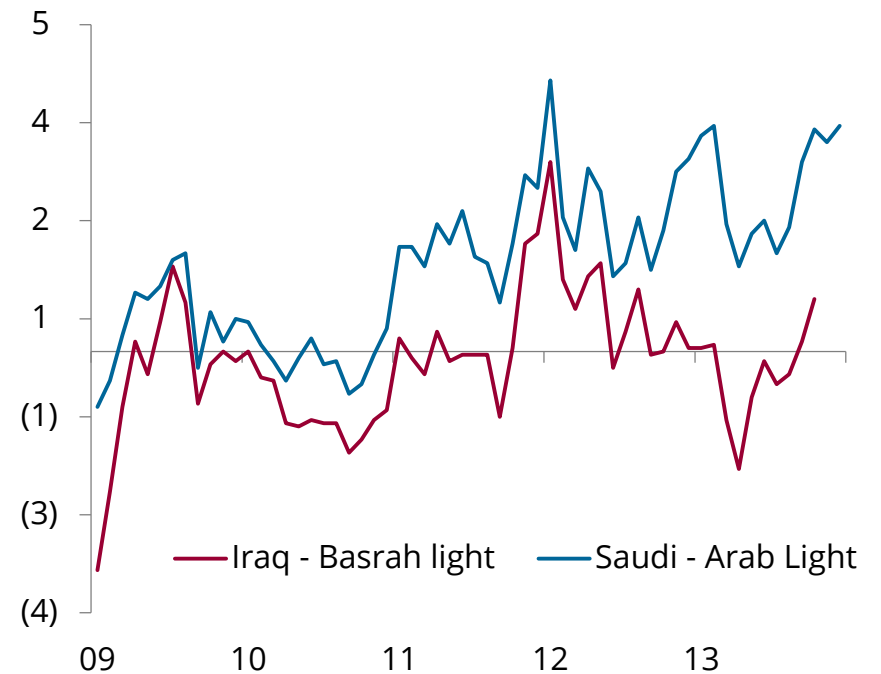
Spare capacities in Libya, Iran and Nigeria are not available to the market as they are dependent on the political stability of the countries. Saudi Arabia continues to act as the primary swing producer in the market at times of market tightness.

But there are two headaches for Saudi Arabia: Iraq and domestic demand

Iraqi production forecast
mb/d



Iraq and Saudi OSPs to Asia
\$/barrel



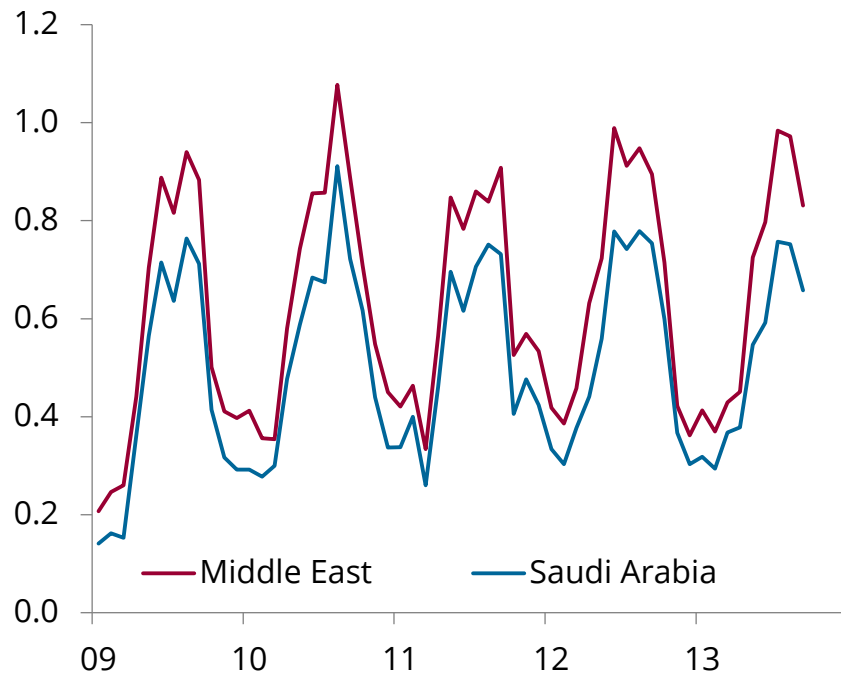
Iraqi production has struggled to grow lately and although challenges remain, growth can pick up substantially

But discounted Iraqi crude could lead to the loss of market share, a problem in the longer run

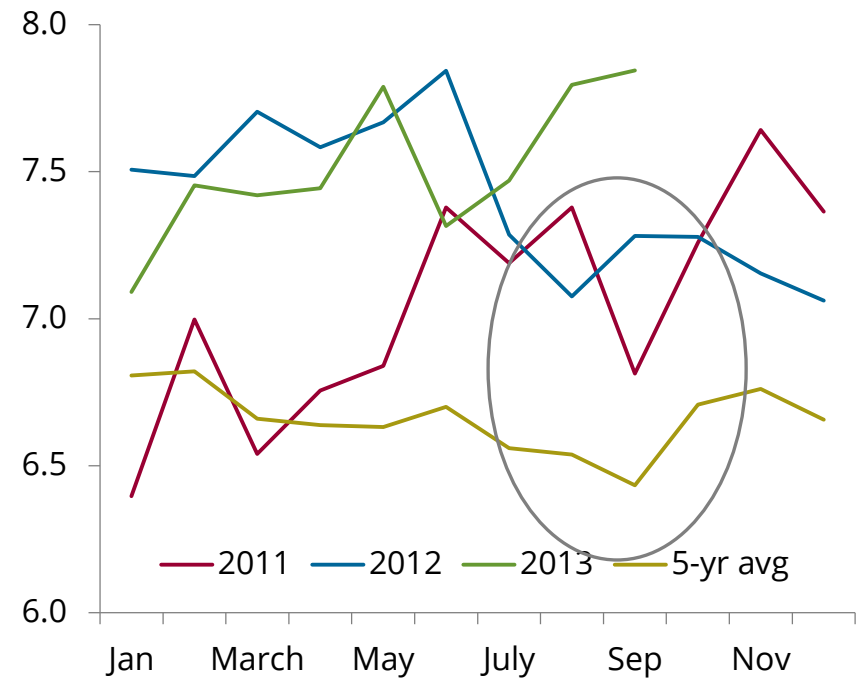
Source: Energy Aspects analysis

Saudi domestic demand is soaring, potentially eating into exports

Saudi crude burn
mb/d



Saudi crude exports
mb/d



Rising domestic consumption has meant higher crude, diesel and fuel oil burn in the summer

As a result, crude exports tend to take a dip over the summer, a trend that can continue through to 2020

Price forecasts

Energy Aspects Brent price forecasts (2013 - 2015)

\$/barrel

		Brent	WTI	differential
Q1	<i>actual</i>	118.4	103.0	15.4
Q2	<i>actual</i>	108.8	93.4	15.4
Q3	<i>actual</i>	109.4	92.2	17.2
Q4	<i>actual</i>	110.1	88.2	21.9
2012	<i>actual</i>	111.7	94.2	17.5
Q1	<i>actual</i>	112.6	94.4	18.2
Q2	<i>actual</i>	103.3	94.1	9.2
Q3	<i>actual</i>	109.7	105.8	3.9
Q4	<i>forecast</i>	108	99	9
2013	<i>forecast</i>	108	98	10
2014	<i>forecast</i>	105	100	5
2015	<i>forecast</i>	108	101	7

Source: Bloomberg (actuals), Energy Aspects analysis; long term forecasts are in real terms

Upside risk

- Supply outages spanning both OPEC and non-OPEC countries; shale disappointing
- Geopolitical risks surrounding Iraq, Nigeria, Syria and Libya all pose significant upside risks
- Demand recovery in the OECD being currently underestimated

Downside risk

- Renewed weakness in Europe; US government default
- Derailment of Chinese recovery

Long-term expectations

- A fairly well balanced market persists for now, but only while demand growth remains weak. Prices remain high as the cost of exploration has increased substantially. If supply shortfalls mount as demand picks up, prices have substantial room to rise in the medium-term



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