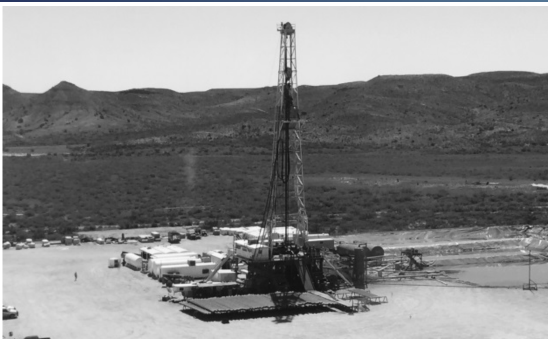

Kimmeridge Energy 2016 Macro Update

Macro Outlook: In Recovery

OPEC Rips, US Slips and Spare Capacity Dips.

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MARKET OVERVIEW

May 3, 2016

Agenda

- Capital Employed and Marginal Cost Trends
- Supply Outlook
- Demand, Currency and Debt
- Natural Gas: The Forgotten Commodity?

September 2015 Macro Summary

- ROACE remains at trough levels. While demand growth is fragile (stronger in the US and weaker in emerging markets and China), supply is moderating.
- Even a moderate reduction in global liquidity is having a profound effect on the industry, with numerous E&Ps going Chapter 11 and more likely to follow. This decline in access to capital, coupled with a strengthening dollar, is also likely to impact supply from emerging market countries (Brazil, Venezuela, Mexico, Indonesia, Iraq, Nigeria, etc.).
- There is little evidence that the US "shale revolution" has been anything other than a supply boom created by cheap capital fueling marginal investment. There remains a wide dispersion between well performance in the core of a shale play (front of the cost curve) and the fringe (end of the cost curve). Operators are retreating to the core, and those positioned in the core are outperforming.
- It appears the commodity has bottomed with the playbook echoing the script of 1998-99. If so, the pattern follows a continued reduction in supply, a continued stabilization in demand, a deceleration in EM supply growth with the potential for a credit/currency crisis, a reduction in US rates/return to QE and a recovery in price.

May 2016 Summary

- ROACE remains at depressed levels but is rising due to a recovery in prices and significant capital write-downs. While observers talk of a shale revolution, total capital intensity in the industry has continued to rise over the last 10 years, suggesting supply growth has been driven by an emphasis on growth without regard for returns.

- Even a moderate reduction in global liquidity is having a profound effect on the industry, with numerous E&Ps going Chapter 11 and more likely to follow. There remains a wide dispersion between well performance in the core of a shale play (front of the cost curve) and the fringe (top of the cost curve). Operators are retreating to the core, and those positioned there are outperforming.

- The decline in liquidity, coupled with a strengthening dollar, is reducing supply from emerging market countries (Brazil, Venezuela, Mexico, Indonesia, Nigeria, etc.), while offshore and oil sands continue to grow, a lack of new investment will impact supply for years.

- While demand growth is fragile and decelerating, it remains positive and has some tailwind from lower prices. The relative strength of GDP remains a key factor in currency trends, and hence commodity prices.

- It appears the commodity has bottomed with the playbook echoing the script of 1998-99. If so, the macro story will be dominated by a deceleration in global growth led by emerging markets, an emerging currency crisis, and decelerating US growth hampered by slower global demand.

- In 1999-2001 energy rallied into a decelerating demand environment due to supply reductions, and energy recovered from a 5.5% S&P weighting to 6.57% in 2000 and 10% by 2006. 2016 appears to be poised for a similar trajectory. **While no recovery is a straight line, a return to sub-$35/bbl appears unlikely, and Kimmeridge forecasts a continued recovery into the $50-60/bbl range ex a global recession.**

Capital Employed and Marginal Cost Trends

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YE2015 in Numbers

- Peer group Net Loss of $150Bn
- Clean Net Loss of $36Bn, or a ROACE of -4% (excluding one time items, principally reserve write-downs)
- Five-year average clean ROACE of 3.42% at an average oil price of $86/bbl and $3.50/mcf
- 2015 PD Reserves fell 2.54Bnboe, despite $102Bn of capex equivalent to a $56/boe PD F&D
- 2015 Reserves (proven developed and undeveloped) fell 8.55Bn boe or 18% back to 2011 levels, with a 2015 F&D of $-24/boe
- Over the last four years the industry has spent $602Bn delivering 16Bnboe of reserve additions at an average cost of $36.54/boe
- Over the last four years the industry has generated an average operating cash flow per barrel of $52/boe with an average oil price of $83.85/bbl and gas price of $3.36/mcf
- At today's prices ($46/bbl and $2/mcf) average operating CF/boe amounts to $15/boe, implying a 28% recycle ratio

Kimmeridge Commodity Outlook Framework

- Over the long term, oil and gas prices have trended in line with the capital intensity of the industry. Since 1998, the capital intensity of the industry has expanded around 8% per annum on a per barrel basis, despite the shale revolution.

- While prices have trended with the marginal cost, they have also been reflective of near-term supply/demand trends, such that when spare capacity is tight, operators earn outsized returns and are incentivized to add production. In contrast, when demand is low, prices tend to trend below the marginal cost, leaving the high-cost players to reduce volumes.

- Liquidity has extended/compressed cycles. The loose monetary policy of the last seven years has encouraged capital providers to accept lower returns than what they have endorsed historically.

- 2014-2016 has been characterized by rising supply and moderating demand, driving prices below the marginal cost. Today, oil and gas prices are trending below the marginal cost of supply. Current pricing is unsustainable. Demand is growing although decelerating, while supply is moderating, laying the foundations for a recovery.

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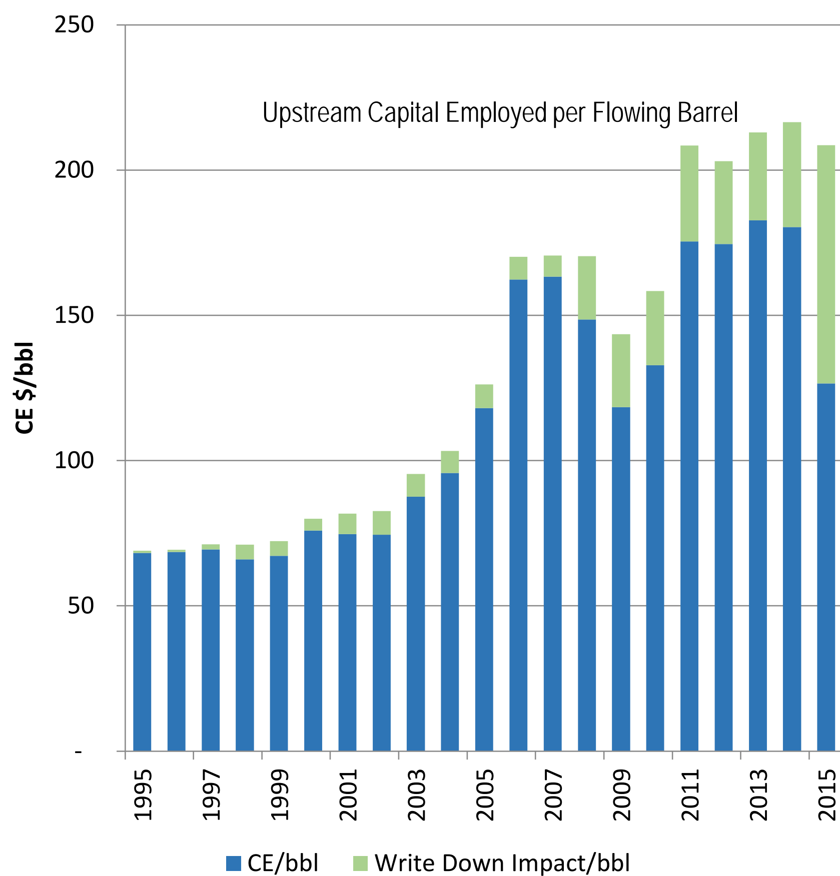
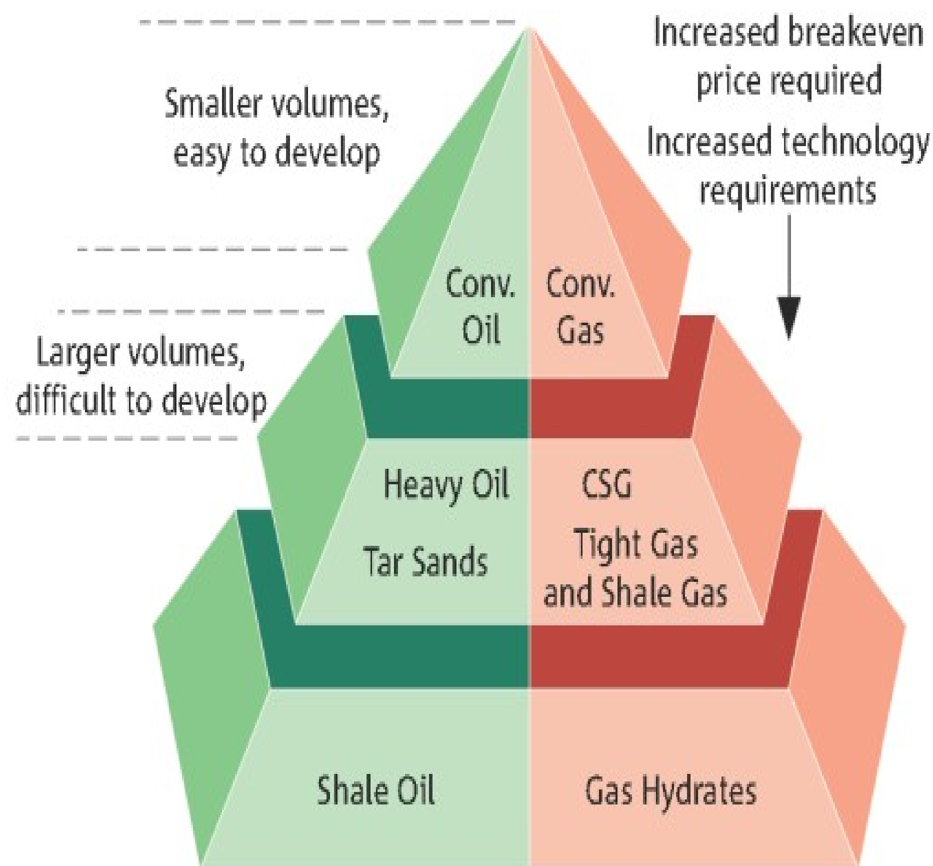
What Shale Revolution? Capital Intensity Has Continued to Climb

- Since 2004, the capital intensity of the US E&P industry has risen at a 2.6% CAGR excluding write-downs and 6.6% inclusive of written-off capital. This implies a marginal cost of $60-70/bbl.





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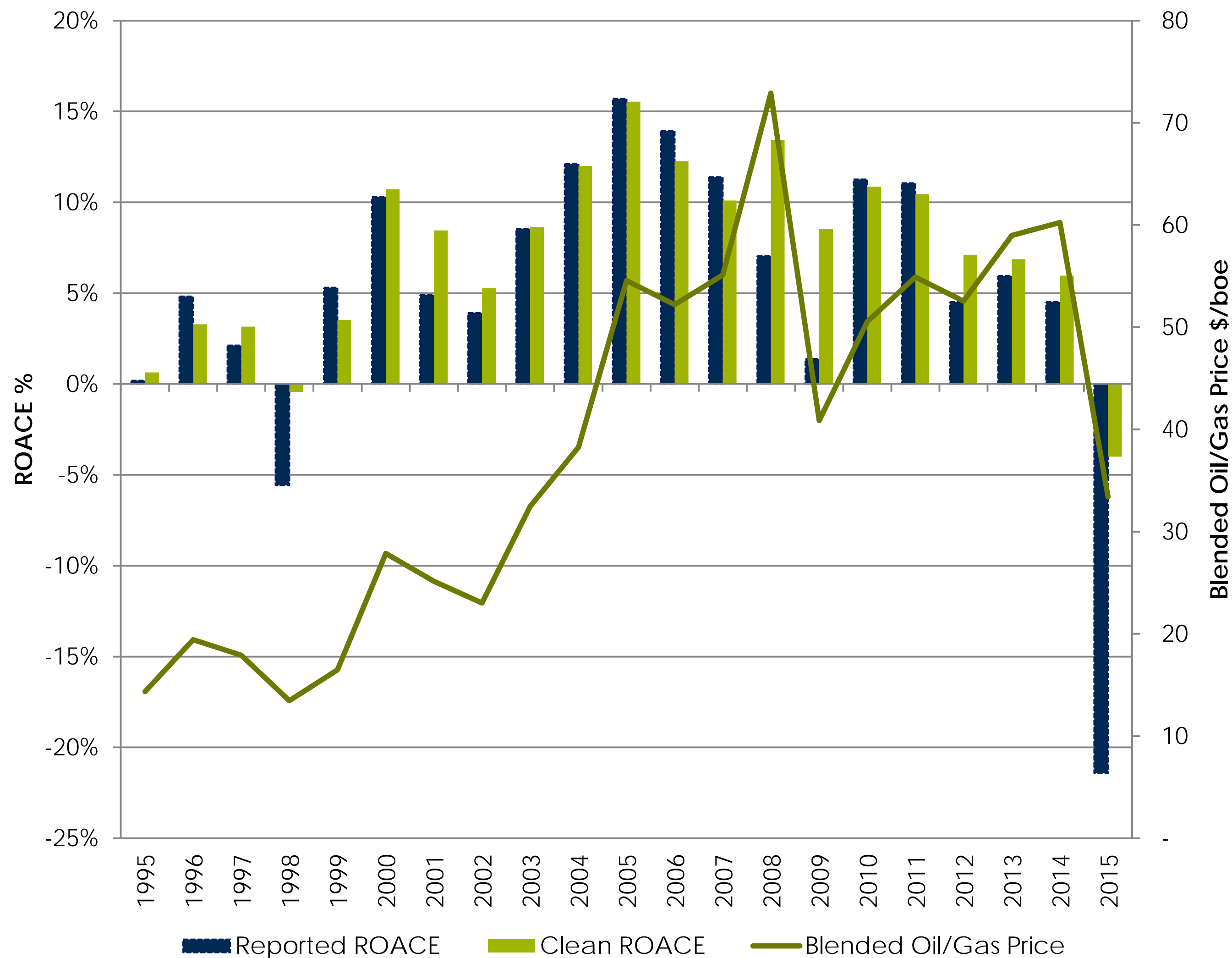
2015 ROACE: The Lowest in 20 Years

- 2015 ROACE was the lowest for the peer group in 20 years (including and excluding write-downs), indicative of a cyclical trough.
- 2015 Net Income (excluding asset impairments) was $-36Bn, the largest loss for the sector on both a percentage and absolute basis.



Over the Long Term, Oil Prices Have Cycled Around the Marginal Cost

2010 to 2014 was unusual for the low level of volatility around the marginal cost

In 2008, the rapid growth in Chinese demand push prices to trade above the marginal cost before collapsing with the financial crisis

In 2000, the marginal cost of supply began to rise with the end of cheap oil and a reduction in global spare capacity

Marginal cost estimates have dropped with capital write-downs

The current drop appears comparable to 1998 being demand-led; and supply accelerated. While absolute prices differ, relative % drops are similar

Oil Price $/bbl

140
120
100
80
60
40
20
0

1/1/1990, 10/1/1990, 7/1/1991, 4/1/1992, 1/1/1993, 10/1/1993, 7/1/1994, 4/1/1995, 1/1/1996, 10/1/1996, 7/1/1997, 4/1/1998, 1/1/1999, 10/1/1999, 7/1/2000, 4/1/2001, 1/1/2002, 10/1/2002, 7/1/2003, 4/1/2004, 1/1/2005, 10/1/2005, 7/1/2006, 4/1/2007, 1/1/2008, 10/1/2008, 7/1/2009, 4/1/2010, 1/1/2011, 10/1/2011, 7/1/2012, 4/1/2013, 1/1/2014, 10/1/2014, 7/1/2015, 4/1/2016, 1/1/2017, 10/1/2017, 7/1/2018

Green bands indicate the range between the cash-cost and the price of demand destruction.

Supply: OPEC Up, US Down, Spare Capacity Dips

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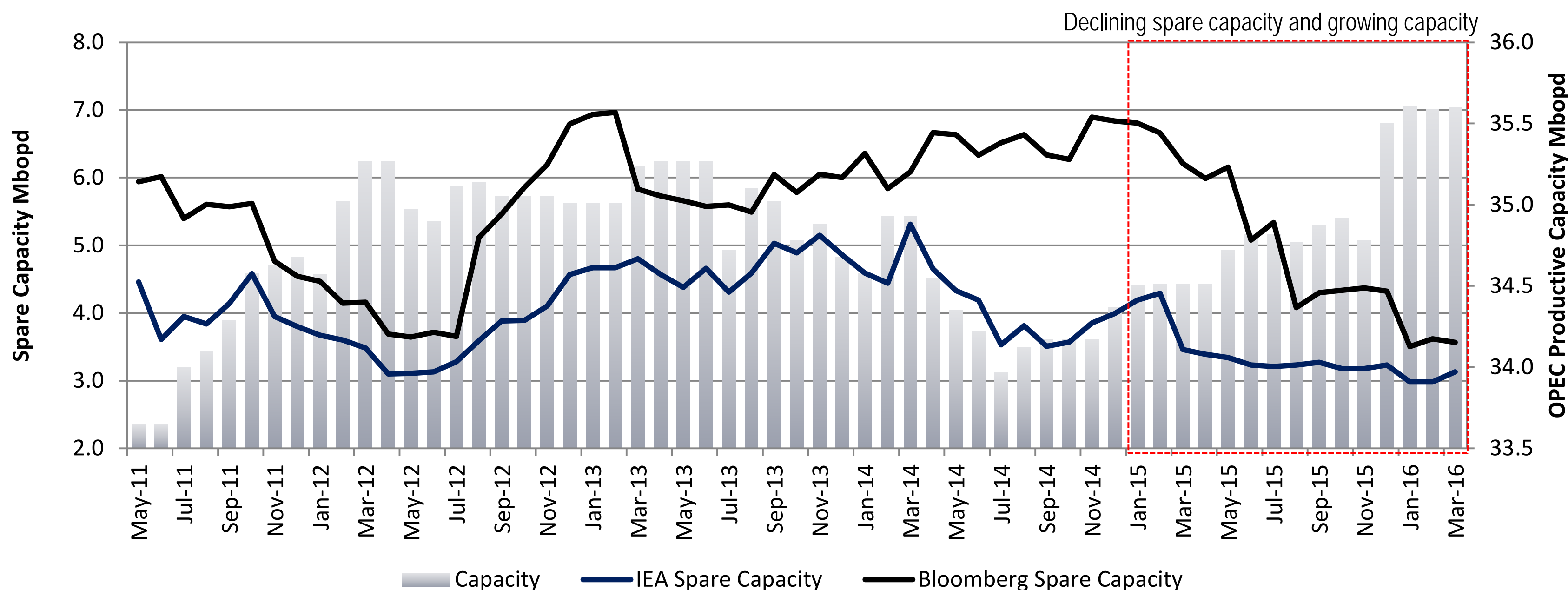
Supply/Demand Summary

- The supply/demand dynamics appear to be tightening however the market is at a delicate juncture with multiple crosswinds including:
  - The decline in US and Mexican volumes
  - The disruption of Nigerian, Venezuelan, Libyan and Kuwaiti volumes
  - The growth of Iranian/Saudi/Iraqi volumes
- These evolving trends are creating an environment where the physical market is oversupplied, driving storage builds (albeit at a slower rate), but spare capacity is declining, leaving the market in a delicate balance. Demand, while positive, remains relatively muted in the face of moderate to poor GDP growth, despite lower prices.



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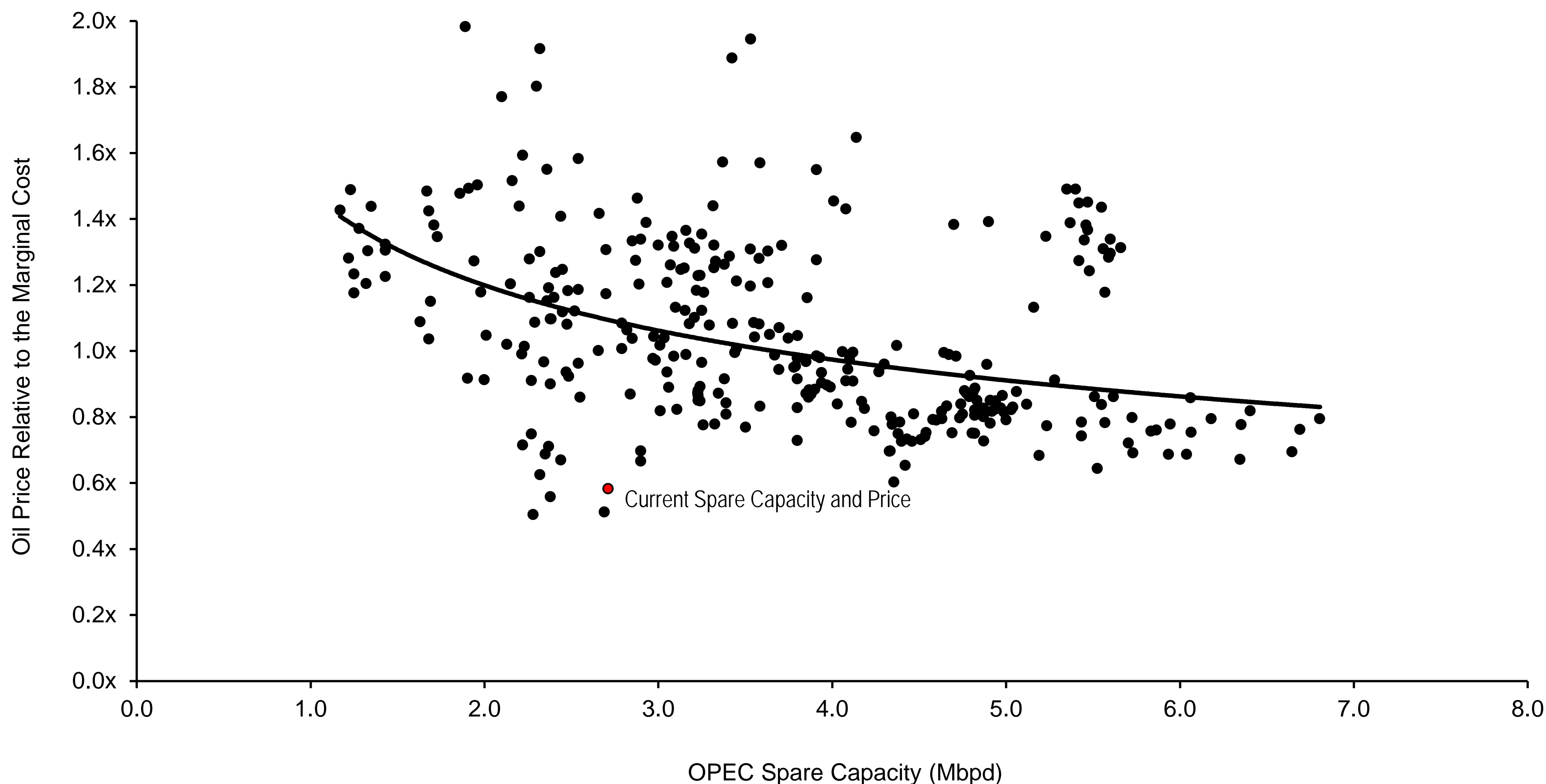
Oil Prices Cycle Based on Near-Term Supply/Demand

- Oil prices have continued to trade around the marginal cost (adjusted for supply/demand). However, as fears grow about a deflating marginal cost and growing spare capacity, prices have trended below the line.



Today's Spare Capacity is Not Unusually High But Is Set to Decline in 2017

OPEC Crude Production
(million barrels per day)

	Jan 2016 Supply	Feb 2016 Supply	Mar 2016 Supply	Sustainable Production Capacity[1]	Spare Capacity vs Mar 2016 Supply	1Q16 Crude Supply
Algeria	1.10	1.10	1.11	1.12	0.01	1.10
Angola	1.75	1.76	1.80	1.81	0.01	1.77
Ecuador	0.53	0.55	0.54	0.55	0.01	0.54
Indonesia	0.70	0.71	0.72	0.72	0.00	0.71
Iran	3.00	3.22	3.30	3.60	0.30	3.17
Iraq	4.43	4.22	4.19	4.35	0.16	4.28
Kuwait[2]	2.83	2.83	2.83	2.83	0.00	2.83
Libya	0.38	0.37	0.34	0.40	0.06	0.36
Nigeria	1.85	1.76	1.70	1.90	0.20	1.77
Qatar	0.64	0.67	0.67	0.67	0.00	0.66
Saudi Arabia[2]	10.21	10.22	10.19	12.26	2.07	10.21
UAE	2.93	2.78	2.73	2.93	0.20	2.81
Venezuela[3]	2.35	2.37	2.35	2.46	0.11	2.36
Total OPEC	**32.70**	**32.56**	**32.47**	**35.60**	**3.13**	**32.58**
(excluding Iraq, Nigeria, Libya)					**2.71**	

1 Capacity levels can be reached within 90 days and sustained for an extended period.

2 Includes half of Neutral Zone production.

Spare Capacity Mbpd

12.0
10.0
8.0
6.0
4.0
2.0
0.0

1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016E 2017E 2018E 2019E 2020E

Assuming Saudi capacity grows to 12.5Mbopd, Iran grows to 4Mbopd and Iraq grows to 4.5Mbopd, global spare capacity may be set to decline in '16/'17 with the net oversupply also declining

March spare capacity = 2.7Mbopd

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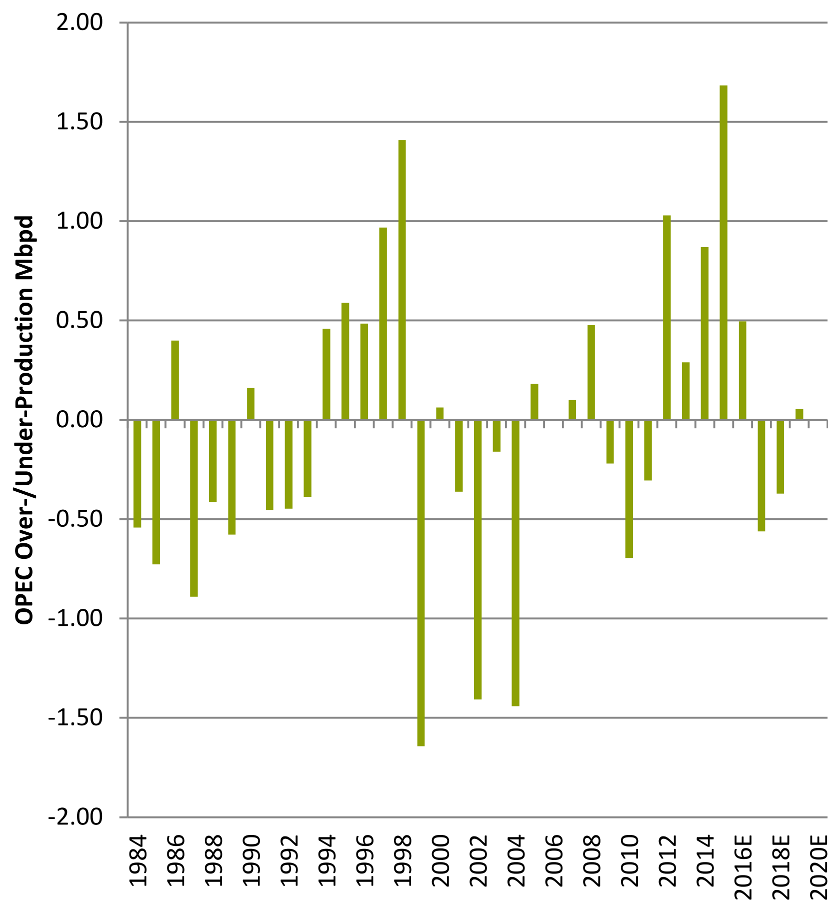
Physical Oversupply is Near All-Time Highs, But Appears to be Abating



- The physical crude market has shown signs of stabilization with the contago in the market contracting and front-end prices rising.
- This appears to reflect a tightening of the market (or a reduction in the physical oversupply), despite OPEC increasing production.
- While much of the reduction has been driven by declines in the US, Venezuela and Mexico, it is also partially a result of supply disruptions in Libya, Nigeria and Kuwait (strikes).
- Despite growing OPEC production, the market appears set to fall into undersupply in 2016 and 2017, while spare capacity will also decline.

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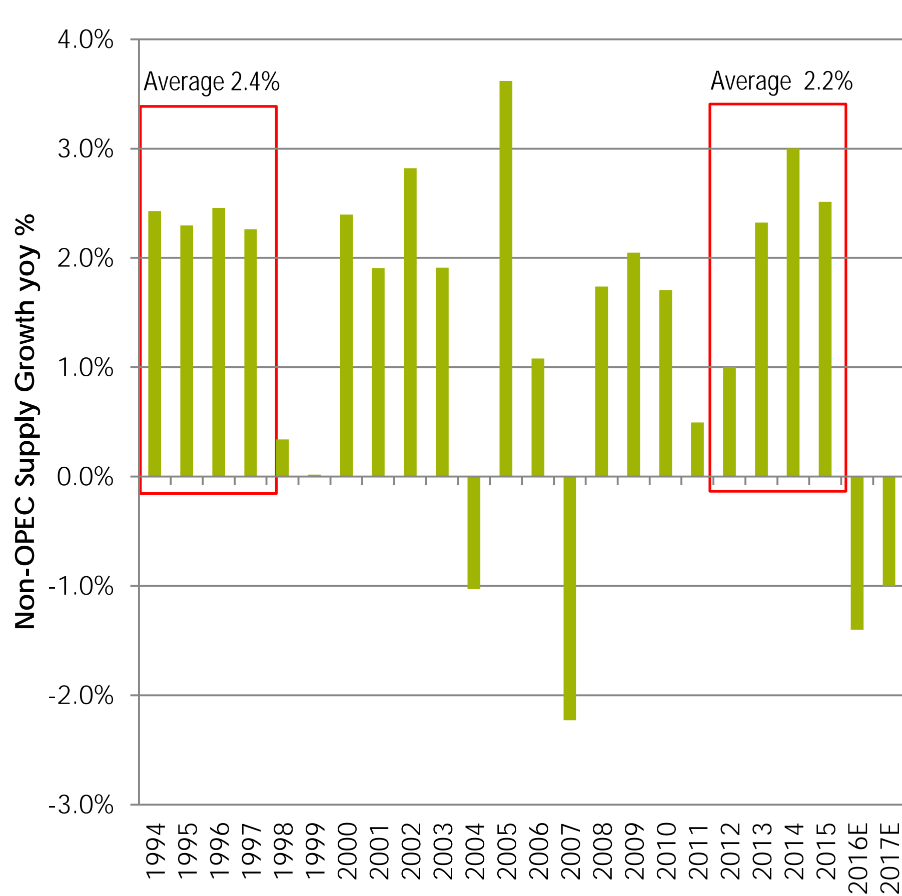
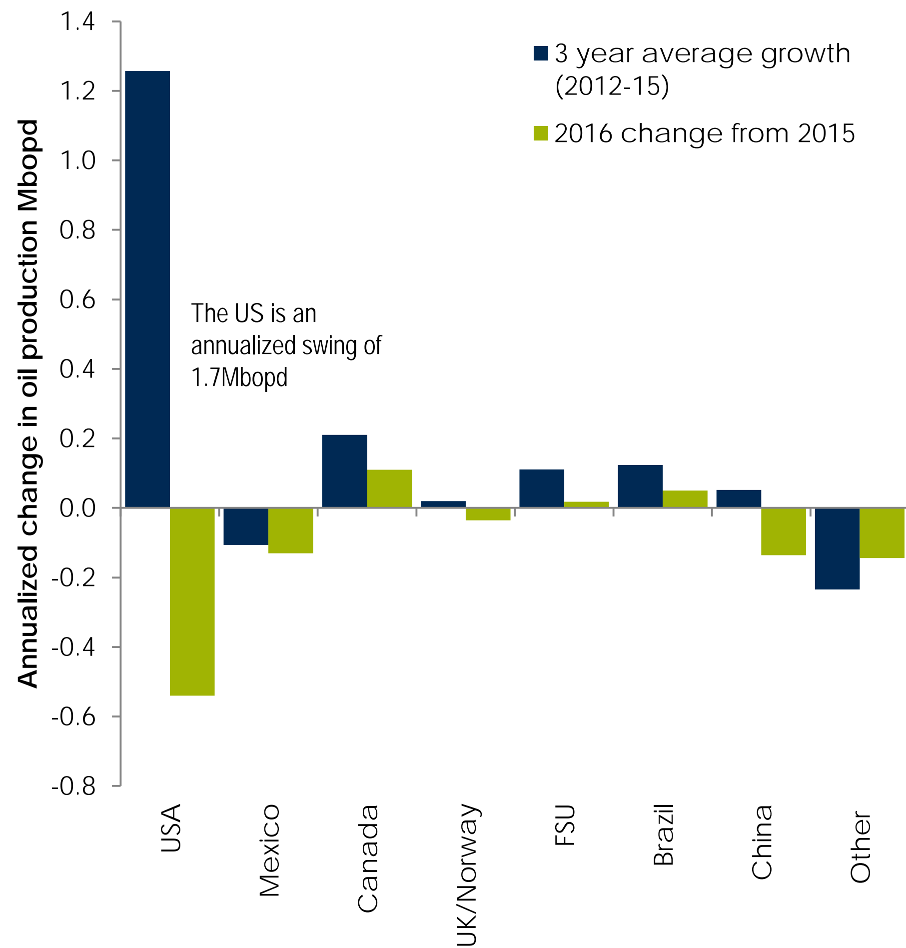
Supply: A Break Out of Non-OPEC Supply

- The US has been the primary driver of non-OPEC supply growth driven by the rise of unconventionals, cheap liquidity and a willingness to forgo returns in the interests of growth, but this is now reversing.





Supply: How Much Can the US Grow When Living Within Cash Flow? Negative.

- In 2015 the average three-year recycle ratio (operating cash flow per bbl, divided by proven developed F&D) was 95% (equal to a 1% annual decline). However, this was at an average WTI price of $80.4/bbl and an average cash margin of $24/boe. In 2015 average cash margin fell to $13/boe with PD F&D of $56/boe implying a recycle ratio of 22%.

	EOY2015	EOY2014	Change
Companies	78	81	-3
75th Percentile PDRR	130%	165%	-21%
% of Cos below 100%	54%	33%	64%
Daily Prod Wtd-ave PDRR	95%	119%	-20%
Total Daily Prod (mboepd)	15,192	14,455	5%

3-year Proved Developed Recycle Ratio
350%
300%
250%
200%
150%
100%
50%
0%
-50%
-100%
-150%
-
2,000
4,000
6,000
8,000
10,000
12,000
14,000
16,000
Cumulative Production (mboepd)
U.S. Cost Curve
Top Quartile
Weighted Ave.
100% Line

Supply: US Growth Has Begun to Reverse with the Price and Liquidity Decline

- Early data supports the view that US supply will decline meaningfully; in the last four weeks US supply growth has declined -375kbopd year-over-year, and with continued decline will reach -935kbopd.

YoY Production Change kbopd

2000
1500
1000
500
0
-500
-1000
-1500

1/2/2009 4/2/2009 7/2/2009 10/2/2009 1/2/2010 4/2/2010 7/2/2010 10/2/2010 1/2/2011 4/2/2011 7/2/2011 10/2/2011 1/2/2012 4/2/2012 7/2/2012 10/2/2012 1/2/2013 4/2/2013 7/2/2013 10/2/2013 1/2/2014 4/2/2014 7/2/2014 10/2/2014 1/2/2015 4/2/2015 7/2/2015 10/2/2015 1/2/2016 4/2/2016 7/2/2016 10/2/2016

Source: EIA

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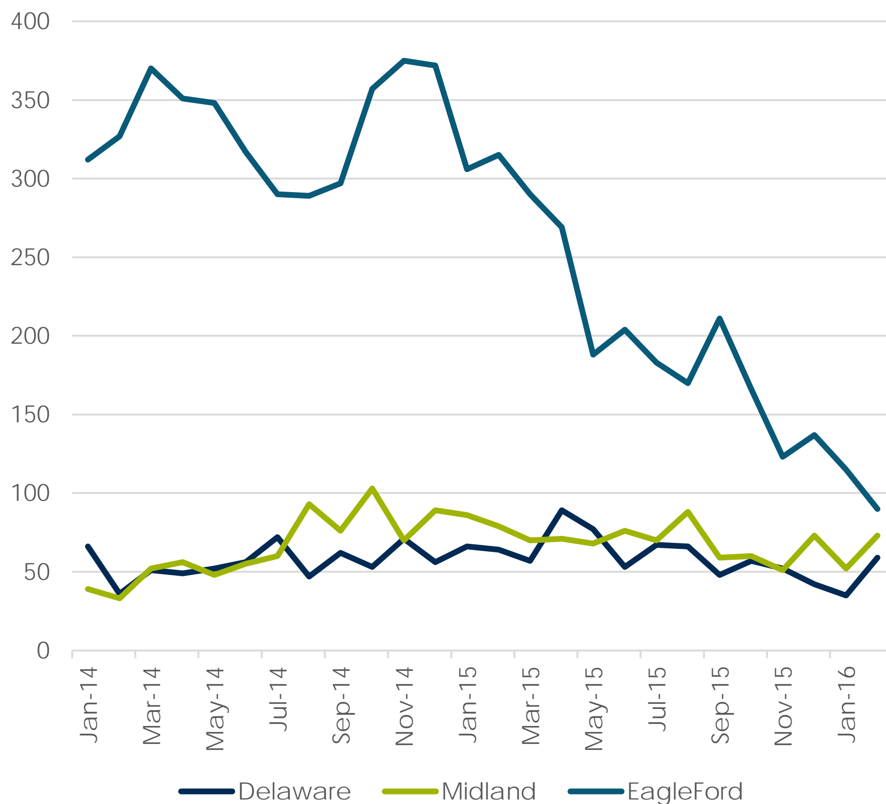
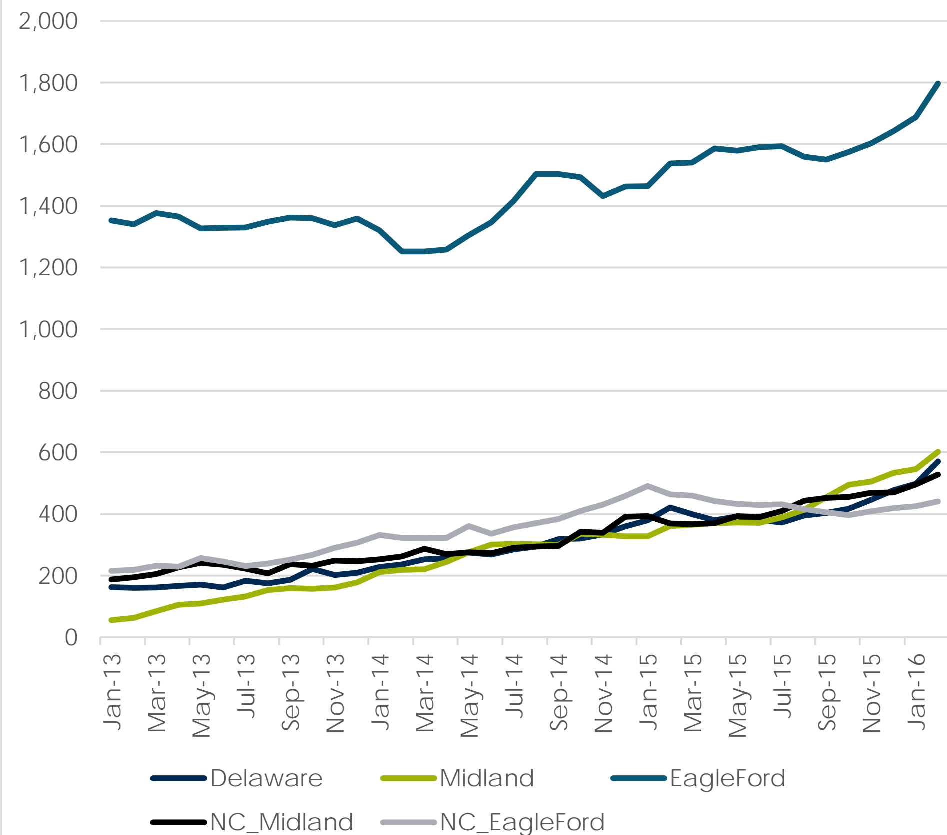
Rig Count is Not the Only Driver of Production

- Rig count and production has declined in the US but there also appears to be a growing back log of drilled wells not yet producing (up 400 wells from the "normalized level").





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OPEC's Supply Growth has Continued

- OPEC Production has ramped up in the face of Iran rejoining the cartel, which is adding to productive capacity (500,000 bopd near term).
- Even assuming Iran averages 3.66Mbopd in 2016, Iraq produces 4.2Mbopd and Saudi averages 10.17Mbopd the net oversupply is set to fall.
- Moreover all three are forecast to continue growing through to 2020.

Production/Capacity Mbopd

40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00

1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016E

Saudi Arabia
Iraq
UAE
Venezuela
Indonesia
Algeria
Iran
Kuwait
Nigeria
Qatar
Libya
Angola

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Saudi's Budget

- Based on the recently released Saudi budget, the country ran a deficit of 15% of GDP in 2015, drawing down foreign assets by $115Bn; and they announced a spending cut of 14% from last year.
- Actual spending was around 13% higher than the budget announced a year ago – speculation is that this is primarily driven by the war in Yemen.
- Using some simple assumptions, Saudi appears to be modeling a $40-45 Brent pricing in their budget, which would represent a halving of revenue from 2014.
- At $80/bbl Saudi's revised budget would be balanced.

	Announced
##	Calculated

	2014A	2015 Budget	2015A	2016E	2016/2015
Revenue	1,046	715	608	514	-15%
Of Which Non Oil	126		163	163	0%
Oil Revenue	920		445	351	-21%
	88%	0%	73%	68%	
Expenses	(1,100)	(860)	(975)	(840)	-14%
Surplus/Deficit	(54)	(145)	(367)	(326)	-11%
Check	*0*	*0*	*0*	*0*	
OPEC Saudi Production	9,713		10,196	10,186	0%
Implied Price Change			-54%	-21%	
Currency Peg	3.75		3.75	3.75	
Implied USD/BBL CF	69.17		31.89	25.18	
Brent	98.97		52.77	41.66	-21%
Cash Margin	70%		60%		
Cash Costs	(29.80)		(20.88)	(16.49)	-21%

BP Saudi Production	11,505
Domestic Use	3,185
Available for Export	8,319

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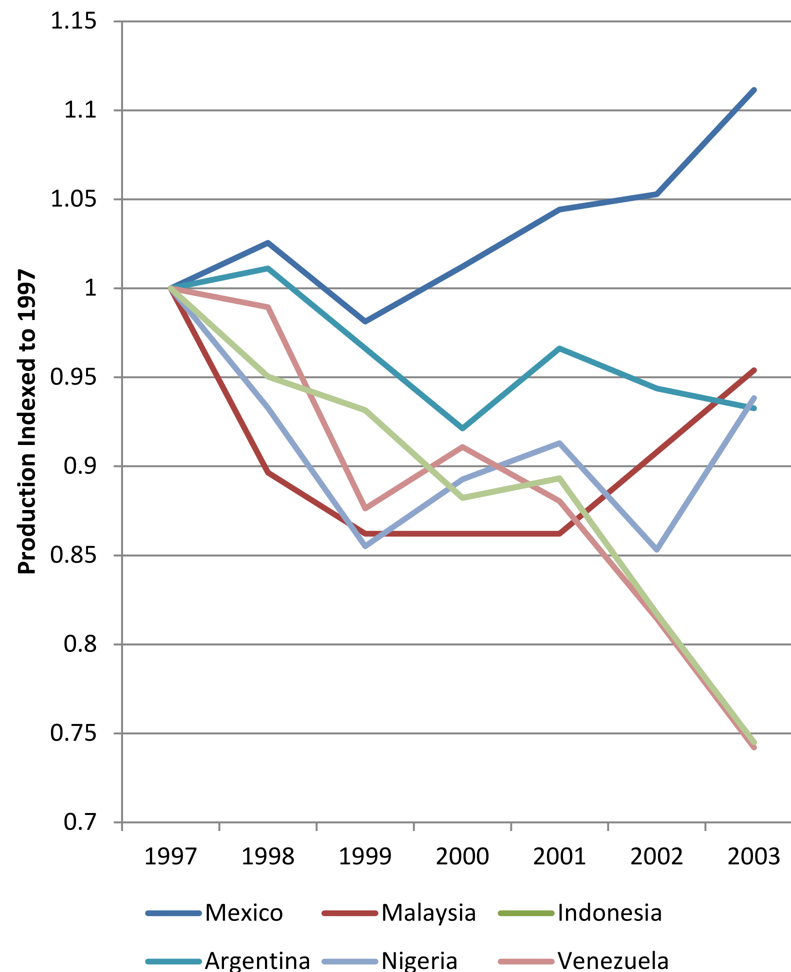
Supply Lessons From '98

- One of the most notable features of the 1998 decline was the long-term effect on supply and the impact on emerging markets.
- In Mexico, the decline reversed four years of growth, which finally recovered in 2000, while Malaysia, Nigeria, Venezuela, Indonesia and Argentina saw declines that took years to reverse, if at all.
- In part, this trend reflected other coincidental factors, namely a stronger dollar, declining emerging market liquidity and a reduction in funding for state-owned E&Ps; these dynamics are replaying today.
- Given mega project delays and outright cancellations, the same outcomes appear likely to result from the current cycle.



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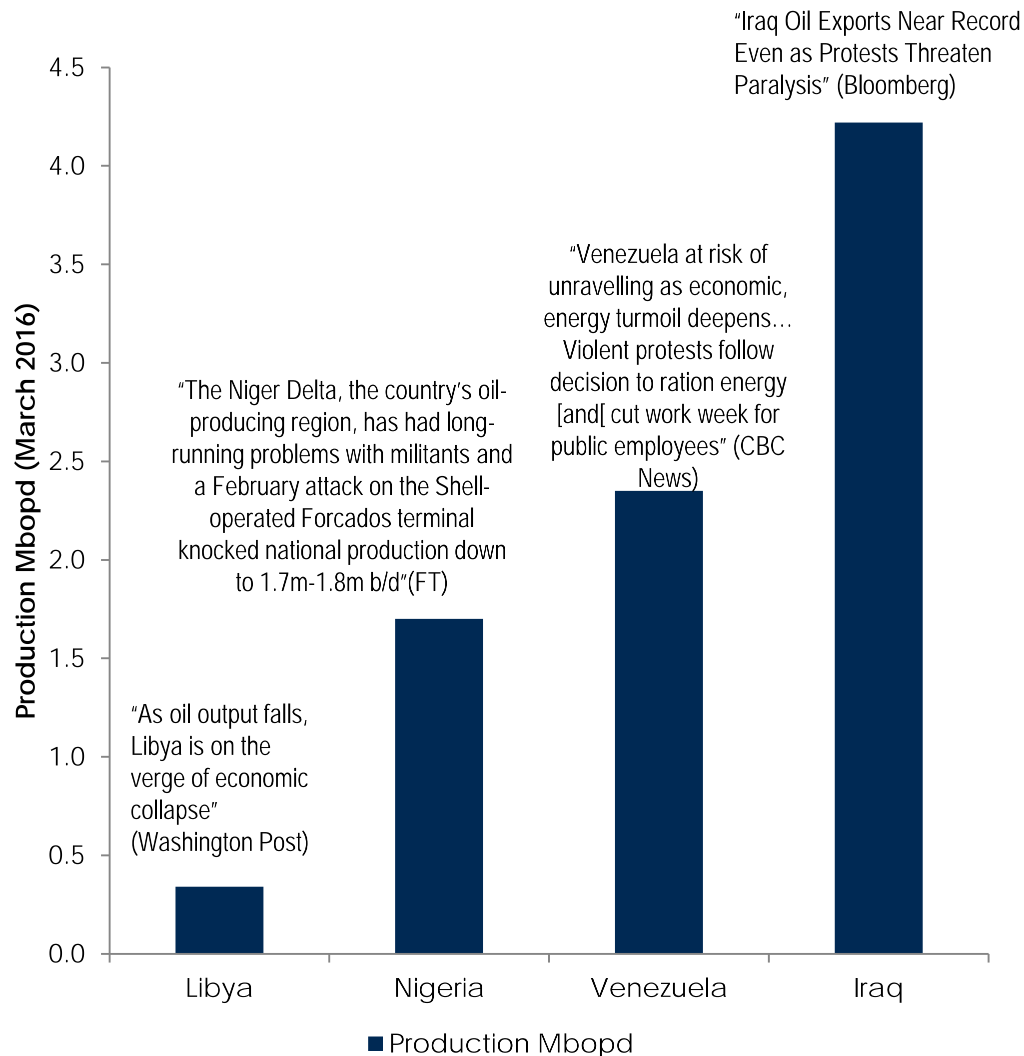
Supply Risks Appear Underestimated

- High levels of storage and growth in Iran/Saudi volumes have desensitized investors to the potential supply risk on the horizon.
- Libya remains divided, Nigerian supply is being disrupted again due to militants while the government defends the dollar peg, while Venezuela is on the verge of collapse and Iraq remains a wild card.
- Venezuela in particular poses a significant tail risk. In 2002-03 when PDVSA went on strike, oil prices rose 44% before production was resumed.



Demand: An Uneven Recovery

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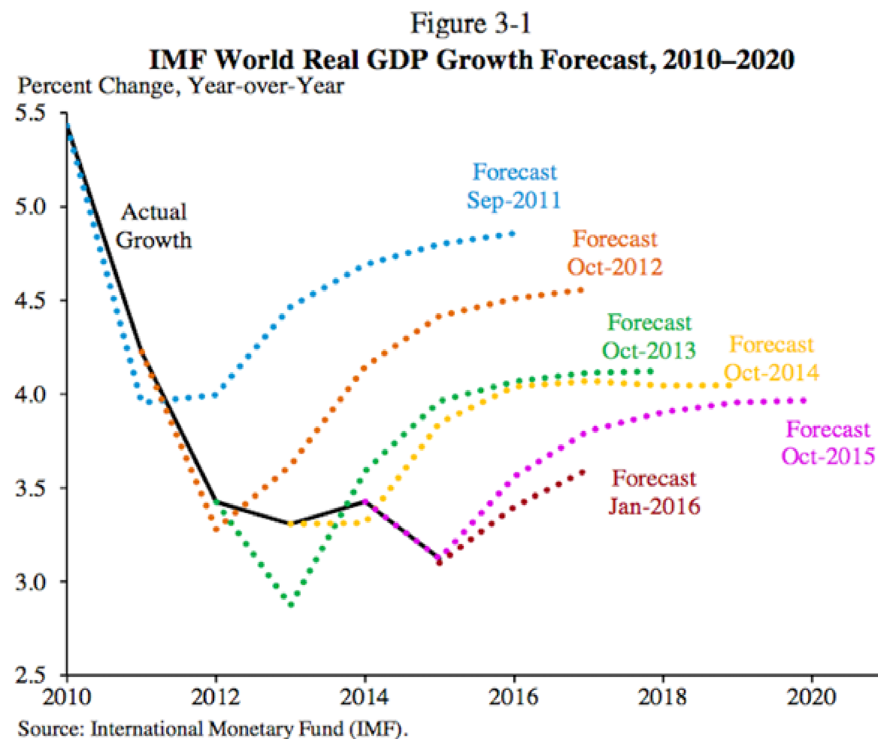
Demand: An Uneven Recovery

- While the primary focus of the market has been on US supply, the directional change in oil prices in 2014 appears to have been equally demand-related, with negative revisions since mid-year 2014.
- The IMF now forecasts global GDP growth was 3.3% in 2015. That was down from a 3.8% estimate for 2015 in its World Economic Outlook published October 2014. The IMF has also lowered 2016 growth from 4% to 3.8% to 3.4% (January forecast) and most recently 3.2%, while still hoping for an acceleration to 3.5% in 2017 (revised down from 3.7%).
- Historically (only one in nine times to the contrary), oil prices have not risen with GDP below 3%. For a material appreciation, YoY GDP growth has averaged 4%+.
- Demand dynamics remain transitory. While the US saw some stronger data in 4Q2015, it appears to be decelerating, while China has shown a recent recovery. Brazil, Venezuela and other emerging markets continue to decelerate and Europe and Japan remain weak.
- Longer term fuel efficiency gains and modest GDP suggest that a return to 2%+ growth is unlikely and that 1-1.5% is the new normal.



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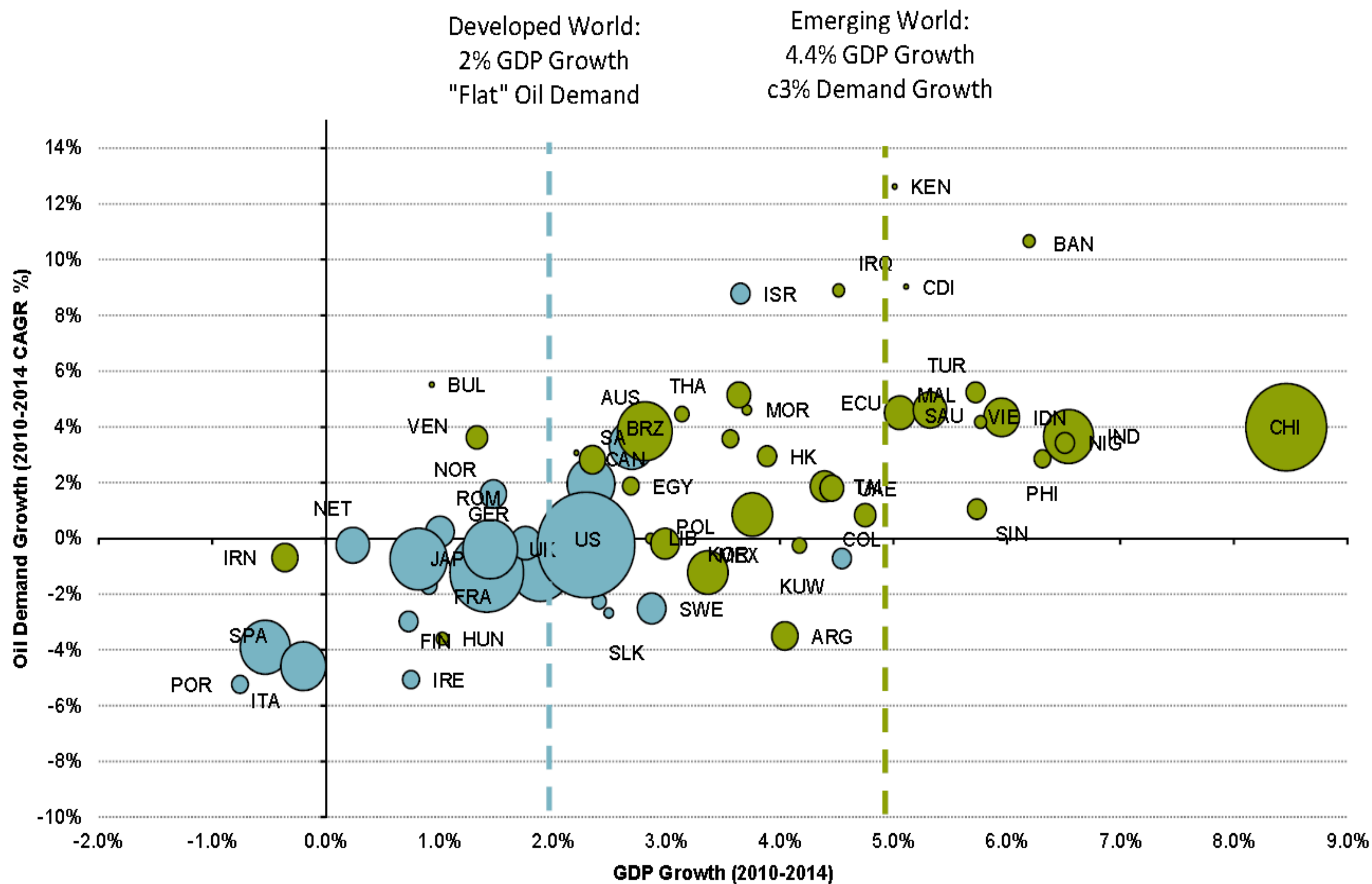
Demand is Correlated to Price and GDP Across the World



Source: IEA and Bernstein analysis.

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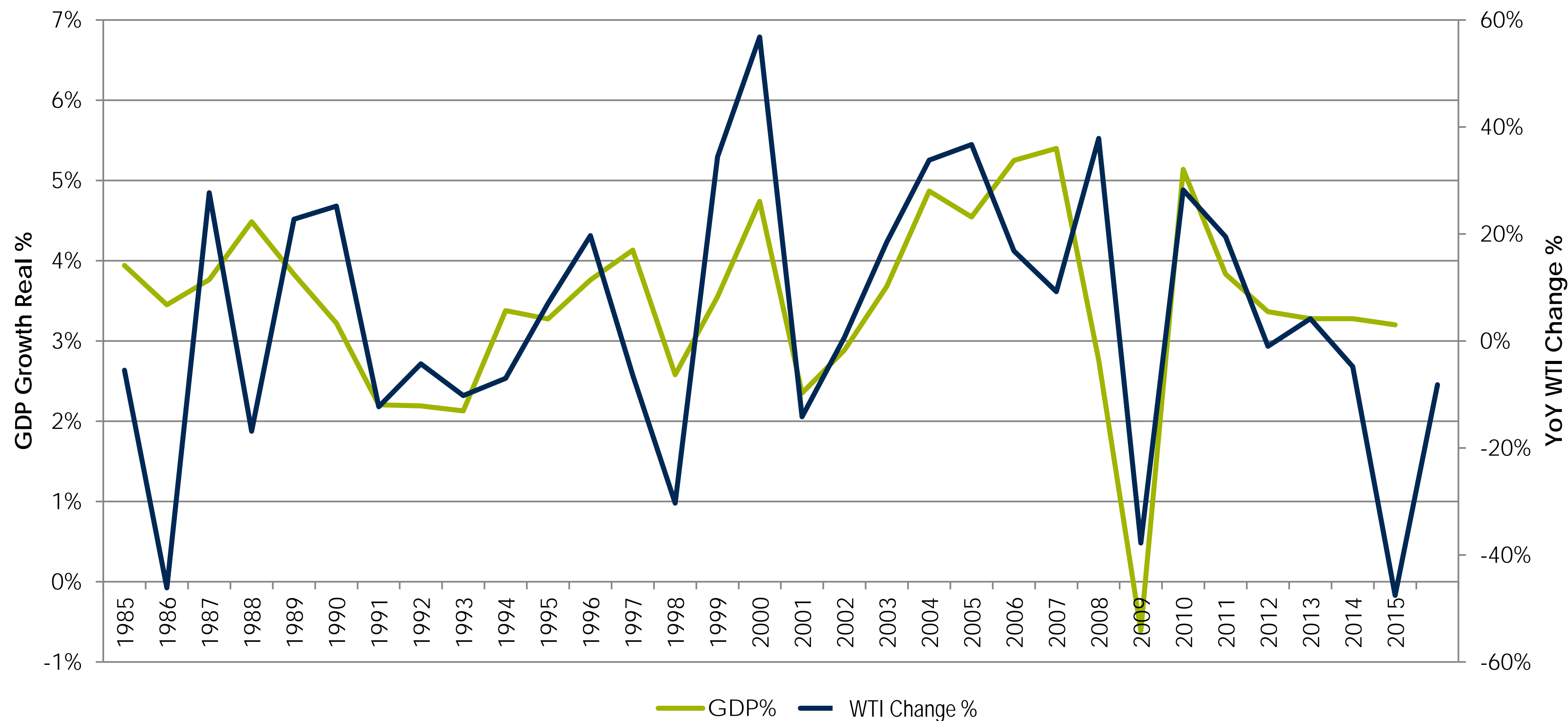
Global GDP and the Demand Problem

- Historically, oil prices have correlated closely with GDP growth. The recent decline in price appears overdone relative to GDP, but reflects the supply dynamics previously discussed. With 2016 and 2017 GDP forecast to average 3.3% it appears any recovery in price must be supply-driven, much like 2001-02 (2.6% average GDP).



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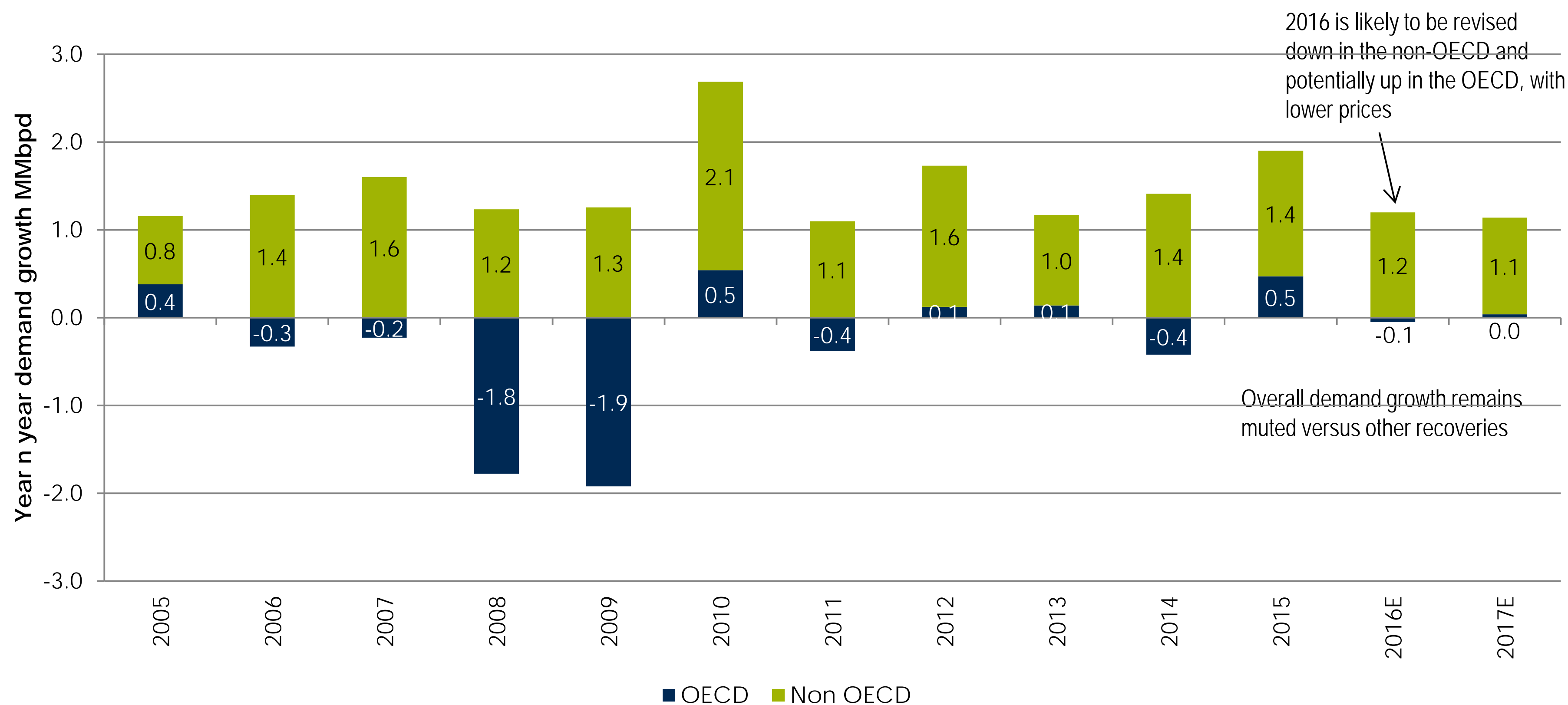
The Stabilization of the OECD and Deceleration of the Non-OECD

- While overall demand revisions were initially negative in late 2014/early 2015, they are now marginally positive. This reflects upward revisions to US and European demand.
- 2016 is likely to return to trend with non-existent OECD demand growth and 1-1.4Mbopd of Non-OECD growth



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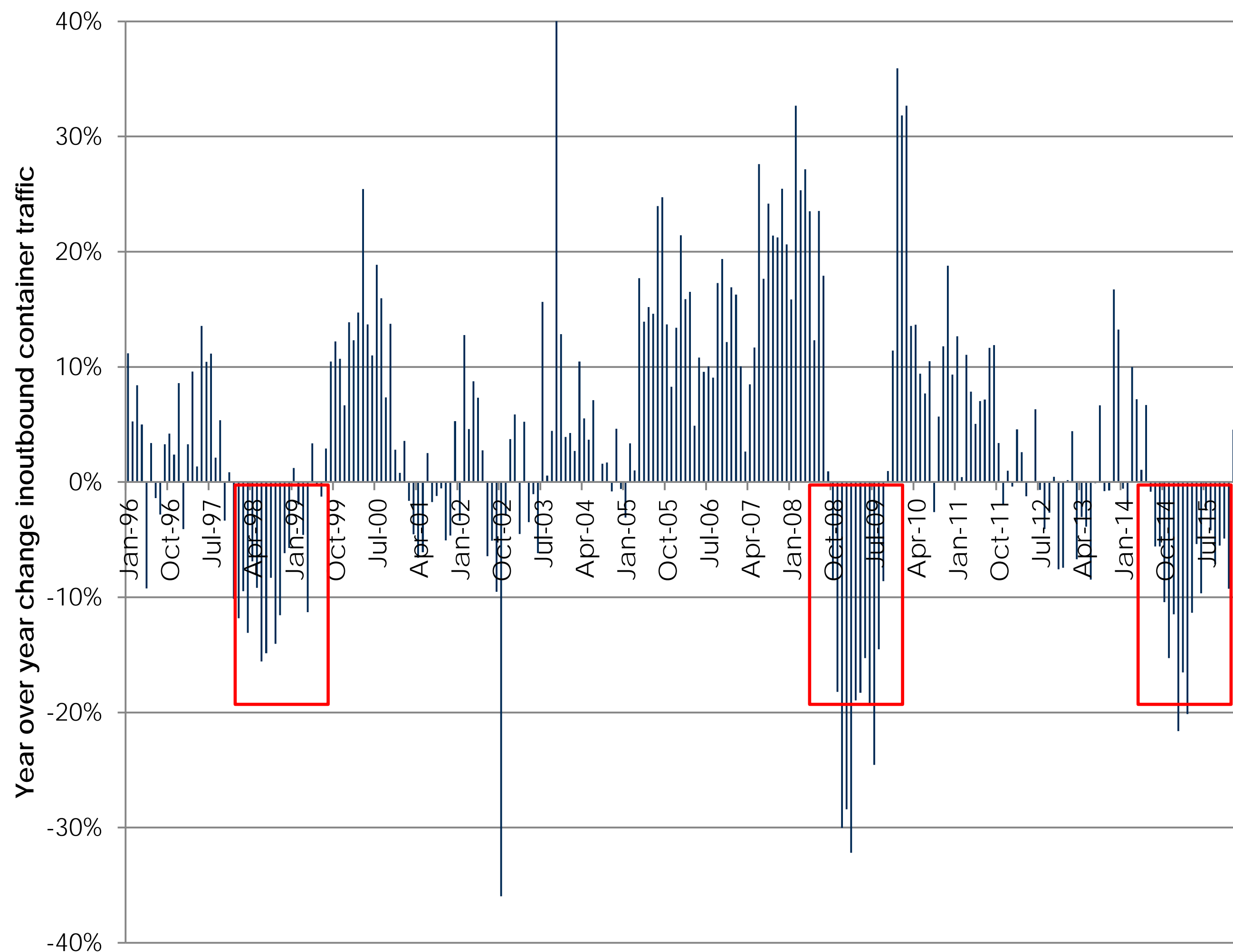
US: Recent Container Data Suggests an Uneven US Economy

- West Coast port outbound container data is showing a recovery in volumes, albeit off weak comps.
- However, inbound data continues to look anemic, while March economic data continues to show deceleration.



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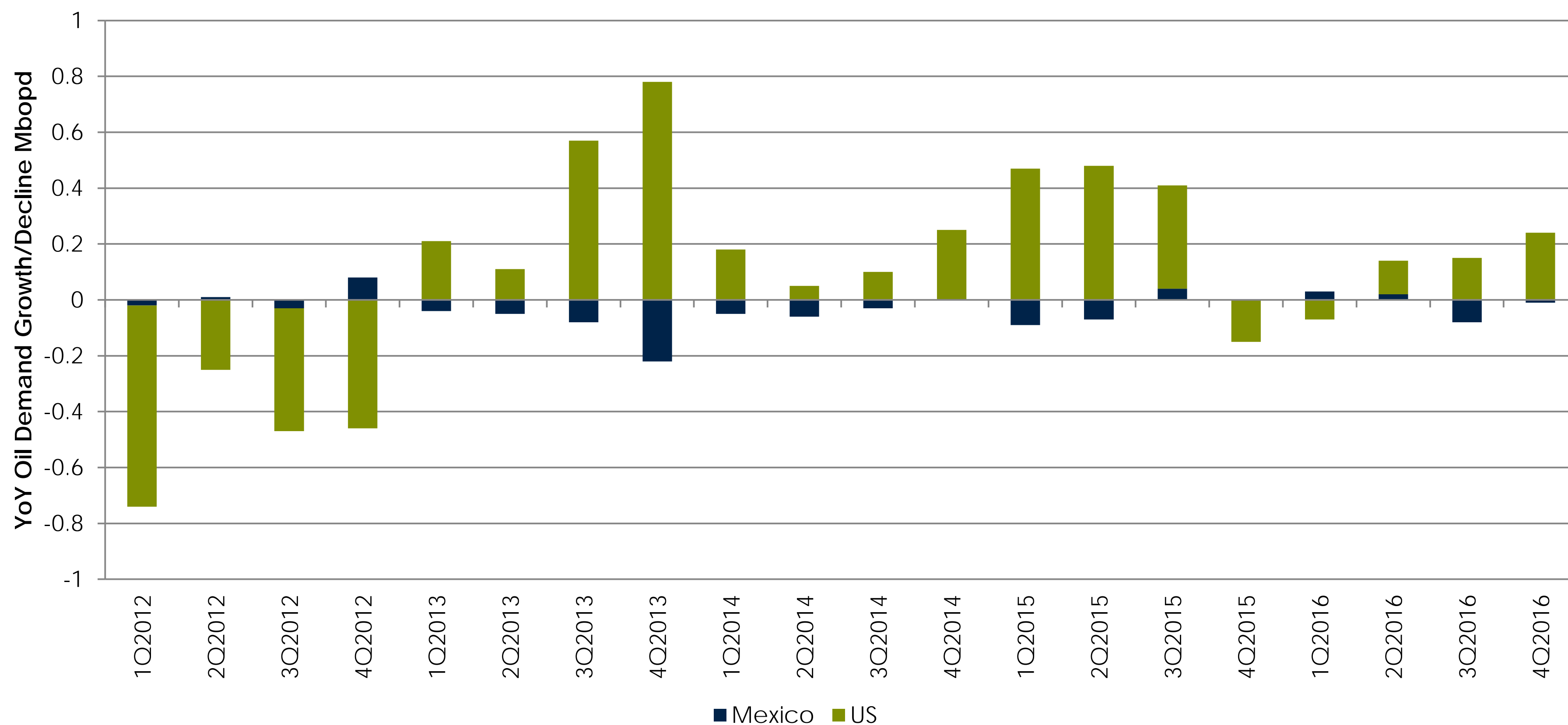
Combined Data for US and Mexico Suggest the IEA is Too Optimistic

- 4Q2015 and 1Q2016 data are likely to show no growth in combined US/Mexico demand. While lower prices and lower unemployment had been tailwinds for GDP, these now appear to have limited further impact.



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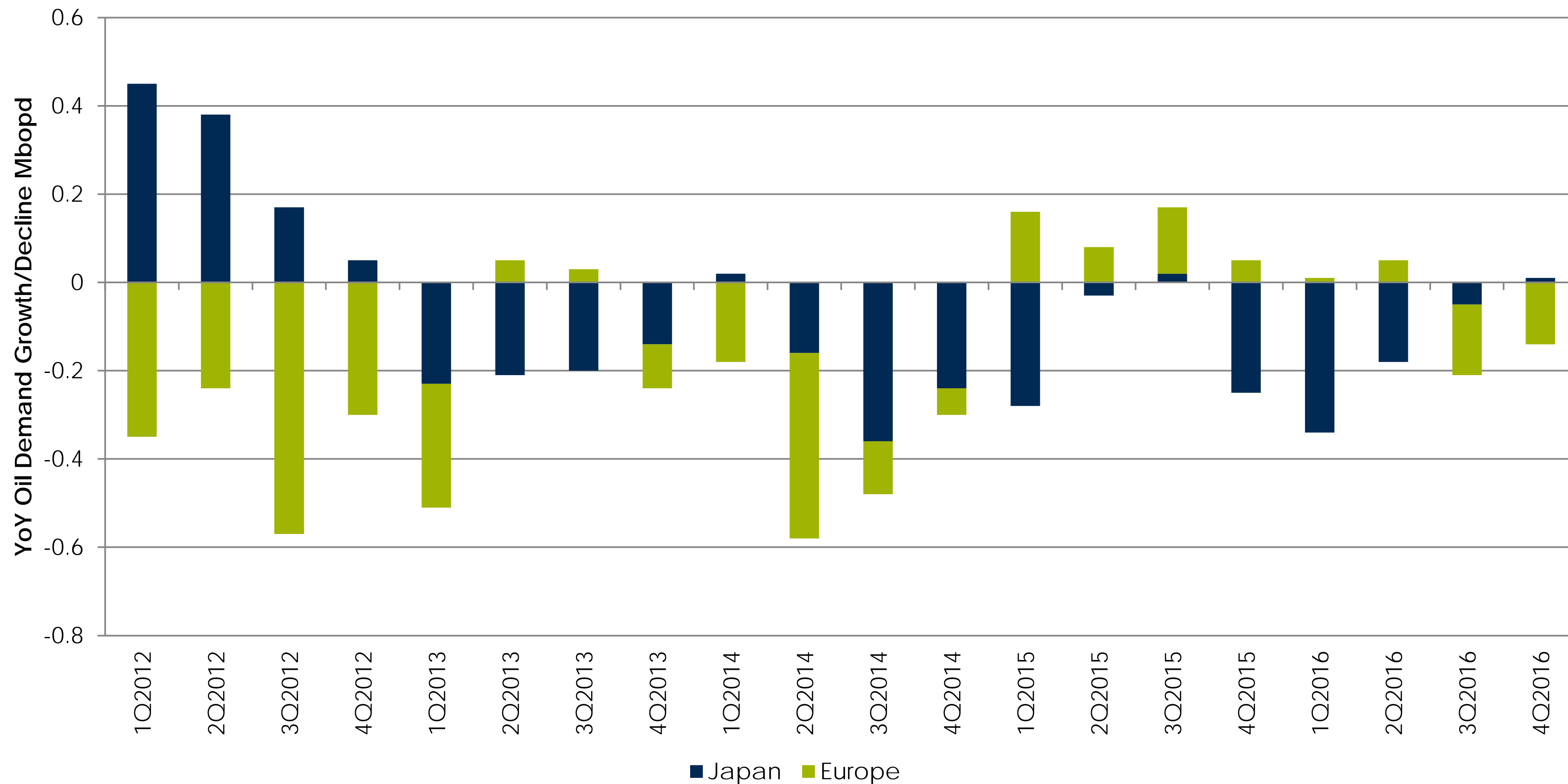
European and Japanese Demand

- European oil demand has been non-existent, while Japanese oil demand has shown negative year-over-year changes in almost every quarter since the beginning of 2013, suggesting negative trends are the new normal.



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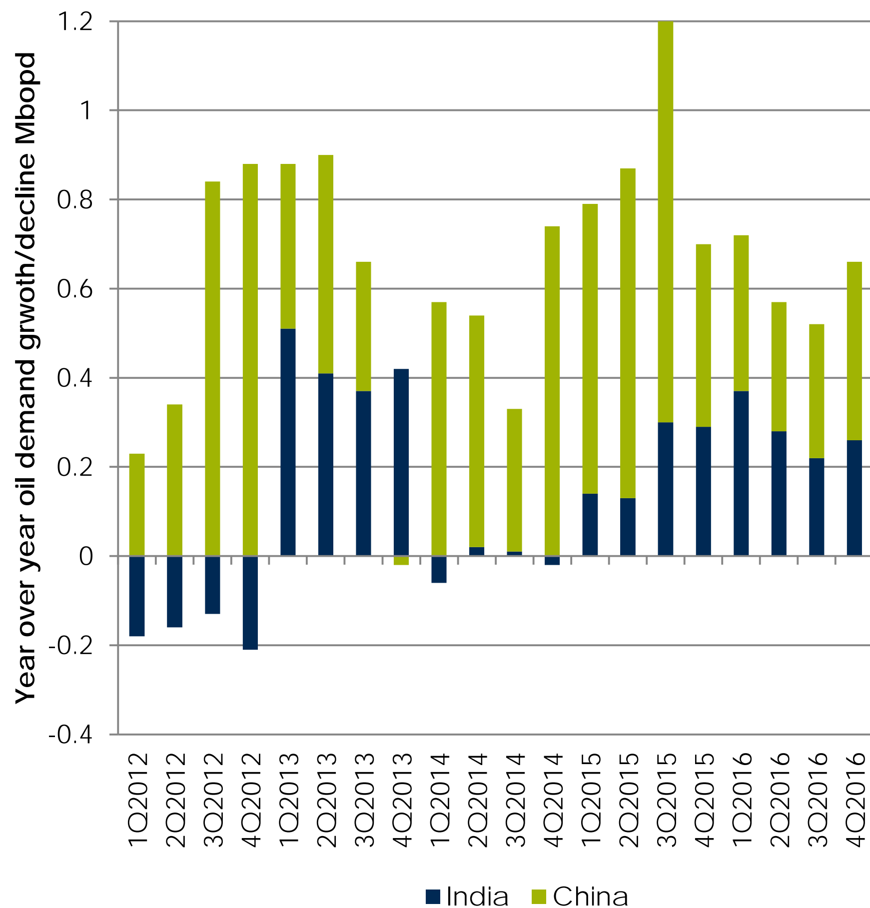
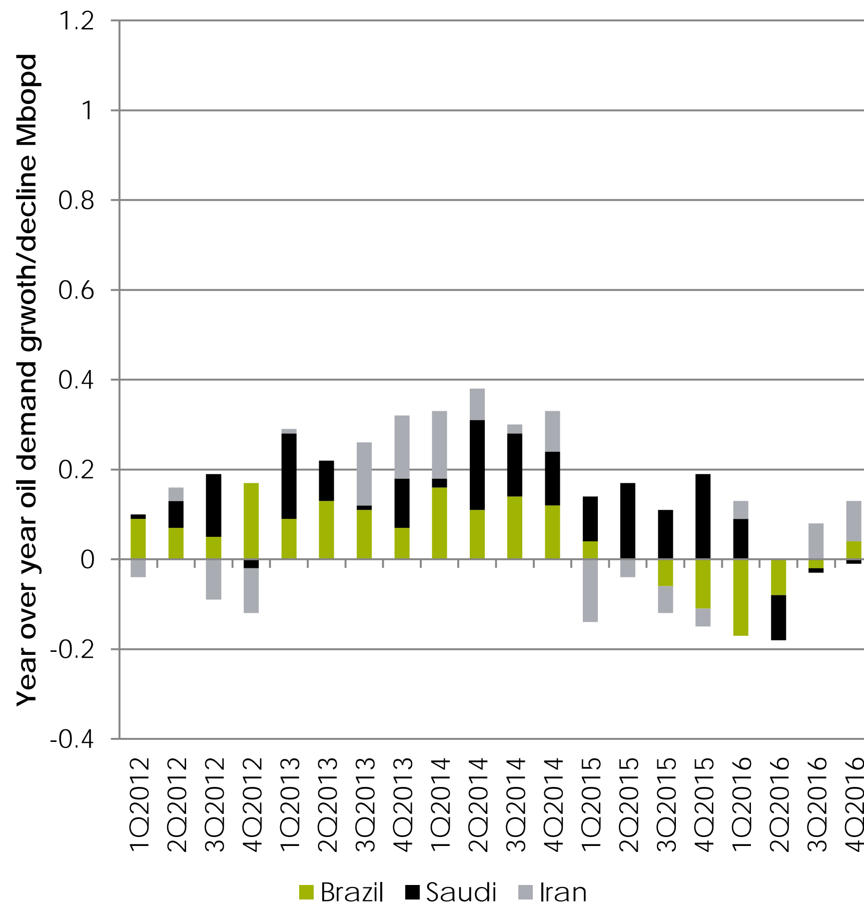
International Demand has Decelerated, With China and India the Key Growth Engines

- India and China combined have decelerated but remain robust, with China in particular showing recovery in April. In contrast, oil-leveraged nations (Brazil, Iran and Saudi) have decelerated and ,absent a price recovery, will most likely miss IEA estimates.





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Oil and the Dollar

- Historical rallies in the USD have led to emerging market decelerations and currency crises. Today's environment seems to be following a similar dynamic (although more debt is held by national entities).
- Decelerating emerging market growth and a stronger dollar have historically impacted the US. This would suggest commodities lead the broader market.

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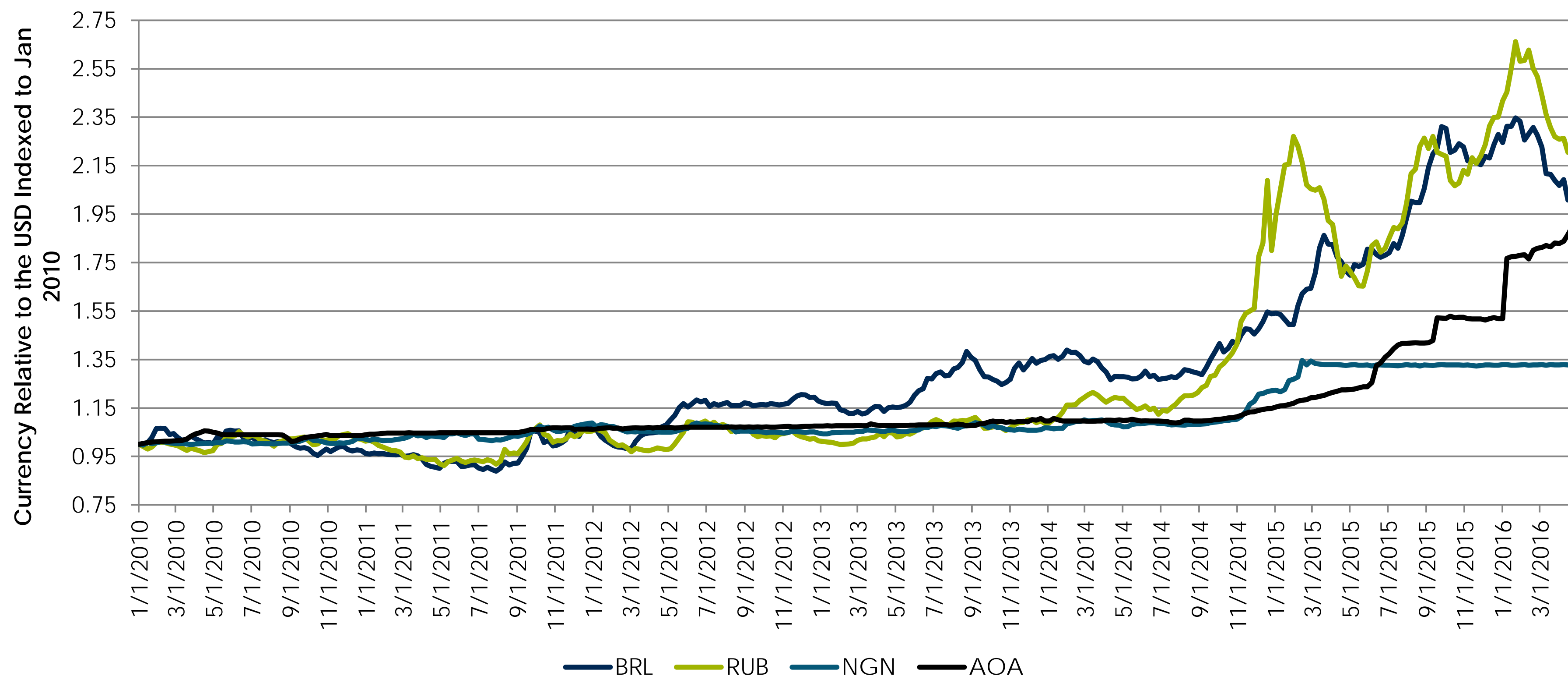
Emerging Market Currency Pressure

- As in previous commodity cycles ('84, '98), emerging market currencies have weakened substantially.
- While US-denominated sovereign debt is lower than in previous cycles, government-sponsored US-denominated debt remains high, and is putting significant strain on government balance sheets at a time of slowing growth.



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Macro Balance: Positive and Negative

Influence	Positive for Price	Negative for Price
Marginal Cost	Structurally, capital intensity has risen Service deflation is bottoming out Low ROACE continues to limit supply Cost of capital continues to rise driving up interest expense	YE write-downs have artificially lowered the capital base Lower capacity utlilization drives efficiency gains Technology application continues to drive improvements
Supply Factors	Reduction in US rig count is lowering supply 80-100kbopd a month Mexico/Venezuelan volumes continue to decline Venezuelan implosion Supply interruptions are becoming more frequent with less cash available to "appease" disruptors	Iran recovery (in progress), likely to trend to 4Mbopd Iraq continued growth if stable Return of Nigeria delta Bottoming of US rig count Full storage
Demand Factors	Recovery in global GDP (unlikely) Weaker dollar (return to easing) China continued recovery from depressed 1Q with stimulus/SPR build Continued Indian growth	Europe/US/Japan recession/stagnation Brexit Greek distress (again) US rates rise despite limited growth Dollar strengthening

Natural Gas: The Forgotten Commodity?

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Marginal Cost of Gas

- Range Resources' first quarter results were indicative of the industry status:
  - The company grew production year over year 4%, but volumes declined 4% from the 4Q2015
  - Unit cash costs were $1.86/mcfe and $2.82/mcfe including depreciation
  - Annualized ROACE was negative for the quarter at -6%
  - The company drilled and brought on line 38% of its targeted well count for the full year in 1Q alone, but reaffirmed annual production guidance of 1415mcfe above 1Q results
- Put simply, despite a decline in rigs, a lack of profitability, negative cash margins and $2.7Bn of debt, the company continues to sustain and potentially grow production.

Revenues and other income:	1Q 2016 $'000s	1Q 2015 $'000s	$/mcfe	$/mcfe
Natural gas, NGLs and oil sales	209,487	325,483	1.67	2.59
Derivative fair value income	86,908	122,839	0.69	0.98
Brokered natural gas, marketing and other	35,018	14,485	0.28	0.12
Total revenues and other income	331,413	462,807	2.63	3.68
Costs and expenses:			-	-
Direct operating	24,054	37,137	0.19	0.30
Transportation, gathering and compression	125,263	89,426	1.00	0.71
Production and ad valorem taxes	5,887	9,928	0.05	0.08
Brokered natural gas and marketing	36,558	21,562	0.29	0.17
Exploration	4,913	7,886	0.04	0.06
Abandonment and impairment of unproved properties	10,628	11,491	0.08	0.09
General and administrative	40,657	48,329	0.32	0.38
Termination costs	162	5,950	0.00	0.05
Deferred compensation plan	16,056	-5624	0.13	(0.04)
Interest	37,739	39,207	0.30	0.31
Depletion, depreciation and amortization	120,561	147,290	0.96	1.17
Impairment of proved properties and other assets	43,040	—	0.34	
Loss on the sale of assets	1,643	175	0.01	0.00
Total costs and expenses	467,161	412,757	3.71	3.28
(Loss) income before income taxes	-135,748	50,050	(1.08)	0.40
Income tax (benefit) expense:			-	-
Current	—	—		
Deferred	-44,038	22,366	(0.35)	0.18
	-44,038	22,366	(0.35)	0.18
Net (loss) income	-91,710	27,684	(0.73)	0.22

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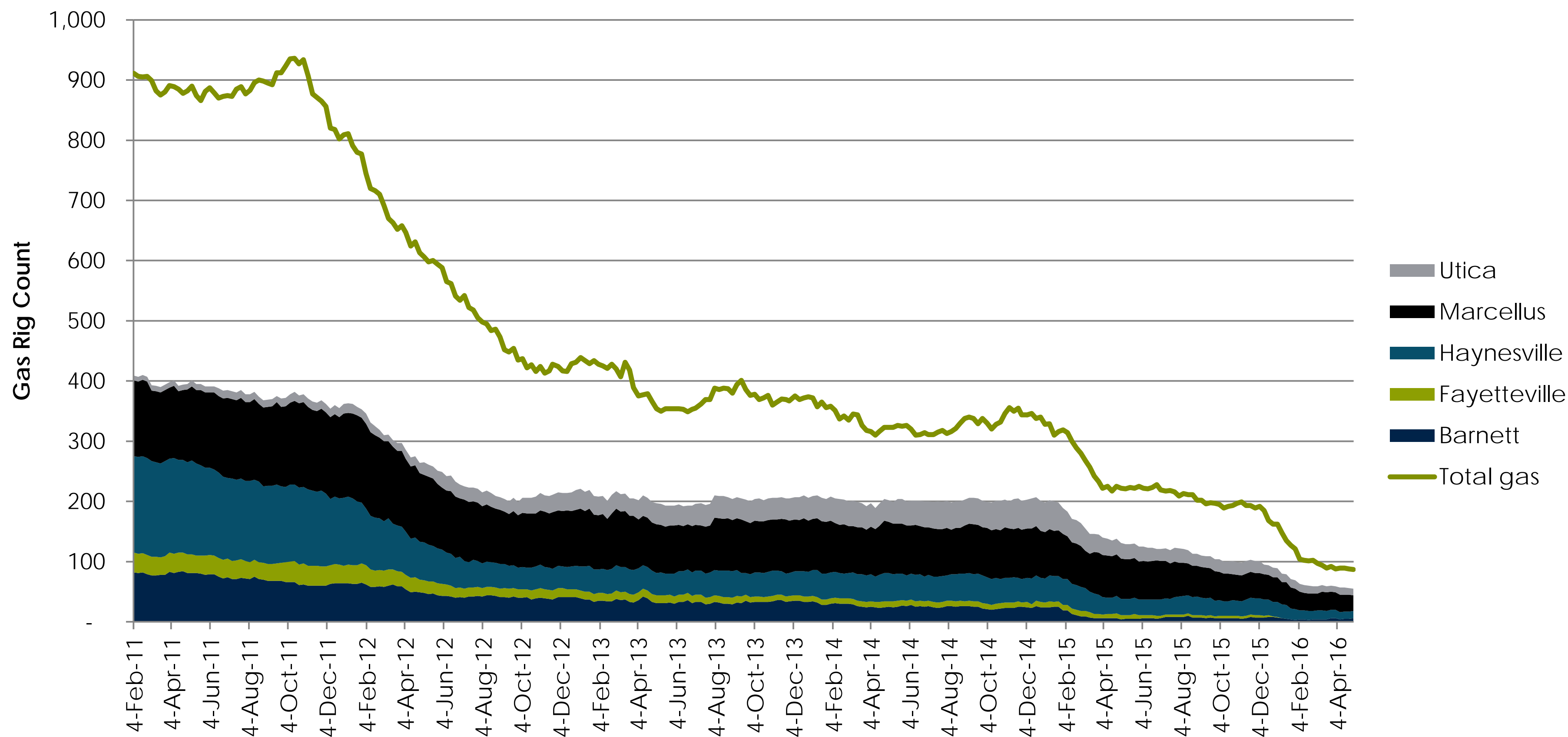
The Rig Count Has Behaved in Line With Cost Expectations

- Since 2011 the US gas rig count has fallen from 911 rigs to 87, while the number of rigs in the major gas shales plays has fallen from 400 to 55. Even the Marcellus and Utica have fallen from peaks of 143 and 50 to 26 and 11, respectively



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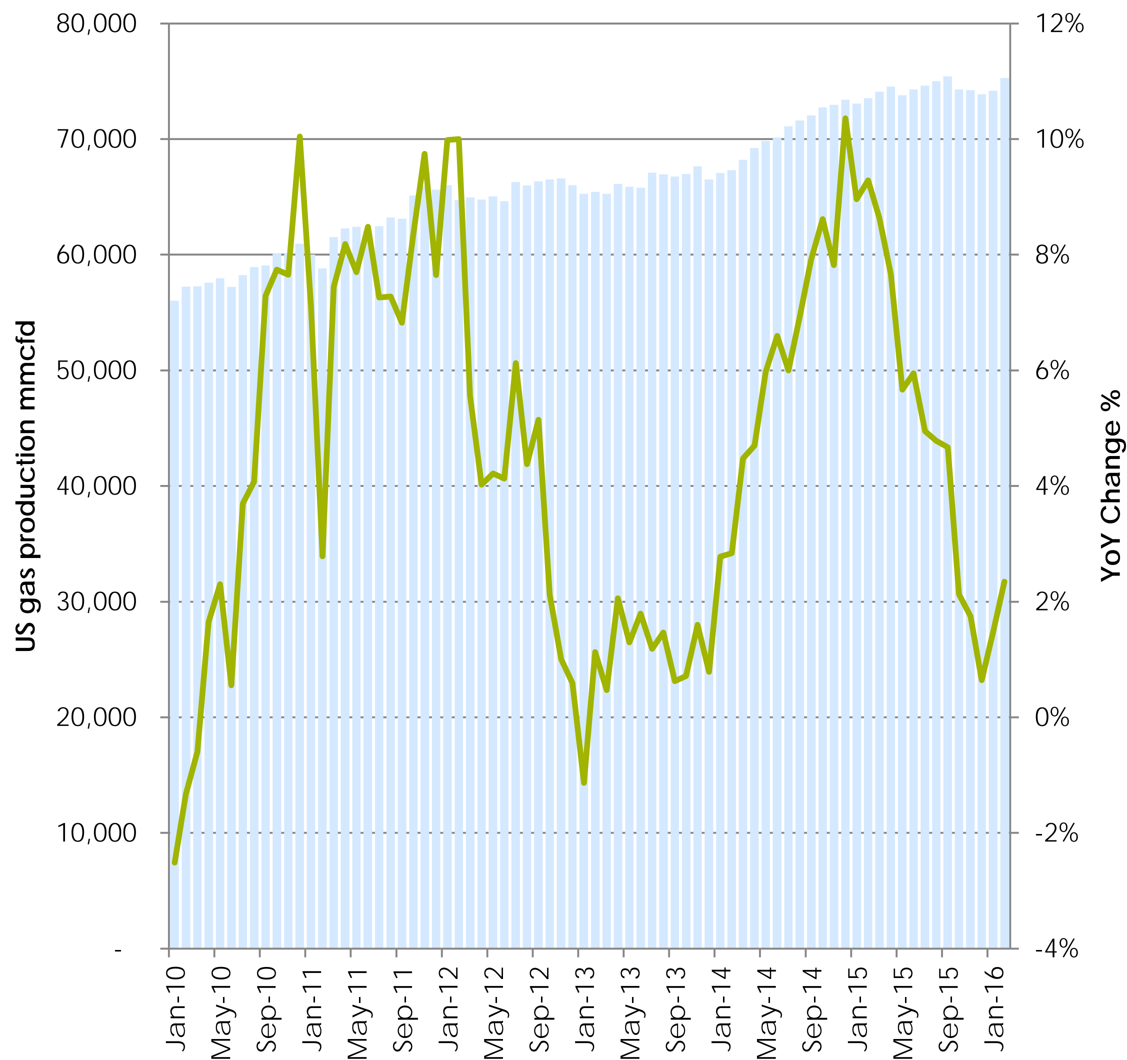
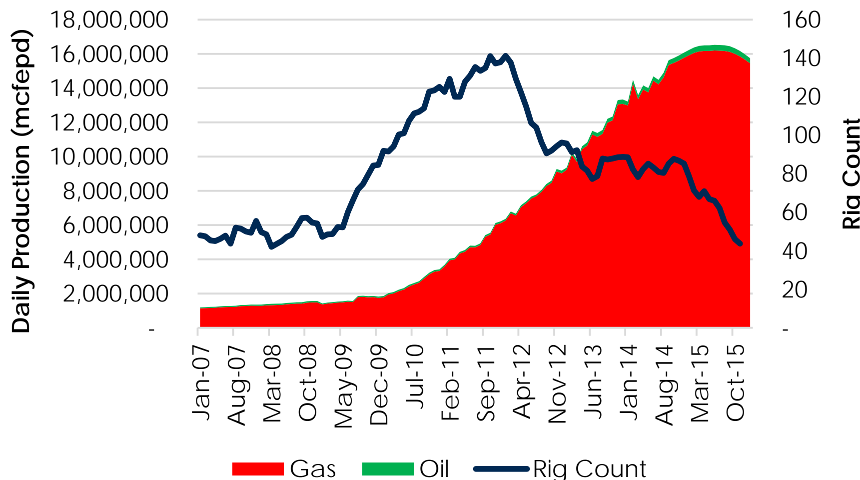
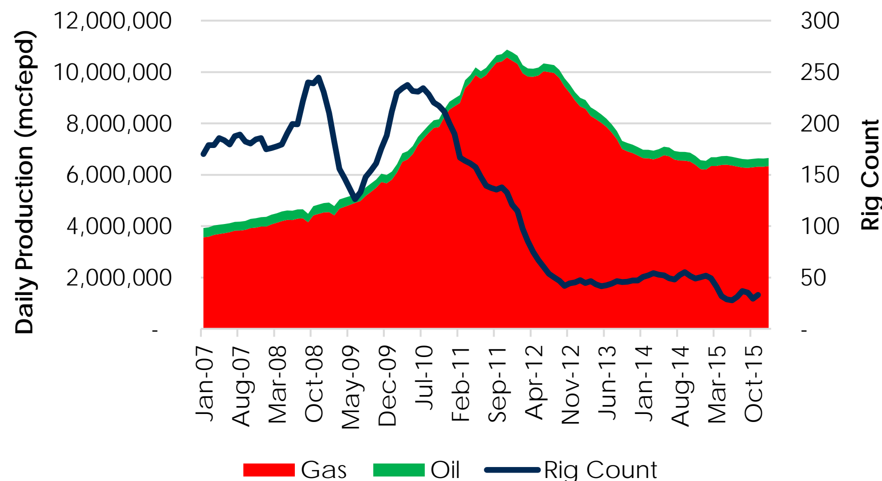
But Supply Has Remained Immune to this Drop

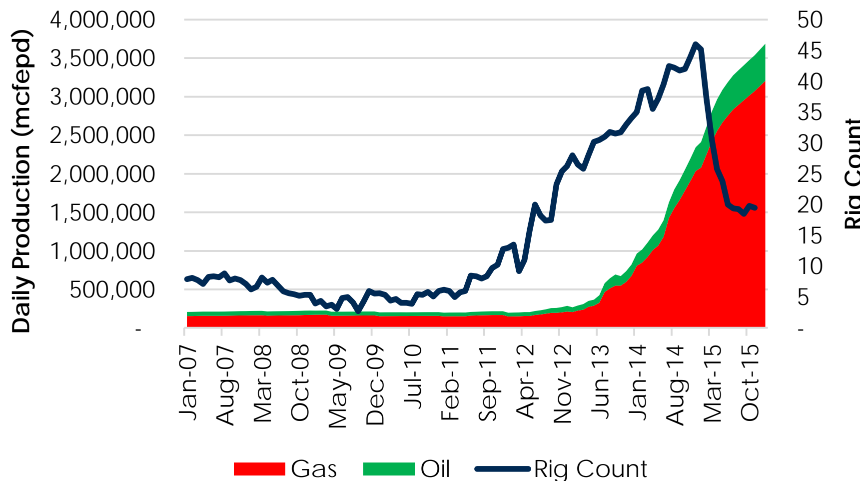
- Industry observers (including Kimmeridge) have consistently been the proverbial boy who cried wolf with regard to US gas production.
- Despite a collapse in the rig count and a collapse in profitability, production has remained stubbornly high.
- Ultimately this appears to have been a result of drilled uncompleted wells and rig efficiency gains, but even these are hard to reconcile with the current volume strength.

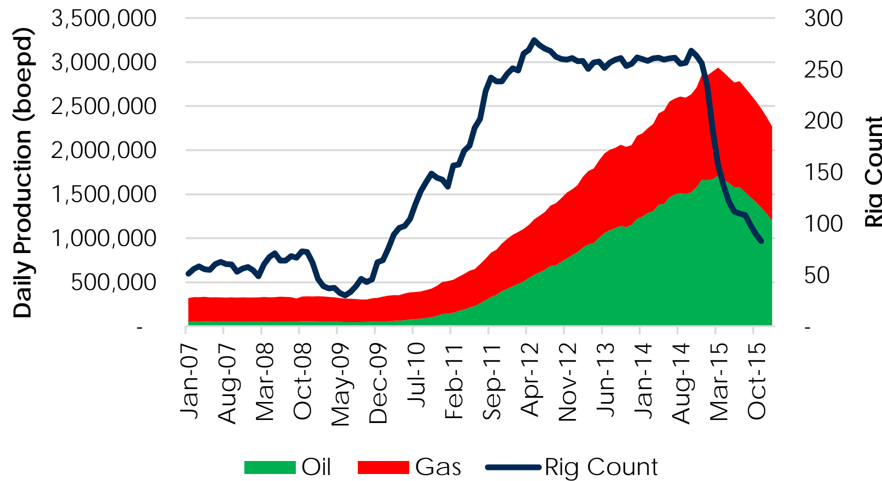


Breaking Down the Basin by Basin Numbers Highlights the Differing Area Trends



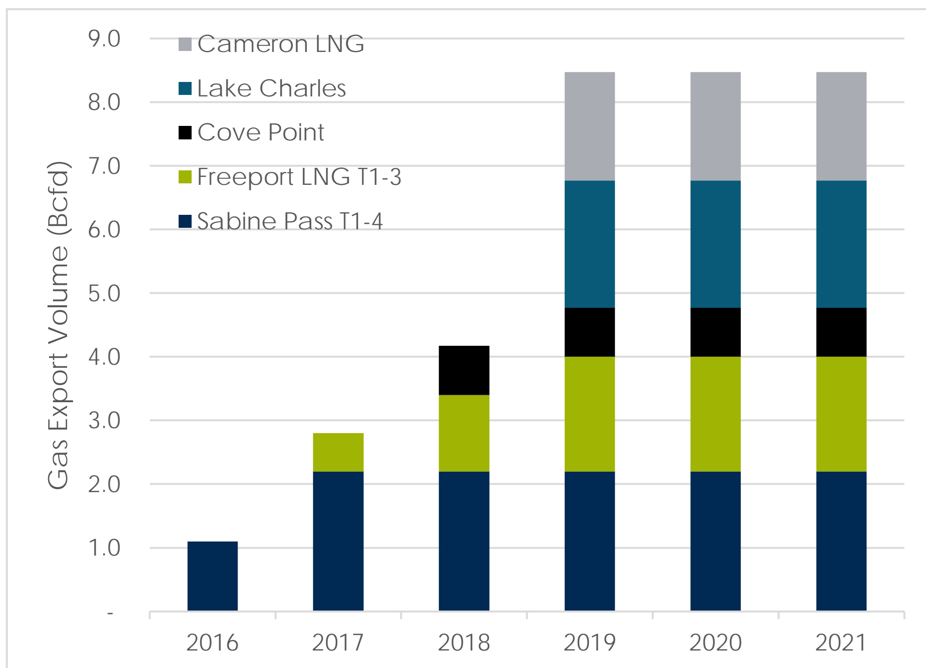


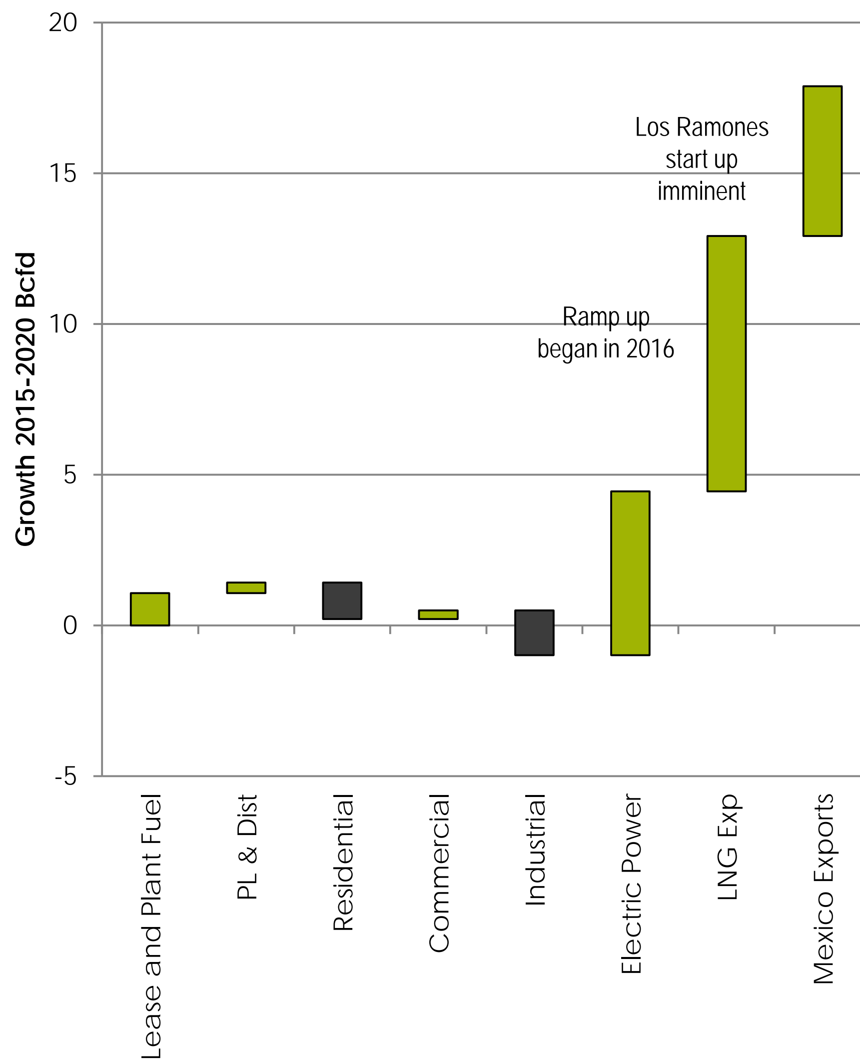




Demand for Gas Remains Robust and is Set to Grow Strongly

- Despite inventories being high, the amount of slack in the gas market is small if demand continues to grow and supply moderates. This drives the high level of volatility in the market.
- Based on contracted and under construction LNG volumes (8.5Bcfd), Mexico exports and growth in gas-fired power generation, total demand is expected to increase 17.8Bcf over the next five years (23%).





Summary and Conclusions

- With ROACE at trough levels, liquidity tightening and OPEC unable to balance domestic budgets at these commodity prices, there appears to be considerable support for higher future oil prices. Current data suggests that while OPEC is growing supply, it is being offset by declines in Nigeria, Venezuela, Mexico and critically the US. As such, spare capacity is actually tightening despite moderate demand growth.

- The potential for supply disruptions, especially in Venezuela, does not appear to have been factored into the market. As a result we believe there is moderate tail risk of a 40-50% move in crude upwards to $65/bbl.

- Demand is unlikely to be the driver of any recovery in the near to medium term. GDP dynamics remain weak, fiscal stimulus has to date been largely ineffective and the benefit of lapping lower pricing is fading. A slowdown in global growth remains the single biggest risk to crude prices.

- The same dynamics appear to exist in the gas market, with strong demand and flattening supply, although the market's ability to defy predictions has been unparalleled and conviction levels must be lower.

- In 1999-2001 energy rallied into a decelerating demand environment due to supply reductions and energy recovered from a 5.5% S&P weighting to 6.57% in 2000 and 10% in 2006. 2016 appears to be poised for a similar trajectory. **While no recovery is a straight line, a return to sub-$35/bbl appears unlikely, and Kimmeridge forecasts a continued recovery to the $50-60/bbl range ex a global recession.**

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