A Return to Higher Oil Prices Is Not Straight-Forward

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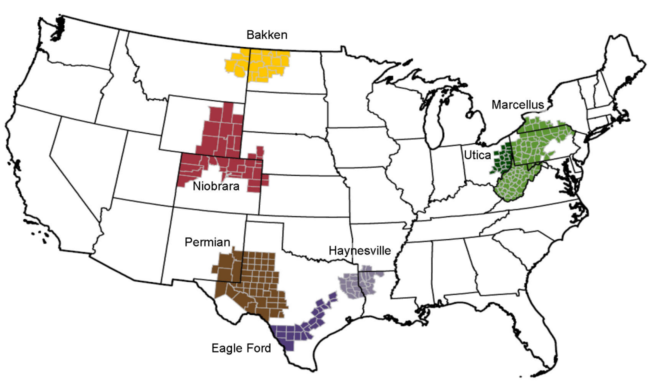
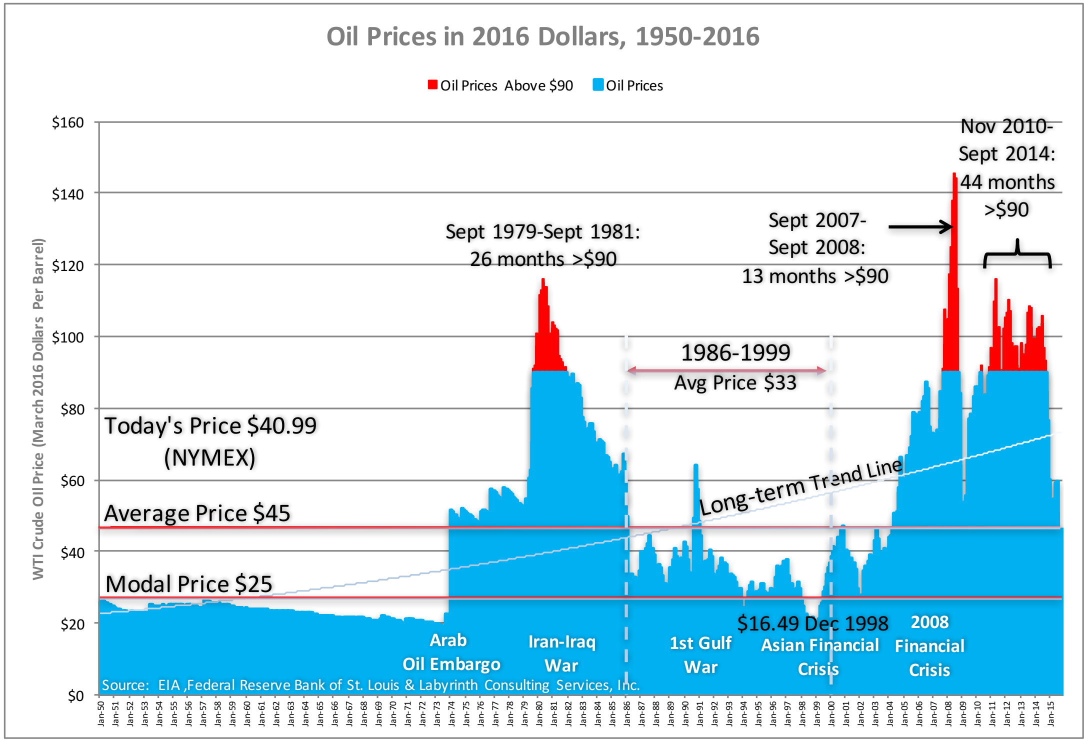
- We are in the third oil-price rally since prices collapsed in 2014.
- This rally is similar to the previous two but may end differently because of growing concern about supply from under-investment.
- The failure of the Doha production-freeze accord may signal that Saudi Arabia expects higher oil prices and is not willing to relent on its plan to keep prices low for as long as possible.
- The weak global economy may not be able to sustain much higher oil prices.
- Everyone's break-even price is higher than current prices including OPEC members.
- Because of a profoundly changed economy and associated monetary policies, we have crossed a boundary and a return to higher oil prices is not straight-forward.

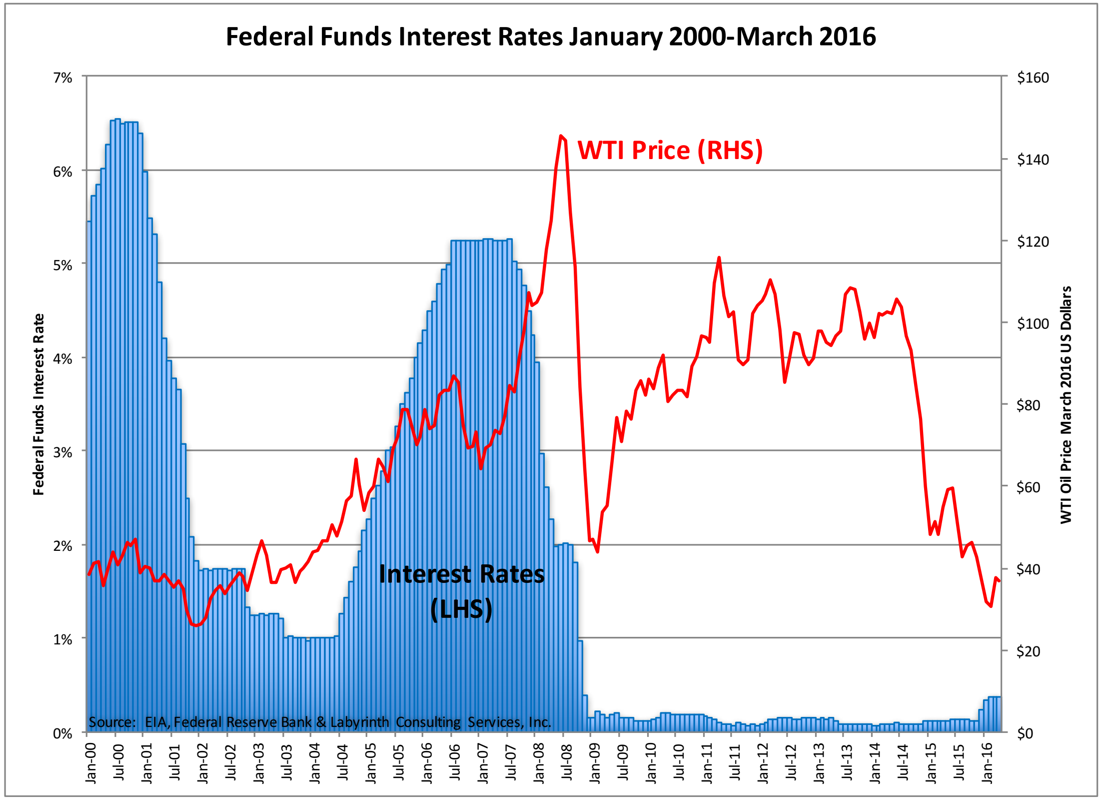


The Big Picture On Oil Prices



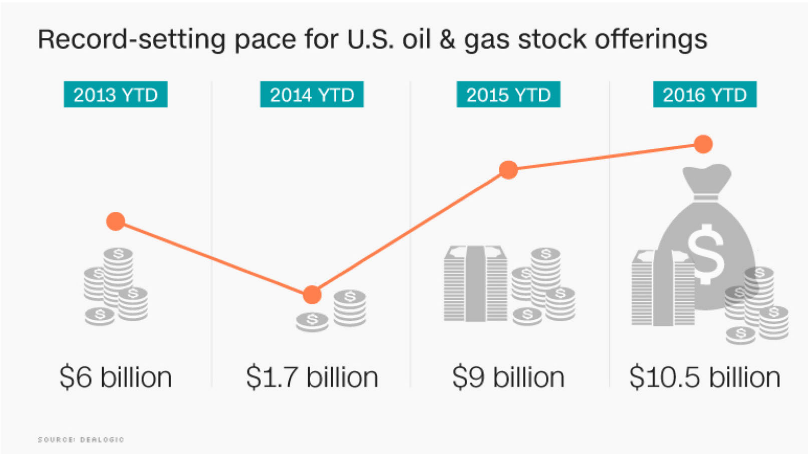
- Average oil price 1950-Present: $45 per barrel.
- Modal oil price: $25 per barrel.
- Present price: $40.99 per barrel.
- 1986-1999: $33 per barrel.
- The end of cheap oil in the 21st century led to financial dislocations and ultimately, the Financial Collapse of 2008.

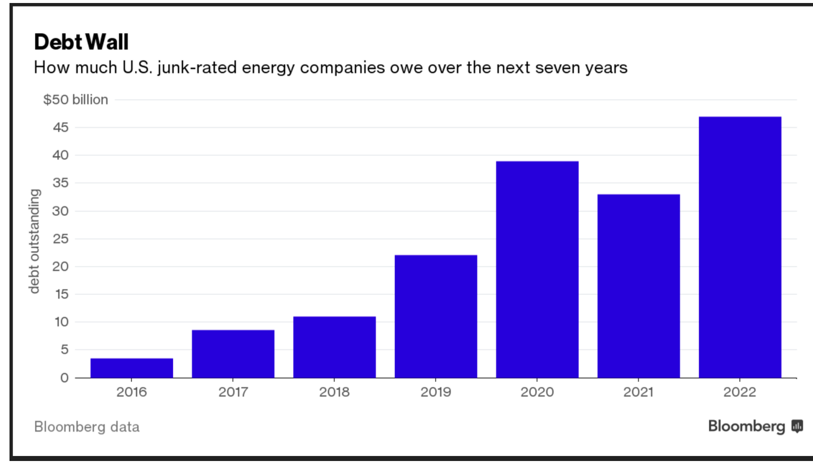
The Big Picture On Oil Prices: Monetary Policy



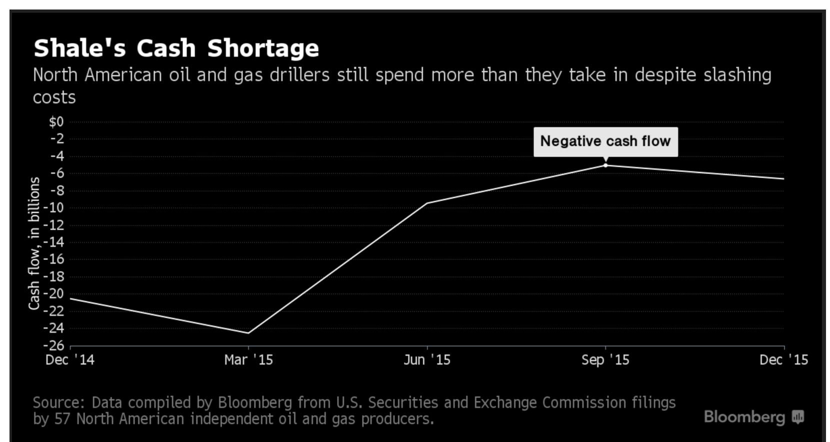
- Interest rates have been almost zero since the Financial Collapse.
- 8 years of zero-interest rate policy has distorted investments and the economy.
- Investors seek yield because traditional investments have almost none.
- U.S. E&P companies became the target.

The Big Picture On Oil Prices: E&P Debt

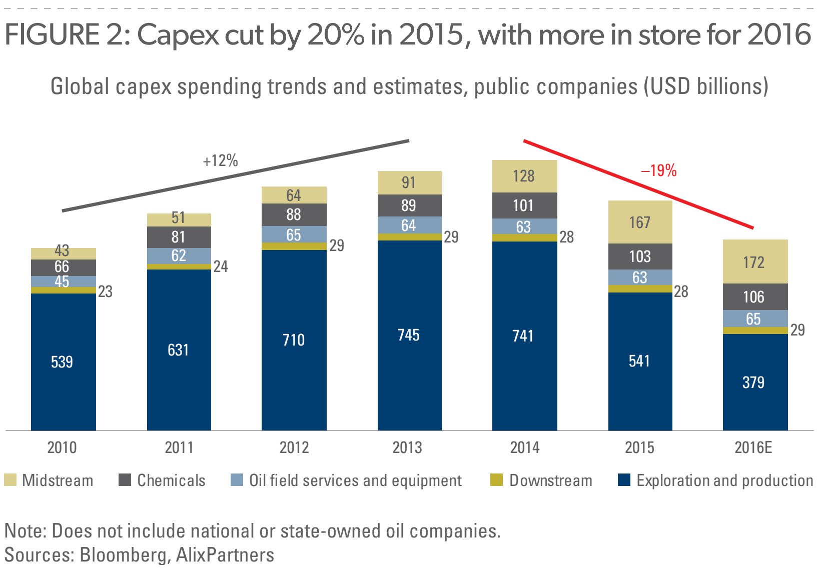


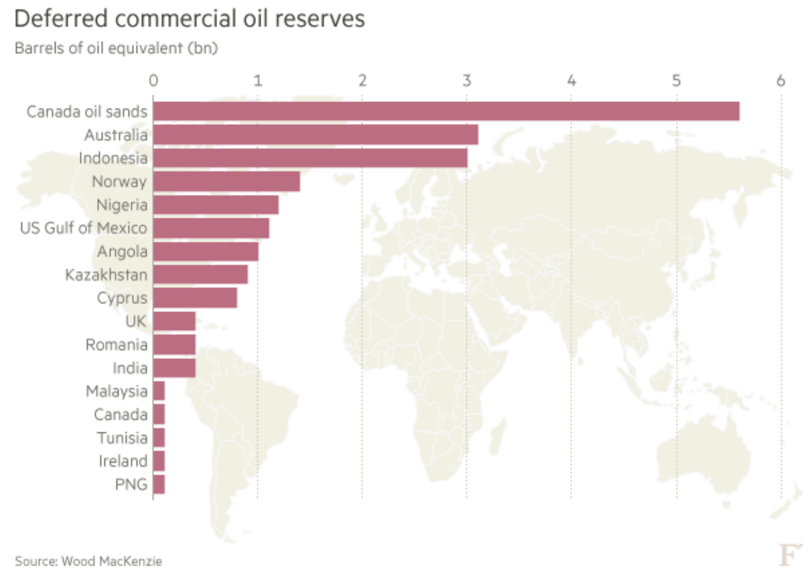


- Secondary share offerings in U.S. E&P companies are already higher YTD 2016 than in 2015.
- Pioneer $1.4 billion, Devon $1.3 billion.
- Investors are looking for the bottom.
- ~$140 billion in junk bond debt coming due over next 7 years.
- But companies are spending more than they earn from operations.



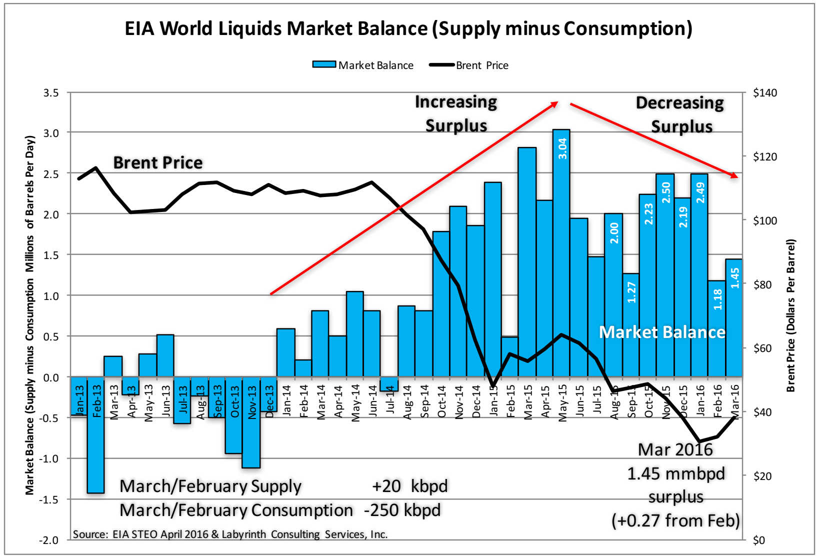
The Big Picture On Oil Prices: Under-Investment

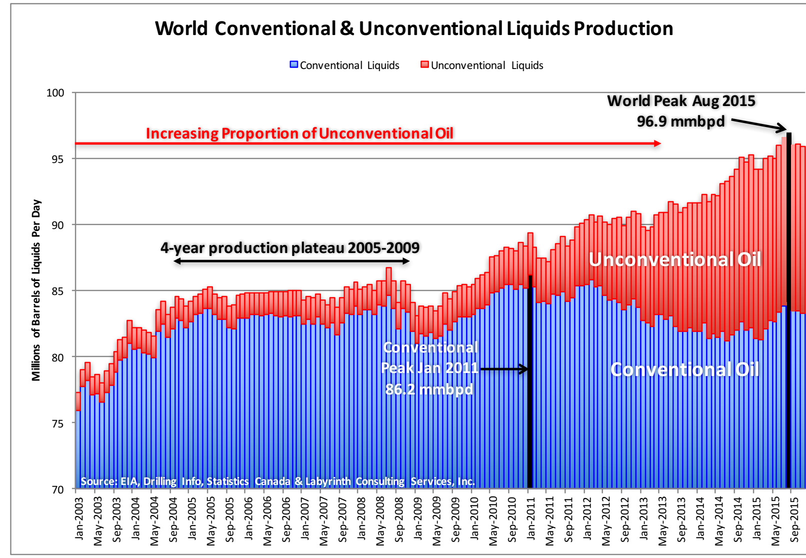




- Large reduction in E&P investment in 2015 and probably even greater in 2016.
- Deferred investments in 2015 equivalent to 20 billion barrels of reserves.
- Global E&P estimated capex for 2016 is 44% (-$412 billion) of 2014.
- A substantial supply deficit will result in the not-too-distant future.
- A price spike seems unavoidable.

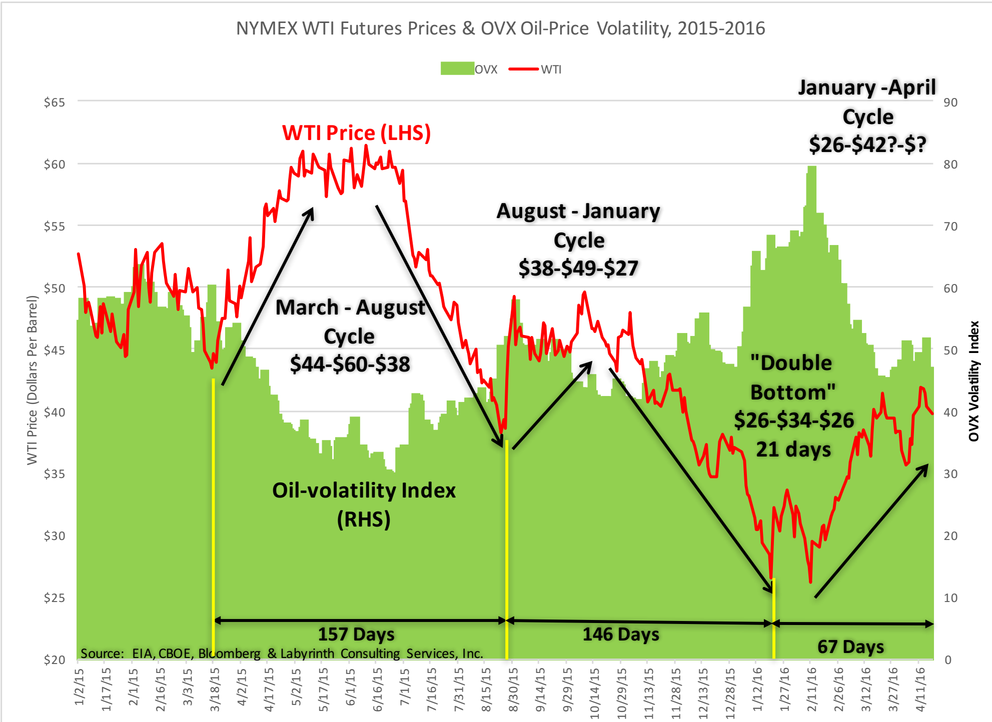
Global Market Balance and Tight Oil Over-Production





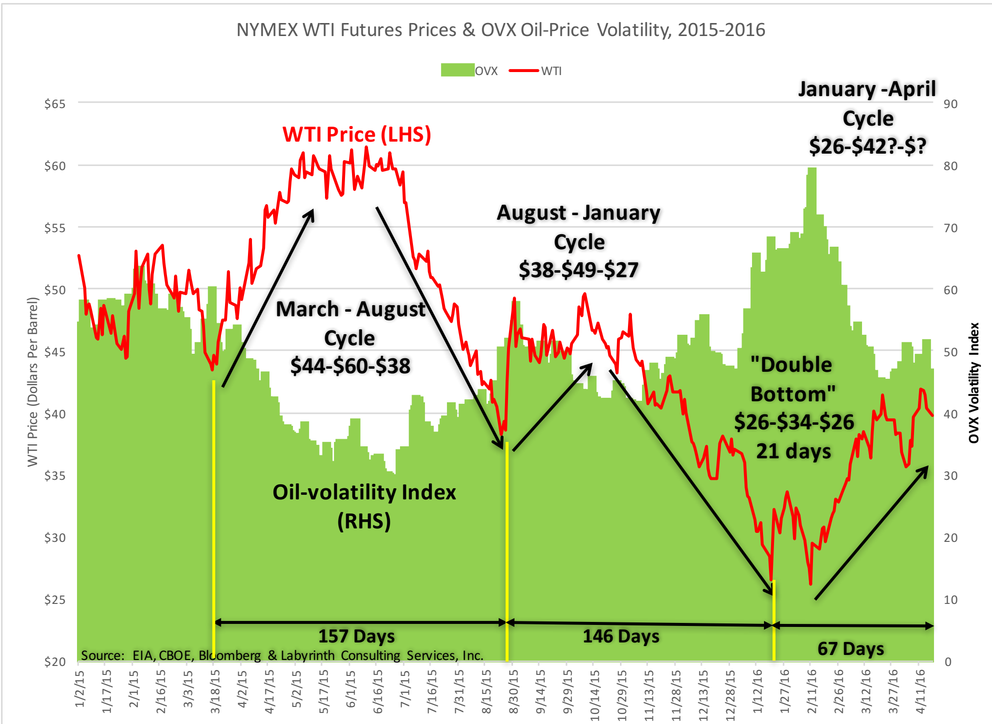
- Current global oil market is over-supplied by ~1.45 million barrels per day.
- The market is moving slowly toward balance.
- Production surplus increased to > 3 mmbpd by May 2015 & has declined since then.
- Supply has flattened but consumption has fallen.
- The origins of over-supply of oil and low oil prices are found, ironically, in increased scarcity of petroleum resources.
- Scarcer resources led to higher prices that permitted production of unconventional oil.
- Over-investment because of high prices and easy credit led to over-production, over-supply and lower oil prices.

Price Cycle Trends and Price Volatility



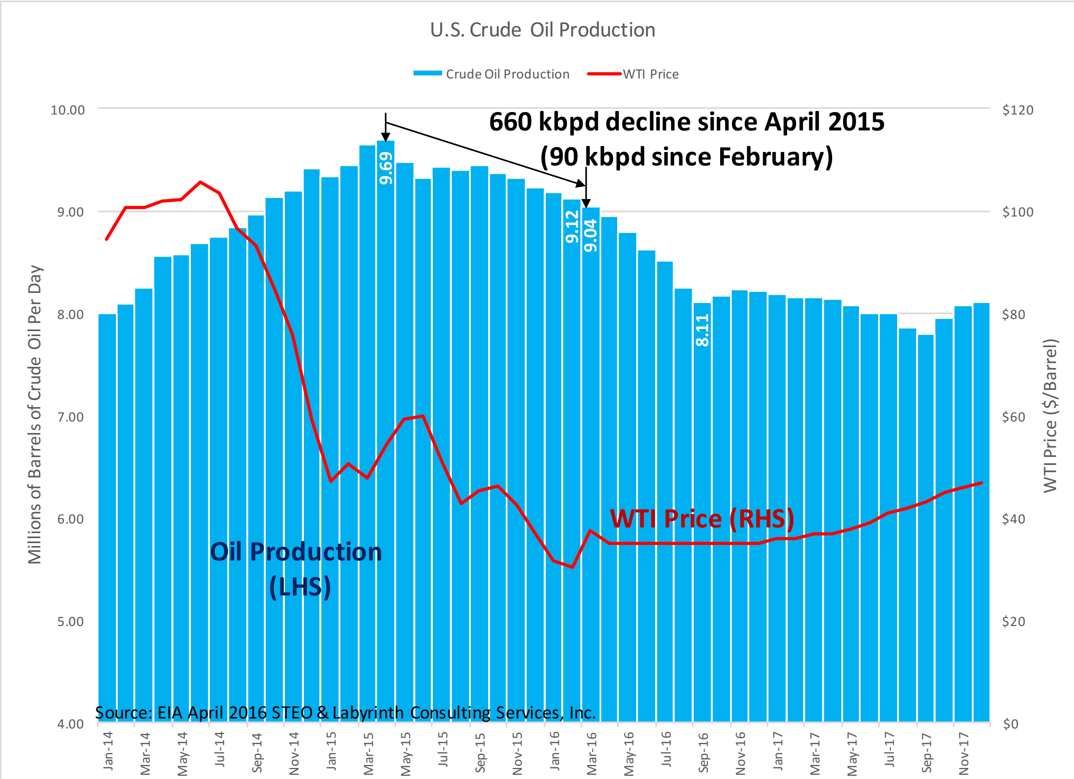
- Oil prices have increased from $26 to $42 per barrel during the current January–April price rally.
- This is based partly on hope for an OPEC-plus-Russia production freeze.
- There were two major price cycles in 2015: March-August ($44-$60-$38 per barrel) and August-January ($38-$49-$27 per barrel).
- The first was based on plunging U.S. rig counts and withdrawals from storage.
- The second was based on good economic news about China and U.S. storage withdrawals.
- Both of these cycles lasted approximately 150 days (5 months).
- Oil-price volatility was generally high at the beginnings and ends of the cycles and generally low during their peaks.

The Present Price Cycle



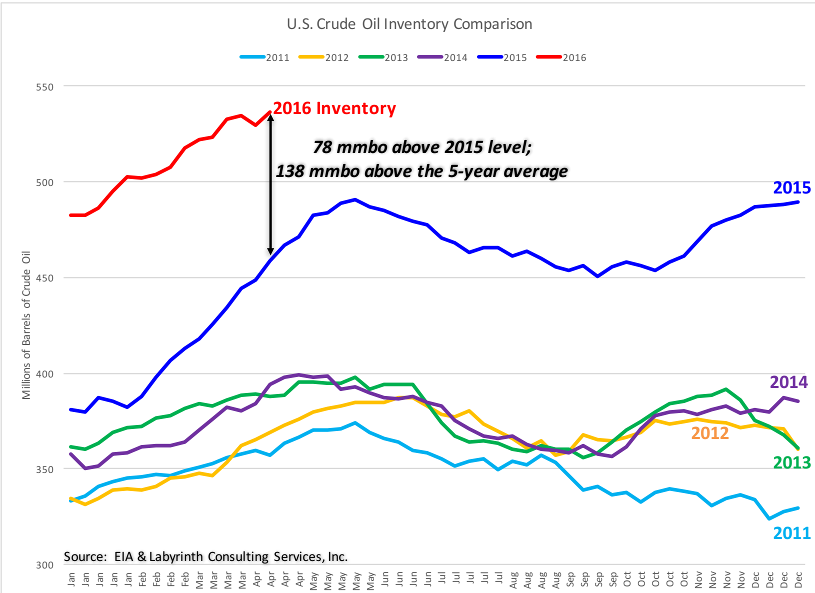
- Prices increased from $26.55 to $33.62 in late January and then dropped to $26.21 on February 11.
- This “double-bottom” pattern probably tested the low-price threshold for the greater oil-price collapse that began in June 2014.
- Prices increased to $41.45 on March 22 over a period of 40 days, then fell to $35.70 over the next 12 days before peaking at $41.97 on April 13.
- The $35.70 low probably tested a threshold.
- Prices are now fluctuating around $40.
- Volatility patterns generally are consistent with earlier cycles but it is too early to say how these are developing.
- The total duration of this cycle is 67 days so far.

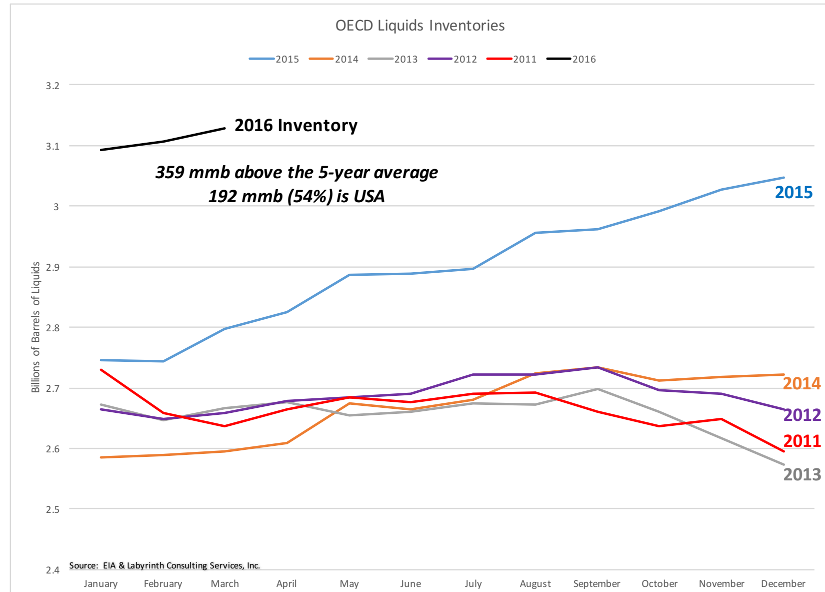
U.S. Production Decline



- March production fell to 9.04 million barrels per day, 90,000 barrels per day less than in February.
- 660,000 barrels per day less than peak production in April 2015.
- EIA forecasts that production will drop another 920,000 barrels per day by September 2016 for a total decline of 1.58 million barrels per day compared to April 2015.
- The rate of decline has increased from ~60,000 bpd/month to ~80-90,0000 bpd/month.

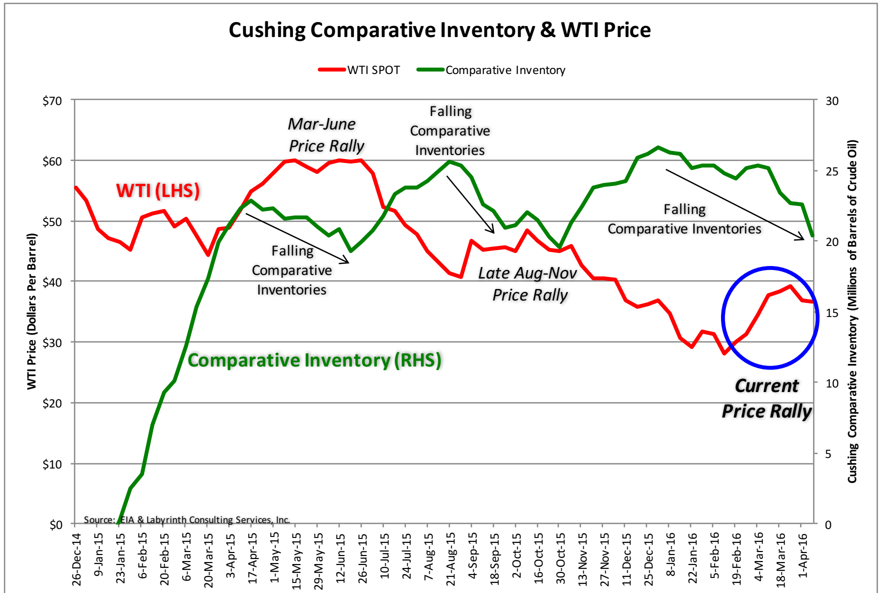
Inventories Remain An Obstacle To Price Recovery

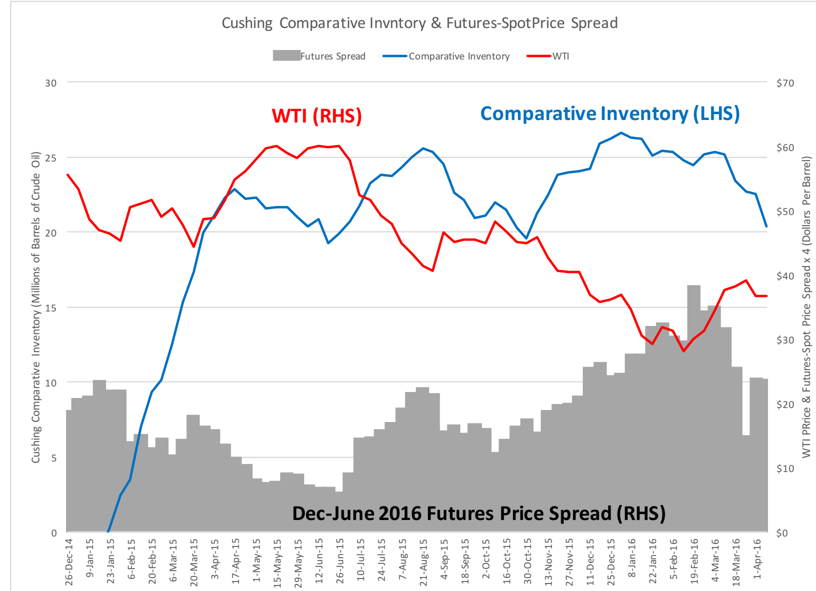




- U.S. stocks are near record high levels of 78 million barrels more than at this time in 2015 and 138 million barrels more than the 5-year average.
- OECD stocks are also at record levels of 3.13 billion barrels of liquids.
- That is 359 million barrels more than the 5-year average but 54% of those volumes are U.S. stocks.

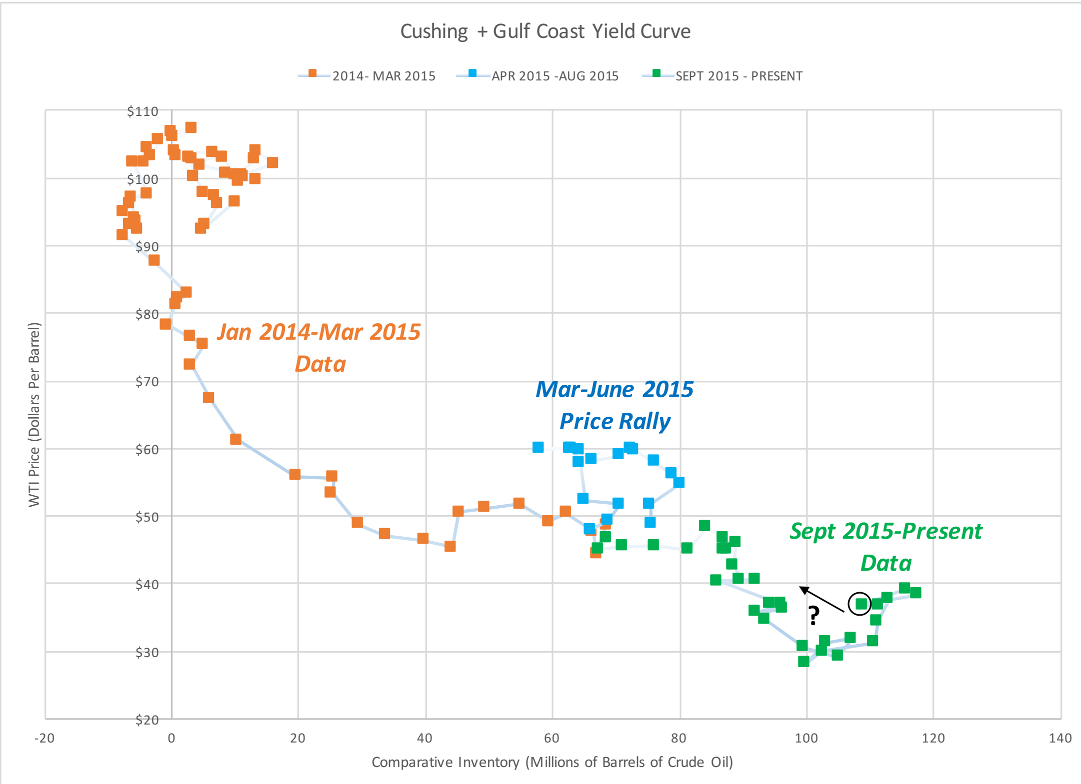
Comparative Inventories Are Falling





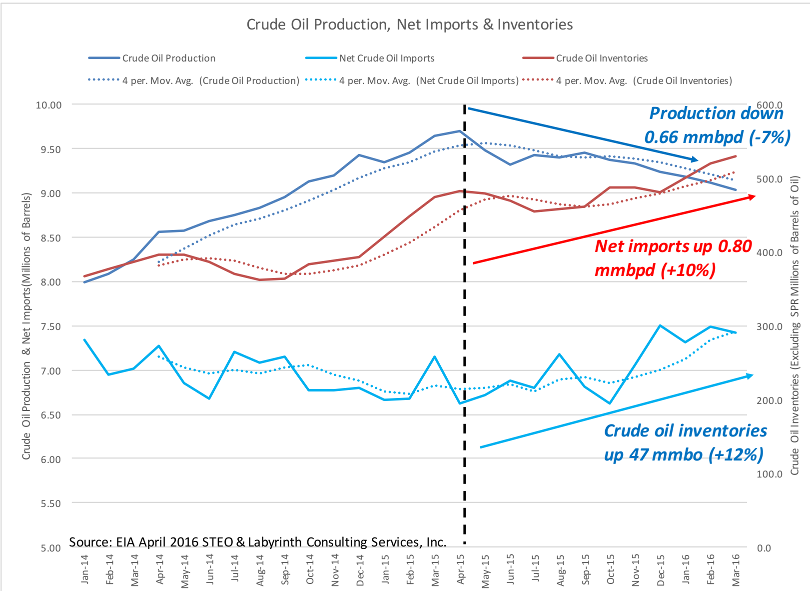
- Comparative inventory is determined by comparing current stocks with a moving average of stocks over the past 5 years.
- The two previous price cycles in 2015 were both characterized by falling comparative inventories. When C.I. patterns reversed, prices fell.
- The current price cycle shows strong C.I. decrease at Cushing.
- Front-to-back futures spreads typically fall with decreasing inventories because short-dated contracts gain value compared to longer-dated contracts.
- The past two cycles ended because producers increased drilling and production at higher prices.

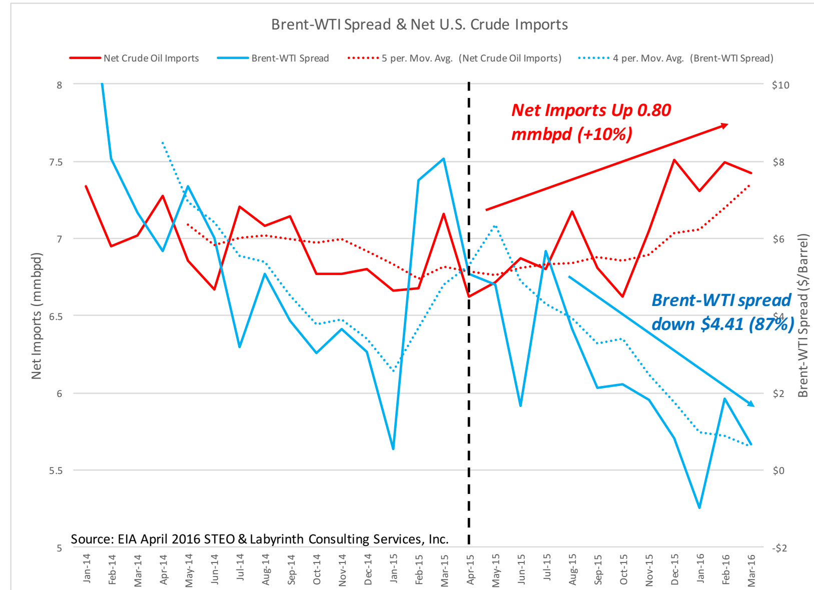
“Yield” Curves are Another Way To Understand Price-C.I. Trends



- A “yield” curve is a cross-plot of comparative inventory and spot oil price.
- This curve is for Cushing plus Gulf Coast inventories (~70% of total U.S.).
- The pattern is inconclusive but hopeful.
- Prices increased despite increasing C.I. and now, C.I. is falling.
- This may signal longer-term market concern about supply.

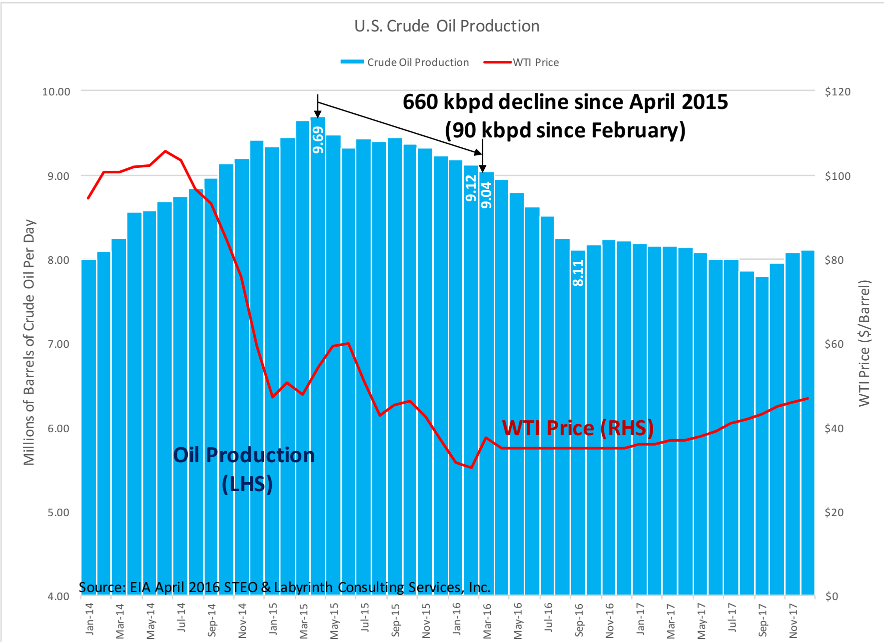
Inventory Growth Includes Imported Oil

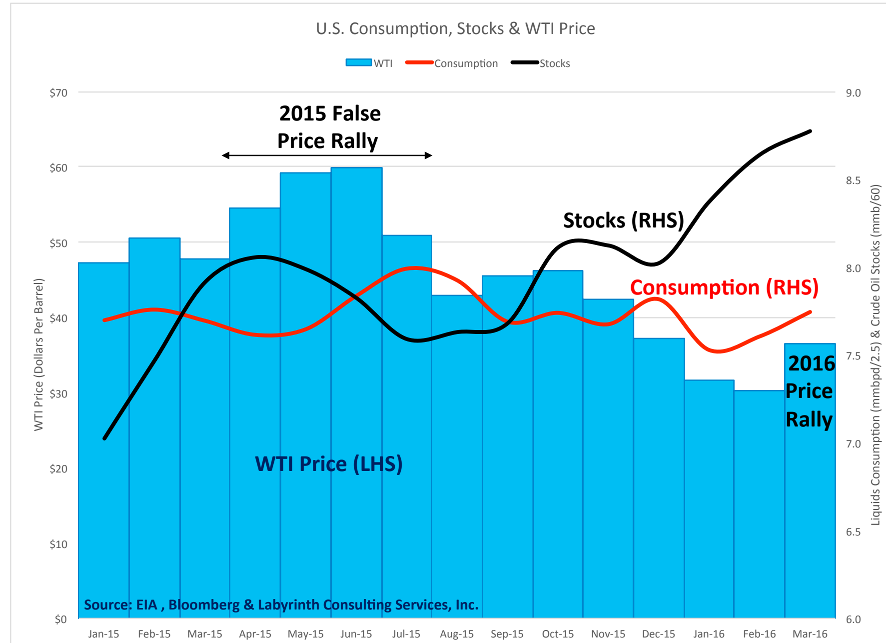




- U.S. inventory includes imported oil bought on arbitrage.
- As U.S. production declined after peaking in April 2015, net crude oil imports increased. U.S. inventories increased at the same time.
- There is a reasonable correlation between decreased Brent-WTI spreads and increased imports.
- Today's world economy is a casino.
- Crude oil is the most widely-trade commodity in the world and WTI is the most active market (2-3 times Brent in weekly volume).

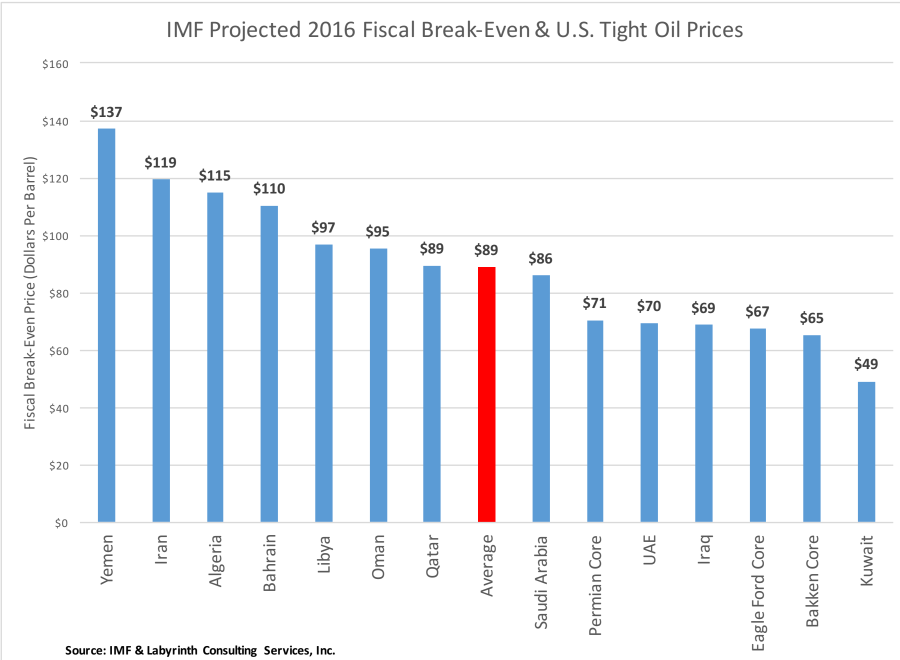
Crude Oil Inventories, Oil Consumption and WTI Prices: 2016 Price Rally





- In the current price rally, consumption has increased following record low prices from December 2015 through February 2016.
- Very high stock levels may be rolling over.
- Consistent production decline of ~70,000 barrels per month since September 2015.
- 90,000 barrel per day decline in March is largest monthly drop so far.
- During 2015 price rally, $15 per barrel (41%) price increase killed consumption.
- In current rally, peak price was almost $16 above baseline with greater percent increase (60%) than 2015.

A Perspective On Break-Even Prices



- There has been a lot talk about low- and high-cost producers since the oil-price collapse of 2014.
- IMF published fiscal break-even prices for OPEC in 2015.
- We have determined break-even prices for the core tight oil plays in the U.S.
- Everyone needs prices higher than today's to break even.
- Realistically, $70 per barrel is the minimum for the real low-cost producers.
- Most OPEC members need more than $80 to break even.
- U.S. tight oil plays look pretty good in this company!

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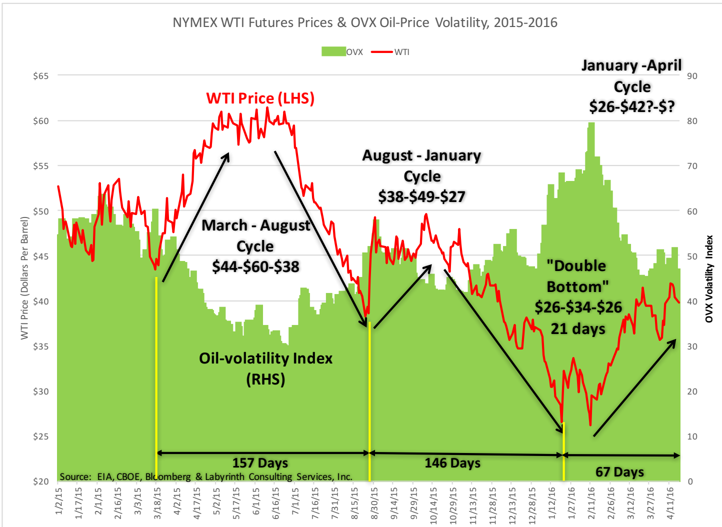

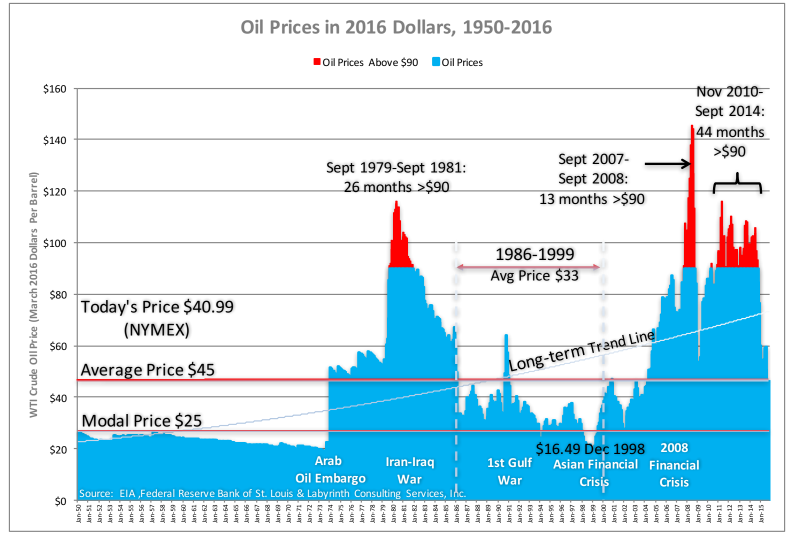

- The current price cycle may represent the beginning of an oil-price recovery.
- Comparative inventories are falling and stocks now include imported oil.
- Chart patterns suggest that a bottom may have been established at $26-$27 per barrel.
- A more recent threshold may have been tested at $36 per barrel. The fact that the Doha failure did not affect prices much is notable.
- Earlier price cycles in 2015 ended badly. Higher prices resulted in increased drilling and completion.
- Also, demand may have been range-bound because of a weak global economy.
- What may be different is concern about medium-term supply because of under-investment.
- There has been more progress toward market balance now but the global surplus is still 1.5 mmbpd.
- The likely path forward will be more price cycles but this time, with higher rather than lower ending prices.
- What is a reasonable price recovery level? History suggests $45 per barrel but everyone needs more now to break even.
- A weak global economy and weak oil demand are the biggest risks.