

MACROCOSM

## Oilmageddon: The Sequel

Thursday, January 15, 2015

Michael Warren and Donald Luskin

**Cheap oil is the new consensus. Supply and demand responses will surprise on the upside.**

We've been saying for almost four years that the global oil price would "mean-revert to where it's been for most of its 153-year history as an industrial commodity: in a range between \$15 and \$40 in today's dollars" (see most recently "[Oilmageddon](#)" December 16, 2014). Just \$5 from the top of that range earlier this week, it doesn't seem so crazy. Suddenly the consensus -- [led by Goldman Sachs](#) -- has gotten very bearish on oil.

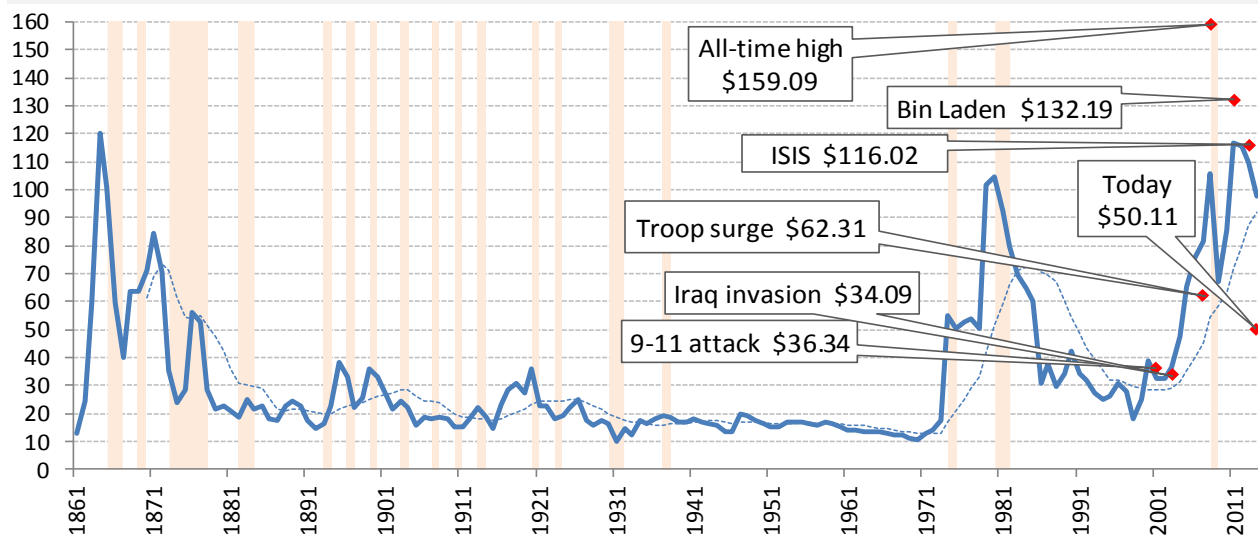
- *But our call for that \$15 to \$40 range is for the long-term, once pipeline transportation infrastructure in the US has improved, and hydraulic fracturing has had the time to go through a couple of technology learning-cycles like those that have slashed the price of semiconductors over the past half-century.*
- In the nearer-term, there will be feedback effects that stabilize the oil price, and induce a sharp correction upward. There will be strong responses to \$45 oil on both the demand side and the supply side. Consensus calls don't think about such feedback. They are based on *feedforward* -- that is, momentum -- and they tend to crop up after most of the move has already happened.
- Remember, [it was Goldman](#) that was calling in 2008 for a near-

### Meet Dr. Michael Warren



TrendMacro's new Houston-based Energy Strategist was formerly Sr. VP at Hart Energy, running the upstream research group. Previously he was National Manager in charge of Latin American research at Toyota, and Latin American strategist at Polyconomics. He earned his Ph.D. in Latin American political economy at Tulane. He served in the US Army in military intelligence, called to active duty during the Bosnia conflict and post-9/11.

— Real global oil price, annual average (today's USD) ... 10-yr average ♦ Key days ■ Recession



Source: BP, BLS, NBER, Bloomberg, TrendMacro calculations

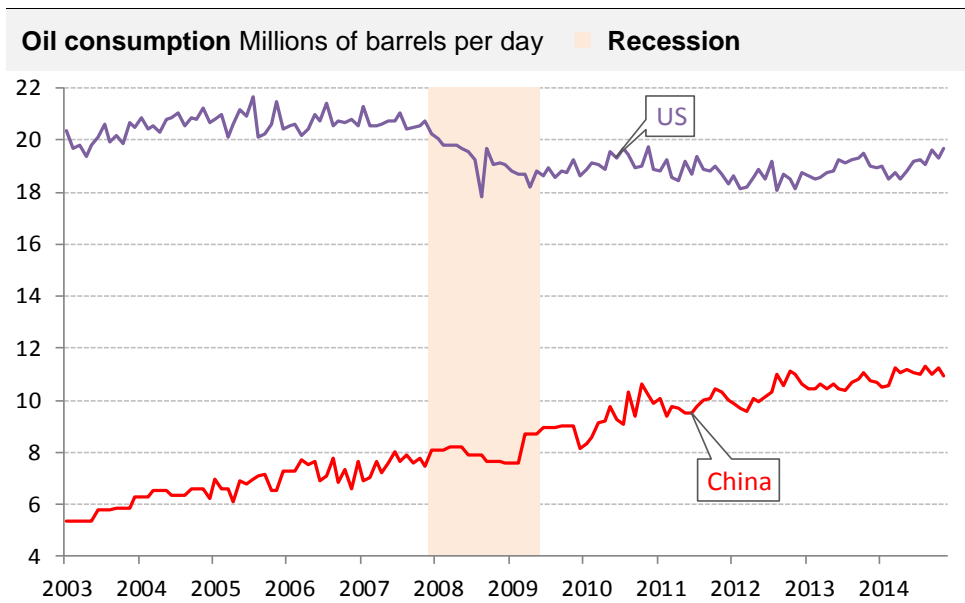
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term "super-spike" in oil to from \$150 to \$200. It got as far as \$147, which triggered a demand-reponse that threw the world into recession -- along with the Lehman failure, to be sure -- and drove the oil price sharply lower.

- Now, demand will rise -- it is already beginning to do so visibly in the US. And supply growth will fall -- that, too, is beginning to be seen in the US. We wouldn't be shocked to see oil trade at \$40 in this move, but we think we're about at the bottom right now.
- We think by the second half of 2015 oil prices will have stabilized in the \$50 to \$65 range, around the breakeven price of the more efficient shale producers. We wouldn't be surprised even by some temporary overshoot that could get briefly above \$80.
- Stocks in the battered energy sector have probably about seen the worst. But given the wholesale slashing of forward earnings expectations, they are panic speculations -- definitely not value plays, even if oil recovers somewhat as we expect. There will be consolidations, and there will be failures.

**THE DEMAND SIDE** Demand responses take time to develop, as individuals, businesses and governments adapt to a new regime of lower oil prices. After all, they have suffered over the last five difficult years in the global economy with the highest average inflation-adjusted oil prices in history (again, see the chart on the previous page).

- Demand in the US is already visibly increasing, to the best levels since the trough of the Great Recession -- even as consumers and businesses are now liberated to spend over \$220 billion a year on something other than gasoline (please see the chart below).



Source: EIA, NBER, TrendMacro calculations

- As yesterday's disappointing [US retail sales report](#) showed, it can take some time for consumers to figure out what else to buy.
- But a relatively more rapid effect is that when gasoline is cheaper,

**Update to strategic view**

**OIL, US MACRO, US RESOURCE STOCKS:**

The consensus is now centering on the very low oil prices we have been predicting all along. But this is a momentum-driven static view that ignores the supply-responses and demand-responses brought forth by a new price regime. Hidden in yesterday's seemingly awful retail sales numbers, increasing oil demand is already materializing in the US and China. At today's prices, uneconomic hydraulic fracturing operations will be run off, with average US production growth slowing to 400,000 barrels per day, below consensus expectations for 700,000, and flattening in 2016. Energy stocks have probably seen the worst, perhaps panic plays here - - but the forward earnings outlook is so bleak, they are not deep value plays. Look for a wave of consolidations -- and some failures -- in the energy sector. We think oil is now below the bottom of its core 2015 range of \$50 to \$65. As demand increases and production slowdowns start showing up in the data, don't rule out an abrupt change in psychology that could put oil briefly back into the \$80's.

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people buy more of it. *More than half the drop in retail sales for December was in gasoline, but that was entirely a function of the falling price, as retail sales are measured in dollars spent. In units of gasoline -- gallons -- sales grew at a 27% annual rate in December, up 8% on the year, and almost touching all-time highs.*

- And [sales-weighted fuel economy data](#) point to Americans beginning to buy bigger vehicles in September 2014, once gasoline prices began to very visibly fall. The Corporate Average Fuel Economy (CAFE) for the entire new sales fleet was 25.8 miles per gallon in August, but has fallen to 25.1 miles per gallon by December. [Reportedly](#) the [Detroit's North American Auto Show](#) beginning this week is heavily featuring more powerful and luxurious cars.
- *Hint: when Americans buy more powerful and luxurious cars, they are willing to commute more. When they are willing to commute more, they are willing to buy new homes.*
- China imported 7.15 million barrels/day in December, an all-time high. Total consumption has been hovering at all-time highs, continuing a great secular uptrend (again, please see the chart on the previous page).
- One special source of Chinese demand is increased storage. The government is looking to state-owned enterprises to add commercial oil storage to help the country maintain a 90-day supply of petroleum. Our calculations point to 236,000/day of capacity under construction. Given the lower prices, buying opportunities are clear. [Reportedly](#), commercial storage capacity will lift demand by 150,000 barrels/day above previous expectations. And the government will expand China's Strategic Petroleum Reserve for a third time from 2016 to 2018.

**THE SUPPLY SIDE:** OPEC is faced for the first time with having to manage abundance. Now there is competition from new oil extraction technologies that flourish under the umbrella of high prices made possible by the cartel's outmoded program of scarcity-management. OPEC's -- primarily Saudi Arabia's -- response has been to retain market share at all costs, by closing that price-umbrella and pressuring higher-cost producers. [As Saudi Oil Minister Ali Naimi put it](#), "We want to tell the world that high efficiency producing countries are the ones that deserve market share."

- Saudi wants the highest price that it can obtain for a barrel of oil, and its cost of production is probably in the mid-teens. *What OPEC members are looking for is a reduction in US oil production growth, which should occur around the third quarter of 2015 and have a positive impact on prices. US operators can achieve a reduction in production growth in 2015 by just cutting back on new wells -- that is, by cutting capital expenditures and reducing rig count -- because existing unconventional wells have steep decline curves. This is already happening to a very visible degree* (please see on the following page).
- While oil prices began their decline from \$90 in October, the impact on rig count had to wait a quarter as 2014 CAPEX guidance was

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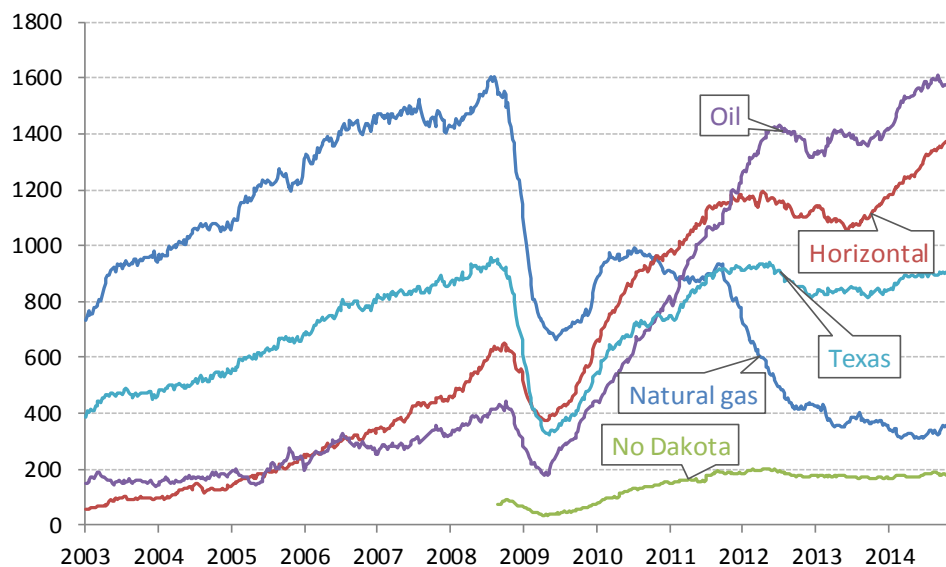
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## Rotary rig count



Source: Baker Hughes, TrendMacro calculations

mostly met by the majority of operators. Rig count, however, has fallen by 90 rigs in the first two weeks of January.

- The Saudis are also sending a message to other countries that are thinking about developing their own tight oil formations -- that is, shale. The technological revolution of horizontal drilling and hydraulic fracturing comes without borders, and many countries -- Argentina, Australia, Russia, and China -- have formations that are currently under development or could be tapped in the future. This message has been completely overlooked by market commentators.

To see how, when, and which factors of US production will slow, we have to understand the geologies, economics and histories of the various US plays. Each play will be affected differently by low oil prices with respect to rig count and production.

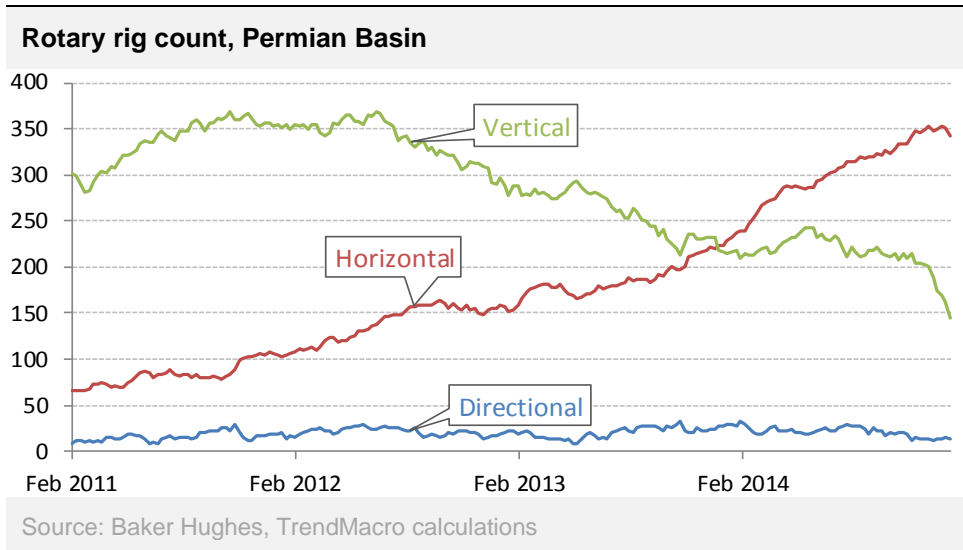
To begin, we should recognize that there are three distinct development phases that a play moves through: delineation, optimization and harvest (please see the table below).

Delineation	Optimization	Harvest
Tuscaloosa Marine shale	Utica	Bakken
Permian (several formations)	Mississippi Lime	Eagle Ford
Brown Dense	SCOOP (Ardmore)	Barnett
Monterey	STACK (Ardmore)	Haynesville
	Greater Green River (liquids)	Fayetteville
	Permian (Wolfcamp)	Marcellus
		Niobara (D-J Basin)
		Granite Wash

- Delineation is the period of capital expenditures and exploration with operators trying to locate the sweet spots in formations.
- Optimization is the period during which producers apply different completion techniques to extract as much of the resource as possible.
- The final stage, harvest, is when producers begin cutting costs and reach mass production of the play after infrastructure has been built out.

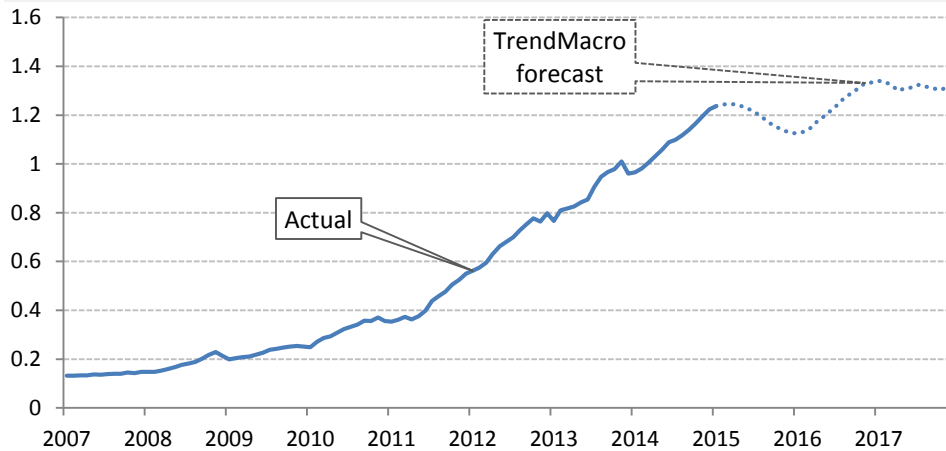
*Horizontal drilling and hydraulic fracturing is a manufacturing process -- not a traditional "gusher"-driven extraction process -- that requires a steady stream of new wells to be drilled to maintain production. When operators start pulling CAPEX and cutting back rigs, which has already begun to happen, then plays stop moving forward through the three phases, and production declines are inevitable even in the harvest plays.*

- Given that the Permian Basin has only one formation beyond the delineation phase -- the Wolfcamp -- we think the key trend to follow is reduction in uneconomical vertical rigs that occurs over the first half of the year (please see the chart below). In a richer CAPEX environment, we'd see an increase in more economical horizontal rigs.



- The Eagle Ford should also see a reduction in rigs -- especially those targeting oil windows -- that is, reservoirs that contain oil. That said, operators can push rigs south to target condensate and natural gas liquids (NGL) windows that have higher yields, or even further south to target natural gas windows, assuming Henry Hub prices recover. Either way, less oil will be targeted.
- *The only pure-play oil formation that is in the harvest phase is the Bakken. We think that this play will be the bellwether for how US operators will deal with a low price environment.*
- We have modeled Bakken production on a month-by-month basis to identify when production might roll over -- that is, produce less oil sequentially month-over-month.
- We forecast that Bakken production will roll over by mid-year and

**Bakken oil production** Millions of barrels per day



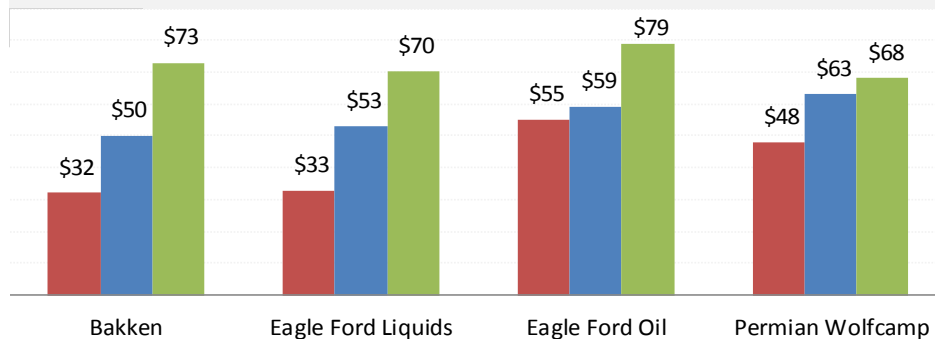
Source: EIA, TrendMacro calculations

start a decline that will level off somewhere around 1.1 million barrels per day by the first quarter of 2016, but recover to new highs in 2017 (please see the chart above).

Breakeven costs -- the oil price at which it is profitable to produce from a given play -- is the key factor in determining the volume of production. As you'd expect, we've see the sharpest pullbacks in rig count in plays and formations that have high breakeven costs. For example, Permian vertical rig counts fell the week of January 9, and there was a fairly dramatic pullback in Eagle Ford rigs in the northern part of the play. Bakken rig count also declined, but not as much, because its breakevens are more forgiving.

- Our breakeven price analysis of the major oil plays suggest is that the Eagle Ford condensate/NGL window will be able to withstand the lower oil prices better than most. Some operators there have lowered the half-cycle breakeven costs -- that is, marginal on-the-ground costs without respect to leasing, transportation, marketing or other ancillary costs -- to the mid-\$30 range. The majority of

**Half-cycle breakeven costs** ■ Low ■ Average ■ High



Source: TrendMacro calculations



operators in the Bakken should be able to live with lower oil prices as well. In the Permian Basin, the Midland Wolfcamp is the only formation where only a some operators appear relatively economic with oil below \$50 (please see the chart on the previous page).

- *But each company must be analyzed separately to ascertain full-cycle breakeven costs.* For example, some operators in the Bakken ship their oil via rail rather than pipeline, which adds \$6 to \$9 per barrel. Leasing costs can also impact economics. In some plays, new operators have driven leasing costs much higher than those enjoyed by legacy operators. Operators that kept leasing costs low, have access to pipeline infrastructure and low half-cycle breakeven costs at the wellhead can and will continue to produce in this low price environment.
- Many operators, however, cannot produce economically, so this year a wave of mergers and acquisitions will likely commence -- liquidating inefficient capacity and leveraging efficient capacity. Obviously, there will likely be some cases in which consolidation just isn't feasible -- some players will simply go under.

There are various wild-cards on the supply side.

- Iraqi production keeps rising, and a new agreement from the Kurdistan regional government could help increase oil exports despite Islamic State wreaking havoc in the area.
- Libya remains a failed state with various rebel groups holding key eastern and western oil export terminals. Pre-crisis production was 1.8 million barrels/day, compared to recent production at 1.2 million. So getting its house in order could add 600,000 barrels per day to the global market. On the other hand, rebel groups could close pipelines as they did last August, when the country effectively curtailed roughly a million barrels/day of exports.
- Nigerian production has been hampered by civil unrest and pipeline closures. Exports could be curtailed by up to 450,000 barrels/day as happened last June.
- Western sanctions could also affect supply from Iran. [Oil Minister Bijan Zanganeh has said](#) that Iran could double exports after sanctions were lifted, adding an additional 1.3 million barrels to the market.
- And as we have said many times, Russia is a very special geopolitical wildcard (again, see "[Oilmageddon](#)") -- a large oil-driven economy that is both controlled by a militarist adventurer and possesses nuclear weapons.

But setting aside those wildcards, and assuming that OPEC continues its *laissez faire* share-building strategy, then the reality is that US production will be the supply-driver for prices in 2015. We think that production won't come down year-on-year, but it will slow, and will appear to be getting ready to roll over until prices rise to meet breakeven costs or those costs get lowered by the inevitable march forward of technology and infrastructure.

- The [US Department of Energy Short Term Energy Outlook](#) estimates annual average production growth at 700,000 barrels per day in 2015 versus 2014, with average production coming at roughly 9.3 million versus 8.6 million for the year. That's already a slowing from 2014, in which the US added an average of 1.1 million barrels per day.
- *Our forecast is that average US production will only grow by 400,000 barrels per day in 2015 versus 2014, not 700,000. For the year, average production will be 9 million barrels, not 9.3 million.*
- *There is too much momentum from legacy production for overall production to actually roll over in 2015 -- that is, for there to be less production than in 2014.*
- Given the rapid pullback in drilling that we envision in 2015, a roll-over could happen in 2016. But even that is unlikely, given the long lead-times in offshore platforms that are coming on line. US oil production could be flat for 2016 and 2017.
- On the face of it, if there's any pick-up in global growth in response to lower oil prices, then market share would be captured by the lower-priced producers from the Middle East -- Iraq and Saudi Arabia. And we do expect growth -- driven by more abundant oil at lower prices for a given quantity.
- *But the OPEC members [who have budgeted](#) for oil at \$60 to \$160 in such a world will be disappointed. As prices test the upper end of the range we are expecting, each uptick brings another hydraulic fracturing rig back into service in the US. Thanks to new US technologies, oil has become an abundance-good. Prices can no longer be kept high by managing deliberate artificial scarcity. Now, as in any other market, higher prices will call forth greater supply, and equilibrium will be established at lower prices with greater output.*

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### Bottom line

The consensus is now centering on the very low oil prices we have been predicting all along. But this is a momentum-driven static view that ignores the supply-responses and demand-responses brought forth by a new price regime. Hidden in yesterday's seemingly awful retail sales numbers, increasing oil demand is already materializing in the US and China. At today's prices, uneconomic hydraulic fracturing operations will be run off, with average US production growth slowing to 400,000 barrels per day, below consensus expectations for 700,000, and flattening in 2016. Energy stocks have probably seen the worst, perhaps panic plays here -- but the forward earnings outlook is so bleak, they are not deep value plays. Look for a wave of consolidations -- and some failures -- in the energy sector. We think oil is now below the bottom of its core 2015 range of \$50 to \$65. As demand increases and production slowdowns start showing up in the data, don't rule out an abrupt change in psychology that could put oil briefly back into the \$80's. ▶