Quarterly Energy Comment

By Bill O'Grady

December 15, 2017

The Market

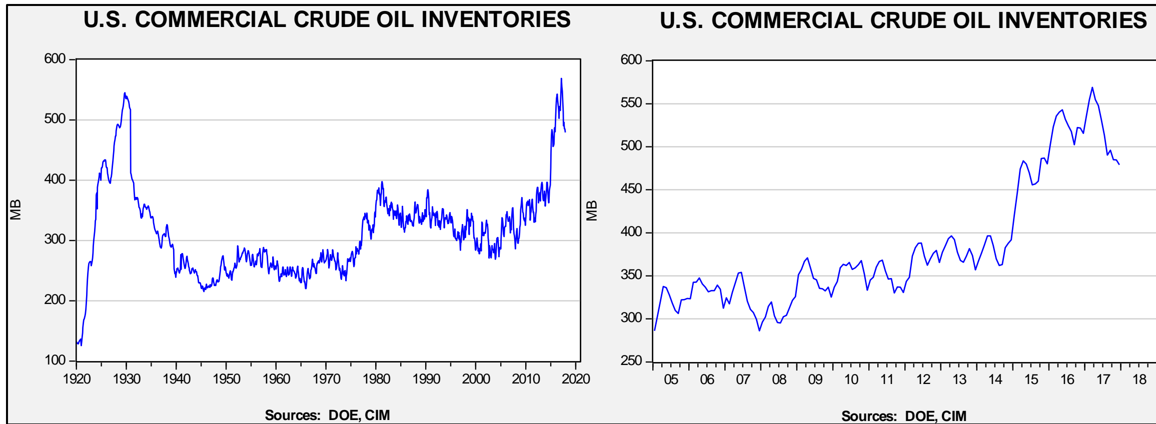
Oil prices have recovered strongly from the mid-summer lows. It appears we are establishing a new trading range between $55 and $60 per barrel.

(Source: Barchart.com)

This recovery was mostly caused by a steady decline in U.S. domestic crude oil inventories, a weak dollar and OPEC output discipline. We expect OPEC to maintain output restrictions until the Saudis price their partial IPO of Saudi Aramco sometime in 2018.

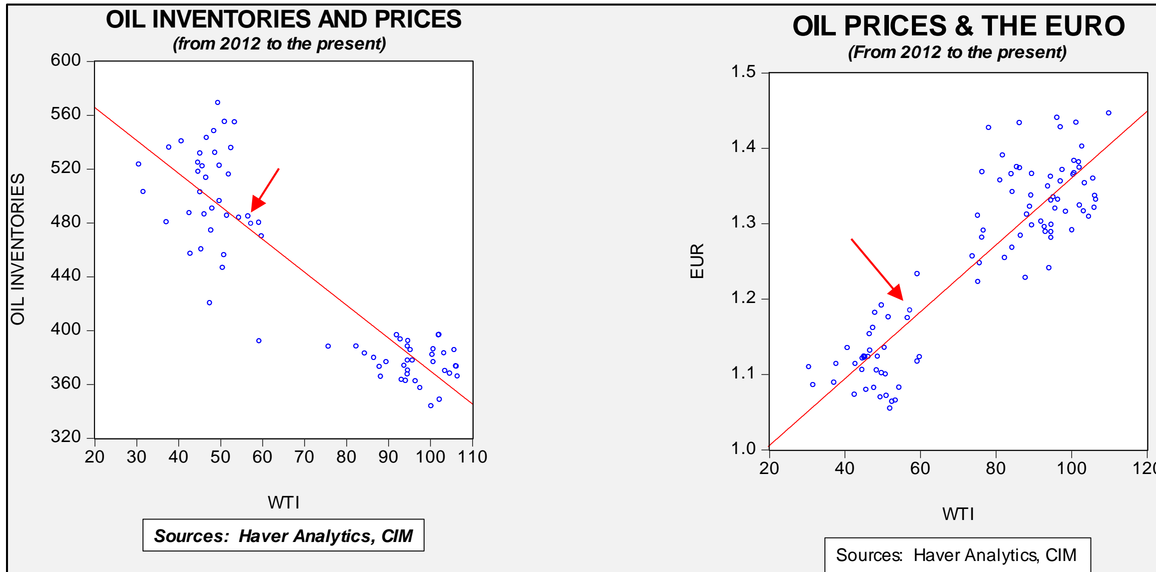
Prices and Inventories

Inventory levels remain elevated.



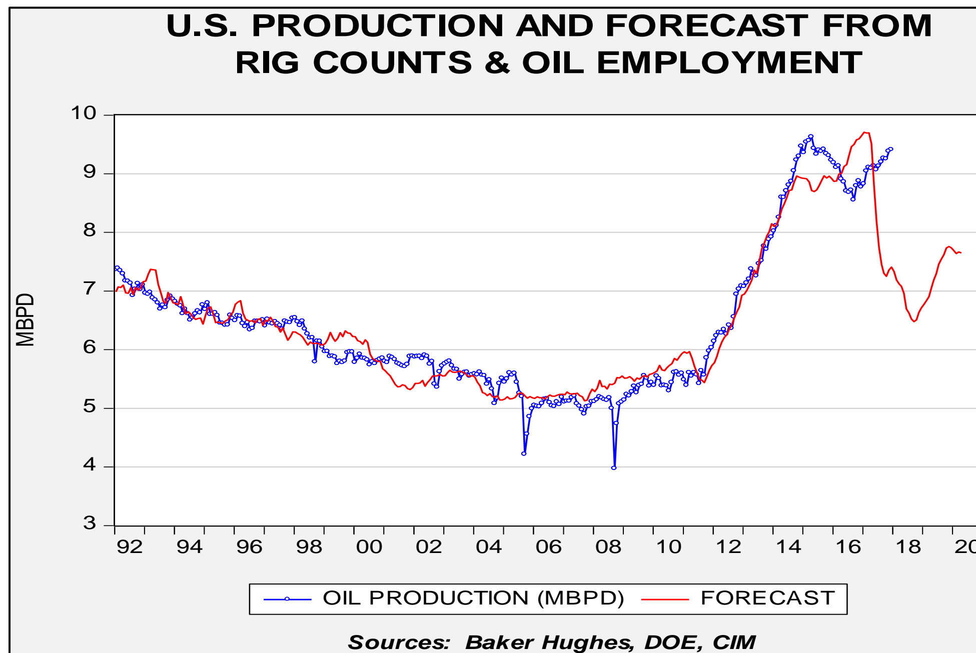
In the above charts, the one on the left shows the long-term inventory situation, while the chart on the right shows a 12-year history. Normal inventories would be below 400 mb, so stockpiles remain elevated. Inventories did decline under 500 mb in August and have continued to fall. It should be noted that 32.4 mb has been sold out of the Strategic Petroleum Reserve since early March, meaning the inventory overhang has been declining even faster than the commercial crude oil inventory charts above would indicate.

Since 2012, oil prices have closely tracked the dollar and U.S. commercial crude oil inventories.



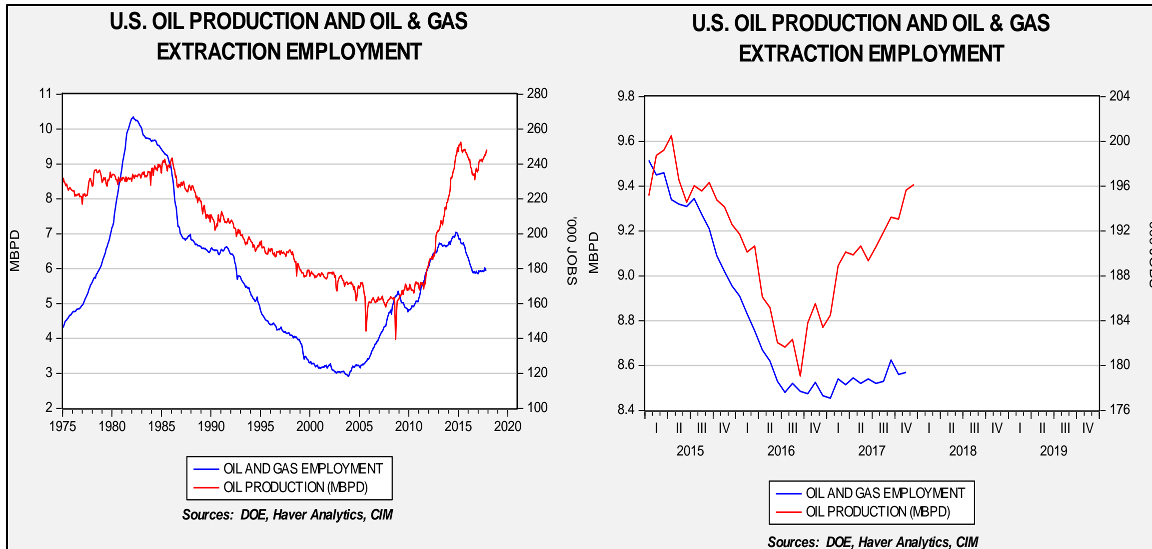
Our model that evaluates oil prices based on the euro and oil inventories suggests a fair value of $62.38. Oil inventories alone generate a fair value of $58.52, while the euro generates a fair value of $64.67. We tend to rely on the combined model for price guidance and it suggests oil prices are modestly undervalued.

Production
U.S. oil production continues to recover.

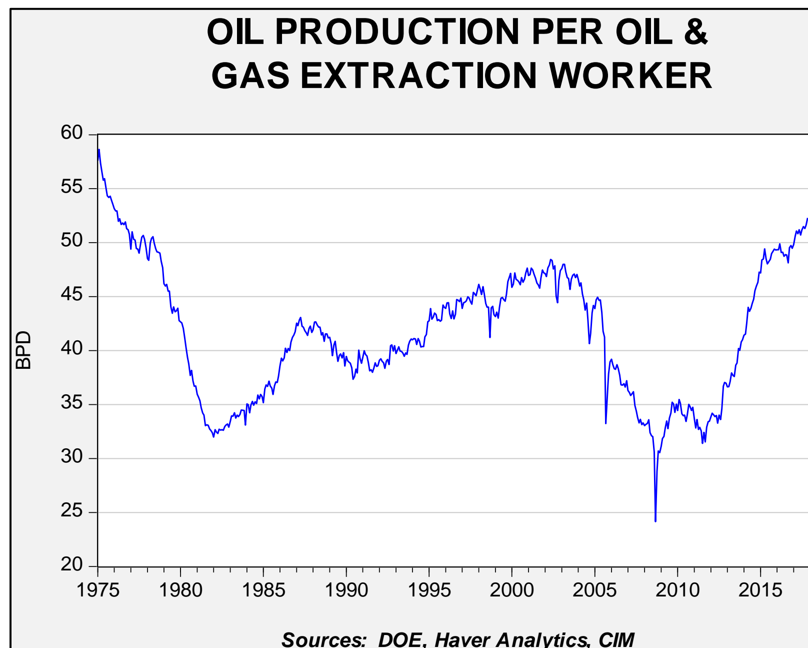


This chart shows oil production and our forecast model that uses rig counts and oil service employment as independent variables. Our model exhibits long lags and is signaling that a major decline in output is looming. However, the advent of shale production has changed the usual relationship between rigs and output. U.S. oil production has become much more coincident to prices, meaning that output tends to react much more quickly than before. This factor tends to make the U.S. more of a swing producer and complicates OPEC's output policy. Simply put, if the cartel is successful in raising prices, the U.S. can react quickly to take market share; in the past, the reaction time was longer which gave OPEC a chance to improve its revenue when it reduced output, lifting prices. Now, American shale producers can react quickly and effectively take advantage of OPEC's production cuts.

Perhaps the most interesting development is the sharp rise in productivity in the oil industry. The chart below shows U.S. oil production and employment in oil and gas extraction, with the chart on the left showing the relationship from 1975 to the present and the right-hand chart since 2015. In general, oil production tended to track employment in the industry. However, note that since mid-2016, oil production has increased by 0.8 mbpd with a very small increase in employment.



Oil production per worker has been steadily rising since 2011.



Before fracking began it took an increasing number of workers to maintain output. But, by 2011, production per worker began to climb and is now approaching levels not seen since the mid-1970s, when the industry was just past its early 1970s peak production. Although there is concern in the industry about slowing output, in general, productivity is impressive.

Oil Summary

We view the current market as fairly valued. Although we expect prices for WTI to work their way higher, the rally since mid-summer has eliminated most of the undervaluation seen earlier this year. For prices to move higher, the dollar must weaken further or oil

inventories must continue to decline. Seasonally, oil stockpiles tend to rise in Q1 so we would anticipate a period of weakness in the early parts of 2018. On the other hand, we do expect OPEC to maintain its output discipline next year or at least until the Saudi Aramco IPO.

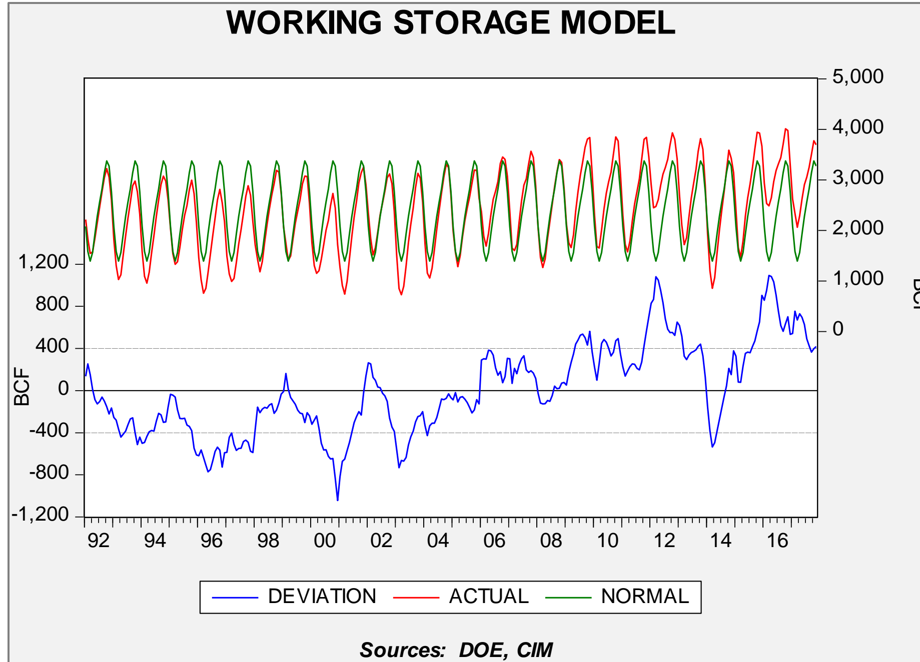
The longer term outlook is mixed. There is a growing possibility that nations will take more aggressive steps to reduce demand through electrification of the transportation sector and tax policy. At the same time, markets are ignoring the potential for a major geopolitical disruption. It's been 27 years since the 1991 Gulf War, when the world faced a supply shock brought by an event in the Middle East. The breakdown in geopolitical order in the region is likely to accelerate, and the likelihood of a supply disruption is rising. In our estimation, this potential disruption is not currently discounted in the market. We also note that recent developments in Saudi Arabia are significant; although reforms are certainly necessary, the potential for internal unrest in the kingdom is rising. Thus, energy assets should probably be held in diversified portfolios to protect from possible supply disruptions.

Natural Gas

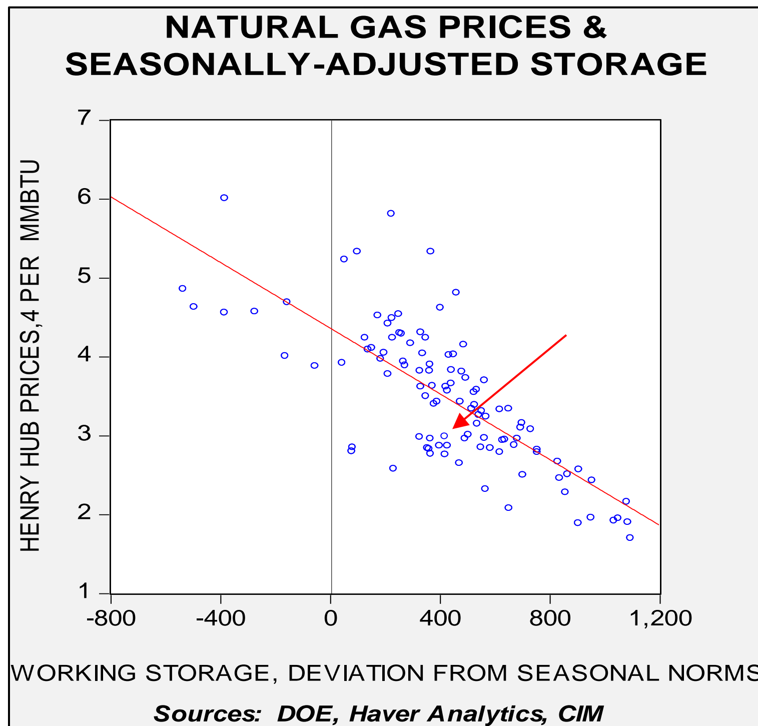
Natural gas prices have been rangebound since April, mostly holding between $3.20 per MMBTU to $2.80 per MMBTU.

(Source: Barchart.com)

This chart shows our working natural gas storage model. It seasonally adjusts the data to show how far inventory levels are deviating from normal. As the chart shows, storage remains elevated.



Prices are modestly undervalued at this point.



Natural gas prices are quite sensitive to temperature this time of year. Inventories usually decline 1.37 tcf from December through March, and this storage will tend to come out of working stocks regardless of weather. Thus, the lowest prices on record have occurred in January. At the same time, very cold weather will rapidly deplete stockpiles and push prices higher. Although the NOAA's winter forecast is rather mild, a short-term "Alberta

clipper" could boost prices in the short run. However, if winter does not fully reduce the current overhang, it will tend to weigh on natural gas prices in the coming months. For now, we have no strong opinions on natural gas prices but we will continue to monitor prices in the coming weeks.

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