



## Oil Markets: The Analytical Challenges

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**Bluford Putnam, Ph.D.**, Chief Economist at the CME Group, presented on commodity risk management at the J.P. Morgan Center for Commodities' international commodities symposium, which was held at the University of Colorado Denver Business School from August 10, 2017 through August 11, 2017.

Oil markets were easy to forecast and analyze in the 1950s and 1960s. The U.S. oil price slowly rose from \$2.50/barrel in 1950 to roughly \$3.50/barrel in early 1973, or roughly the equivalent of \$20-\$25/barrel at inflation-adjusted prices. Since late 1973, when the Organization of the Petroleum Exporting Countries (OPEC) first flexed its muscles, the oil price has been on a roller coaster ride. One does not just have to analyze the politics and economics of OPEC, there have been major resource discoveries, such as in the North Sea, as well as supply-side technological revolutions with hydraulic fracturing of shale oil, and now we are looking forward to demand-side technological disruption from electric vehicles.



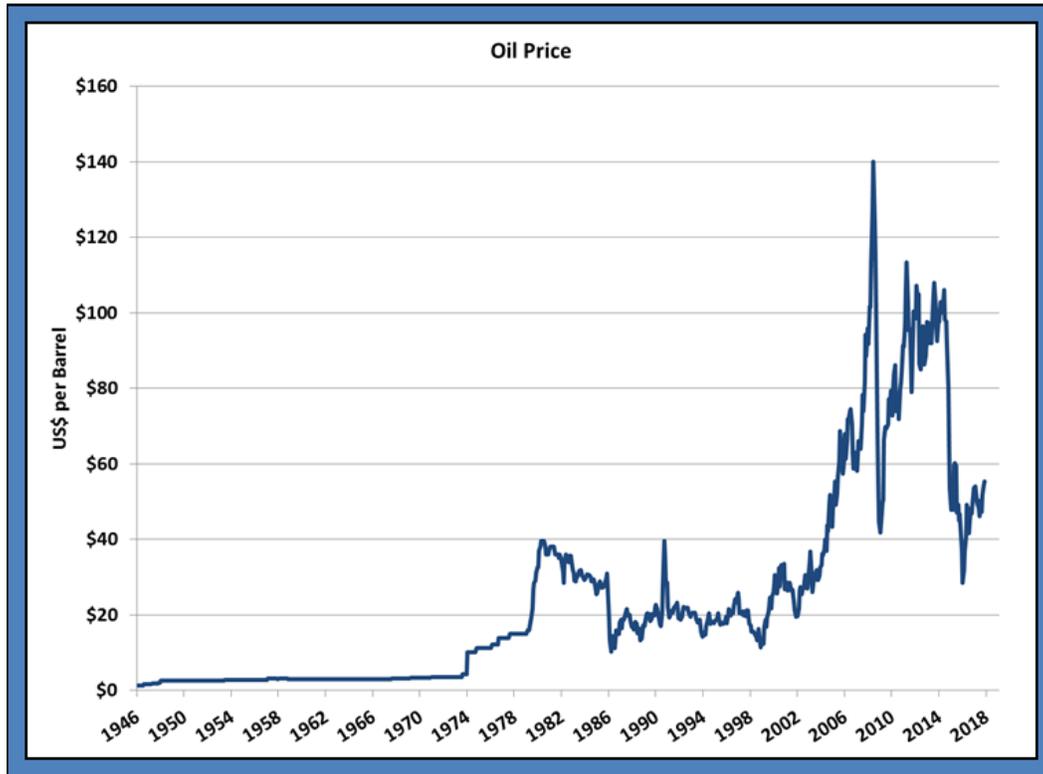
For those data-driven economists stuck in the world of fixed-parameter regression analysis, the inability to assume a stable political or technological environment is a major challenge, since the one thing that seems certain is that the supply-and-demand parameters are time-varying, and the parameter shifts seem to come in jumps and not in a steady pattern. Failure to use statistical techniques allowing for regime shifts can lead to estimates that unintentionally embed the view that the past is a useful predictor of oil market prices – which it is decidedly not.

For Wall Street analysts, the magnetic attraction is to extrapolate recent trends to grab media headlines. For example, back on May 21, 2008, *The New York Times* ran an article by Louise Story entitled: “An Oracle of Oil Predicts \$200-a-Barrel Crude”. Similarly, as oil prices were sliding in 2015 and into early 2016, Anjali Raval and David Sheppard writing in *The Financial Times* on January 11, 2016, reported on the research of some investment bank energy analysts with the title: “Oil prices to slide towards \$20 a barrel”. As it happened, oil prices peaked in June 2008 at \$139/barrel and hit bottom in February 2016 at \$27/barrel – both within a month of the sensationalist analysis.

Perhaps, the best analysis of long-term oil markets was provided back in 1984 by Charles Maurice and Charles Smithson in a classic and concise book, *The Doomsday Myth: 10,000 Years of Economic Crises*, published by the Hoover Institution Press. Instead of ignoring technology and politics, Maurice and Smithson focused on the long term and emphasized the ability of markets to create incentives for technological change and to win out over politics – eventually. For analysts and economists, though, the very long and variable time lags and uncertainties over the magnitude of the eventual technology and political responses present a continuing challenge and can make it difficult to resist the temptation to extrapolate the latest trend. Here, we take a concise look at the key long-term and short-term forces that may drive the oil price in 2018, and in the 2020s. We will start with long-term challenges, such as supply-side technology and demand-side technology, and then provide some cautionary comments related to the economic and political environment as of Q4/2017.



Figure 1



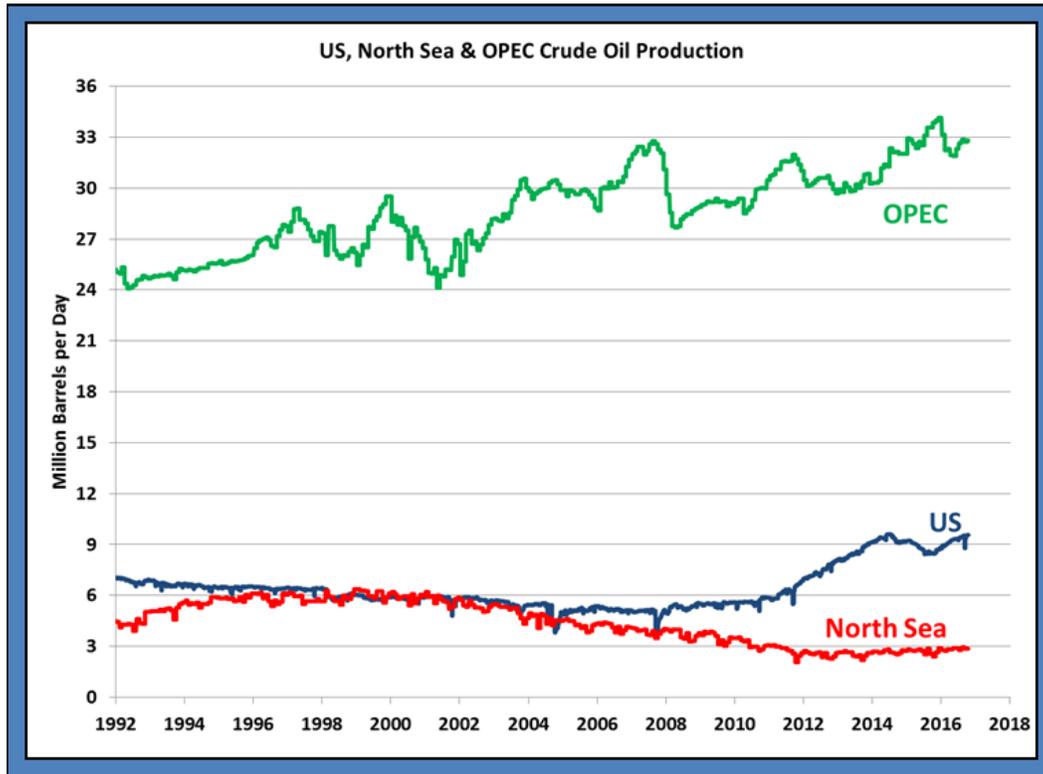
Source: MacroTrends, LLC – US WTI Crude Oil.  
 (<http://www.macrotrends.net/1369/crude-oil-price-history-chart>)

### Long-Term Supply Technology Themes

The key supply-side technological development is the U.S. shale oil revolution, which commenced before 2010 and has driven U.S. oil production from below 6 million barrels per day (mbd) to over nine million mbd currently, and headed for over 10 mbd in 2018 and beyond. What is often not appreciated is that shale oil technology is not a one-time event. The extraction technology continues to improve every year, driving the marginal cost of the next barrel of oil produced successively lower over time. Also worth noting is that the advances in supply-side oil extraction technology have largely not yet impacted traditional drilling, including in the North Sea. Indeed, the major change in the North Sea oil scene is that in the 2020s, safely decommissioning depleted oil wells will be a much bigger business than drilling new ones. From a production perspective, U.S. oil output is now three times larger than North Sea oil production and that gap is expected to continue expanding through the next decade, weakening Brent's role as even a regional benchmark. We also note that as Brazil liberalizes rules for international companies to drill offshore, there will be some powerful supply increases coming from the more efficient drillers compared to the costly, inefficient and formerly protected domestic oil company, which itself is now in a restructuring phase as it emerges from its scandal-plagued past.



Figure 2



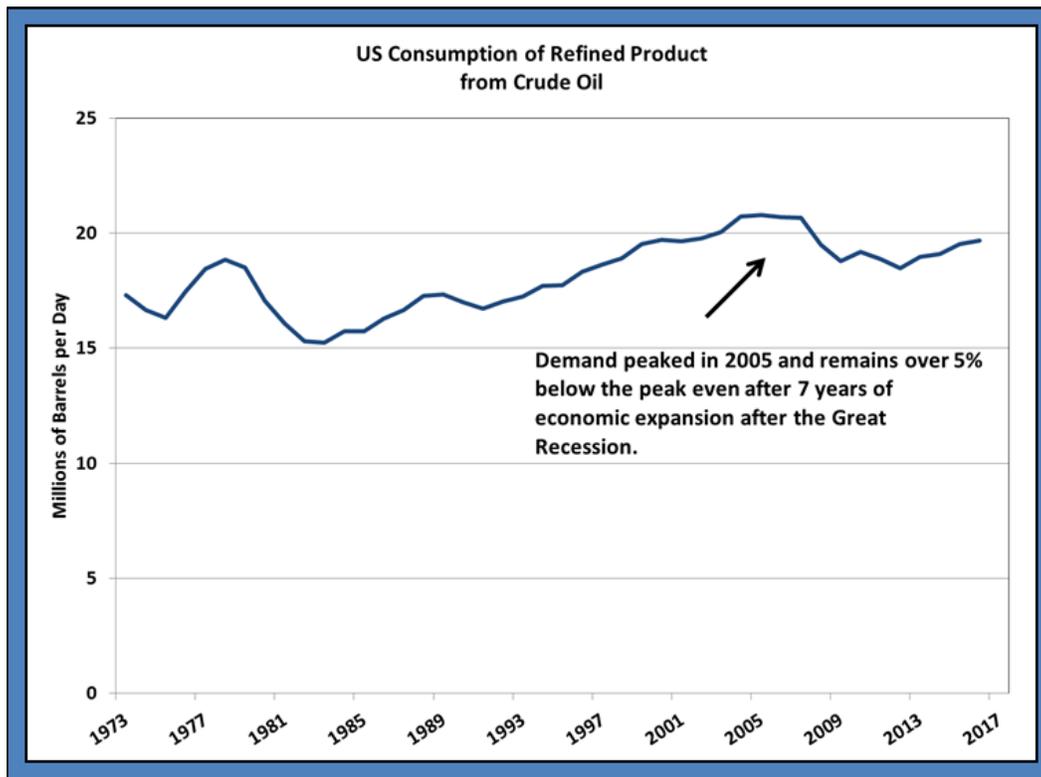
Source: Bloomberg Professional.  
 (US = DOETCRUD, North Sea = PIWANORT, OPEC = OPCRTOTL)

### Long-Term Demand Technology Themes

On the demand side, the key technological development involves the great strides being made in transportation fuel efficiency. In its refined state, the primary job of oil is to power transportation – from automobiles to trucks, to trains to boats and planes. Total petroleum demand in the U.S. peaked back in 2005 and was then driven lower by the Great Recession of 2008-2009. Still, after years of steady, albeit modest, economic expansion, U.S. petroleum demand in 2016 remained more than 5% below its peak of over a decade ago. And, even more importantly, the future of transport efficiency is getting brighter by the day with major new investments in electric-powered vehicles. The truly impressive gains for fuel efficiency in transportation are not likely to emerge until the 2020s, yet when they do, we would be looking at a major source of downward pressure on crude oil prices.



Figure 3



Source: US Energy Information Administration.  
(Data Code = MTTUPUS2)

### Short-Run Demand-Supply Pressures

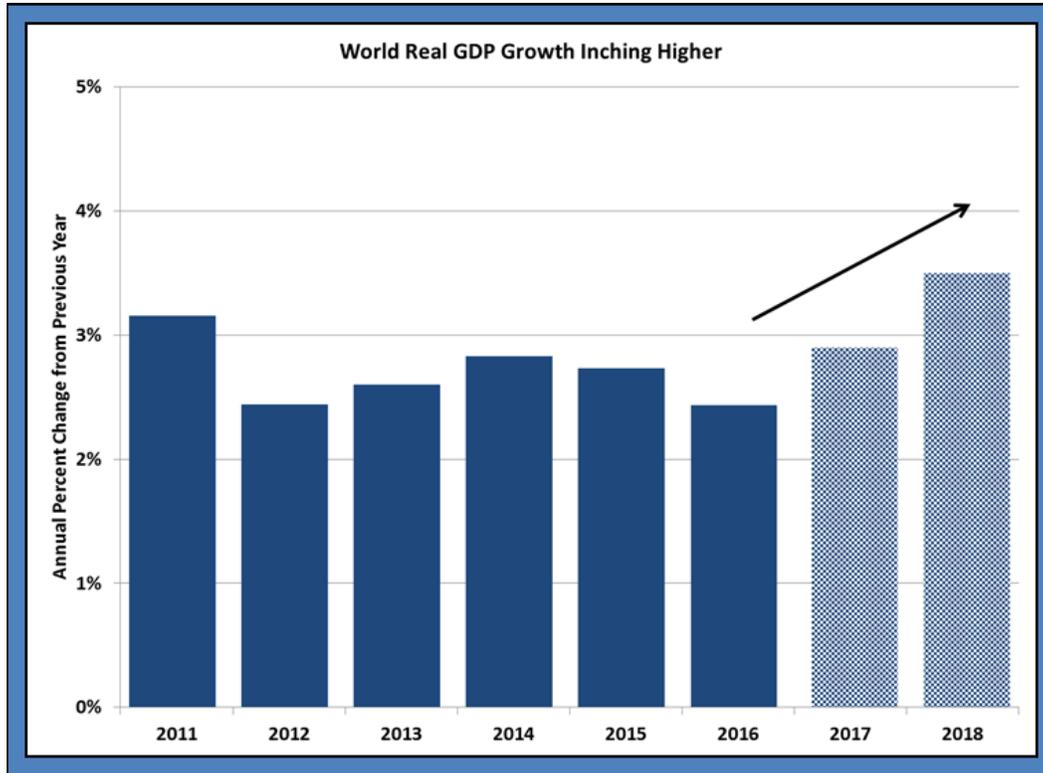
There are some key supply disruptions impacting oil prices in the short run. Venezuela's economy has imploded and production has been sharply reduced with no sign of improvement on the horizon. The Kurdish independence vote caused some analysts to worry that Turkey would shut off the pipeline that takes oil from the Kurdish region of Iraq to markets in Europe. Saudi Arabia has a strong incentive to cut production to push oil prices higher in the short term in an effort to boost the Initial Public Offering (IPO) price of state-owned ARAMCO. Indeed, with the U.S. pulling back from a world leadership role, the Saudis are now talking with Russia, and a key theme is about how to keep oil prices above \$50/barrel and push them towards \$60/barrel and maybe even \$70/barrel.

Also a positive for oil prices in late 2017 and into 2018 is the modestly improving tone of global economic activity. According to World Bank calculations, world real GDP growth has not exceeded 3% since 2011; however it now appears that that world economic growth will be close to 3% in 2017 and moving toward 3.5% or higher in 2018. While the U.S., Europe, and Japan are all indicating they can grow a little over 2% in 2018, the important gains driving global growth improvement are coming from the developing world. Indeed, the gains in global economic activity are coming largely from what is no longer happening. China has stabilized and slowed its pace of deceleration. Brazil has exited its deep



recession. Russia is a major beneficiary of oil prices coming off their lows of February 2016 (below \$30/barrel) and now edging higher. India has shown solid growth, if not a steady pace of reforms.

**Figure 4**



Source: Data through 2016 from the World Bank via the Bloomberg Professional (WRGDWRLD); 2017 and 2018 estimates provided by CME Group Economics.

### **Conclusion: The Tug of War between Long-Run Technological Advances and Short-Term Supply-Demand Factors**

While our perspective is that the short-term supply constraints and demand increases will eventually have to confront the longer-term technology disruptions, the lags can be long and variable. The next downdraft in oil prices coming from long-term technology developments may be delayed for years until the transportation efficiencies are more fully realized. Still, when oil prices rise to the top of the trading range, the maturity curve typically displays “backwardation,” in which there are higher short-term prices twinned with lower long-term prices. This type of maturity curve suggests that oil markets are, indeed, grappling with the tug of war between (a) upward short-term pressures resulting from geopolitics and global growth and (b) downward long-term price pressures resulting from technological advances on both the demand and supply side of the equation.



### Endnotes

All examples in this report are hypothetical interpretations of situations and are used for explanation purposes only. The views in this report reflect solely those of the author and not necessarily those of CME Group or its affiliated institutions. This report and the information herein should not be considered investment advice or the results of actual market experience.

### Author Biography

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Dr. Bluford Putnam is Managing Director and Chief Economist of CME Group. He manages the Intelligence & Analytics team, which includes both data science and management analytics. As Chief Economist, Dr. Putnam is responsible for leading the economic analysis on global financial markets by identifying emerging trends, evaluating economic factors and forecasting their impact on CME Group and the company's business strategy. He also serves as CME Group's spokesperson on global economic conditions and manages external research initiatives.

Prior to joining CME Group, Dr. Putnam gained experience in the financial services industry with concentrations in central banking, investment research and portfolio management. He most recently served as Managing Partner for Bayesian Edge Technology & Solutions, Ltd., a financial risk management and portfolio advisory service he founded in 2000. He also has served as President of CDC Investment Management Corporation and was Managing Director and Chief Investment Officer for Equities and Asset Allocation at the Bankers Trust Company in New York. His background also includes economist positions with Kleinwort Benson, Ltd., Morgan Stanley & Company, Chase Manhattan Bank and the Federal Reserve Bank of New York. Dr. Putnam holds a bachelor's degree in liberal arts from Florida Presbyterian College (later renamed Eckerd College) and a Ph.D. in economics from Tulane University.

Dr. Putnam has authored five books on international finance, as well as many articles that have been published in academic journals, including the *American Economic Review*, *Journal of Finance*, and *Review of Financial Economics* among others.

Dr. Putnam is also a member of the J.P. Morgan Center for Commodities' Research Council as well as its Advisory Council.