Fracking and the Fall of Oil Prices

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HSA10-05 The Economics of Oil and Energy

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1. Background

Crude oil is one of the world's most used resources. Oil and its distillates are employed in almost every sector of the modern world. Crude oil is used to fabricate plastic, distilled to make gasoline and diesel fuel used by modern transportation vehicles, and is heavily consumed in generators to create energy. With such widespread use in nearly all aspects of modern life, crude oil is a heavily traded resource with dramatic effect on the global economy. It is no surprise that one of the most heavily funded and researched areas in the search for energy is devoted to discovery and extraction of oil and other forms of fuel from the ground. This influx of capital allows for newer and better ways developing and perfecting oil extraction. With so much time, energy, and money being funneled into petroleum (another term for crude oil) there are new methods being developed and implemented that drastically amplify the production of oil. One of the most significant modern developments of oil and the related extraction of gas has been "Hydro Fracking." The development and significant increase of shale hydro fracking in the United States has led to a dramatic decrease in the global price of crude oil.

2.What is Fracking?

The physical geological fracturing of shale stone commonly referred to as "Fracking," "Hydro Fracking," or "Shale Fracking" is the process of removing petroleum and other natural gasses that are trapped in stone formations deep underground[1]. Some form of releasing trapped oil from stone has been under continuous development since the 1860s where nitroglycerin was used to shatter stones releasing the oil inside[2]. Towards the end of the 20th Century, pressured by relative high prices and foreign sources of crude oil, geologists developed far more useful and economical methods of petroleum extraction[2]. Modern day hydro fracturing, in which fracking solution is injected deep into shale deposits, has become a mature process (a simplification of which can be seen in Figure 1.) The development of horizontal fracturing allowed for the shale stone to be more efficiently extracted[2]. Hydro fracking is now used globally, with many countries beginning to

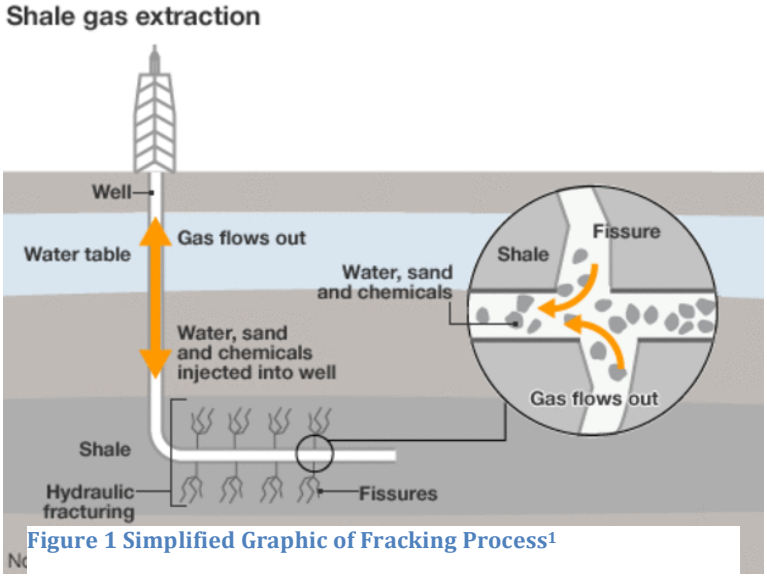


Figure 1 Simplified Graphic of Fracking Process[1]

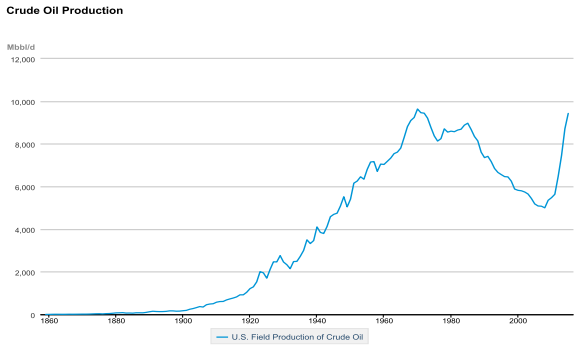


Figure 2 Growth of US Crude Oil Production[10]

[1] http://www.bbc.com/news/uk-14432401
[2] https://web.archive.org/web/20121114205741/http://www.spe.org/jpt/print/archives/2010/12/10Hydraulic.pdf

explore fracking options[3]. The United States is ahead of this boom, which has allowed geologists and oil producers to drastically increase gas production[4]. Fracking has been under development for many years with varying amounts of controversy and success[2]. As of late, fracking production has gone through a dramatic increase as visible in Figure 2. This increase in production has had a dramatic downward effect on the price of crude oil.

3.Economic Effect of Fracking:

Over the past two years there has been a significant fall in the price of oil as seen in Figure 3. Current oil prices are generally perceived as an effect of increased supply caused by drastically higher production from crude oil pumped from wells in oil-producing countries[9]. This increased production is due to many varying political and economic factors. A major component of the increase in the availability of natural gas, a relative of petroleum, is related to hydro fracking. Using EIA estimates from 2013[5], visible in Figure 4, reveals that shale gas fracking has become a major

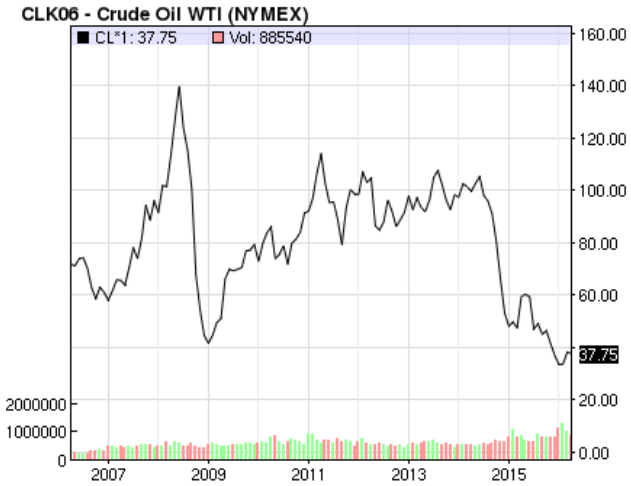
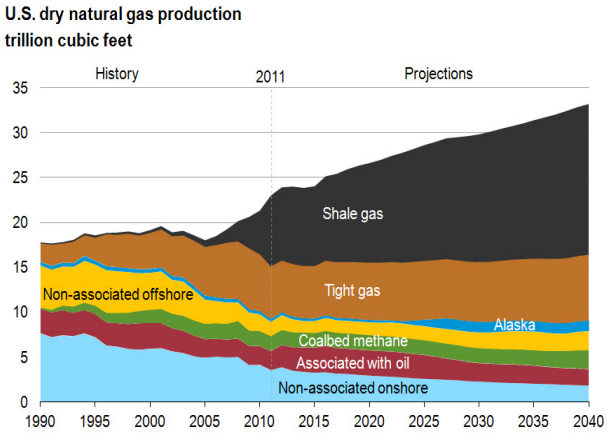


Figure 3 Price history of crude oil[6]



Source: U.S. Energy Information Administration, *Annual Energy Outlook 2013 Early Release*

Figure 4 Oil And Gas Production Estimates[5]

[3] http://www.theguardian.com/environment/2013/mar/01/frontline-poland-fracking-frontier
[4] http://www.forbes.com/sites/jamesconca/2015/07/22/u-s-winning-oil-war-against-saudi-arabia/#4872e19e7876
[5] https://www.eia.gov/energy_in_brief/article/

source of oil-related production in the United States. This increasing trend clearly demonstrates that more and more of American oil and natural gas production is coming from shale fracking. Not only is the market share of natural gas produced by fracking increasing but the net production as a whole is increasing as well.

This increase in estimated production ties in closely with the more recent statistics of oil production and further relates to production and oil prices. The increase in production, as visible in Figure 2, caused by the development and implementation of shale fracking creates a clear supply/demand imbalance. This imbalance has steadily increased as well is clearly demonstrated in Figure 5. This drastic supply imbalance highlights reasons for the severe decrease in price per barrel of late[6]. It is a simple supply and demand issue: As the supply of an object increases faster than demand can keep up with it then the price of that object will tend to fall mirroring this imbalance[7]. Using this basic relationship, it is much easier to see how this drastic increase in production of the United States from fracking has the direct result of causing the visible drop in oil prices.

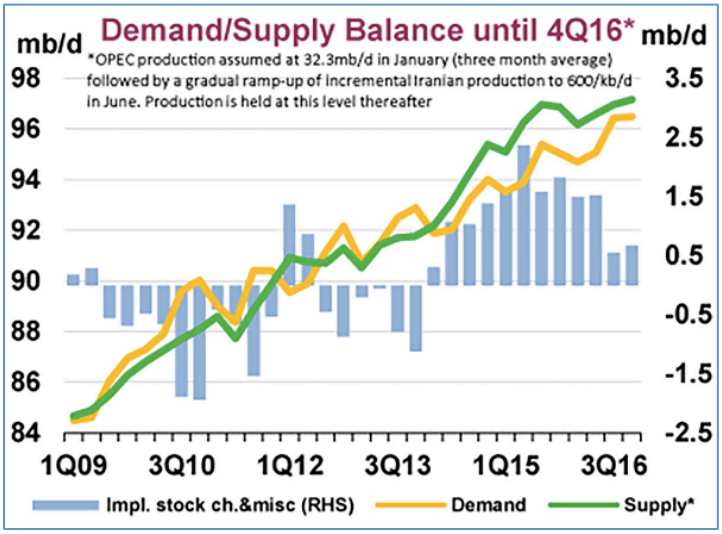


Figure 5 Supply & Demand Balance[9]

4.The effect of Fracking on Non-US fuel producers:

While the immediate effect of the United States' production increases and the subsequent supply/demand imbalance may be straight forward, the more subtle effect of fracking on the price of oil comes from other world oil producing areas. One of the most

[6] http://www.nasdaq.com/markets/crude-oil.aspx
[7] http://www.investopedia.com/university/economics/economics3.asp

significant effects of the United States' ramped up production as a result of fracking is the forced competition it has instilled in many of the nations that belong to OPEC (The Organization of the Petroleum Exporting Countries[8])[9]. Due to the increased production and subsequent dramatic increase in oil and oil derivative exports by the United States[10], OPEC has had to raise production to maintain market share on their exports as profits decline. Countries like Saudi Arabia, the largest producer and semi- leader of OPEC[8], have the majority of their wealth coming from their oil exports. In order to stay in the "race" and keep at a competitive position relative to the United States, OPEC has had to increase production way beyond what is necessary to meet global demand. This intentional increase of production has caused the price of crude oil to plummet rapidly and has stabilized at historically low levels. OPEC oil producing powers have created a vicious cycle where production has to be increased to stay competitive yet prices are lowering so more needs to be produced and exported to insure profits remain flowing.

While this line of thinking is generally believed to be the source of the current economic situation, some believe increased production by OPEC, most notably Saudi Arabia, is due to the Saudis desire to eliminate economic and political competition[11]. Some analysts associate the current oil price situation with Saudi intent to control market share by lowering oil prices to destabilize political foes and to stunt the growth of US fracking technology-growth[11]. However, as evident by continued increases in shale oil

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[8] www.**opec**.org
[9] http://www.vox.com/2016/1/12/10755754/crude-oil-prices-falling
[10] https://www.eia.gov/dnav/pet/pet_move_exp_dc_NUS-Z00_mbblpd_m.htm
[11] http://marketrealist.com/2016/01/crude-oils-total-cost-production-impacts-major-oil-producers/

production OPEC's ramped up production will not ultimately succeed in stopping increased and maturing shale oil production in the United States.

5.Environmental effects:

One cannot discuss any of the effects and costs of shale fracking without also discussing the drastic environmental effects and expenses that are caused by the fracking process. Views about the negative environmental aspects of fracking[12] are varied and controversial as are interpretations of scientific evidence. However, some major affects tied to fracking seem incontrovertible. For example, significant earthquakes in the central United States with a demonstrated connection to increased hydro fracking have multiplied by about 666% over a five-year range[13]. There is also great concern over the possible long-term polluting effects of the chemicals that are injected into the shale oil wells.

There is a link between the economic benefits of fracking and the possible environmental costs. Ignoring earthquakes and pollution threats that may be caused by fracking, one can appreciate the value of fracking technology that has allowed the production price anywhere from ten dollars in rare cases [14] to approximately sixty dollars[15] a barrel. At the current price per barrel of crude oil shale fracking has been able to stay profitable and cost effective, even without new expansion[14]. However, when one

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[12] http://environment.yale.edu/envy/stories/fracking-outpaces-science-on-its-impact

[13] http://earthquake.usgs.gov/research/induced/

[14] http://www.cnbc.com/2015/08/20/us-crude-oils-break-even-cost-how-low-can-it-go.html

[15] http://www.cnbc.com/2015/12/01/how-us-drillers-weathered-opecs-new-oil-order.html

factors in the environmental costs of fracking and the resulting environmental costs of clean-up, fracking becomes far less profitable. This decrease in theoretical profitability ties directly into the production of crude oil because if fracking's environmental costs make the process even slightly more expensive United States fracking producers may end up having a difficult time competing with traditional forms of crude oil production.

6.Conclusion:

The introduction and development of shale stone fracking has led to dramatic declines in the price of a barrel of crude oil. This is directly a result of an increase in production caused by new fracking techniques and the subsequent effect that this increased production has had on other oil producing regions. Shale fracking by the United States and the subsequent increase in crude oil production by fracking competitors are primary motivators for the general fall of oil prices in recent years. Still, uncertainties in the long-term of the environmental risks and costs of fracking may ultimately limit or even eliminate use of the method as a competitor to the tried-and-true oil pumping that has made OPEC the world energy powerhouse. However, due to the moderately cheap cost of production and the absurd amount of government interest in fracking, it is unlikely that there will be a significant change in fracking practices in the near future.

[Word Count: 1509]