The U. S. Fracking Boom: Impacts on Global Oil Prices and OPEC

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See footnote at end of text.

After a steady decline spanning several decades, U.S. crude oil production rebounded in 2008 owing to the increased adoption of hydraulic fracturing, a technology otherwise known as fracking. In conjunction with horizontal drilling and micro-seismic imaging, the use of this technology, originally developed for the exploration of natural gas, allows for tapping into oil reservoirs that are trapped in shale siltstone and clay stone formations (Maugeri, 2012). Hence, oil extracted on the basis of fracking techniques is commonly referred to as shale oil to differentiate it from crude oil obtained by conventional drilling methods.

To date, the only country that permits fracking on a large scale is the U.S. (Kilian, 2017). Many other countries are highly reluctant to employ this technology because of its potentially negative implications for the environment, notably hazards that may arise from water pollution and seismic tremors (Jackson et al., 2014). With the beginning of the surge in shale oil production in late 2008 (Kilian, 2017), U.S. crude oil production steadily increased until the end of 2014, with the share of shale oil in total U.S. production rising from about 6% in January 2000 to almost 50% at the end of 2014 (see Figure 1). Owing to fracking, U.S. crude oil production almost doubled over the past 15 years.

Thus, the advance of fracking and the associated recovery of the U.S. oil production is often called a game changer for the global oil market. The peak oil hypothesis – the idea that global oil production will reach a maximum after which production steadily decreases – has thereby been dealt another blow, ignoring as it does the impact of higher oil prices in making more expensive oil extraction technologies profitable (Baumeister and Kilian, 2016). The recovery of the U.S. oil production as a consequence of fracking is just one manifestation of this price mechanism, ensuring the continued satiation of the global demand for oil.

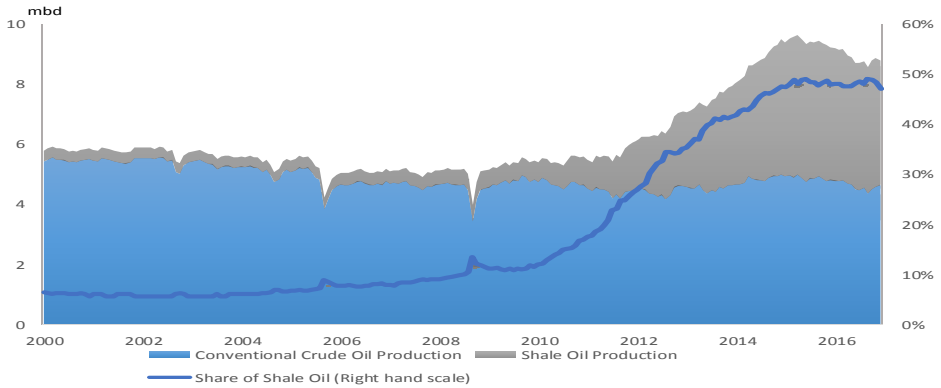

Figure 1 - Shale Oil and Total Crude Oil Production in the U.S. in million barrels per day (mbd) and Share of Shale Oil in Total U.S. Production

The importance of fracking may even further increase given that numerous other Non-OPEC countries contemplate intensifying the usage of this technology. In addition to Australia, India, and Russia, which is among the world's largest oil producers, several European countries, such as the UK and Romania, have commenced investigating the potentials of fracking (EIA, 2013). As a result, media reports frequently convey the impression that the market power of the Organization of the Petroleum Exporting Countries (OPEC), if still existing at all, has drastically diminished. With about 33 million barrels per day (mbd) in 2016, OPEC contributed more than one third to the world's total crude oil production of about 92 mbd and was hence the world's most important crude oil supplier.

Without a doubt, the U.S. fracking boom is an example of a technological change in a single industry of one country affecting international trade worldwide (Kilian, 2017), not least world oil prices and the behavior of the OPEC cartel.[1] With world oil prices shrinking by $49 per barrel (bbl) between June and December 2014 (Figure 2), Saudi Arabia led an effort to reverse OPEC's longstanding strategy of defending oil prices to defending market shares. This entailed refraining from its former behavior of curbing oil production to stabilize world oil prices.

Prior to this change, the 12 OPEC members usually agreed upon individual production allocations for each country that effectively set an upper limit, or quota, for the total OPEC production level. This strategy was predicated on the idea that OPEC's profits could be maximized when the production quota

is optimally set (Griffin, 1985). Frequently, however, the actual OPEC production level substantially exceeded the announced quota. In December 2016, for example, OPEC production exceeded the quota by about 3 mbd.

At its November meeting in 2016, OPEC changed its strategy again and, in a broad alliance with Non-OPEC oil producing countries, most notably Russia, decided to cut global production by 1.2 mbd to push world oil prices higher. The cut in OPEC production was officially reconfirmed in January 2017, when OPEC announced the new quota of 32.5 mbd (OPEC, 2016). Recently, OPEC announced that this quota will be valid until December 2018 (OPEC, 2017). This raises the question about OPEC's power to influence global oil prices and the respective role that fracking plays.

Figure 2 - Global Crude Oil Prices

Adapting the supply-side model proposed by Kaufmann et al. (2004) to assess OPEC's long-term ability to influence real oil prices, we have investigated the effect of the increase in U.S. oil production due to fracking on both global oil prices and OPEC's market power. Drawing on monthly data on the U.S. oil market spanning from January 2000 to December 2016, we employ an Error Correction Model (ECM) to gauge the short-run effects of fracking on global oil prices and on OPEC's ability to steer the market. Among our key results based on research that will be published as Ruhr Economic Paper (see http://en.rwi-essen.de/publikationen/ruhr-economic-papers/), there is a statistically significant negative long-run relationship between increased U.S. oil production and global oil prices. A similarly negative influence is found for OPEC supply volumes that exceed the OPEC quota, indicating that OPEC still matters.

The question now is whether the effects detected for the past will also be valid for the future. Presumably due to the recovery of global oil prices in the aftermath of the OPEC decision at the end of 2016, but probably also encouraged by OPEC's announcements with respect to production cuts, U.S. oil production from fracking has been revitalized, which will put downward pressure on global oil prices. It thus seems unlikely that global oil prices will substantially spike in the near future. This assumption seems all the more warranted given that growing calls for massive abatement measures to combat climate change may hasten the arrival of peak demand, that is, the all-time maximum in global oil demand after which demand will decrease. The likelihood that peak demand materializes anytime soon, however, appears to be low. Unfortunately for the earth's climate, the development of global oil demand due to the world's economic performance, rather than any greenhouse gas regulation, is likely to be the driving factor of CO_2 emissions in the near future, confirming yet again Bill Clinton's mantra: It's the economy, stupid!

Footnote

[1] Figure 2 also illustrates the influence that local circumstances can have on price trajectories: The divergence in prices for WTI and Brent seen between April 2011 and May 2014 was the result of an increased shale oil supply, paired with a bottleneck in refinery and transport infrastructure in the U.S. that prevented competition of WTI with imports (Borenstein and Kellogg 2014; Kilian 2016). At the end of 2015, the price differential virtually vanished due to the expansion of transport infrastructure, allowing light crude oil that used to be landlocked in the center of the U.S. to reach existing refineries.

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