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Potential Global Economic Impact of OPEC's Oil Production Freeze

Zekarias Hussein, Deepika Wadhwa, Badri Narayanan, Muhammad Aamir Khan

Introduction

World oil prices have been depressed for more than two years because of the global oil supply glut. After reaching their peak in mid-2014 and trading at over $100 a barrel, oil prices went into a free fall later that year and briefly plunged below $30 per barrel in early 2016. The Organization of the Petroleum Exporting Countries (OPEC), which comprises of 14 oil producing member-countries and controls around a third of world oil production, had until recently chosen not to throttle production in order to maintain global market share and probably to drive U.S. shale oil and non-OPEC oil producers, who have higher costs, out of business.

However, this glut of global oil supply has not only suppressed energy prices but also increased tensions between members Saudi Arabia, Iran and Iraq. OPEC members, seeking to bolster oil prices, have recently agreed to slash production by 1.2 million barrels per day (bpd) or about 1 percent of global output. The production decline agreement effective Jan 1, 2017 is for six months, with the possibility of another six-month extension. Saudi Arabia, the largest producer in the cartel has approved to slash 486,000 bpd or about 40% of the total. The next highest reductions are by OPEC's second-largest producer Iraq at 210,000 followed by United Arab Emirates at 139,000. While two members, Libya and Nigeria are exempt from cuts. This output reduction would slash OPEC's daily production to about 32.5 million barrel. Even Russia, not an OPEC member, has also agreed to cut its output by about 300,000 barrels a day.

Expectation of OPEC action and improving fundamentals lifted oil prices to an average of $43 per barrel towards the end of 2016. There is optimism in the markets that these output cuts could tend to push up oil prices. However, some skeptics believe that there could be increased output from Libya and Nigeria, which could push OPEC's production beyond the overall quota, and also that OPEC and non-OPEC countries past track record is poor in complying with the quota commitment. Moreover, latest inventory report published by the U.S. Energy Information Administration (EIA) implied oversupply as its crude stocks increased by 4.1 million barrels reaching to 483.1 million barrels.

Given these uncertainties about the supply shifts, both now and in the future, it would, therefore, be interesting to analyze their effect on global oil prices. For oil-producing and exporting countries, a significant decrease in the supply of its production not only will have consequences on various macroeconomic aggregates but also will have structural impacts. Likewise, there will be the immediate and long-term implications on import-dependent countries due to the higher oil bill. While it is too early to predict a clear trend of the price fluctuation and their possible impact, the forward and backward linkages of oil production decline are likely to have ripple effects in the global economy.

The paper shall focus on examining the impact under 2 scenarios:

1. If OPEC members comply with their production cuts, with or without changes in the projected output of the other main oil producing countries.
2. If OPEC and Non-OPEC members both comply with their reduction commitments.

Data and Methodology

To define our scenarios, we use crude oil production data from OPEC's monthly market reports and the US short term and long-term oil projection forecasts from U.S. EIA, among other data sources. The simulations shall capture only the effects of the supply component on the oil prices (with the assumption that all other shocks likely to affect the global economy are ceteris paribus).

In order to quantify the impact of these supply changes; the paper employs the GTAP-E-Power model (Peters, 2016)[1] using the current GTAP database version 9, since it is a detailed framework capturing all energy sources comprehensively. We are able to assess the impact of oil production cuts on renewable sectors and CO2 emissions as well.

Some CGE Modeling Results

Macroeconomic Impacts

In Scenario 1, the results indicate that recent oil supply cutbacks by OPEC countries are likely to have a negative impact on the GDP of these countries. GDP is projected to decline mainly for Kuwait and Saudi Arabia by -2.8% and -2.7% respectively, followed by Iraq (-1.78%) UAE (-0.98%) and Venezuela (-0.80%) (Table1). Since GDP in most of these countries remains heavily dependent on oil revenues from export earnings. The reduction in output could result in significantly lower GDPs for major oil exporters as its impact on global oil prices may not yet have been fully felt. The oil price outlook is still highly uncertain and there may be considerable volatility around its upward trend since it is unclear how much impact the supply reductions are having on world oil inventories that are close to record highs. Similarly, both aggregate exports and imports are expected to decrease as well for these economies with a net decline in imports.

While not much impact could yet be seen on GDPS of major oil importing countries, which include, China, India, Canada, UK, and Mexico, among others as the full impact of supply cuts has yet not kicked in.

[1] Peters, J.C. (2016), "GTAP-E-Power: An Electricity-detailed Economy-wide Model," *Journal of Global Economic Analysis*, Volume 1 (No.2), pp. 156-187.

Table 1: Percent Change in GDP and Aggregate Exports and Imports

S.No.	Countries	GDP	Exports	Imports
1	Algeria and Lybia	-0.44	-0.18	0.00
2	Angola and Gabon	-0.79	-0.43	-0.41
3	Australia	0.00	0.00	0.13
4	Brazil	0.00	-0.07	0.20
5	Canada	0.00	-0.01	0.12
6	China(Mainland)	0.00	-0.04	-0.02
7	Ecuador	-0.39	-0.17	-0.67
8	France	-0.03	0.10	0.00
9	Germany	-0.02	0.04	0.03
10	India	-0.03	-0.03	-0.06
11	Iran	0.46	1.30	1.67
12	Iraq	-1.78	-1.16	-2.18
13	Japan	-0.04	0.44	-0.08
14	Kuwait	-2.80	-2.16	-2.62
15	Mexico	0.03	0.06	0.13
16	Nigeria	1.27	4.89	5.15
17	Norway	0.00	0.19	0.32
18	Qatar	-0.30	0.20	0.54
19	Russia	-0.02	0.31	0.75
20	Saudi Arabia	-2.70	-2.65	-3.26
21	South Korea	-0.03	0.08	-0.02
22	United Arab Emirates	-0.98	-0.86	-0.75
23	United Kingdom	-0.02	0.03	0.05
24	United States	0.00	-0.07	0.00
25	Venezuela	-0.80	-1.30	-2.18

Source: CGE simulation results

Sectoral Impacts

The results indicate that decline in oil production increases output in import substitution sectors such as crops and textile and clothing in OPEC countries. While output in fisheries and livestock and meat declines by a small percent in most of the countries. These changes could be because of multi-sectoral general equilibrium adjustment effects through supply and demand drivers, as well as changes in the labor market.

Oil production cut o has a strong positive impact on the manufacturing sectors especially heavy manufacturing, which expand at varying rates ranging from 5.5 percent for Kuwait 4.3 percent for Saudi Arabia, 2.1 percent for Venezuela and 1.3 percent for Iraq under Scenario 1. The output impact on manufacturing sectors are adverse for Nigeria with output declining by -4.6 percent and -7.5 percent in light and heavy manufacturing sectors, respectively. The other sector which could see contraction is shipping services as output cut would mean higher oil prices, lower demand and trade. And since oil trades via sea, including that of refined products, the oil

production cut would have a significant impact on the shipping sector. The only sectors that benefit from decline in oil production is mainly gas.

Table 2: Percent Change in Sectoral Output

Countries	Crops	Processed Food	Tex & Clo	Livestock & Meat	Fisheries	Forestry	Coal	Oil	Gas	Petrol product	Light Man	Heavy Man	Services
Algeria & Libya	0.0	-0.1	-0.2	-0.1	-0.1	0.5	0.4	-3.1	2.4	-1.1	-0.1	-0.2	-0.1
Angola & Gabon	0.0	0.0	0.1	0.1	0.0	0.7	1.2	-2.0	4.0	-0.8	0.6	0.9	-0.1
Australia	-0.1	0.0	-0.1	-0.1	0.0	-0.2	-0.1	2.3	0.7	-0.3	-0.2	-0.3	0.0
Brazil	-0.1	-0.1	-0.1	-0.2	-0.1	-0.1	-0.3	0.9	0.0	-0.1	-0.1	-0.1	0.0
Canada	-0.2	-0.1	-0.2	-0.1	-0.2	-0.3	-0.4	1.1	-0.4	-0.4	-0.3	-0.4	0.0
China(Mainland)	0.0	0.0	-0.1	0.0	0.0	0.0	-0.1	1.7	-0.8	-0.4	-0.1	-0.1	0.0
Ecuador	0.5	0.5	0.4	-0.1	0.2	0.2	3.2	-2.3	2.8	0.1	0.3	0.9	-0.1
France	0.0	0.0	0.1	-0.1	-0.2	0.4	-0.1	1.9	3.4	-0.7	0.0	0.1	0.0
Germany	0.1	0.0	0.0	0.0	0.2	0.1	0.2	2.0	2.8	-0.5	0.0	0.0	0.0
India	0.0	0.0	0.0	0.0	-0.2	0.0	0.2	1.9	1.2	-0.9	-0.1	-0.1	-0.1
Iran	-0.3	-0.1	-1.4	0.0	0.0	-0.5	-1.8	2.4	-7.2	-0.3	-0.7	-2.2	0.0
Iraq	0.5	0.3	4.0	-0.2	0.2	0.1	1.7	-4.9	16.4	-2.7	0.9	1.3	-0.5
Japan	0.1	-0.1	0.2	0.0	-0.1	0.2	0.6	4.2	1.5	-1.1	0.2	0.2	-0.1
Kuwait	1.1	-0.5	2.5	0.0	-1.4	0.8	0.2	-5.2	7.0	-0.8	2.2	5.5	-0.1
Mexico	0.0	0.0	-0.2	0.0	-0.1	-0.2	0.0	1.2	-0.1	0.0	-0.2	-0.3	0.0
Nigeria	0.0	-3.7	-4.2	0.8	0.5	-0.3	-6.9	9.1	-20.0	2.3	-4.6	-7.5	0.5
Norway	-0.2	-0.2	-0.5	-0.1	-0.2	-0.5	-0.7	1.0	-0.6	-0.1	-0.4	-0.9	0.0
Qatar	-0.2	-0.2	-0.4	-0.3	-0.1	0.4	-0.4	-3.0	0.8	1.2	-0.4	-0.5	0.0
Russia	-0.2	-0.1	-0.6	0.0	-0.1	-0.6	-0.9	0.7	-0.7	-0.5	-0.7	-1.0	0.0
Saudi Arabia	1.3	0.9	4.6	0.9	-0.3	0.7	0.1	-6.2	6.2	0.1	2.5	4.3	-0.7
South Korea	0.0	-0.1	0.1	-0.1	-0.1	0.0	-0.1	3.3	-1.9	-1.4	0.2	0.0	-0.1
UAE	0.3	0.1	0.9	-0.2	0.5	1.5	1.1	-5.3	4.3	1.0	0.9	1.1	-0.2
United Kingdom	0.0	0.0	-0.1	0.0	-0.2	-0.1	0.1	0.8	1.1	-0.3	-0.1	-0.1	0.0
United States	0.0	0.0	-0.1	0.0	-0.2	-0.1	0.0	1.0	0.6	-0.5	-0.1	-0.1	0.0
Venezuela	0.3	0.1	0.6	0.1	-0.1	0.7	5.5	-3.3	4.8	-0.4	0.6	2.1	-0.3

Source: CGE simulation results.

CO2 Emissions and Renewable Energy

In this section, we discuss the implications that OPEC supply cuts could have on CO2 emissions and renewable energy sectors. Whether the shorter-term impact of these cuts will be higher or lower carbon emissions, however, what is most important is the impact on longer term energy investment. The global impact of oil supply cuts on CO2 emissions is varied across countries. The results indicate an increase in emissions for Venezuela, Kuwait, UAE and Qatar in scenario 1 (Table 2). This could be mainly because of boost in consumption of fossil fuels such as coal and gas in these countries which could lead to more carbon emissions. The low prices of traditional energy sources in these countries undermine the economic case for investment in low carbon alternatives like nuclear, wind and solar power.

The modelling results indicate that oil production cuts are estimated to have a positive effect on the growth of renewable energy in many countries. The volatility around the oil prices has clearly led to less incentive to invest in developing new supplies in the oil and other fossil-fuel sectors and moreover, with the recent output cut there is a likely prospect for oil prices to increase in the short and medium terms. Furthermore, the economics of renewable energy depends upon public policies (e.g. subsidies etc.) and the availability and pricing of alternative energy sources (e.g. crude oil, natural gas, coal, etc.). There is also a huge secondary influence of market perceptions dominated by perceptions about oil prices in order to decide what sources of energy are competitive. The perceptions about surging oil prices and highly volatile oil market only improves the competitive advantage of renewable energy, which makes it further attractive for buyers to substitute to renewable sources of energy. Besides, the wind and solar power costs have been plummeting for many years. The cost of wind turbines and solar PV panels have dropped tremendously over the past few years which has led to growth in the global investment in renewable energy sectors.

Table 3: Percent Change in CO2 Emissions and Renewable Energy

S.No.	Countries	Co2 Emissions	Nuclear	Wind	Solar	HydroBL	HydroP	OilBL	OilP	CoalBL	GasBL	GasP
1	Venezuela	1.46	0.18	0.21	0.35	0.82	0.27	-1.48	0.52	-0.01	-0.46	1.42
2	Kuwait	1.19	0.18	0.21	0.35	0.03	0.27	-3.56	-2.23	-0.01	-0.59	-0.09
3	UAE	0.46	0.18	0.21	0.35	0.03	0.27	-1.48	-0.71	-0.01	-0.33	-0.29
4	Qatar	0.34	0.18	0.21	0.35	0.03	0.27	-1.48	-0.42	-0.01	-0.10	-0.10
5	India	-0.05	0.28	0.33	0.72	0.36	0.70	-1.48	-0.18	0.13	-0.34	0.13
6	China(Mainland)	-0.08	0.27	0.30	0.16	0.27	0.14	-1.48	-0.48	0.06	-0.34	-0.36
7	Mexico	-0.09	0.29	0.30	0.18	0.30	0.27	-0.15	-0.07	0.19	-0.24	-0.09
8	Australia	-0.16	0.18	0.13	0.31	0.13	0.27	-1.48	-0.22	0.05	-0.35	0.05
9	United States	-0.18	0.18	0.20	0.35	0.20	0.27	-1.48	-0.24	0.07	-0.28	0.07
10	United Kingdom	-0.19	0.26	0.28	0.34	0.28	0.27	-1.48	-0.18	0.08	-0.22	0.05
11	Brazil	-0.24	0.11	0.12	0.35	0.10	0.23	-1.48	-0.15	0.05	-0.34	0.01
12	Germany	-0.25	0.19	0.19	0.39	0.23	0.27	-1.48	-0.24	0.09	-0.43	0.00
13	Canada	-0.28	0.00	0.00	0.24	-0.01	0.21	-1.48	-0.28	-0.09	-0.34	-0.10
14	Russia	-0.31	-0.28	0.59	0.35	-0.36	0.27	-1.48	-0.58	-0.25	-0.36	-0.27
15	Norway	-0.32	0.18	0.15	0.35	-0.18	-0.10	-1.48	-0.52	0.24	-0.34	-0.31
16	South Korea	-0.35	0.44	0.63	0.89	0.67	0.27	-1.48	-0.43	0.00	-0.67	0.18
17	Algeria & Lybia	-0.42	0.18	0.21	0.35	0.03	0.27	-0.89	-0.42	-0.01	0.40	-0.25
18	France	-0.45	0.17	0.21	0.38	0.03	0.38	-1.48	-0.32	-0.03	-0.34	-0.19
19	Japan	-0.46	0.45	0.54	1.16	0.54	0.27	-1.48	-0.11	0.17	-0.34	0.58
20	Ecuador	-0.55	0.18	-0.36	0.35	0.00	0.27	-1.32	-0.30	-0.01	0.15	-0.09
21	Angola & Gabon	-0.58	0.18	0.21	0.35	0.29	0.99	-2.08	-0.10	-0.36	-1.42	0.19
22	Nigeria	-0.73	0.18	0.21	0.35	-2.46	0.27	-1.48	-0.42	-0.01	-0.02	-0.65
23	Iran	-1.19	1.01	0.64	0.35	-0.57	0.27	-0.60	-0.40	-0.01	-0.36	-0.09
24	Saudi Arabia	-1.60	0.18	0.21	0.35	0.03	0.27	-5.22	-2.10	-0.01	0.90	-0.09
25	Iraq	-2.03	0.18	0.21	0.35	-0.42	0.27	-3.69	-1.78	-0.01	-0.79	-0.09

Source: CGE simulation results.

Oil prices have struggled to break much above $50 a barrel in 2017 despite most OPEC oil producers appear to be adhering to the deal so far but it is unclear how much impact the supply reductions are having on world oil inventories that are close to record highs. However, if OPEC and non-OPEC deliver their promised cuts, and extend them into the second half of the year, oil inventories could possibly shrink later in 2017, which could be then reflective on the prices. We are awaiting latest data from the oil producers to perform further simulations.