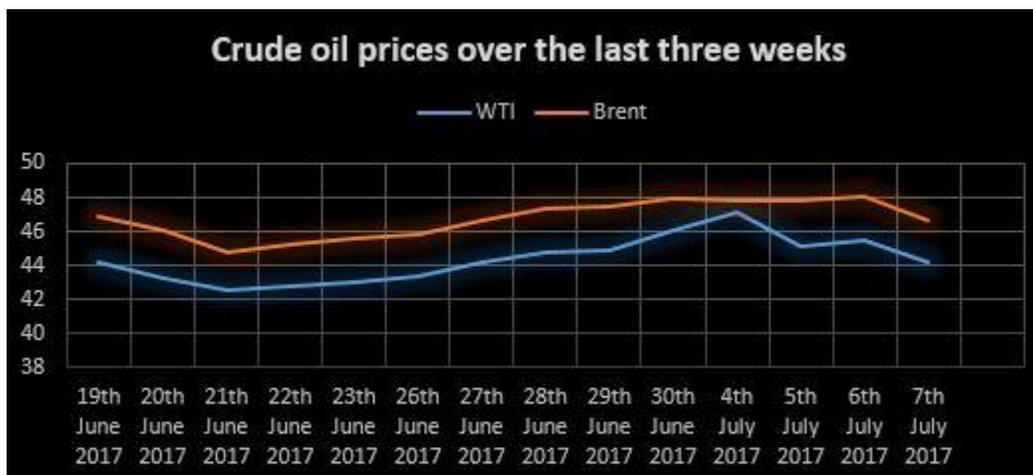
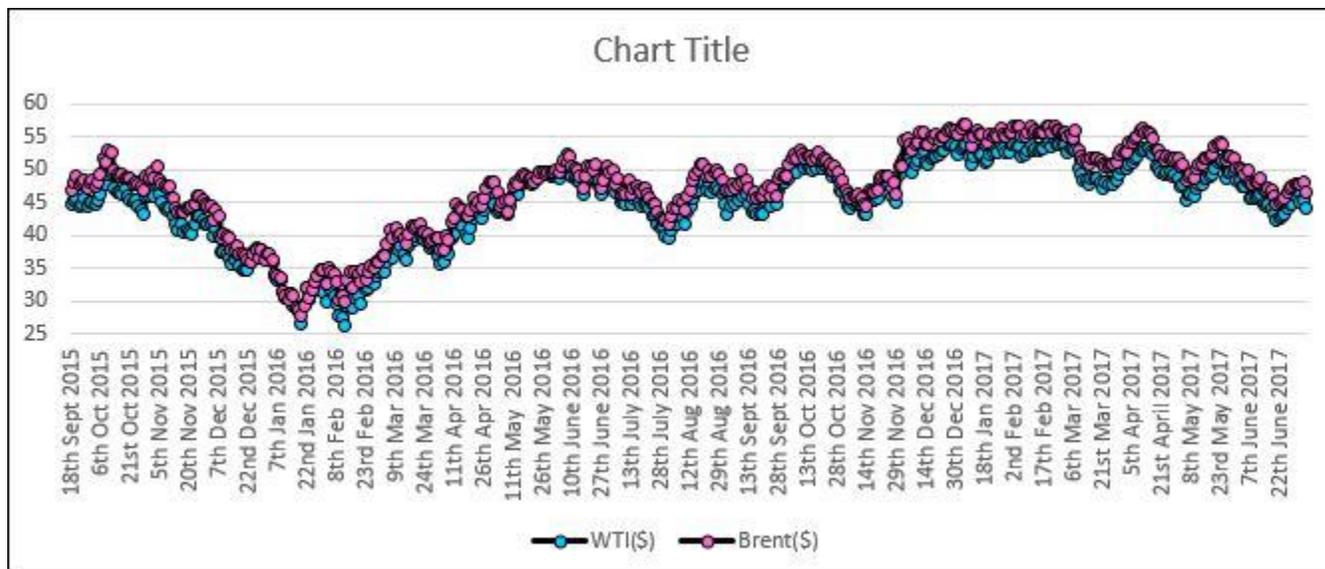


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Some of the news items for this week are as follows:



- The crude oil price tumbled somewhat after receiving the news that Russia was opposed to any proposal that suggest deepening of the production cuts by OPEC and its allies. Russia is in favour of continuing with the deal in place at present, as any move to deepen production cuts could send a wrong signal that OPEC and its allies are nervous and are ineffective in supporting prices. The crude output has shown a dip and a slight fall in shale drilling over the last week.

As per Baker Hughes data, the US drillers cut two rigs in the week of June 30, at 756. This decline has happened after 23 weeks of rig additions. In the first quarter of 2017, the drillers added 137 rigs, and in the second quarter, it dropped to 94 rigs. Some energy analysts believe that this drop may just be a 'brief pause' in a drilling recovery that may continue through to 2019. Despite the drop in prices last month, the US shale drillers are expected to continue drilling new wells, but might revisit their spending costs if process drop below \$45 and stay there for several months.

The US shale drilling overall is expanding at a fast rate, and with growth in demand being slower than expected the efforts by OPEC and its allies to balance the market can get undercut. This will result in an oversupply in 2018.

Another factor adding to the global supply of oil is OPEC's crude production which rose to a maximum in June. While the OPEC members were fully compliant in their pledged cuts in the first 5 months of the year, the total OPEC output now is 390,000 b/d above the target of 1.8 mb/d reduction set in November 2016. Libya is producing 1 mb/d (which is above what it was producing earlier), Saudi Arabia increased output by 90,000 b/d in June, and Angola and UAE increased their output by 40,000 b/d from May.

- US President Trump attended the Three Seas initiative meeting at Warsaw, Poland, on Thursday and called upon European countries to buy US gas, as exports from the US would help them reduce their dependence on Russia. At present 75% of eastern Europe fuel comes from Russia, and in recent years it has cut off gas shipments over pricing disputes with neighbouring countries in the winter months. The 'Three Seas' initiative is so named as several of the member countries (Poland, Austria, Hungary, Latvia and Estonia) surround the Adriatic, Baltic and Black Seas. The Three Seas project aims to expand regional energy infrastructure that includes pipelines and LNG import terminals.

The US started exporting gas through its Cheniere Energy Inc. LNG export terminal in 2016, and delivered its first cargo to Poland in June. The US is expected to become the world's third largest exporter of LNG in 2020. However, a global supply glut may depress prices, and thus make the market become more competitive.

- Qatar Petroleum CEO, Saad Sherida Al Kaabli has said that UAE has declared force majeure to halt shipments of condensate from Qatar and that his company is taking legal action for it. Saudi Arabia, UAE, Bahrain and Egypt have accused Qatar of supporting terrorism and allying with Iran, that is considered their regional foe. These countries have demanded Qatar curtail its support for Muslim Brotherhood, shut down al Jazeera satellite TV channel, close a Turkish military base and downgrade its relations with Iran. To this effect, these countries imposed political and economic boycott with Qatar. Qatar also faces expulsion from the Gulf Cooperation Council, a regional economic and security cooperation body, if Qatar does not comply with its demands. Qatar has indeed refused to comply, which has prompted the four countries to continue with their political and economic boycott of Qatar.

Qatar is the second largest exporter of LNG, and plans to raise its LNG production by 30% in the next 5 years.

- BP is gradually shifting its exploration portfolio toward natural gas and advantaged oil in regions where it currently operates. It has been looking for opportunities to grow new production acreage, and exiting less competitive exploration prospects. The company has decided to relinquish its 50% interest in Block 24/11 offshore southern Angola as the gas discovery made there in 2014 has not come out to be commercial. Last October, BP had announced that it would

not continue frontier exploration in the four blocks it operated in offshore southern Australia. So, far in 2017, BP has announced four gas discoveries. These include the Savannah and Macadania gas discoveries in Trinidad (~ 2 tcf gas in place). Qattameya discovery in Egypt and a major gas discovery in Senegal with the Yakaar-1 exploration well.

Regarding new exploration acreage and opportunities it has been awarded new licenses in US Gulf of Mexico, in the UK North Sea, east coast of Canada and Mexico.

- Earlier this week, General Electric (GE) Co. completed its buyout of Baker Hughes (BH) Inc. By merging the GE oil and gas equipment and services operations with BH, a new company “Baker Hughes – a GE company’ has been created, which is the world’s largest oilfield service provider in annual revenue. The new company, which will have 70,000 employees, will now rival Schlumberger for dominance in the global oilfield service market.
- Paramount Resources is purchasing the assets of Apache Canada in a \$459 million transaction, as the latter exits Canada to focus on its assets in the US, UK, North Sea and Egypt.

So much for the industry news this week.

For the lighter side this week

As students of science, especially who have majored in physics, we come across the explanation for, *why is the colour of sky blue?*

What I remember is, yes, it is blue due to the scattering of light. But recently, I revisited this, and tried to understand it better. Here is what I found:

A major fraction of the solar radiation reaching the earth is the visible light and infrared radiation. About 40% of this radiation is visible light of wavelengths between 400 and 700 nm. Ultraviolet radiation also reaches the earth and has wavelengths in the range 200 and 400 nm.

As these different components of solar radiation penetrate through the earth’s atmosphere, they undergo scattering, which increases their path-length through the atmosphere, and thus makes absorption more likely.

Scattering of white light essentially refers to the interaction of photons of light of different wavelength with the molecules of gases and dust constituting the atmosphere.

The nitrogen and oxygen molecules are much smaller than the wavelengths of ultraviolet and visible light, and go through what is referred to as *Rayleigh scattering*. Per this scattering, the *probability that a photon will be scattered at a given angle is inversely proportional to the fourth power of wavelength*. Thus, the photons of blue light ($\lambda=450$ nm) are scattered more than the photons of red light ($\lambda=600$ nm), and for that matter more than the green and yellow photons. This gives the sky the blue colour that we see.

The water droplets found in the clouds, dust particles and aerosols are much larger than the wavelengths of ultraviolet and visible light, and scatter light independent of the wavelength of the light.

Such a scattering is referred to as *Mie scattering*. The white or grey colour of the clouds is due to this scattering.

Did you know?

Recently, I came across an interesting record, that of *a man with over 1000 children*. Did you know that?

Yes, it was Moulay Ismail, who succeeded to the Sultanate of Morocco in 1672, at the age of 26.

Though he is known for many other things, but he is known to history more for his prodigious capacity for reproduction. I believe the *Guinness Book of World Records* has his entry with 1042 children, from four wives and at least 500 mistresses.

So, it does raise the question about the limit to man's fertility. Various simulations have been run and explanations have been given considering different factors, but it has been concluded that Moulay's record is probably true. Of course, a sane person would find such a record as insane, which was made possible by a tyrant monarch, who could accomplish his desires at the cost of human compulsion and helplessness.

I hope you find these interesting.

So much for this week! Till the next post, stay safe and happy!