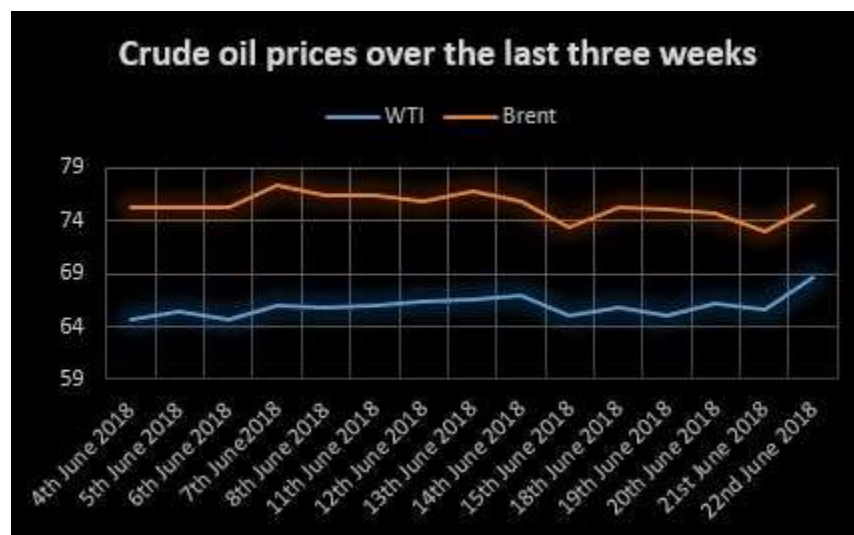
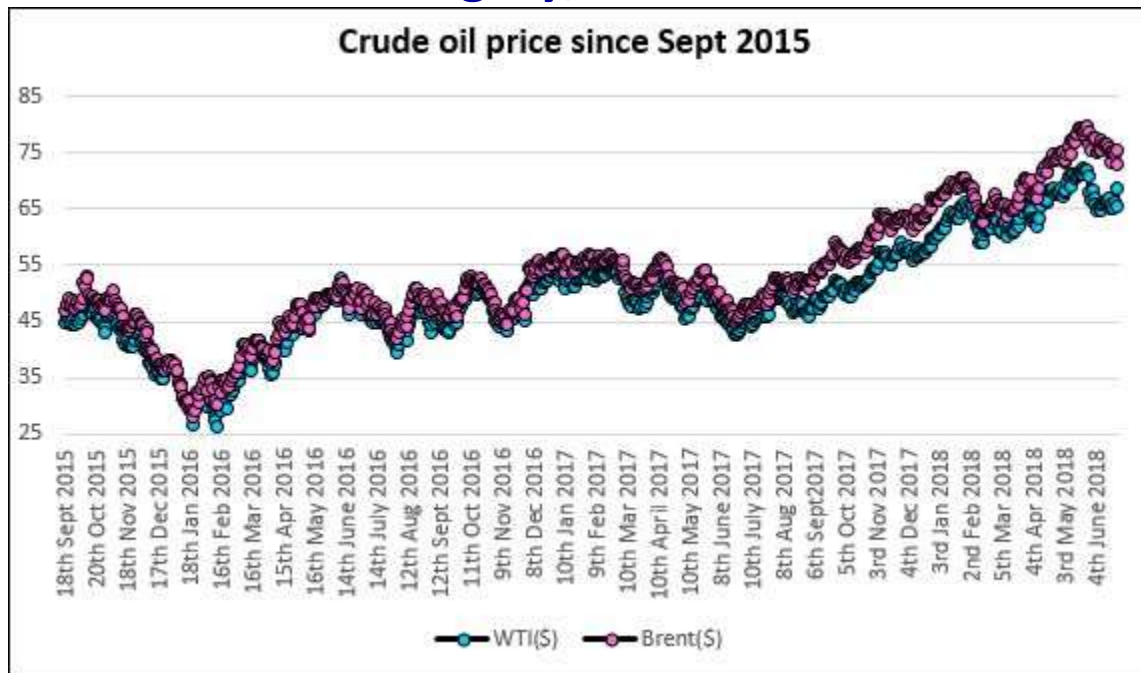


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- The much-anticipated OPEC oil ministers meeting took place at Vienna yesterday, and they agreed to a moderate increase in oil production. Though it was expected that due to different stands that had been expressed by some member countries, there may not be any concrete outcome from the meeting, but consensus did prevail there. OPEC has decided to strive for 100% compliance to the production cuts decided in November 2016, but the member countries that have the spare capacity will increase production in proportion to their allocation. Saudi Arabia was hoping for an increase of 1 mb/d production increase to be agreed to at the meeting, but according to the Nigerian oil minister, Emmanuel Ibe Kachikwu, this amount would be 700,000 b/d. The crude price rallied sharply after this announcement. This decision by OPEC falls in line

with the call President Trump gave recently, and would make the US producers happy. Besides, Saudi Arabia is looking for floating its IPO early next year and would like the oil price to stay strong.

- Earlier in the week some oil companies and energy analysts had suggested that a reasonable production increase should be agreed to by the OPEC, or else the price of crude could reach close to \$100, which will hurt the demand for oil and more investment could be diverted to alternate energy projects around the world.
- Saudi Arabia has been towing a fine line in that it would like to maximize oil revenue without damping demand, it would like the oil price to stay high in view of its pending IPO, and at the same time keep their close ally President Trump on board. In his tweets recently, the latter had sounded critical of OPEC artificially boosting oil prices. According to IMF, Saudi Arabia needs a price of \$87.90 per barrel to balance its budget. Thus, in spite of the higher oil prices this year, the country is expected to post a significant budget deficit this year.
- The US lawmakers recently resurrected the 'No Oil Producing and Exporting Cartel' Act, or NOPEC, which was used a century ago to break up the oil empire of John Rockefeller. The bill would allow the US government to sue OPEC for manipulating the energy market, and seek reparations. It was reintroduced late last month, and the House Judiciary Committee sent it for floor deliberations. Since 2000, the US politicians have tried several times to pass the NOPEC bill, but it was opposed by Presidents Bush and Obama. But President Trump has been critical of the OPEC in the past, and if the bill gathers support at the lower level, he is quite likely to sign it. Given the history of the bill, it is unlikely to reach that stage.

For the lighter side this week

Big data and data analytics are the buzz words these days. The oil and gas industry has always had large volumes of data to acquire, process and interpret, and since the introduction of 3D and 4D seismic, the handling of large quantities of data has only become more prominent. As our industry moved from large mainframe computers coupled with array processors to scalable multiprocessors for crunching large volumes of data, the seismic software, data storage and visualization capabilities were also developed alongside. But in the last decade, our industry has really been grappling with the problem of handling the sheer volume of data, and that has been overwhelming experience for seismic interpreter to say the least. Fortunately, advancements in terms of recognizing and handling such large volumes, or big data, have come along. Advanced data analytic capabilities have been developed that have started enabling oil and gas companies collect and analyze data more effectively, and thus perform better.

Though analytics have the potential for applications in different areas in the oil and gas industry, from upstream, midstream to downstream, but it is important for the top executives or decision makers in companies to be proactive in drawing up plans for embracing advanced data analytics capabilities, and then see their time-bound implementation.

Data analytics refers to a special class of analytical tools or methods that are used to study complex systems, not amenable to traditional applications. It would be in order here to distinguish two terms: deductive and inductive reasoning, as we do below.

- Using logic or reason to form a conclusion or opinion about something is *deductive*.
- Using examples to reach a general conclusion about something is *inductive*.

In the traditional analysis deductive reasoning is what is normally applied. Beginning with simple components and their functioning, and how they affect bigger components based on say the laws of physics, the overall behavior of the large system is deduced. In the data analytics approach, inductive reasoning applications are emphasized. Beginning with a simple curve fitting example, or regression, if that is what is the most suitable analysis for the data at hand, then that would be applied. If that is not the 'good enough' tool for a complex relationship, then some other suitable relationship, or tool will be applied. In fact, based on the available data, some applications may find patterns that represent useful information, other applications may provide some kind of feedback, or 'learning' from the data about the applicability of the method being used, and also self-determine what approach or tool would be more appropriate. Such applications come under the purview of machine learning and artificial intelligence. Such data driven applications are not a replacement for the traditional approaches, but are used in conjunction with them. In some cases, the 'data-driven' applications may be considered, where information is collected on how the system behaves in different circumstances, without paying attention to the internal mechanics about how it came to that conclusion. Such applications come under the category of neural networks, wherein they are first trained, validated and then used to describe the given data.

Next, it may be appropriately mentioned that though some newer techniques or their applications are being devised and implemented in the seismic context, not all the tools in the data analytics toolbox are new. For example, neural networks, fuzzy logic, support vector machines, etc. have all been used before, but in a narrow application scope that have yielded limited value. But their recent applications, alone or otherwise in conjunction with other tools, on big data does provide more convincing results. Thus, data analytics essentially refers to the effective application of a variety of simple-to-sophisticated statistical analysis tools that use a so-called evidence-based approach in decision making, and that too in a quick turn-around time. For doing all this, reliance is made on high computing power that is available these days, which also seems to help. The applicability of the techniques or tools in data analytics could have their own assumptions and limitations, which may be borne in mind all the time. Besides, the statistical assumptions required, the results obtained with data analytics need to be checked so as to ensure that they are convincing, and carry very little uncertainty. Here the human expert input is mandatory. Thus, data analytics will benefit from big data, keeping the aforesaid in mind.

Finally, a word about human decision-making. It could be limited or imperfect. The reasons could vary from the limited attention span the human mind has, its limited capacity for computation of the available information, and to be able to focus on an issue or a problem. Therefore, data analytics applications on big data, where the human mind limitations, or the information processing capacity are overcome, is the future for your industry. No wonder we hear so much hype about these all the time. More on this another time.

I hope you find these interesting.

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