

24 / The signalling effect of oil inventories suggests further support for crude oil and E&P into late summer early autumn

The American Petroleum Institute and Energy Information Administration data on crude oil inventories in the United States weekly reports last week were deemed by media and pundits as supportive of the price of crude oil. The API said that stocks rose by only 38,000 barrels for the week ending on August 24 while the EIA reported a 2.6 million barrel decline in inventories. The API reported small increases in product stocks as of August 24 as gasoline and heating oil rose by 21,000 and 982,000 barrels respectively. In terms of products, the EIA report was considered more bullish by the media with declines of 1.6 million barrels in gasoline stocks and 800,000 barrels of distillate inventories.

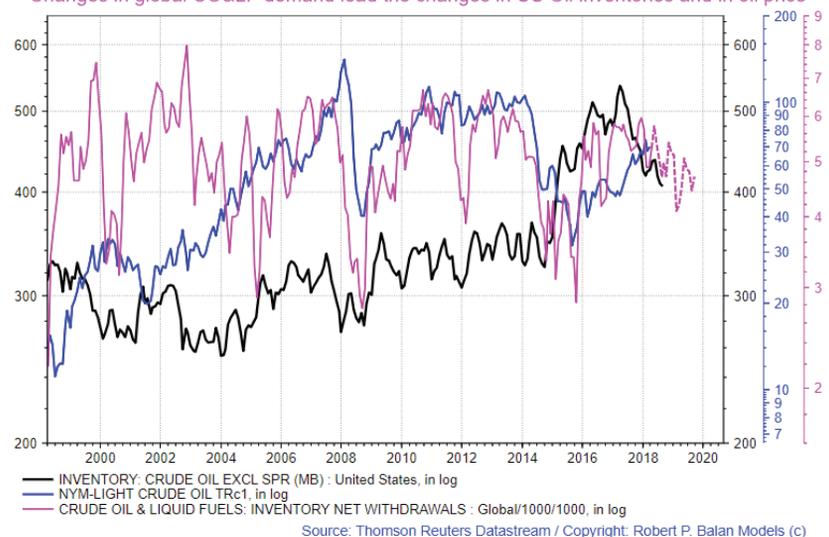
U.S. crude oil production is at the 11 million barrel per day level, deemed high by pundits, but the lack of sufficient pipeline networks in regions like the Permian basin and other areas has prevented stocks from exploding. At the same time, demand for gasoline and distillate products because of buoyant economic conditions has supported the price of the energy commodity, and refineries work overtime to keep pace with demand. Energy prices generally rose after those reports.

This narrative has conflated the demand for gasoline and distillate products with the lower inventories AND the corresponding rise in crude oil prices. **What this bullish narrative did not, and cannot, explain is the fact that the reports also said petroleum inventory has been at the highest since November 2017 (red line in the 1st chart on this page).** The pundits have been very selective in picking the rationale of their bullish argument (see 1st graph on this page). The primary thrust of their arguments is that lower crude and product inventories (the inverse of higher supplies) should not negatively impact the oil price discovery process. However, why wouldn't higher petroleum inventories have the

US petroleum inventories' deep links to USD, oil imports, exports, global demand
Oil and petroleum inventories build (after a lag) as global oil demand and consumption expands
Stronger US Dollar is first indication of strong US, and thereafter, global oil demand



Global CO&LF inventory withdrawals, US oil inventories, Crude oil price
Changes in global CO&LF demand lead the changes in US Oil inventories and in oil price



opposite impact? Why is this data being ignored as an important element in setting the price of oil?

It pays to go through the data which impact US oil inventories. The US Dollar plays an important role in the draws and builds; moreover, the US Dollar's lead is spectacular. The EIA's consumption forecast is not bad at all. **Total petroleum inventories lag the Oil inventories by about 8 weeks (we don't know why -- perhaps reporting issues).** Therefore, you can use the Oil inventories to forecast total petroleum inventories (which is unusual). After about a week or so from now, you will have a curious situation where US oil inventories will be rising, and total petroleum inventories will be falling (see 1st graph on this page).

The oil trading universe considers lower inventories (in crude and products) as one prerequisite for rising prices. And builds in inventories are to be shunned, as these are considered harbingers of lower oil prices. But are these suppositions correct?

You should not fear the build in petroleum and oil inventories. The build of inventories is a natural consequence of improving demand for oil crude oil and products. It is inventories being stockpiled in anticipation of near-term consumption. Crude oil cannot be a just-in-time inventory material -- you need some lead time before it is available for consumption. So that is what happens -- demand and consumption increase; inventories

build in anticipation of the bonanza. We can actually show that inventories build at the heels of higher demand and consumption (see 2nd chart on previous page). **Note also that crude oil prices have a general tendency to follow changes in CO&LF demand trends.**

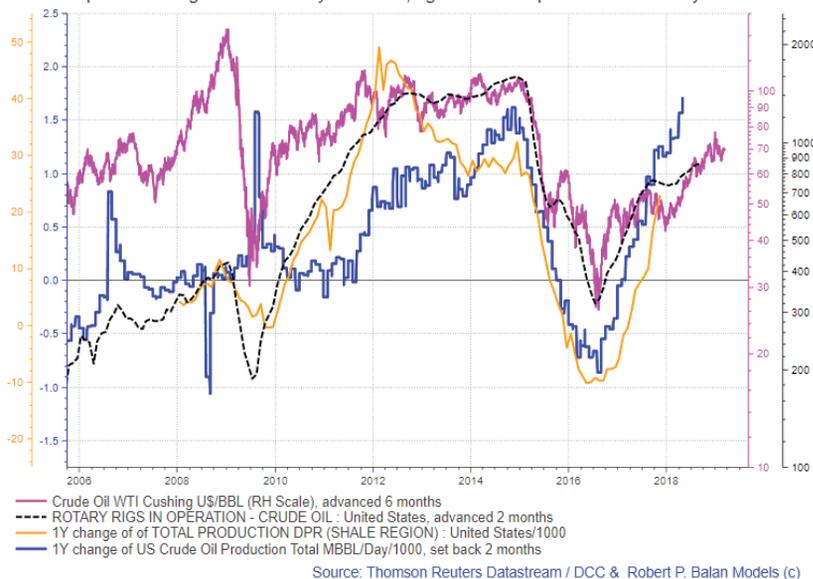
Think about it (think like a businessman): who would stockpile inventories (in anything) if there is no existing (and improving) demand or consumption trends? Inventories are not residuals of supply less consumption. Supply from production is a function of oil rigs; and the oil rig count is in turn a function of the oil price. Higher oil price begets a higher oil rig count after 6 months, and more oil rigs in turn produces more oil 2 months after the change in oil rig count. Look at it this way, changes in oil production substantially lag behind changes in inventories. There cannot be a link direct between changes in inventories and production, except on lagged, cumulative basis (see 1st graph on this page).

That oil inventories are residuals of supply less consumption is a common misconception of economists which fails Econ 101. No right-thinking business person will order crude oil (in large quantities) if there is no demand for it (with the exception of the arbitrageurs).

The build in inventories is healthy sign. **Moreover, the builds lag actual demand and consumption trends and therefore are not really part of the oil discovery process.** They may affect sentiment, but its impact disappears after a day or two. In fact, that is what actually happened two weeks ago when petroleum inventory soared, and oil prices fell by more than 2%. However, the memory of one of the largest builds in petroleum inventories seen in several months was quickly forgotten after two days, as the impact of rising global oil consumption seeped into market data and oil prices started the run that we are seeing at present

Temporal Order: Oil Price, US Rig Count, US Shale & US Total Production

The oil price leads rig count trends by 4 months; rig count leads production trends by 3-4 months



GASOLINE, OIL DEMAND TRACKERS vs WTI Spread (CL1-CL3), CLc1



(see 2nd chart on this page). **The message: do not fear inventories; they can also be signs of good times.**

Since we understand that inventories lag so far behind consumption and demand data that it is difficult to accept them as prime movers of oil. What can we use it for (to justify all the trouble that we go into understanding its genesis), and how does it really impact the price discovery process for oil prices and E&P equities?

The simple answer: oil inventories is the hard (but lagged) data for oil consumption. We know that inventories as temporally displaced consumption. We know the average lag between the two variables. We then set out to prove if the two variables have similar mathematical identities, so we

can use them both to arrive at a future trajectory of oil prices.

The first step: if we push the inventory data ahead, we can synch the two variables. If they match (and they do) then we know that inventories are real representation of consumption.

Consumption (and expectations of demand; e.g., forward demand) is what really drives oil and E&P prices. We explained earlier that this forward demand can (and does) promote inventory holding, which in turn can help raise price levels. There is a looped (feed-backed) relationship between inventories and oil price because rising oil prices also encourages inventory building. Technically expressed: stocks will increase if forward prices exceed

current spot prices by enough to cover storage. Moreover, strong demand for crude in the future relative to contemporaneous demand can also sustain high prices or cause prices to rise even if current inventories are plentiful.

Put simply, the propensity to build inventories, and thus the energy sector's capacity to satisfy unexpected demand, is set in large part by expectation of future demand and the current price (term) structure of crude oil.

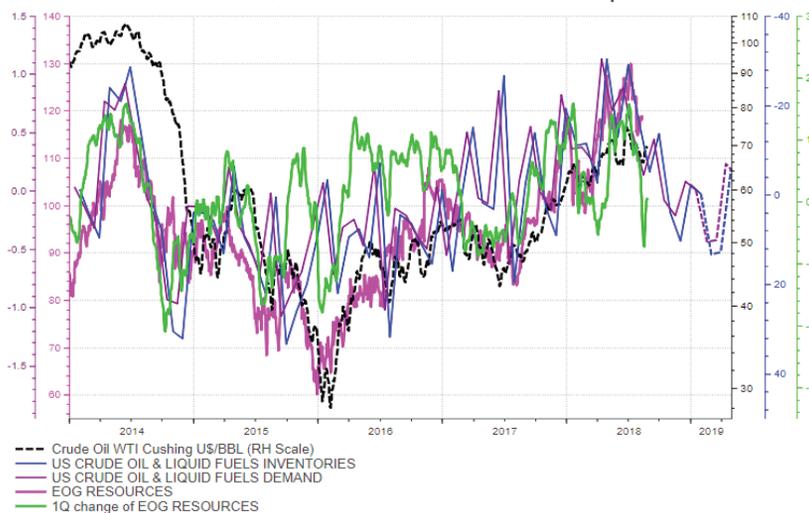
Finally, we then take the final step. We extend the two synched variables by Vector Autoregression (VAR); if the results show that the projected results are still consistent with each other, then we know we have a valid forecast construct in our hands. And that is what happens in this case (see 1st graph on this page):

Oil prices and E&Ps, according to this construct, will be rising until this autumn, then fall precipitously into late Q4 2018. This is entirely consistent with the implications of the oil demand tracker model vs WTI Oil prices. Two different approaches, two different modelling works, one unified conclusion. It cannot get better than that. Better still, we have shown that utilized properly, oil inventories can be useful despite their significant time lag to actual demand.

What happens when we put all the elements that typically go into conventional oil price trajectory analysis? Taking the aggregate of global CO&LF production, supply, demand and consumption yields results which are then extended by VAR analysis. **The results are hardly surprising -- they bear very high resemblance to the structure that was produced by the demand cum inventory process.** (See 2nd chart on this page)

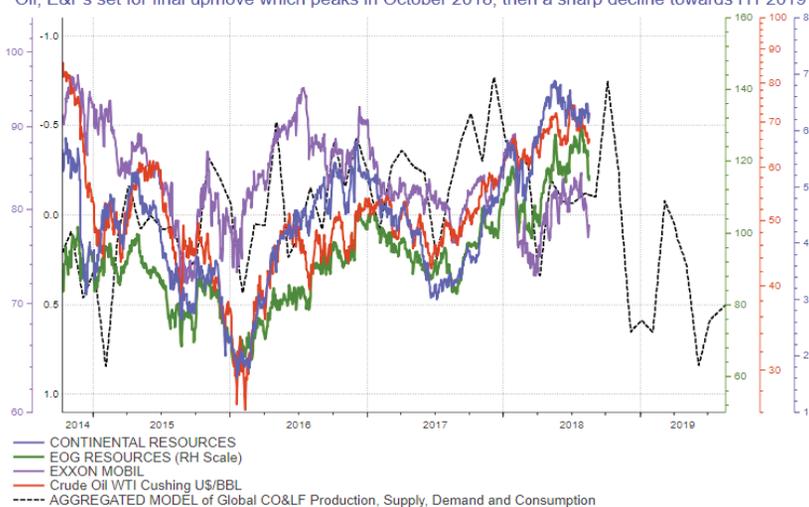
Not surprisingly, the route taken by oil prices and E&P equity prices resemble the liquidity flow changes of the global central banks' balance sheets (see 3rd chart above). This is

US oil inventories, demand models vs WTI price vs EOG



Source: Thomson Reuters Datastream / Robert P. Balan (c)

Aggregate model of global CO&LF production, supply, demand and consumption Oil, E&Ps set for final upmove which peaks in October 2018, then a sharp decline towards H1 2019



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the macro equivalent of the impact the Fed's and Treasury's liquidity flows have on equities, and indeed commodities, on a day-to-day, week-to-week, basis. That is also the reason why crude oil demand forecasts, properly done, are indicative of where economic growth will likely go, as we discussed before in earlier editions of

Capital Observer. This makes sense, as economic growth is, by first principles, the driver of equity and commodity prices. To us, this lends credibility to the route for oil prices and E&P equities projected by the aggregated value of CO&LF production, supply, demand and consumption (see 3rd graph above).

Summary:

There is no single factor which will explain oil prices. The oil market is an economic system where changes in one element almost always affect all the other elements. Unfortunately, the system has no starting or ending point. Rather, it is better described as a circle or an ellipsoid.

There would seem to be no reason for crude prices to rise in a world where crude is plentiful; under normal conditions, the supply of crude can almost be a given if there are no geopolitical events which prevent producers to ship or transport it. The capacity to turn crude into products is, however, limited -- by definition -- and by comparison to the relative ease in producing oil supplies.

This constraint works with demand to produce most of the high frequency changes in oil prices. When we speak of demand, we speak of demand for products. Consumers do not use crude oil -- they consume oil products. But those relationships are governed by feedbacks, giving rise to the ellipsoid characteristics of the oil price discovery process.

A boost (decline) in crude supply can depress (raise) product prices, just as a drop (rise) in product demand will usually lower (boost) product and crude prices.

At times, crude prices lead product prices. At other times, product prices lead crude prices. Nonetheless, it is clear to us: **changes in spot product prices due to changes in product demand generally leads to changes in oil prices (and E&P equity prices). We came to this conclusion by modelling the relationship between the change in product prices and the change in crude values.** We will articulate this hypothesis in our next oil-related article at the Capital Observer.

The demand trackers, are good forecasters of future oil and E&P prices (see chart below). In fact, some

GASOLINE, OIL DEMAND TRACKERS vs WTI Spread (CL1-CL3), CLc1



Source: Thomson Reuters Datastream / Robert P. Balan Models (c)

Positive correlation (and lead) of the US Dollar with US Refiners' equities

A strong US Dollar improves export profits of US major refiners; hence rising USD is positive for refiners



Source: Thomson Reuters Datastream/ Copyright: Robert P. Balan Models (c)

E&P equities lag behind the evolution of gasoline and oil prices by 7 trading days (XOM) so that you can use both the demand trackers AND oil prices to forecast changes in those E&P equities. Implication from the data: the possibility for a run up into early autumn before more challenging time.