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Have the Stars Aligned for Higher Oil Prices?

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The market for WTI crude has been flirting above $100 per barrel since February and the futures market is at $100 for July and August deliveries. When crude oil prices go up it puts a burden on everyone, everything that's delivered on a truck goes up – food, beer and steel, to name a few. Transportation (land, water and air) consumes more than 2/3 of the oil produced, heating and industry account for the rest.

World oil demand peaking

Following a recessional drop in demand of 2 million b/d in 2009, 4Q10 saw the greatest spike in world demand since 2004 with a jump of 1.4 million b/d from 1Q10, subsequently reaching record highs. All economic indicators show that the recession is behind us and the world economy is expected to grow at a strong 4.4% interannual rate through 2015. Most oracles (ExxonMobil, Total, OPEC, EIA and IEA, in that order) point towards a demand of 100-105 million b/d by 2030, up roughly 20% from the 2010 level of 87 million b/d. This increase symbolizes a growth rate of 650-900 thousand b/d per year over the next 20 years. Can global oil supply keep up with this vigorous demand? Imbalances in supply and demand critically shape the behavior of oil prices.

The oil supply picture

Oil supply is a mix of four ingredients: a) crude oil and condensates produced at the wellhead from 40,000+ oil fields in 90 countries; b) NGLs or natural gas liquids extracted from the gas produced mainly from gas fields and from some of the gas produced with the oil; roughly half of all the gas produced around the

world is processed in plants in 50 countries, c) refinery gains are volume increases obtained from the molecular break down of heavy oils, and d) biofuels are the emerging fuels obtained from processing corn and sugar cane. There are also small quantities of 'other liquids' from non-hydrocarbons and coal derivatives. Crude oil is the mainstay of supply accounting for 85% of the total mix. It is also the only source of spare or back-up capacity for any supply disruptions!

The oil supply scenario over the last 5 years as summarized Table 1 underscores several factual trends: a) a total oil supply growth rate of 420 thousand b/d per year, all on the back of NGLs and biofuels, in stark contrast to an expected demand growth rate of 650-900 thousand b/d per year, b) crude oil supply is at a plateau, c) NGLs and biofuels are the only ingredients showing growth – 160 and 230 thousand b/d per year, respectively.

The NGLs 5-year growth rate of 160 thousand b/d per year is slightly less than its long term (10-year and 15-year) trend of 200. IEA's outlook through 2030 doubles this long term growth rate with the bulk coming from the OPEC countries. OPEC's NGLs growth rate has been soft (80 thousand b/d per year) over the last 5 years.

Biofuels is the 'new' fuel. Its growth rate was just 36 thousand b/d per year before 2005. Following an initial jump attributable to government directives & support, growth rate subsequently decreased to 150 thousand b/d per year in the last 2 years. This is attributable to unintended concerns such as land use changes, competition with food supply and fresh water resources, etc, making prognosis of future growth somewhat tenuous. BP's 2011 outlook uses a growth rate of 250 thousand b/d per year through 2030, similar to the present 5-year average, and coming mostly from the US and Brazil.

Coincidently, the timeline covering the past 5 years provides a unique insight into supply/demand trends before, during and after a giant recession. For the first time in over 100 years we have seen a continuous climb in oil prices (Fig. 1) over a prolonged period (2004-2008) *driven mostly by market forces*. Previous price increases – there were three since the 1970s – were characterized by jumps *mostly driven by geopolitical events* (embargos, revolutions and wars). In this same vein, the run-up in prices through mid 2008 provides a benchmark for crude oil supply at

its maximum capacity – all producing countries were doing their utmost best to take advantage of an unprecedented price bonanza.

Is the 5-year oil supply growth rate of 420 thousand b/d per year representative of the future trend? The comparable 10-year (2000-2010) growth rate is 890 thousand b/d per year but this dropped significantly to 420 thousand b/d in the last 5 years following a zero growth rate of crude, the primary component of oil supply. Crude oil output was at an all time high of 63 million b/d when the 1980 recession began and dropping a huge 10 million b/d by 1982 as world demand shrunk. Recovery was slow and it took 15 years for crude ouput to return to 63 million b/d, thereafter rising to 68 million b/d in 2000 and to 73.7 million b/d in 2005. From then on it has remained flat all through the sharp run-up in prices to 2008 and to the present day. Output has increased just 10 million b/d over 30 years in spite of 400+ billion barrels of new oil discoveries during the same period. The culprit of this non-linear behavior is field decline dynamics which unfortunately is not well understood by analysts.

It is important to note that the plateau trend of crude oil over the past 5 years also extends to all oil producing regions with the exception of Europe which is in decline (Table 2). This would certainly indicate a worldwide state of very limited spare capacity, if any. Previous studies (Sandrea, O&GJ Nov. 23, 2009) show that this trend was predictable and may be sustained through 2015 with global production entering a slow decline thereafter. Crude oil production capacity is expected to return to 63 million b/d by 2030 – a negative growth rate of 500 thousand b/d per year.

OPEC's supply pattern essentially mirrors the global print as illustrated in Tables 1 and 2. At the start of the 1980 recession, OPEC was producing 30 million b/d of crude, a then all time high, falling to a low of 14 million b/d by 1986 and finally returning to the previous high 25 years later. In concert with rising oil prices since 2004, OPEC's output reached a new high of 32 million b/d in 2008 so overall they have been able to generate a net increase of merely 2 million b/d over 30 years. As a result, their contribution to the expansion of global crude supply during this 30-year span was just 20%.

Closing Remarks

Consequently, any growth in supply to satisfy an increasing oil demand would have to come from NGLs and biofuels as has been the case in the last 5 years. A significant contraction in demand from the transportation sector is almost mandatory in the short term. The irony is that high gas prices at the pump essentially act as a 'direct' tax on consumption. Fortunately, vast reserves of natural gas that have been discovered in the US in the past 5 years can now become an important source of transportation fuel in the form of CNG. This would further open opportunities for other fuel concepts such as hydrogen/natural gas blends or HCNG which have already been tested by the US DOE, and eventually for fuel cell vehicles (FCVs). Natural gas prices are currently 1/5 those of oil on an energy-equivalent basis!

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Table 1: World Oil Supply 2005-2010

million b/d

	2005	*2008*	*2010*	*Growth, kb/d/year*
Crude Oil	73.7	73.7	74.0	flat
NGLs	7.6	8.0	8.4	160
Refining gains	2.1	2.1	2.2	flat
Biofuels	0.7	1.5	1.8	230
Other Liquids	0.5	0.2	0.2	
WORLD	84.6	85.5	86.7	420
OPEC	***34.9***	***35.5***	***34.5***	flat

Notes: Crude oil including condensates account for 85% of total supply; NGLs 10%; Refining gains 2.5%, Biofuels 2.0%.
Sources: EIA; BP, OPEC, O&GJ

Table 2: Regional *Crude* Oil Supply 2005-2010

million b/d

	2005	*2008*	*2010*	*Growth*
Middle East	23.1	23.3	22.7	flat
Iran	*4.1*	*4.1*	*4.1*	
Saudi Arabia	*9.5*	*9.3*	*8.9*	
Eurasia	11.1	11.9	12.5	slight
Kazakhstan	*1.3*	*1.3*	*1.5*	
Russia	*9.0*	*9.4*	*9.7*	
N America	10.9	10.3	10.8	flat
Canada	*2.4*	*2.6*	*2.7*	
Mexico	*3.3*	*2.8*	*2.6*	
USA	*5.2*	*5.0*	*5.5*	
Africa	9.6	10.0	10.0	flat
Algeria	*1.8*	*1.8*	*1.7*	
Angola	*1.2*	*1.9*	*1.9*	
Libya	*1.6*	*1.7*	*1.7*	
Nigeria	*2.6*	*2.2*	*2.4*	
Asia/Oceania	7.4	7.5	7.7	flat
China	*3.6*	*3.8*	*4.0*	
Indonesia	*1.0*	*0.9*	*0.9*	
C&S America	6.3	6.3	6.4	flat
Brazil	*1.6*	*1.8*	*2.0*	
Venezuela	*2.6*	*2.4*	*2.4*	
Europe	5.2	4.3	3.7	declining
Norway	*2.7*	*2.2*	*1.9*	
UK	*1.6*	*1.4*	*1.2*	
WORLD	73.7	73.7	74.0	flat
OPEC	*31.9*	*32.5*	*32.1*	flat

Notes: Top 10 Producers: Russia (9.7 mb/d), Saudi Arabia (8.9), USA(5.5), China (4.0), Iran (4.1), Canada (2.6), Nigeria (2.4), UAE (2.4), Iraq (2.4) and Venezuela (2.4) account for 60% of current world crude oil (& condensate) output. OPEC was producing 30.5 mb/d in 1979, dropped to 14.5 mb/d in 1986 and recovering to 30.5 mb/d in 2004.

Sources: EIA, BP, OPEC
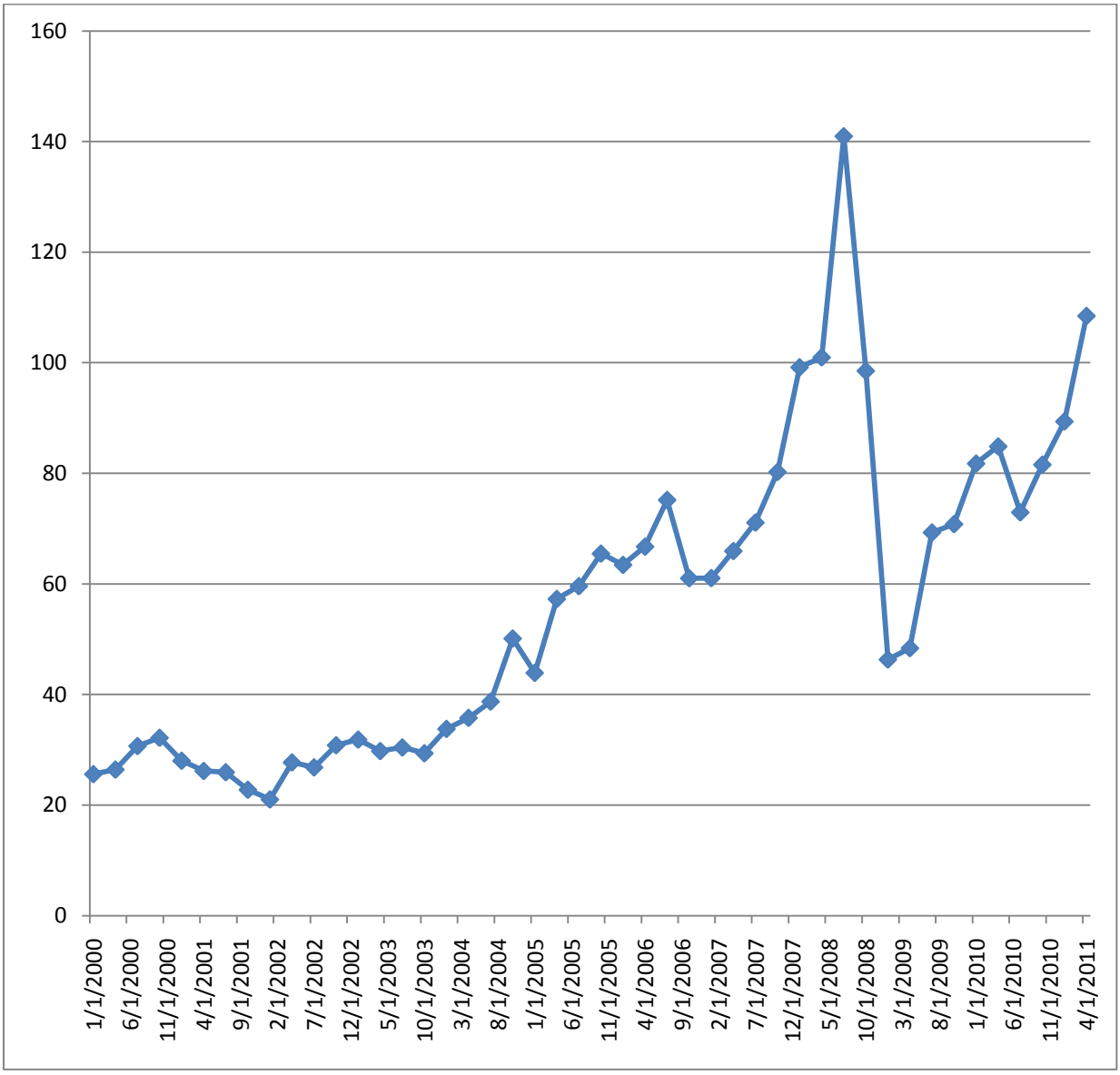
Fig. 1: Monthly Oil Prices (WTI) since 2000