Peak Oil May Be Imminent

By Douglas B. Reynolds*

China and Oil Demand

There is inconsistency surrounding China's official GDP statistics. For example, in an Economist article (*Economist* 2015a) about China's North East industrial area, it shows a graph that has a zero growth rate for that specific region. However, within the same article, it is explained that sales in a specific retail store are way down, and not at the same level, which would normally indicate that there is a recession in China's North East industrial area, not zero growth. In another *Economist* article (*Economist* 2015b), Chinese coal demand is revealed to be down 8% from a year ago, and coal imports are down 38%. Such a decline in coal use is not consistent with an official Chinese growth rate of 7%. Moreover, Europe, Russia and Japan are all in economic slumps which might imply that Chinese exports are probably in a slump. So a decline in industry, a decline in coal demand and a possible decline in export markets all point to one conclusion: China could be in a recession and may not have an official 7% growth rate. It is possible, though, that other non-coal, non-export and non-industrial sectors are booming such as real estate construction growth and service sector growth which may be able to overcome an industrial decline. Yet, growth in services would still need more coal fired electric power, while growth in construction would still need more steel. This leads to the conclusion that China may be in a recession.

If it is true that China is in a recession, then the story of the recent oil price decline has more to do with Chinese, Japanese, Russian, Brazilian, and European oil demand stagnation, due to slow economies, then with Saudi Arabian and shale oil supply increases. Indeed, Europe has had declining oil demand for a decade.

The usual story of the oil price decline is that Saudi Arabia has increased oil supplies, or at least has not reduced them, for the purpose of putting shale oil producers out of business. However, the Saudis would have to pursue such a goal for a long time to put American shale oil out of business. If any one U.S. shale oil company cannot pay their bills, they can declare bankruptcy and those shale oil assets would be resold at a low price to new investors looking at the temptation of available shale oil returns. Those new investors will simply buy up the old assets of the bankrupt firm and find out-of-work shale oil workers to run a new company and start up a new shale oil firm at the same location and with the same reserves as the old bankrupt business, which is to say, you cannot kill the American shale oil industry that easily, it will just reinvent itself. A Saudi induced oil price decline can temporarily reduce drilling and production, but then as soon as prices revert to high levels, the rush will be back on.

However, over the last year, Saudi Arabia has not changed its oil production levels by much if at all. It's only commentators, who see no change in Saudi production, and who are interpreting this as a sign that the Kingdom is actively manipulating markets that's making it seem as if Saudi Arabia is actively doing anything. Commentators see this because they probably remember how Saudi Arabia did manage oil prices to some degree in the 1970s and 1980s and still think of Saudi Arabia as a great oil price manipulator. Unfortunately, now that the Saudi's have mature oil fields, there may be less room for changes in their level of oil output than in earlier years, as is often the case in mature oil fields. If you temporarily reduce oil output in a mature field, you create oil reserve destruction. So, you don't want to make a lot of sudden changes in the level of oil production, geologically speaking, lest it cause you to produce less oil in the long run. Plus, if Saudi Arabia reduces its oil production, it can hurt some of its refineries' profits. Saudi Arabia also wouldn't invest in a lot on new oil fields, just to put shale oil producers out of business, as that would produce more non-performing assets and have little effect on the long run American supply market.

All of this suggests that the oil price declines of the past year are demand side price declines more than they are supply side price declines, but the dynamics are about to change.

The Recent Trend in Supply Increases

With the fall in oil prices, there has been much discussion that there is a new horizon of ever expanding shale oil supplies, and even such proclamations that the price of oil will soon reach $20 per barrel. Yet much evidence shows peak oil to be imminent. To explain, you need to understand the worldwide Hubbert curve trend shown in Figure 1 and as explained in Reynolds (1999a, 1999b and 2014). Figure 1 shows average yearly production of oil in millions of barrels per day (mbd) as a function of cumulative production in billions of barrels. The Hubbert trend is the upper curve, and the actual production is the lower curve. Notice that every time the actual oil production gets close to the Hubbert

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trend the price of oil rises, and vice versa when production goes well below the trend which is shown in Reynolds and Baek (2012). The trend peaked in 2005 then plateaued until 2009 whereupon high prices and some technology had an effect on the production engineering and a new 2nd Hubbert curve trend emerged even for conventional oil.

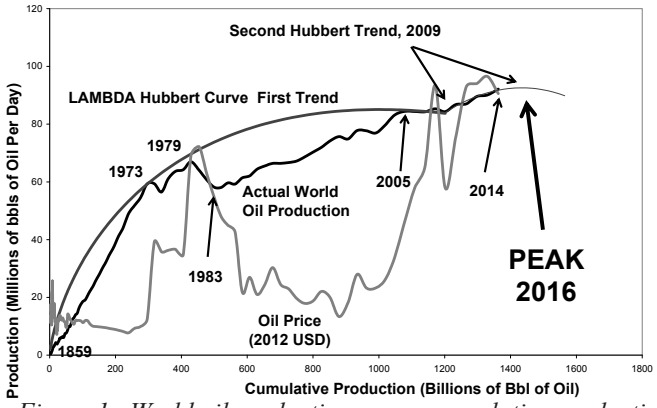

Figure 1, World oil production versus cumulative production.

When actual production comes close to the trend, oil prices rise.

The 2nd Hubbert cycle, starting in 2009, has followed a new trend in the tradition of Reynolds and Kolodziej (2009). The amount of extra oil production above the old Hubbert trend is, so far, about 8 mbd, of which 5 mbd is from the U.S. including a little more than 1 mbd from North Dakota's Bakken Shale and more than 3 mbd from Texas and New Mexico mostly from the Eagle Ford and Permian Basin fields. Canada has added an extra 1 mbd since 2009 mostly from tar sands production and some shale oil. This means shale oil is about 5% of world production, and mostly from the three main American regions, Canadian tar sands is about 2% of world production, and conventional oil is 93% of world production. Much of the rest of the increase in world oil supplies, since 2009, is from conventional oil in the Middle East.

This sudden rise in a 2nd Hubbert trend after an initial peak in the first Hubbert trend is not unusual, see Brandt (2010 and 2007) and Hubbert (1962). We have seen these sudden conventional rises of 2nd Hubbert cycles in the past in large regions, such as in the U.S. in 1977, see Reynolds and Zhao (2007), and in the Union of Soviet Socialist Republics (U.S.S.R.), also known as the Former Soviet Union (FSU), in 1985, see Reynolds (2000) and Reynolds and Kolodziej (2008). The 3rd Hubbert cycle of the FSU in 1996 was due to a fundamental change in institutions, prices, technologies and property rights, see Reynolds and Kolodziej (2007), the likes of which are not on par with what is happening for the world's 2009 2nd Hubbert cycle. So comparing the 1996 FSU 3rd Hubbert cycle to the world's 2009 2nd Hubbert cycle would be inappropriate. Therefore, the 2009 world's 2nd Hubbert cycle has more in common with the 1977 U.S. and 1985 U.S.S.R. cycles rather than the 1996 FSU cycle.

If, though, we compare the 1977 U.S. 2nd Hubbert cycle and the 1985 U.S.S.R. 2nd Hubbert cycle to the world's 2009 2nd Hubbert cycle, where the former large region histories had only temporary increases in supplies before a new peak occurred, then that suggests that within the next few years, worldwide conventional oil will peak. If conventional oil does peak then a mere 1% per year reduction in conventional oil production would require a 20% per year increase in oil shale and tar sands production to keep world supplies even—a difficult task for only three major shale oil regions and a tar sand region to attain given their already high levels of production. While the shale oil regions have already sustained a better than 20% growth rate over the recent past, they would need a 40% or greater growth to sustain growing world economies. Such growth rates will become harder to sustain as the fields become more densely exploited. For example the U.S. sustained a greater than 7% growth rate in oil production for decades at the beginning of the 20th century, but that entailed the use of many fields and regions. The U.S.S.R. sustained a 10% growth rate in the early 20th century for many decades, also using many fields and regions, so a 40% growth rate with only three regions would be a challenge. Even if tar sands can increase by about 10% per year from a 2 mbd base, that still does not look to be enough to maintain a level world production rate, let alone have worldwide increases in production, should conventional oil production soon peak.

If we look outside of the U.S. for new shale oil fields and regions, there has yet to be a lot of shale oil production, even though there are many potential fields. It is telling that the shale oil industry has had about ten years of high oil prices and technological breakthroughs that would normally help to get more shale oil regions on-line, and yet only the three major regions, the Bakken, the Eagle Ford, and the Permian, have emerged worldwide to produce a lot of new energy liquids. Most other shale regions have not yet developed, even with the high oil prices of the past decade, or those regions have shale gas and not oil. Since only 60% of the world's 2nd Hubbert cycle increase is from shale oil, and since such a performance of rapid increases will be hard to sustain for the three major regions, and since other shale oil regions have yet to develop even with these past high oil prices, then, the conclusion must be that producers will be hard pressed to increase shale oil production fast enough to fill the void between normal world oil demand growth and world conventional oil supplies as soon as conventional oil peaks.

With so much of the discussion of the lower oil prices being attributed to shale oil, there is a disconnect between the real cause for the recent decreases in prices—a slowdown in demand—and the perceived cause—an increase in oil production.

Fiscal Systems Changes

The other aspect of the coming peak in oil production is that oil producing governments around the world will quickly ratchet up their oil fiscal system taxes and government takes, as soon as oil prices begin to rise. According to Johnston (2003) there are different fiscal systems such as profit taxes, production sharing agreements and royalty schemes, which are used by oil producing countries and provinces in order to share the wealth of oil production. The idea is that these governments are trying to use a fiscal system in order to maximize revenue, but also to maximize their industrial development, their employment and even their environmental protection. The usual idea behind such fiscal systems is that the regional government hires a set of consultants to find a maximizing system, and as such the driving factor of the oil production supply side market is these various fiscal systems, i.e., the fiscal systems determine oil supply and indirectly the price of oil.

Another way of looking at fiscal systems is that instead of the fiscal system determining the supply and the price of oil, it is the price of oil that determines the fiscal system. This is Reynolds' (2002) idea of the Walmart or Neiman Marcus strategy coming into play. The idea is that when oil prices are low, governments pursue a strategy of having low government takes in order to induce more investment and increase exploration and development, which indirectly maximizes production quantities, rather like how Walmart makes money by having low prices but high quantities of sales. When oil prices are high, governments then pursue a strategy of having high government takes which can inadvertently reduce exploration and development but which maximizes the revenue per barrel of oil, rather like how Niemen Marcus makes money by having high prices even as it has a low quantity of sales. This suggests that when oil prices change, so will all the fiscal systems of the world.

While the ratcheting up of fiscal system government takes will not quickly effect current world production up or down, it may indeed affect current exploration and development downward, especially in shale oil regions, and, therefore, the high oil prices can induce a slowdown of new oil production coming on line, rather than speeding it up as one might expect in a high oil price environment. Therefore, rather than a counter cyclical spiral of first increases in prices followed by increases in supply followed by decreases in prices, you can have a pro-cyclical pattern of downward supply and upward prices followed by even less supply and even higher prices. That is, once peak oil starts, oil prices will rise. Once oil prices rise, fiscal systems will tighten due to the Neman Marcus strategy. Once fiscal systems tighten, you may get oil production declines rather than oil production increases. Consequently, supply is constrained all the more and oil prices rise all the more, inducing even greater government takes and so on. (Full disclosure: I invest in futures.) It could be a true oil price shock of epic proportions.

This hypothesis of the price effecting the fiscal system more than the fiscal system effecting the price is possibly about to occur on a massive scale as oil prices are about to shock upward. Assuming there are enough research economists left out there to do the research, after the financial crisis cut backs, then this would be an excellent field of study. However, oil prices won't shock upwards next decade, but more like next year or next blue moon (two to three years) or maybe even next month.

The Oil-Economy System

The world's economy is really an oil-economy system that should be viewed as a physical-engineering system that relies on oil dependent technologies. When oil supplies decline, the oil based system is forced to use less oil, and consequently less oil-dependent technologies which then reduces productivity which must of necessity reduce GDP. Once GDP declines, monetary and fiscal policies, which are used to increase economic growth, kick in. However, the G-8 (the top 8 developed countries) central banks' abilities to use monetary policies are limited right now due to all of the quantitative easing already carried out for the 2008 financial crisis. Plus the G-8 governments' abilities to use fiscal policies are limited due to all the debts already accrued to fight the same financial crisis. Therefore, the G-8 central banks and governments have no more leverage to change economic policy. The world economy, then, may be rather less like riding an elephant with slow changes in momentum and slow turns and more like riding a surfboard where the slightest perturbation can cause a quick flip, which is exactly what happened to the former Soviet Union in the late 1980s. If the 2nd Hubbert oil cycle peaks soon, then oil prices will increase quickly, and then as happened in the U.S. and the West in 1970s, and as happened in the U.S.S.R. in the late 1980s, see Reynolds (2011a and 2011b), the peak in oil supplies could create a wage and price

spiral that should increase the velocity of money and push all of that Federal Reserve quantitatively eased pile of high powered money back into the economy. This may create, as happened during the fall of the Soviet Union, hyperinflation with stagflation.

At that point, many will clamor for governments to put in place additional safety nets as the world's economies suffer, yet governments around the world may soon enough be experiencing peak government and will not be able to help many people. Then it will be up to the free markets to overcome an oil shock, it's just that there is very little ability for free markets to change the oil supply side and much more ability for free markets to change the oil demand side. Indeed, it was the oil demand side that saved the U.S.S.R. when it endured a massive recession while the FSU adjusted its entire economy. The former Soviet oil shock of the late 1980s did not make the economy more efficient as much as it simply forced people to live with less. See Orlov (2008). Therefore, as the world is forced to endure an oil price shock, preparation cannot be done on a government level but on an individual, regional and corporate level. As the Netherland Bureaus for Economic Policy Analysis (CPB 2004) states about oil supply disruptions, "Establishing and maintaining well-functioning markets appears to be an efficient approach in realizing a secure supply of energy." It is just that this does not mean we will have cheap supplies of energy.

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