The Oil Drum
DISCUSSIONS ABOUT ENERGY AND OUR FUTURE

A Closer Look at Oil Futures

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[editor's note, by Super G] From the contributor formerly known as thelastsasquatch.

Fossil fuels comprise the largest commodity markets on the planet. In a world facing an upcoming date when it will have used 50% of its oil (and natural gas), interest in energy futures will continue to increase. And, as energy becomes more precious vis-à-vis dollars, the activity in the futures markets, particularly for crude oil and natural gas, will have increasing impacts on society. Indeed, the amount of finite oil that can be financially controlled by a near infinite amount of money is enormous. The following is a basic primer on energy futures and will be one of several foundational posts linked to a longer upcoming story, "Peak Oil, Investments, and Diversification". I will outline the basics of an oil futures contract, and discuss the risks and rewards of investing in energy futures. The post will conclude with a discussion of the growing paradox between money and energy.

There have been numerous posts on The Oil Drum referencing crude oil futures markets (Peak Oil Contango?, Predicting Future Oil Prices). If Peak Oil is factual (which I completely believe it to be), then at some point the mainstream public will gravitate towards investments that benefit from long term higher oil prices. Crude oil futures may not be the simplest but are the most direct way to invest in this theme(if dollars are your goal)

INVESTING IN FUTURES

Before we get to the specifics of an oil futures contract, lets explain exactly what a generic futures contract is, and how one invests/speculates in one.

First, the difference between investment, speculation and gambling should be mentioned. Investment is a long term allocation of funds to something with a (perceived) positive rate of return. Speculation usually refers to a short term investment with a (perceived) positive rate of return. Gambling is allocating capital to something with a zero-sum or negative expected return. To spend capital on something that gets you a negative return implies there are other reasons for the decision (primarily maladaptive) which is a subject for another post.

Here is an excellent introduction to futures and forwards. Essentially, when one buys a futures contract on an exchange, one is entering into a legally binding contract to control the financial upside (and downside) of a product at a certain price and time. Futures markets are attractive to many because they offer often uncorrelated returns to conventional stocks and bonds and because the margin requirements are very low compared to traditional equity markets. Many commodities require 5% or less initial margin to enter into a futures position. (Crude oil is currently 6.7% margin ($4,725) for contracts expiring in 2006 and 4.8% margin ($3,850) for

contracts expiring 2007-2012). With 5% margin a 10% move (in the right direction) will result not in a 10% return but in a 200% return on money invested. (Leveraged return =(100/Margin rate) x Nominal return). Of course, this leverage is a double edged sword as a move in the wrong direction results in sharp losses and a move below maintenance margin will result in a call from the broker representing the clearinghouse. If subsequent margin is not posted on a losing position, the clearing member can legally liquidate the position without the investors permission. The vast majority of players in the futures markets never take delivery of the product, but participate in the financial movement of the commodity until they close out their contract prior to expiration.

So, after one buys (or sells) a futures contract, it will eventually result in one of three outcomes:

1. the buyer will sell it at some point prior to expiration at a gain or a loss
2. if a margin call occurs and the client doesn't post required margin, the brokerage firm will liquidate the position, irrespective of profit or loss.
3. the contract will expire, and the buyer (seller) will take (make) delivery of the specified commodity.

CRUDE OIL FUTURES

(The grey box quotes are directly from the NYMEX website)

> Crude oil is the world's most actively traded commodity, and the NYMEX Division light, sweet crude oil futures contract is the world's most liquid forum for crude oil trading, as well as the world's largest-volume futures contract trading on a physical commodity. Because of its excellent liquidity and price transparency, the contract is used as a principal international pricing benchmark.
>
> The contract trades in units of 1,000 barrels, and the delivery point is Cushing, Oklahoma, which is also accessible to the international spot markets via pipelines. The contract provides for delivery of several grades of domestic and internationally traded foreign crudes, and serves the diverse needs of the physical market.
>
> Light, sweet crudes are preferred by refiners because of their low sulfur content and relatively high yields of high-value products such as gasoline, diesel fuel, heating oil, and jet fuel.
>
> Specific domestic crudes with 0.42% sulfur by weight or less, not less than 37° API gravity nor more than 42° API gravity. The following domestic crude streams are deliverable: West Texas Intermediate, Low Sweet Mix, New Mexican Sweet, North Texas Sweet, Oklahoma Sweet, South Texas Sweet.
>
> Specific foreign crudes of not less than 34° API nor more than 42° API. The following foreign streams are deliverable: U.K. Brent and Forties, for which the seller shall receive a 30 cent per barrel discount below the final settlement price; Norwegian Oseberg Blend is delivered at a 55¢-per-barrel discount; Nigerian Bonny Light, Qua Iboe, and Colombian Cusiana are delivered at 15¢ premiums.
>
> The contract is listed for 72 months.

As of Wednesday there was open interest of 1,130,596 contracts on the entire oil futures strip from Oct 2006 thru Dec 2012. At 1,000 barrels per contract this represents 1.1 billion barrels of notional oil, only about 12% of annual use for the US. (I admit a lack in html graphics ability, especially compared to The Oil Drum master)

As of this writing, front month oil is $69.19. The strip prices peak in Dec 2007 at $74.44 gradually declining to $66.30 in 2012.

INVESTING IN CRUDE OIL FUTURES

These are some of the more prominent reasons to invest in oil futures (in a Peak Oil world):

1. Oil, unlike other futures choices, is actually embedded in ALL commodities. It doesn't take sugar to deliver cocoa or frozen orange juice to plant soybeans. The pervasivness and non-substitutability (easily) of oil will eventually result in outsized price increases
2. The market does not recognize a)net energy, b)the important differences between (short term) flow and (long term) reserves or c)net exports. As these concepts permeate the investing public, it will result in new higher price floors.
3. Oil price spikes will likely be negatively correlated, or at least uncorrelated with other asset classes, so provide beneficial diversification.
4. All renewable sources of energy (wind, solar, biomass refining, etc) require oil to transport their goods and employees. Even if we seamlessly transition from a world of fossil fuels to one of renewables, we cant make windmills from wind or solar panels from sun. Oil will continue to increase in value.
5. We still are firmly entrenched in a neo-classical system that believes in perfect substitutes so 'hoarding' behavior is not yet being seen. Hoarding could occur at local, regional and national levels and once the concept of finiteness of oil is more widely understood, the hoarding aspect will represent another permanent increase in demand.

These are some of the more prominent risks associated with oil futures (in a Peak Oil world):

1. Since oil is priced at the marginal unit, demand destruction, even in the face of less future reserves, will result in price drops. Large exogenous shocks to the system, like bird flu or some other natural (or man-made) disaster could cause oil prices to drop precipitously.
2. Since oil is only storable to a point by end-users, a situation like the one above would preclude end users (that are aware of long term scarcity issues) from `hoarding' at the margin and prices could stay low until the economy recovered.
3. If oil prices go high enough, there is the risk of nationalization of the resources, rationing, windfall profits taxes on oil companies, all of which change the dynamics of the oil pricing market.
4. In a real collapse (New Orleans on a national scale due to a shortfall in production below the level needed to make the system work), money in futures in a brokerage account might be meaningless.

LABOR AND ENERGY

Since it is Labor Day weekend, it might be instructive to remind ourselves how much `labor power' fossil fuels in general and crude oil in specific provide for us. Here are some quick facts about US oil consumption and production. A closer look shows the US currently uses about 7.6 billion barrels per year. Given our current population of 300,000,000, this equates to over 25 barrels per person per year. Each barrel of oil has 5,800,000 BTUs. An average man working for

1 hour generates between 240-500 BTUS (this range assumes computer operators blended with construction workers). So one barrel of oil provides the latent energy of up to 25,000 hours of human labor, or 12.5 years working 40 hour weeks.

Using this estimate (and this is unadjusted for energy 'quality', e.g. it would be hard to get enough persons to push a semi-truck full of steel from Chicago to Denver.) So annually each American has at its disposal 300+ high quality oil slaves (and that's just the oil -if we include the natural gas and coal we're up to 57 boe which is 700+ energy slaves). We are receiving a massive labor subsidy due to fossil fuels.

One barrel of oil costs $70 and generates the energy of 12.5 years of human work. The average American wage is about $20 per hour so a business can pay someone for 3.5 hours of work for the same amount of money. In effect, we are printing money to buy the good stuff from countries that haven't yet expended their `energy armies'. (How long the world will continue to accept an abstraction for something finite and powerful is an open question, but something here seems awry. I humbly opine that this paradox between energy, labor and value will necessitate that neoclassical economics be replaced by a better model.)

ENERGY AND POPULATION

I believe there are 3 different definitions of Peak Oil and they will come in succession.

1. The point when we have used half of the oil that will ever be extracted.
2. The point when we reach maximum sustained production (given that we use high technology like horizontal drilling and water and nitrogen injection, we are likely borrowing from the second half of what was normally a bell shaped curve so this point will come later).
3. The point when the meme of finite energy resources takes hold in society.

For sake of this discussion, lets use the first definition, and assume we are roughly at Peak Oil now. We have used 1 trillion + barrels and have 1 trillion + left. But as discussed previously (exhaustively?), those 1 trillion barrels require a decent amount of energy to locate, harvest, refine, and distribute and this amount of `energy cost' subtracted from the gross is increasing.

Lets assume that the 1 trillion barrels nets out to 650 billion barrels to non-energy society. (Yes I chose this number specifically). Given our current world population, that equates to *100 barrels of net oil remaining for every person on the planet*, (and leaves none for our children, grandchildren or subsequent generations). Any Tom, Dick or Rainwater for $4,000 can financially control 1000 barrels of oil in the futures markets, *or 10 times his or her all time planetary allotment*. Once Peak Oil version #3 is realized, there will be many investors clamoring to financially (or physically) control their 100 barrels, let alone 10,000 or 1,000,000 barrels. Can the futures markets absorb this? Will this make the Hunt Brothers cornering of the silver market seem like childsplay? The world uses 85 million barrels per day - and for a mere $340 million in margin, this entire amount can be controlled via the futures markets. Consider this in contrast to the $7+ Trillion invested or saved annually, and the nearly $100 trillion in stock and bond market assets. Will the market send the right signals? What smart angles will hedge funds take on this?

CONCLUDING THOUGHTS

Global society runs on a just-in-time inventory system. It cares about the current flow of products and assumes that shortages will trigger price increases which will in turn spur development of substitute products. Paradoxically, an awareness of future oil scarcity coupled

with higher current flows would result in lower prices. Imagine if OPEC issued a press release that admitted their proven reserves were overstated but simultaneously announced that they had developed a new siphoning technology that would immediately bring 120 million barrels per day online. Would futures go up or down?? They would plummet as there would be more supply at the margin than people could use or store. Similarly, if OPEC announced a new trillion barrel oil find, but simultaneously initiated a reduction of the current flow rate to 50 million bpd, oil prices would spike even in the face of long term abundance.

What if Exxon announced they believed oil was going to $200+ per barrel and therefore had adopted a policy to shut down production and lay off workers so as to keep the oil in the ground until 2020 when it will be worth more? Their market capitalization would be decimated, as investors care about current quarterly and yearly earnings, which would now be near zero.

The market cares about the marginal barrel and immediate results. And that fact, in the opinion of this writer, is the achilles heel of modern society. Oil and natural gas are products that are largely non-discretionary in our world economy. They are unlike any other product in history in the % of human society that revolves around them. Long lead times are needed to create alternatives and restructure society around more local energy sources and smaller energy footprints. The high futures prices caused by production shortages or excessive financial ingress into commodities will slow economic activity, which will then reduce demand for oil and prices will plummet and overshoot on the downside. Then, when the economy next recovers, we will be further along the curve of depletion and prices will make new highs. This cycle of volatility will hamstring policymakers (and investors) as we will get mixed signals every 12-18 months until we are well past Peak when we will have permanently high oil prices.

The invisible hand moves from mouth to feed trough and back again, like a machine. Without market regulation, the hand will gorge its corpulent body, unaware that the upstream feedtrough appears to be narrowing. True to its origins, it will only react when its hungry, and as the Hirsch/Bezdek report pointed out, society needs 10-20 years to effectively prepare for a change in diet.

In conclusion, many are saying that the era of cheap energy is over but in the ways that count it is still here. At some point in the future, when net tradable global production is too small to quench societies thirst, $70 oil and $3 gasoline will be viewed as incredibly cheap.