



Forecasting the Price of Oil and its Impact on the Economy

Higher oil prices make dramatic news.

In 2007, we saw a 50% jump from \$70 to \$100 per barrel from mid-August to the end of the year. Only during three other times – the Iranian Revolution (1979), Iraq’s invasion of Iran (1980), and Iraq’s invasion of Kuwait (1990) – was there a price increase of this magnitude.

Oil prices affect consumers on a daily basis, at the gas pump and in their home heating bills. No other goods or services have such an impact. Yet, for all its visibility, there are widespread misconceptions about what determines the price of oil and how it affects the economy.

In this article, we look at what drives the price of oil, the prospects for 2008 and the implications of these forecasts. In particular, we examine the 2007 price jump in order to see whether it is likely to be permanent.

Our analysis draws upon the research of [Philip Verleger](#), an expert on energy prices and the author of numerous articles on the oil markets. (We interviewed Verleger on Jan. 30, 2008.)

Light and Sweet or Heavy and Sour?

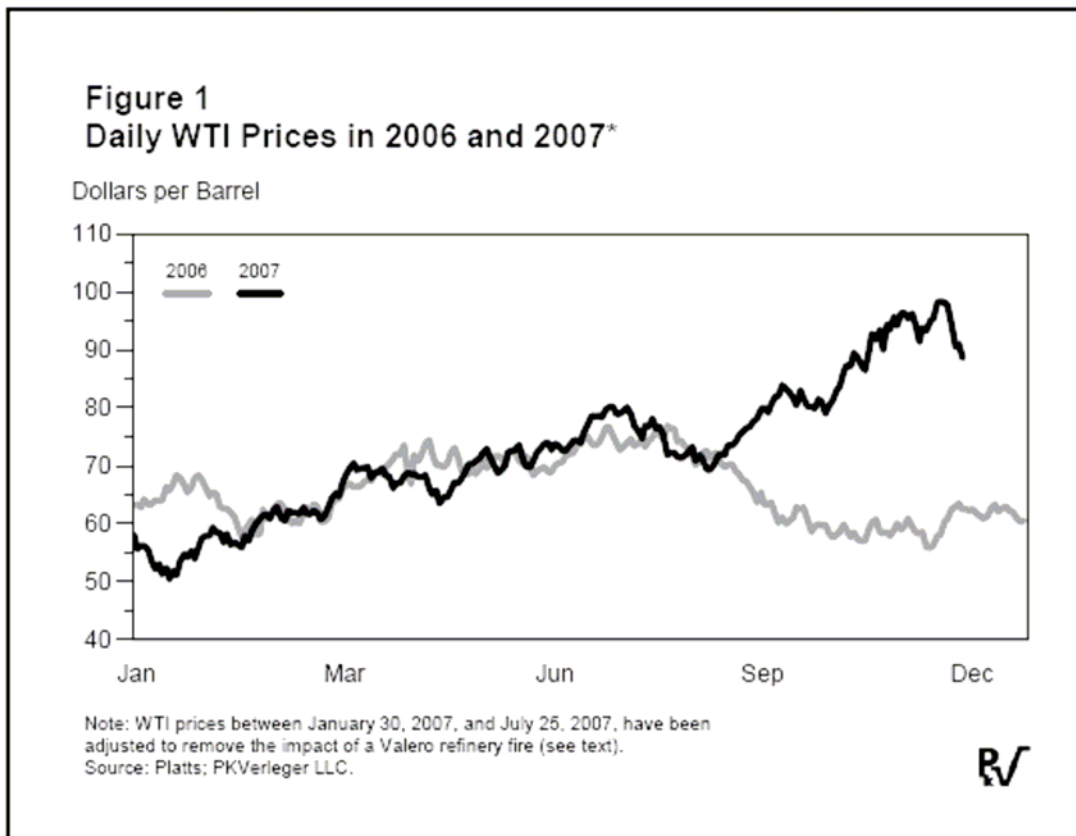
When we hear that oil is at \$80 per barrel, we assume that is the price in the U.S. market. This is not the case. The quoted price for oil is based on WTI, or West Texas Intermediate. This is a “light sweet” crude oil, low in sulfur content and easy to refine. But oil comes in more than one flavor, and WTI represents at most a third of US oil consumption. The majority of the oil refined in the U.S. is “heavy and sour,” driven in part by Canadian and Saudi supply. This oil is considerably cheaper – about \$15 per barrel cheaper – than WTI, but costs more to refine.

Using WTI as a benchmark for oil prices is like using the price of an expensive French wine to gauge the price of the overall wine market.

Historically, WTI and sour crude prices have been closely correlated, so the quoted price of oil was an accurate indicator of the market. However, this relationship has started to break down, primarily because of new environmental regulations which limit the amount of sulfur in diesel fuel. These regulations have placed a premium on sweet crude that has caused price movements to diverge.

Oil in 2006 and a Year Later

To understand 2007 price jump, look at oil prices in 2006. The chart below presents the data for these two years:



Oil prices followed nearly identical paths until mid-August, when we saw the beginning of the dramatic increase that lasted until the end of the year. Verleger's examines the oil markets in 2006-07 with the goal of isolating the underlying supply and demand factors causing the increase last year.

Debunking the Popular Myths

The most popular explanation for the 2007 price increase is growing demand from China, which now consumes 8.5% of the world supply (versus 24% for the U.S.). For an example of how this line of reasoning is presented by one prominent economist, see [Dealing with the Dragon](#). Verleger's data shows this is not a reasonable explanation. The Chinese market has been correctly forecasted for the last several years. There was no abnormal spike in demand



from China (or from India or other markets) during the latter half of last year. As Verleger notes, "it is hard to attribute the sudden price boost to oil buyers waking up to the fact that the global economy was expanding and oil use was rising."

Supply was not being adversely affected by political disputes or international conflict. If anything, the international dynamics were calmer in 2007 than they were in 2006, as evidenced by the declining casualty rate in Iraq. This was not the source of the price increases.

A shortage of sweet crude in the world markets in 2007 caused the Saudis to increase production of sour crude. This led to a price decline in sour crude prices relative to sweet crude, well-documented in publicly available data. The Saudis were not responsible for the spike.

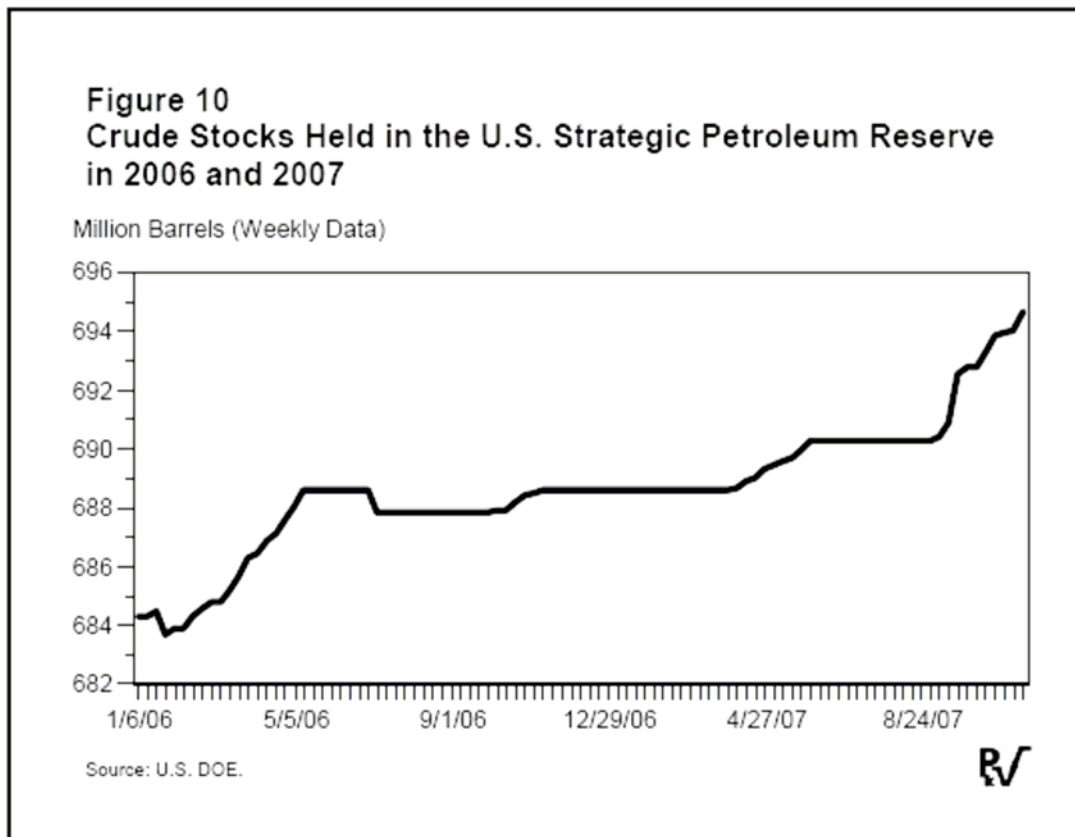
Speculation did not cause a price spike. Verleger's data shows investments in commodities, as an asset class, increased from \$100 billion to \$170 billion in 2007, but most of this increase occurred before the beginning of the August price rise. In addition, the open interest in oil futures contracts was decreasing while prices were increasing, showing that speculators (or whoever was investing in the futures markets at that time) had a diminishing influence on oil prices. Verleger argues the "data seem to exonerate speculators."

In addition to the oil futures traded on the commodities exchanges, oil experts also look to price movements in "trust" securities (such as the BP Prudhoe Bay Royalty Trust) to calibrate expectations of future prices. If these trusts indicate that oil prices are heading for a sharp increase, oil producers will cut back supply and/or raise current prices until equilibrium is reached. Data show these trusts have a better record of predicting price movements than projections offered by government agencies. Yet future prices implied by these trusts were stable in 2006-07 timeframe, so they cannot explain the 2007 price increase.

Explaining the 2007 Spike

Verleger's key contention is, beginning in mid-August, the Department of Energy began building up the strategic petroleum reserves, in particular using 1/3 sweet crude and 2/3 sour crude. In fact, approximately 0.3% of the world's supply of sweet crude went to the SPR. Verleger estimates this action drove oil prices up as much as \$10 per barrel, due to the elasticity of oil prices relative to demand, especially in the sweet markets.

The flow of oil into the SPR is shown below:



On a percentage basis, the increase beginning in mid-August of 2007 may not appear that dramatic. But with sweet crude in high demand and tight supply, the effect on prices was extreme.

Unconfirmed reports suggested that China may also have been accumulating sweet crude into its own SPR during this period, and may be continuing to do so now. If this is true – and oil analysts are trying to confirm these facts – it would explain some of the 2007 price increase. But its effect would be dwarfed by the impact of oil flowing into the American SPR.

Oil companies were reducing their inventories over the last half of 2007 by 50 million barrels of crude stock, representing a little over two days of U.S. oil consumption. The turmoil in the financial markets increased the cost of borrowing for oil companies, making it unattractive for them to finance inventories. Econometric data suggest this inventory reduction contributed a few dollars per barrel to the overall price increases.

“Delta” hedging contributes to price increases. This is a tactic employed by large fuel consumers, particularly airlines, to hedge against price increases by purchasing call options, allowing oil to be bought at a fixed price. Bankers



selling these call options hedge their exposure in the futures market, and the net effect is to magnify price increases in an escalating oil environment, such as the latter half of 2007.

Verleger's bottom line is the US SPR usage contributed \$10 of the increase from \$70 to \$100 per barrel, with inventory reductions responsible for \$3 per barrel. Delta hedging was responsible for the remaining \$17 per barrel.

Outlook for 2008 and the Impact on the Economy

A common concern is that the 2007 oil spike will lead to a repeat of the 1980s, when the US economic growth was stunted under the burden of expensive oil. This scenario is highly unlikely.

The world economy is less oil dependent. Research from Lehman Brothers shows 0.63 of a barrel is needed to produce \$1,000 of GDP, as compared to 0.89 of a barrel in the 1980s. The inflation-adjusted price of oil would need to exceed \$100/bbl over a sustained period to replicate the environment of the '80s. Additionally, the dollar was stronger then; the fall of the dollar has contributed to the current rise in the price of oil. To the extent the dollar strengthens against world currencies, the price of oil will decline.

The gating factor in today's economy is not oil prices. It is credit and liquidity, driven by the housing market.

We asked Verleger if an easing of the credit crisis would translate to lower oil prices. "If banks solve their liquidity problem, then it will depend in large part on what oil exporters do," said Verleger. "It is not a competitive market. If OPEC is aggressive and cuts production, or focuses on inventories, it will push prices higher."

On the question of the risk of prolonged higher prices, Verleger says it "really depends on how aggressive the members of the cartel are." More non-OPEC production in today's market could force OPEC to be more aggressive.

"In 2008, if current flows to the SPR continue, and China continues to do what many believe it has been doing, it will result in a tight sweet crude market, with prices in the high \$80s or mid \$90s," Verleger said.

For many in the oil industry, the ultimate question is how oil prices will behave if the economy and overall demand slows down, as many are predicting. Verleger lives in a data-driven world, and has closely studied the path of oil prices during the last five recessions. There is no pattern: in November of 1973 oil prices went



up, in January of 1980 they went down, from 1981-2 they went down, in 1990 they went up, and in 2001-2 they went down.

Verleger said “it boils down to how the oil exporting countries behave.” In an economic crisis, he expects them to keep production tight and inventories low, which foretells higher prices. OPEC has seen crude go from \$10 to \$80 per barrel without a drop in demand in the US. He knows the analysts at OPEC watch the data as closely as he does, and believes they understand that dropping the price of crude from \$80 to \$10 would not stimulate our economy. “They would rather keep the money in their pockets,” said Verleger.

For his part, Verleger has recommended that the DOE change the composition of flows to the SPR, to increase the portion of sour crude and reduce the portion of sweet crude. This would relieve the primary upward pressure on prices, but so far the response has been negative.

Verleger believes refinery problems would be necessary for prices to go significantly higher than current levels. Alternatively, he cites concern for the oil exporting countries vis-à-vis the dollar, causing them to hold back on production. “A further decline in the dollar could cause OPEC countries to cut production,” Verleger noted, adding that “a problem in Nigeria could also cause this.”

Our final question for Verleger was how high oil prices would need to rise before they significantly impaired the economy.

“If the central bank controls inflation, then oil prices don’t have much impact,” he said on the day the Fed lowered interest rates by 50 basis points.

“Bernanke has offered a good explanation for his interest rate cuts,” Verleger said.

But Verleger is not convinced that the liquidity problem is solved, which he believes is the key to economic growth.

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