

SELLING THE CITIZENS' OIL

When the Price Is Right

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Summary

This brief provides an introduction to how oil is valued and priced. It discusses the global dynamics as well as how oil producers determine the prices of their specific grades of crude. While preliminary, the brief aims to sketch out some of the main elements of this complex and technical topic, given its vital importance to the revenue profiles of many oil-rich countries around the world.

The global price of oil

Global oil demand does not refer to the need for crude oil but is rather typically measured as the consumption of refined products. In Europe and the United States, the bulk of crude oil is transformed into transportation fuel, mostly diesel in Europe and mostly gasoline in the United States. In Asia, demand for transportation fuel is growing, but industrial use is still dominant.

In total, the world is consuming petroleum products equivalent to roughly 88 million barrels per day in production. Of that, 74 million barrels are actual crude oil; 11 million are condensates and natural gas liquids, both of which are lighter than crude oil and mostly used in the petrochemical industry; and 2 million are so-called refinery gains, which occur when crude oil and other liquids are heated, causing molecules to expand which increases the volumes. The final 1 million barrels per day consist of biofuels, mostly U.S.-produced ethanol.

Typically, crude oil has little value unless it is heated and put through the big steel drums of refineries. Yet, sometimes lighter varieties, which make up less than 1 million barrels per day, never see a refinery and are burned directly in power plants, such as those in Japan and the Middle East.

Global oil supply typically refers to crude oil only but does include other liquids such as condensates and natural gas liquids. This “other” category is gaining importance now that more countries produce natural gas. Most oil fields contain some natural gas, which is extracted separately or flared. Most natural gas fields also have valuable liquids, including condensates, natural gasoline, butane and propane. The density of oil is measured in API degrees, a scale devised by the American Petroleum Institute. Oil below 10 degrees sinks in water and is heavy slurry or bitumen; oil above 50 degrees is considered condensates. The stuff in between is crude oil.

The value of crude oil is determined by the value of the products that can be refined from it. As a rule of thumb, the market pays more for light and sweet crude than for a heavy and sour grade, which is thicker, has more sulfur and is harder to refine. Technologically simple refineries can turn light oil into valuable products like gasoline and diesel. If simple refineries ran heavier

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ABOUT THIS SERIES

Revenue Watch researched how eleven countries sell their shares of oil production. The results are detailed in four briefs that recommend transparency, identify good sale practices, and explain how oil sales and global oil prices work. The Oil Sales briefs are: *The Case for Transparency in National Oil Company Crude Sales*; *The Governance of Oil Sales: Early Lessons on Good Practice*; *How Governments Sell their Oil*; and *When the Price is Right*. They can be found at www.revenuewatch.org/oilsales.

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crude, they would generate far less gasoline and diesel and much more fuel oil, the less expensive fuel used for power generation or as a bunker fuel in vessels.

Some countries, such as Nigeria and Libya, produce very light and sweet oil, while others, such as Mexico and Venezuela, produce very heavy oil. The difference between the two qualities can be as much as \$15 per barrel. The typical crude oil from the Middle East is closer to the sweet barrels and at times referred to as medium-heavy and medium-sour.

When the media report on the “price of oil,” they are usually referring to the price of the Brent crude oil contract on the electronic exchange, ICE Futures. Brent is a highly visible industry benchmark based on light, sweet crude oil produced in the North Sea. The oil market needs benchmark crudes to act as price guides for other crudes. Producing countries often look to Brent as their anchor and price their grades of crude at a premium or a discount to Brent depending on whether it is of a higher or lower quality. Roughly two-thirds of internationally traded oil is priced against Brent. Other benchmarks are used, especially in the U.S. and Asian markets, where Brent is less common. In the United States, the benchmark for sweet crude is West Texas Intermediate, and an increasingly popular sour benchmark is the Argus Sour Crude Index (ACSI). In Asia, the benchmarks are the Middle East crudes, Dubai and Oman.

Traders buying and selling crude oil use dated Brent as their marker, which is the spot price for physical trades of Brent cargoes (see definition on page 3). Assessing the price of Brent is a complex affair with several inputs that cover the spot market, where the actual, physical oil is traded, and the futures market, where paper oil contracts are traded. One of the factors that make a benchmark popular is the availability of paper contracts, which allow traders to hedge, or insure the oil they are buying against price fluctuations. High volume, consistent quality, security of supply, diversity of producers and sellers, and broad acceptance are attributes of a benchmark.

The Brent contract, known as a liquid contract, is used for a number of global oil trades. Growing in popularity, Brent is stealing the spotlight from Nymex, a light, sweet crude oil contract in New York, which is mainly based on West Texas Intermediate, the sweet oil from Texas and its neighboring states. The Nymex contract is very popular but harder to navigate as of late, since West Texas Intermediate is a landlocked crude whose price can unevenly diverge from that of comparable grades (see box).

The Decline of West Texas Intermediate

The decline of West Texas Intermediate is a good example of how the price of a crude can alter for reasons that undermine its utility as a benchmark. Because of the reversal of pipelines, additional imports from Canada, and increased production of shale oil in the United States, growing volumes of West Texas crude were trapped in the Midwest. Supply and demand did its work: A glut of availabilities forced the price of West Texas Intermediate to fall in 2010 compared with oil of similar qualities. Traditionally, West Texas Intermediate sold at a small premium over Brent. By the fall of 2011, West Texas was trading at a \$25 discount versus Brent.

West Texas Intermediate has a strong connection with the paper market, and its fall in price had major consequences for the oil futures on the Nymex. It is the key deliverable grade into the light, sweet oil contract. The Nymex oil is priced in Cushing, Oklahoma., where there was more than enough oil. When West Texas fell in price, producers pricing their crude off the Nymex contract had to find other crudes for price guidance. Producers of West Texas Intermediate, Canadian oil and oil shale in the Midwest had to accept hefty discount for their crudes. Some started railing and trucking their oil outside the region in an effort to get a better price.

Electronic exchanges project oil prices on a screen as the oil is traded through contracts. Oil price firms such as Platts and Argus tell the world—at least the industry players who can afford their expensive services—the price of a specific crude oil traded on the physical market, or the bids and offers made if oil was not traded. They assess the spot prices of crude oil by talking to traders. A good deal of judgment clearly goes into this reporting, because some traders could choose to mention a higher or lower price to influence the reporting.

Definition

“Dated Brent is a market term for a cargo of North Sea Brent blend crude oil that has been assigned a date when it will be loaded onto a tanker. Cargoes that have been assigned loading dates are referred to as dated cargoes, wet cargoes or wet barrels. Cargoes without loading dates are known as paper barrels and are traded for speculative or hedging purposes. Dated Brent prices are used, directly and indirectly, as a benchmark for a large proportion of the crude oil that is traded internationally”

Reuters Financial Glossary

In the simplest of economic models, supply and demand should determine the price of oil. While true to a large extent, oil has also become an asset class. Speculators buy and sell oil futures not because they are interested in physical oil but because they make money that way. With financial capital flowing into the oil futures market, the oil price has become a reflection of the world's expected future economic performance. No longer merely a reflection of supply and demand, oil price now reflects dynamics including economic sentiment, the value of the dollar and the value of equities.

Oil and politics are never far apart, and the volatility of oil prices typically increases when tensions rise in producing countries, as seen during the Arab Spring in 2011. Uncertainty about possible future supply disruptions always help to push up the price in the futures, or paper, market. The price of actual, physical oil is always closely linked to the price of paper oil. At times the paper market determines the direction, and other times the physical market shows the way.

Although studies have not been able to measure the price impact of speculators, macro sentiment or political influence, it is generally believed that oil prices have a premium because of these factors. Another generally accepted explanation is that demand and supply set the direction for the price but that speculation exacerbates daily price swings and trends. The counterargument is that financial flows in the futures markets simply supply more liquidity to the trade.

What would be a fair price for crude oil?

It is mistakenly believed that the oil most easily produced, from the Middle East, sets the price floor, but it is rather the oil that is most difficult and costly to produce that is reflected in the price. The thinking is that the oil price must at least cover the cost of the most expensive oil produced, which is Canadian oil sands and U.S. shale oil. This oil has become the marginal barrel of supply because the world needs it to meet demand. The maximum cost to produce Canadian oil sands and U.S. shale oil is around \$60 per barrel. If the demand for oil dropped and the price fell below \$60, producers would discontinue outputs of difficult and expensive oil and the world might run short, which would once again increase prices. Such was the case in 2008 and 2009, when Canadian projects were shelved after a drop in prices while OPEC producers pumped away.

A price of \$75 per barrel, which Saudi Arabia's King Abdullah initially advocated after the 2008 crash to invite more investments, would cover Canadian costs handsomely. So why was Brent trading at more than \$100 for most of 2011? It is hard to say. The Arab Spring undoubtedly contributed to the price. The jump into triple digits coincided with unrest in the Middle East and North Africa. Plus, having lots of cash with nowhere to go but commodities likely added to the upswing. And just as in 2008, prices have found support from the view that oil supply will have to remain matched with oil demand. Many think supply could fall short, and, to rectify the misbalance, the higher price should lower demand growth.

Identifying the price of a specific grade

Producers selling oil look at benchmark crudes for guidance in setting the price of their crudes. Producers in Europe, West Africa, East Canada and even at times in Asia use Brent. To be precise: They look at the physical spot price, which is called dated Brent, which is one step removed from

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the Brent futures contract. Oil streams of a better quality, such as Nigerian and Libyan crude, are priced typically at a slight premium to dated Brent. Meanwhile, Russian Urals or Iraqi Kirkuk, which are heavier and have more sulfur, trade at a discount to dated Brent.

This premium or discount versus the benchmark—the price differential—determines the relative value of a specific grade. When producers sell oil, they take the price of dated Brent as a given. They analyze how similar grades trade versus dated Brent and then identify the appropriate differential for their grade. They can also influence their crude's relative value by how they market their oil and word their contracts. (For more on how producers sell their oil, see *How Governments Sell Their Oil*.)

On the surface, it seems like a relatively simple exercise. One can calculate how a Nigerian crude, such as Bonny Light, compares to dated Brent and establish the right premium. If dated Brent is worth \$100 per barrel, Bonny Light could be worth \$102.50, because Bonny Light products are slightly more valuable than those made from dated Brent.

Differentials between a benchmark price and a specific grade of crude can vary over time. Through 2002, Bonny Light could barely command a 20-cent premium per barrel over dated Brent. When the output of Bonny Light and grades with a similar quality were affected by Nigerian unrest in the latter half of the 2000s, the premium increased to more than \$2.50. The premium can vary widely. One month, the Nigerian national oil company can set the official selling price at \$3.80 over dated Brent. Another month, it can set it at \$1.95.

Researchers have attempted to provide a statistical correlation between the price of a benchmark grade and a crude oil priced off this benchmark. The World Bank-sponsored Energy Sector Management Assistance Program argues that each extra degree of API gravity raises the relative crude price by \$0.007 per dollar of the Brent price.¹ The same study says that every 1 percent of sulfur lowers the price by \$0.056 per dollar of Brent and that every degree of the acidic measure TAN lowers the price by \$0.051 per dollar. This model notes that the higher the benchmark price, the wider the differentials between the benchmark and other crudes.

The fair and full price of oil is hard to establish. Market talk and the swiftness of moving cargoes offer a pretty good idea how the market is receiving prices set by producers. Over time, crude with a consistent quality will establish a relatively consistent average versus a benchmark. At times, a price can be fair and full even when the relative price is very different from that average. A host of market factors can push the price to differ from the average in ways that disregard, at least temporarily, the quality differences among grades. Factors that affect the price of specific grades of crude include:

- Swings in production volumes of a crude. A supply distortion can push up the price of the affected crude, prices of similar grades or even the benchmark.
- Swings in demand due to seasonality. In winter, demand for sour crude oil goes up as consumers need more heating oil and diesel, while the need for sweeter oil comes in the summer.
- Swings in demand due to refinery maintenance or outages. Every spring and fall, refineries go into turnaround and, with lower runs, need less crude.
- Competing grades mispricing their streams. When a competing grade is priced too high, market players will look for cheaper alternatives and bid up other grades.

¹ http://www.esmap.org/esmap/sites/esmap.org/files/08105.Technical%20Paper_Crude%20Oil%20Price%20Differentials%20and%20Differences%20in%20Oil%20Qualities%20A%20Statistical%20Analysis.pdf

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- Sudden or slow changes in crude quality. Because crude streams are typically a mix of fields, a problem in one field can change the quality and its price.
 - Weather-related issues. Strong winds from hurricanes or tropical storms can affect loadings and sailings and even shut an offshore output completely.
 - Swings in demand for refined products over time. This more subtle change can favor one crude over another and change the pricing accordingly.
 - Changes in government policies. The push for low-sulfur diesel and gasoline has made low-sulfur crude more valuable, as it saves refineries costly desulphurization units.
 - The distance to market. If a crude has found a new but farther market, a producer might have to give a price incentive to gain a foothold in that market.
 - The skills of the seller and the buyer. Since all factors affecting price can be hard to see, a skilled seller will be better in finding the full price.

The different ways to sell oil exist to maximize revenue through the skills and marketing abilities of the producers. Different ways to sell oil include:

- Term sales. These sales are negotiated for a longer period, typically a year, and create a long-term relationship between sellers and buyers with the price linked to a spot benchmark.
- Spot sales. This is the quick and dirty way where parties find each other, transact a deal and create the market where prices are “discovered” for their oil.
- Hybrid sales. Some producers sell half of their production on term contracts and half in the spot market or else allow term contract holders to sell it in the spot market.
- Oil tenders. Tenders can take many shapes but typically involve a seller (or buyer) that invites counterparties to bid for a defined volume and quality of oil.
- Retroactive pricing. Some Middle East and Asian clients use a method where a seller determines what a buyer needs to pay after all product prices are known.
- Delivery agreements. Producers can use a stake in a refinery to create a secure outlet for their crude and fluctuate the price depending on the refining margins.
- Outsource the sales. Some producers prefer to have international trading firms or oil majors sell their oil as they lack the skills or the commitment to invest in skills.

The two most common sales principles are term or spot contracts. Recognizing that the spot market for oil is now the dominant place for price recovery, most term contracts link their prices to spot market benchmarks, such as dated Brent, West Texas Intermediate, Dubai and Oman. Most oil is sold using term contracts, as they provide a secure market for the producer and a secure supply of oil for a refiner. The volume and the price can change, but swings should remain within expectations or reason.

Most oil produced is sold by national oil companies (NOCs) that learned their trading skills only in the past few decades. Before the 1973 crisis, most oil was sold through the major international companies known as the “Seven Sisters”: Esso, Mobil, Chevron, Gulf, Texaco, Shell and BP. They told producing countries how much to produce and at what price. The producers’ revolt against this arrangement led to nationalizations and the creation of NOCs in many countries. Producers remained dependent on international oil companies to market and sell their oil because they had no ships or refineries in markets. It was only after the Iranian Revolution in 1979 that a global spot market for oil developed to a size that made a difference. Independent international traders effectively broke the power of the international oil companies and opened the market. Around 1986, oil producers began to jointly link their crude oil prices to spot pricing.

The Organization of the Petroleum Exporting Countries (OPEC) tries to influence the flat price of oil by balancing the crude market. By keeping the supplies to the market on the tight side, OPEC

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preserves the upside potential of the price and protects against the downside. Many of the world's largest crude exporters are members of OPEC. These members try to obtain a fair and full price of their crude by maximizing the differentials between their grades and the benchmarks. As OPEC members, they also try to influence the benchmarks themselves. OPEC price guidance has been crucial for traders who seek to identify prices in uncertain times, and as such OPEC has been a dominant force in the oil market since its founding in 1960.

If the price tells the story, OPEC has been tremendously successful in the past decade, as the oil price has raced from an average of \$19 per barrel in 1999 to \$80 in 2010. The flat price of oil—or the global benchmark price—has a major impact on the income of oil-producing countries, more so than the differential between specific grades and the flat price. While OPEC has some influence, the spot price of oil lies to a large degree outside the control of individual countries.

Maximizing the price of crude sold is an art that oil producers aspire to master. The complexities described above make this a difficult task to execute, and an even more difficult dynamic for outsiders to observe and evaluate. The Revenue Watch policy brief *The Case for Transparency in National Oil Company Oil Sales* emphasizes the importance of transparency in the sale of oil by governments and national oil companies, given the extensive effects that these transactions have on the public revenue of oil-rich countries.



The Revenue Watch Institute promotes the effective, transparent and accountable management of oil, gas and mineral resources for the public good. Through capacity building, technical assistance, research, funding and advocacy, we help countries to realize the development benefits of their natural resource wealth.

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