



The Structure of Global Oil Markets

June 2010



WHAT ARE THE VARIOUS OIL TRADING STRUCTURES?

Total world production of crude oil is around 85 million barrels per day. The crude oil feeds a network of refineries at key locations located close to consuming centers or next to pipelines or shipping facilities. The crude oil is processed at the refineries and transformed into finished oil products.

Some companies are fully integrated, refining their own crude oil production and then feeding their retail networks with the oil products produced. But for the most part production and refining are not fully integrated and refiners engage in trade to secure supplies for their facilities or to dispose of surpluses.

This oil is primarily secured via term contracts as refiners are typically loath to rely too heavily on spot supplies as these may be unreliable and exhibit high price volatility. End users (airlines, manufacturers, etc.) operate similarly. An airline, for instance, usually secures supplies at airports from term suppliers rather than entering the spot market to fuel its fleets.

Hence, the bulk of the crude oil and oil products is sold through term contracts, where a volume is agreed with a specified tolerance over a defined period. The tolerance is built in to provide flexibility to either buyer or seller to load more or less than the contracted amount.

Estimates vary but typically industry sources concur that 90-95% of all crude oil and oil products are sold under term contracts. The mechanisms for pricing crude and products vary by market sector and geographical region but are summarized under (Q3).

The balance, 5-10%, is sold on the spot market. A spot deal is usually defined as a one-off deal between willing counterparties for a physical commodity. Because the deals are on a one-off basis, the spot market is representative of the marginal barrel in terms of supply and demand.

Typically, spot sales are surpluses or amounts that a producer has not committed to sell on a term basis or amounts that do not “fit” scheduled sales. Buyers may also have under- or over-estimated their consumption and may have oil surpluses to sell or shortages to cover.

A variety of derivatives instruments are available that allow people to lock in or hedge a price for oil deliveries in the future. These include forwards, futures, options and swaps. These markets may overlap.

Where they have become highly commoditized, cargoes or partial cargoes of crude oil and oil products may trade as forwards, usually in half-monthly, monthly or quarterly blocks. These markets are often termed the “cash” markets to distinguish them from instruments such as swaps which do not involve a physical delivery of oil, and therefore are referred to as “paper” instruments. Examples of forward cash markets include cash Dubai and open spec naphtha C+F Japan. They are distinct from futures because they are always physically deliverable and they are bilaterally traded between counterparties in the over-the-counter (OTC) market. The term OTC is a bilateral market in which deals are negotiated between counterparties, usually over the telephone. There is no central organization of such markets, although third-party bodies such as the International Swaps Dealers Association may lend expertise on structures affecting the value of derivative contracts.

Futures are also used to lock in prices for forward delivery, but they are different from forwards in that they trade under standardized terms on a futures exchange. Deals are agreed bilaterally, either electronically on screens or through open outcry in a trading pit, but are executed with the exchange through a process known as novation. In novation, a deal is split into two legs, a purchase and sale, and each leg is executed with the exchange as counterparty. Futures deals may or may not involve physical delivery of a commodity, depending on the underlying contract terms. In oil, the New York Mercantile Exchange (NYMEX) and IntercontinentalExchange (ICE) are the key futures exchanges.

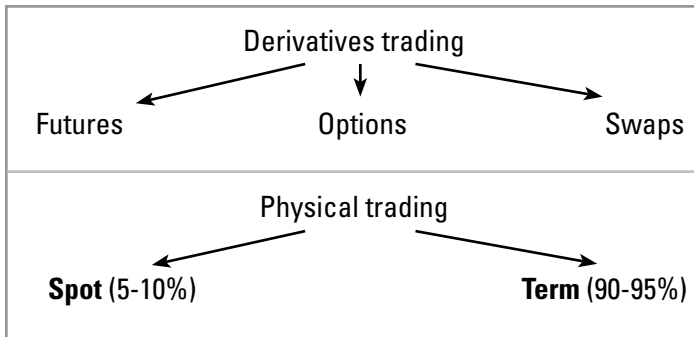
Options are most visibly traded on the same exchanges as futures, but they may also be traded on an OTC basis. Options give the buyer or seller the right to take delivery or give delivery of oil. A put is the right, but not the obligation to sell; a call is the right but not the obligation to buy. Market participants can buy or sell puts or calls.

In swaps, there is never a physical delivery, and as the swap matures there is simply an exchange of cash flows. So the swaps are purely financial instruments. Swaps are usually traded OTC and can be tailor-made, although commoditized instruments are also traded on exchanges such as ICE. Swaps are fixed for floating deals:

- A sells to B fixed price and B agrees to sell back to A at a specified time at whatever the market rate is at the time.
- The floating leg is settled against the market price for the physical commodity during the settlement period.

- A common mechanism for settlement of a monthly swap is to settle against Platts monthly averages for the physical commodities underlying the swap, but there are a number of price publishers that are used to settle derivatives.

TRADING



HOW IS THE PHYSICAL OIL MARKET STRUCTURED?

Platts assesses thousands of individual physical oil commodities across the oil spectrum on every trading day. Platts' coverage of the petroleum sector includes everything from crude oils to finished oil products to highly specialized petrochemicals.

These can be classified as "upstream", which refers to the production of the raw materials, to "downstream", which refers to the consumption of finished products. The terminology is, however, used relatively.

Broadly, crude oil and condensates are "upstream"; oil products ranging from gasoline to jet fuel to bitumen are "downstream". The oil value chain is extremely complex and some oil products such as naphtha may be processed further to make petrochemicals.

There are more than 300 separate grades of crude oil sold around the world.

- Oil is produced from widely differing geographical areas, on land — in which case the oil is called onshore — and at sea — in which case the oil is known as offshore.
- Examples of offshore oilfields include Statfjord and Gullfaks from the Norwegian North Sea.
- Onshore fields range from the biggest to the smallest. The giant Ghawar field in Saudi Arabia, the world's biggest, stretches for hundreds of miles along eastern Saudi Arabia, and seepages from it stain the sands on the desert surface.

- But at the other extreme, tiny fields like that at Kimmeridge in Dorset, England, pump only around 200 barrels per day (b/d). The average production per well in the US is only about 10 b/d.

The crude oils that are sold in the market are often blends of oils from individual oilfields which have been gathered and pumped to a single location either at land or in the sea. For instance, North Sea Brent Blend is actually a blend of dozens of oilfields that have been gathered and pumped to the Sullom Voe oil terminal in the North Sea, from which they are transported by tanker. The major Saudi Arabian and Russian export crude oils are all blends of many different streams of oil. These are blended and sold as a brand, for instance Arab Light or Urals.

The crude oils are refined to make oil products. The basic refining process is that of distillation. The crude oil is heated, and oil products bubble off at different temperatures, the lightest at the lowest temperatures and the heaviest at the highest temperatures. These products are typically treated further to make finished oil products such as gasoline that we use in everyday life. A variety of upgrading processes such as cracking, coking and hydrotreating allow refiners to maximize the yield of high-value finished products manufactured from crude oil.

WHAT ARE THE DIFFERENT TYPES OF OIL AND WHAT ARE THEIR CLASSIFICATIONS?

Finished oil products are those most familiar to the public: automotive gasoline, known also as "gas" in the US and "petrol" in the UK; kerosene, which is used in the airline sector as commercial aviation fuel or in the household sector for illumination and heating; diesel for use in trucking and agricultural machinery; and heating oil, used by homeowners and industrial companies for space heating.

The different grades of crude oils are differentiated by their distillation characteristics and the qualities of the products produced from distillation.

They are classified as light or heavy, and sweet or sour. Light crude oils contain more light products such as gasoline whereas heavy crude oils contain more heavy residues such as fuel oil. The lighter a product, the less dense it is. Density is measured using either specific gravity or API gravity (e.g. the density of water is 1; anything below that floats, anything above it sinks.)

Sweet and sour refers to the level of sulfur, an undesirable impurity that is dangerous and pollutive. Sweet crude oils

contain less sulfur; sour crude oils contain more sulfur. Prospectors used to taste the oils they found and could determine the approximate level of sulfur from the taste, hence the sweet/sour terminology.

Because these are physical liquids, they have non-standard parameters of quality, delivery, timing, location and lot size. For instance, in defining a fuel oil for use by a utility, dozens of quality parameters are specified, and the testing regime for each parameter is also defined.

HOW IS PHYSICAL OIL, AND HOW ARE OIL DERIVATIVES, BOUGHT AND SOLD?

Because the volumes of oil sold each day are so large, oil companies typically sell or buy most of their oil under long-term agreements, usually annual contracts that get renewed each year. The balance, also referred to as the marginal barrel, is bought or sold on the spot market. Critically, the marginal short or long barrel is the unit that sets the price, and is fully responsive to standard economic principles of supply and demand. This is in line with time-tested standard economic principles.

Platts' aim is to reflect the value of the marginal unit, the spot price, and publish assessments of the spot price.

The proportion of term to spot varies by company and also over time. Many of the large Middle Eastern oil producers have traditionally sold their oil on a term basis. The largest, Saudi Aramco, does not enter the spot market or allow further resale of its oil in the spot market. Others, such as Kuwait, may be more flexible, but by and large, producers worldwide sell their oil on a term basis.

Spot and term oil can be sold on a fixed price basis or on a floating basis. Floating sales are overwhelmingly the norm and buyers and sellers agree to link the price to an instrument that rises and falls with the market. Buyers and sellers generally prefer floating price deals to fixed because it is less risky.

- For instance, it takes about 40 days for a cargo of crude oil from a producer in the Middle East to reach a refiner in the US Gulf Coast.
- If the refiner bought the oil at fixed price, he would face a potentially large financial loss if prices fell by the time the oil was delivered.
- If the refiner buys crude oil on a floating price basis tied to the value of the oil when it is delivered to his refinery and sells the oil products also on a floating basis, the price risk that he faces is reduced.

In general, floating price mechanisms allow companies more flexibility in risk management, and more flexibility in optimizing purchases and sales.

Fixed price deals simply state a price at which a company will trade. For instance, a seller may offer a Dated Brent cargo of 600,000 barrels for loading May 5-7 at a fixed price of \$80/bbl. If a deal is concluded, the price is \$80/bbl irrespective of what happens to the market between the deal time and when the cargo is loaded on a tanker.

In a floating price deal, the counterparties agree to the main terms of the deal but the price is set at a later date, usually when the cargo is loaded onto a tanker or delivered into tanks at the delivery port. The mechanism for setting the price is agreed to at the time of deal. These mechanisms include the following:

- 1) ones that reference Platts or its competitors' spot price assessments, referred to as "Platts-related" or "quotes-related" deals.
- 2) ones that are linked to a futures exchange, usually referred to as "futures-related" or "EFP" deals. The term EFP is used because such deals involve an exchange of futures for physical.

Such floating price deals can be term or spot.

Floating price mechanisms often reference Platts assessments. A strong reason for using Platts, as opposed to futures prices, is that futures may be disconnected from the actual conditions in the physical markets as futures trading is typically for a period far away in the future, while the physical market (which Platts assessments seek to reflect) are reacting to the physical constraints faced in the very near term. Hence a Platts assessment should be more in line with the actual physical markets in comparison to a futures price.

It is important to emphasize that whatever the mechanism, physical oil is what changes hands. A trader may sell a physical commodity at the futures value plus or minus a differential. But the existence of the differential emphasizes that physical and futures are different things, and that physical value is established by physical supply and demand.

The mechanics of establishing a price and executing a trade, whether it uses fixed price or floating price, are manifold. A company may elect to trade at a posted price, in a tender or auction, through a negotiation model, with or without a broker, or by using a market-related benchmark. E-trading is simply one such mechanism.

It's also important to distinguish between the trading mechanism and the instrument that is traded. E-trading has become a popular mechanism for trading derivatives, including swaps that are bought and sold in the Over the Counter markets. Swaps are generally traded bilaterally rather than on an exchange, and before the advent of e-trading, the mechanism involved bilateral negotiation usually through a broker on the telephone, "voice-broking". Although e-trading competes for the role of broker, both mechanisms for putting buyer and seller together currently coexist. Most people concur that technological efficiency may displace the voice broker in the long run for highly commoditized instruments, but the market has a way of creating new mechanisms and the need for brokers therefore will likely continue.

Hedging is an action that a company takes to reduce the risk that it will be hurt by an adverse change in the price.

In hedging, a company will reduce price risk in a market by taking an equal and opposite position in a related market. For instance, if a Russian producer sells a 700,000-barrel cargo of Urals crude oil for loading May 25-29 on a price tied to Dated Brent crude oil on those dates, he may sell a Brent CFD for May 25-29 settlement to lock in a price for the oil. The swap will be settled against Platts' Dated Brent assessments on May 25, 26, 27, 28 and 29. A CFD stands for Contract for Difference, and is identical with the term swap. In the example above, the CFD fixes the difference between the Dated Brent price and the cash BFOE (Brent-Forties-Oseberg- Ekofisk) price, and the settlement in both cases is tied to the values as assessed and reported by Platts. Producers often use a combination of instruments in hedging, including futures and CFDs.

A company can sell either "long" which means that it sells oil it already owns, or it can sell "short" which means that it sells oil which it still needs to acquire in order to fulfill its obligation. A company that wishes to hedge will take an opposite position in a related market to mitigate price risk.

Market structures change over time, and instruments evolve that fulfill a market need. The evolution of futures around key benchmarks happened in oil in the mid to late 1980s following a decision by key oil producers to move to market-related pricing on key benchmarks such as Brent, Dubai and West Texas Intermediate (WTI), which act as an overall barometer of supply and demand in the market. The benchmarks used have evolved over time; for instance, in the past Alaska North Slope (ANS) was used to benchmark US sour crudes rather than WTI. It is the market that determines which oils it is comfortable to

use as a benchmark for other oils. Platts has outlined a number of key criteria that the market typically identifies as important in determining whether to use a grade of oil in benchmarking others. The over-arching concern is that no single entity or logistical constraint should be able to control the benchmark, as this would delink its value from the supply-demand fundamentals of the market at large.

Internal controls at a producing company are easier to manage if oil is sold term and linked to a benchmark. The performance of employees, for instance, is more easily monitored with reference to benchmarks.

The futures markets have developed into useful tools to manage risk associated with the linkage of physical value to market value (prior to that OPEC countries would offer their oil at a fixed price posting, which was a very inflexible system that did not work well). Similar to swaps, futures can be used for hedging or speculation. Whether to use swaps or futures depends entirely on the interests of the individual market participants.

In general, futures exchanges are popular because they are highly liquid, so that market participants can quickly enter and exit market positions, they do not involve counterparty risk, and they are regulated, in the US by the Commodity Futures Trading Commission. But futures do not offer full hedging coverage as the price of futures and the price of the physical commodity are different.

Therefore, market participants that hedge typically prefer swaps because they offer full convergence and full hedging protection against an adverse movement in the physical price.

On the other hand, while swaps offer a perfect hedging mechanism with zero basis risk, there is nonetheless the presence of counterparty risk. In fact, counterparty risk is inherent to any trade, whether it is against an exchange, a clearer or a trading company. Participants mitigate OTC counterparty risk using a variety of sophisticated mechanisms, including periodic cash top-ups by the losing party or master agreements that bundle all the losses and gains across the spectrum of commodities, with the counterparty settling only the net amount. This counterparty risk can be efficiently mitigated, assuming there is a widely accepted and published daily price benchmark in the marketplace. Swaps operate on an over-the-counter basis globally and beyond the boundary of any particular jurisdiction. However, publishers provide the global transparency required for the market to operate efficiently.



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For more information, please contact the Platts sales office nearest you.

North America
+1-800-PLATTS8 (toll-free)
+1-212-904-3070 (direct)

EMEA
+44-(0)20-7176-6111

Latin America
+54-11-4804-1890

Asia-Pacific
+65-6530-6430

Russia
+7-495-783-4141

www.platts.com
support@platts.com

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