

Price Signals in Oil Markets

By Ian Bourne*

The peak in crude prices in July 2008 has led to a heated debate about oil price formation. On one side, many politicians — not just from inside oil producers' group Opec — and some influential lobbyists, such as Michael Masters, say that financial flows and speculators have caused oil price volatility, distorting prices and breaking the link with fundamentals such as inventory levels. On the other side, long-time commentators on the oil markets say that the complex fundamentals of supply, demand and inventory levels are the determining factors in all recent price movements in oil markets, as explained by oil economics as established in Paul Frankel's *Essentials of Petroleum* (1946).

The temperature of this debate was raised further by policy-makers' concern about systemic risk in financial markets after the credit crunch of August 2007 and the credit freeze of September 2008. The political mood changed, as markets were seen as part of the problem, rather than a solution. Politicians took aim at derivatives, and have started to enact laws that seek to control derivatives trading more closely. The scope of these laws includes commodity derivatives, not just financial derivatives.

President Barack Obama signed a new U.S. law on derivatives on 21 July — the Dodd-Frank Wall Street Reform and Consumer Protection Act — in which commercial hedging is exempt, and which defines over-the-counter derivatives narrowly, to include swaps but not forwards. But, these exemptions aside, oil and other energy commodity OTC derivatives are covered by new oversight powers for the regulator, the Commodity Futures Trading Commission (CFTC), under the new U.S. law. The EU is also moving forwards with an agenda to increase regulation of derivatives, including commodity derivatives.

Legislators appear to have accepted the arguments of those who see speculation in all derivatives markets — financial and commodities — as a danger that needs regulating. The theory is that speculators have driven up the price in defiance of market fundamentals. Yet the case against oil derivatives has not been made, and the idea that speculators drive prices is not proven.

Discussion about oil markets has become polarised. Those who believe that oil prices are formed by financial investors, often referred to as speculators, do not accept that no empirical evidence exists to back up this claim. The Paris-based International Energy Agency (IAE) has attempted to act as an honest broker, gathering participants from both sides of the argument at round-table discussions. But, faced with the unshakeable belief of the “speculators are to blame” proponents, the IAE has found it hard to dismiss the speculative case. After its round-table discussion on oil price volatility in Tokyo in February 2010, the IEA noted: “Debate on the precise degree of price impact derived from speculation was inconclusive.”

This appears to be a way of ducking the argument, but the IEA's careful words in fact reveal that it is highly sceptical of the argument that speculation distorts oil prices. If the “precise impact” of an economic effect cannot be measured, one plausible conclusion is that this effect does not exist. Some analysts who came into the debate asserting that speculation is in control of prices are now back-tracking, after repeated failure to win the debate through reasoned arguments. The manner of back-tracking takes several forms.

The most ardent proponents of the speculative case now admit that fundamentals play a role, but that some undefined share of the oil price is the result of speculation. They cannot put a number on this element of the oil price, but assert that it exists.

A second group of back-trackers seeks to appear diplomatic. The debate about the relative importance of fundamentals against speculation cannot be decided, they say, and further discussion is of little use. The problem with this approach is that it suggests that the evidence is balanced, whereas in fact no evidence backs up the speculative case.

Another attempt to circumvent this problem is to accept the lack of evidence, but to say that this does not matter. A report for the French government by Professor Jean-Marie Chevalier says it is “difficult to distinguish between the defenders of the physical fundamentals... and the defenders of financial fundamentals”. The report goes on to admit: “Nor do available statistical data establish clearly the links of causality between the open positions of financial investors in futures prices and the prices observed in the spot market.” Yet, despite this evidence-based fact, the report then asserts that “nothing suggests these links can be excluded”. This is not a reasonable position, undermining the report's following assertions that oil market risks “may generate systemic risk” and that “the price of oil emerges as a problem for general financial market regulation” (Report of the Working Group on the Volatility of Oil Prices, February

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A final form of back-tracking by those who find it hard to give up the belief that speculative forces mould oil prices, although they cannot prove their case, is to say that it is up to their opponents to prove the opposite case. They call on proponents of the fundamentals-based argument to prove that supply, demand and inventory levels define the oil price at all times. This is impossible, because while fundamentals can explain price movements, they cannot pinpoint an exact price at any time, such as North Sea Dated and cash WTI crude ending the day on 3 July at \$144.08/bl and \$145.29/bl respectively.

One reason for this is that it is never possible to obtain a timely, detailed and accurate global supply and demand dataset. And even if perfect data were obtainable, economists could still only use this to infer the price direction implied by the fundamentals, not the absolute magnitude of price changes. The “fair price” cannot be determined by economic theory, but is whatever price the market agrees.

Those who need to prove their case are the commentators and politicians arguing that financial flows have become a key driver of oil prices, displacing fundamentals. The idea that factors other than the supply and demand for oil drive its price in the market is so unorthodox in terms of practical oil economics that its adherents should be asked to prove it. So far they have not been able to, despite at least 10 years of research.

One of the terms used by followers of the speculative argument is the “financialised” commodity markets. This term is unclear and unhelpful in analysing oil markets, and has not been defined. The term “financialised” commodity markets appears to be based on the idea of some co-movement between oil market volatility and other financial markets during the financial crisis, and between oil markets and other commodity markets (Index investing and the financialization of commodities, Ke Tang and Wei Xiong, Princeton University, February 2010).

The idea implies spillover from the financial market crisis into oil market volatility. In itself, the idea of spillover is not contentious, given the drop in oil demand caused by the recession that followed the crisis, and given the issues of creditworthiness and liquidity surrounding certain oil market participants during the credit freeze after the collapse of Lehman Brothers in September 2008. But spillover does not prove causality.

Proponents of the speculative argument need to look beyond temporal correlations. The question is whether financial investors’ positions and inflows cause the price increase. Almost all serious analyses use Granger tests for this, showing no causality between financial flows and investors’ positions and oil price movements. Arguments based on the supposed “financialisation” of oil prices have failed to prove that speculators drive prices.

Studies such as those using the term “financialisation” invariably focus on crude futures, ignoring the links between futures and physical oil markets. A lack of understanding of physical oil markets skews research into oil price formation, as it becomes biased towards what may or may not be affecting activity on futures markets. This leads it to focus on expectations. This factor is a valid and useful analysis of one of the elements in futures prices further along the curve, but it is of limited use in explaining physical oil prices.

An understanding of physical oil markets requires research into how prices are identified in these markets. Price discovery in physical oil markets is made transparent by price reporting agencies (PRAs). Reporters at PRAs identify the price of physical spot oil cargoes, which are formed in open markets by negotiation between buyers and sellers — the spot market participants. The PRAs publish methodologies publicly explaining the process by which prices are identified. In many oil markets, PRAs show bids, offers and deals with counterparties named. This is a level of transparency beyond that provided by futures markets.

Price benchmarks provided by PRAs are far from simply being a satellite of futures. The North Sea physical and forward market is the benchmark against which the Ice Brent futures contract is cash settled. Ice gasoil and Nymex WTI can be physically delivered. Atlantic basin crude is priced against North Sea Dated, not Ice Brent. Physical oil tethers the futures markets.

Discussions of the price swings of 2008-09 that focus on headline crude futures prices alone are flawed. The failure to understand the real role of physical markets in crude and products means that this sort of analysis looks at crude as if it is an isolated commodity, traded for its own sake. In fact, crude is simply a feedstock. Crude is bought by refiners to make products, not for its own sake. Frankel’s *Essentials of Petroleum* notes “how vital it is to think always in terms of the whole industry rather than to try to solve the problems of any one of its component parts as if it were self-contained”.

The 2008 price spike was mainly the result of a diesel shortage, accompanied by Opec supply restraint. Diesel prices drove all oil prices higher, and premiums for capacity-constrained diesel to crude

and to other products that were in surplus — such as fuel oil and even gasoline — widened. “Each product sells at the price its market will bear,” as Frankel notes. “The relation of prices to yields can only be fully understood if we keep in mind that any one petroleum product can be made only if others are derived simultaneously.”

Refiners had to make as much diesel as possible to meet demand and were making unprecedented margins of nearly \$40/bl on diesel, so they bid up the price first of low-sulphur crude, supply of which is limited, and then of higher-sulphur crude, supply of which was constrained by Opec.

Rising diesel demand is a direct cause of rising crude demand, although processing enough crude to meet diesel requirements may well cause excess gasoline and fuel oil output. This is what happened during the latter part of the oil price cycle of 2003-08. At the same time as demand for crude was rising, Opec members refused to increase production, claiming that high oil prices were not their responsibility, but were caused by speculative financial flows into oil.

The feedbacks from fuel oil, diesel and gasoline demand into crude demand (and, therefore, pricing) is crucial in oil today’s market cycles. It is not possible to analyse crude prices without analysing products prices. Desulphurisation and upgrading capacity in the refining system was stretched to its limits up to mid-2008. Refinery utilisation rates have never been so high as during the price boom. From 2004 to mid 2008, outright global refining capacity was being utilised at levels of over 85pc — record high levels and effectively full utilisation, given maintenance requirements and sub-marginal capacity in Africa, eastern Europe, the FSU and South America. This was because diesel is essentially a straight-run product, requiring refiners to process more crude to make more diesel.

The first half of 2008 was characterised in particular by huge diesel premiums, partly because of increased Chinese demand ahead of the Beijing Olympics, including demand that may have been for inventory building rather than consumption. Diesel demand had to be capped through record high prices to keep it within the supply limits of the capacity constrained refining system.

The diesel constraint involved total crude refining capacity, but especially upgrading capacity and desulphurisation capacity. Diesel demand growth in 2004-08 was far greater than expected, as the economy was growing strongly. This was especially the case in China in 2004 and again in 2008. This capacity constraint argument is a simple but compelling explanation of the price spike.

Prices collapsed after July 2008 because of a drop in demand when the recession struck, especially after the collapse of Lehman Brothers in September 2008, exacerbated by destocking along the supply chain (tertiary oil stocks, petrochemicals, plastics), and on the supply side by Saudi Arabia relaxing output restraint after May in the face of crude’s damaging rally towards \$150/bl.

The prompt price reflects supply and demand of and for various grades of crude and products, tied together through refinery economics; the supply chain (freight rates, time lags, etc.); and inventory economics. Nearby futures prices are tied to this prompt price through settlement procedures, although overshoots or undershoots can occur in intra-day futures prices — such as the famous intra-day highs of \$147.27/bl on Nymex WTI and \$147.50/bl on Ice Brent futures on 11 July 2008.

Supply and demand expectations affect the longer-dated contracts on the forward curve. These factors, often called “future fundamentals”, are uncertain. But current fundamentals are hardly any more certain. Today’s fundamentals are not known until several months after the present time. The weekly U.S. data are always revised, monthly data are revised several times and sometimes very heavily seven to eight months after the year in question (U.S. EIA summer revisions). Non-U.S. data have much greater time lags than U.S. data, and Chinese demand data have to be implied from trade, output and refinery statistics. No inventory data exist for many countries, including China — the world’s second largest consumer.

The best guide to current fundamentals is not supply, demand and inventory data. The best guide to current fundamentals is the prompt price. Later, when fundamentals data become available, an explanation always comes through of how physical oil flows define oil prices.

Fundamental factors invariably explain overall oil price formation and direction. But oil market commentators need to keep an independent and open mind, looking at evidence for other factors, such as links with speculation by non-commercial investors. It is important to look at all evidence-based explanations of oil price formation. So far, all of the evidence suggests that so-called speculators play almost no part in price formation.

One of the latest evidence-based studies into speculation is by the OECD. It argues against the popular notion that flows of investment into oil futures markets increase demand for oil futures and, therefore, must push up the price. This logic, while apparently common sense, does not apply to oil futures because the supply of oil futures contracts is infinite. Each new transaction creates a new “paper” contract. For every buyer in a swaps or futures market, there is an equal and opposite position taken by a seller. Each

time an investor buys (sells) a contract, it is created. The supply of contracts is limited only by liquidity — by the willingness of other participants to sell (buy). Oil futures markets are highly liquid, so demand and supply of oil futures contracts is, in theory, infinite.

As the OECD study explains: “The first possible logical inconsistency within the bubble argument is equating money inflows to commodity futures markets with demand. With equally informed market participants, there is no limit to the number of futures contracts that can be created at a given price level. Index fund buying in this situation is no more ‘new demand’ than the corresponding selling is ‘new supply.’ Combined with the observation that commodity futures markets are zero-sum games, this implies that money flows in and of themselves do not necessarily impact prices. Prices will only change if new information emerges that causes market participants to revise their estimates of physical supply and/or demand.” (Speculation and financial fund activity, OECD draft report, May 2010 [www.oilis.oecd.org/olis/2010doc.nsf/ENGDATCORPLOOK/NT000029BA/\\$FILE/JT03282467.pdf](http://www.oilis.oecd.org/olis/2010doc.nsf/ENGDATCORPLOOK/NT000029BA/$FILE/JT03282467.pdf)).

Many of those who argue that speculators drive oil prices insist that empirical studies of trading positions are of little or no use because the data are flawed. They say that data aggregation by the CFTC renders the statistics worthless. But it is important to note that the key CFTC studies on price formation were written by the commission staff with full access to the full disaggregated data set. The CFTC has analysed uncoded data that are unavailable to non-staff (in order to protect market participants’ individual market positions).

A key CFTC study is “Price volatility, liquidity provision and the role of managed money traders in energy futures markets” by staff of the Commodity Futures Trading Commission, Public Company Accounting Oversight Board (November 2005). It states: “Employing a unique dataset consisting of trader positions in U.S. energy futures markets, we analyze trading relationships between managed money traders (MMTs) and other groups of traders (e.g., floor brokers, swap dealers, producers, manufacturers). We find that on average MMTs do not change their positions as frequently as other groups. Using causal techniques we determine that, on average, changes in MMTs positions are triggered by position changes of other trader groups. We find that MMTs are an important source of liquidity to the other participants and we reject the hypothesis that MMT trading causes price volatility in futures markets.”

This report built on previous staff studies, such as “Market Growth, Trader Participation and Derivative Pricing,” by Michael Haigh, Jeffrey Harris, James Overdahl and Michel Robe. In this study, the CFTC economists maintain that “hedge fund activity does not affect prices in energy futures markets.” The latest CFTC staff study was its “Interagency Task Force on Commodity Markets, Special Report on Commodity Markets”, which is available in draft form only because it was not published by the CFTC. It states: “Whereas the publicly available data only identifies commercial and non-commercial categories of participants in the crude oil futures market, the COT report is built upon confidential CFTC data collected for market surveillance purposes which allows for a more precise categorization.”

In this draft report, the CFTC says it has analysed “daily price changes and position changes by various trader groups and combinations of trader groups between January 2003 and October 2008.” It finds that: “Over the full time period, there is little evidence that daily position changes by any of the trader subcategories systematically precede price changes. This result holds for all potential categories of speculators, for non-commercial traders in total, for hedge funds and swap dealers individually, and for the positions of non-commercial traders combined with swap dealers. A reaction in the positive direction indicates that trader positions increase (decrease) following a price increase (decrease) on the previous day. A reaction in the negative direction indicates that trader positions decrease (increase) following a price increase (decrease) on the previous day. These results are representative and have been subject to a variety of robustness checks.” (Interagency Task Force on Commodity Markets, Special Report on Commodity Markets, online.wsj.com/public/resources/documents/DraftITFReport010509.pdf)

The physical oil price is set by the market. The fair or reasonable price is decided every day by those buying and selling oil. It is identified through price discovery by PRAs. Futures prices are tethered to these physical prices, and all of the evidence suggests that the whole price complex sends out signals that reflect the fundamentals of supply, demand and inventory levels. It is important for governments and the industry to trust the resulting price signals rather than constantly question them.