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CRS Report for Congress

Primer on Energy Derivatives and Their Regulation

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Summary

Prices for oil and other energy commodities are set in futures and derivatives markets, where producers, commercial users, and financial speculators buy and sell contracts whose value is linked to the price of the underlying commodity. Trading occurs on regulated futures exchanges and in a largely unregulated over-the-counter (OTC) market; both forms of trading are global in scope. This report presents basic information about these markets, the instruments traded, the regulatory framework, speculation, and current legislative proposals. The report will be updated as warranted.

Derivative financial contracts gain or lose value as the price of some underlying commodity, financial indicator, or other variable changes. In essence, traders promise to buy or sell a commodity in the future *at today's price*. The terms of derivative contracts — which include futures contracts, options, and swaps — may be simple or complex, but all involve two parties, one of whom stands to gain if prices rise, the other if they fall. Thus, futures markets are "zero-sum" — any change in the price of the underlying commodity generates profits for some traders, and an equal amount of losses for the rest.

Benefits of Derivatives Trading: Hedging and Price Discovery

It is not inaccurate to describe derivatives as bets on the direction of future price trends. Questions then arise: what separates the market from gambling? What public interest is served by the activity? There are two recognized benefits to derivatives trading: hedging and price discovery.

Hedgers are traders who use the market to avoid price risk arising from their commercial dealings in the underlying commodity. An oil producer, for example, can use the markets to lock in today's price for future sales of physical oil, obtaining protection against the risk of falling prices. The producer will purchase contracts that gain value if the price of oil falls. If the price does in fact drop by the time the futures position expires, the producer will lose money on physical sales, but the loss will be offset by futures

contract profits. Conversely, if prices rise, the producer will lose money on the futures contracts, but gain on physical sales. Whichever way prices move, the net result is the same: the risk of unfavorable price movements over the term of the futures contracts has been eliminated, or hedged. The ability to manage price risk with futures enables firms to budget and invest more efficiently, and provides a buffer against adverse price shocks.

Who takes on the price risk that the hedger gets rid of? It will probably be a speculator who will never actually handle the physical commodity, but is simply seeking to profit by forecasting future prices. Most trading in derivatives is speculative; the futures exchanges are associations of professional speculators. The advantage of large volumes of speculative trading is that hedgers can quickly find someone to take the opposite side of their trade. For instance, a firm that is at risk if energy prices rise (such as an airline or a power utility) can instantly find a speculator who is willing to bet that prices will fall, enabling the hedging firm to lock in the current price.

Price discovery is the second benefit. Centralized marketplaces like the futures exchanges are forums where all available information about supply and demand for the underlying commodity is brought together and incorporated into the price. Traders' decisions to buy or sell are guided by data on current inventories and consumption, expectations about long-term supply and demand trends, macroeconomic conditions, geopolitical risk factors that could disrupt supply, and innumerable other considerations. A central tenet of free market economics is that a competitive market, where no participant is able to manipulate or dictate prices, is the best available mechanism for determining prices that will ensure that supply meets demand and that resources are efficiently allocated. The price generated by the futures exchanges is publicly available: traders in the market, firms in the energy industries, and consumers may all use it to guide their energy-related transactions.

Rapid energy price increases in 2007 and 2008 have led many to conclude that the market is not performing its price discovery function well. There are several possible explanations for why this might happen. First, there could be manipulation: are there traders in the market — oil companies or hedge funds, perhaps — with so much market power that they can dictate prices? The federal regulator, the Commodity Futures Trading Commission (CFTC), monitors markets and has not found evidence that anyone is manipulating prices. The CFTC has announced that investigations are in progress, but generally manipulations in commodities markets cause short-lived price spikes, not the kind of multi-year bull market that has been observed in oil prices since 2002.

Absent manipulation, another possible explanation is that the futures markets could set prices too high if a speculative bubble were under way, similar to what happened during the dot-com stock episode. If traders in the grip of irrational exuberance believe that the current price is too low, and take positions accordingly, the price will rise. Eventually, however, bubbles burst and prices return to fundamental values, often with a sharp correction. A variation on the bubble explanation is that institutional investors, such as pensions funds, have increasingly decided to allocate part of their portfolios to commodities, and that the resulting inflow of cash may have overwhelmed the commodities markets, driving prices above fundamental levels. There is little data, however, on the amounts invested by institutions, or the effect of their trades on prices. The CFTC is in the process of obtaining such information, using its "special call" authority, and will report its findings in September 2008.

Derivatives Trading Venues: Futures Exchanges and OTC Markets

The Futures Exchanges. The premier energy futures exchange is Nymex (the New York Mercantile Exchange), which handles nearly two-thirds of global contract volume. (China, Japan, India, and the U.K. also have major energy futures exchanges.) In 2007, 353 million futures and options contracts changed hands on Nymex, 150 million of which were based on West Texas Intermediate crude oil.[1] Each WTI oil futures contract represents 1,000 barrels, and has a fixed expiration date.[2] Because of the homogenous nature of the contracts, they can be traded very rapidly, and many speculative traders open and close positions in a time frame of minutes or seconds.

While each contract represents 1,000 barrels, purchase of a futures contract does not mean that the buyer actually expects to take possession of the physical oil. Most contracts are offset and settled for cash (as explained in the "Appendix" section below). This means that there is no direct relationship between the number of futures contracts outstanding and the volume of physical oil available for purchase in the spot market. No oil is actually set aside or held off the market to cover the possibility that futures traders may decide to settle their contracts by taking physical delivery.

Participants in exchange trading include exchange members (who trade for their own accounts and execute customer orders), financial institutions, businesses that deal in the underlying commodities, commodity pools (the futures equivalent of mutual funds), and individual investors. Because of the risks associated with volatile commodity prices, however, individuals play a much smaller role than they do in the stock market.

Nymex, like many other futures exchanges, is structured as a for-profit, stockholder-owned corporation. Under the Commodity Exchange Act (as described below), it is a self-regulatory organization; it must adhere to a set of regulatory principles designed to keep markets free from manipulation and excessive speculation, to protect public customers from fraud, and to provide trading and price data to the public and to regulators.

The OTC Market. In addition to the exchange market, many contracts linked to the price of energy commodities are traded over-the-counter. Unlike futures contracts, OTC derivatives are not necessarily homogenous: any contract term may be negotiated between the parties. Economically, however, exchange-traded futures and OTC swaps or options are close substitutes; many traders, whether hedgers or speculators, are active in both markets.

OTC trading takes two principal forms. First, there is a bilateral dealer market, where contracts may be customized to fit the traders' particular requirements. Financial institutions like Morgan Stanley and Goldman Sachs are leading dealers, and stand ready

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[1] "Volume Surges Again," *Futures Industry Magazine*, March/April 2008, p. 23.

[2] An oil futures contract is available expiring each month, up to about two years into the future. Most trading involves contracts due to expire in the next 1-3 months.

to enter into contracts with those who expect prices to rise and those who expect them to fall. Because the market in OTC swaps and options is unregulated, very little information about price or volume is available to the public or to the CFTC.

Another form of OTC trading involves electronic trading facilities, where multiple traders may place bids and offers and trade with each other. In these markets, contracts are standardized, and may be bought and sold rapidly, as are exchange-traded futures contracts. The leading electronic OTC market is operated by IntercontinentalExchange (ICE), which handles a volume of natural gas contracts that is comparable to Nymex's, and also offers high-volume contracts in electric power and crude oil. As in the bilateral swaps market, the CFTC does not receive regular reports about trading on these markets, although it has used its special call authority to obtain certain information from ICE.

The unregulated status of both types of OTC markets is a key issue in the current debate over energy speculation.

Derivatives Regulation: The Commodity Exchange Act

The Commodity Exchange Act (CEA, 7 USC §1 et seq.) provides for regulation of derivatives markets. Federal regulation dates from the 1920s, but much of the current regulatory structure was established in 1974, when Congress created the CFTC as an independent regulatory agency. The CFTC's regulatory authority is patterned after the Securities and Exchange Commission (SEC): both agencies oversee exchange markets that have self-regulatory responsibilities. Exchanges are required to set and enforce rules to protect customers, prevent fraud and manipulation, maintain orderly and fair markets, and so on, and the regulators have the power to modify the exchanges' rules, as well as issue rules and regulations of their own. Common to securities and commodities law is a presumption that certain forms of trading, especially when public investors are involved, should take place only on a regulated exchange.

Unique to the CFTC is a duty to prevent excessive speculation, defined in section 4a as an "undue burden on interstate commerce." The CFTC is specifically authorized to establish limits on the size of positions that speculators are allowed to accumulate. However, the statute does not provide any specific criteria for identifying an "excessive" amount of speculation, and the term is subject to various interpretations. Record trading volumes, for instance, do not necessarily indicate excessive speculation — rather than a cause of price volatility, increased volumes may be the result, as speculators see increased profit opportunities and hedgers face more price risk that they wish to trade away.

The emergence during the 1980s and 1990s of large OTC markets in financial and then commodity derivatives was a major challenge to the regulatory framework. The CEA stated that futures trading should only take place on a CFTC-regulated market, raising the possibility that a court might rule that OTC contracts were illegal, off-exchange futures contracts, and hence unenforceable. In 2000, Congress passed the Commodity Futures Modernization Act (CFMA, P.L. 106-554), in part to address this legal uncertainty and set out the conditions under which derivatives could be traded in the OTC market without CFTC oversight.

The CFMA established three categories of commodities: financial commodities (such as interest rates, currency prices, or stock indexes) were defined as *excluded*

commodities. Excluded commodities can be traded in the OTC market with minimal CFTC oversight, provided that small public investors are not allowed to trade. A second category is *agricultural commodities*; here, because of concerns about price manipulation, the law specifies that all derivatives contracts based on farm commodities must be traded on a CFTC-regulated futures exchange, unless the CFTC issues a specific exemption after finding that a proposed OTC agricultural contract would be consistent with the public interest. Finally, there is a third "all-other" category — *exempt commodities* — which includes anything that is neither financial nor agricultural. In today's markets, this means primarily metals and energy commodities. The statutory exemption from regulation provided by the CFMA for exempt commodities is what is commonly known as the "Enron loophole."[3]

As concerns about manipulation and excessive speculation in energy markets has grown in recent years, the adequacy of CFTC regulation has been questioned. In October 2007, both the Government Accountability Office and the CFTC issued reports that described the unregulated status of exempt commodities as problematic and suggested that the CFTC needed more supervisory authority over the OTC market in order to be able to monitor the energy derivatives markets effectively.[4]

The CFTC recommended that Congress give it authority over electronic trading facilities like ICE, where certain contracts had come to play a significant role in price discovery. The farm bill (P.L. 110-234, enacted on May 22, 2008) included provisions similar to the CFTC's recommendations. If the CFTC determines that an energy contract traded on an OTC electronic trading facility plays a significant role in setting prices (that is, if prices generated there are linked to, or used as reference points by, other markets), the OTC market will be required to register with the CFTC and comply with several regulatory core principles aimed at curbing manipulation and excessive speculation (including the establishment and enforcement of position limits). It will be required to publish and/or report to the CFTC information relating to prices, trading volume, and the size of positions held by speculators and hedgers.

The farm bill did not address bilateral contracts that are not executed on a trading facility, but which are negotiated between the counterparties — these remain outside the scope of CFTC regulation, except for certain anti-fraud and manipulation provisions. Some believe that this omission means that the Enron loophole has been only partially closed. A number of bills before the 110th Congress would remove the statutory exemption for bilateral energy swaps, by putting them on the same regulatory basis as OTC agricultural contracts (which must be approved by the CFTC as consistent with the public interest before they can be traded), or by restricting participation in OTC energy markets to firms that deal in the physical commodities. (Summaries of these bills appear in CRS Report RL34555, *Speculation and Energy Prices: Legislative Responses*, by Mark Jickling and Lynn J. Cunningham.)

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[3] For more information, see CRS Report RS22912, *The Enron Loophole*, by Mark Jickling.

[4] CFTC, *Report on the Oversight of Trading on Regulated Futures Exchanges and Exempt Commercial Markets*, October 2007, 23 p. and GAO, *Commodity Futures Trading Commission: Trends in Energy Derivatives Markets Raise Questions about CFTC's Oversight*, GAO 08-25, October 2007, 83 p.

Appendix. A Futures Contract

The Mechanics of a Futures Contract

An oil futures contract represents 1,000 barrels of oil, but neither party to the contract need ever possess the actual commodity. (Contracts may be settled by physical delivery, but in practice the vast majority are settled in cash.) When a contract is made today, one party (called the "long") agrees to buy oil at a future date from the other (the "short"). Contracts are available with different maturities, designated by expiration months, but the size is always the same. (In oil, a contract expires every month.) The price at which this future transaction is to take place is the current market price. Assuming the price of oil is $135 per barrel, the long trader is committed to buy at that price, and the short is obliged to sell.

Assume that tomorrow the price of oil goes to $140/barrel. The long trader now has the advantage: he is entitled to buy for $135 oil that is now worth $140. His profit is $5,000 (the $5 per barrel increase times the 1,000 barrels specified in the contract). The short has lost the identical amount: she is obliged to sell oil for less than the going price.

If, on the following day, the price goes to $145, the long gains another $5,000. The short, down a total of $10,000, may reconsider her investment strategy and decide to exit the market. She can do this at any time by entering into an offsetting, or opposite transaction. That is, she purchases a long contract with the same expiration date. Her obligation (on paper) is now to sell 1,000 barrels (according to the first contract) and to buy 1,000 barrels (the second contract) when both contracts expire simultaneously. Whatever price prevails at that time, the net effect of the two transaction will be zero. The short's position is said to be "evened out" — she is out of the market.

The short's decision to exit does not affect the long, who may prefer to ride with the trend. This is because all contracts are assumed by the exchange's clearing house, which becomes the opposite party on each trade, and guarantees payment. The ability to enter and exit the market by offset, without having to make or take delivery of the physical commodity, permits trading strategies based on short-term price expectations. While some traders may keep a long or short position open for weeks or months, others buy and sell within a time frame of minutes or seconds.

The exchange clearing house, which guarantees all trades, also controls traders' funds. Before entering into the trade described above, both long and short would have been required to deposit an initial margin payment of $11,813. (The amount is set by the exchange; the figure is current as of July 9, 2008.) All contracts are priced, or "marked-to-market," each day. The long trader above would have had his $10,000 gain credited to his margin account, while the short would have had to make additional "maintenance" margin payments to cover her losses. It is worth noting that her two-day $10,000 loss represents 85% of her original investment, that is, her initial margin deposit of $11,813: the risks of futures speculation are high. When traders exit the market, any funds remaining in their margin accounts are returned. (Other transaction costs, such as brokerage commissions and exchange fees, are not returnable.)

Options on futures are also available for many futures contracts. The holder of an option has the right (but not the obligation) to enter into a long or short futures contract over the life of the option. The option will only be exercised if price movements are favorable to the option buyer, that is, if the underlying futures contract would be profitable. The seller of the option receives a payment (called a premium) for granting this right. The seller profits if the option is not exercised by the buyer.