

GAO

Briefing Report to the Chairman,  
Committee on Energy and Commerce,  
House of Representatives

May 1991

# OIL PRICES

## Analysis of Oil Futures Market Prices Since Iraq's Invasion of Kuwait



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General Government Division

B-243748

May 16, 1991

The Honorable John D. Dingell  
Chairman, Committee on Energy  
and Commerce  
House of Representatives

Dear Mr. Chairman:

You asked us to evaluate a response by the Commodity Futures Trading Commission (CFTC) to your request for information concerning the movements of oil prices between July 30 and September 28, 1990, a period that included Iraq's invasion of Kuwait on August 2, 1990. You were concerned about possible manipulation of oil futures prices during this period. In transmitting the data you requested, CFTC concluded that the futures market was functioning normally and that there was no evidence that oil futures were being manipulated. We briefed the Committee on February 20, 1991, on the results of our evaluation. You asked that we update our analysis through the end of February and officially transmit the results. This briefing report contains the information you requested.

Our examination of CFTC's report led us to the same conclusion it reached--that oil futures prices reflected actual changes in supply and demand conditions. Furthermore, the data since September point to the same conclusion. Significantly, this latter period included the largest single-day price movement for crude oil on record (down \$10.55 on January 17, 1991). This extreme movement did not lead to a breakdown or other problems in the futures market.

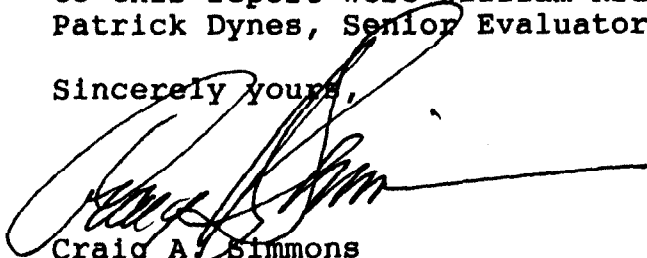
In order to respond to your request we collected and analyzed data on oil prices, trading volumes, and similar data from CFTC and the New York Mercantile Exchange (NYMEX). We also reviewed the ways that CFTC and NYMEX monitor the markets and how they guard against manipulation of the futures market.

We discussed a draft of this report with CFTC and NYMEX officials to ensure its factual accuracy. They generally agreed with the facts presented, and their technical comments were incorporated as appropriate.

B-243748

We are sending copies of this briefing report to the Chairman of CFTC, the President of NYMEX, and other interested parties. If you have any questions about the material contained in this report, please contact me at (202) 275-8868. Major contributors to this report were William Kruvant, Assistant Director, and Patrick Dynes, Senior Evaluator.

Sincerely yours,

A handwritten signature in black ink, appearing to read "Craig A. Simmons", with a long horizontal line extending to the right.

Craig A. Simmons  
Director, Financial Institutions  
and Markets Issues



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# Objective

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- To examine whether oil futures markets have been manipulated to raise prices more than was justified by supply and demand factors

OBJECTIVE, SCOPE, AND  
METHODOLOGY

OBJECTIVE

When futures markets are functioning normally, futures prices reflect the market's judgment of future supply and demand conditions. Like any market, the futures market can possibly be manipulated. In this context, manipulation means that some market participants intervene in the market to artificially affect price. If this is done successfully, the manipulator causes the futures price to be higher or lower than that justified by actual supply and demand. In these circumstances, a manipulator can profit at the expense of other market participants. The objective of our study was to examine the oil futures market for indications that prices had been manipulated.

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# Scope

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- The Chairman asked us to examine a report by the CFTC responding to his request for information
- We expanded our examination to cover the period after CFTC's report (since October 1990)



THE ORIGINAL REQUEST

On September 11, 1990, the Chairman of the House Committee on Energy and Commerce asked the Commodity Futures Trading Commission (CFTC) to provide data on oil futures market activity covering the period between July 30 and September 28, 1990. CFTC Chairman Gramm responded on October 12, providing the data along with her evaluation of how the oil futures market had been functioning since the invasion of Kuwait. Subsequently, Chairman Dingell asked us to review and evaluate the CFTC report.

ADDITIONAL DATA

Because some time had passed since CFTC's response, and because the Middle East crisis was continuing, we agreed with the Committee to expand the scope of our work to cover the time period through February 1991.

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# Methodology

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To respond to the request, we

- Collected and analyzed data on cash and futures markets
- Examined CFTC and NYMEX controls on oil futures markets

METHODOLOGY

We used data from both CFTC and the New York Mercantile Exchange (NYMEX) for our analysis. These two organizations are the most closely involved and generate the most current and accurate data on oil futures trading. We also met with officials of both organizations to clarify how they monitor and regulate the markets.

Since a major concern of the Chairman was whether the markets were manipulated, we also had extensive discussions with CFTC and NYMEX officials concerning how they monitor the markets to detect manipulation. We also reviewed other ways that CFTC and NYMEX seek to prevent manipulation, such as position limits, margins, contract design, clearance and settlement procedures, and limits on price movements. Whenever practicable, we verified the information through examining documents or confirming data with other sources.

Our work was done during January and February 1991 in accordance with generally accepted government auditing standards.

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# The Functions of Futures Markets

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- Price discovery
- Risk shifting

INFORMATION ON OIL  
FUTURES MARKETS

PRICE DISCOVERY AND RISK SHIFTING

One major function of the futures market is called "price discovery." This means that when the market is functioning as designed, the prices that result from trading accurately reflect underlying supply and demand conditions. As CFTC points out, the prerequisites for an optimally functioning futures market include

- presence of a large number of buyers and sellers,
- continuous open auction of the commodity,
- free flow of all relevant information to all buyers and sellers, and
- standardized commodity characteristics so that the only variable is price.

The other major function of the futures market is called "risk shifting." Risk shifting allows owners of the commodity to transfer risk to speculators who assume the risk with the expectation of making a profit. There are many reasons why a market participant, or speculator (known in market jargon as a hedger), would like to shift risk, but all basically concern the risk that the price of the commodity would change adversely, exposing the hedger to losses. For example, an oil refiner might be concerned that the price of crude oil will increase in the future. In this case the refiner could contract for delivery of the needed crude oil in, say, July, at a price determined (locked in) in April. On the other hand, a refiner could protect the value of his inventory by agreeing to sell refined products in the future (e.g., July) at prices agreed upon today (e.g., April). Lastly, the futures market locks in prices for crude oil producers by enabling them to sell oil for delivery in the future at a price agreed upon today.

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# Market Surveillance Programs

- Large Trader Reporting System
- Data are examined for irregularities as the contract matures
- CFTC may take various actions including making informal contacts, sending warning letters, or filing injunctions

LARGE TRADER REPORTING SYSTEM

The Large Trader Reporting System is the lifeblood of CFTC's market surveillance system. It collects data from a variety of sources, including individual market participants, futures commission merchants, exchanges and clearing organizations. Data elements include the identity of the customer, daily positions, prices, open interest,<sup>1</sup> and deliveries.

ANALYSIS OF DATA

CFTC and NYMEX surveillance economists examine price movement trends, the relationship between the cash price and the futures price, and other relationships--including political and economic events--to identify any possible problems. Of particular interest are contracts near maturity, because cash and futures prices should converge. Problems may occur when open interest declines, and the size of a large trader's position increases relative to the remaining open interest. As open interest declines, the ability of those with large positions to influence price increases.

WEEKLY MARKET SURVEILLANCE  
MEETINGS AND INTERVENTIONS

CFTC holds weekly market surveillance meetings to review significant market developments. CFTC can take action to counter developing market problems by (1) making informal contact to request information on the strategy being used by the trader or express concerns that holding a large position so close to delivery could cause artificial price relationships, (2) issuing a warning letter advising the trader of its responsibility for an orderly liquidation and that it could be investigated for price manipulation, (3) referring the problem to the exchange for appropriate action, (4) filing an enforcement action seeking an injunction or other relief, and (5) declaring a market emergency.

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<sup>1</sup>Open interest is the total number of buy (long) or sell (short) contracts outstanding--that is, the number of either long or short contracts.

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# Trade Practice Surveillance

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- NYMEX and CFTC both monitor trading and discipline traders
- Most actions are against prearranged trading or trading ahead of a customer



TYPES OF TRADE PRACTICE ABUSES

NYMEX officials told us that the ways traders can abuse trading are well known, and NYMEX surveillance staff check for these abuses. The abuses include trading ahead of a customer order, wash or accommodation trades, failing to maintain trading records, noncompetitive cross-trading, and prearranged trading. Trading ahead of a customer order is trading for one's personal account, or an account in which one has an interest, before executing a customer order in that contract. Wash or accommodation trading is entering or purporting to enter into transactions to provide the appearance of trading activity without actually changing a market position. Cross-trading is matching customer orders without offering them competitively. Prearranged trading is agreeing to some aspects of a transaction before it is openly executed on the exchange floor. NYMEX does special analyses to check for these violations.

TRADE PRACTICE ABUSE INVESTIGATIONS

Both CFTC and NYMEX investigate trade practice abuses. During the April 1990-April 1991 period, NYMEX initiated 184 trade practice investigations. CFTC initiated 20 investigations during calendar year 1990.

CFTC REVIEWS NYMEX TRADE PRACTICE SURVEILLANCE PROGRAMS

CFTC conducts periodic reviews of NYMEX rule enforcement programs to ensure that NYMEX members obey exchange rules and that NYMEX is fulfilling its self-regulatory responsibilities.

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# Speculative Limits

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- Speculators have limits on the number of contracts they can hold: 7,500 crude oil futures contracts overall, no more than 5,000 contracts for any month, except the spot month, in which the limit is 1,000 contracts.

LIMITS ON THE NUMBER OF CONTRACTS TRADED

Speculators, or those without a commercial interest in oil, can hold no more than 7,500 futures contracts overall, and no more than 5,000 contracts in any contract month, except the spot (settlement) month, in which the limit is 1,000 contracts.

REPORTABLE HOLDINGS

CFTC officials told us that all open positions of 250 contracts or more in any delivery month must be reported. They said that reportable positions are approximately 70 percent of energy futures' total open interest. That is, approximately 30 percent of the open interest is held by participants holding fewer than 250 contracts at a time. NYMEX requires reports of all open positions of 200 contracts or more.

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# Hedge Exemptions

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- Commercial firms have limits on their participation in energy futures markets
- The hedge ceiling is based on the commercial firm's need for buying or selling oil

LIMITS ON COMMERCIAL FIRM PARTICIPATION IN ENERGY FUTURES MARKETS

There are limits on how extensively commercial firms can participate in the energy futures markets. A ceiling, called a hedge exemption, is placed on commercial participants on the basis of the quantity of oil they buy or sell. Commercials cannot hold positions in futures contracts above their limit.

DETERMINATION OF THE HEDGE CEILING

Commercial firms must apply for a hedge exemption<sup>2</sup> to participate in the energy futures markets beyond the limits imposed by restrictions on speculators by demonstrating their involvement in the cash market. These exemptions are reviewed annually. NYMEX is responsible for conducting due diligence checks of applying firms. NYMEX would then examine clearinghouse records for credit information and evidence of any late payments. The applicant must also submit financial statements to NYMEX. NYMEX talks with the firm about the needs of the company and the size of the trades it intends to take. NYMEX staff also discuss hedging strategies and the exposure of the firm to different sides of the market, like refining and retailing. NYMEX also considers whether the size of the position that the commercial is petitioning to take would reflect undue concentration in the oil futures market. Petitions for hedge exemptions are frequently modified. NYMEX officials told us they are generally familiar with companies that apply for a hedge exemption because the companies have been active in the futures market.

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<sup>2</sup>Or to raise an existing hedge exemption.

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# Margins

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- Energy futures margins were increased in response to the oil crisis
- Margins are based on price volatility
- NYMEX has \$6 billion-\$7 billion of original margin on deposit

ENERGY FUTURES MARGINS WERE INCREASED IN RESPONSE TO THE OIL  
CRISIS IN AUGUST 1990

Before the crisis, margins on energy futures contracts were typically 5 to 8 percent of the value of the contract. During the crisis period starting in August, margins increased to 25 to 40 percent of contract value.

MARGINS ARE BASED ON PRICE VOLATILITY

NYMEX officials told us that margins are computed daily and adjusted if necessary. Margin calculations are based on implied and historical volatility. Implied volatility is based on activities on the options markets. Margins calculated on the basis of implied and historical volatility incorporate both anticipated future events and historical experience.

CURRENT MARGIN DEPOSITS

During February, NYMEX had \$6 billion to \$7 billion in original margin payments on deposit. As much as \$600 million in variation margin (daily margin payments made when prices move adversely) flowed through the NYMEX Clearing House daily from unprofitable positions to profitable ones.

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# Design of Futures Contracts

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- Exchanges design contracts subject to CFTC approval to minimize opportunities for market manipulation



**CONTRACTS ARE DESIGNED TO PREVENT MANIPULATION OPPORTUNITIES**

CFTC and NYMEX officials told us that energy futures contracts are designed so that possible manipulations can be prevented. Contract terms and conditions must conform to commercial practice and provide for adequate deliverable supply. According to these officials, improperly designed contracts can increase the chance of cash, futures, or options market disruptions and undermine the usefulness and efficiency of the market. CFTC reviews the contract for potential commercial usefulness for hedging and price basing as well as other public interest considerations. Delivery points need to have adequate capacity to handle potential deliveries. Although the crude oil futures contract has a single delivery point in Cushing, Oklahoma, oil from the international spot crude market can be put into pipelines by oil tankers at terminals on the Gulf of Mexico.

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# Clearance and Settlement

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- The NYMEX Clearing House has not experienced any late payments

LATE PAYMENTS

NYMEX officials told us--and CFTC officials confirmed--that the NYMEX Clearing House experienced no late payments through January 1991. The exchange did not make any late payments to clearing members nor did clearing members make any late payments to the Clearing House. Before January 15, 1991, NYMEX met with its main settlement bank and other banks used by clearing members to review payment procedures. They cautioned banks to be aware of intra-day margin calls and reviewed customer lines of credit on a case-by-case basis. Clearing House guarantee funds on deposit by clearing members were not increased. Before January 15, 1991, one clearing member that cleared solely for its own account and did not carry customer positions did withdraw from the Clearing House, and that member's account was transferred to another clearing member.

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## Price Limits

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- NYMEX has instituted a \$7.50/\$15.00 price limit/trading halt
- When the first limit is reached, trading stops for 1 hour
- Trading will always resume for at least 30 minutes

PREEXISTING PRICE LIMITS

There were no price limits on the first month of the energy futures contracts. Price movements for the contracts in later months were limited to \$1.50 per day (\$3.00 on the day after a \$1.50 limit was reached).

NEW PRICE LIMITS

Price fluctuation limits are intended to temporarily limit short-term price movements by confining price increases or decreases to a specific price range, which if reached triggers a temporary trading halt. As part of NYMEX's emergency preparedness plan, price fluctuation limits were established for the two nearest months of the energy futures contracts. Once prices move \$7.50 per barrel<sup>3</sup> either up or down from the previous day's settlement price, there is a temporary trading halt of 1 hour in all months of that contract and its related option. When trading reopens, price fluctuation limits are reset<sup>4</sup> and prices can move another \$7.50 either direction. When trading reopens, if prices in either of the front 2 months move an additional \$7.50 (\$15.00 in total) in the direction preceding the halt, the markets do not halt again; however, this \$7.50 acts as a price limit. If, on the other hand, the market reverses direction after the halt and moves by \$7.50, there would be a second 1-hour trading halt. After any trading halt, trading will reopen for at least 30 minutes, even if the 30-minute period extends beyond the normal market time. Trading was halted on January 17, 1991, after prices dropped by \$7.50. Trading was not suspended again that day, because prices did not change by an additional \$7.50.

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<sup>3</sup>Or 20 cents per gallon on unleaded gasoline, heating oil, and propane contracts.

<sup>4</sup>There is no revised limit in the last half hour of the last trading day of an expiring contract.

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# Futures Market Participants

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- Speculators are a small part of the market
- NYMEX distinguishes six types of hedgers--end users, integrated, marketers, producers, refiners, and traders

SPECULATORS ARE A SMALL PART OF THE MARKET

CFTC distinguishes between commercial and noncommercial (speculative) participation in the energy futures markets. During the time period of our review, commercial participation was approximately two-thirds of the market while noncommercial participation was approximately 10 percent.<sup>5</sup> NYMEX officials told us--and CFTC officials confirmed--that energy futures trading has a higher proportion of commercial or nonspeculative participation than agricultural futures trading does. In fact, commercial participation in energy futures markets has increased since August.

NYMEX DISTINGUISHED SIX TYPES OF HEDGERS

NYMEX collects trading data on speculators and six types of hedgers: end users (e.g., airlines), integrated (i.e., a company that produces, refines, and distributes crude oil and other products), marketers (e.g., heating oil dealers), producers (e.g., independent drillers), refiners, and traders. In December 1990, traders accounted for 36 percent of trades (of the top 25 trading firms), refiners accounted for 29 percent, integrated oil companies 21 percent, and the other categories for the remaining 14 percent.

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<sup>5</sup>About 30 percent of trading was nonreportable.

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# Futures Market Participants

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- Trading firms include banks doing swaps, refining subsidiaries of investment banks, and trading arms of oil companies
- Some trading firms arbitrage, which keeps price relationships in line



TRADERS HAVE VARIOUS FUNCTIONS

Trading firms are engaged in a number of oil-related businesses. Banks who swap a stream of payments for a stream of oil are classified as traders. Oil companies have trading subsidiaries that are also classified as traders. Investment banks sometimes have refining subsidiaries that are classified as traders. Some trading firms specialize in buying and selling oil while it is in transit by sea.

THE FUNCTION OF TRADING FIRMS

Many of these trading firms look for price discrepancies and seek to profit from them by purchasing the less expensive item and selling the more expensive item (arbitrage). This type of activity helps to keep price relationships between the cash and futures markets in West Texas Intermediate Crude Oil and North Sea Brent Crude Oil in line.

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# Types of Market Manipulations

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- Corners
- Squeezes

CORNERS AND SQUEEZES

Corners and squeezes are the most serious forms of market manipulation. They both involve actions by a person or group of persons acting in concert that could cause prices to rise above those that would be established by legitimate forces of supply and demand. In a corner, the perpetrator would secretly amass a large position in the cash market before or at the time he/she acquires a large long position in the futures market. The perpetrator's goal is to amass a long position that is greater than the supply available to the shorts (those with a commitment to sell) in the cash market, and then either demand delivery or require shorts to pay artificial prices to offset their futures contracts. A squeeze works essentially the same way, except that the perpetrator deals entirely or predominately in the futures market, taking advantage of a naturally occurring shortage of the cash commodity.

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## Is There Evidence of Market Manipulation?

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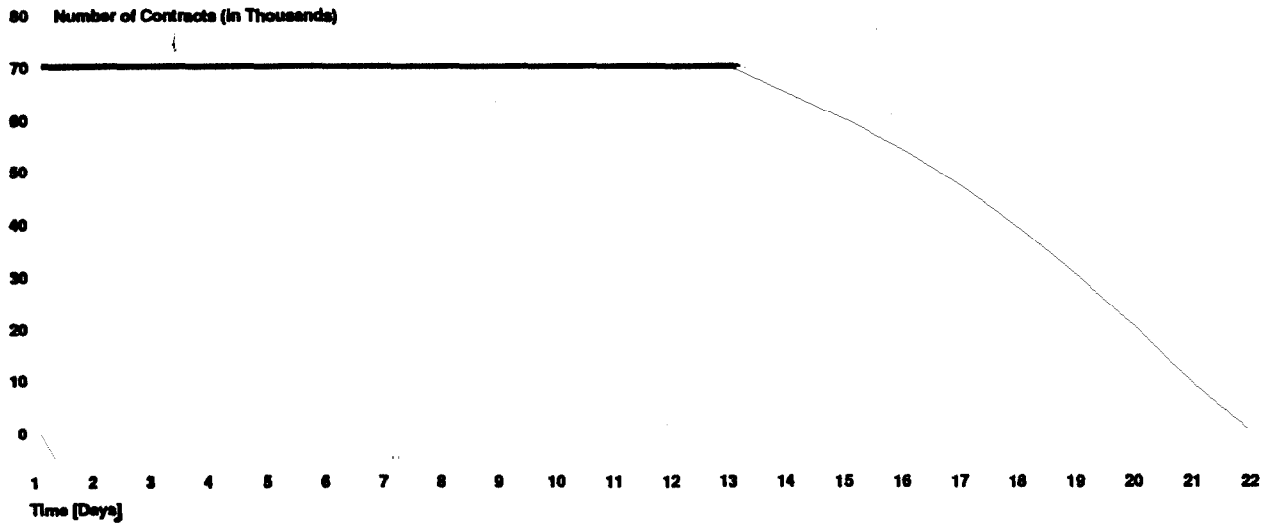
- Behavior of open interest
- Convergence of cash and futures prices
- Excessive speculative buying

INDICATORS OF POSSIBLE MARKET MANIPULATION

There are three indicators that NYMEX and CFTC look at when determining whether market manipulation may be about to take place:

- Unusual behavior of open interest: As contract expiration nears, the amount of unsettled contracts ("open interest") normally falls rapidly. This is because only a few people in the market actually want delivery of oil, so they settle their futures positions with offsetting futures transactions. If open interest remains high as contract expiration approaches, a manipulator may be attempting to execute a corner or squeeze.
- Convergence of cash and futures prices: As contract expiration approaches, the futures and cash prices should become closer. In fact, when the current crude oil futures month (often called the "spot month") approaches expiration, the two prices should be essentially identical. If prices do not converge, this may be an indicator that someone is manipulating the futures price.
- A sudden increase in the amount of speculative buying may indicate that the market is being manipulated. This could be signaled by an unusual increase in the holdings of open interest by a group of market participants.

# Illustration of Normal Behavior of Open Interest

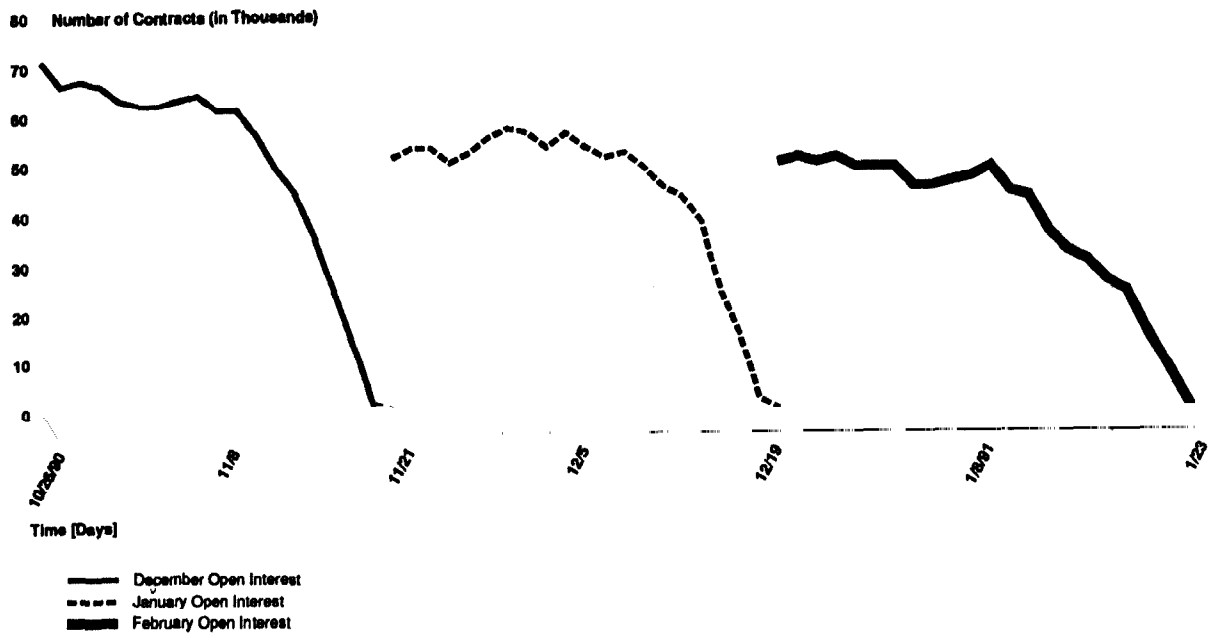
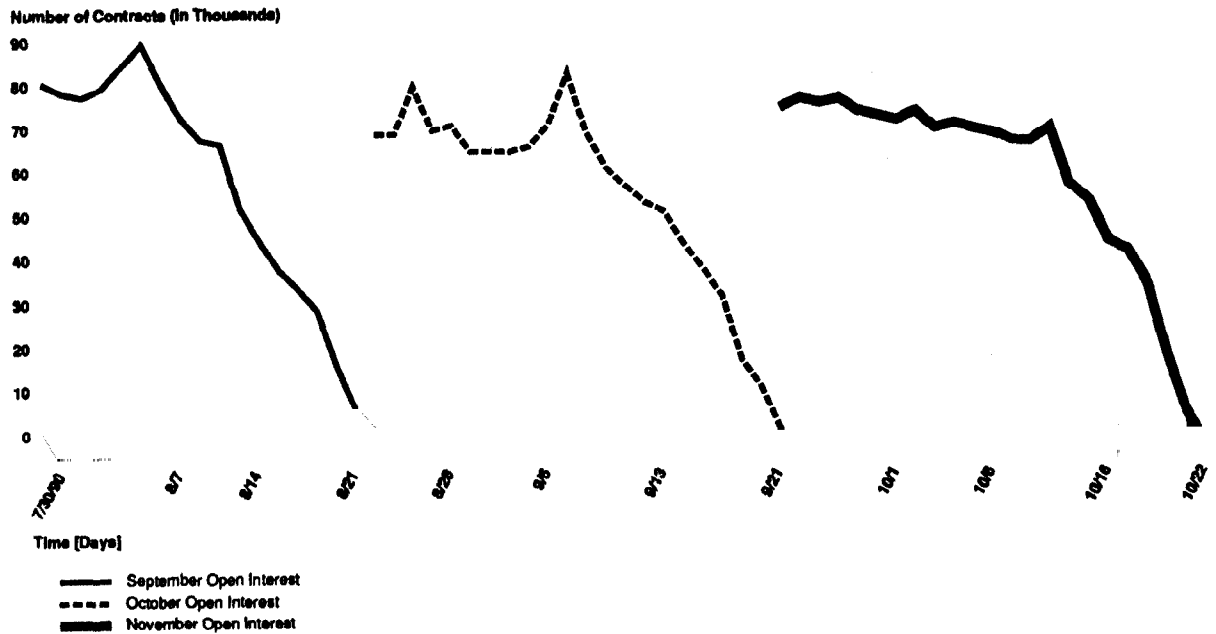


Typical trading month has 22 trading days.

"NORMAL" BEHAVIOR OF OPEN INTEREST

This graph illustrates the type of behavior expected in the normal liquidation of open interest as a contract approaches expiration. A typical expiration month has 22 trading days, and during approximately the last week of trading, open interest should fall to zero as participants close out their positions and, at expiration, delivery is made.

# Crude Oil Open Interest: September 1990-February 1991

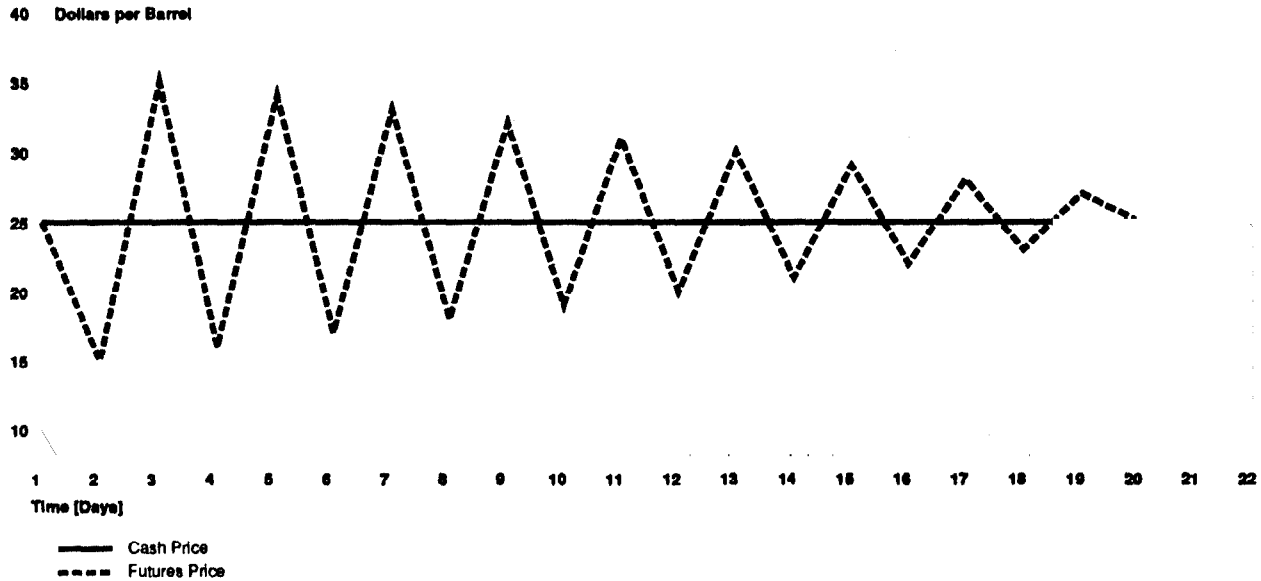




SEPTEMBER THROUGH FEBRUARY CONTRACT OPEN INTEREST

These graphs represent six contracts that have expired since the invasion of Kuwait. All of the contracts have exhibited the normal pattern of declining open interest as the contract approaches expiration.

# Illustration of Converging Cash and Futures Prices

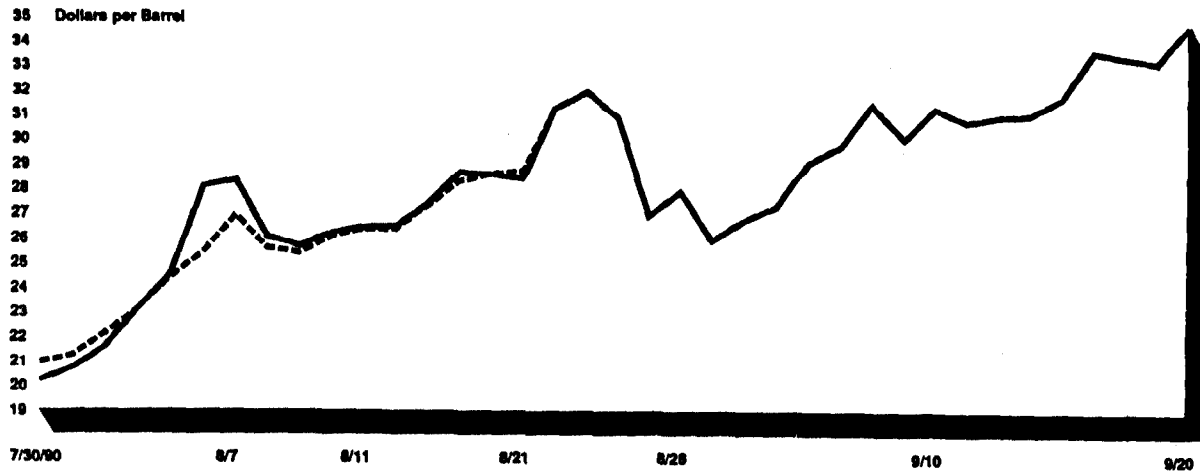


Typical trading month has 22 trading days.

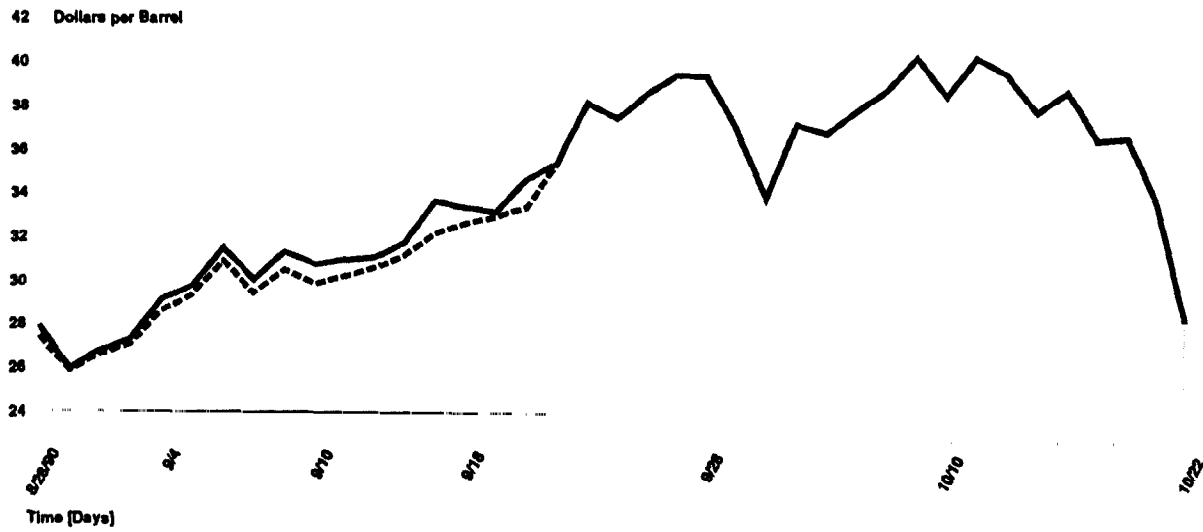
TYPICAL PRICE CONVERGENCE IN THE CASH AND FUTURES MARKETS

This graph shows the typical behavior of cash and futures prices. As a contract nears the spot month, the futures and cash prices typically converge until, as the spot month begins, they are essentially identical. They should continue to be equal during the spot month until the contract matures. The reason that prices converge at the beginning of the spot month is that very little time separates the cash market from the futures market during that month, so there is no reason for prices in the cash and futures markets to differ significantly.

# Crude Oil Cash and Futures Prices: Oct.-Nov. Contracts



October contract expired on 9/20/90.

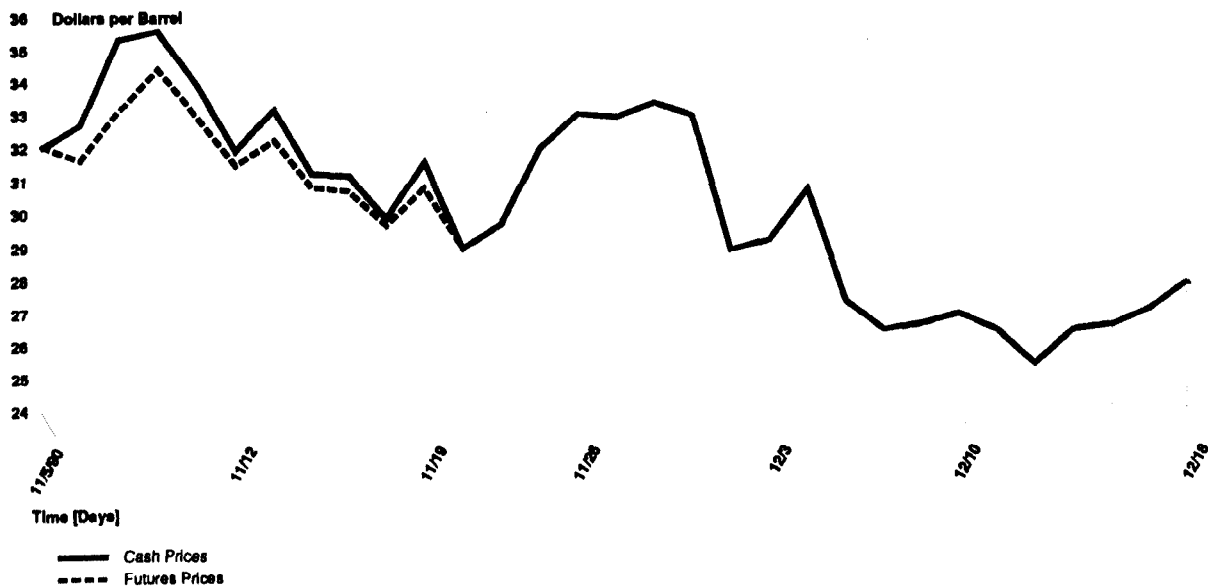


November contract expired on 10/22/90.

OCTOBER AND NOVEMBER FUTURES AND CASH MARKET PRICES

These graphs show the behavior of cash prices compared with the prices of the October and November crude oil futures contracts. The October contract includes the rapid run-up in prices caused by the invasion in early August. In that case, cash prices rose faster than futures prices for a few days, but they then converged. There were small differences between the prices until the beginning of the spot month (last week of August to the last week of September) when they equalized. The futures and cash prices moved together until the contract expired on September 20. The November contract showed a similar pattern, with cash prices somewhat above futures prices until the beginning of the spot month (last week of September to the last week of October). Cash and futures prices maintained equality until the contract expired on October 22.

# Crude Oil Cash and Futures Prices: Jan.-Feb. Contracts



January contract expired on 12/18/90.

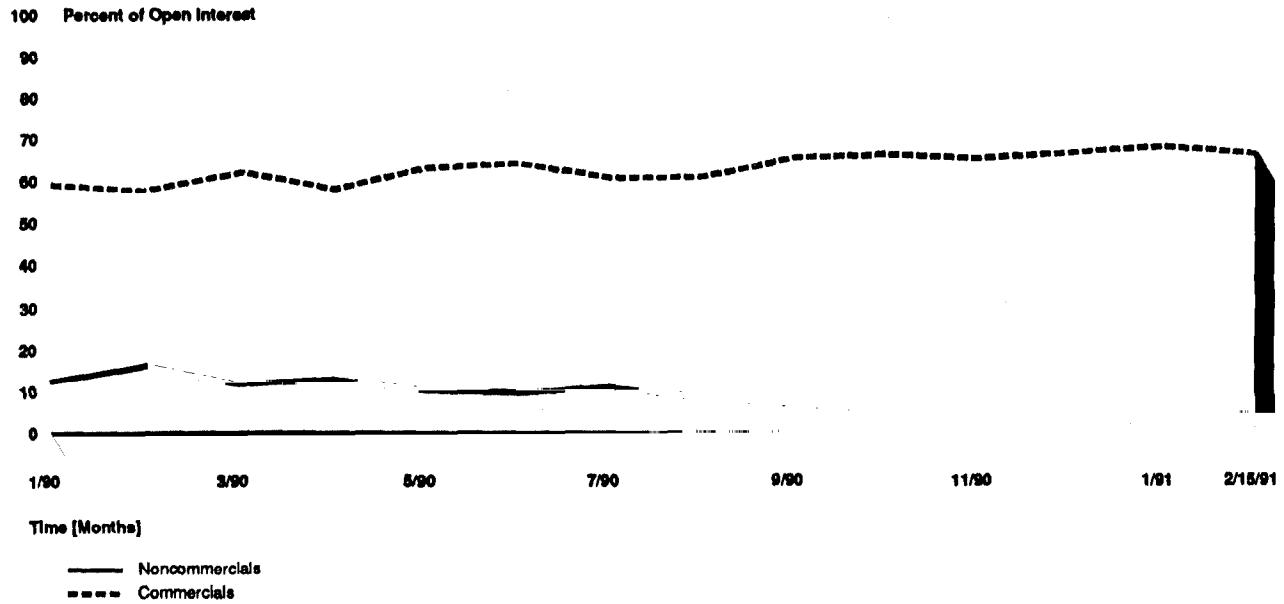


February contract expired on 1/22/91.

JANUARY AND FEBRUARY FUTURES AND CASH MARKET PRICES

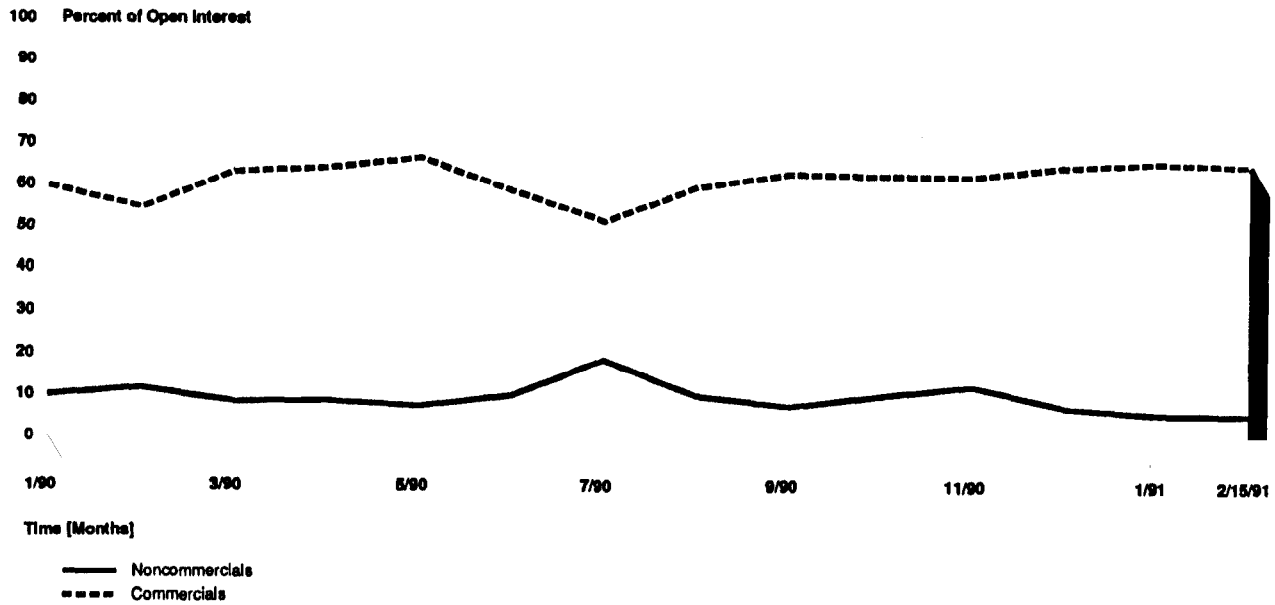
These two graphs chart the movement of cash and futures prices for the January and February crude oil contracts. The pattern for the January contract is essentially the same as the pattern for the November contract, with prices equalizing about a month before expiration. The February contract experience reflects the very large price reduction of January 17th. Since the decrease took place within the spot month, such a large change should be reflected in both the cash and futures price. This was exactly what happened. Thus, there is no evidence in any of the four contracts of price manipulation in the futures market.

# Long Positions of Futures Market Participants: Crude Oil

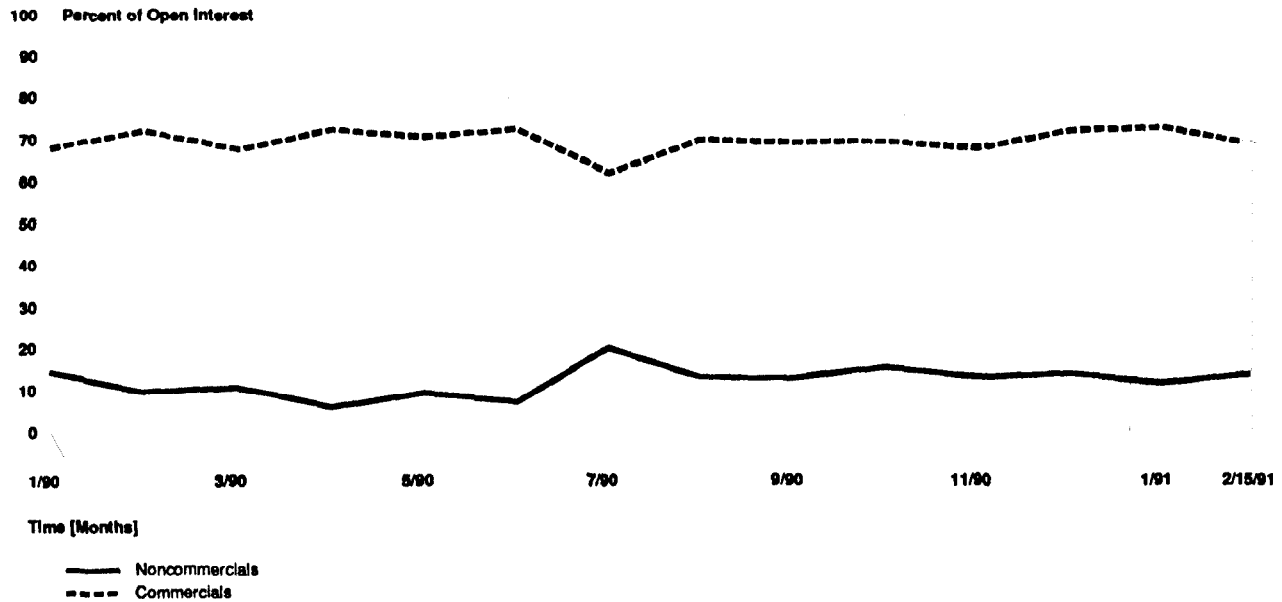




# Long Positions of Futures Market Participants: Heating Oil



# Long Positions of Futures Market Participants: Gasoline



COMMERCIAL AND NONCOMMERCIAL HOLDINGS OF OPEN INTEREST

This trio of graphs represents the percentage of open interest in crude oil, heating oil, and gasoline held by commercial and noncommercial interests participating in the futures market from January 1990 through February 15, 1991. One indicator of excessive speculative buying would be if noncommercial firms built up an unusually large long (or short)<sup>6</sup> position in a commodity. This has not happened. In each case there has been relatively little movement in the percentage of open interest held by commercial and noncommercial groups. Thus, no group moved to greatly increase its long position and, by implication, excessively speculate in the market.

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<sup>6</sup>For simplicity, only long positions are shown in these graphs. The experience of short sellers, however, was similar.

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