OIL PRICES AND THE IRAQ WAR: MARKET INTERPRETATIONS OF MILITARY DEVELOPMENTS

*Robert E. Looney**

Introduction

By their nature, crises tend to have a negative impact on markets and economic activity. In a play on the old market adage, "buy on the rumor, sell on the fact," market wags now advise one to "sell on the saber-rattling, buy on the bullets." Another variant suggests a wise move is to "buy when you hear the sound of the cannon, sell when you hear the sound of the church bells."[1] While no doubt good advice in many cases, are these words of wisdom good guidance when it comes to oil markets during periods of war and conflict?

---

*Robert E. Looney is Professor of National Security Affairs and Associate Chairman of Instruction, Department of National Security Affairs at the Naval Postgraduate School (Monterey, California). He earned his Ph.D. in economics from the University of California, Davis, and has written 20 books on various aspects of economic development, including *Economic Development in Saudi Arabia: Consequences of the Oil Price Decline* (Greenwich, Connecticut: JAI Press, 1990); *The Economic Causes and Consequences of Defense Expenditures in the Middle East and South Asia* (with David Winterford) (Boulder, Colorado: Westview Press, 1994); *Manpower Policies and Development in the Persian Gulf Region* (New York: Praeger Publishers, 1994); *Industrialization in the Arabian Gulf* (JAI Press, 1994); *The Economics of Third World Defense Expenditures* (JAI Press, 1995); and *The Pakistani Economy: Economic Growth and Structural Reform* (Praeger Publishers, 1997). The author currently is working on a book forecasting alternative futures for the Saudi Arabian economy. In addition, Dr. Looney's articles have appeared in such publications as *Journal of Development Economics*, *Middle East Policy*, *Middle Eastern Studies*, *Orient*, *OPEC Review*, *World Development*, *Economic Development and Cultural Change*, *The Journal of Energy and Development*, *American-Arab Affairs*, *Iranian Studies*, *Pakistan Development Review*, *Modern African Studies*, *International Organization*, *South Asia*, *Journal of South Asian and Middle Eastern Studies*, and *Contemporary South Asia*.

The Journal of Energy and Development, Vol. 29, No. 1

This paper examines oil price movements prior to and immediately following the initiation of the 2003 conflict in Iraq. Are the oil price movements during this period similar in nature to those previously observed in wartime situations? Are the markets reacting in a rational, predictable way to readily available information on military developments?

Oil Markets during Crisis Periods: Conceptual Issues

Identifying crisis/oil market links largely involve several steps. The first is the monitoring of factors that generally are viewed by markets as affecting the outcome of the conflict. In this regard, the research noted above focused on the deployment of forward-engaged naval forces. These are often the first to respond to a crisis, and their arrival on scene often can have a stabilizing political influence. The comings and goings of naval forces are widely reported so that market traders can consider this information in planning their buy/sell strategies.

Second, it is essential to select an index capable of reflecting the market's interpretation of the severity of a crisis as well as the degree to which market confidence is restored following a military action. Because commodity markets are volatile and subject to destabilizing events such as conflict in the Arabian/Persian Gulf, producers and consumers frequently seek ways of hedging and trading risk. In response to this need, markets for commodity risk trading arose in the mid-1980s and their use has become increasingly widespread. Instruments traded in these markets include futures and forward contracts, options, swaps, and other derivatives. Futures contacts are among the most important of these instruments and provide important information about cash and storage markets.[2]

A futures contract is an agreement to deliver a specified quantity of a product at a specified future date, at a price (the futures price) to be paid at the time of delivery. Futures contracts usually are traded on organized exchanges such as the New York Mercantile Exchange (NYMEX) and, as a result, tend to be more liquid than forward contracts, which are not traded as widely. Other than this distinction, a futures contract differs from a forward contract only in that the futures contract is market-to-market, which means there is a settlement and corresponding transfer of funds at the end of each trading day.

Although futures and forward contracts specify prices to be paid at the time of delivery, it is not necessary to take delivery. In fact, the vast majority of futures contracts are closed out or rolled over before the delivery date, so the commodity does not change hands because these contracts usually are held for hedging or speculation purposes—delivery of the commodity is not needed. For example, suppose that in January an industrial consumer of crude oil is worried about the risk of oil price increases during the coming year. That consumer might take a long futures position in crude oil by buying, say, an appropriate number of fully futures

contracts, but continue to buy oil on an ongoing basis from his usual source. If the price of oil rises between January and July, the consumer will pay more for his oil but will enjoy an offsetting gain from the futures position.[3]

Because oil futures prices provide more information than spot prices, movements in these markets were used to explore the effect of naval forward engagement and crisis response. Traders base their offers on the best economic, political, and military information available to them at the time the contract is traded. As a result, even though futures prices can be poor predictors[4] of actual prices because of unanticipated events, they are considered by most as the best unbiased estimate of the likely spot or daily price of oil when the contracted delivery date actually arrives. Of course, this predicative ability of actual prices in the future falls off the longer the futures contract.[5]

While the analysis below focuses on futures prices, it should be noted that in the short run retail prices do not follow precisely many of the patterns seen in these markets. In fact, a number of econometric studies confirm the casual observations that gasoline prices respond asymmetrically to crude-oil-price movements by rising more quickly when crude oil prices are increasing than falling when crude oil prices are decreasing.[6] Although popular opinion seems to attribute the asymmetry to market power, S. Peltzman shows that price asymmetries arise independently of market structure.[7] While interesting in themselves, these retail patterns do not alter the main conclusions derived below.

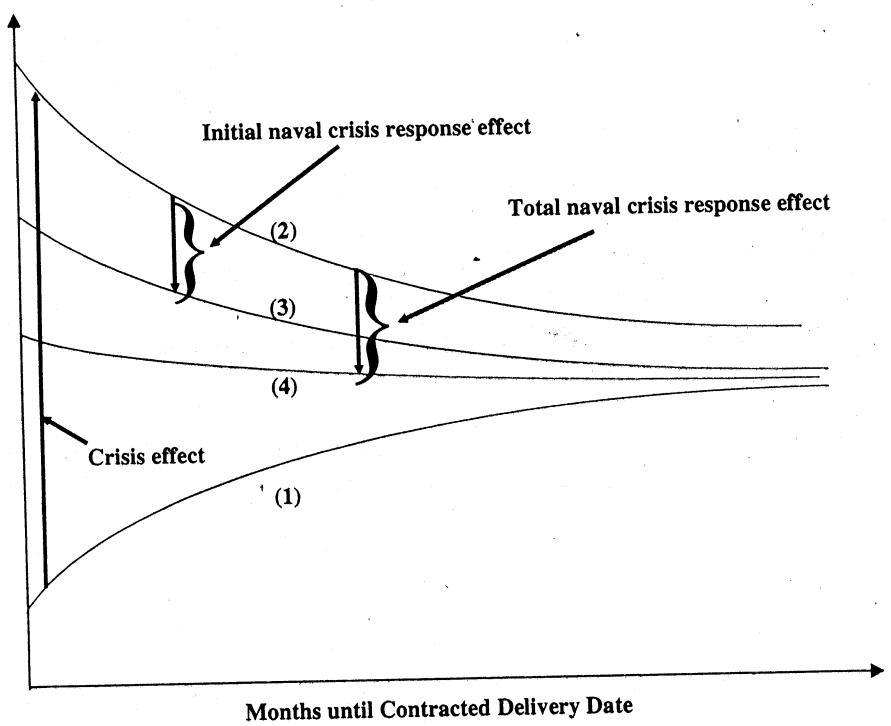
In sum, futures markets transactions generate oil price forecasts that reflect traders' confidence as to the future state of oil markets. Thus, futures prices can be used to assess the effects of military actions, such as naval forward engagement and crisis response on market confidence in oil availability.

Oil Price Movements during a Crisis

With these considerations in mind, the actual oil price patterns observed in prior conflicts (the "first" Gulf War of 1990-1991, the Taiwan Strait Crisis of 1996, Operation Desert Strike of 1996, Operation Desert Fox of 1998, the Libyan Operations of 1986, the Gulf Shipping Crisis of 1987, and the Iraq-Kuwait border confrontation of October 1994) followed a fairly similar pattern. Prior to a crisis, oil futures-market curves generally slope upward as shown in figure 1, curve 1. Curve 1 reflects both the cost of storage and the general expectation among traders that oil prices will increase over time. With the advent of a crisis, however, future availability of oil is in doubt and traders attach an uncertainty or "war premium" to their asking price.[8]

The effect on futures prices is twofold. First, such a development increases futures prices for all months (indicated by an upward shift in the futures price schedule). Second, the slope of the futures market curve becomes negative (figure

Figure 1
NOTIONAL RELATIONSHIP BETWEEN NAVAL CRISIS RESPONSE AND OIL FUTURES MARKETS
(in dollars per barrel)



(1) Pre-crisis futures price profile
(2) Immediate post-crisis profile
(3) Initial price profile following naval crisis response
(4) Profile after markets equilibrate

1, curve 2), reflecting traders' willingness to pay a premium for immediate possession of oil. It was found that when naval forces respond to the crisis, some of the uncertainty concerning oil supplies is alleviated. The impact of this information on trades shifts the futures price curve downward and decreases the short-run premium paid for immediate possession of oil. These effects are evidenced by a downward shift and flattening of the futures price schedule (figure 1, curve 3).

Over time, naval forward presence reduces risk to oil supplies and alleviates traders' concerns over oil availability. Increasing confidence in oil supplies can be seen graphically by a further flattening of the futures price curve (figure 1, curve 4).

The 1990 Iraqi Invasion of Kuwait

As noted, we found this model (with some case-by-case variation in detail) to depict oil price movements in a number of recent conflicts. In the case of Kuwait in 1990, following the August Iraqi invasion (a Thursday), oil spot prices increased to $28.30 by August 6 (the following Monday).[9] Traders at first did not know what to make of the invasion. But as events unfolded over the weekend, uncertainty heightened and futures markets shifted from upward sloping (figure 2, curve 1) to downward sloping (figure 2, curves 2, 3, and 4). As evidenced by the steep slope of the August 6 futures price profile (figure 2, curve 2), a high premium was placed on immediate possession of oil. Futures prices increased again on August 7 before beginning to stabilize on August 8 as U.S. intentions became clear. Spot prices declined to $25.65 by August 8 as well.

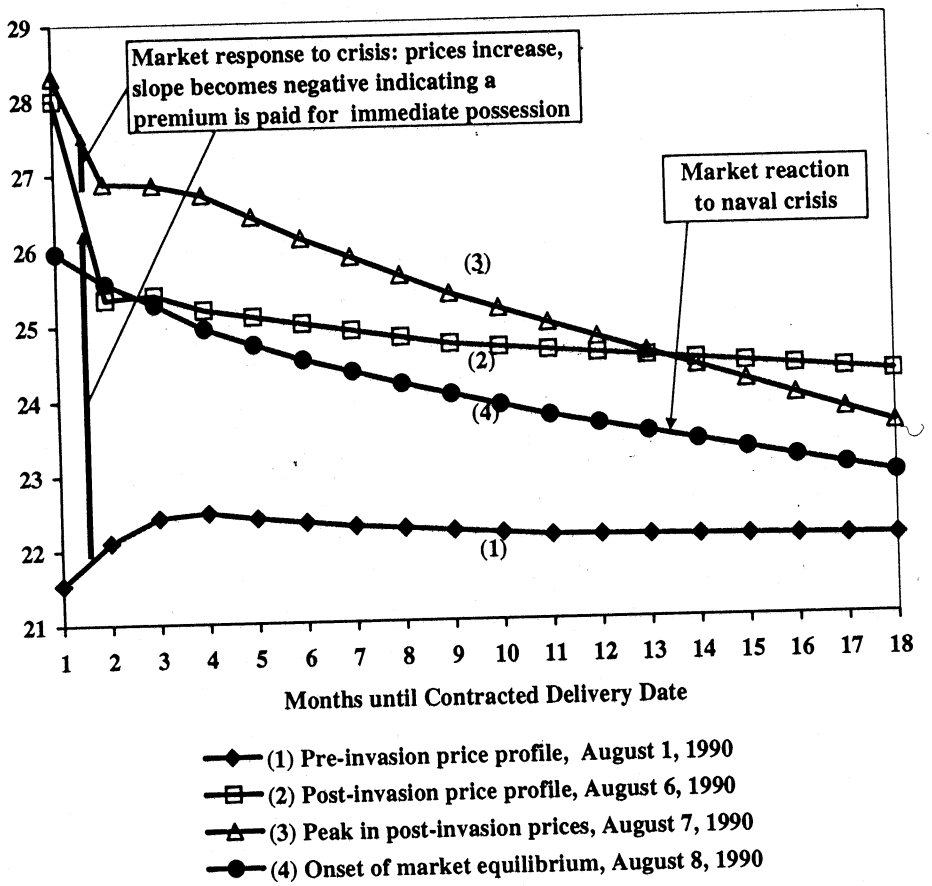
A close examination of movements in the sensitive NYMEX futures market shows that futures prices in fact had stabilized by around August 9. In general, as markets stabilize, the differential decreases between the price a trader offers for delivery of oil next month and the price offered for delivery of oil in two months. The differential between these two futures contracts is a very sensitive indicator of oil traders' uncertainty over oil availability. In this case, stabilization of the price differential (i.e., the first futures contract minus the second futures contract) indicates that the full effects of naval crisis response had taken place, and a new equilibrium in oil markets had been established by August 9 (figure 3). (In figure 4, a positive differential in the futures market reflects greater risk, i.e., a steeper downward slope in the futures price curve. Conversely, a negative differential reflects the elimination of a risk premium.) Specifically, the narrowing differential observed in this case reflects the reduced risk premium that sellers were able to charge for oil as concern over destruction of Saudi oil fields decreased. Put differently, because of the greater likelihood of continued Saudi oil availability, buyers were no longer willing to pay a high premium for delivery in the immediate future.

Given the high oil inventories at the time, the fall in futures prices can be attributed only to the markets' confidence that the U.S. naval crisis response in the region would prevent any further encroachment by Iraq. While prices later began to drift up from this initial equilibrium, a close reading of the events of August 1990 suggests that this subsequent increase was due mainly to factors other than U.S. forward engagement in the region. General market uncertainty over U.S. intentions regarding Kuwait was heightened by Iraq's threat to attack Middle Eastern oil fields and the deliberate inaction of other members of the Organization of the Petroleum Exporting Countries (OPEC) to increase output.

Although subsequent movements in spot and futures prices occurred throughout the fall of 1990 (figure 4), there are other explanations for these fluctuations—in essence, they were a war premium as markets assessed the risk to future supplies involved in removing Iraq from Kuwait. As figure 4 clearly shows, the war premium

Figure 2

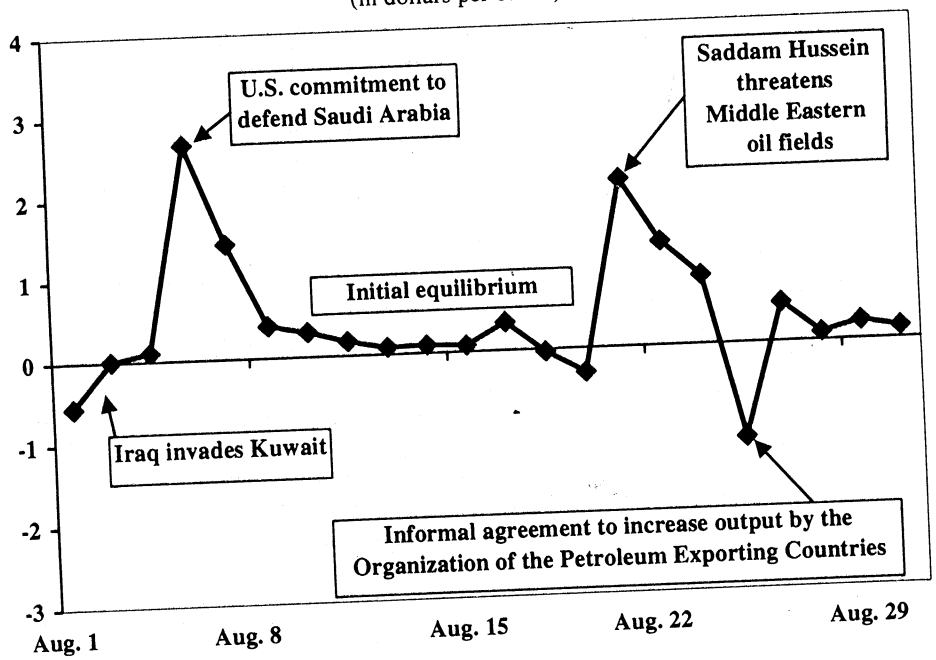
STABILIZATION OF NEW YORK MERCANTILE EXCHANGE (NYMEX) MARKET FOLLOWING CRISIS RESPONSE TO 1990 IRAQI INVASION OF KUWAIT: NYMEX FUTURES PRICES
(in dollars per barrel)



collapsed almost immediately once hostilities broke out on January 17, 1991. At that point, the markets appeared to be confident of the eventual outcome.

In sum, oil prices were declining steadily (figure 5) throughout 1990 up to about a month before the invasion of Kuwait. This was a period of excess stocks, rather slack demand, and overcapacity among the major producers. There was little upward pressure on prices until signs of Iraq's belligerence became more and more apparent in July. As noted earlier this was also a period of upward sloping futures

Figure 3
STABILIZATION OF NEW YORK MERCANTILE EXCHANGE (NYMEX) MARKET FOLLOWING NAVAL CRISIS RESPONSE TO 1990 IRAQI INVASION OF KUWAIT
(in dollars per barrel)

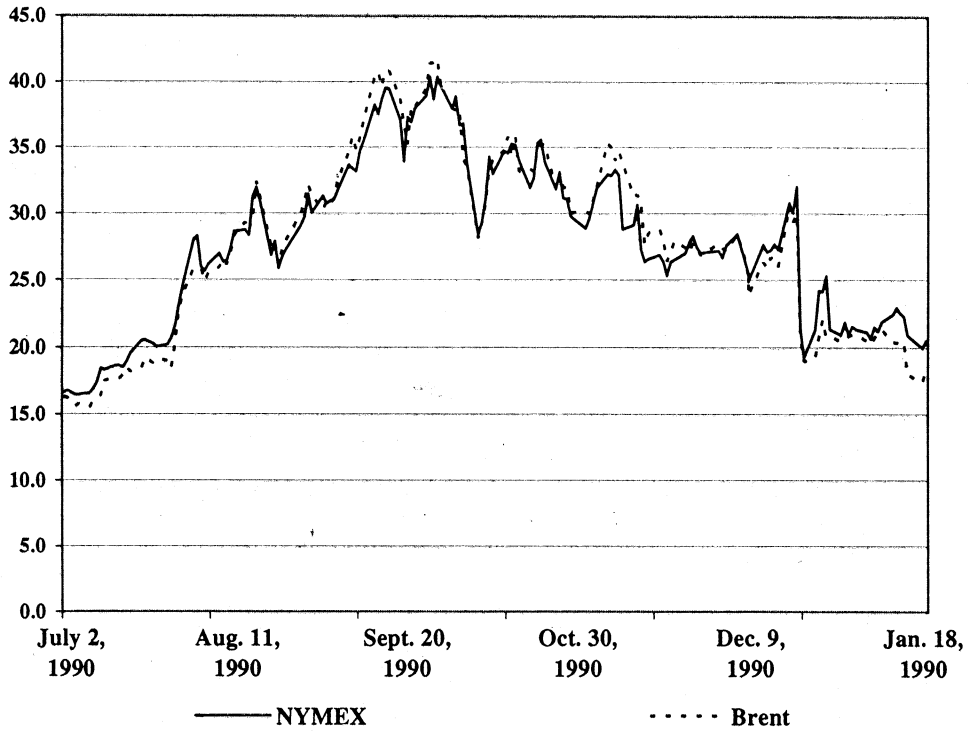


curves, indicating no risk premium was associated with concerns over future availabilities of oil. In other words, we safely can attribute most of the price increases from mid-July 1990 up to January 17, 1991, as strictly associated with military-related events in Kuwait. In retrospect, it also is safe to say that the oil markets were good interpreters of military events as they pertained to future availabilities of oil.

Pre-Iraq War Oil Scenarios

As the 2003 Iraq War became more and more likely, there was increased speculation as to possible oil price outcomes. Clearly, predicting what would happen to oil prices should the United States and its allies attack Iraq is not an exact science. As a result a wide range of outcomes have been suggested, depending on the length of the war, state (supply/demand balance) of oil markets at the time of the war, and

Figure 4
NEW YORK MERCANTILE EXCHANGE (NYMEX)/BRENT SPOT PRICES: JULY 1990-FEBRUARY 1991
(in U.S. dollars per barrel)

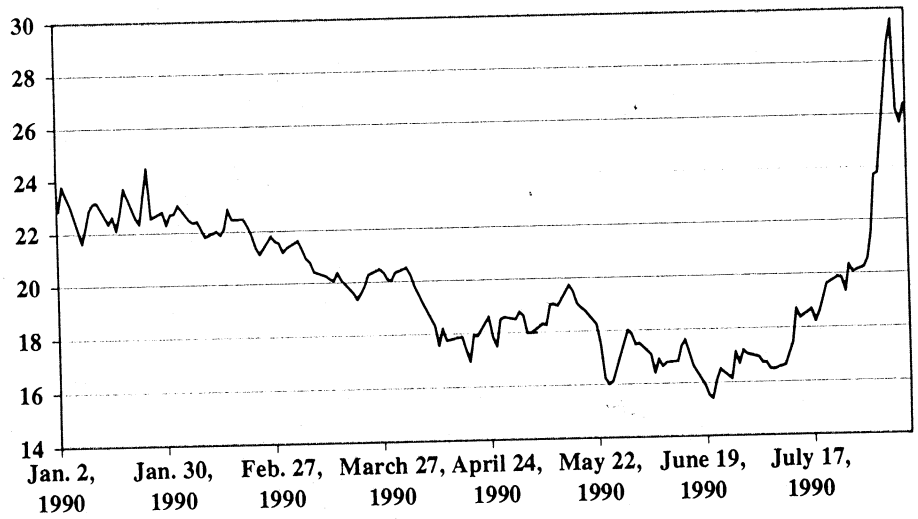


the amount of damage to Gulf oil fields stemming from the war.[10] While there are too many of these scenarios to summarize here, they generally fall into one of three broad categories.

Optimistic: A U.S.-led military campaign against Iraq starts before the end of March 2003 and is concluded successfully within two months, with fewer than 1,000 casualties on the coalition side and without any heavy damage to Iraq's non-military facilities.[11] Variants of this scenario usually assume President Saddam Hussein's government falls quickly, the Iraqi oil fields remain intact and the country's already dwindling oil exports of about 2 million barrels per day (b/d) disappear for a few months, Venezuela's exports resume, and other countries led by Saudi Arabia boost production to make up any losses. Prices briefly spike to over $40 per barrel but within three months recede to normal levels or even lower with supplies plentiful. This scenario appears to capture the Bush Administration's position toward the end of 2002. Although when presidential advisor Larry Lindsey noted that,

Figure 5

NEW YORK MERCANTILE EXCHANGE SPOT PRICE LEADING UP TO THE AUGUST 1990 INVASION OF KUWAIT
(in U.S. dollars per barrel)



with Saddam gone, 3 million to 5 million b/d could be added to world supplies, thereby suggesting that war would be good for the economy, the White House retreated from the comment; Lindsey was replaced later.

Highly Optimistic: Because he is a Nobel Prize winner writing in a respected and widely circulated magazine (*Business Week*), Gerry Becker's oil scenarios have received considerable attention.[12] Becker feels that an oil scenario will unfold similar to the one at the time of the first Gulf War: "world oil prices will probably rise further as war with Iraq appear to be more certain."[13] However, if the first few days indicate that Saddam will be decisively and quickly defeated, as he felt highly probable, then oil prices should fall sharply as the "war premium" disappears and uncertainty about world oil production diminishes. "Cutbacks in Middle East output would be much smaller than during the Persian gulf war since Kuwait's facilities would not be destroyed, and Saddam has much less power to damage other facilities than a decade ago."[14]

Worst Case: The basic version of this scenario assumes the invasion meets stiff resistance, Iraqi oil fields are set aflame, production is disrupted elsewhere in the Gulf, and global supplies fall by 6 million b/d. Although the International

Energy Agency maintains that its members have enough oil in storage to cover a 12 million b/d disruption, this is only a temporary solution. Emergency stocks cannot close the gap over a protracted period. In such a case, oil prices could climb to $80 a barrel and stay above $40 well into 2004, halting the U.S. economic recovery and triggering a global recession. G. Perry analyzed a similar "worse case" possibility and forecast with a potential loss of 7 million b/d, a tripling of crude prices, and $3-per-gallon gasoline.[15]

No doubt, these alternative scenarios were in the back of the minds of many oil traders as they watched events unfold in the days leading up to the conflict and the period immediately afterward.

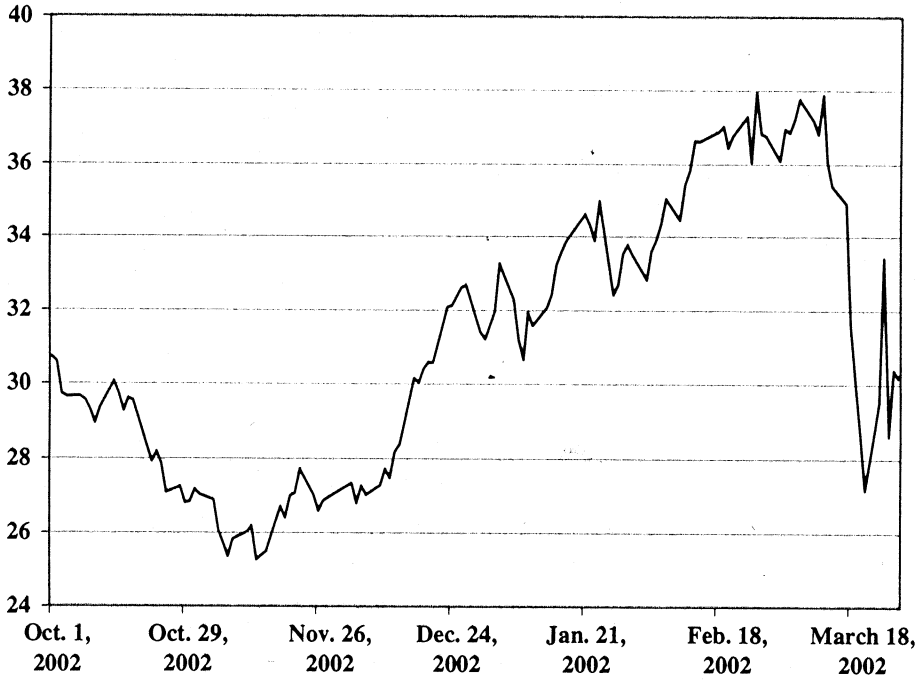
Oil Markets Prior to the War with Iraq

The oil market environments at the time of the Gulf conflict of 1990-1991 and the Iraq War were sharply contrasted. Generally, very weak oil markets and falling prices characterized the six-month period leading up to the 1991 Gulf War. In marked contrast, oil markets in the months prior to the 2003 war with Iraq generally were strong. Prices in the six months prior to the March 19, 2003, start of the war went through three main phases (see figure 6).

Falling Prices —Price/Inventory Paradox: The first phase, from October 1 through mid-November, 2002, was one of generally falling prices, with the spot NYMEX price at its lowest ($25.36) on November 7. This particular price movement is a bit puzzling given that inventories were quite low. In part, the fall in price reflects the fact that OPEC production in both September and October climbed to their highest levels of the year (2002). Many traders took this information to anticipate increased supplies of crude oil entering the U.S. market in late November and December and, consequently, bet that oil prices would fall in the future. As a result, they sharply increased their net short positions by selling contracts then with the intention of balancing out their position later by buying contracts at lower prices in the future. This pattern is consistent with a falling NYMEX price during a period when U.S. crude inventories were near the lowest level in years.[16] In other words, looking at spot prices one might assume that inventories were adequate or on the high side when, in fact, the reverse was the case.

Rising Prices—The War Premium: The second period was one of rising prices starting November 11, 2002, rising to $36.96 on February 27, 2003, and peaking at $37.87 on March 12. This period is reflective of the so called "war premium" that assumes an increasingly likely military conflict between the United States and Iraq could damage oil fields, pipelines, and export terminals in some Arabian Gulf states.[17]

Figure 6
NEW YORK MERCANTILE EXCHANGE SPOT PRICE BEFORE AND AFTER THE START OF THE 2003 IRAQ WAR
(in U.S. dollars per barrel)



Falling Prices—The Gulf War Syndrome: The final period, up to the beginning of hostilities, was one of generally falling prices. Starting around March 13, 2003, with the possibility of war with Iraq just days or even hours away, oil markets rode a wave of optimism as the anticipation of a quick war led many traders to go "short," expecting prices to fall following the onset of hostilities. Apparently, they felt that that uncertainty over the war with Iraq, the war premium, and the decrease in Venezuelan exports were the main reasons prices had risen to nearly $40 per barrel on March 12.

At that time, many traders and some analysts expected that prices would fall well below $30 per barrel. Traders came to this conclusion mainly on the news that Venezuelan oil exports were rising. In addition, it reflected the growing feeling that the upcoming war with Iraq would play out along the lines of the highly optimistic scenario noted earlier—it would likely be short with little damage to the oil fields or terminals in the Gulf region. Combining these facts, traders assumed that the start of the conflict would set off a price drop of the magnitude experienced on January 17, 1991, the start of the Gulf War. At that time (1991), the NYMEX crude futures plunged by one-third, or $10.56 a barrel, in the biggest single-day price drop ever.

The *Financial Times* had a less charitable view of these trading patterns as they extended into the first days of the conflict in 2003:

> Pollyanna would be proud of these hard-nosed speculators driving oil prices down as Iraqi oil wells burn. With spot prices down 25 percent in a week, they appear to believe that war in Iraq will be a swift affair. Futures prices suggest that when it is over the Organization of Petroleum Exporting Countries will shower the world with crude and the price will fall out of its $22-$28 a barrel band late next year.[18]

Oil Markets after March 19, 2003

With the beginning of hostilities, prices began falling, although nowhere on the scale of January 17, 1991. As news of the war was not as encouraging as many had anticipated, prices started to fluctuate, and by Friday, March 28, 2003, they were more or less back to the March 19 level. On March 28 the NYMEX May contract (figure 7) closed at $30.16 per barrel (versus $29.88 on March 19), while the Brent May contract (figure 8) closed at $26.35 per barrel (versus $26.75 on March 19). The difference in NYMEX and Brent prices largely reflect the very low stocks in the United States due to the Venezuelan strike—most Venezuelan oil is exported to the United States.

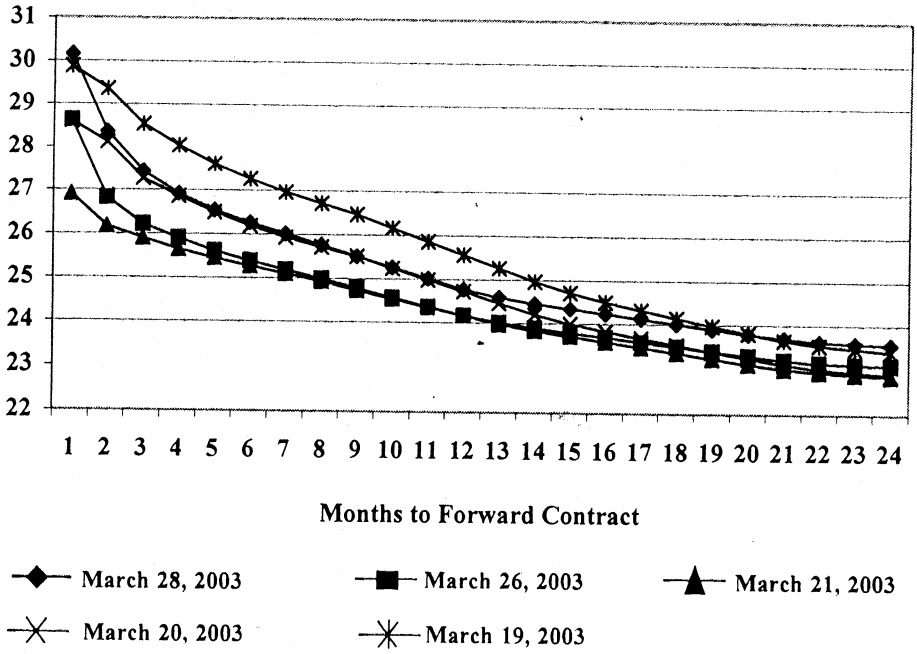
Of particular interest is the manner in which each market assessed changing risk to future positions. As noted earlier, a good proxy of the market's uncertainty over short-term future prices is given by the spread between the first and second forward contracts. This declined rapidly up to March 20 but has been increasing gradually since, especially in the NYMEX market (figure 9). While it is too early to say if the slight decline in spreads on March 28 is indicative of a reduced perception of risk, it is clear that the markets increasingly were uncomfortable with many of the assumptions that had entered into their immediate post-war assessments of likely future prices. Martin Wolf provides a more critical interpretation: "Markets are cold-hearted beasts. As the bombs and missiles rained down, equity prices jumped and oil prices tumbled. But markets can also be stupid."[19]

Clearly, there was widespread disappointment that the highly optimistic oil scenario noted above was not likely to play out in the strict sense. Nonetheless, even the relatively optimistic scenarios had predicted an oil spike to around $40 per barrel, and this did not occur. On the other hand, those who had stressed the market similarities with the first Gulf War were proven wrong. In this regard, there are a number of significant differences between the two periods and some new factors currently at play.

Strategic Petroleum Reserve: First, in direct contrast to the decision on January 16, 1991, at the start of the Gulf War in 2003 President Bush decided not to release oil from the strategic petroleum reserve.[20] This action implicitly trusts OPEC

Figure 7

NEW YORK MERCANTILE EXCHANGE DAILY FUTURES PRICES BEFORE AND AFTER THE START OF THE 2003 IRAQ WAR
(in U.S. dollars per barrel)



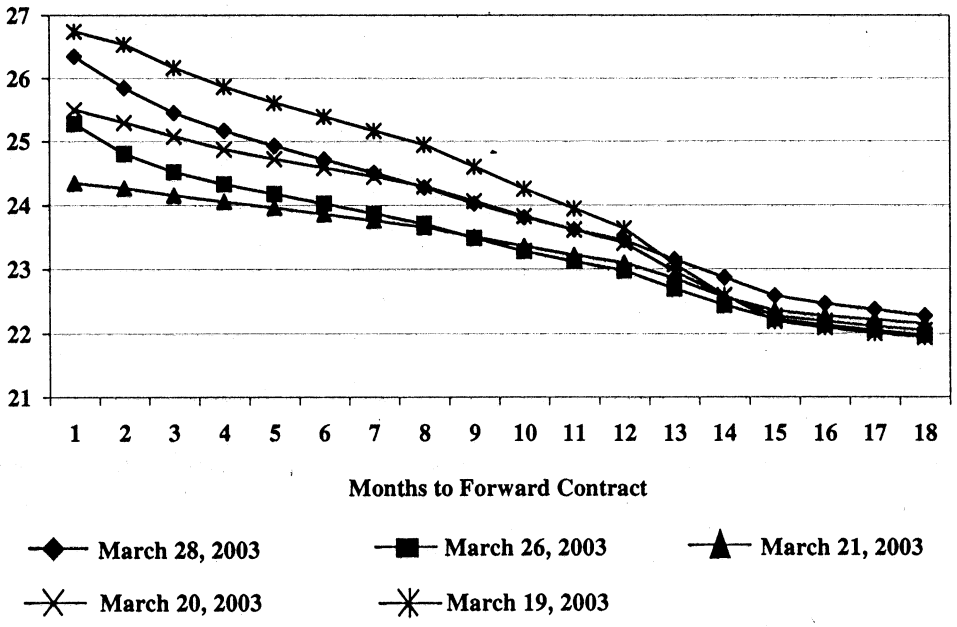
to cover the supply gap caused by the loss of around 2 million b/d of Iraqi output. In the first Gulf War, the United States and its International Energy Agency partners opted for a 2.5 million b/d release from emergency stocks.

Lack of OPEC Spare Capacity: Second, at the start of the Iraq conflict there were serious doubts about the real level of OPEC spare production capacity. One estimate asserted that OPEC (omitting Iraq and Venezuela) could only produce an increase of 1.1 million b/d.[21] In contrast, OPEC's spare capacity in July 1990, before the Iraqis invaded Kuwait, was 5.2 million b/d. While Venezuelan output gradually was coming back online after a crippling strike, it was anticipated that it would be some time before production and exports could reach their pre-strike levels. There also was very limited non-OPEC spare capacity at this time.

Nigerian Production Problems: Nigeria is the fifth largest source of U.S. crude oil imports. In 2002 the country accounted for about 6 percent of total U.S. imports of crude oil and about 3 percent of total U.S. consumption. Just before the

Figure 8

BRENT DAILY FUTURES PRICES BEFORE AND AFTER THE START OF THE 2003 IRAQ WAR
(in U.S. dollars per barrel)

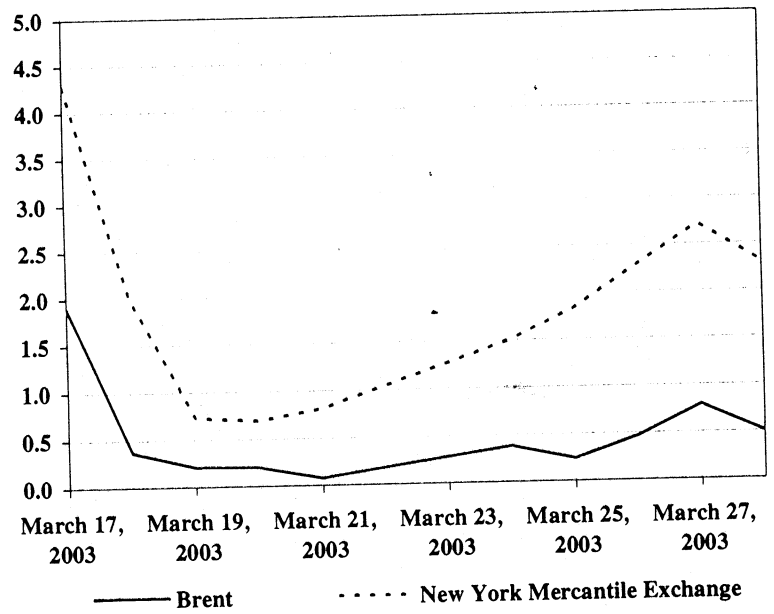


start of the Iraq War, an election-related dispute between the Ijaw and Itsekiri tribes in the oil-producing West Niger Delta area began to escalate with the intervention of the Nigerian military. Violence has reached a point that the major companies, ChevronTexaco and Royal Dutch/Shell, undertook the unprecedented act of pulling out staff and shutting down production.[22] The result was a drop in Nigerian output of nearly 40 percent.[23] Additionally, elections were complicating the Nigerian government's attempts to resolve the strife. Perhaps because of this factor, the Ijaw were making political demands regarding voting boundaries that would be hard for the government to meet; thus, the conflict quickly resolved.

Low Inventories: As noted, inventories were extremely low. As of March 14, 2003, commercial crude-oil stocks stood at approximately 270.2 million barrels. This figure was just above the minimum threshold at which the U.S. government warns shortages may occur. Crude stocks have never been this low at this time of year going back to 1982, when weekly figures were first recorded. Weak inventories were on target to be the lowest at the end of March 2003 since 1974.

Figure 9

OIL MARKET RISK PREMIUM: FIRST/SECOND FUTURES CONTRACT DIFFERENCE, MARCH 17-MARCH 27, 2003
(dollar difference: first/second forward contract)



Conclusions

Based on these patterns and developments in the early days of the Iraq War, several observations can be drawn concerning the markets' interpretation of military developments.

1. Military events did not appear to be driving the oil markets in 2003 to the extent they did in the first Gulf War. For one thing, low inventories and little surplus capacity for production mean that every event on the supply side will have a magnified effect on trader expectations[24]—the oil markets are very jittery.[25]

2. The oil markets appear to have retained their acceptance of the essence of the highly optimistic scenario—otherwise prices would have been much higher. In addition, most traders, while appearing to react to hour-by-hour news breaks on the war,[26] probably could not interpret this information in a way that provided insights to future market fundamentals—the failure to take Basra during the first week of the conflict was not good news, but how did this fact really impact on future oil markets? Even burning oil wells failed to halt the slide of oil prices in the early days of the war.[27] Much of this news probably just resulted in trades that canceled each other.

3. Because of a series of unresolved issues over the use of the Strategic Petroleum Reserve, developments in Nigeria (and perhaps Venezuela), low inventories, limited spare capacity in the oil-exporting countries, delays in getting Iraq production back on line, and possible terrorist threats to facilities in the Gulf, one could anticipate that the markets would continue to be volatile,[28] with the forward markets retaining their downward slope and with the steepness of the curves largely reflecting concern over supplies in the short term.

4. In terms of the questions posed earlier, it seems the counter-intuitive rule of selling right before the start of a conflict and buying right after hostilities begin is the best strategy—at least based on the conflicts noted here.

NOTES

[1]Quoted in Marianne Lavelle, Jodie T. Allen, Noam Neusner, and Kenneth T. Walsh, "Future Shock?: Or Unlike the 1991 Gulf War, Will a New Attack on Iraq Bring Cheap Oil and Faster Growth?", *U.S. News and World Report*, available at http://www.usnews.com/usnews/issue/archive/020930/20020930022819_brief.php, accessed September 30, 2002.

[2]This discussion of forward markets draws on Robert S. Pindyck, "The Dynamics of Commodity Spot and Futures Markets: A Primer," *The Energy Journal*, July 2001, pp. 1-29.

[3]Ibid., p. 15.

[4]Param Silvapulle and Imad A. Moosa, "The Relationship between Spot and Futures Prices: Evidence from the Crude Oil Market," *The Journal of Futures Markets*, April 1999, pp. 175-94, find that both spot and futures markets react simultaneously to new information.

[5]Anthony Bopp and Scott Sitzer, "Are Petroleum Futures Prices Good Predictors of Cash Value," *The Journal of Futures Markets*, December 1987, p. 705.

[6]Summarized in Stephen P. A. Brown and Mine K. Yucel, "Gasoline and Crude Oil Prices: Why the Asymmetry?" *Federal Reserve Bank of Dallas, Economic and Financial Review*, Third quarter 2000, pp. 23-29.

[7]Sam Peltzman, "Prices Rise Faster than They Fall," *Journal of Political Economy*, June 2000, pp. 466-502.

[8]J. Galibon, "Analyzing the Forward Price Curve," in *Managing Energy Price Risk* (London: Risk Publications, ENRON Capital and Trade Resources, 1995).

[9]Robert Looney, David Schrady, and Ron Brown, "Estimating the Economic Benefits of Forward-Engaged Naval Forces," *Interfaces*, July/August 2001, pp. 74-86.

[10]Josef H. Hebert, "Different Oil Scenarios Should U.S. Invade Iraq" Associated Press, available at http://www.sltrib.com/2003/Jan/01062003/nation_w/17733.asp, accessed January 5, 2003. This link goes to an article by the author but with a different title: "War with Iraq Could Mean $3-a-Gallon Gasoline . . . or Not."

[11]N. Behravesh, "Iraq War Scenarios," *Global Insight*, available at http://www.globalinsight.com/About/PressRelease/PressRelease284.htm, accessed February 18, 2003.

[12]Gary Becker, "An Attack on Saddam Won't Send Oil Sky-High," *Business Week*, November 25, 2002, p. 26.

[13]Ibid.

[14]Ibid.

[15]George Perry, "The War on Terrorism, The World Oil Market and the U.S. Economy," Analysis paper no. 7 (Washington, DC: Brookings Institution), available at http://www.brook.edu/dybdocroot/views/papers/perry/20011024.pdf, accessed November 28, 2001.

[16]U.S. Department of Energy, Energy Information Administration, "This Week in Petroleum: Forward Fundamentals," available at http://tonto.eia.doe.gov/oog/info/twip/twiparch/021120/twipprint.html, accessed November 20, 2002.

[17]Moin A. Siddiqi, "The Threat of War Underpins World Oil Markets," *The Middle East,* December 2002, pp. 44-48.

[18]"Oil," *Financial Times*, March 22, 2003, p. 26.

[19]Martin Wolf, "The Markets are too Eager to Discount the Cost of War," *Financial Times*, March 26, 2003.

[20]Carola Hoyos, "U.S. Not to Release Oil from Strategic Stockpile," *Financial Times*, March 21, 2003, p 6.

[21]"Oil and War," *Business Week Online*, available at http://www.businessweek.com/bwdaily/dnflash/mar2003/nf2003037_8484_db035.htm, accessed March 7, 2003.

[22]Michael Peel and Alison Beard, "Chevron Closes Nigeria Delta Operations," *Financial Times*, March 24, 2003, p. 10.

[23]Masood Farivar, "Nigerian Situation Bad, May Worsen, Oil Analysts Say," Dow Jones Newswires, March 26, 2003.

[24]Chip Cummins, Bhushan Bahree, and Thaddeus Herrick, "Over a Barrel: Oil Markets Have Less Margin of Error than in Last War," *Wall Street Journal*, March 11, 2003, p. A1.

[25]Nerma Jelacic, "Crude Oil Prices Rise on Supply Jitters," *Financial Times*, March 28, 2003.

[26]David Reilly, "News on War Fuels Trading on Futures Marts," *Wall Street Journal*, March 24, 2003, p. C7.

[27]Kevin Morrison, "Talk of Burning Wells Fails to Halt Slide in Oil," *Financial Times*, March 21, 2003.

[28]Chip Cummins and Bushan Bahree, "Oil Prices May Face More Volatility: Futures Fall 9.3% but Worry Remains Over Tight Supply, Threat to Iraqi Exports," *Wall Street Journal*, March 19, 2003.