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King Abdullah Petroleum Studies and Research Center

Oil Market Reactions to Recent Geopolitical Events

Ronald D. Ripple

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The prices for crude oil reported on both the New York Mercantile Exchange (NYMEX) and the Intercontinental Exchange (ICE, London) reflect the oil market's expectations for the future balance of oil supply and demand. In the face of significant geopolitical events, the observed price changes may be employed to assess implied supply disruptions. In the last three and a half months, the world has seen three significant geopolitical events: the September attacks on Saudi Aramco facilities, the killing of Iranian General Qasem Soleimani, and the Iranian retaliatory missile attacks on Iraqi military bases that house United States (U.S.) military personnel.

The bombings of Saudi Aramco facilities in September produced a far more muted reaction in the oil market than many had predicted. The market response to the increased tensions following the killing of General Soleimani was more muted, even while the media indicated this action threatened outright war. Indeed, the market settlement price fell closing-over-closing. One way to view this divergence is to assess the inferred crude oil volumetric disruption that would underlie the observed futures market price changes.

On January 3, 2020, following the killing of Soleimani, the futures market for Brent (on the ICE) responded with an increase in the price for the March delivery month from $66.25 to $68.60 over the day before, a 3.5% increase. Trading volume also more than doubled from 238,123 to 517,674 for the near-month contract. The price increased by 15% in response to the Saudi Aramco attack (from $60.22 to $69.02), and trading volume leapt from 236,338 to 764,352 for the then near-month contract: a rise of over 220%.

Employing the price elasticity model given below, the 3.5% observed price increase may infer that the market assessed that there would be a disruption of between 280,000 and 320,000 barrels per day (b/d) in March 2020, depending on whether we examine the NYMEX or ICE prices, respectively. By January 7, the ICE price for the near-month (March) contract had actually fallen to $62.51, or $3.74 below the price on January 2, continuing a recent gradual decline and suggesting little concern regarding supply availability.

By the end of the week following each of these significant geopolitical events, the price had fallen back to near or below where it had been prior to the respective events. In each instance, it took less than a full week for the market to assess that what was identified in the media as a major geopolitical event would not actually significantly impact the global availability of crude oil in even the nearest delivery month.

Perhaps most notably, the price even fell on the day of the recent Iranian missile attacks on bases in Iraq, which house U.S. troops and other military assets, in retaliation for Soleimani's death. There was a spike in trading activity on January 8 (from 319,183 to 606,472 for the near-month contract), and the spread between the high and low price for the day was roughly six times larger than for the day before. However, the settlement price still fell by $2.83.

Furthermore, there is no evidence that the price movements stimulated by these events were driven by additional speculative activity.

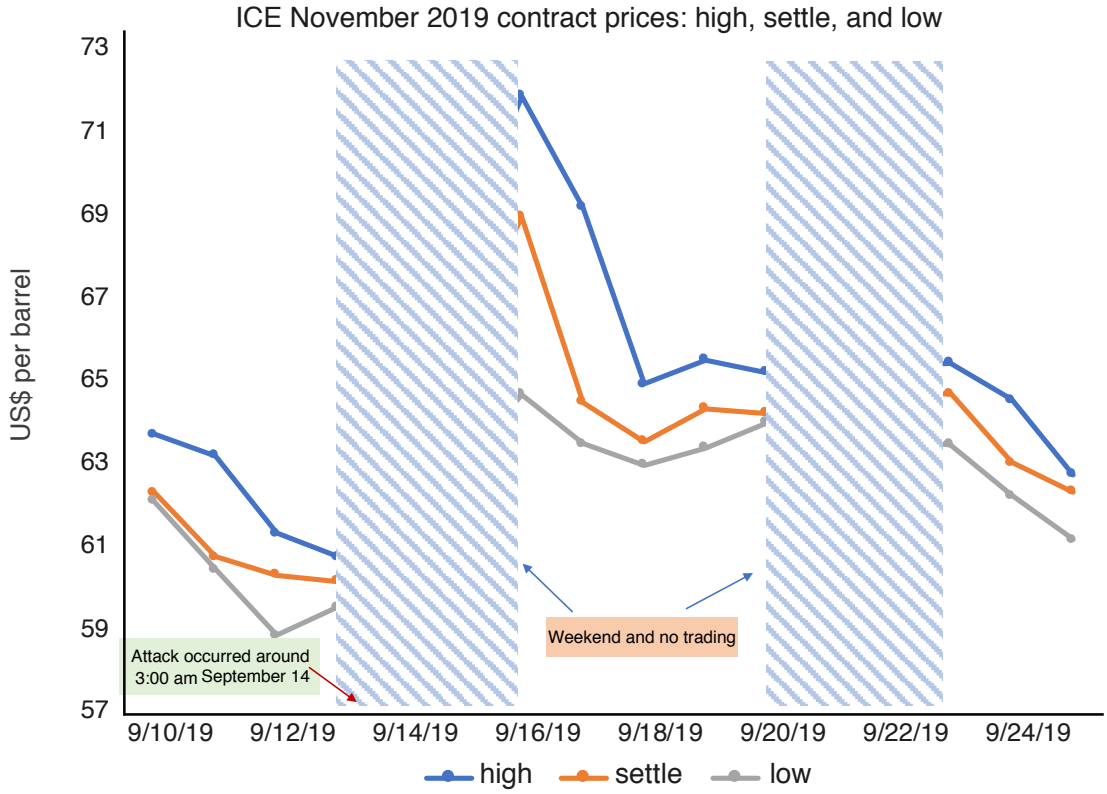
The trader classification structure of the open positions across the entire forward curve, as reported by the Commodity Futures Trading Commission (CFTC), remained quite static following the Aramco attacks. The open positions of commercial traders actually increased by more following the Soleimani killing. In each case, the open interest in the near-month ICE contract continued to slowly decline, which is natural as it progresses toward expiry at the end of the month.

What follows below is a detailed analysis of oil market reactions to the Saudi Aramco attacks, which also presents the full price elasticity model employed to estimate the implied market assessment of the volumes disrupted for both the Aramco attacks and the killing of Soleimani.

What happened to oil prices following the Saudi Aramco attacks: NYMEX and ICE?

The price of November 2019 Brent, on the ICE, jumped from $60.22 on Friday to $69.02 at the close of trade Monday. The high price for the day, Monday, was $71.95, with a low of $64.75. On the NYMEX, the October 2019 contract for light sweet (WTI) was still trading, even though it was well into its phase out with trade set to cease at the close of business Friday, September 20, 2019. The October price rose from the settlement of $54.85 Friday to $62.90 at Monday's close; the high Monday was $63.38 and the low was $58.77. The NYMEX November contract price rose from $54.80 to $62.67, with an intraday high of $63.89 and a low of $58.62. Figures 1 and 2 show the transition of the daily settlement price for the November contracts on the two exchanges, along with their intraday highs and lows.

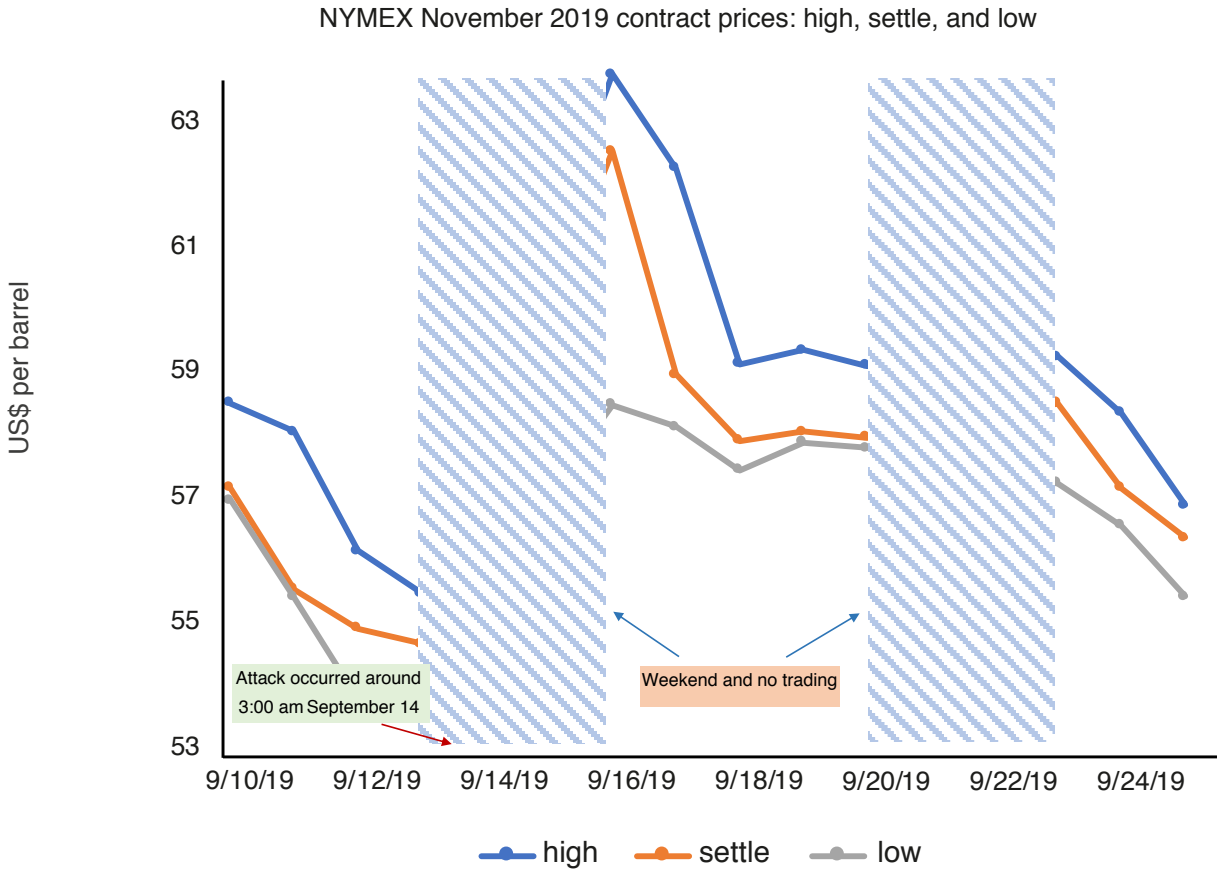
Figure 1. ICE Brent prices.



Source: ICE online data; author's construction.

It is clear from the spread between the highs and lows in these figures that intraday volatility spiked on Monday, September 16, as one would expect, but it dissipated and returned to normal perhaps more quickly than would have been expected. On both exchanges, the settlement prices have returned to their pre-attack levels, and the intraday spreads are narrower.

Figure 2. NYMEX light sweet prices.



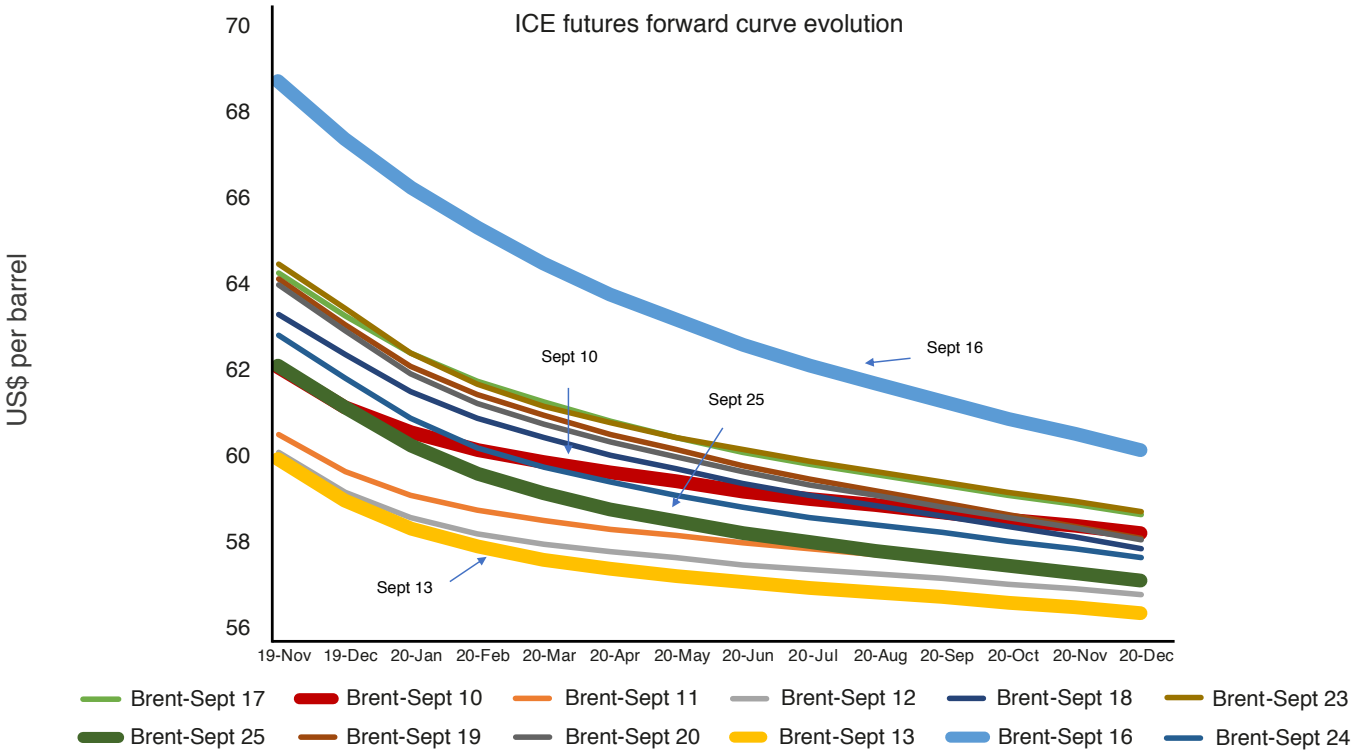
Source: NYMEX online data; author's construction.

The evolution of the futures forward curves

The evolution of the forward curves, Figures 3 and 4, on the two exchanges also reveals the speed with which the markets returned to their pre-attack levels. The forward curves also show a steeper degree of backwardation than existed during the week prior to the attack.

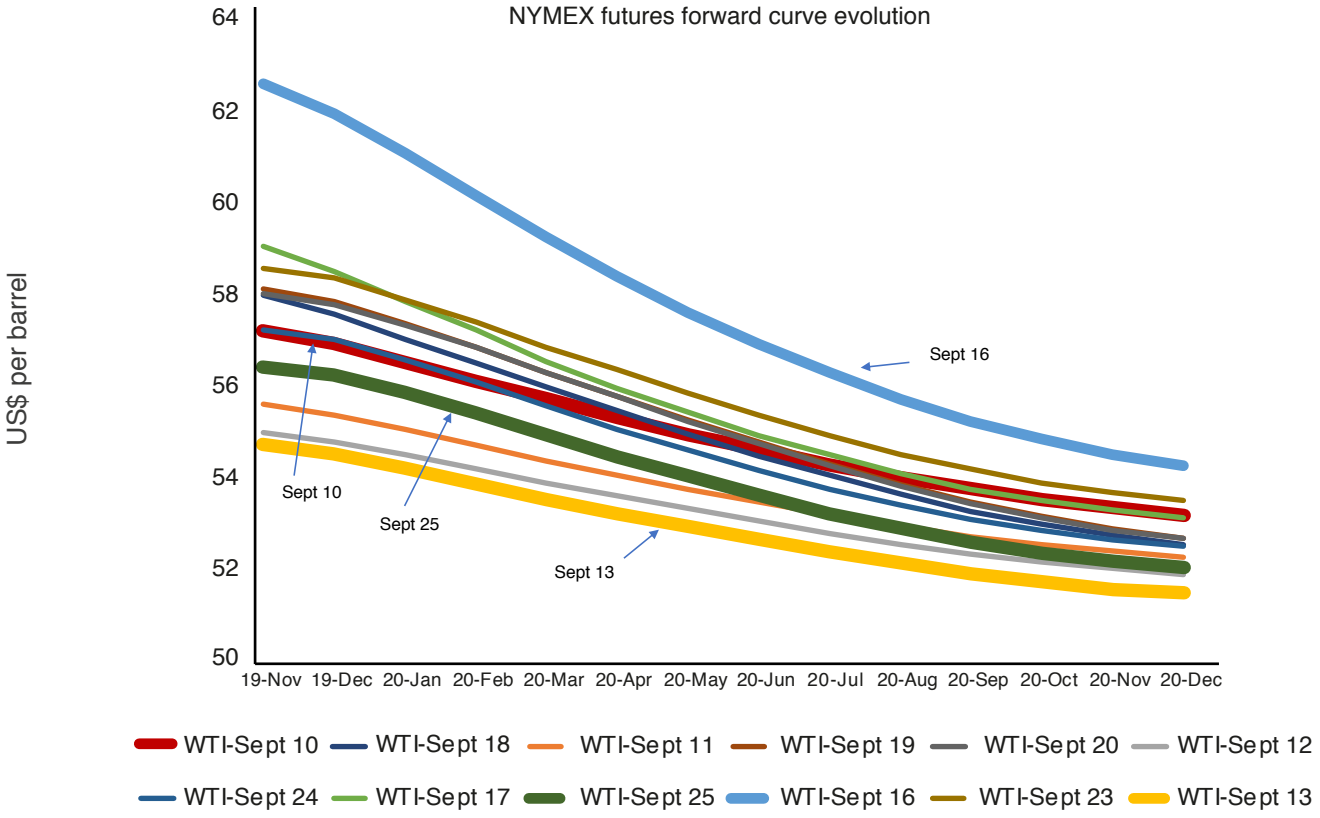
In Figures 3 and 4, the heavy red curve represents Monday, September 10 and the heavy green curve September 25. The heavy light blue curve represents Monday, September 16, the first trading day following the attacks, and the heavy yellow curve represents Friday, September 13, the closing prices immediately before the attacks. The contract maturities included in these forward curves (Nov. 2019 – Dec. 2020) represent approximately 98% of total daily trading volume and 85% of total open interest.

Figure 3. ICE futures forward curves – Nov. 2019 – Dec. 2020.



Source: ICE online data; author's construction.

Figure 4. NYMEX futures forward curve – Nov. 2019 – Dec. 2020.



Source: NYMEX online data; author's construction.

In each market, the September 25 forward curve falls within the range of forward curves that existed during the week prior to the attacks. As noted, the degree of backwardation increased, with the September 25 curve steeper than any of the curves during the week prior to the attacks, but moderating from the extreme of September 16. One interpretation of a backwardated forward curve is that the market has assessed the current supply-demand balance to be tighter than that expected to hold in the future.

The immediate response by the market to the attack on the Saudi production facilities observed in the forward curve was for a significant increase in the backwardation of the forward curve. This was realized by a more significant increase in the near-month maturities relative to the more distant maturities. For example, the change in the settlement price on the NYMEX for the November 2019 contract between Friday, September 13 and Monday, September 16 was $7.87 (a 14.4% increase), while the change for December 2020 was $2.93 (a 5.7% increase). Similarly, on the ICE, the price for November 2019 increased by $8.80 (a 14.6% increase), while the change for December 2020 was $3.78 (a 6.7% increase). This kind of relative shifting is consistent with the so-called Samuelson effect, whereby near-month prices are expected to be more volatile than those for later maturities. This follows logically when one considers that an event like the attack on the Saudi facilities is expected to have far more of an impact on near-term than later market conditions, somewhat like the differences between short-run and long-run price elasticity effects.

An additional inference may be drawn from the evolution of the forward curves. In each market, the forward curve returned to near its position early in the week prior to the attacks, higher than it was at the end of that prior week, i.e., higher than Friday, September 13. One may infer that this differential represents an element of pricing perceived geopolitical risk following the attack: between $1.69 and $2.17 per barrel from NYMEX and ICE, respectively. While these differentials seem rather modest, they may represent an incremental increase to geopolitical risk that had, in fact, been previously priced.

What level of supply disruption did the market expect?

What should the price change have been, given the reported magnitude of productive capacity taken offline? Smith (2009) provides a basis for assessing this. Smith develops a model based on fundamental economic analysis tools and price elasticities, and demonstrates that very large jumps in prices may occur without the benefit of significant activity from speculators; short-run market fundamentals are sufficient on their own to produce such results.

The derived equation is:

$$\%\Delta P = -\frac{1}{(\varepsilon_s - \varepsilon_d)} * \%\Delta Q$$

Where ε_s is price elasticity of supply, ε_s is price elasticity of demand, P is the price of oil, and Q is the quantity produced, and %Δ representing percentage change. Based on this equation, some reasonable estimates of the short-run elasticities, and the reported capacity damage, the expectation for Brent is an increase from $60.22 on Friday to $98.36 for November Brent on the ICE, and for WTI to increase from $54.80 to $89.51 for November light sweet (WTI) on the NYMEX. The applied elasticities are $\varepsilon_s = 0.04$ and $\varepsilon_s = -0.05$. The magnitude of disruption frequently announced in the media was 5.7 MMb/d, which linked to an assumed 100 MMb/d of world production implies a 5.7% reduction in production.

Since the realized price on Monday on the ICE was $69.02, and $62.67on NYMEX, it is clear the market did not respond accordingly. Two significant factors must be understood. First, the November futures prices are in fact for oil to be delivered during the month of November, and these will reflect what the market expects the conditions to be at that time. And second, with the markets closed for the weekend, participants had time to internalize evolving news, such as Aramco stating it could provide supplies from inventory, and make informed judgements before trading resumed on Monday. Had the attacks occurred during the week with active trading ongoing, one may expect that initial price increases may well have reached those indicated by Smith's model.

But what can be said about the market's perceptions/expectations for November? The Smith model may provide an insight. The equation may be inverted so that the actual observed percentage change in price produces an estimate of what percentage quantity change must have been assumed. This, of course, assumes that we have correct/reasonable estimates for the short-run elasticities. The inverted model takes the following form:

$$\%\Delta Q = \%\Delta P * -(\varepsilon_s - \varepsilon_d)$$

The observed 14.61% price increase for Brent and 14.36% increase for WTI imply that during Monday, September 16 trading, the market expected disruption of 1.32 MMb/d according to ICE Brent and 1.29 MMb/d from the NYMEX. Given the five-hour time difference between London and New York City, the slightly lower 'expectation' from the NYMEX may be explained by new news having been revealed. The range of expectations may be evaluated using the intraday high and low prices on the two exchanges. For ICE, the range was 1.75 MMb/d for the high and 0.68 MMb/d for the low. And, for NYMEX, the range was 1.49 MMb/d and 0.63 MMb/d, respectively.

By Wednesday, September 18, with ICE Brent down to $63.60 and NYMEX WTI down to $58.04 (and using the same, pre-attack, September 13 base), the implied expected disruption was about 0.5 MMb/d (0.51 for ICE and 0.53 for NYMEX). The much-narrowed intraday high-low price spread as the week progressed suggests a coalescing of the market's view of expected effective disruption for November. Given what we saw above in the transition of the forward curves, by the end of the first week following the attacks, the market expected only minimal effective disruption to world production for November and beyond.

Employing this model to assess the market's assessment of expected potential disruption following the Soleimani killing, we see that the 3.5% price increase on the ICE (3.1% on the NYMEX) implies a disruption of 320,000 b/d (280,000 b/d on NYMEX), which amounts to less than 20% of the capacity of a very large crude carrier (VLCC).

Trading volume and open interest movements: NYMEX and ICE

As would be expected, trading activity on Monday, September 16 was substantial, a considerable increase over both the trading activity on Friday, September 13, and the average for the prior week. Markets trade to discover changes in values/prices that result from shifting expectations of future market conditions following a significant event like the attacks. Total trading volume on September 16 for contracts on the ICE for the delivery months of November 2019 through December 2020 was 2,629,029, with open interest of 2,137,153. On the NYMEX the values were 3,664,363 and 1,821,938, respectively, but included the October 2019 delivery maturity. These numbers imply very large volumes of crude oil, as each contract represents 1,000 barrels. However, it must also be recognized that these are for volumes to be delivered over the entire period through December 2020. So, for ICE, these volumes are for delivery over 427 days, and over 458 days for NYMEX.

To put these values in context, note that open interest represents the number of barrels that may be delivered, and each contract is for delivery into/across an entire month. Trading volume represents the number of times contracts were traded, and each trade may represent a simple change of ownership of an existing contract, the creation of a new contract, or the cancellation of an existing contract. So, for ICE, the trading volume on September 16 represents roughly just one trade for each open contract, while on the NYMEX it was roughly two trades per contract.

The open interest on both exchanges has been extremely steady over the recent three-week period, the week prior to the attacks and the two following. Noting that open interest represents the volumes that may be delivered over the maturities represented, the ICE open interest of 2,137,153 contracts represents 5,005,042 b/d, (see Ripple [2008] for calculation methodology). For the NYMEX, the 1,821,938 contracts represent 3,978,030 barrels per day. For the November 2019 contracts on each exchange, the oil is to be delivered over a 30-day period. The November 2019 open interest on the ICE on September 16 was 361,255 contracts, which was down slightly, and which implies 12,041,833 b/d of delivery. On the NYMEX, the November 2019 open interest was 362,491, which was up slightly as there was a transition from the waning October contract, implying 12,083,033 b/d. The combined open interest of the two exchanges for November 2019 deliveries represents 24 MMb/d day of deliverable oil in a world consuming nearly 100 MMb/d.

During this three-week period, with the attacks occurring at the end of the first week, open interest remained little changed. Trading volume grew to facilitate the incorporation of new information and expectations for the future, before returning to normal relatively promptly. By Wednesday, September 18, each exchange saw its trading volume return to pre-attack levels. So the surge in trading volume dissipated after just two days.

How did trader groups/classifications respond?

There are no readily available data on the level of trading activity conducted by classifications of traders, but there are data on the open interest held by such groups. The CFTC publishes a report each Friday presenting the open interest held the previous Tuesday by defined classifications of traders. The ICE reports trader classification open interest for selected commodities (including crude oil) traded on its exchange.

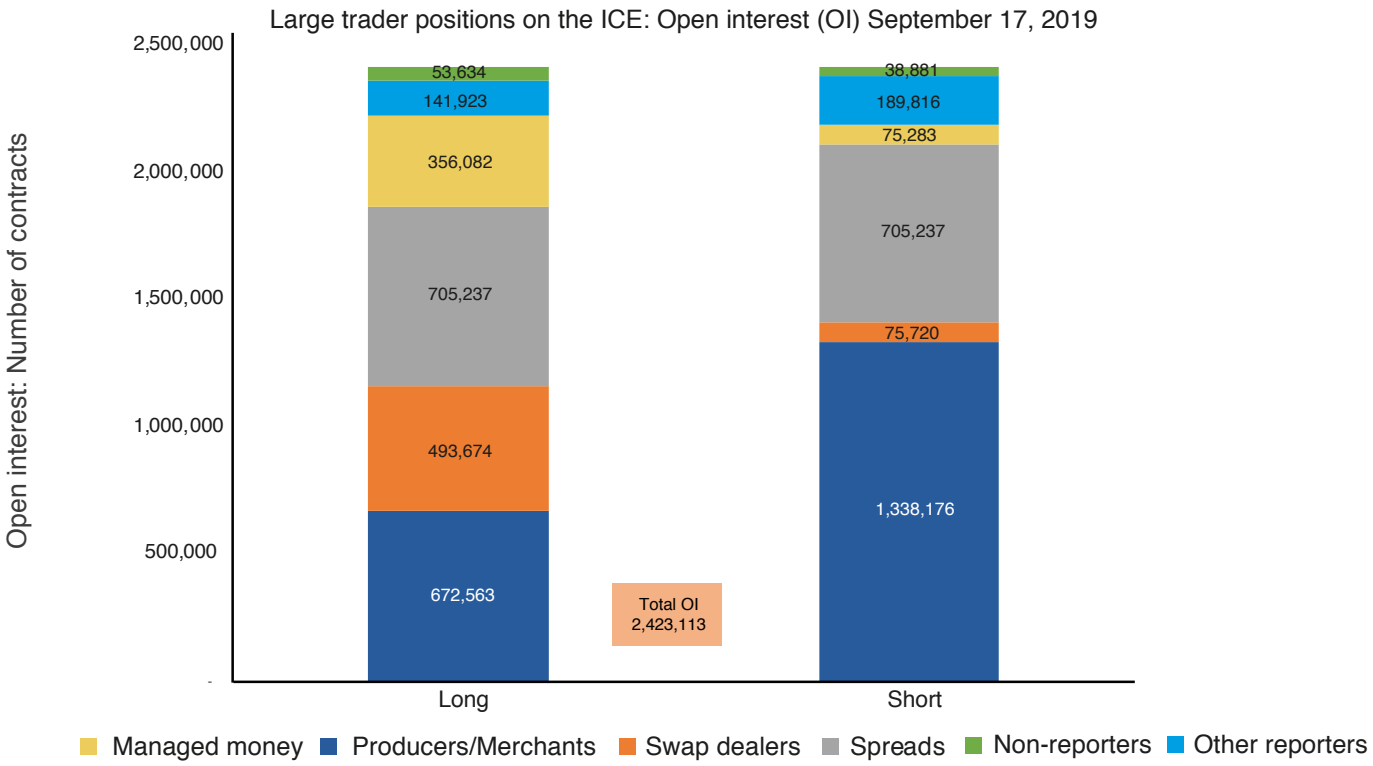
Before examining the distribution of open interest across trader classifications, it will be helpful to define the classifications and the position designations reported. The trader classifications are producers/merchants/processors/users (PM), swap dealers (SW), managed money (MM), and other reporters (OR). Reporting is required by all crude oil traders having 300 or more contracts open at the daily close. Small trader open interest levels are captured as the residual from known total open interest and that reported by the large traders. These disaggregated classifications may be aggregated into commercial and non-commercial traders. The aggregated designation is relevant because commercial traders do not face trading limits, while the non-commercials do.

Producers/merchants/processors/users and swap dealers fall in the commercial classification because they are deemed to be hedging market risk exposure, while managed money and other reporters fall in the non-commercial classification. For each of these classifications, open positions are reported for long, short, and spread categories. A trader is long when s/he takes a position to receive the commodity at maturity and short when taking a position to deliver at maturity. A spread position exists when a trader is long (short) a near-maturity contract and short (long) a more distant maturity contract for the same commodity. These are calendar spreads, and traders with these positions may be hedging, in the case of swap dealers, or aiming to profit from a change in the slope of the forward curve, in the case of managed money and other reporter traders.

It will be seen below that, with the sole exception of producers'/merchants'/processors'/users' short positions on the ICE, spread trading dominates all other outright futures long and short positions by any trader classification. And it should be recognized that calendar spread positions will not place either upward or downward pressure on a price or prices across the forward curve since each trade involves both a long and a short position.

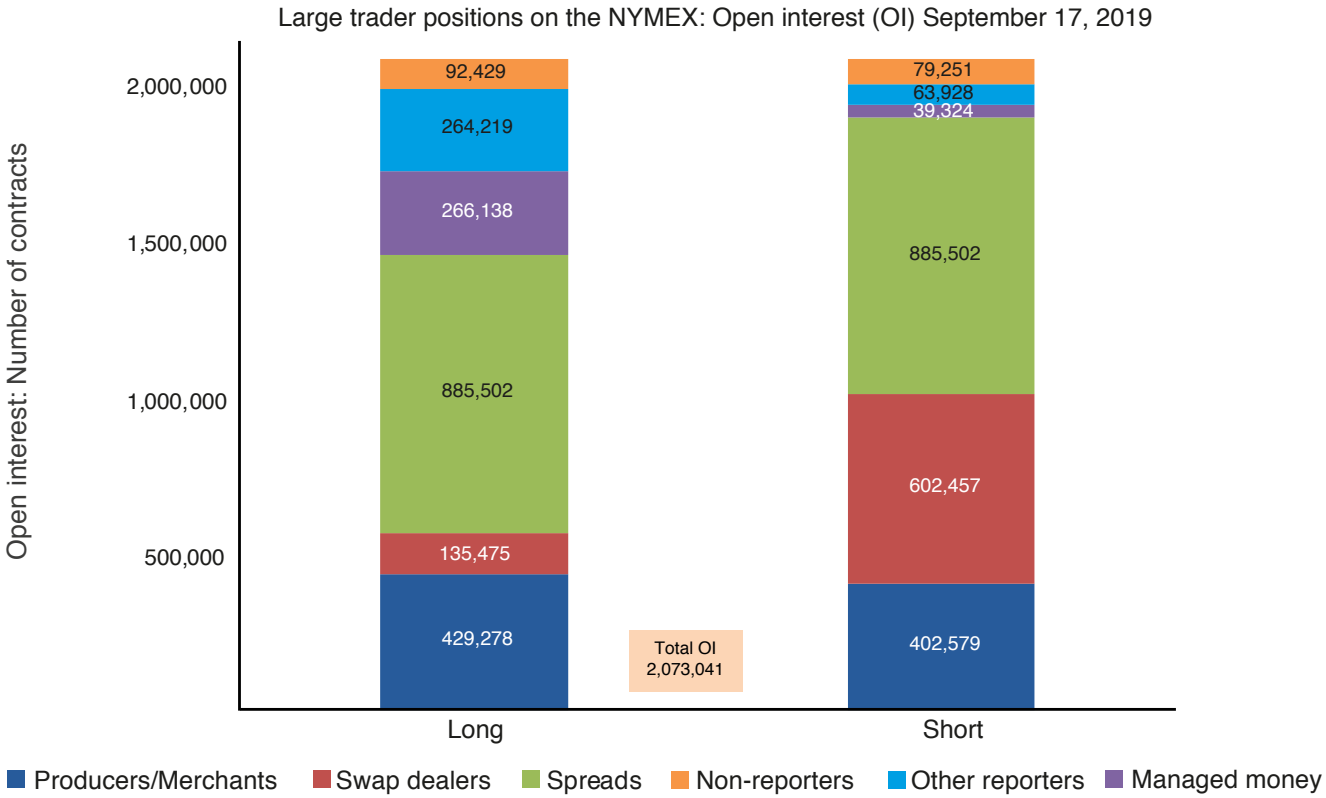
The distributions of longs, shorts, and spreads across the trader classifications did not change significantly on either exchange in response to the attacks. This can be seen in the CFTC and ICE reports. Figures 5 and 6 present the longs and shorts by trader classification for each of the exchanges for September 17, the day after trading reopened following the attacks. Note that spreads appear in both the long and the short 'stack' with the same number of open positions. This must be the case since every contract must have both a long (buyer) and a short (seller), and each spread represents both a long and a short position for the commodity, just in different maturities.

Figure 5. ICE large trader positions.



Source: ICE Commitment of Traders Reports; author's construction.

Figure 6. NYMEX large trader positions.



Source: CFTC Commitment of Traders Reports; author's construction.

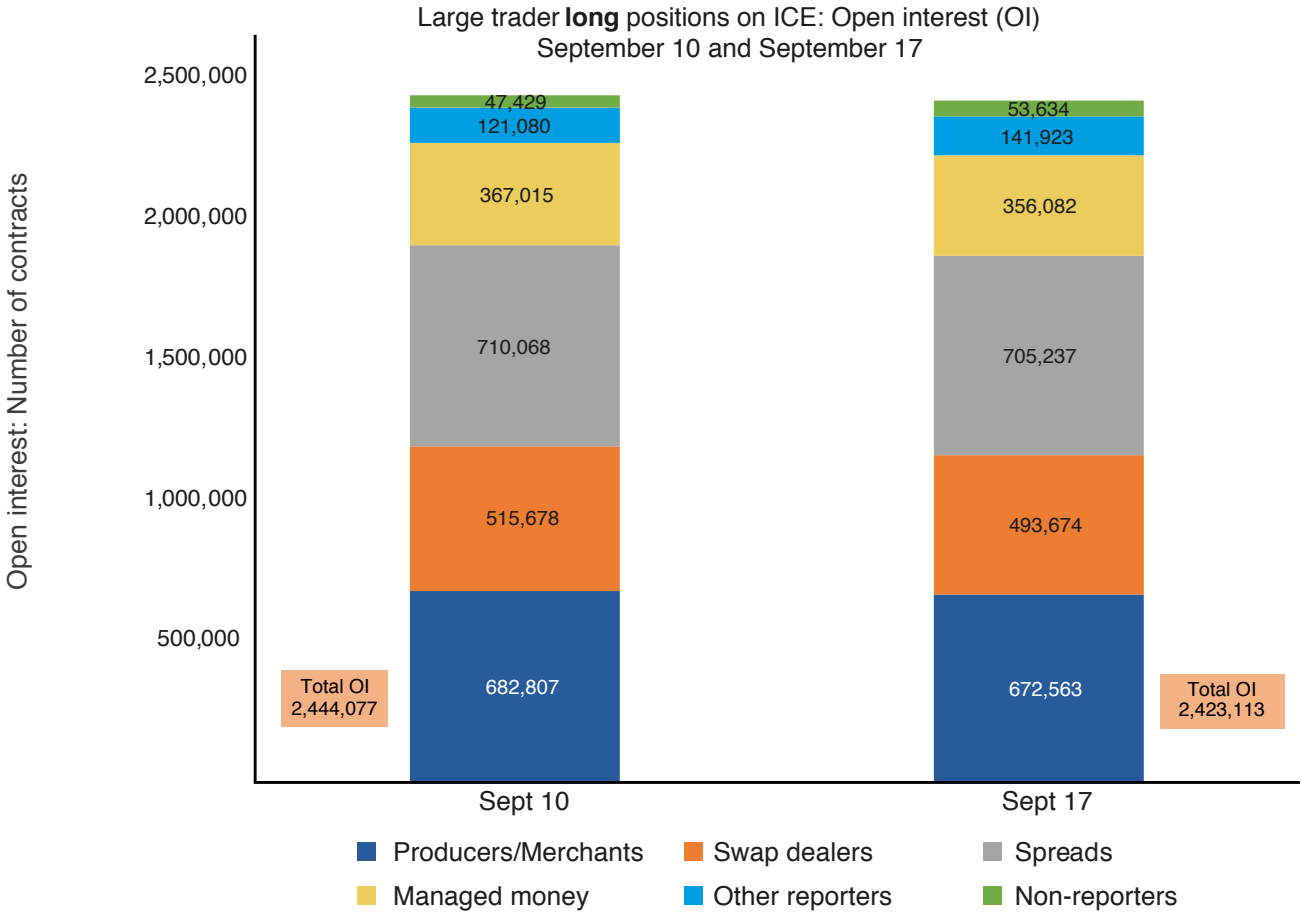
The total open interest of 2,423,113 represents the open interest for the entire forward curve that existed at the close of trading, i.e., all contract maturities open for trading for the designated report date.

It is clear that trading patterns differ markedly between the ICE and the NYMEX. However, each in its own way demonstrates the importance of non-commercial/speculator traders in the market. Note the size of the combined PM and SW short positions in each from commercial traders engaged in hedging market risk. These traders simply cannot rely upon PM and SW long hedgers to hedge their market risk. They are only able to satisfy their desired hedging due to the participation of non-commercials.

It is frequently argued that speculators drive the price in these markets. We already saw above that large movements in price may result, or be expected to result, simply due to the nature of short-run price elasticities, as Smith (2009) points out. Additionally, it is argued that speculators dominate these markets, but these two graphs and the two to follow illustrate to the contrary.

Figures 7 and 8 focus on the long positions on each exchange for the September 10 and 17 reports: one set just before and one set just after the attacks, straddling the price jump that occurred on Monday, September 16.

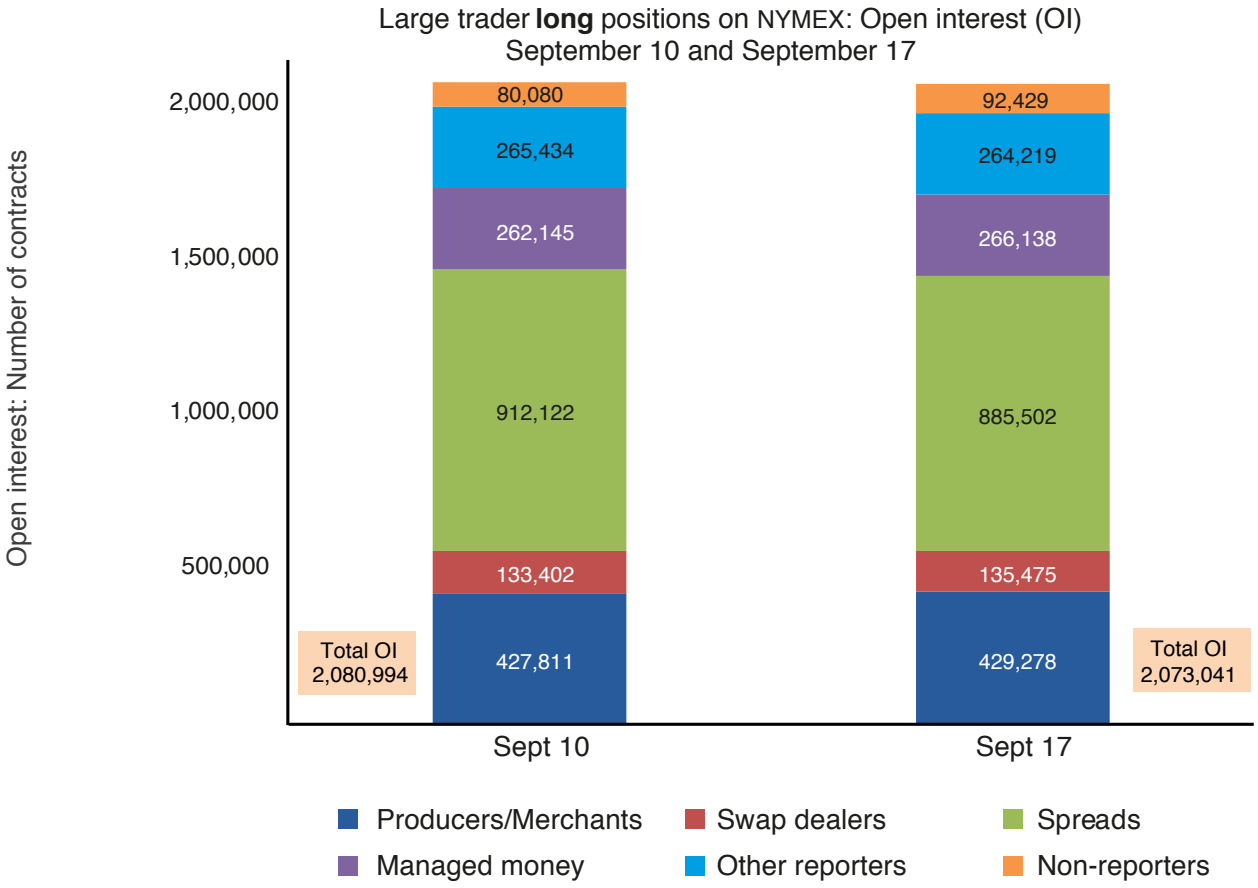
Figure 7. ICE large trader long positions, September 10 and 17.



Source: ICE Commitment of Traders Reports; author's construction.

The graphs demonstrate there was no significant movement by any trader classification between these two report dates. It is also worth noting that on each exchange the long positions (outright longs not part of a spread trade) of the PM and SW commercial traders far exceed those of the MM traders, both before and after the attacks, by roughly the same ratio.

Figure 8. NYMEX larger trader long positions, September 10 and 17.



Source: CFTC Commitment of Traders Reports; author's construction.

Summary

The September 14, 2019 attacks on the Saudi Aramco production and processing facilities sent shock waves across the industry and around the world. However, the price impacts appear to have been significantly moderated relative to what may have been expected and, indeed, were suggested by many. This is likely in large part due to the attacks occurring early on a Saturday morning when markets were closed for the weekend.

The price rose by less than 15%, rather than the 60%-plus that some expected and some models would have projected. Trading activity rose significantly on Monday and Tuesday, once markets reopened, allowing market participants to process and internalize expectations that had been significantly altered from the market close on Friday. However, the time over the weekend allowed for more in-depth analysis and a fuller consideration of the global balances and the prospect for Saudi Aramco to effect repairs rapidly. The latter mitigated the potential for significant production/supply disruptions even in the relatively near delivery months.

In less than a week prices moderated and returned to normal. This included both the intraday high-low ranges and the complete forward curve representing the next year's contract maturities. And, while total open interest fell slightly on both exchanges, there was no significant change in the distribution of contracts across trader classifications.

The market reaction to the killing of General Soleimani and the following Iranian missile retaliation were similarly muted, with a price increase of 3.5% close-on-close, which implied an initial market expectation of a 280,000 – 320,000 barrel per day disruption. And these reactions followed events that occurred during an active trading week. The market responded, reassessed, and responded again, leaving the market in a position very much on track with expected market movements prior to these events, in less than one week of trading activity.

References

Ripple, Ron D. 2008. "Futures trading: What is excessive?" *Oil and Gas Journal* 106 (22): 24-32.

Smith, James L. 2009. "World Oil: Market or Mayhem?" *The Journal of Economic Perspectives* 23(3): 145-164.

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