CME Market Sentiment Meter Historical Market Analyses:

WTI Crude Oil

September 14, 2019
Abqaiq-Khurais Attack

The CME Market Sentiment Meter (MSM) assigns market states from futures and options settlement data. There are four possible market states: Complacent, Balanced, Anxious, and Conflicted. This series of application notes provides detailed examples on how to use MSM by exploring economic events.

Executive Summary

In the year 2019, daily settlement prices (most active expiry) for WTI Crude Oil futures (CL[1]) rose as tensions with China and Iran grew from January to April. During this period, the Market Sentiment Meter (MSM) indicated Balanced market states. Following a period of Conflicted market states in May, CL fell from 63.21 USD/bbl to 51.14 USD/bbl. The market state became Anxious and CL began to rise. In August, the prospect of trade talks diminished and the market state was Balanced. The MSM indicated that the market state remained Balanced for the rest of the 2019.

On September 14th 2019, there was a drone attack on the Saudi Aramco facilities located in Abqaiq and Khurais, Saudi Arabia. There was a rise in CL from 54.85 USD/bbl to 62.9 USD/bbl. The market state was Balanced prior to the attack. The risk-return curve became skewed immediately after the attack. However, the market state remained Balanced. This rise in price was short lived and fell the following day, period of Balanced market states.

1 WTI Crude Oil Futures (CL)

- CL is a physically delivered contract at Cushing, Oklahoma.
- West Texas Intermediate (WTI) and Brent crude oil futures are leading benchmarks for U.S. crude oil.
- U.S. domestic production: 10.96 Mbbl (2018).
- U.S. imports: 7.76 Mbbl (2018).
- 14.16 Mbbl to transportation (2018).
- 5.13 Mbbl to industrial consumption (2018).

2 The Abqaiq-Khurais Attack and 2019 Trade-War Tensions

The year 2018 ended with a fall in settlement price in the fourth quarter of the year, with WTI ending 2018 with a price of $45.41 a barrel, despite trading at a four-year high of $75.30 just three months earlier on October 1st. This is the result of three main factors:

- Economic sanctions enforced by the U.S. on Iran.
- Increased oil production by Saudi Arabia and the U.S.
- Reduced demand for fuel due to the China-U.S. trade war escalating.

[1] The CME DataMine product codes are used in this work. See Appendix C.

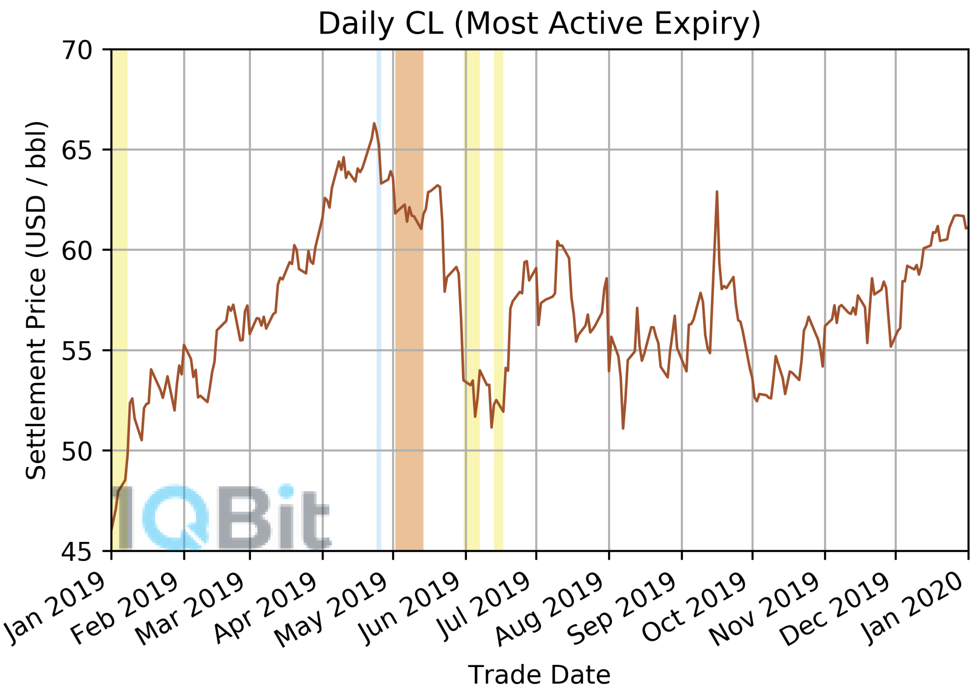

Figure 1: **Daily Settlement Price for CL** (most active expiry) (brown line). The shading indicates the market state. Regions where the MSM is Complacent (Blue), Balanced (White), Anxious (Yellow), and Conflicted (Red) are highlighted.

In 2019, the U.S. made several hard stances that led to tensions with trade partners and nations who have strong ties to these trade partners. There was also voicing of personal opinions by world leaders on public outlets affecting world demand.

At the start of 2019, there were reports that trade war tensions and lower demand would cause the price of crude to continue falling. However, there were signs contrary to this:

- Production cuts announced by Saudi Arabia in January.
- U.S. economic sanctions placed on Venezuela.
- Lower production of U.S. crude oil in general.

In the third week of April 2019 there was a fall in CL. By the end of the first week of May, prices began rising. The MSM indicated a Conflicted market state. On May 23rd 2019 CL had the sharpest drop in a single trade date since December of the previous year. It continued to drop until the third week of June. After this, CL rose and became less volatile in August.

The Conflicted state indicates that more than one school of thought is present (e.g. around the possibility of future price movements). For example, even in volatile times, seeing a shift from a Conflicted market state to a Balanced or Complacent state over a long period of time yields usable information. In this particular case, the MSM shifted from a Conflicted

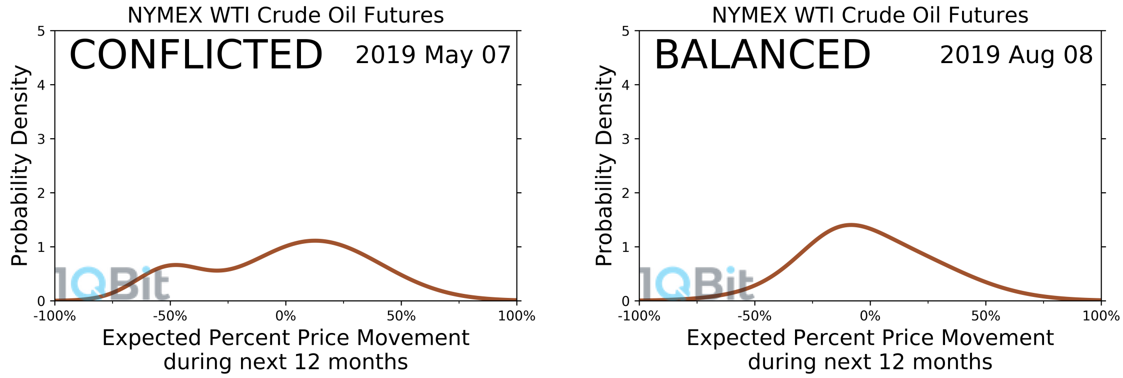

Figure 2: **May 2019 to August 2019.** Left: The risk-return curve during a time of high economic and political tension. Right: The risk-return curve for once trade talks between China and the U.S. had died down.

state to a Balanced state (Fig. 2). During this time, the trade talks worsened and high tensions with Iran were maintained. This shift signaled that varying schools of thought on potential price moves beginning to agree towards a single outcome.

From August 2019 onwards, there is a distinct lack of Anxious and Conflicted market states.

On September 14th 2019, there were a series of drone attacks on the Abqaiq and Khurais oil-processing facilities in Saudi Arabia. Both of these facilities are state-owned. The facilities were shut down for repairs. Saudi Arabia's oil production was halved. This reduced the world's oil production by five percent.

CL rose from 54.85 USD/bbl to 62.90 USD/bbl. Members of the Houthi movement claimed responsibility for the attack citing Saudi Arabian intervention in the Yemeni Civil War as their motivation. Saudi Arabia claimed that more drones and missiles were deployed than were stated by members of the Houthi movement. Saudi Arabia, the U.S., and several other countries have stated that Iran was more likely to be responsible for the attack. Iran has denied having involvement in the attack.

In Fig. 3 the broader and skewed distribution indicates greater anticipated volatility one day immediately after the event when compared to one day before the event. However, the MSM market state remains Balanced – the most common market state. Further, by monitoring the market state in the following days, it is evident that the market state remains balanced, maintaining a slight skew towards a positive price move in going from the day before the attack to the day after.

In summary:

- The price of CL rose due to political tensions until a sudden drop. The MSM indicated a Conflicted market state prior to the price drop.
- There was a period of Anxious market states which preceded a jump back up in the market price, after which the market state returned to being Balanced from May to

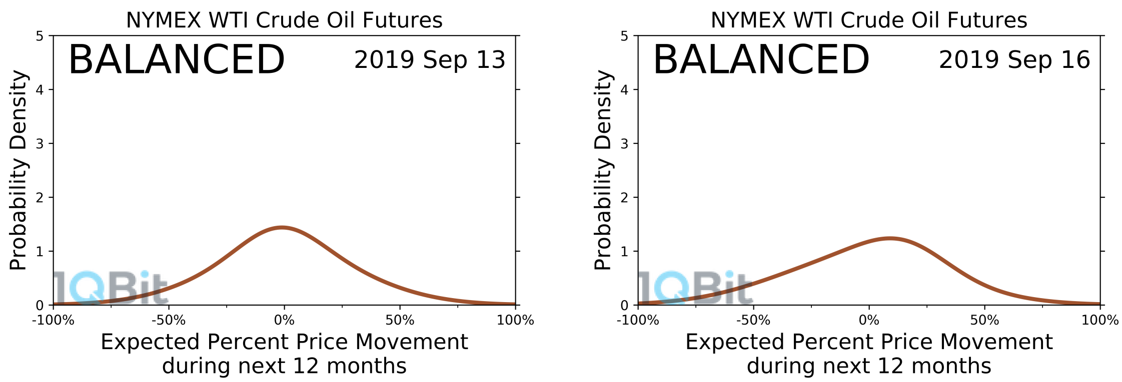

Figure 3: **Two Days in September 2019.** Left: The risk-return curve one day before the 2019 Abqaiq-Khurais attack. Right: The risk-return curve one day after the attack. The MSM reflects the effect of this event on potential outcomes of future CL price moves.

August 2019, as China-U.S. trade talks worsened.

- The rest of the 2019 was dominated by Balanced market states, which gave insight into why the price did not jump significantly despite the Abqaiq-Khurais Attack.
- The Anxious and Conflicted states indicate that options traders are "expecting something to happen", even though they might not be sure what.
- The return to a Balanced state indicates that volatility is likely to remain constant. It may be large or small. In this sense, the large rise in price following the end of the Anxious state in July 2019 is typical of the price movements over the rest of the year.

APPENDIX

A About the Historical Market Analyses

This series of application notes describes notable historical events and times and how they affected market prices and trends. Each event considered is tailored to a specific product which is covered by the MSM product line. For each historical narrative, an analysis is provided making use of the data and features available through the MSM in order to gain an economic and financial insight into each situation.

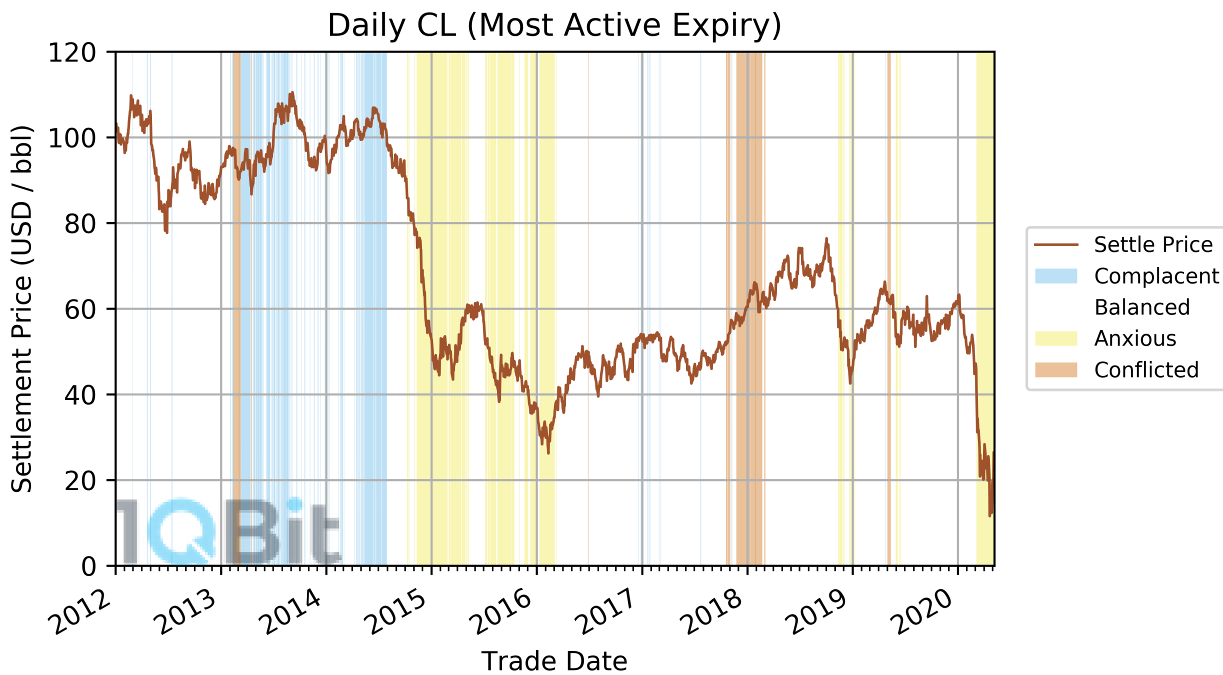

Figure 4: **2012-2019 Daily Settlement Price for CL** (most active expiry) (Brown line). The shading indicates the market state. Regions where the MSM is Complacent (Blue), Balanced (White), Anxious (Yellow), and Conflicted (Red) are highlighted.

B Market Sentiment Meter Market States

The CME Market Sentiment Meter models risk by allowing there to be multiple "schools of thought" for price movement. There are four possible "market states": **Complacent**, **Balanced**, **Anxious**, and **Conflicted**. Graphical representations of the market states are found in Figs. 4-5. These are represented in a single Mixture Distribution. The Mixture Distribution represents the expected price movement over the next twelve months, so that its standard deviation can be directly compared to an annualized volatility. However, the Mixture Distribution may change daily, evolving over time as new information arises. The model works best for events in which the timing is known but the outcome is uncertain.

Edited by Anish R. Verma

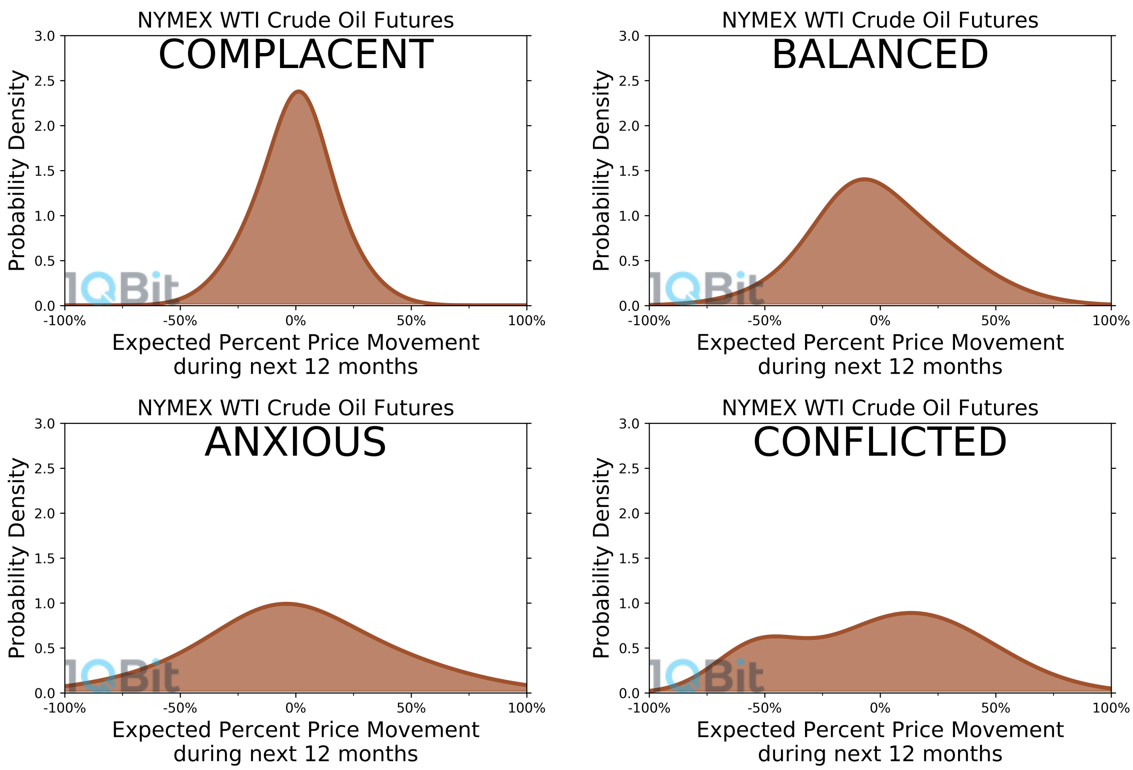

Figure 5: **MSM Market States.** Graphical representations of the risk-return curves for the four market states within the MSM: Complacent; Balanced; Anxious; and Conflicted states.

The **Complacent** market state is a “calm” state indicating that market participants have few concerns. Conceptually, it is when the schools of thought do not differ significantly, resulting in a tall and narrow distribution. The narrow width of the curve is a direct result of a small standard deviation, and generally indicates that there is only a small chance of a large price move.

The **Balanced** market state is the most common state. This distribution has a larger standard deviation than the Complacent state, indicating a larger difference in the schools of thought when compared to the Complacent state.

In the **Anxious** market state, the schools of thought are diverging, and result in a much broader risk-return curve. Indeed, the differing schools of thought can also skew the distribution and move the mean off centre, yielding information about the direction of a potential price move.

Most unique to the MSM model is the **Conflicted** market state. The defining feature of this, graphically, is the bi-modal nature of the distribution. For this situation, the schools of thought differ significantly and subsequently result in a large volatility. This may indicate a large price move.

C CME DataMine Product Codes

Throughout the Historical Market Analyses, CME DataMine product codes are used to refer to the various products. For convenience, tabulated below is a list of CME DataMine product codes currently available through the Market Sentiment Meter.

DataMine Code	Futures Product Name
C	CBOT Corn
CL	NYMEX WTI Crude Oil
EC	CME Euro FX (USD per EUR)
ES	CME E-Mini S&P 500
GC	COMEX Gold
NG	NYMEX Henry Hub Natural Gas
S	CBOT Soybean
TYF	CBOT US Treasury 10-Year Note