

**Commodity and Energy
Markets Association
(CEMA) Conference in
Boston**

**Tapping the Value
of Futures Data:
A Practitioner
Perspective**

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Bayes Business School * <https://www.bayes-cid.com/hilary-till>**



Tapping the Value of Future Data: A Practitioner's Perspective

- I. The Promise of Big Data
- II. The Reality of “Black Holes”
- III. The Wealth of Futures Price Data
- IV. What Futures Prices Reveal about
Petroleum Complex Fundamentals
- V. Caveats on the Use of Price Data



Source of Image:
Gary Kelley's "From Field to Market."

Updated from Till and Eagleeye (2023).



I. The Promise of Big Data

- A. **Algorithmic Trading**
- B. **Industry Cost Reduction**
- C. **Tapping the Value of Data Embedded in Industry**



Source of Image: David Molinaro's "Convergence."



II. The Reality of “Black Holes”

- A. In Emerging Markets
- B. Even in Some Markets in the U.S.



Source of Image: David Molinaro's "Convergence."



II. The Reality of “Black Holes”

A. In Emerging Markets



With “emerging markets ... [becoming] increasingly dominant in the international economy, we have more and more ‘black holes’” in data coverage, explained Ed Morse, (then) Global Head of Commodities Research at Citi in CFTC (2017).

“We know what [crude oil] inventories are ... in OECD countries ... We have a ... decent idea in some other countries; Saudi Arabia is very good for example at posting their inventories of products and crude oil, as is Brazil.”

Source: CFTC (2017).



II. The Reality of “Black Holes”

A. In Emerging Markets (continued)

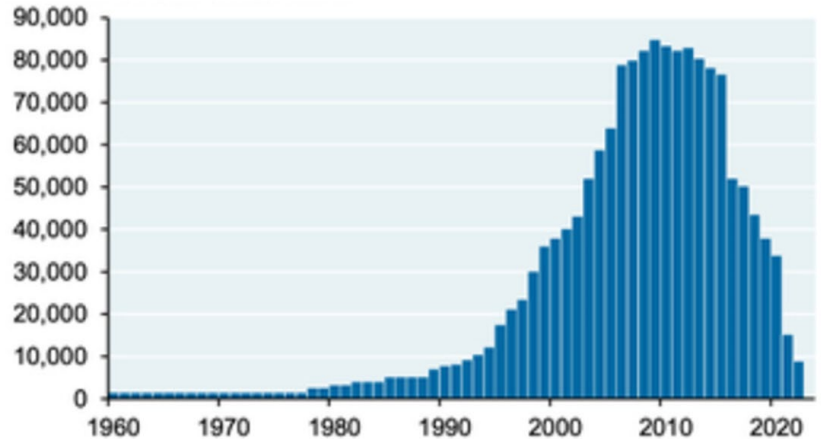
“Even China, which produces a lot of statistics, has a lot of missing barrels, a lot of missing molecules, [and] a lot of missing tons of grains because their inventory [data] is a state secret.”

“So black holes are getting larger and larger and impacting our understanding of [commodity] fundamentals.”

Excerpting from Tooze (2024):

China economic disclosures

Annual number of economic indicators made available by China's National Bureau of Statistics



Source: FT, October 21, 2022 based on CEIC/CNBS data

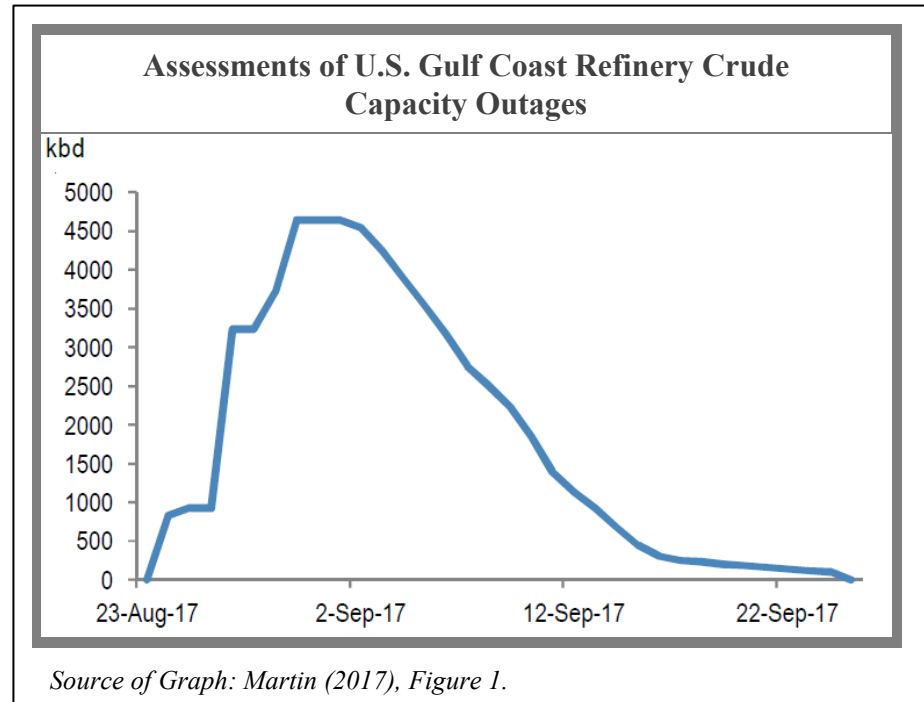
Source: CFTC (2017).



II. The Reality of “Black Holes”

B. Even in Some Markets in the U.S.

Martin (2017) discussed how “Hurricane Harvey hit the Texas refining system hard”. As a result of the disruption to refinery crude processing, the J.P. Morgan commodities research team assessed the “cumulative loss of product supplied as ... 22 [million barrels] mb of gasoline and 20 mb of middle distillates ...”



II. The Reality of “Black Holes”

B. Even in Some Markets in the U.S. (continued)

“The majority of this shortfall will turn up in [U.S.] PADD 3 inventory levels in future weeks’ [Energy Information Administration] EIA reports.

**However, some of this was destined for export markets, and some for shipment ... via pipeline to PADD 1 – so the impact will be dispersed across *several markets, not all of which will publish data that makes the true impact transparent, and thus, we continue to look at price signals as a guide for the underlying market dynamics,*” noted Martin (2017).
(Italics added.)**



III. The Wealth of Futures Price Data

- A. **The Evolution of Pricing in the Oil Markets**

- B. **Petroleum Complex Futures Markets Provide Needed Transparency**



Source of Image: David Molinaro's "Convergence."



III. The Wealth of Futures Price Data

B. Petroleum Complex Futures Markets Provide Needed Transparency

Even when fundamental data on the oil markets are sparse or opaque, large-scale supply-and-demand shifts leave footprints in futures-price relationships, from which one can potentially infer the market's fundamentals.

In the presence of active futures markets, an observer need not be a member of a cartel or a large corporation to gain insights into the oil market.



Source: Till (2008).



IV. What Futures Prices Reveal about Petroleum Complex Fundamentals

- A. Incentivizing Fundamental Behavior
- B. Driving Fundamental Behavior
- C. Proxying the Physical Market with Futures Spreads
- D. Understanding Chinese Demand
- E. Managing the Domestic U.S. Crude Oil Surplus (2011 through 2013)
- F. Geopolitical Dislocations
- G. Inferring the Marginal Cost of Production



Source of Image: David Molinaro's "Convergence."



IV. What Futures Prices Reveal about Petroleum Complex Fundamentals

A. Incentivizing Fundamental Behavior

A futures trader interprets a commodity's price as part of a dynamic process. A commodity's price moves in whatever direction is needed in order to elicit a supply or demand response that will balance a commodity market.

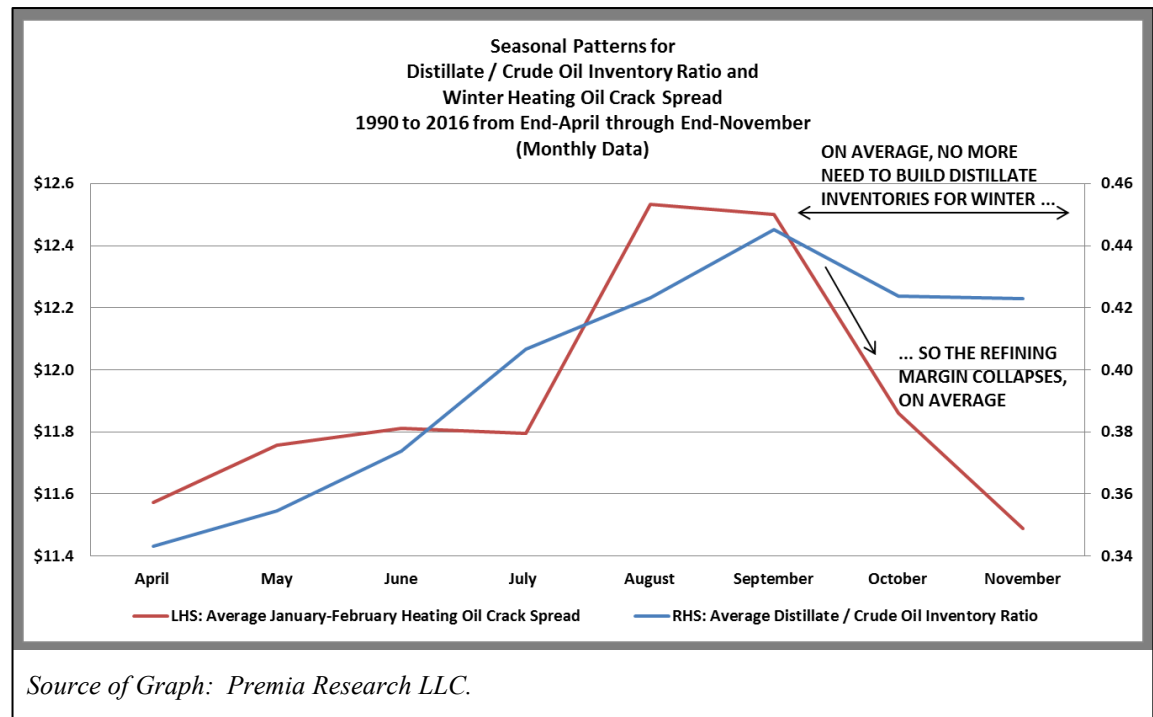


It may be useful to review the technical aspects of this interplay.

IV. What Futures Prices Reveal about Petroleum Complex Fundamentals

A. Incentivizing Fundamental Behavior (continued)

Building Distillate Inventories Before Winter (1990 to 2016)



IV. What Futures Prices Reveal about Petroleum Complex Fundamentals

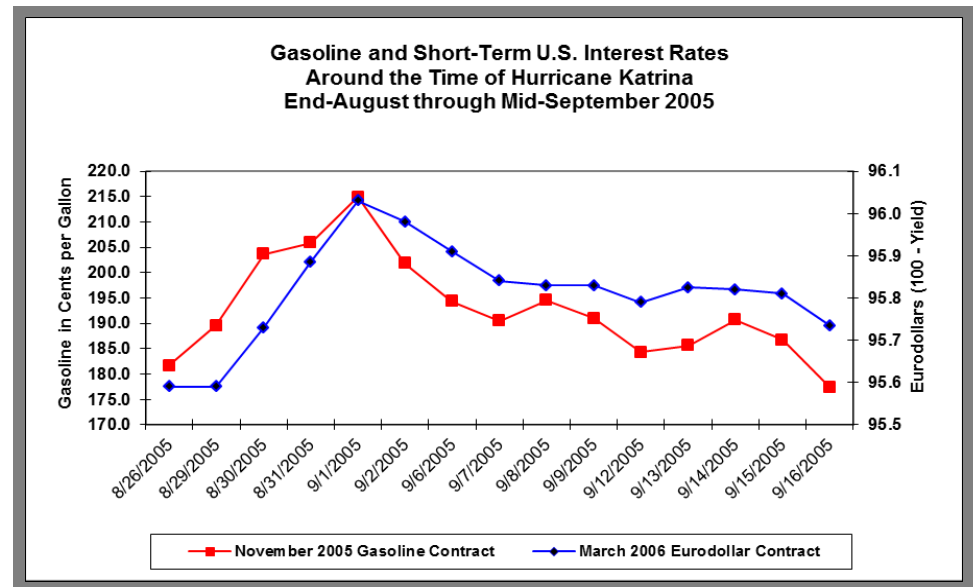
A. Incentivizing Fundamental Behavior (continued)

Hurricane Katrina (2005)

One can also look at the aftermath of Hurricane Katrina in the United States in 2005 for a good example of the dynamic interplay between an oil product's price and its supply-and-demand situation.

With the onset of Hurricane

Katrina, the price of gasoline rallied 18% in four days before falling back about the same amount fifteen days later.

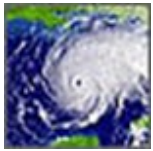


IV. What Futures Prices Reveal about Petroleum Complex Fundamentals

A. Incentivizing Fundamental Behavior (continued)

Hurricane Katrina (2005)

(continued)



According to a 2005 *Dow Jones Newswire* report, “[Hurricane] Katrina shut in nearly all of oil and gas production in the Gulf of Mexico.

The large-scale supply disruption and fear of an economic shock triggered a massive [domestic and international] government[al] response.”

This unprecedented governmental response caused gasoline prices to decline from their post-Katrina peak.



IV. What Futures Prices Reveal about Petroleum Complex Fundamentals

A. Incentivizing Fundamental Behavior (continued)

Hurricane Katrina (2005)

(continued)

Further, and as also illustrated in the graph on Slide 15, with that response, fears of an economic slump diminished, which in turn caused deferred interest-rate contracts to decline, ...

... as the market resumed pricing in the expectation that the Federal Reserve Board could continue tightening interest rates at the time.

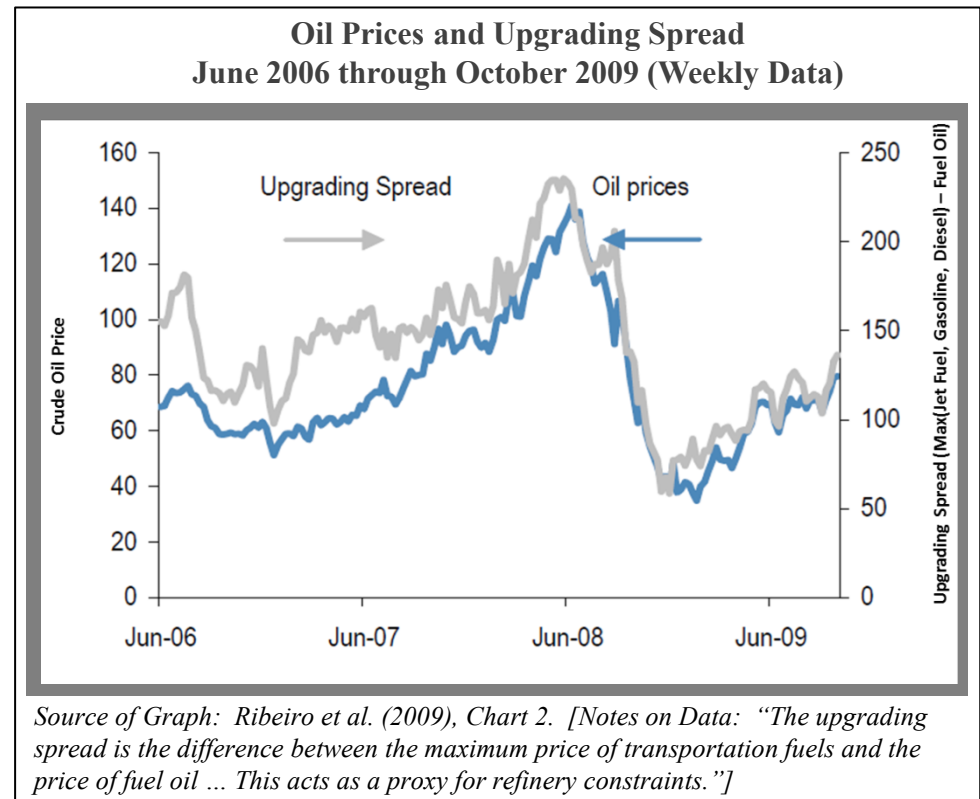


IV. What Futures Prices Reveal about Petroleum Complex Fundamentals

A. Incentivizing Fundamental Behavior (continued)

Refinery Constraints (2008)

The upgrading spread “will widen not only if there is a shortage of refinery capacity, but also if there is insufficient flexibility in the refining system to meet the demand for lighter products.”



Source: Ribeiro et al. (2009).

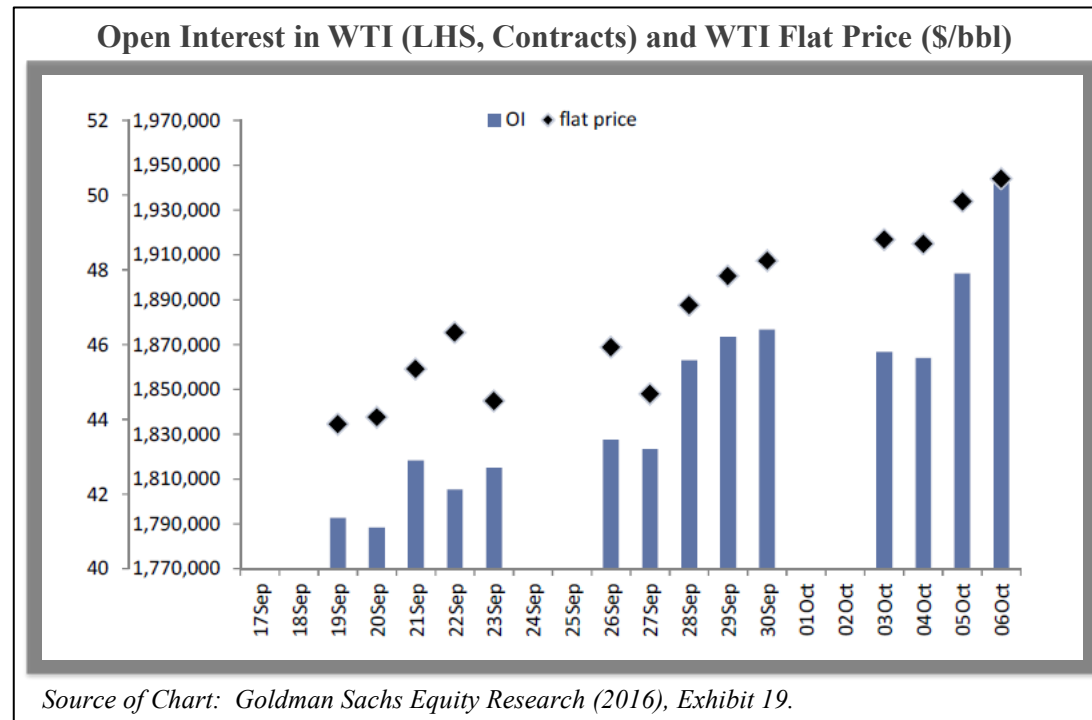


IV. What Futures Prices Reveal about Petroleum Complex Fundamentals

B. Driving Fundamental Behavior

*Hedging Opportunities
(Particularly for Short-Cycle
U.S. Light Tight Oil Projects)*

Goldman Sachs Equity Research (2016): “[A]s prices have trended higher[,] there has been a marked increase in hedging activity.”

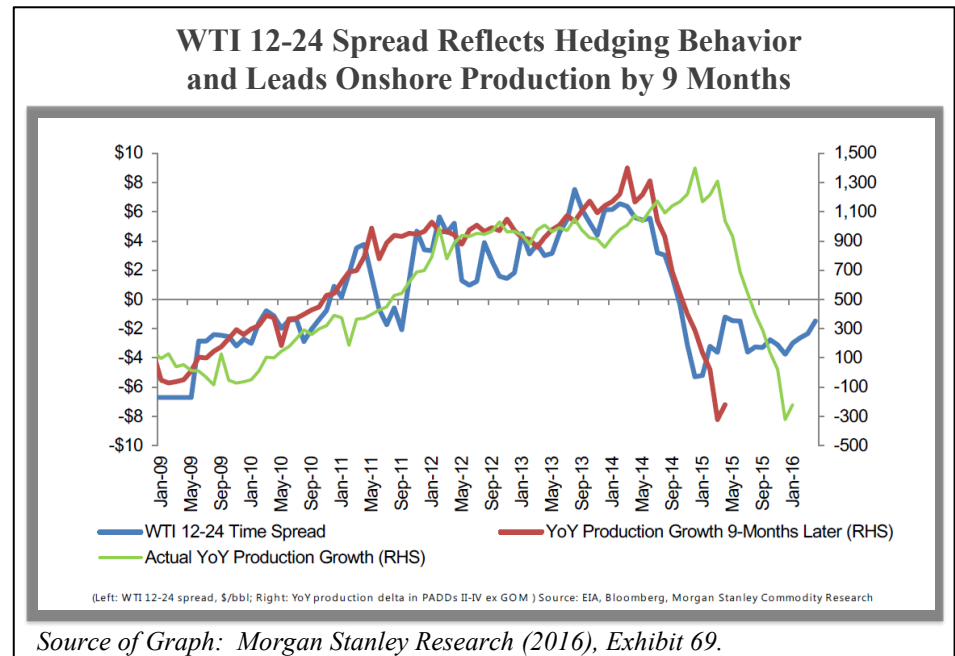


IV. What Futures Prices Reveal about Petroleum Complex Fundamentals

B. Driving Fundamental Behavior (continued)

Hedging Opportunities (continued)

Morgan Stanley Research (2016): “History shows a 9-month lag between hedging and production ...”

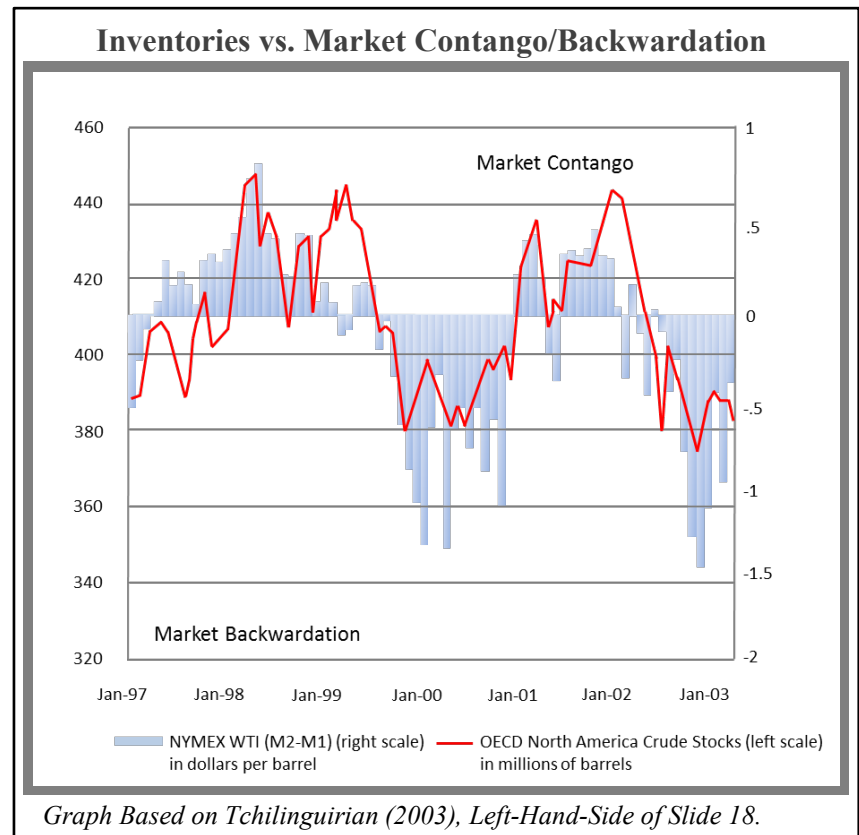


IV. What Futures Prices Reveal about Petroleum Complex Fundamentals

C. Proxying the Physical Market with Futures Spreads

Longson and Volynsky (2015):

“Prompt [term] structure can be a good real-time proxy for the physical [oil] market, and the data proves that out.”



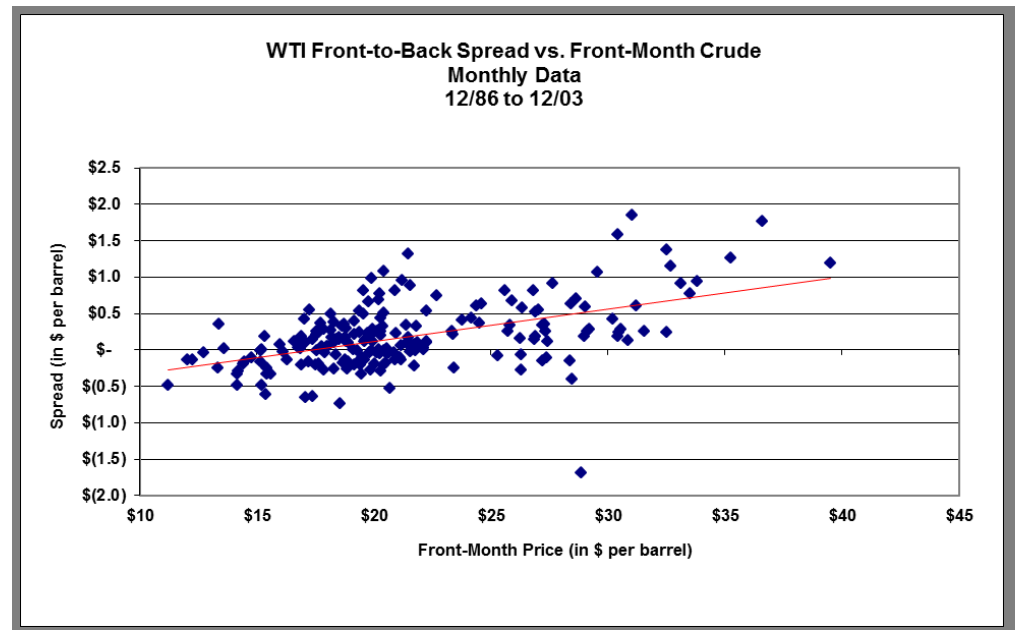
IV. What Futures Prices Reveal about Petroleum Complex Fundamentals

C. Proxying the Physical Market with Futures Spreads (continued)

Caveat: Spare Capacity Also Matters in Interpreting the Oil Futures Curve Shape

A futures curve can be “backwardated” when there is no pressing need to incentivize precautionary stockholdings in oil.

In this state of the world, when the curve is in contango, this indicates that there is ample supply relative to near-term demand.

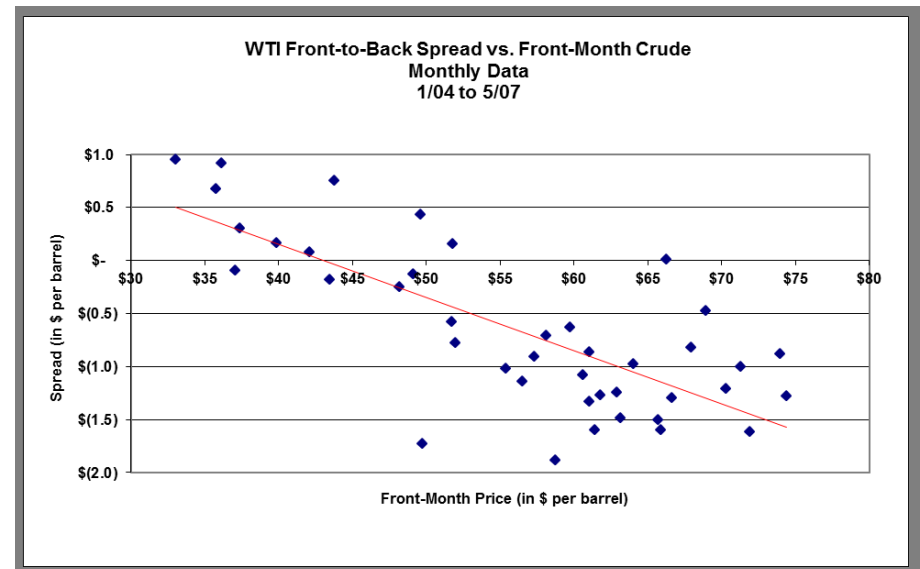


IV. What Futures Prices Reveal about Petroleum Complex Fundamentals

C. Proxying the Physical Market with Futures Spreads (continued)

Caveat: Spare Capacity Also Matters in Interpreting the Oil Futures Curve Shape (continued)

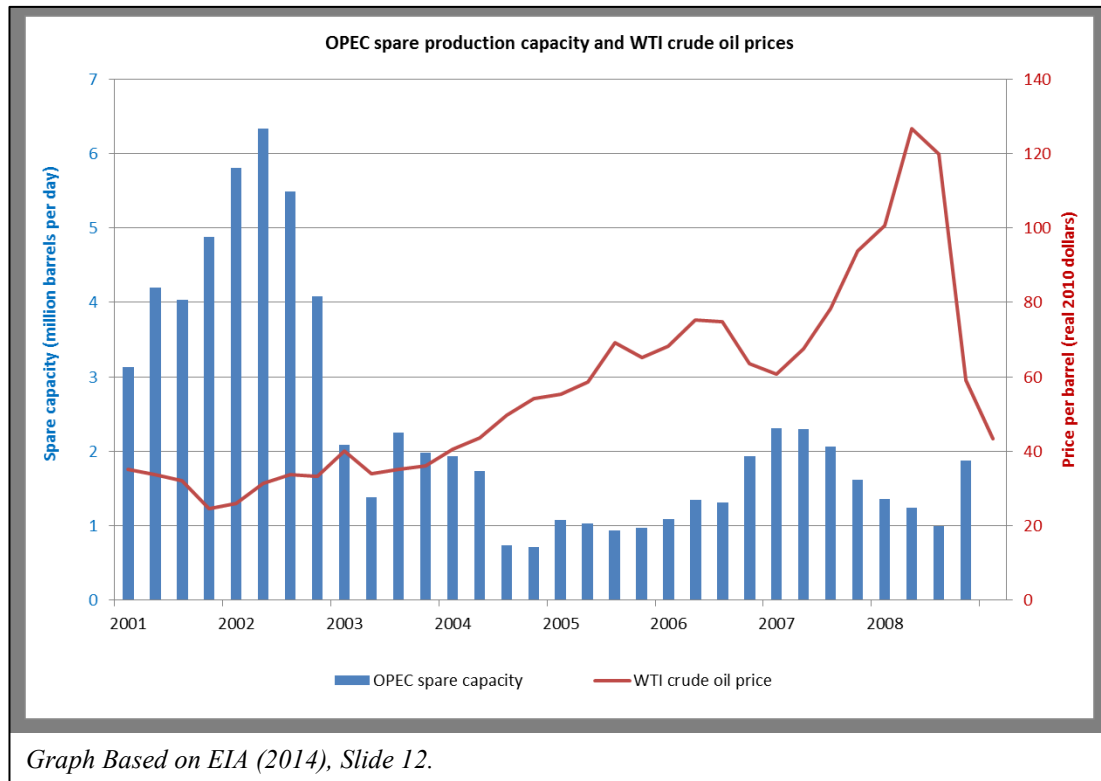
When there is inadequate spare capacity, a futures curve needs to be in “contango” since there is a pressing need to incentivize precautionary stockholdings in oil.



IV. What Futures Prices Reveal about Petroleum Complex Fundamentals

C. Proxying the Physical Market with Futures Spreads (continued)

Caveat: Spare Capacity Also Matters



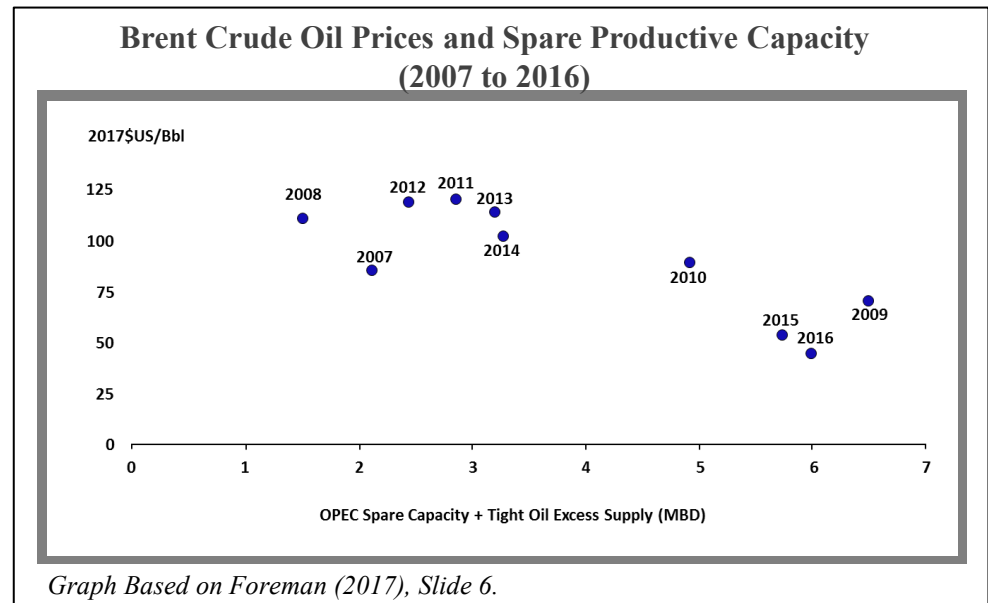
IV. What Futures Prices Reveal about Petroleum Complex Fundamentals

C. Proxying the Physical Market with Futures Spreads (continued)

One More Caveat on Spare Capacity:

An Analyst Now Needs to Also Include Tight Oil Excess Supply, Not Just OPEC Spare Capacity

Foreman (2017): “Although the OPEC swing producer model is outdated, excess productive capacity continues to correspond with prices.”

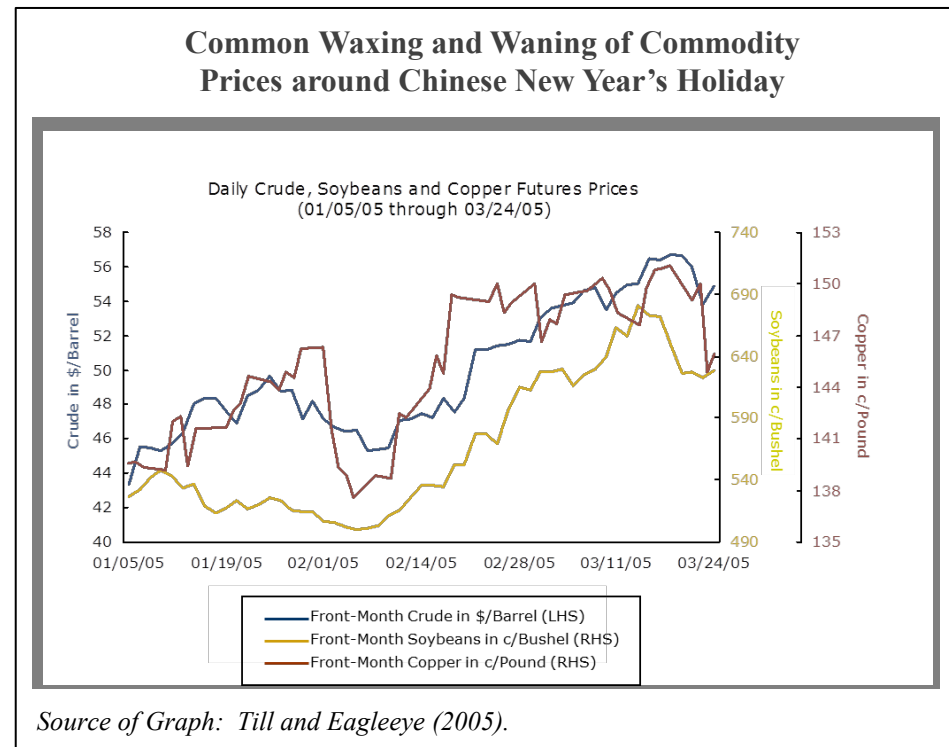


IV. What Futures Prices Reveal about Petroleum Complex Fundamentals

D. 1. Understanding Chinese Demand (Through 2008)

Stein (2005): “This is the first business cycle where Chinese demand is having a global effect on prices, notably of energy and other raw materials.”

The graph on the right provided an early indication of the structural changes to come in the commodity markets, and particularly, in the oil markets.

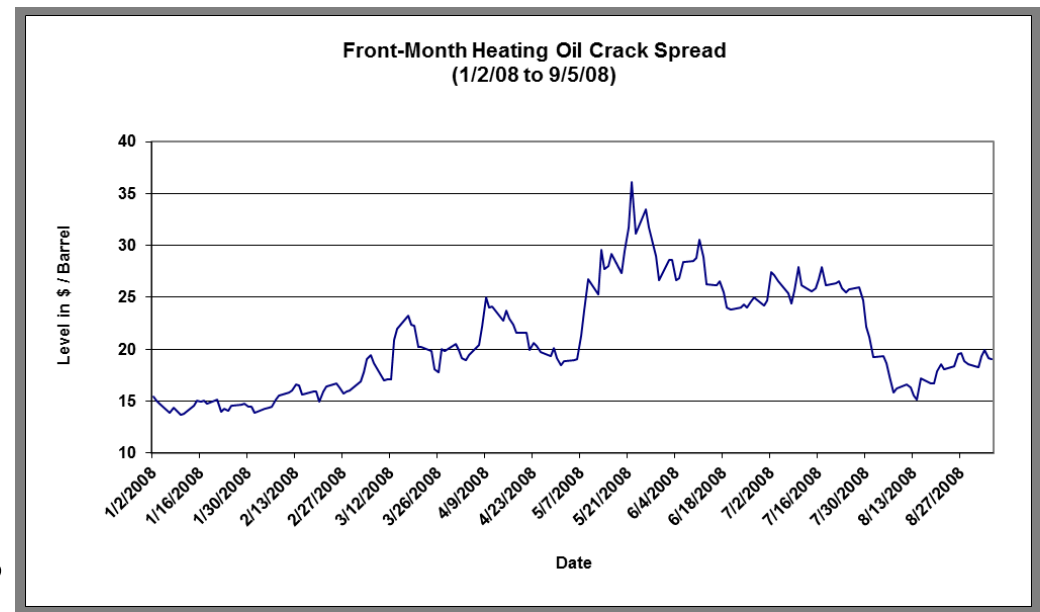


IV. What Futures Prices Reveal about Petroleum Complex Fundamentals

D. 1. Understanding Chinese Demand (Through 2008) (continued)

Through the summer of 2008, the heating-oil crack spread indicated extraordinary demand for middle distillates.

There were no severe weather events, supply disruptions, or large-scale trading blowups in the U.S. or Europe at the time, so it was not immediately apparent why this relationship should spike so extraordinarily.



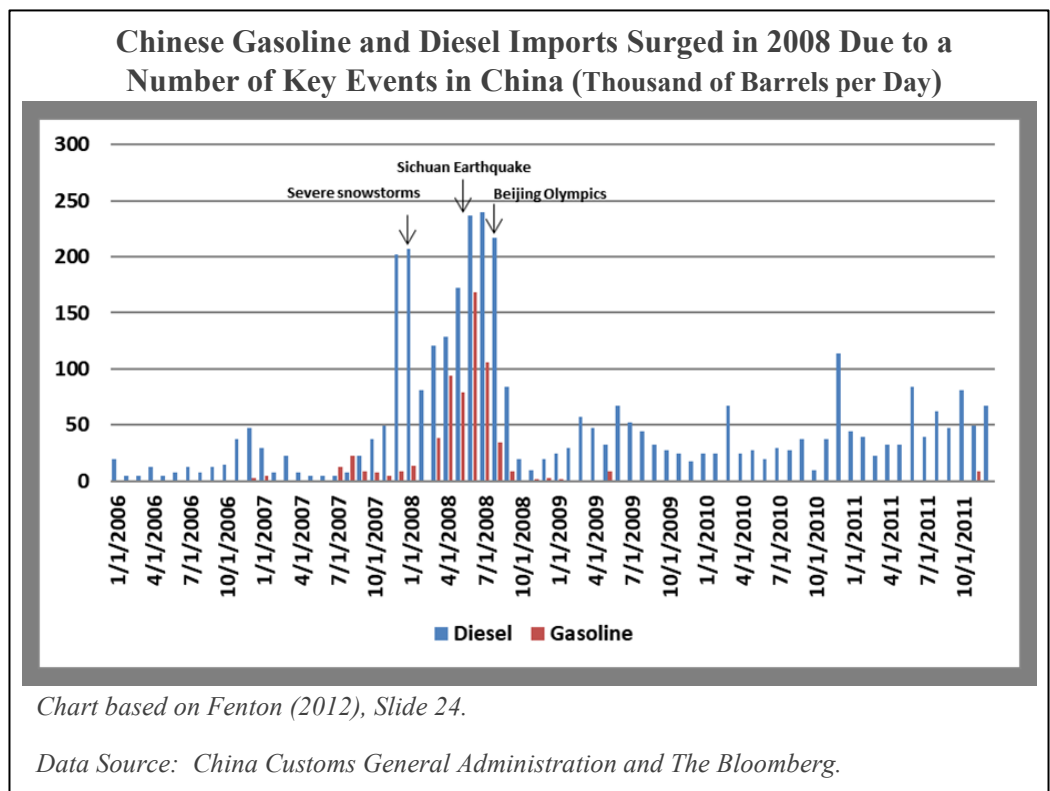
Source: Till (2008).



IV. What Futures Prices Reveal about Petroleum Complex Fundamentals

D. 1. Understanding Chinese Demand (Through 2008) (continued)

That is, except for news from China, including the devastating earthquake in Sichuan, China, which damaged power-supply grids, and also pre-Olympic petroleum-product stocking in order to ensure that there would be no shortages during the historic Beijing Olympics.



IV. What Futures Prices Reveal about Petroleum Complex Fundamentals

D. 1. Understanding Chinese Demand (Through 2008) (continued)

Kaufmann and Ullman (2009) looked into where “innovations in world oil prices enter the market,” using data from 1987 through March 2008.

One of their results was that spot price for Dubai-Fateh oil had been a “gateway’ for innovations to crude oil prices.”

“A large fraction of the crude oil shipped to Asian nations from the Middle East (more than 10 mbd) uses the spot price for Dubai-Fateh as a benchmark ... As such, innovations in the spot price for Dubai-Fateh may [have] reflect[ed] increasing demand in Asia.”



IV. What Futures Prices Reveal about Petroleum Complex Fundamentals

D. 2. Understanding Chinese Demand (2024)

Sina Finance (2024), as translated in *Nanhua Futures News*:

“As the world's largest crude oil importer, when there are changes in China's crude oil demand, *Shanghai crude oil futures* often lead European and American markets in either rising or falling trends.

This means that Shanghai crude oil futures have begun to fulfill their price discovery function, serving as an important representative benchmark oil for the demand side of the crude oil market, transmitting relevant information to the world through price changes.”

(Italics added.)



IV. What Futures Prices Reveal about Petroleum Complex Fundamentals

E. Managing the Domestic U.S. Crude Oil Surplus (2011 through 2013)

At the end of 2013, alert futures traders had an early signal that “the boom in ... [domestic oil] production ha[d] been well absorbed by existing U.S. infrastructure.”

Refinery margins (as represented by the 3:2:1 crack spread) no longer needed to consistently rally at the end of each month to provide an extraordinary return for transporting domestic crude oil, in whatever way possible, to U.S. refineries.

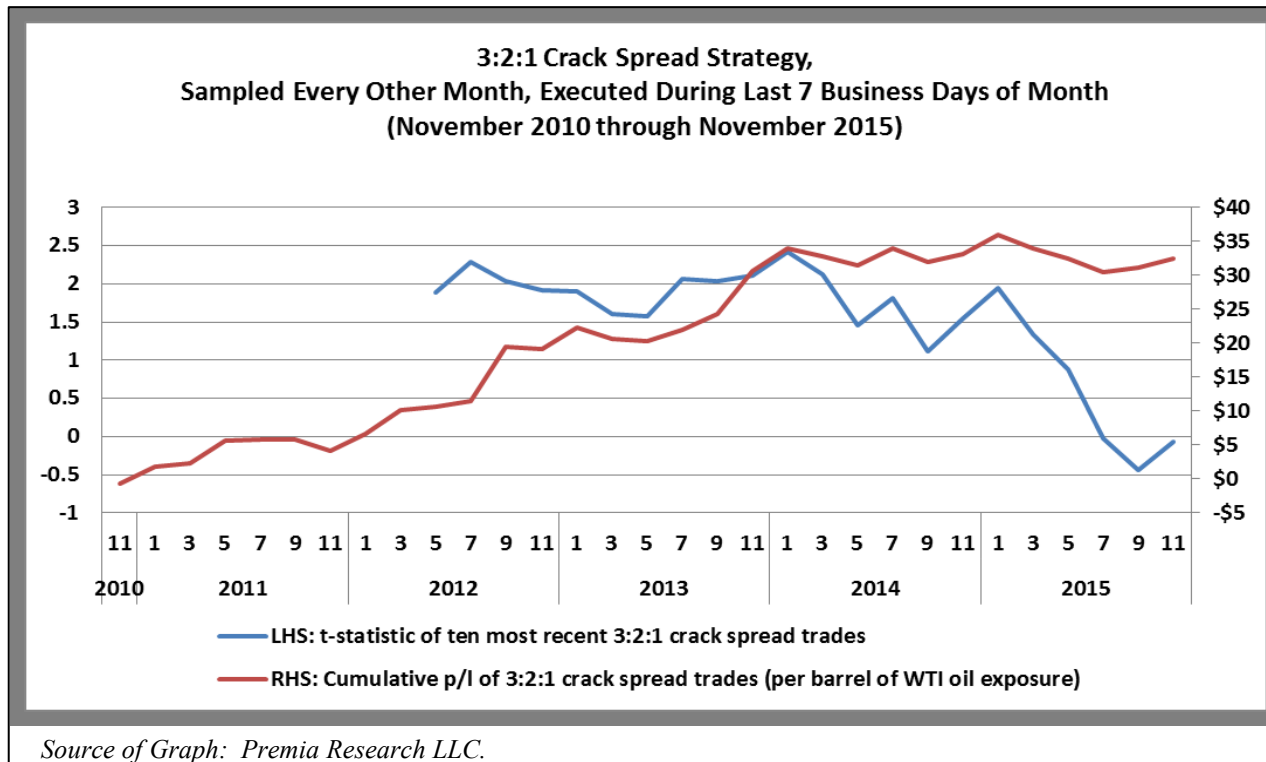
This observation is illustrated on the next slide with a graph that shows the degradation of performance of such a strategy, starting in late 2013.



IV. What Futures Prices Reveal about Petroleum Complex Fundamentals

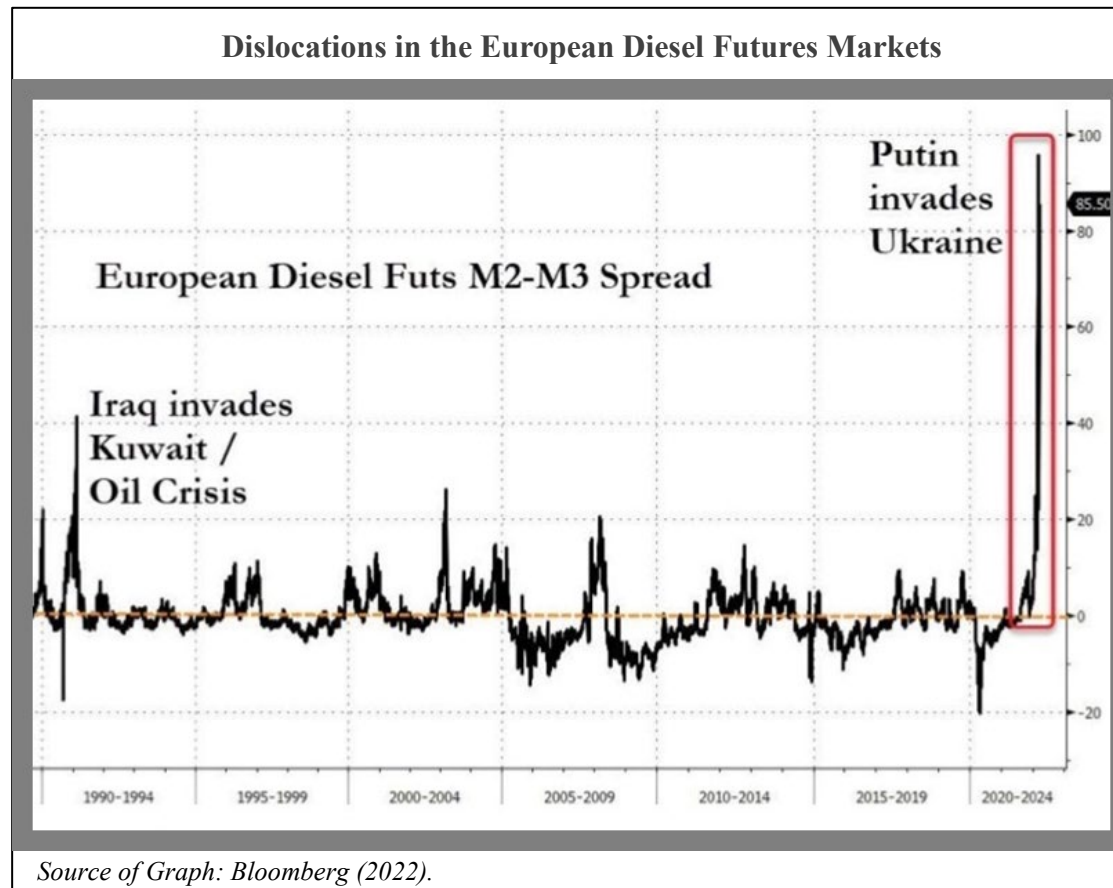
E. Managing the Domestic U.S. Crude Oil Surplus (2011 through 2013)

(continued)



IV. What Futures Prices Reveal about Petroleum Complex Fundamentals

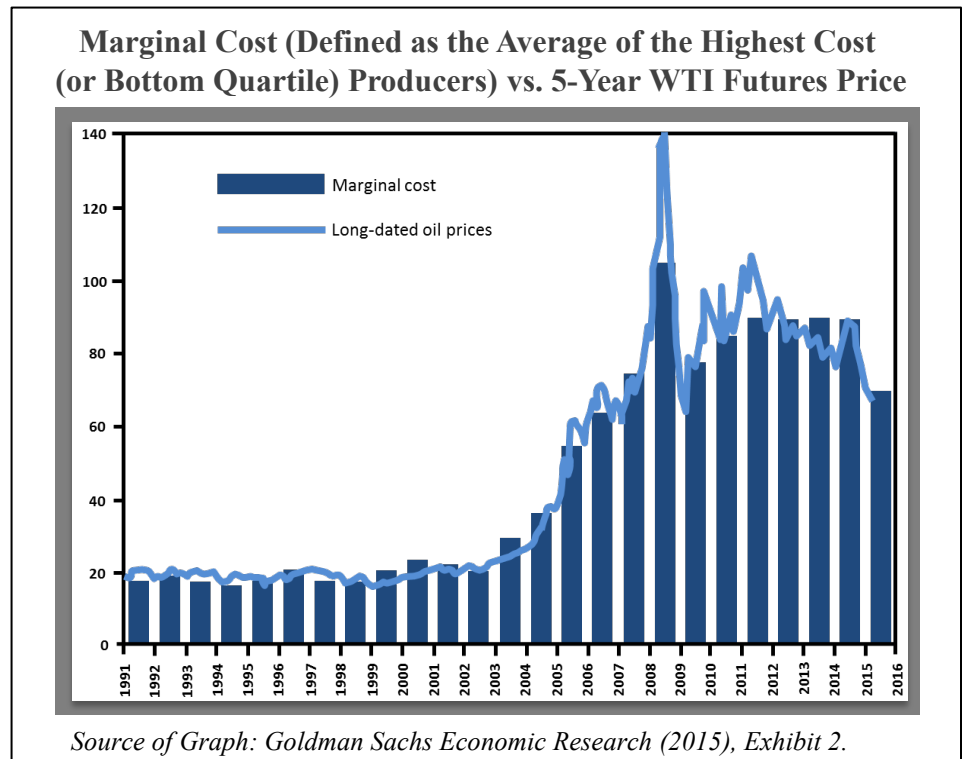
F. Geopolitical Dislocations



IV. What Futures Prices Reveal about Petroleum Complex Fundamentals

G. Understanding Marginal Cost of Production

“[T]he long-dated commodity price ...[is] a reflection of [a] ... commodit[y’s] marginal cost of production ...”



Source: Goldman Sachs Economic Research (2015).



V. Caveats on the Use of Price Data

A. Purely Technical Effects

B. Not Predictions



Source of Image: David Molinaro's "Convergence."



V. Caveats on the Use of Price Data

A. Purely Technical Effects

Dynamic Hedging

“An additional ... factor is worth mentioning as it relates to the speed and magnitude of the oil price decline [in the Fall of 2014]: the impact of hedging unwinds.”



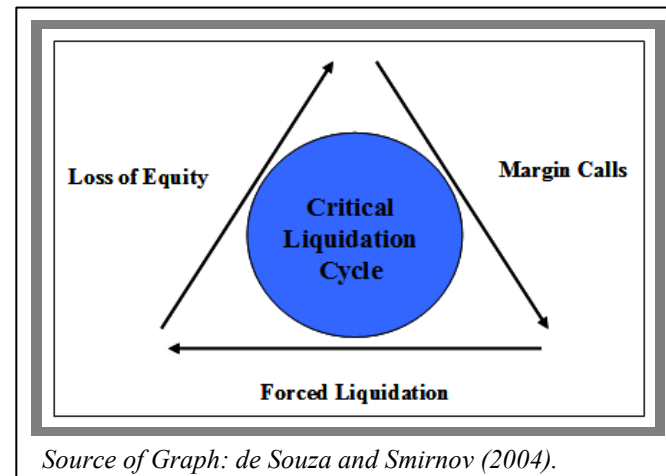
In October 2014, “Wall Street banks ... scrambled ... to neutralize their exposure to big oil options trades, adding to the downward spiral in crude prices as they ... [sold] futures contracts to offset options deals that ... [became] unexpectedly in the money.”

V. Caveats on the Use of Price Data

A. Purely Technical Effects (continued)

Liquidation Pressure

Futures traders are also aware that the effects of traders having to liquidate large positions can be a temporary, but meaningful, driver of price.



This scenario illustrates another interaction effect between trades and price.

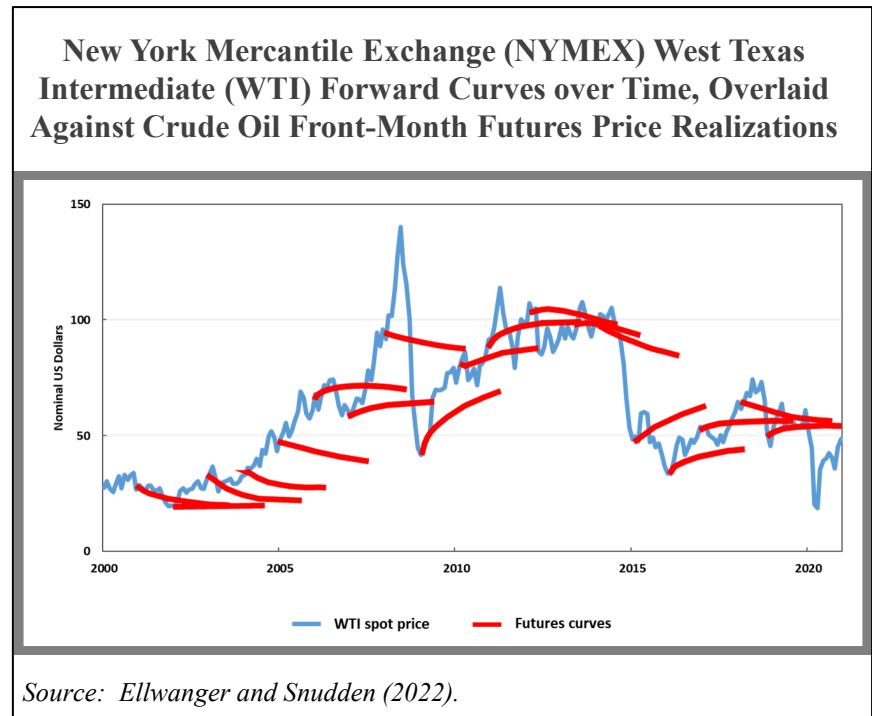


V. Caveats on the Use of Price Data

B. Not Predictions

The forward curve is not a good price predictor, but still functions well for hedging storage costs and requirements.

Tchilingurian (2003): “Supply and demand determine spot prices, and inventory levels affect the difference between the price of oil today against the price tomorrow.”

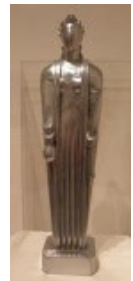


Conclusion

Instead of asking: do the fundamentals justify the oil price? ...

... this presentation adopted the view of a veteran oil futures trader and asked the opposite question: what is the price telling me about fundamentals?

The reason for this outlook is as follows: the market imposes sufficient discipline to prevent a trader from ignoring price but for a very short space of time!



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