IMO 2020:
Implications for Crude Oil Prices

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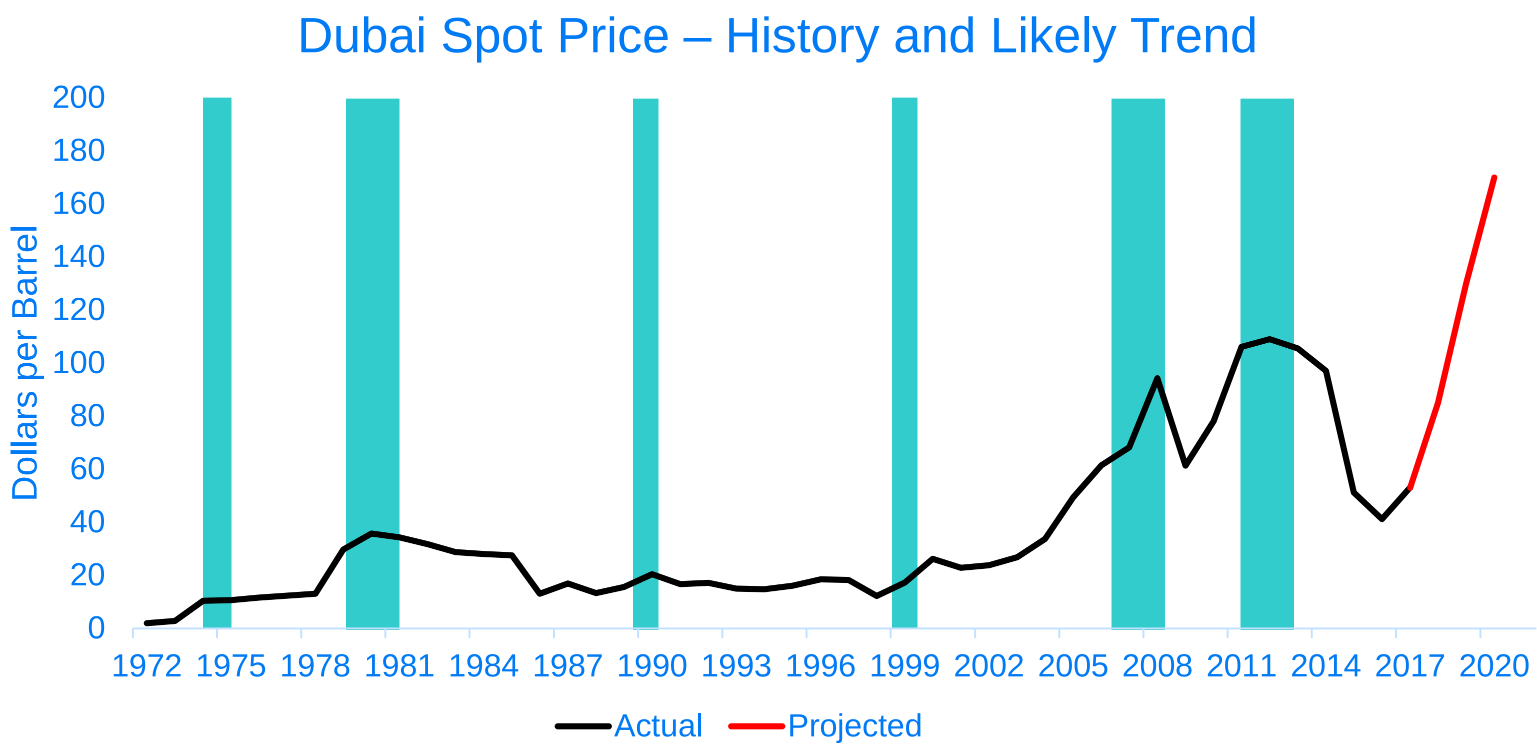
The IMO Fuel Regulations Threaten to Disrupt Oil Markets

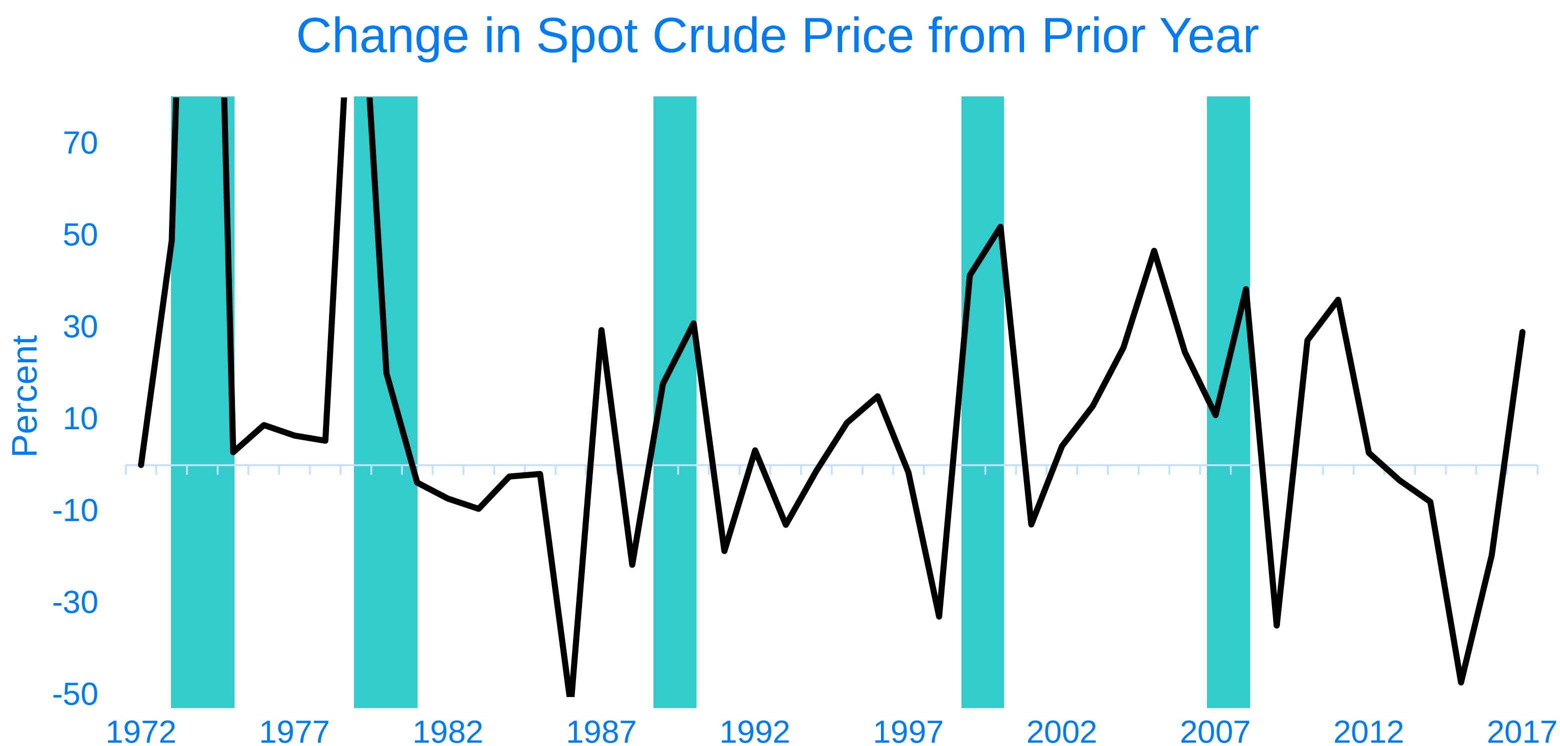
- Regulations on bunker fuel sulfur content will take effect on January 1, 2020.
- The rules will likely create chaos in global petroleum markets.
- Despite a 12-year advance notice, the shipping and refining industries are still unprepared.
- Past episodes of regulatory change have created minor and major disruptions in petroleum markets.
- This episode will likely be the greatest disruption ever seen.

Six Historical Crude Oil Price Spikes and IMO "Projection"



Note: Blue-shaded areas indicate periods of crude oil price spikes.
Source: History – BP Statistical Review of World Energy; Projection – PKVerleger LLC.

The Picture Is Much Clearer If Oil Prices Are Presented as the Percentage Change from the Prior Year

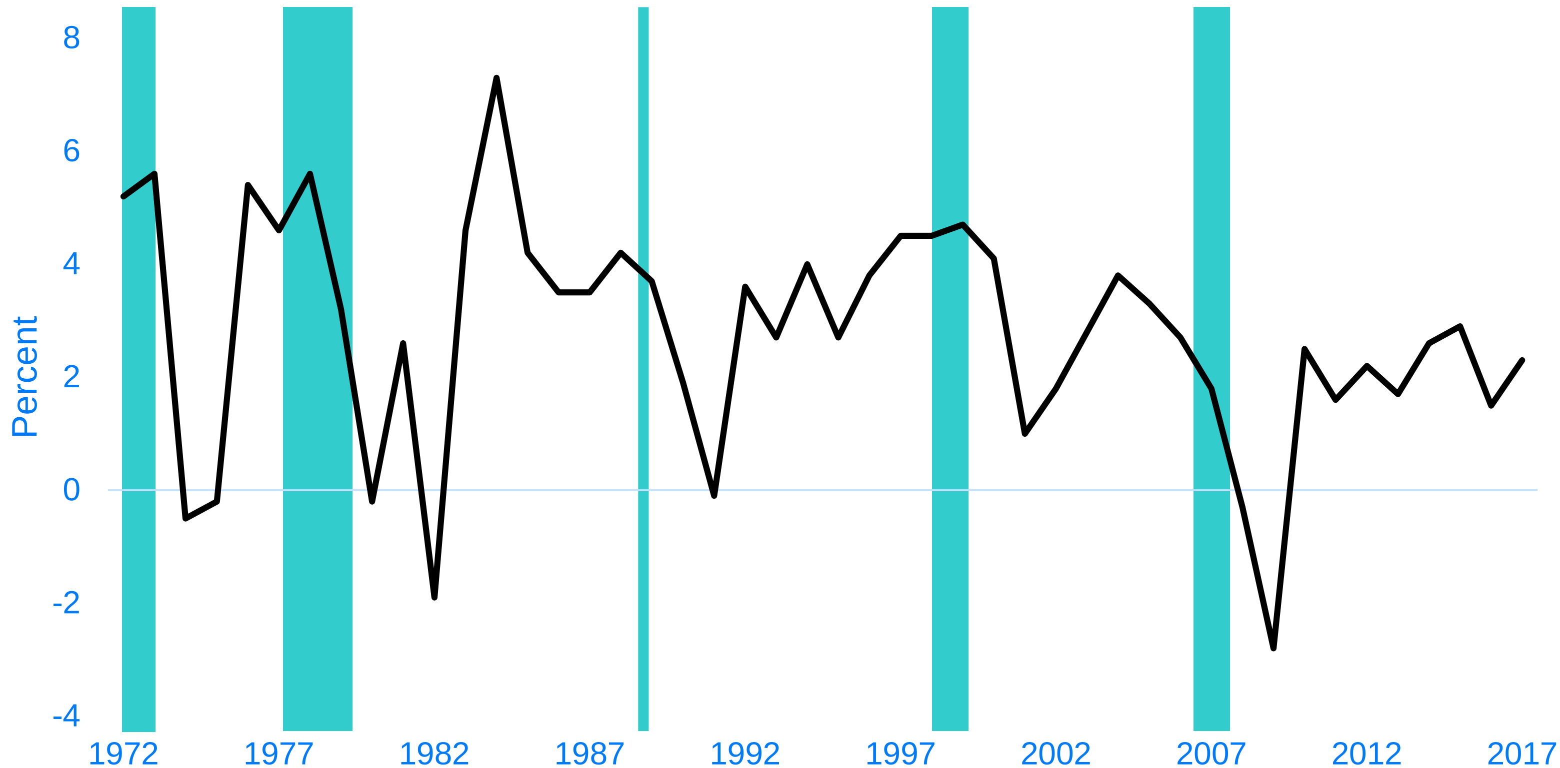


Note: Blue-shaded areas indicate periods of crude oil price spikes.
Source: PKVerleger LLC.

Large Increases in Oil Prices Have Been the Cause of Significant Economic Downturns

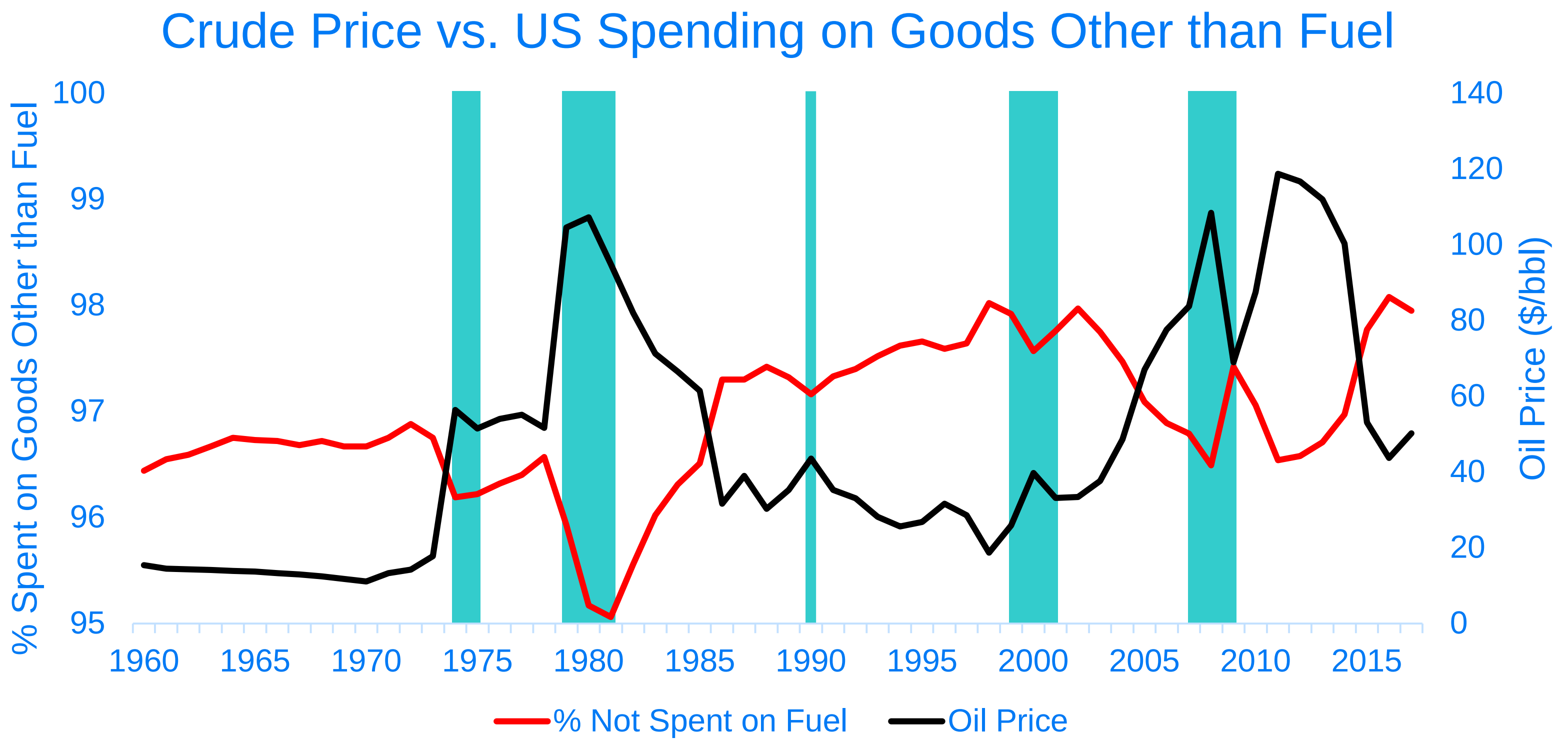
- High prices act as a tax on consumers.
  - The price elasticity of demand for fuel is very low. Consumers continue to buy gasoline or diesel when prices rise.
  - Consumers must reduce savings, increase borrowing, or cut purchases of other goods when gasoline prices rise.
  - Usually prices of other goods and services such as airline flights are reduced.
  - The reduction in consumption has a feedback or multiplier effect on GDP growth.
- Since 1972, there have been 10 years where oil prices spiked.
  - Average growth in years without spikes was 3.1 percent from the prior year.
  - Average growth in years with spikes has been 1.7 percent.

Change in US Real GDP from Prior Year with Oil Market Disruptions Highlighted



Note: Blue-shaded areas indicate periods of crude oil price spikes.
Source: US Bureau of Economic Analysis.

Comparing Consumer Spending Allocation to Real Oil Prices Reveals a Strong Negative Relationship



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Source: US BEA; *BP Statistical Review of World Energy*; PKVerleger LLC.

The IMO 2020 Regulations Will Cause the Largest Oil Market Distortion of All Time

- The IMO rules were first proposed in 2008.
  - They allowed for the creation of “emission control areas” where low sulfur fuel had to be used as early as 2010. These ECAs include seas off the United States and the European Union.
  - The rules stipulated that by 2025 all ships would have to use fuels containing less than 0.5% sulfur.
  - The 2008 agreement allowed the IMO to move the effective date to 2020 if sufficient fuels were available.
- Three paths to compliance were envisioned in 2008.
  - Use of low-sulfur fuels
  - Use of LNG as a ship fuel
  - Installation of sulfur scrubbers on ships

In 2016, the IMO Concluded that the Industry Could Comply with Standards in 2020

- The study on which the IMO relied for this decision has been widely criticized.
- Circumstances in the global economy and the petroleum industry have changed dramatically since 2016.
- In 2016 and even today, the shipping industry has done little to prepare. Most shipowners expect to use low-sulfur fuel.
  - Only 7% of the world's fleet of 60,000 ships will likely install scrubbers.
  - Effectiveness of scrubber technology is still uncertain.
  - Few ships are powered by LNG.
- The head of Maersk, a major shipping line, told *The Wall Street Journal* that "**the onus should be on refiners, not shipowners, to deal with the fuel issues**."
- Refiners are not ready. Those that are expect to earn huge profits.

Key Circumstances Have Changed since the IMO Made 2020 the Deadline

- Oil-exporting countries agreed in January 2017 to reduce output to force a global inventory drawdown.
  - The inventories would have provided a cushion in 2020.
  - The inventories kept markets in contango.
- Venezuela's output began to collapse. Other oil-exporting countries did not increase output to compensate—choosing instead to enjoy the higher prices.
- US light tight oil (LTO) output increased.
  - LTO lacks a distillate middle and does not produce the products needed to meet IMO 2020 standards.
  - Rapidly increasing US LTO output has discouraged development in other areas.
- Canadian oil has been bottled up and cannot reach the market.

For More Details…

…from PKVerleger LLC on the potentially catastrophic oil market, oil price, and global economic impacts of the IMO 2020 regulation on marine fuel sulfur content, contact Kim Pederson at kim@pkverlegerllc.com. Thanks!