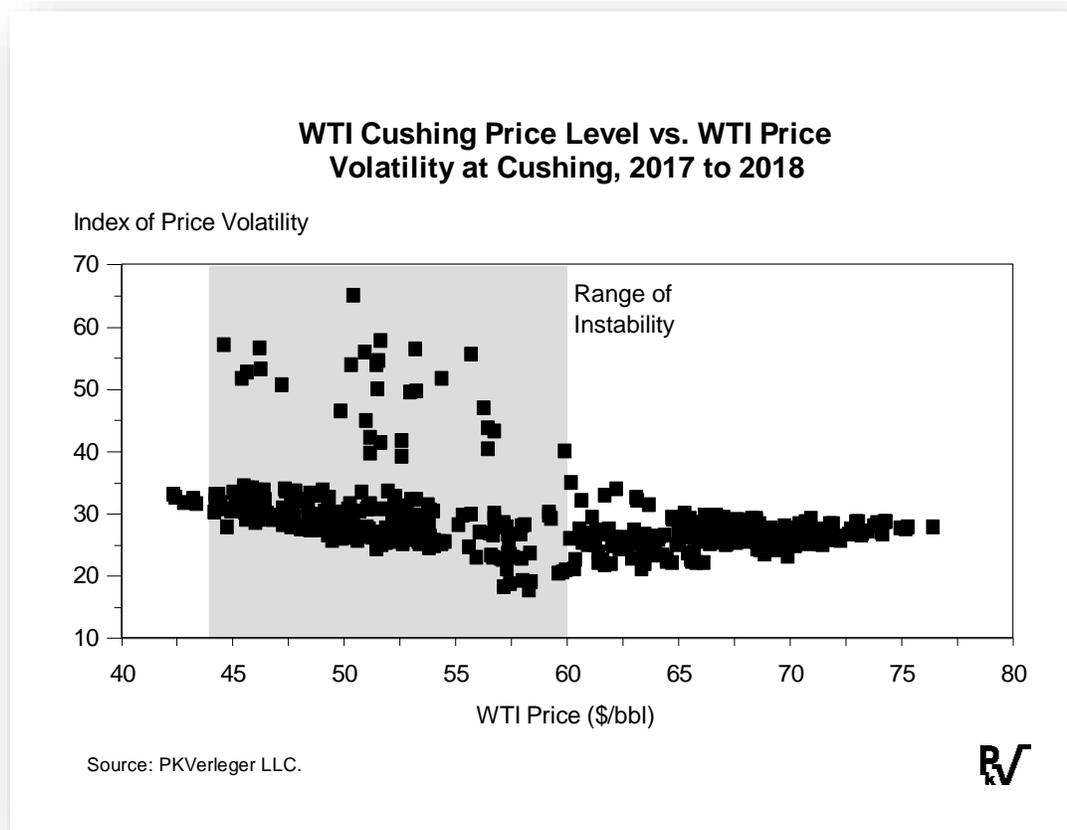


The Failure of Traditional Oil Market Fundamentals



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Summary

The analysis of petroleum markets has changed little since 1950. For almost three-quarters of a century, those seeking to understand and predict movements of prices have focused on “supply/demand balances.” The balances comprise estimates of how much oil the forecaster believes will be consumed and produced and the difference, which represents the inventory increase or decrease. (Table 1 shows a sample of such balances from the most recent International Energy Agency forecast.) Forecasters use the “balances” to project price movements, expecting increases if the stock change is negative and decreases if supplies exceed demand.

Table 1. IEA Global Crude Oil Supply/Demand: History and Projections, 2015 to 2019 (Million Barrels per Day)

| | 2015 Actual | 2016 Actual | 2017 Actual | 2018 Projection | 2019 Projection |
|------------------|-------------|-------------|-------------|-----------------|-----------------|
| Global Demand | 95.3 | 96.4 | 97.9 | 99.2 | 100.6 |
| Global Supply* | 94.6 | 96.9 | 97.5 | 99.8 | 101.4 |
| Inventory Change | 1.2 | 0.6 | -0.4 | 0.6 | 0.8 |

* Includes processing gains, biofuels, and NGLs.

Source: IEA *Oil Market Report*, December 2018.

This approach has been employed without change by oil market observers since the end of World War II. Initially, such balances were used by the Texas Railroad Commission (Texas RRC) to determine the state’s crude oil output and then assign quotas to producers. The monthly forecasts came from the oil companies and estimated, among other things, consumption and supply for the nation as a whole. Based on these numbers, the commissioners adjusted output quotas to keep inventories from becoming excessive or tight.¹

The Texas RRC achieved its goal of stabilizing prices for more than twenty years. Production “allowables” or quotas were altered to maintain market balance. Prices were stable. In addition, an import quota program introduced by the Eisenhower administration prevented lower-priced crude from flooding the United States and driving prices down.²

The *Oil & Gas Journal* institutionalized the supply/demand projection process before 1970 in its biannual “Forecast Review.” Twice a year, *OGJ* would publish its estimates of supply/demand balances. While the basis for the calculations was never cited, the published reviews suggested that oil companies had a large input.

Government officials, consultants, investment banks, and companies have been preparing supply/demand balances since 1973. Today, near the beginning of 2019, the process is little

¹ M.A. Adelman, *The World Petroleum Market (Baltimore, MD: Resources for the Future by Johns Hopkins University Press, 1972), p.151.*

² Douglas Bohi and Milton Russell, *Limiting Oil Imports (Washington, DC: Resources for the Future by Johns Hopkins University Press, 1978).*

different. Once a month, for example, the IEA, the US Energy Information Administration, and OPEC release their supply/demand estimates. Invariably, these projections are close to each other, as Table 2 illustrates.

There are key differences, however, between the projections filed in the 1950s with the Texas RRC and those published today. First, the early forecasts were based on very simple methodologies. In contrast, today's forecasts are generated by detailed, complicated models.

Second, forecasts produced forty or fifty years ago were not transparent. The details of the methodologies and even the projections were not disclosed. Today, the specifics of forecasting methods are available to anyone interested.

Third, the information provided in forecasts prepared fifty years ago was used successfully to keep oil markets calm and steady as regulators, particularly in the United States, adjusted production based on them. In contrast, the forecasts today are not useful with regard to smoothing or governing prices because traditional forecasts can be and have been extremely inaccurate. For example, in early October 2018, the EIA's monthly forecast projected an average WTI price in December of \$72 per barrel and an average Brent price of \$79. Right now, WTI will average \$52 in December and Brent \$60. The forecast errors of roughly twenty-five percent lead one to ask, "Why bother?"

Regarding forecast accuracy today, however, an examination of the "supply/demand" balances used in the mid-October forecasts reveals no substantial mistakes. The forecasters correctly estimated consumption and output, that is, there were no surprises regarding physical volumes. Still, price forecasts were wide of the mark—so wide as to ridicule the idea of forecasting. So, why have forecasts been so awful? The blame lies not with the forecasters but with the methodology.

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To be blunt, the supply/demand balance approach to assessing oil markets—and many other physical commodities—is irrelevant today. Twenty years into the twenty-first century, the traditional way of modeling commodity markets is obsolete. Those using it can be likened to

Table 2. IEA, EIA, and OPEC Supply/Demand Projections for 2018 and 2019 (Million Barrels per Day)

| | 2018 | 2019 |
|----------------------|--------|--------|
| <u>Global Demand</u> | | |
| IEA | 99.15 | 100.55 |
| EIA | 100.09 | 101.60 |
| OPEC | 98.79 | 100.08 |
| <u>Global Supply</u> | | |
| IEA | 99.16 | 100.56 |
| EIA | 100.08 | 101.60 |
| OPEC | 98.79 | 100.08 |
| <u>Call on OPEC</u> | | |
| IEA | 31.79 | 31.60 |
| EIA | 32.23 | 31.56 |
| OPEC | 32.42 | 31.44 |
| <u>OPEC NGLs</u> | | |
| IEA | 6.96 | 7.02 |
| EIA | 6.65 | 6.52 |
| OPEC | 6.34 | 6.45 |

Source: Argus Media.

professional race drivers stocking the pits for their Formula 500 cars with buggy whips instead of spare tires. Put simply, the supply/demand balance methodology is dead. It was killed by the surge in US oil production.

The rise in US crude oil output, which has more than doubled since 2008, has been widely celebrated. By some measures, oil firms in the United States now produce greater amounts of crude than producers in any other country, including Saudi Arabia. Indeed, the US energy secretary now talks of US energy “dominance.”

What many ignore, however, is that the increase in US production has also raised the relevance and importance of US energy commodity markets. This has occurred because a large number of smaller firms, not the major traditional integrated companies, have accounted for the output boost. These firms are the “frackers” whose production comes from the thousands of wells drilled into key tight oil formations in the United States.

The meteoric expansion of fracking has been fueled by a continuous flow of capital from Wall Street investors. Much of the funding has been tied to the frackers’ ability to hedge against price declines. It is these hedges that have vitiated the supply/demand balance approach to gauging global oil markets. The financial firms that have helped producers hedge future production have become a source of price instability, a force large enough to overwhelm the combined attempts of Saudi Arabia and Russia, the world’s largest oil exporters, to control the price direction. Today, it is markets, not producers, that control direction. The consequence is much greater price volatility.

Here we show how the market has been transformed. A situation exists today where crude oil prices must be low or high. Using WTI as an indicator, prices must move in a range between \$40 and \$45 per barrel or be \$60 or higher.³ When in the \$45-\$60 range, prices must swing wildly because computers at the firms that have sold hedges to producers will buy and sell with every uptick or downtick in prices.

The data today (and we emphasize that these results are data dependent) indicate that when WTI prices fall between \$45 and \$60 per barrel, they are unlikely to stay in that range for long. Similarly, Dated Brent prices cannot remain between \$58 and \$68 per barrel for any extended time.

The \$45 to \$60-per-barrel range for WTI is an “excluded” range, or “range of instability,” because US frackers have hedged more than five hundred million barrels of oil—almost sixteen days of OPEC supply—within this range. The parties writing the hedges must buy or sell crude aggressively when prices are in it, a condition that creates significant volatility.

The data demonstrate the price instability that exists in this range. Figure 1 (page 4) compares the movement of the CBOE index of oil price volatility to oil prices. Note the much greater dispersion of observations between \$44 and \$60 per barrel.

The data reveal an area of price instability around \$45 per barrel for WTI because some producers, doubting that prices would ever drop so low, have sold puts at that level to reduce

³ We use WTI prices because they are the relevant price for those who hedge.

hedging costs. On December 24, 2018, they were taught an expensive lesson: prices can and do fall below \$45 per barrel or any other floor from time to time.

The econometric test described in the “Modeling the Impact” section below (page 18) validates the enormous influence of hedging on oil prices. Recent movements cannot be explained by the excellent econometric models developed by entities

such as the Federal Reserve or researchers such as Kilian and Baumeister. These models are constructed using traditional specifications in which consumption, production, and stock changes determine prices. The models ignore the fact that financial markets, in effect, can increase or decrease global production by ten percent for periods of up to ten months.

While some will claim that this “production” comprises “paper barrels,” such barrels can and have had the same impact on oil prices as physical barrels. The econometric research presented here strongly validates this conclusion, as do the harsh lessons taught to disbelievers during the last quarter of 2018.

Oil-exporting countries, were they interested and resourceful, could moderate price volatility. However, to do so they must radically alter their approach. In effect, producers must be willing to buy back their production instantaneously when prices begin to fall. They can do this by purchasing oil in the futures or forward markets. Income from their oil exports would increase substantially if they did this.

Oil prices will continue to be volatile if such steps are not taken. Press conferences that produce bold pronouncements or complaints regarding price volatility will not be effective. Markets have changed. The buggy-whip approach applied for so many years by forecasters has failed. For better or worse, prices will be driven by the hedging process whenever WTI dips below \$60 per barrel or Brent falls below \$70. At such levels, it is the computers, not oil ministers, pundits, or politicians, that determine day-to-day price movements.

