

Oil Prices

Searching for an explanation

By John Robertson

Reading time: 4-8 mins

Higher oil prices can be viewed as a response to refining capacity shortages, rather than the result of insufficient natural resources.

The aim

Every day, we see commentaries about the oil price which are events-focused: what happened in markets last night; a change in an analyst's view; or discussions about the domestic political implications of price rises.

Generally absent from these commentaries is any consistent framework which helps explain why oil prices might be where they are and why they might be different (or the same) in the future.

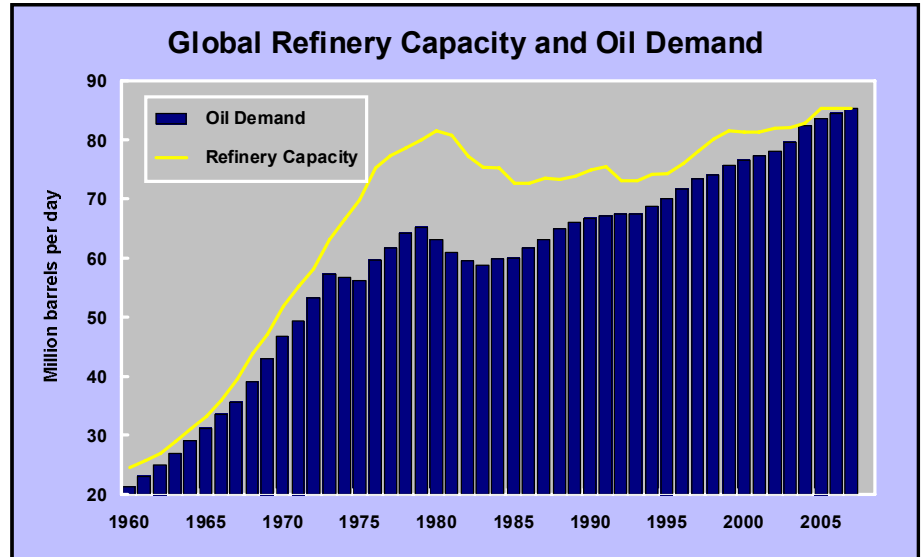
This is not a straightforward task, but, as advisers, we need a framework to help convey an understanding of events to our clients. Otherwise, we might as well just tell them to read the daily newspapers for their advice.

The aim of these notes is to offer an historical perspective¹ on oil market adjustments and, in doing that, suggest a framework advisers might like to use to draw their own conclusions about the likely trajectory of prices in the future.

Historical context

The **first chart** shows annual global oil demand since 1960 in the blue bars and global refining capacity for each year over the same time period in the yellow line. There are several observations which can be made from these two series:

- ▼ Oil usage grew quickly between 1960 and 1973 at an average pace of 7.9% a year.
- ▼ Refining capacity expansion during the 1960s largely reflected the growth in demand.
- ▼ There was no significant growth in usage between 1973 and 1983. This coincided with two oil price shocks and below average global growth.



- ▼ The momentum in refinery construction could not be stalled quickly enough in response to changed conditions in the early 1970s, carrying the industry well past the refining space it needed by 1980.
- ▼ Capacity building effectively ceased for more than a decade after 1980, allowing demand to catch up to operating rates.
- ▼ The gradual expansion of capacity which resumed in the mid-1990s was not sustained for long and proved insufficient to meet the world's needs over the past four years.
- ▼ Today, there is virtually no gap between refining capacity and the oil supplies being demanded.

Why worry about history?

Having this historical perspective is particularly important because the longer the spread of data the more information we have to underpin our analysis. That should make our conclusions applicable to a broader range of circumstances.

Despite these benefits, analysts are surprisingly reluctant to embrace such a sizeable chunk of history when trying to make judgments about the future. Too often, an outlook is simply an extrapolation of the most recent series of events.

One conspicuous example of this analytical reluctance was evident in a recently issued report by a well-known independent valuation firm.

The valuation needed a 15 year projection of commodity prices. In seeking out *history* to validate the projections, this valuer used data from 2006 to 2008.

This is not only an absurdly short period from which to draw generalisations about the succeeding two decades, but coincides with a part of the price cycle which is almost certainly unrepresentative. The commercial conclusions were correspondingly suspect notwithstanding the valuer being legally entitled to refer to himself as an expert.

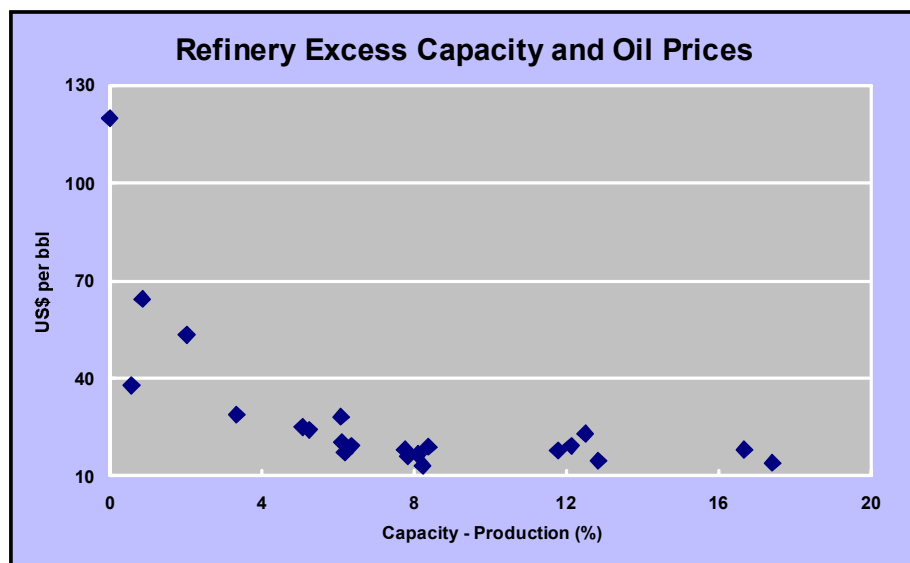
Connection with prices

Analytically, the history outlined above is interesting because of the link between excess refining capacity (i.e. the difference between refining capacity and consumption) and petroleum prices.

The **second chart** (next page) highlights this relationship. It shows oil prices on the vertical axis and excess capacity over the past 20 years on the horizontal axis.

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There are two aspects of this chart which are analytically important:

1. the price-capacity reaction curve is nonlinear. This suggests that the speed of reaction to a change in capacity utilisation will vary. The responsiveness will be weak when there is significant excess capacity. It could be swift when excess capacity is low; and
2. since excess capacity is historically low presently, the market is now situated in that part of the curve in which even small adjustments to capacity can elicit large swings in price.

No doubt other factors have also influenced the precise level of prices:

- ▼ geopolitical conditions which have disrupted crude oil supplies;
- ▼ a weak US dollar has pushed prices up;
- ▼ concerns that available oil reserves have peaked, ushering in an era of oil shortage;
- ▼ supposedly, direct investment by commodity funds has also pushed up prices; and
- ▼ changes in product mix are also forcing some adjustments.

According to OPEC, distillate demand rose by 5.2 million barrels per day during 2000-2007, while gasoline consumption increased by only 2 million barrels per day and fuel oil demand declined.

However, over the same period, an additional 1.2 million barrels per day of gasoline conversion units were constructed, but only 700,000 barrels per day of distillate units. This has led to upward pressure on light crude prices.

According to OPEC's May 2008 monthly report, the spread between gasoil and gasoline in the northwest Europe market has surged, from minus \$2.41 per barrel in April 2007 to almost \$30 per barrel in April 2008, as a result of the mismatch between capacity and usage.

While there are a range of influences working at the margin, refining capacity imposes an overriding constraint on the amount of refined oil products that can reach the market.

Two ways to adjust

The framework outlined here suggests that some combination of lower demand and capacity expansions must occur for there to be any reduction in world oil prices.

a) Demand outlook

Demand is a function of economic activity, as illustrated in the **third chart** (next page). Over the past 20 years, an average GDP growth rate of 3.5% has been associated with an oil consumption growth rate of 1.5%.

The slowdown in global growth occurring in 2008 would normally lead to some slackening in the growth in demand for petroleum products.

However, no mainstream forecasters expect a repetition of the recession which occurred in the early 1980s.

Forecasters might be wrong on this point. The current economic weakness could prove more intractable than is currently anticipated and inflation more stubborn in the face of rising interest rates. There is also a risk that forecasters are too optimistic in their assumptions about the impact of high oil prices on economic activity.

Extrapolating average demand growth of 1.5%, consistent with the experience of the past 20 years, implies a need for additional supplies of 11 million barrels per day by 2015. OPEC and the US Department of Energy have both published medium-term forecasts suggesting a need for at least an additional 13 million barrels a day by 2015 and 20 million barrels a day by 2020.

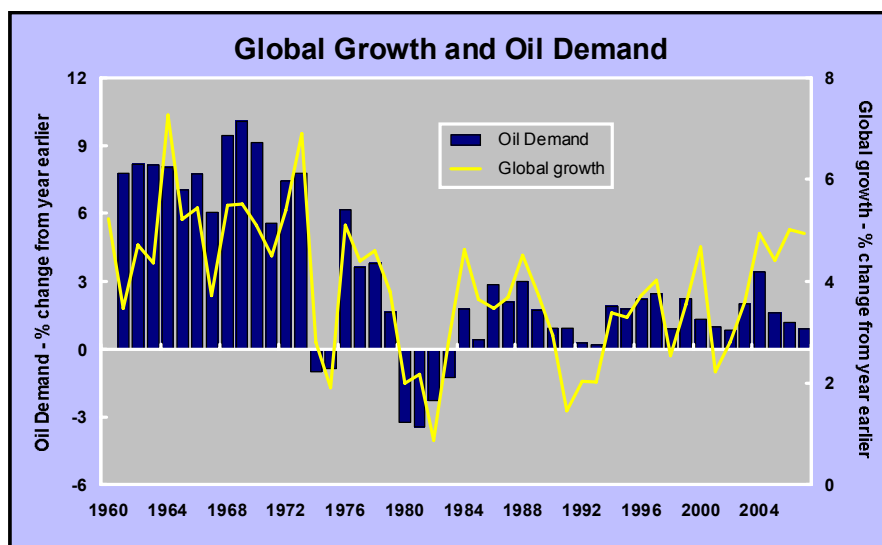
b) Investment Outlook

There is some scope for capacity creep as refiners take out bottlenecks and work plants more efficiently. However, this is likely to amount to less than 0.5% a year, still leaving us well short of what will be needed.

Changes in the location of economic activity require some modification to the location of refineries, counting against otherwise possible expansions in what are now inappropriate locations. Opportunities to expand production in Europe, for example, will come to nothing with the locus of fresh demand being in Asia.

The lead time for a major refining project could easily be four or five years, so that developments with an impact before 2012 should already be known and well advanced. The industry has more flexibility in responding to needs between 2012 and 2020.

OPEC's 2007 world oil outlook identified refining projects, including the effects of capacity creep, that are likely to add 8.5 million barrels a day to supplies by 2012. Most of these will be located in the Middle East, China and India.



This was from 14 million barrels a day of announced projects, some of which were likely to be cancelled or postponed. It identified a potential 9.2 million barrels per day by 2015. It foresaw the peak in additions occurring in 2011 when over 2.5 million barrels a day could be added.

Forecasts beyond this time horizon are more speculative. Taking the currently stated intentions of industry participants at face value, capacity constraints could be influential again after 2012, but there is time in which to adjust these intentions to increase investment.

Inferences about prices

The aim of these notes was to highlight some of the broad influences on the oil market and not offer any formal price forecasts.

The combination of the demand and supply numbers summarised above suggests some easing in the capacity constraint over the next three years. The sensitivity of prices to small supply side adjustments implied in our model suggests that prices could retrace sharply from where they are now.

However, the numbers also suggest that any respite could be short-lived.

There will be continuing upside risks for oil prices as long as there is uncertainty about the commitment of the industry to undertake enough investment to meet its additional needs, especially among the Asian region economies.

Policy complications

Any investment shortfall will not be good for the welfare of the oil industry or the economic welfare of oil consuming nations.

From a policy standpoint, the issue which should be most preoccupying governments of consuming and producing nations alike, is how to ensure, over the coming six to ten years, that the industry is committed to building the refining capacity which will be needed. More than US\$220 billion, at current prices, will probably be needed for new capacity up to 2020, with at least that amount again needed for ongoing replacement.

This might have once been a straightforward investment proposition, based on expected growth in demand. However, it became a more complicated strategic problem once governments committed themselves to find energy substitutes to counter global warming, actions which risk eroding the financial returns of petroleum refiners.

Nonetheless, markets should help. Rates of return on capacity investments should have risen enough to spur the necessary spending. Sharply rising capital costs and shortages of technically skilled operators risk delaying the industry's responses to these more favourable investment conditions, but there seems to be adequate time and resources to ensure that enough capacity will be installed to match the likely longer term growth in demand.

Conclusions

In summary, the price-capacity analysis offers some insights into why oil prices have reacted as they have in recent years and offers a framework from which inferences can be drawn about the future as more evidence accumulates about economic conditions and the industry's likely investment programme.

An oversupply of capacity of the sort which occurred in the 1980s appears unlikely. This suggests a lengthy period of close to balanced conditions.

According to our framework, finely balanced markets can be consistent with a wide range of price outcomes. Prices could easily settle back into a range of \$50-70 per barrel as the next phase of refining capacity expansion occurs. That said, any propensity for production to be lost or projects delayed could see prices sharply higher.

This will be an especially awkward time for price forecasters. High price volatility is likely to characterise the oil market. Our analysis suggests that heightened levels of volatility will only be averted with a larger investment commitment than we are currently anticipating.

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¹ The data used in the charts displayed here are from the Organization of the Petroleum Exporting Countries, the International Monetary Fund and the Energy Information Administration within the US Department of Energy.