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As gasoline demand booms, don't sleep on diesel

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In 2015, gasoline-diesel differentials favored gasoline for the first time in many years, but the longer-term future favors diesel, and meantime refiners need to be able to swing between the two.

When crude oil prices crashed in late 2014, the differential between gasoline and diesel in every market started to favor gasoline. This trend has continued through 2015 and into 2016 as low crude prices have boosted consumer demand for gasoline. At the same time, slowing economic growth in China has tempered the increase in demand for diesel (Exhibit 1).

Lower overall prices tend to drive gasoline demand because its consumption is concentrated in the more price-sensitive personal transportation market. Gasoline is also more popular in many mature markets such as North America, where energy-efficiency improvements depressed demand. These are the markets that saw the sharpest reaction to lower prices as consumers quickly shifted behaviors.

Pricing reflects refiners' operating tradeoffs

Changes in the relative pricing of gasoline and diesel reflect the economic tradeoffs faced by refiners as they try to supply the product mix the market desires. While there is a great deal of flexibility to vary the gasoline/diesel mix when designing a refinery, once built, refiners struggle to shift the balance between the two. What flexibility they do have comes at a cost in terms of yield and quality—a cost that grows quickly the further they move from the mix for which the refinery was originally designed. This explains the pricing spreads between the two products that the market sees when demand shifts toward one product or the other.

The price spread between gasoline and diesel can be thought of as having three basic states (Exhibit 2). When demand is largely in line with what refiners can most efficiently produce, the differential between gasoline and diesel is small, and in what we call the balanced state. When demand shifts toward diesel, the spread shifts to diesel at a premium; this is a diesel-maximizing state. Similarly, when the market shifts heavily toward gasoline, the spread shifts to a gasoline-maximizing state.

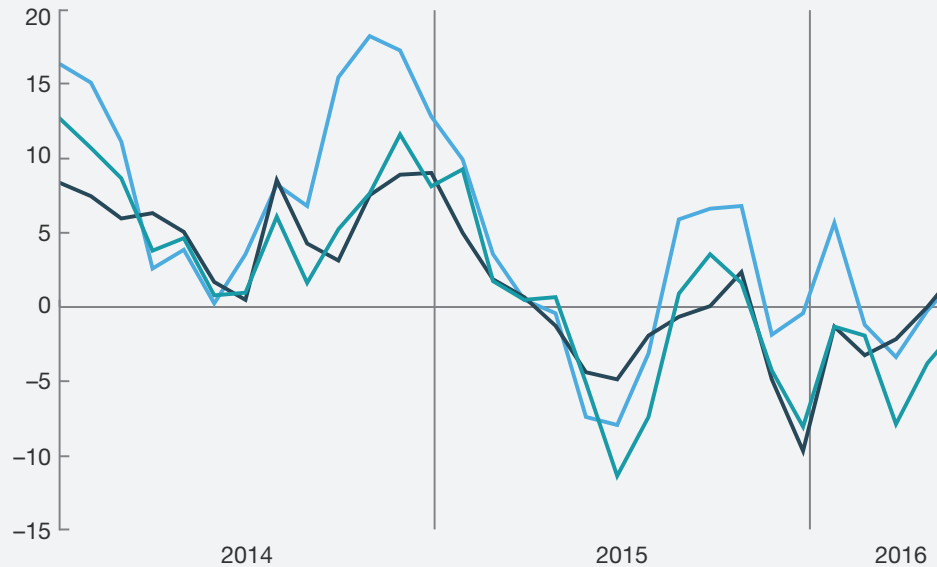
From 2010 through 2014, the market was consistently trying to maximize the production of diesel and minimize gasoline. This was driven by emerging Asian markets with a bias toward

Exhibit 1

Gasoline-diesel differentials have moved to favor gasoline in recent history.

Regional gasoline-diesel differential,¹ \$/barrel

— ULSD – Gasoline 95 NW Europe
— Diesel 50 ppm – Gasoline 92 Singapore
— ULSD – CBOB 87 USGC



¹USGC product prices adjusted for RINs.

McKinsey&Company | Source: OilDesk; Platts

commercial (trucking) and industrial demand favoring diesel fuel. Simultaneously, high prices were depressing demand for the more price-sensitive personal vehicle market that favors gasoline.

The market shift in 2015 saw a sharp swing to gasoline maximization (max) during the peak summer demand season, but since then the market has shown more of a seasonal swing back and forth between diesel-max and gasoline-max. This accords with a market that is on average well balanced, but with seasonal variations toward diesel in winter and gasoline in summer.

A shift-back to diesel maximization is coming—but not immediately

The impact on demand from lower oil prices seems to have largely played out. At the same time, slow economic growth in Asia is lowering demand, and shifting it toward a more balanced mix of diesel and gasoline. Diesel and gasoline demand seem to be growing at roughly equal rates, so for the next few years, we expect to see the market continue in a broadly balanced state, with only seasonal swings between gasoline- and diesel-max states affecting pricing.

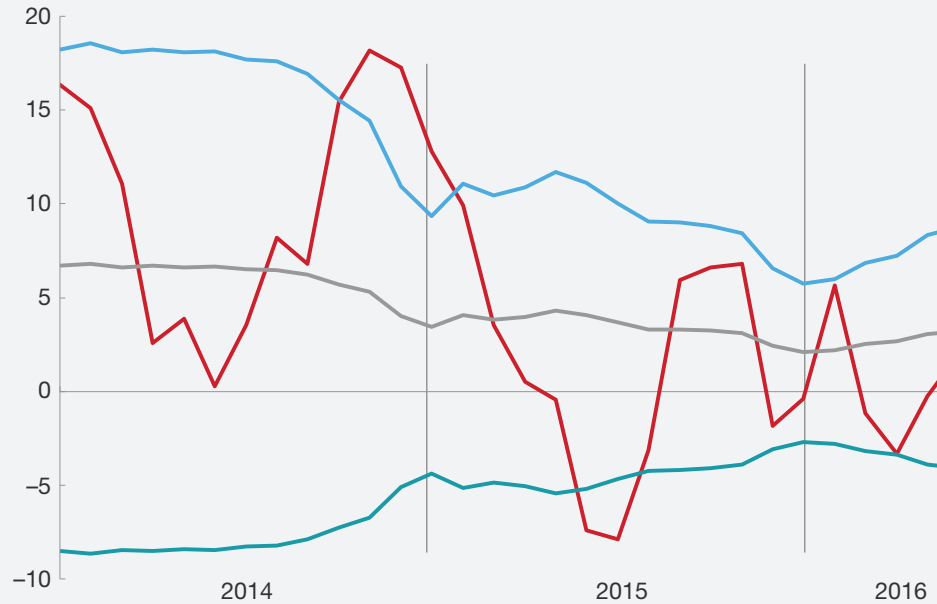
However, our long-term view is that the market will move back toward a diesel-biased world. Global demand growth will again shift toward emerging economies which tend to have a diesel bias, and efficiency standards for personal vehicles will tighten significantly in mature markets, suppressing gasoline demand. Also, post-2020, evolving quality specifications for international

Exhibit 2

Gasoline-diesel differential can be explained by three distinct modes of refinery operations.

Gasoline-diesel differential, USGC,¹ \$/barrel

— Distillate max
— Balanced
— Actual
— Gasoline max



¹ULSD – CBOB 87, adjusted for RINS.

McKinsey&Company | Source: OilDesk; Platts

marine fuels will likely drive a shift from residual fuel oil to marine diesel, significantly bumping up demand. Finally, the rate of growth for road fuels will decline but air transportation will not. The resulting relatively higher demand for jet fuel will add to diesel tightness as kerosene is a major component of both fuels.

The future for refiners

For refiners, this outlook has significant implications for both operations and capital investment.

Since 2010, refiners have invested in shifting their plants toward higher diesel yield. The payoff for many of these efforts currently looks weak, but refiners should not be too quick to undo what they have accomplished, or to abandon further opportunities. There are still likely to be diesel maximizing opportunities worth pursuing.

Even in the current more balanced market condition, the ability to swing back and forth between max diesel and max gasoline is valuable. The key is to be able to rebalance efficiently and at the right time. This places a premium on commercial and operational optimization processes that are deftly responsive to market shifts.

Fortunately, the current market state provides a wide window in which to look for the most cost-effective path forward. □

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