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Oil Analyst

Pricing Power and the OPEC Put

Daan Struyven
+1(212)357-4172 |
daan.struyven@gs.com
Goldman Sachs & Co. LLC

Yulia Zhestkova Grigsby
+1(646)446-3905 |
yulia.zhestkova@gs.com
Goldman Sachs & Co. LLC

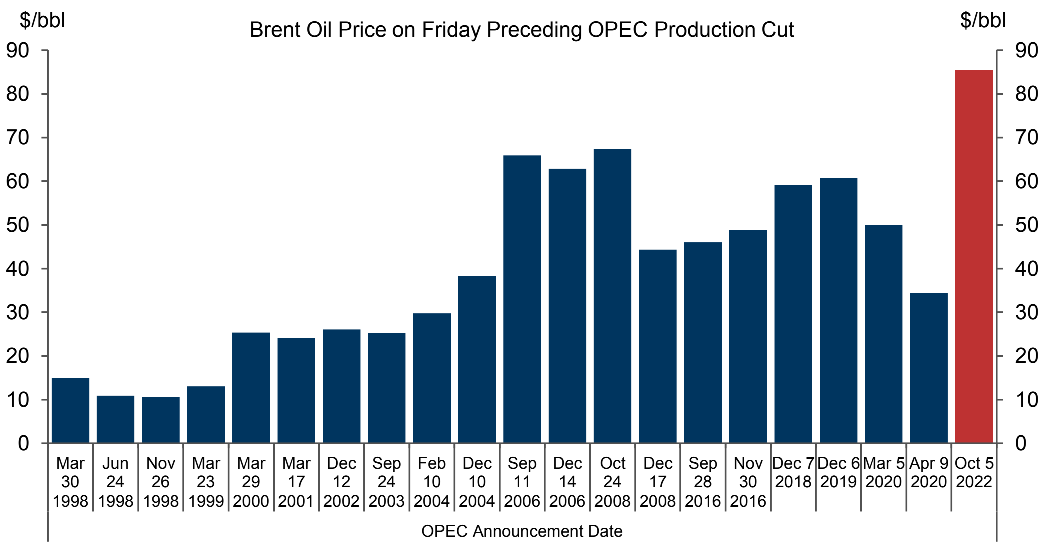
Jeffrey Currie
+44(20)7552-7410 |
jeffrey.currie@gs.com
Goldman Sachs International

- In 2022 OPEC became successfully pro-active for the first time in decades. The October OPEC cut was not only the first successful preemptive cut ahead of demand weakness, but it also occurred at an unusually high oil price level. To better understand OPEC's recent behavior and the outlook for oil prices, we analyze OPEC's pricing power—its ability to raise prices without hurting its demand too much—using two approaches.
- Our first approach analyzes high-frequency oil price moves around all OPEC production announcements of the last four decades. We find larger effects of OPEC supply news on oil prices in recent years, suggesting that OPEC pricing power is now much greater-than-usual.
- Our second approach looks at a micro economic model of OPEC as a dominant producer, and concludes that the fundamentals imply that OPEC pricing power is now larger-than-usual. First, the formation of OPEC+ has boosted the producer group's effective market share. Second, the low price elasticity of non-OPEC oil supply, including for US shale (related to financial discipline and bottlenecks), and limited spare capacity are restraining competitors' ability to offset OPEC production cuts. Third, global oil demand is now inelastic given the lack of substitutes in an energy constrained world.
- We still expect solid global oil demand growth of 2.7mb/d in 2023 (on a Q4/Q4 basis) to push the market back into deficit in H2, and raise Brent to $105/bbl by 2023Q4. This tightening should then allow OPEC to unwind its October production cut in H2. However, if the market turned out to be softer, then OPEC could stick to its October cuts or cut production even further given its significant pricing power. Overall, this "OPEC put" limits the downside risks to our bullish oil price forecast.

Pricing Power and the OPEC Put

In 2022 OPEC became successfully pro-active for the first time in decades. The October OPEC cut was not only the first successful preemptive cut ahead of demand weakness, but it also occurred at an unusually high oil price level (Exhibit 1). To better understand OPEC's recent behavior and the outlook for OPEC production and oil prices, this first *Oil Analyst* analyzes OPEC's pricing power—its ability to raise prices without hurting its demand too much— using two approaches.

Exhibit 1: OPEC Announced a Preemptive Production Cut in October at an Unusually High Oil Price



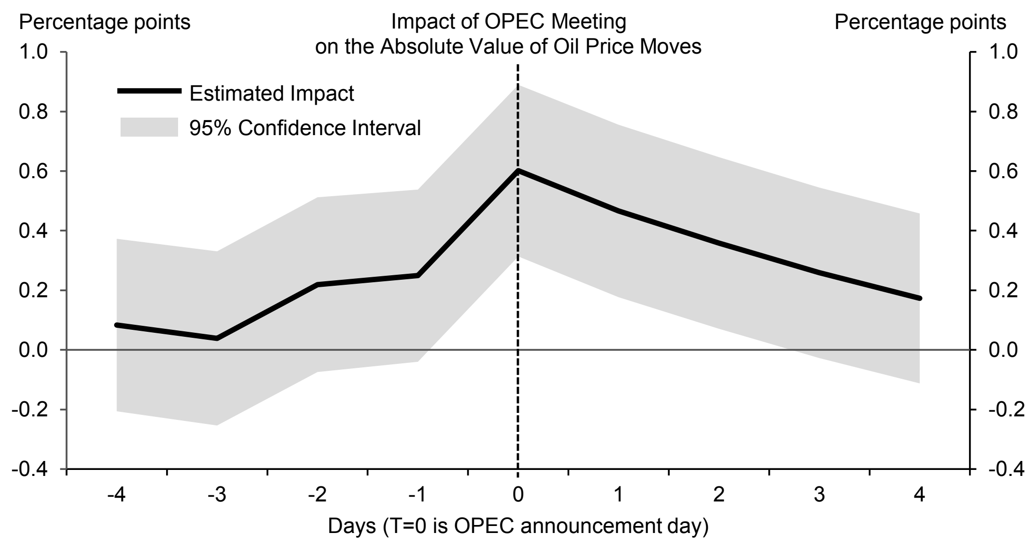
Source: Haver, Goldman Sachs Global Investment Research

Approach 1: Market-Implied Pricing Power

Our first market-implied approach analyzes oil price moves around all OPEC meeting announcements going back to the introduction of OPEC production quota in 1983. The idea is that news about OPEC production should have larger effects on oil prices when OPEC has more pricing power.

Exhibit 2 illustrates our approach. We find that oil prices tend to move around 40% (0.6pp) more at the day of announcement, averaging across all OPEC meetings from 1983 through 2022. We also find somewhat greater volatility in oil prices—measured as the absolute value of the percent move in oil prices after controlling for moves in US equities, US rates, and the dollar—in the two days following the announcement and the day preceding it.

Exhibit 2: Oil Prices Tend to Move Significantly More on the Day of OPEC Production Announcements (And the Next Two Days)



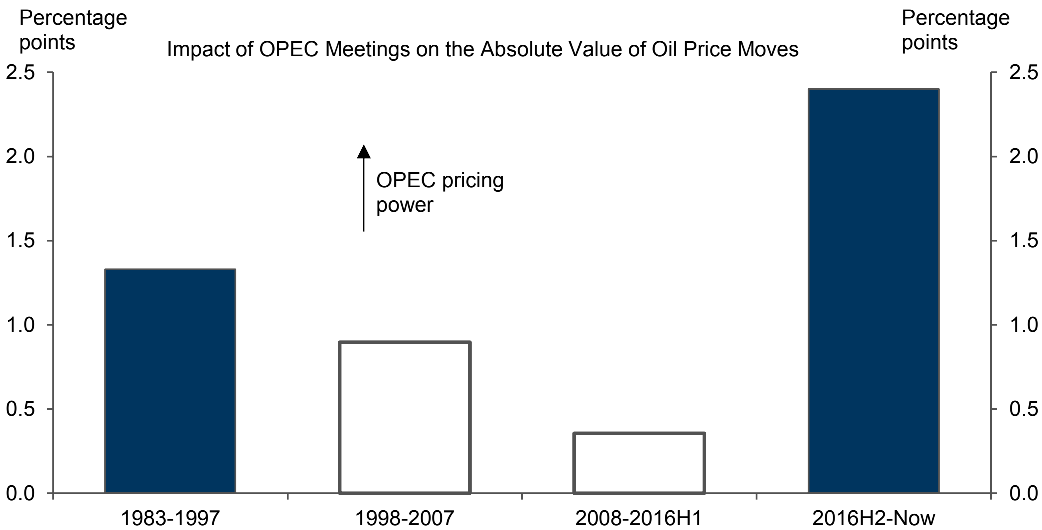
We regress the residual daily Brent oil price percent change—after controlling for daily changes in the S&P500, the Dollar TWI, and the 10-year US Treasury yield—on a constant and indicators for the time since an OPEC announcement. The chart shows the coefficient on and a 95% confidence interval around these OPEC time indicators. The sample includes 9,424 daily observations and covers OPEC meetings starting in 1983.

Source: Goldman Sachs Global Investment Research, OPEC, EIA

To assess how OPEC pricing power has changed over time, Exhibit 3 presents estimates of the average cumulative price impact of OPEC meetings over four days across subsamples.

We find that our market-based measure of OPEC pricing power is significantly greater-than-usual in our most recent 2016H2-2022 sample, which starts with the creation of OPEC+ in late 2016. In contrast, we find no significant OPEC pricing power in neither the 2008-2016H1 period of very rapid growth in US shale nor the 1998-2007 period of rapid Russian growth and limited OPEC spare capacity.

Exhibit 3: The Impact of OPEC News on Oil Prices Has Recently Been Significantly Greater-Than-Usual



We regress the absolute value of the residual daily Brent four-day cumulative percent change—after controlling for daily changes in the S&P500, the Dollar TWI, and the 10-year US treasury yield—on a constant and an indicator for whether OPEC made an announcement two trading days ago. Filled and unfilled bars show estimates significant at the 95% level and insignificant, respectively.

Source: Goldman Sachs Global Investment Research, OPEC, EIA

Our first approach suggests that OPEC pricing power is now far greater than it has been historically. This finding is robust to looking at daily moves in real dollars per barrel, not controlling for other returns, focusing on large moves (through quantile regressions), and using rolling rather than fixed samples.

Approach 2: Fundamentals of Pricing Power

Our second approach looks at the fundamental drivers of OPEC pricing power using a micro economic model of the oil market.

The oil market is neither perfectly competitive (OPEC's market share is too high) nor monopolistic because the producer group tries to anticipate the production response of non-OPEC producers when deciding on its production. Instead, the intermediate "dominant producer/competitive fringe" model best fits the oil market.

Specifically, a dominant producer (OPEC) makes production decisions based on its residual demand curve, which first "removes" the supply curve of the competitive fringe (non-OPEC). The lower the elasticity of its residual demand, the more OPEC can raise its prices without losing too much demand, and thus the more pricing power it has. The Appendix shows formally that OPEC's residual demand becomes more inelastic, i.e. that OPEC's pricing power rises with a:

1. High market share of OPEC
2. Low price elasticity of non-OPEC supply
3. Low price elasticity of global oil demand

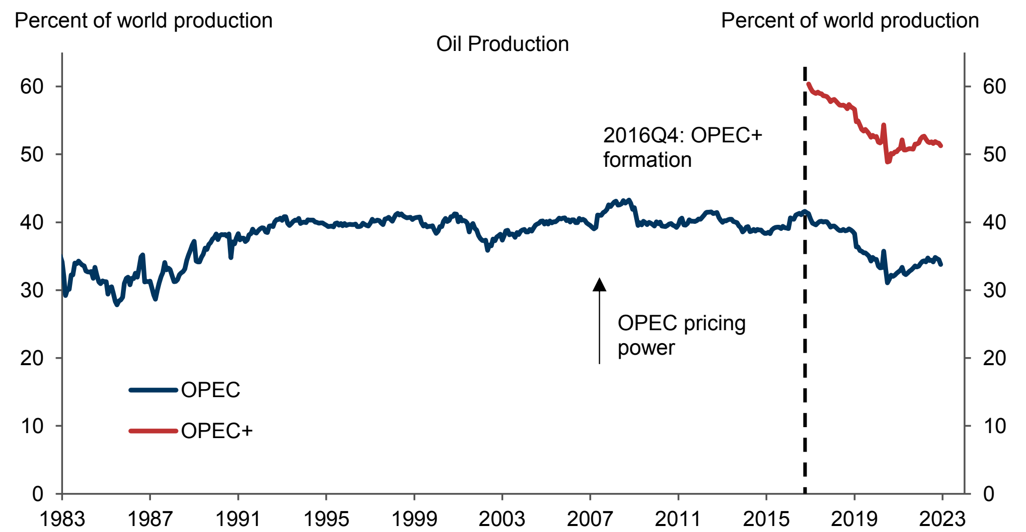
We next present evidence on each of these three drivers, which shows that OPEC pricing power is now higher-than-usual.

Factor #1: High Market Share

OPEC's market share had been remarkably stable around 40% from the early 90s until 2016. However, the formation of OPEC+ boosted the group's effective market share to around 60% when producers such as Russia, Kazakhstan, and Mexico joined the club in 2016Q4.[1] While the production share of OPEC+ has edged down since then, it remains well above OPEC's pre-2016 peak.

[1] OPEC+ includes OPEC member countries, and Azerbaijan, Bahrain, Brunei Darussalam, Kazakhstan, Malaysia, Mexico, Oman, Russia, Sudan, and South Sudan.

Exhibit 4: The Formation of OPEC+ in 2016 Boosted the Producer Group's Effective Market Share



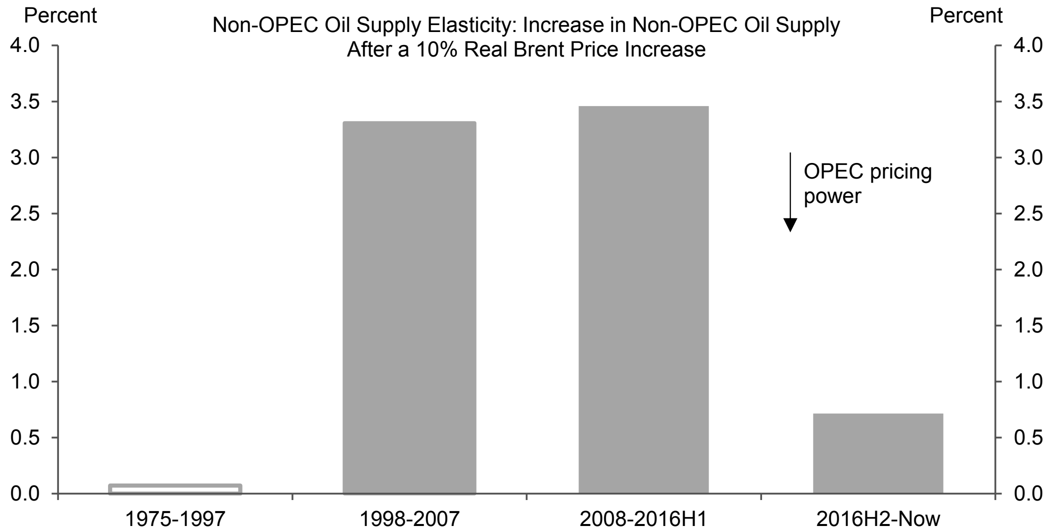
Source: IEA, EIA, Goldman Sachs Global Investment Research

Factor #2: Low Price Elasticity of Non-OPEC supply

The lower the price elasticity of non-OPEC production, the less market share OPEC loses when OPEC cuts its production, and thus the more pricing power OPEC has.

Using a model which isolates oil demand and supply shocks, we estimate that the elasticity of non-OPEC supply has dropped to a low level in the most recent 2016H2-2022 sample (Exhibit 5). In contrast, non-OPEC production was the most elastic during the US shale boom of 2008-2016H1 and the Russian oil boom of 1998-2007.

Exhibit 5: Non-OPEC Supply Has Become Less Responsive to Oil Prices



We use a two-stages least-squares (2SLS) model to estimate non-OPEC oil supply elasticities. The oil price demand shock in the first stage equates the predicted value of a regression of real oil price growth on OECD real GDP growth, US industrial production growth, and traveling services US trade volumes growth. We estimate supply elasticities in the second stage by regressing non-OPEC oil supply growth on the oil price demand shock, and controlling for oil production costs, and a dummy for the Covid shock. Filled and unfilled bars show estimates significant at the 95% level and insignificant, respectively.

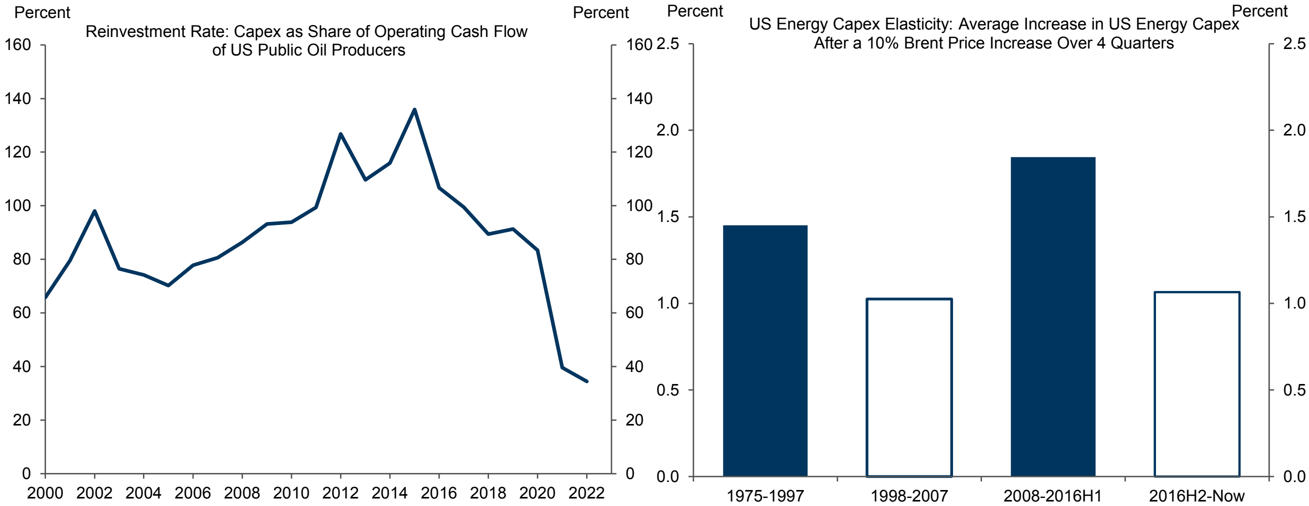
Source: Goldman Sachs Global Investment Research

Why has non-OPEC supply become so inelastic?

The key structural reason is that most non-OPEC producers are now financially very disciplined, and restrain investment even when oil prices rise. In fact, despite a 500%+ increase in oil prices from the spring of 2020 to the summer of 2022, global oil and gas capex has fallen in real terms in 2021 and 2022.

US producers are now particularly disciplined as their reinvestment rate has collapsed from above 100% to below 35% (Exhibit 6, left panel). Our regressions confirm that the price elasticity of US energy capex has fallen relative to the capex booms of the 1980s and the 2010s (Exhibit 6, right panel).

Exhibit 6: Sharp Declines in Reinvestment Rates and the Capex Response to Oil Prices

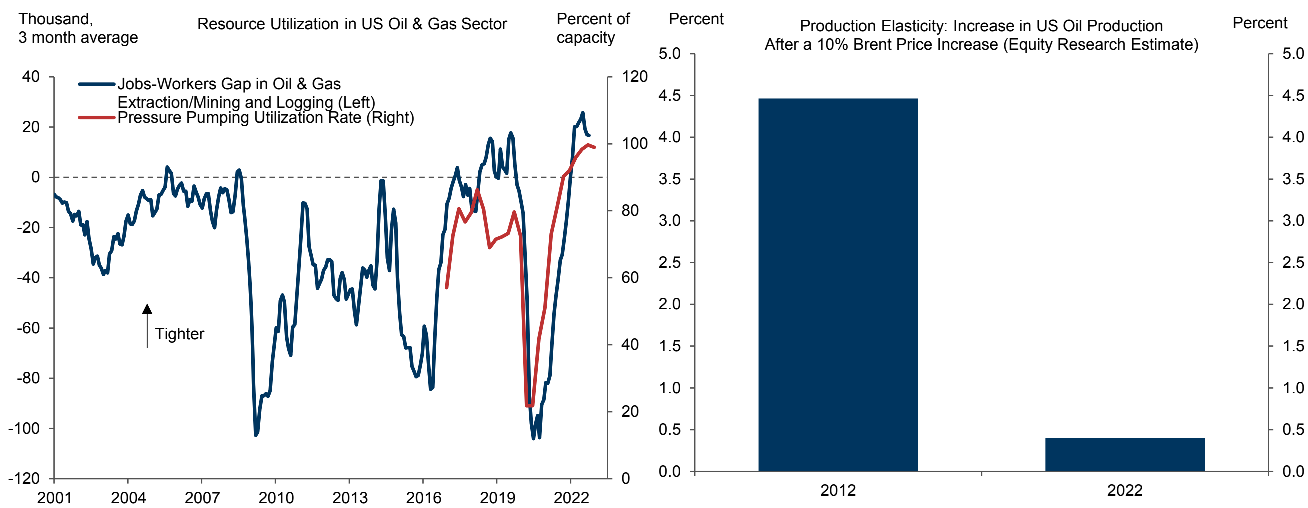


We regress quarterly growth in US energy capex on three lags of Brent oil price growth, controlling for last quarter's US consumption growth and its energy capex share in GDP. Filled and unfilled bars show estimates significant at the 95% level and insignificant, respectively.

Source: Goldman Sachs Global Investment Research

In addition to the structural shift to financial discipline, cyclical bottlenecks are further constraining US oil production. The left panel of Exhibit 7 shows that labor shortages in the US oil and gas sector—measured with our jobs-workers gap measure of excess labor demand—are severe, while existing pressure pumps operate at full capacity. Bottom-up estimates from our natural resources equity analysts tell the same story: the US production response to oil prices is much smaller than a decade ago (Exhibit 7, right panel).

Exhibit 7: Labor and Equipment Bottlenecks Have Lowered the US Production Response to Oil Prices Further



The jobs-workers gap equals the number of job openings minus the number of unemployed.

Source: Haver, Goldman Sachs Global Investment Research

Non-OPEC+ ex-US oil producers are even more constrained and suffer from very little spare capacity. We expect their production to peak in 2023Q2 before declining for multiple years. Overall, the evidence strongly supports that the fall in the elasticity of non-OPEC production has boosted OPEC's pricing power.

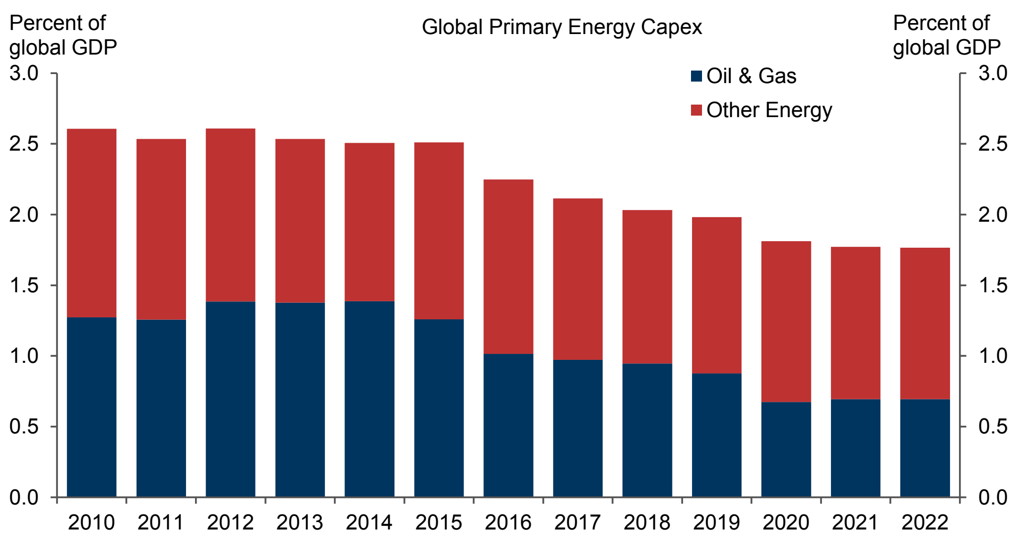
Factor #3: Low Price Elasticity of Global Oil Demand

The lower the price elasticity of global oil demand, the less demand for OPEC oil falls when it cuts production, and thus the more pricing power OPEC has.

The academic literature and our own regression analysis find hat the elasticity of global oil demand has trended down since the 80s. Key reasons include the rise in the oil demand shares of transportation fuels (for which there are few substitutes) and emerging markets (which often use subsidies to shield consumers), and the decline in energy intensity of GDP.

Global energy shortages are now likely depressing the elasticity of oil demand further, and support OPEC pricing power. Following the 40% decline in primary energy capex over the past decade (Exhibit 8), affordable alternatives to oil remain limited.

Exhibit 8: Low Energy Capex Has Led to Energy Shortages Which Support OPEC Pricing Power

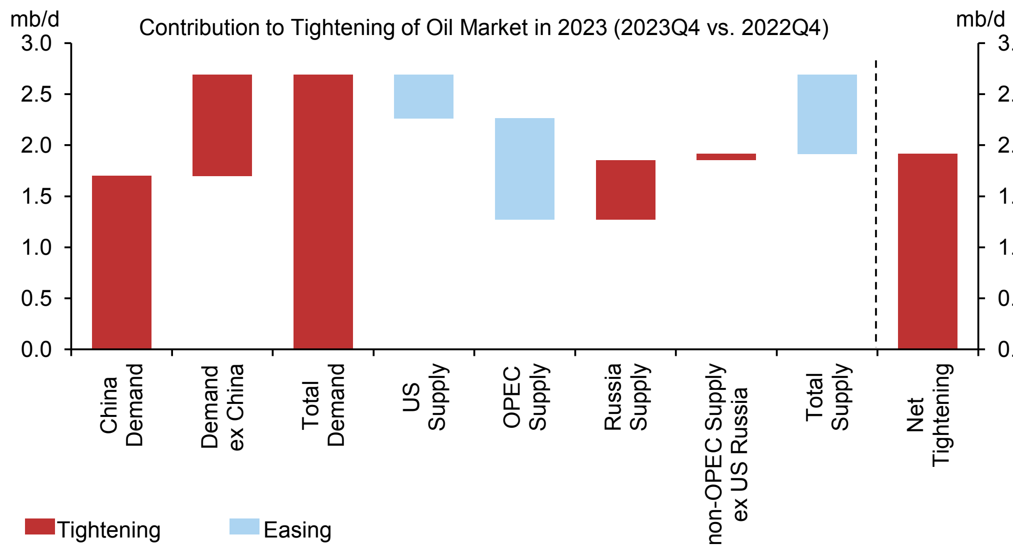


Source: Goldman Sachs Global Investment Research, IEA

The OPEC Put

We still expect that solid global oil demand growth of 2.7mb/d in 2023 (Q4/Q4)—with a major 1.7mb/d contribution from China— will push the market back into deficit from June onwards, and push Brent back up to $105/bbl by 2023Q4. We expect demand growth in 2023 (Q4/Q4) to exceed supply growth by nearly 2mb/d, and look for the oil market to shift from a 1.7mbd surplus in 2022Q4 to a 0.2mbd deficit in 2023Q4 (Exhibit 9). This tightening, in turn, should allow OPEC to start unwinding its October production cut in H2. OPEC's recent focus on remaining "proactive and pre-emptive" and its projection of a back-loaded 2.3mb/d rise in oil demand this year also suggest that OPEC is unlikely to cut production further.

Exhibit 9: We Expect the Oil Market to Tighten This Year as We Expect Demand Growth to Exceed Supply Growth by Nearly 2mb/d (Q4/Q4 Basis)



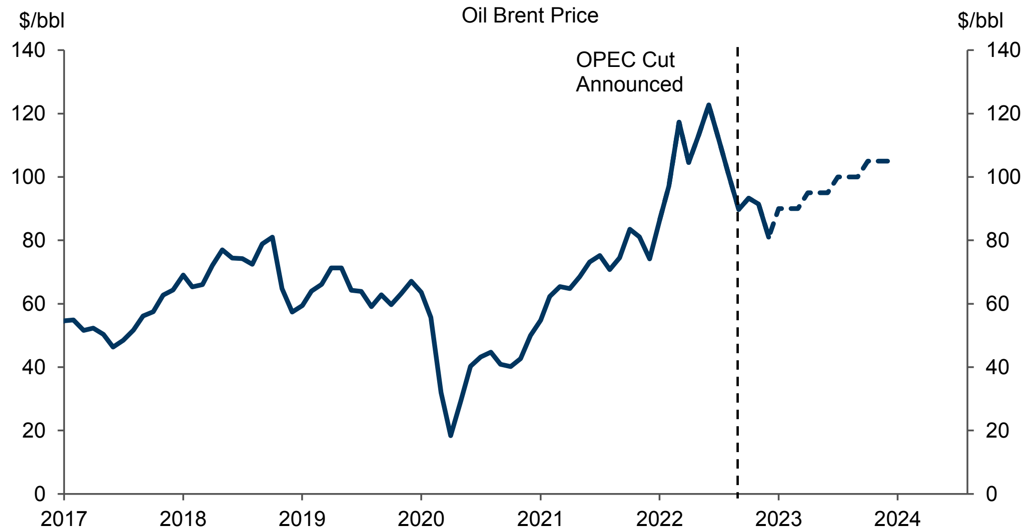
Source: IEA, JODI, National Sources, Kpler, Goldman Sachs Global Investment Research

However, if the oil market turned out to be softer, then OPEC should be able to put a floor under prices given its strong pricing power. OPEC could keep its production lower for longer beyond its June 4th meeting, or implement further cuts. The stated frustration of the producer group with the Western energy polices, including the price cap on Russian oil (and the risk it creates precedents), likely also limit OPEC's willingness to raise production.

We will be looking for any signals for another potential production cut from the February 1 Joint OPEC-Non-OPEC Ministerial Monitoring Committee (JMMC) co-chaired by Saudi Arabia and Russia.

Taken together, our market-based and fundamental approaches suggest that the pricing power of OPEC is now unusually high. We believe that this rise in OPEC pricing power has led to a "OPEC put," which limits the downside risks to our bullish Brent forecast of $90/95/100/105 for Q1/Q2/Q3/Q4 (Exhibit 10).

Exhibit 10: We Expect Brent to Rise to $105/bbl by 2023Q4



Source: Haver, Goldman Sachs Global Investment Research

Daan Struyven

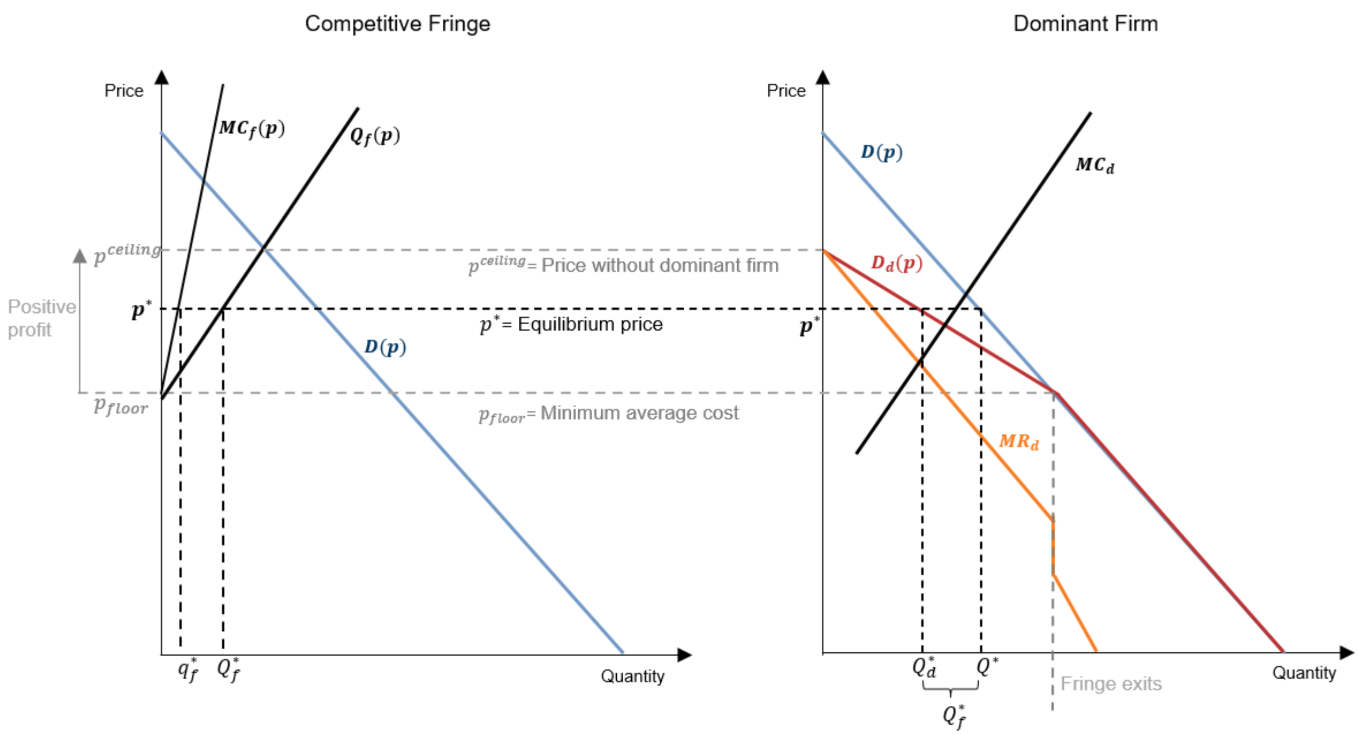
Yulia Zhestkova Grigsby

Appendix

Dominant Firm and Competitive Fringe: Market Structure and Measuring Pricing Power

We analyze the behavior of a dominant firm operating in a market with a competitive fringe of *n* firms, visualized in Exhibit 11.

Exhibit 11: Visual Analysis of a Dominant Firm and Competitive Fringe Market



Source: Goldman Sachs Global Investment Research

We start by looking at the competitive firm's production decision. A competitive-fringe firm takes prices as given and chooses output q_f based on its marginal costs curve, which is also its supply curve $MC_f(p)$. Since all competitive firms are the same, total supply of the competitive fringe equals the horizontal sum of the individual firms' supply $n*q_f(p)=Q_f(p)$.

If the fringe firm faces prices below its minimum average costs of production p_{floor}, its profits are negative, it leaves the market, and the dominant firm is a monopolist. In contrast, in the absence of a dominant firm, the fringe firms produce at the level where total demand $D(p)$ equals total supply $Q_f(p)$.

The main difference between a dominant firm and a monopolistic producer is that the dominant firm considers the production of the competitive fringe since the equilibrium price is determined by the combined output of the competitive fringe Q_f and the dominant firm Q_d. As a result, the dominant producer makes production decisions based on its residual demand curve, which first removes the supply curve of the competitive fringe

$$D_d(p) = D(p) - Q_f(p)$$

Thus, the more the competitive fringe increases its production, the less residual demand remains for the dominant firm to cover.

If the equilibrium price is too high, $p>p_{ceiling}$, then the fringe firm produces all the demanded quantities, and the dominant firm has no residual demand left. On the other hand, if the price is too low, $p<p_{floor}$, then the residual demand equals market demand as the fringe exits the market and $Q_f(p)=0$.

The dominant firm maximizes its profits by choosing an output level Q^*_d such that its marginal cost MC_d equals its marginal revenue MR_d, which is a derivative of the residual demand. Thus, the dominant firm behaves as a monopolist would with respect to its residual demand which ends up determining the equilibrium price p^*.

Since the residual demand curve is flatter than the total demand curve and hence more elastic, the equilibrium price p^* is lower than what a monopolist would charge. The higher is the elasticity of market demand, the higher is the elasticity of a residual demand, and hence the lower is the price that the dominant firm can charge. We next formally show that the elasticity of residual demand also depends on the supply elasticity of the competitive fringe and the dominant firm's market share.

From the residual demand equation above, the marginal revenue of the dominant firm is:

$$\frac{dD_d}{dp} = \frac{dD}{dp} - \frac{dQ_f}{dp}$$

which we can express in terms of elasticities by multiplying both sides by p/Q, multiplying the left-hand side by Q_d/Q_d, and the last term on the right-hand side by Q_f/Q_f:

$$\left(\frac{Q_d}{Q}\right)\varepsilon_d = \varepsilon - \left(\frac{Q_f}{Q_d}\right)\beta_f$$

$$\rightarrow \varepsilon_d = \left(\frac{Q}{Q_d}\right)\varepsilon - \left(\frac{Q_f}{Q_d}\right)\beta_f < 0$$

(where $\boldsymbol{\varepsilon}_d$ is the elasticity of the residual demand D_d that the dominant firm is facing, $\boldsymbol{\varepsilon}$ is the elasticity of total demand D, and $\boldsymbol{\beta}_f$ is the supply elasticity of the competitive fringe Q_f.)

The absolute value of the elasticity of the residual demand is higher if:

1. the supply elasticity of the fringe $\boldsymbol{\beta}_f$ is higher (where $\boldsymbol{\beta}_f>0$)
2. the absolute value of the total demand elasticity $\boldsymbol{\varepsilon}$ is higher ($\boldsymbol{\varepsilon}<0$)
3. the market share of the fringe, which is closely related to Q_f/Q_d, is higher.

Disclosure Appendix

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