Oil Analyst

Q&A on Risks to Supply in the Middle East

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- Brent crude oil prices have risen 10% to $78/bbl since Tuesday as the market reassesses the risk of disruptions to oil production in the Middle East following Tuesday's strikes on Israel. Under our assumption of no major supply disruption, we continue to expect Brent to trade in the $70-85 range, and forecast an average price of $77/bbl for 2024Q4 and $76/bbl for 2025.
- Iran crude production has risen by about 1mb/d over the past 2 years to 3.5mb/d, with a roughly equal split between domestic consumption and exports.
- High spare capacity and our historical analysis of supply disruptions strengthen our view that physical or political barriers to deploying spare capacity are the key upside tail risk to oil prices. Averaging across episodes, we estimate that the rise in combined production from Saudi Arabia and the UAE typically offsets 80% of disrupted production within 2 quarters.
- We estimate the impact of two hypothetical types of disruption scenarios:
    - Assuming a 2mb/d 6-month disruption to Iran supply, we estimate that Brent could temporarily rise to a peak of $90 if OPEC rapidly offsets the shortfall, and a 2025 peak in the mid $90s without an OPEC offset.
    - Assuming a 1mb/d persistent disruption to Iran supply, reflecting for instance a tightening in sanctions enforcement, we estimate that Brent could reach a peak in the mid $80s if OPEC gradually offsets the shortfall, and a 2025 peak in the mid $90s without an OPEC offset.

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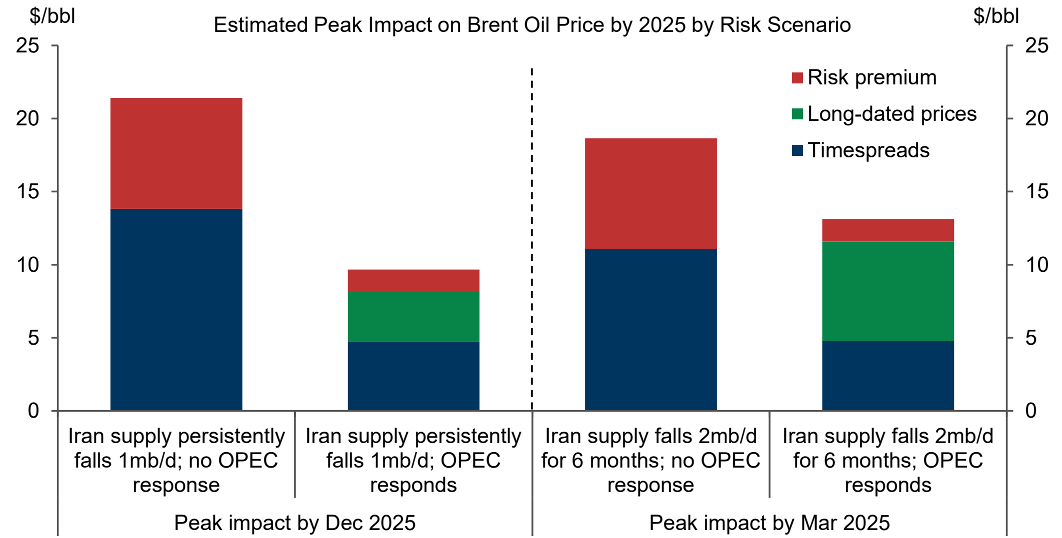
Our Risk Analysis Suggests $10-20/bbl of Upside to Our Brent Price Forecast at the Peak by 2025 From Potential Disruptions in Iranian Production



Estimated peak impact is relative to our baseline forecast with Brent crude prices at $76/bbl for the 2025 average and $74/bbl in Dec 2025.

Source: Goldman Sachs Global Investment Research

Q&A on Risks to Supply in the Middle East

Brent crude oil prices have risen 10% to $78/bbl since Iran launched its missile attack on Israel on Tuesday, leading the market to reassess the risks of an escalation in the conflict and the risks this would pose to supply in the Middle East. Uncertainty as to how the situation evolves is high, with a wide range of scenarios possible. We analyze the risks to supply in the Middle East and to oil prices.

Q0. What is your base case forecast for supply in the Middle East and for prices?

In the absence of major disruptions to oil supply in the Middle East, we continue to expect Brent to trade in the $70-85 range, and forecast an average price of $77/bbl for 2024Q4 and $76/bbl for 2025. This reflects our assumptions of roughly flat Iran supply at 3.4mb/d through 2025, and three months of OPEC+ production increases starting in December 2024.

Q1. What are the main hypothetical oil disruption scenarios in the event of an escalation in the conflict investors are focused on?

The development of the conflict and its impact on regional oil supply are highly uncertain. In the very near term, much depends on Israel's response to Tuesday's missile attack by Iran. Beyond the initial response, however, investors are focused on the risk that Israel and Iran may enter a cycle of retaliatory attacks that may escalate into a broader conflict, with possible consequences for regional oil supply.

Investors are focused on three main hypothetical scenarios:

1. **Damage to Iranian oil infrastructure:** The scope of potential damage to Iranian oil infrastructure includes downstream assets (i.e. refineries), midstream assets (i.e. pipelines and terminals), and upstream assets (i.e. production fields). We note that the impact on global energy prices would likely be more limited for damage to downstream assets than for damage to upstream or midstream assets, and that Western policymakers reportedly want to prevent a spike in global energy prices.

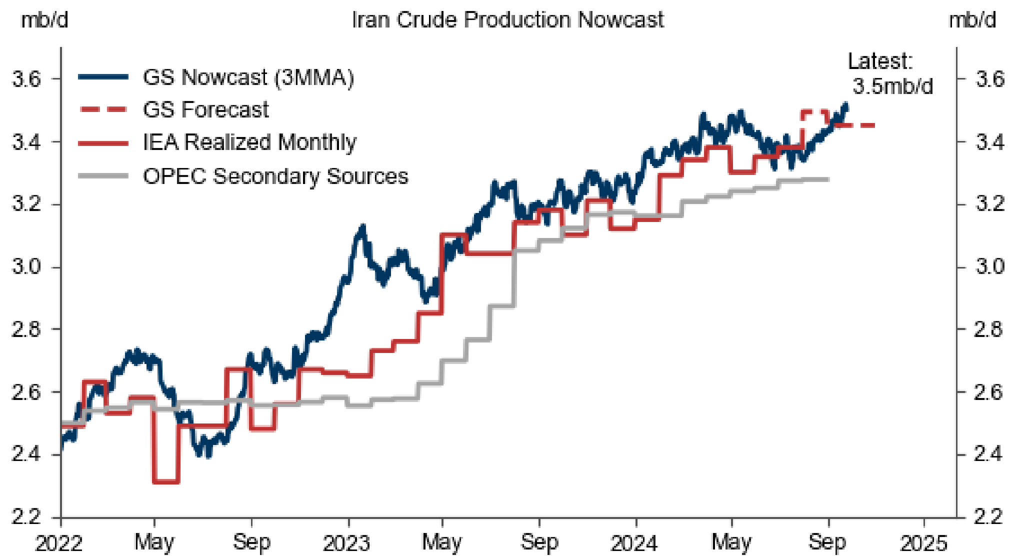
2. **Tightening in the enforcement of secondary sanctions:** Escalation may lead to a potential tightening in the enforcement of existing secondary sanctions against the importation of Iranian crude, and the potential implications for global oil supply.

3. **Broader disruption of regional oil supplies:** Investors focus on a) the risks to regional trade routes, with security concerns potentially resulting in further redirection of oil away from the Red Sea (although Red Sea flows are already depressed due to ongoing attacks by Yemen's Houthis), b) the tail scenario of attacks on regional oil infrastructure outside Iran in the event of a regional escalation, and c) the extreme tail scenario of an interruption of trade through the strait of Hormuz.

Q2. How much crude oil does Iran produce and export? And what are the largest oil assets in Iran?

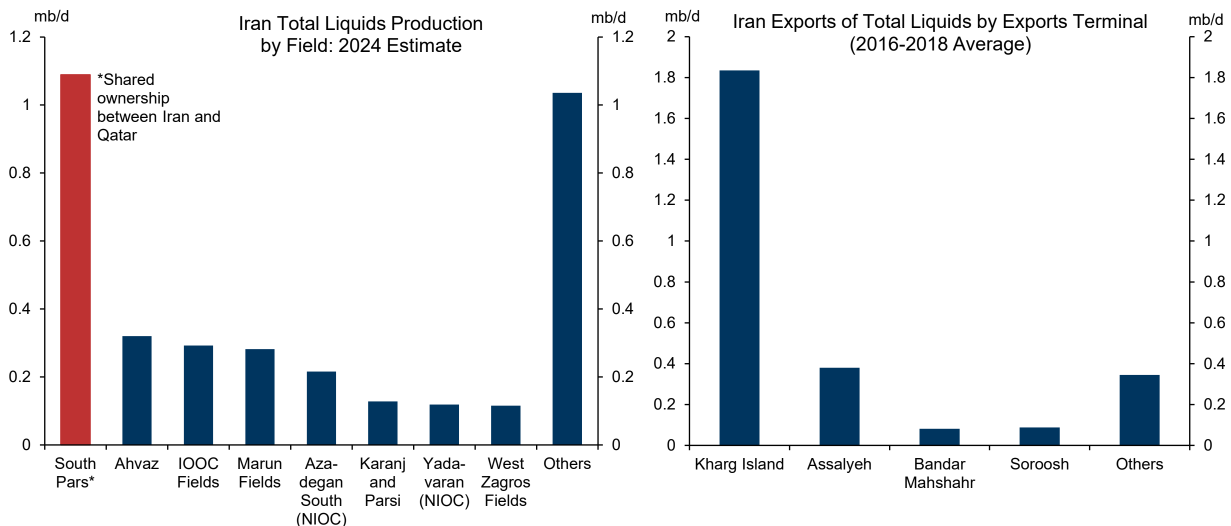
We estimate that Iran crude production has risen by about 1mb/d over the past 2 years to 3.5mb/d (Exhibit 1), and that it also produces around 0.8mb/d of condensates. The left panel of Exhibit 2 shows that Iran's oil production is quite spread out over numerous fields except for the very large South Pars field (which contributes over 1mb/d to Iran liquids production), jointly owned by Iran and Qatar (which may reduce the incentives of Iran's opponents to disrupt production).

Exhibit 1: Our Nowcast Suggests That Iran Crude Production Has Risen by About 1mb/d Over the Past 2 Years to 3.5mb/d



Source: Kpler, JODI, GTT, IEA, OPEC, Goldman Sachs Global Investment Research

Exhibit 2: The Ownership of Iran's Largest Field Is Shared with Qatar; Exports Are Highly Concentrated in the Kharg Island Terminal



Total liquids exports include crude, fuel oil, condensate, Liquefied Petroleum Gas (LPG), and clean refined products. Total liquids production include crude oil and Natural Gas Liquids (NGL

Source: Woodmac, Kpler, Goldman Sachs Global Investment Research

Iran exports nearly half of its domestic crude production (mostly to China), while condensates are largely used domestically. Iran's exports are highly concentrated in the Kharg Island export terminal (Exhibit 2, right panel). Bloomberg reports that oil vessels that were previously sitting empty at an anchorage area near Kharg Island have left the area, but that this is currently not affecting loadings.

The remaining crude oil and condensates are refined in Iran, and these refined oil products primarily service domestic consumption. S&P estimates that Iran had about 2.4mb/d of refining capacity in 2023 spread across 10 main sites, with the largest refineries in Isfahan (370kb/d), Abadan (360kb/d), and Bandar Abbas (320kb/d).

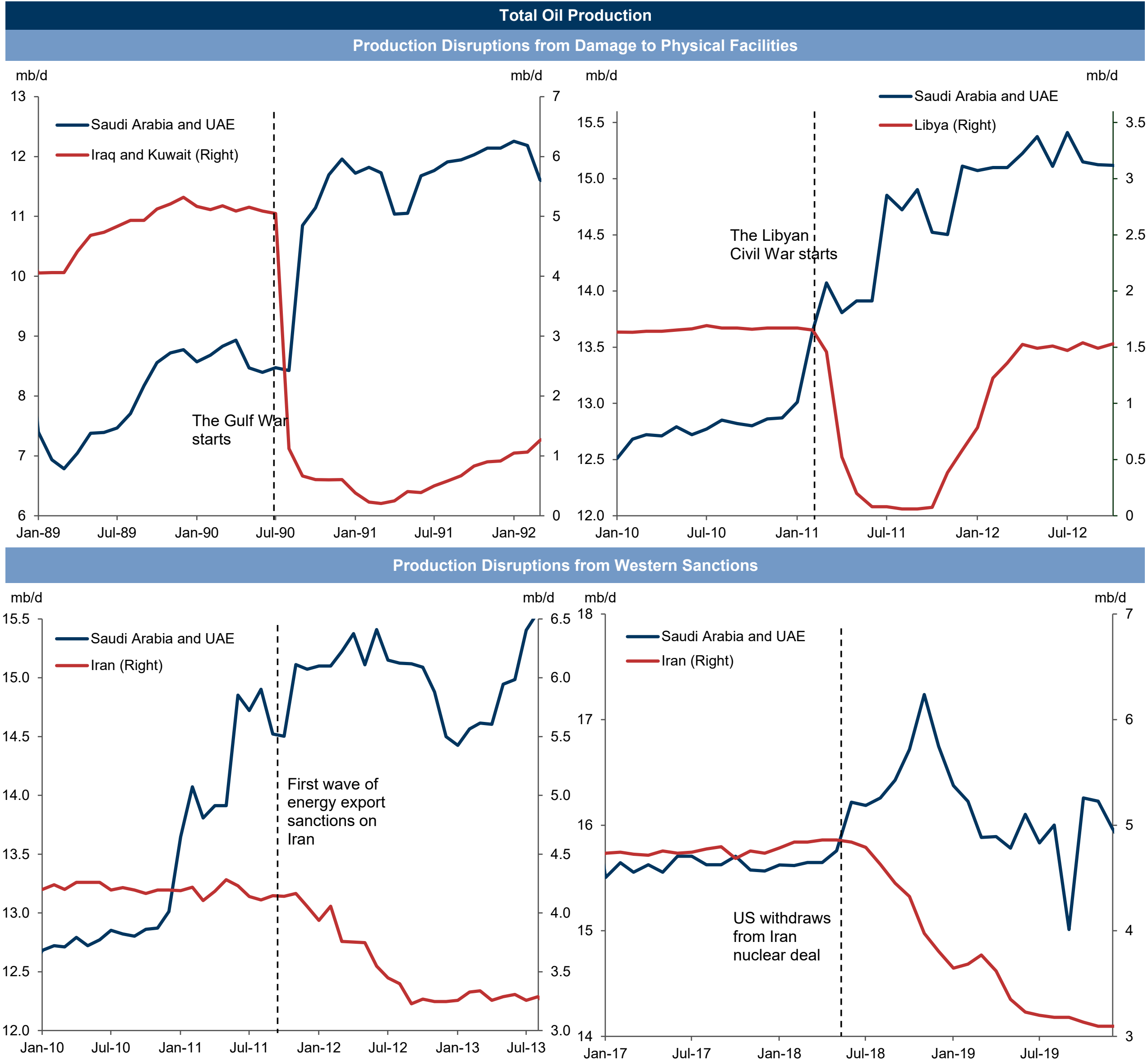
Q3. Could core OPEC+ producers step in to fill any hypothetical breach?

We've argued that high global spare capacity of over 6mb/d limits the upside to oil prices in most macroeconomic and geopolitical scenarios. But what lessons can we draw from history about the response of core OPEC+ producers to supply disruptions?

Exhibit 3 shows production in disrupted countries and in Saudi Arabia and the UAE—which together currently have about 4¼mb/d of spare capacity—during four relevant episodes. We consider two disruption episodes with damage to oil facilities (the 1990 Gulf War, and the 2010 Libyan Civil War), and two episodes where Iran production falls following stricter (enforcement of) energy sanctions.

Our study of these four events suggests that combined production from Saudi Arabia and the UAE tends to rise quickly and significantly following supply disruptions, typically offsetting 70-90% of lost production within 2 quarters. This analysis reinforces our long-held view that physical (e.g. closure of the strait of Hormuz) or political barriers to deploying spare capacity are the key upside risk to oil prices.

Exhibit 3: Saudi Arabia and UAE Production Historically Tends to Offset Most of the Disrupted Supply Within Two Quarters



Source: IEA, Goldman Sachs Global Investment Research

Q4. How would these scenarios affect oil prices?

Exhibit 4 presents our estimates of the peak impact on oil prices by 2025 of the two types of scenarios introduced above relative to our baseline forecast. The impact is the sum of the estimated impact on:

- the fair value of timespreads (i.e. spot prices minus long-dated prices) based on their negative relationship with inventories,
- long-dated oil prices based on their negative relationship with spare capacity
- the risk premium (i.e. timespreads minus the inventories-based fair value of timespreads) based on the historical distribution of risk premia (Exhibit 5)

1. Temporary 2mb/d disruption in Iran supply:

The two bars on the right of Exhibit 4 show the peak price impact of a hypothetical sudden and large 2mb/d disruption in Iran supply, which ends after 6 months (following potential physical damage to midstream or upstream assets).

In the first and most likely subscenario, other OPEC+ producers rapidly fill in the shortfall and fully offset the 2mb/d disruption within 2 quarters. Although this would leave our 2025H2 global balance unchanged vs. our baseline, we estimate a peak $13/bbl boost to oil prices in early 2025 with Brent reaching around $90/bbl in early 2025.[1] However, once the disruption ends, oil prices largely normalize as the risk premium, core OPEC+ supply, and thus spare capacity return to our base case.

In the second subscenario, other OPEC+ producers don't fill in the shortfall, and Brent ends up in the mid $90s in late 2024-early 2025, nearly $20 above our baseline. In contrast to the first subscenario, oil prices remain significantly above our no disruption baseline because the large deficits in late 2024-early 2025 leave inventories at a persistently lower level than in the absence of a disruption.

2. Persistent 1mb/d disruption in Iran supply:

The two bars on the left of Exhibit 4 show the peak price impact of a hypothetical reduction in Iran supply, which starts in November 2024 and then persists at 1mb/d (following a potential tightening in the enforcement of secondary sanctions).

In the first and more likely subscenario, other OPEC+ producers gradually fill in the shortfall by continuing their announced monthly increases through November 2025 (vs. February 2025 in our baseline). Although this would leave our 2025Q4 global balance unchanged vs. our baseline, we estimate a peak $10/bbl boost to oil prices with Brent reaching the mid $80s by mid 2025. [2]

[1] This $13/bbl boost relative to the baseline is the sum of increases in: 1) inventory-implied timespreads by $5/bbl (the late 2024-early 2025 deficit reduces inventories), 2) long-dated oil prices (reduced spare capacity boosts long-dated prices) by $7/bbl, and 3) the risk premium by $2/bbl (which moderates by early 2025 to its 60th percentile as core OPEC+ stabilizes the market).

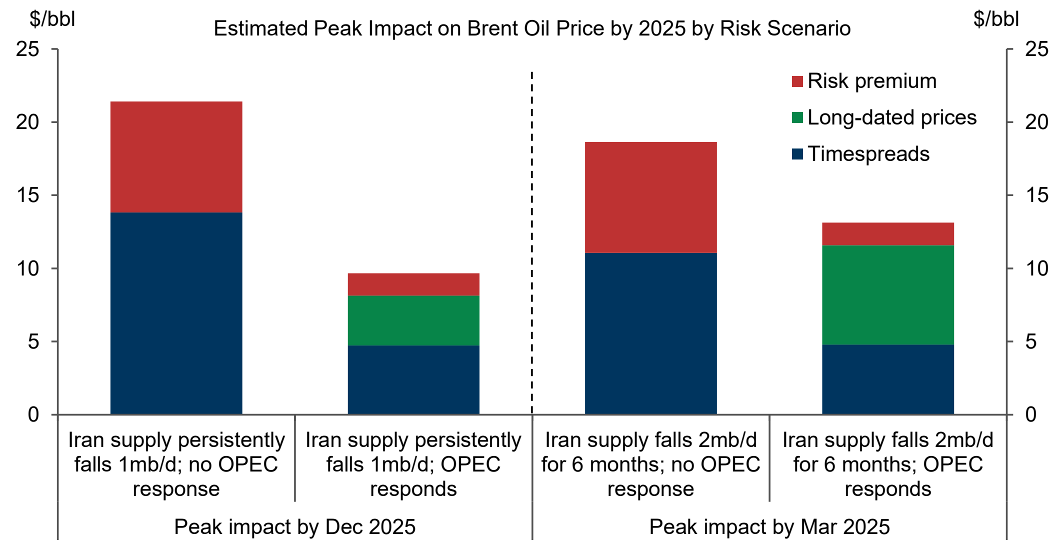
[2] This $10/bbl boost is the sum of increases in: 1) inventory-implied timespreads by $5/bbl (the late 2024-early 2025 deficit reduces inventories), 2) long-dated oil prices (reduced spare capacity boosts long-dated prices) by $3/bbl, and 3) the risk premium by $2/bbl (which we assume moderates to its 60th percentile as core OPEC+ stabilizes the market).

In the second subscenario, other OPEC+ producers don't fill in the shortfall, and Brent ends up at $95/bbl by late 2025, around $21 above our baseline.

In contrast to the temporary Iran disruption with offset, oil prices in our persistent subscenario remain at higher levels than in our baseline given lower inventories and lower spare capacity in case of the core OPEC+ offset.

For both disruption scenarios, we note that a potential reversal in currently low speculative positioning may increase upward pressure on risk premia and oil prices.

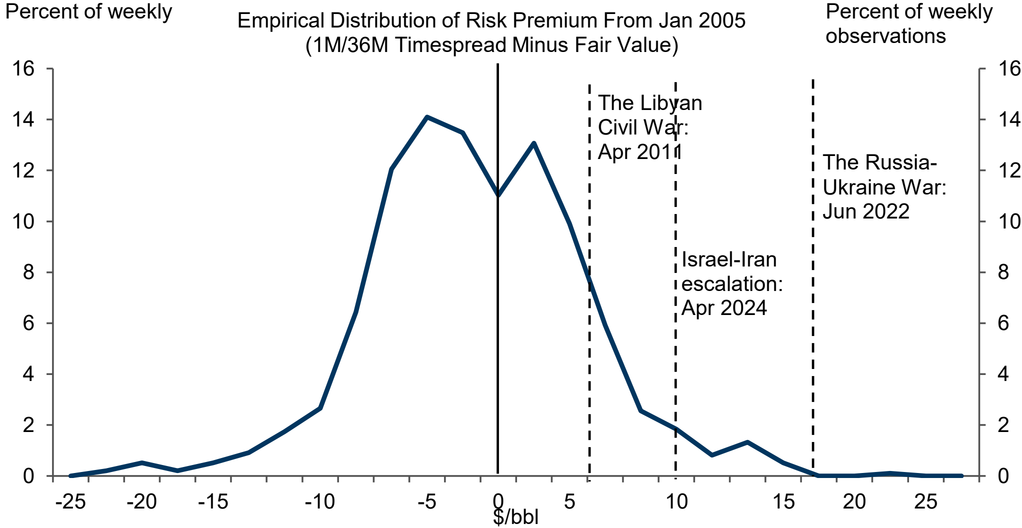
Exhibit 4: Our Risk Analysis Suggests $10-20/bbl of Upside to Brent Prices at the Peak by 2025 From Potential Disruptions in Iranian Production



Estimated peak impact is relative to our baseline forecast with Brent crude prices at $76/bbl for the 2025 average and $74/bbl in Dec 2025.

Source: Goldman Sachs Global Investment Research

Exhibit 5: Our Risk Premium Estimate Reached $10/bbl Last April After Iran's First Attack on Israel



We exclude 2020 from our estimation sample. We use a constant $70/bbl backend assumption to transform the gap between the Brent 1M/36M timespreads and its inventory-implied fair value from percentage points to $/bbl equivalent.

Source: ICE, Goldman Sachs Global Investment Research

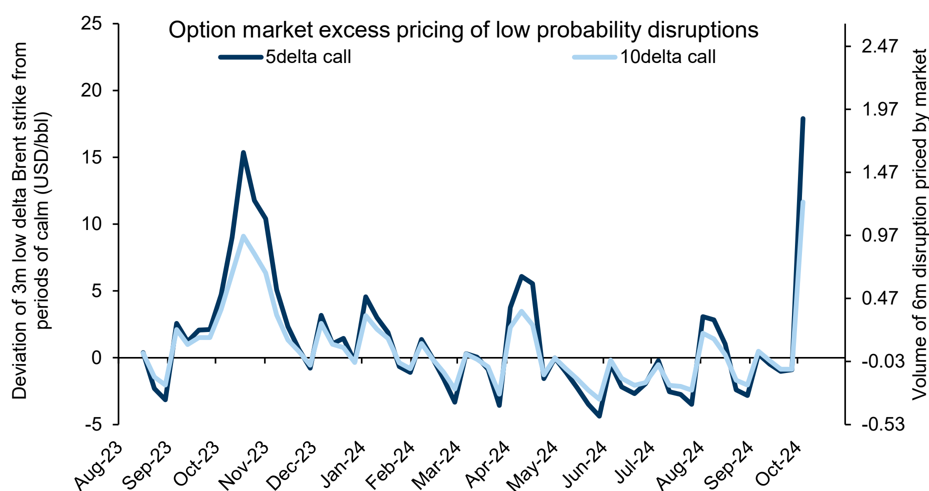
Q5. What disruption risk is the oil market currently pricing?

Brent crude has rallied $7/bbl since the start of the week, with timespreads strengthening by $4/bbl. While our modeling suggests this amounts to a high market-implied (change in the) probability (of around 2/3) of a persistent 1mb/d disruption to Iranian supply with a subsequent OPEC response (second bar in Exhibit 4), this estimate likely overstates the market's true assessment of disruption risk because initially rock bottom speculative positioning likely amplified the repricing.

However, the options market better reflects the binary nature of current events, in our view. While implied volatility has increased significantly for at-the-money options, it has jumped towards all-time highs for far out-of-the-money (i.e. low delta) options capturing tail events.

We show in Exhibit 6 that options markets are pricing in a roughly 5% probability of a $20/bbl price jump, which we estimate roughly corresponds to a 2mb/d 6-month interruption without an OPEC offset (third bar in Exhibit 4), occurring within the next month. This week's repricing in these 5-delta call is roughly 30% larger than at the peak in October 2023.

Exhibit 6: Option Markets Price in a Roughly 5% Probability of a $20/bbl Oil Price Jump in the Next Month



Source: Goldman Sachs Global Investment Research, ICE

Q6. How do you see secondary impacts on refined product and tanker freight markets?

Iran is self-sufficient for refined products such as gasoline, diesel and jet fuel. Iran exports 0.2mb/d of residual fuel oil largely to the Fujairah bunker market (UAE) and exports 0.3mb/d of propane largely to China.

The secondary impacts on tanker freight rates and refined product margins are quite complex given potentially offsetting forces.

For freight, a rise in precautionary restocking demand could boost oil tanker freight rates. Indeed, our global index of dirty (i.e. mostly crude) tanker freight rates has already

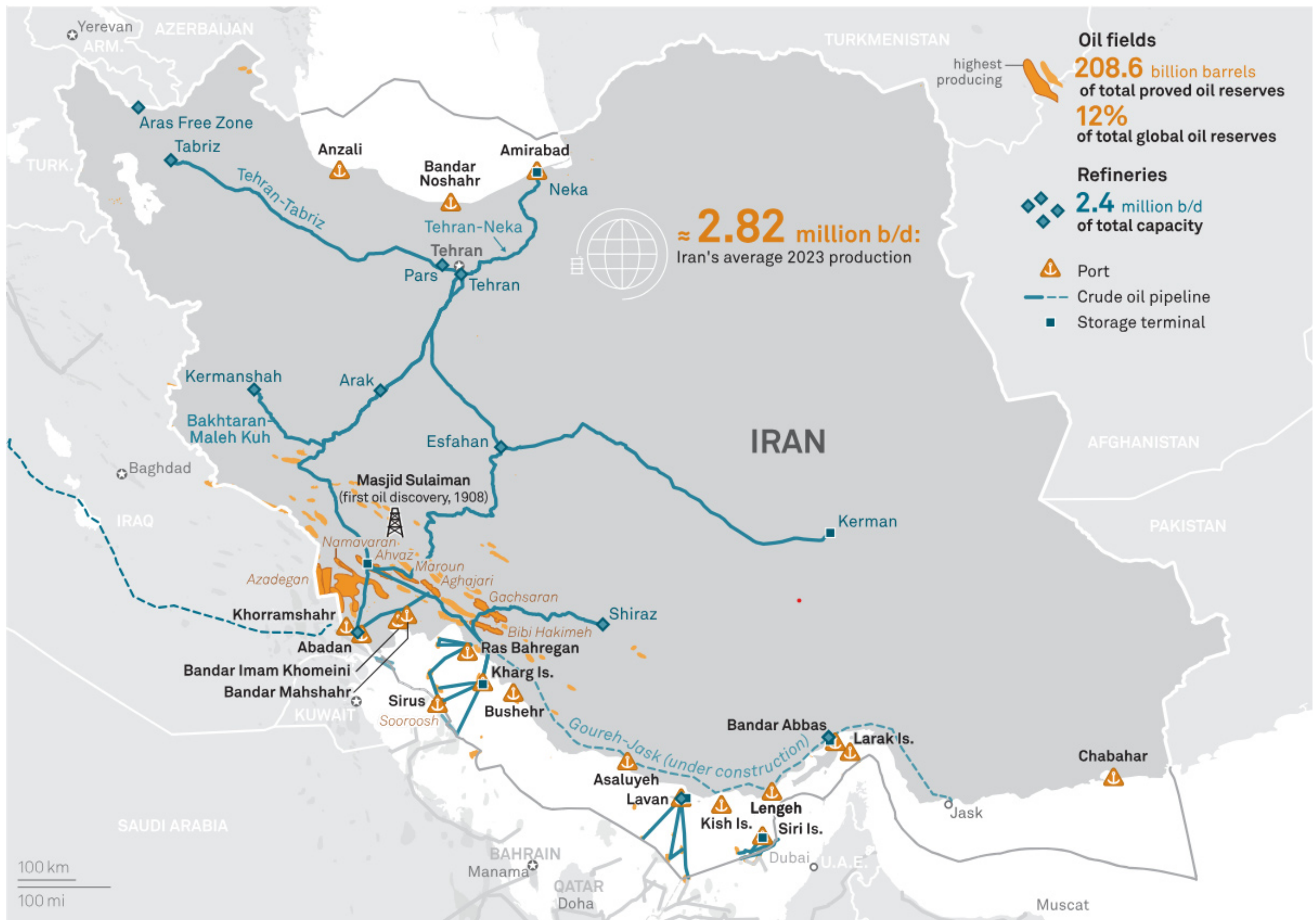
rallied $0.9/bbl (37%) this week. Surprisingly, our global index of clean product tanker rates remains stable at relatively low levels. Similarly, a larger redirection of remaining barrels away from the Red Sea could also significantly tighten tanker markets by increasing the demand for tanker tonne-miles. However, if escalation would significantly reduce regional exports, then a fall in tanker demand may lead to a fall in tanker freight rates once the initial precautionary restocking demand subsides.

For refined products, clean product margins for gasoline and middle distillates (diesels/gas oils, jet fuel/kerosene) in the net importing regions of North Western Europe (ARA) and NY Harbour should increase with clean tanker freight rates, but the impact on freight rates is ambiguous. Refining margins could also expand in the initial reaction because of lower liquidity in refined products versus crude markets. However, refining margins could also compress as crude input costs jump in the case of a large crude supply disruption.

The clearest positive price impact in the case of escalation for refined products may be in propane markets given Iran's 0.3mb/d of propane exports. The price of Natural Gas Liquids (NGL) as a share of crude prices has risen around historical Iranian disruptions, despite higher crude flat prices, although this eventually reversed.

Appendix: Map of Iran Oil Infrastructure

Exhibit 7: Iran Oil Infrastructure



Source: Platts

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