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Oil

China concerns another speed bump on the road higher

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- Over the last ten years, Brent prices have averaged a c.10% drawdown in November, in what has practically become a Thanksgiving tradition. While it's tempting to blame a lack of liquidity for another capitulation, we believe the market is right to be anxious about forward fundamentals, due to significant Covid cases in China and a lack of clarity on the implementation of the G7's price cap.
- While confidence remains high in a 2Q23 China reopening and the structural bullish underinvestment thesis, the path between now and next spring remains highly uncertain. China's Covid cases are at Apr-22 highs, yet, the new policy reaction function is unknown. However, the logic of exponential virus spread, means further lockdowns will likely be required, if full reopening is not feasible. Therefore, we cautiously lower our expectations for China demand by 1.2 mb/d in 4Q22, equivalent to the effective cut recently implemented by OPEC+, the group's first successful preemptive curtailment.
- Meanwhile, Russia oil export flows are being maintained at elevated levels as inventories are drained ahead of the imminent implementation of the EU crude embargo. Consequently, we expect a lagged impact of the embargo on production, raising our expectations by c.0.3 mb/d over 4Q22.
- The net impact is a c.1.5 mb/d loosening of 4Q22 balances, lowering our 4Q22 Brent forecasts by $10/bbl, to $100/bbl. Markets have instead priced a c.2 mb/d softening over the next 3 months, as these fundamental developments occurred during a seasonally low liquidity period, with discretionary positioning at post-pandemic highs, activating CTA sell triggers, exacerbating the move lower.
- WTI has notably underperformed, with prompt spreads plunging into contango, as the grade suffered from a unique combination of factors: (1) a disruption to a USGC pipeline; (2) soaring dirty tanker rates; and (3) quality concerns causing WTI to discount sequentially by c.$5/bbl+ from similar grades.
- Until broader macro stability is able to generate an increase in passive flows, the burden of proof remains on fundamentals. To that end, it's crucial to monitor both Russia's export flows, as well as China's pandemic response in the coming weeks. For longer-term investors, the current sell-off provides an opportunity to add length on yet another speed bump that will come to pass. From a tactical perspective, uncertainties abound, while discretionary positioning is still long and

CTAs flows will be selling, leaving risks skewed lower in the near-term.

China concerns another speed bump on the road higher

The last five years have provided us with four memorable oil sell-offs in the month of November. Over the last ten years - excluding 2020 - Brent prices have averaged a c.10% drawdown over the course of the month (Exhibit 1). While it's tempting to blame a lack of liquidity for yet another November price capitulation, we believe the market has a right to be anxious about forward fundamentals, even if technical factors may have exacerbated the move lower.

Top of mind is China demand, ironic given the recent signals regarding reopening. However, in line with our economists' expectations, we expect the recent moves to merely signal the beginning of a multi-month preparation process. Although some easing of restrictions is apparent at the margin, the logical conclusion of the exponential growth inherent in virus spread means that any new, higher threshold of virus tolerance is likely to be breached eventually anyway, as long as full reopening is not yet ready for implementation. National caseloads are now at levels last seen during the highs of Apr-22 lockdowns, when oil demand fell c.2 mb/d YoY. To that end, with China demand currently missing our Oct-Nov expectations by c.0.8 mb/ already, we lower our expectations for China demand by 1.2 mb/d for the quarter (to 14.0 mb/d), anticipating further lockdowns from here (currently c.14.5 mb/d). This is equivalent to the effective production cut recently implemented by OPEC+, the first such instance of the group successfully anticipating demand weakness and taking a preventative action.

Meanwhile, Russia oil export flows are being maintained at elevated levels despite the imminent implementation of the EU embargo on crude oil (loading deadline is December 5), alongside the G-7 price cap. This present rush to evacuate barrels is symptomatic of the issues that Russia is expecting to face in the coming weeks. With their redirection just halfway complete, dirty tanker markets are already soaring to unprecedented levels.[1] Similar to April 2022, we expect a lagged impact of the embargo on production, following the deadline, as vessels struggling to find end-consumers are unable to return on time to pick up their next cargo. We raise our expectations of Russian production by c.0.3 mb/d over 4Q22, however, we maintain our view that production will have to sequentially decline 0.6 mb/d to 10.4 mb/d (total liquids) by March 2023.

The net impact of the above is a c.1.5 mb/d loosening of our 4Q22 balances, subtracting $10/bbl from our Brent forecasts to $100/bbl. The peak-to-trough ($13/bbl) sell-off recently amounts to a significant c.2 mb/d market repricing of fundamentals over the next three months (alternatively: 1mb/d over six months), excessive in our view. However, these fundamental changes caught the market during a seasonally low-liquidity period, with discretionary positioning at post-pandemic highs, sending prices through thresholds where CTA sell triggers were activated.

In addition to the above, WTI crude has notably underperformed in recent days, with

[1] These are the highest levels since the GFC, outside of the sanction designation of COSCO Shipping Tanker (Dalian) Co Ltd in Sept 2019, and during widespread floating storage in 2Q20.

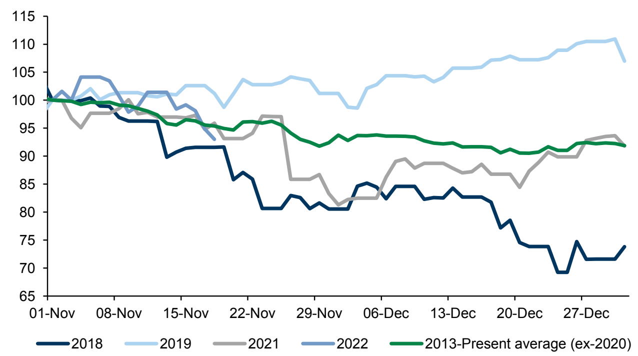
prompt spreads actually plunging into contango, usually a significant warning sign. However, WTI grades are suffering from a unique combination of factors that meant prompt spreads aren't sending a clean signal of global balances. Firstly, a pipeline disruption on the Gulf coast will result in more crude being sent to Cushing, OK. Secondly, soaring dirty tanker markets are punishing a crude that relies on marginal export economics along some of the world's longest trade routes. Lastly, and likely most importantly, however, seems to be potential quality concerns for WTI barrels that has seen them dislocate sequentially by c.$5/bbl or more in recent days from regional grades of similar high-level characteristics. We find only $1.5/bbl or so of this can potentially be accounted for by diverging refined product netbacks, leaving the remainder challenging to explain. Such divergences have occurred only briefly in the past, but none so large as this, leaving it unclear when they will be resolved.

Nevertheless, despite more pessimistic expectations for forward balances over the next few weeks and months, we find the underlying trends in oil markets to be healthy. Oil inventories have been drawing at a rate of c.1.5 mb/d over the last four weeks, versus a seasonal build of 0.5 mb/d, and this is despite China demand and Russian production levels surprising bearishly versus our expectations. Prompt demand therefore continues to realize robustly outside of China, in our view.

Since China has now given firm indications that this is the beginning of the end for lockdowns, little has changed for our 2023 and structural outlook (GSe $110/bbl Brent). Consistent with this, and in complete contrast to a spot asset like oil, energy equities have instead held firm near their decadal highs (Exhibit 2). Until broader macro-stability is able to generate an increase in passive flows for commodity markets, the burden of proof remains on fundamentals to drive back discretionary positioning, and eventually CTAs too. To that end, it's crucial to monitor both Russia's export flows, as well as China's demand and pandemic response in the coming weeks. On the latter, we remain particularly cautious.

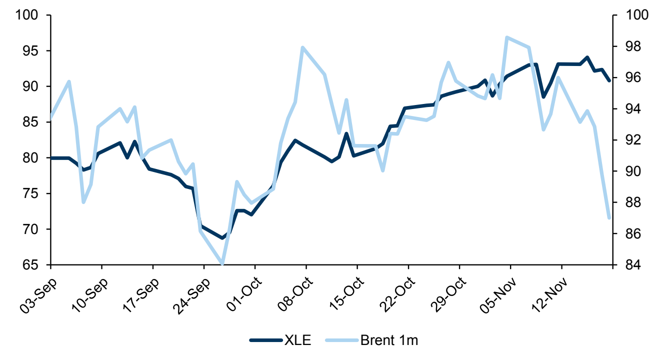
For longer-term investors, the current sell-off provides an opportunity to add length on yet another speed bump that will come to pass. From a tactical perspective, uncertainties abound, while discretionary positioning is still long and CTAs flows will be selling, leaving risks skewed lower in the near-term.

Exhibit 1: Oil sell-offs have become somewhat of a Thanksgiving tradition
Brent prices indexed by 1-Nov each year



Source: ICE, Goldman Sachs Global Investment Research

Exhibit 2: Equities have significantly outperformed as they discount prompt concerns
S&P500 Energy subsector (XLE, lhs) versus Brent 1m (USD/bbl, rhs)



Source: ICE, Bloomberg, Goldman Sachs Global Investment Research

Exhibit 3: OPEC has historically only cut following large price declines and after demand has fallen
Price returns and fundamentals around OPEC meeting cuts

	Returns around meeting									Demand Growth	Meeting Outcome
Meeting date	**-3m**	**-1m**	**-1w**	**Day**	**+1w**	**+1m**	**+3m**	**+6m**	**+1y**	**Quarter of meeting***	**Decision**
05-Oct-22	-20%	-10%	-1%							Weak	Cut?
06-Dec-18	-20%	-16%	5%	-2%	2%	-2%	11%	4%	6%	Weak	Cut
30-Nov-16	2%	-4%	-6%	9%	5%	13%	12%	0%	25%	Weak	Cut
17-Dec-08	-51%	-11%	6%	-2%	-20%	-2%	5%	56%	60%	Weak	Cut
24-Oct-08	-48%	-36%	-3%	-6%	5%	-13%	-22%	-17%	28%	Weak	Cut
14-Dec-06	-3%	3%	-3%	2%	-1%	-18%	-4%	13%	49%	Average	Cut
20-Oct-06	-18%	1%	2%	-2%	2%	-1%	-10%	11%	42%	Average	Cut
10-Feb-04	1%	-7%	-4%	3%	3%	5%	25%	37%	52%	Strong	Cut
24-Sep-03	-8%	-14%	-2%	5%	3%	7%	9%	24%	74%	Average	Cut
24-Apr-03	-20%	0%	-2%	0%	-2%	8%	16%	18%	41%	Average	Cut
28-Dec-01	-11%	11%	6%	0%	4%	-5%	28%	25%	42%	Weak	Cut
25-Jul-01	-5%	-8%	0%	1%	-1%	1%	-17%	-24%	1%	Weak	Cut
17-Mar-01	-2%	-6%	-6%	-1%	2%	8%	5%	6%	2%	Average	Cut
17-Jan-01	-17%	-2%	4%	-3%	6%	7%	10%	-3%	-24%	Average	Cut
23-Mar-99	39%	33%	9%	-1%	8%	16%	21%	73%	86%	Strong	Cut
24-Jun-98	5%	-1%	9%	-2%	2%	-7%	6%	-28%	23%	Weak	Cut
31-Mar-98	-11%	4%	-2%	-3%	-2%	8%	-2%	0%	1%	Weak	Cut
Conditional avg.	**-17%**	**-8%**	**2%**	**-1%**	**0%**	**-1%**	**3%**	**2%**	**23%**	**Weak**	**Cut**
Conditional avg.	**-3%**	**1%**	**0%**	**0%**	**3%**	**4%**	**9%**	**22%**	**40%**	**Av/Strong**	**Cut**

Demand strength defined as average if +/-0.5% within average of centred 5y average rolling YoY growth.

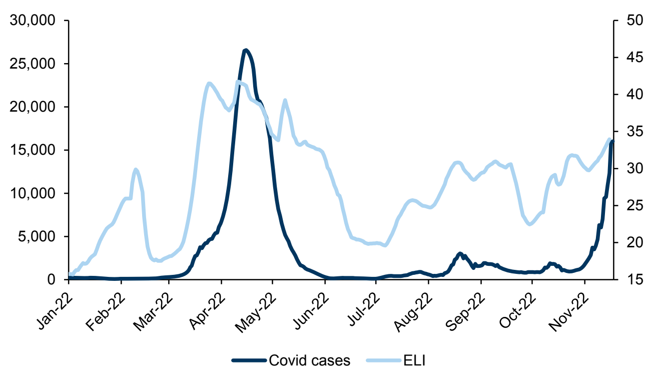
Source: OPEC, IEA, ICE, Goldman Sachs Global Investment Research

China reopening a Red Herring for spot assets

While China recently signaled the beginning of the end for lockdowns, we simply believe that recent headlines mark the start of a multi-month preparation period for reopening. To that end, in line with our economists, we have maintained our current base case of 2Q23 reopening. Nevertheless, a truncation in the risk distribution for China's reopening next year has been helpful for risk assets, with China equities staging a significant rally, while the USD TWI has already depreciated c.5% from recent highs.

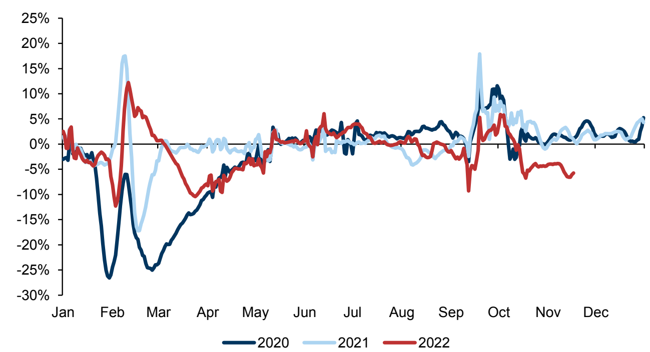
Prompt oil prices, however, have meaningfully underperformed, with Brent prices now c.$10/bbl from November highs. This is because commodities are spot assets, that are largely a function of prompt balances (versus equities and fixed income that are discounted future cash flows).[2] Thus, the current surge in cases to >30,000/day - despite lockdowns already currently subtracting c.0.7mb/d oil demand - portends to more oil demand weakness ahead.

Exhibit 4: Cases have already exceeded the levels of April 2022, when widespread lockdowns were implemented
China covid cases (lhs) versus GS Effective Lockdown Index (ELI, rhs)



Source: Goldman Sachs Global Investment Research

Exhibit 5: Road congestion has sequentially weakened since the Party Congress
China road congestion vs 2019 levels (Population weighted average of 100 major cities, calculated as average of actual travel time to 'free flow' travel time)



Source: Wind, Goldman Sachs Global Investment Research

Cases are now at levels last seen during the highs of Apr-22 lockdowns, when oil demand fell c.2 mb/d YoY. Although some easing of restrictions is apparent at the margin, the logical conclusion of the exponential growth inherent in virus spread means that any new, higher threshold of virus tolerance is likely to be breached eventually anyway, as long as full reopening is not yet ready for implementation.

The $10/bbl sell-off is equivalent to a c.2 mb/d weaker China demand outlook over the next three months (or 1mb/d over six months) using our inventory-based framework (Exhibit 7). This is an excessive, but not unreasonable, reassessment in our view. While demand today remains more than 1mb/d above the Apr-22 lows, lockdowns have typically lasted only up to two months.[3] We think that a downward reassessment of our 4Q22 China demand forecasts is warranted given the aforementioned risk, subtracting 1.2 mb/d from our previous 15.2 mb/d expectations (versus 14.4 mb/d at present),

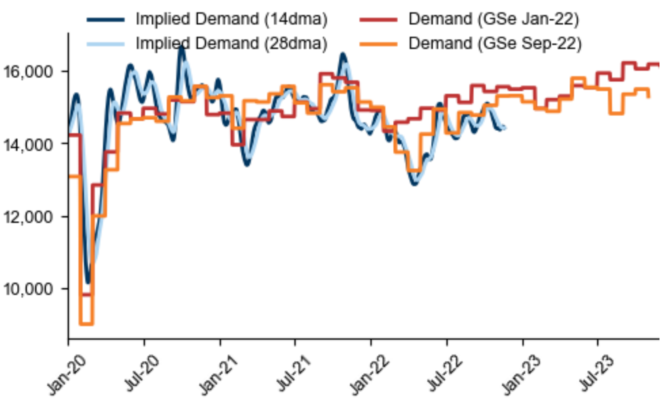
2 Empirically we have found that oil prices are a function of the inventory outlook 3-6 months ahead.

3 Alternatively, the price sell-off is equivalent to a 2 mb/d demand downward reassessment over three months. All else equal.

equivalent to an Effective Lockdown Index level of 40. This is worth c.$7/bbl to our 4Q22 Brent forecast, all else equal.

Exhibit 6: China spot demand continues to realise softly as with reopening unlikely until 2Q23 in our view

China high frequency modelled implied demand (kb/d) vs previous GS forecasts



Source: Kpler, IIR, ICIS, QQ, Goldman Sachs Global Investment Research

Exhibit 7: The impact of given fundamental shocks is particularly elevated today

Flat price impact of different fundamental shocks in different pricing regimes (USD/bbl)

Brent spot move ($/bbl)	Legacy pricing regime				Demand destruction regime
	Duration (months)				Duration (months)
D>S imbalance (kb/d)	3	6	9	12	*Duration not relevant*
250	2	3	4	5	8
500	3	5	8	11	15
750	4	8	12	16	23
1000	5	11	16	21	30
1500	8	16	23	31	45
2000	11	21	31	41	60
2500	13	26	39	52	75
3000	16	31	47	62	90

Historical pricing regime assumes $100/bbl base price, with back end prices moving with a 70% beta to timespreads. Duration not relevant in demand destructive regime as prices lift higher to balance supply with demand given depleted stocks, prices stay elevated as long as the disruption is in place. Duration's 'irrelevance' in the demand destruction regime is more theoretical than likely to be practically observed.

Source: Goldman Sachs Global Investment Research

Russia's final inventory flush before EU crude embargo implementation

In addition, investors have been left disappointed by higher than expected production and export flows from Russia. This is despite just two weeks remaining before the EU embargo takes effect on crude, alongside the G-7 price cap, for which more details are set to be announced next week.

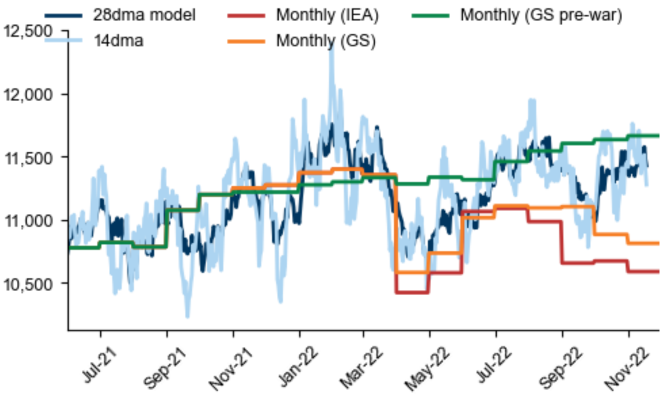
Russia's production of c.11 mb/d of total liquids so far in November (equivalent to 9.7 mb/d crude), c.0.25 mb/d above our previous expectations. Russia has lifted exports and has been evacuating pipeline crude storage[4] ahead of the early December loading deadline for the upcoming embargo (Exhibit 9). This has left even more barrels floating on water as India and China have been hesitant to ramp up imports further due to uncertainty around the price cap (Exhibit 10 and Exhibit 11). The consequence of this export push is to pull hard on an already-tight dirty tanker market, which have seen their day rates increase by c.50% in a month (Exhibit 12).

Nonetheless, the urgency in Russia's oil evacuation foreshadows the issues to come. In March 2022, when widespread self-sanctioning led to a sharp drop in European imports, it wasn't until the following month, when vessels didn't return on time to pick up the next cargoes, that production quickly shut in (by c.1 mb/d at its peak). While Russia is probably better prepared to avoid a similar outcome, we continue to expect production to have to decline by c.0.6 mb/d by March 2023 from current levels, due to the binding constraints of tanker market capacity and long-term crude supply contracts. Nevertheless, we increase our expected Russian crude production path by 0.2 mb/d over 4Q22-1Q23 to reflect the lagged impact of the embargo.

[4] This is evidenced by rises in crude storage towards the highs at export terminals tracked by satellites.

Exhibit 8: Russian exports and production have sustained c.0.2-0.3 mb/d below pre-war levels

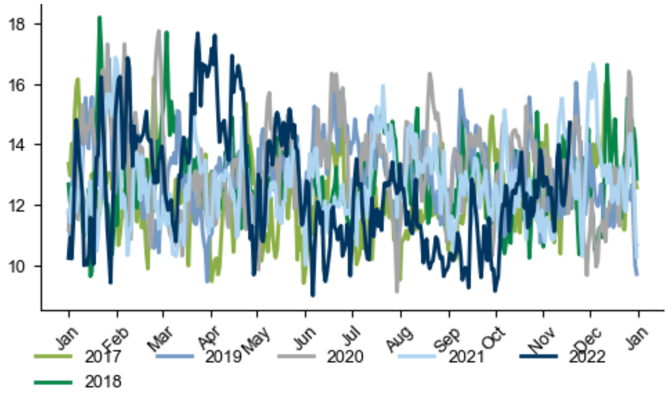
High frequency Russia total liquids production model versus GS forecasts (kb/d)



Source: Kpler, IEA, IIR, Goldman Sachs Global Investment Research

Exhibit 9: Increased crude stocks at export terminals suggests internal destocking of the Transneft pipeline system

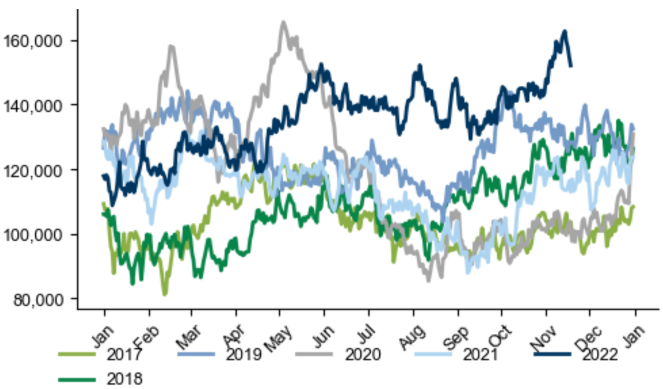
Russia crude storage (mb)



Source: Kpler, Goldman Sachs Global Investment Research

Exhibit 10: Russia is evacuating oil onto water ahead of the early December loading deadline for the embargo

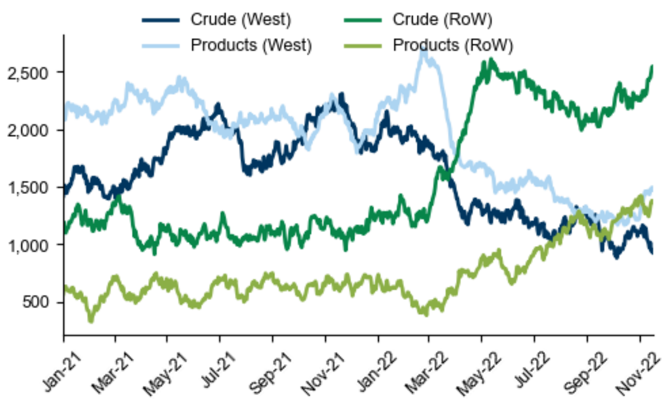
Russian origin oil on water (kb)



Source: Kpler, Goldman Sachs Global Investment Research

Exhibit 11: Russia's great oil redirection is only half-way done

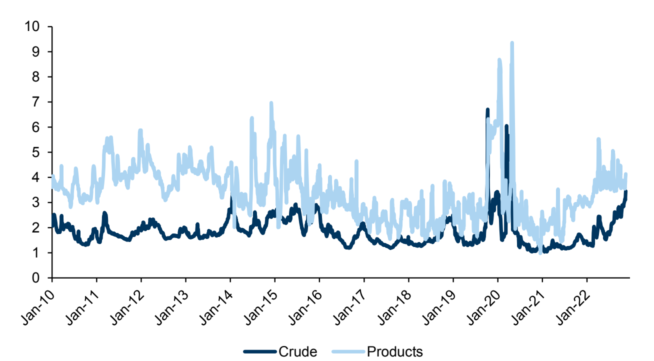
Russia seaborne oil exports (by type and destination, kb/d)



Source: Kpler, Goldman Sachs Global Investment Research

Exhibit 12: Dirty tanker rates are soaring in recent weeks

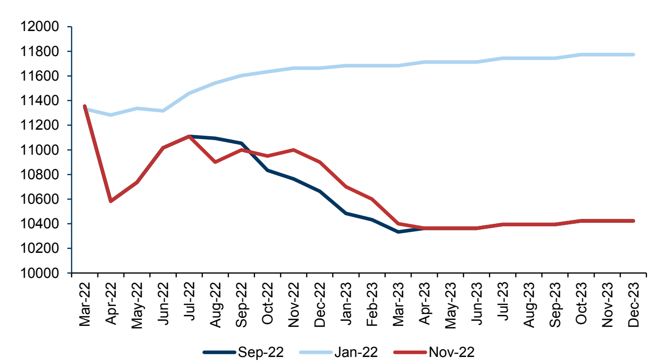
Simple average of clean and dirty freight rates (USD/bbl)



Source: Refinitiv Eikon, Goldman Sachs Global Investment Research

Exhibit 13: Russian production declines are likely to lag the embargo implementation by a few weeks

GS Russia total liqudis (crude, condensate, and NGLs) production expectations by report date (kb/d)



Source: IEA, Kpler, Goldman Sachs Global Investment Research

Discretionary flows were caught positioned long

Additionally, we find that discretionary length was still likely near YTD highs into this week's sell-off, aligning with our conversations with investors.[5] Therefore, a fundamental softening in oil balances was likely to result in significant selling activity, with the marginal buyer in fact less obvious. This wouldn't have been apparent when looking at overall oil or commodities positioning data that showed net length of 550 mb and $66 bn respectively, not much above 2Q20 levels.

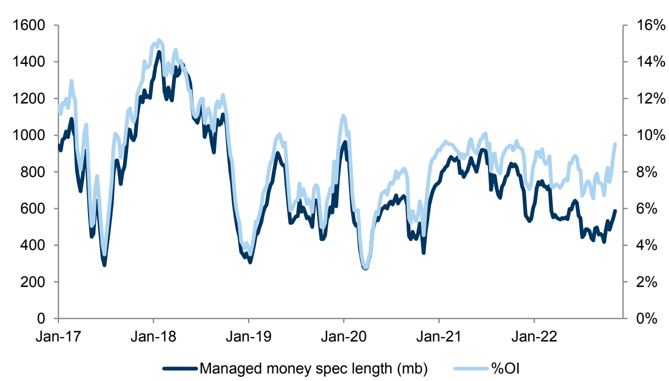
We can instead measure this discretionary length by normalizing managed money net positioning by open interest in order to control for the significant loss of passive positioning that remains on the sidelines due to elevated rates and commodities volatility. On this measure we find that positioning had increased a lot in recent weeks, and was approaching post-pandemic highs going into this week (Exhibit 14).

Given the recent recurrence of Thanksgiving sell-offs in oil, combined with the aforementioned fundamental disappointments (China, Russia), it is also likely that oil commodity investors preemptively cut positioning until clearer signs emerge of the impact of the EU embargo and China's updated pandemic policy response function. This was likely exacerbated by CTA flows, which would have hit selling thresholds throughout the recent price downdrafts.

Until macro-stability is able to generate an increase in passive flows, the burden of proof remains on fundamentals to drive back discretionary positioning, and eventually CTAs too. The oil market is unlikely to benefit from the macro tailwinds of a sustainably weaker dollar and declining rates volatility until 2Q23, as we approach terminal rates and China begins functionally reopening.

Exhibit 14: Discretionary positioning is higher than understood due to the collapse in open interest

Total oil managed money net spec length (mb, lhs) and as % open interest (%, rhs)



Source: CFTC, Refinitiv Eikon, Goldman Sachs Global Investment Research

[5] There are three main buckets of oil positioning. First is passive flows via risk parity strategies, that historically formed a large part of commodities length. Second, is trend-following CTAs, that add or subject length based on price thresholds. Lastly, is the discretionary positioning of speculative money managers that typically will take more fundamentally-driven views.

WTI facing additional headwinds

The recent sell-off has been even more pronounced for WTI (compared to Brent), which traded below $78/bbl on November 18, with both of the first and second prompt timespreads falling into contango at one point. Such weakness in a prime physical indicator has rightfully created some cause for concern, as prompt spreads tend to reflect prompt S-D imbalances.

However, in this case, we think some additional dynamics may have been exacerbating the sell-off for WTI spreads. Firstly, on November 17, Shell announced that the 360 kb/d Zydeco pipeline will be operating at reduced capacity until mid- to late-December; this will lead to more flows backing up, or having to divert, into Cushing (WTI's pricing point) to reach export terminals further east (Louisiana) rather than go directly to the US gulf coast from the Permian.

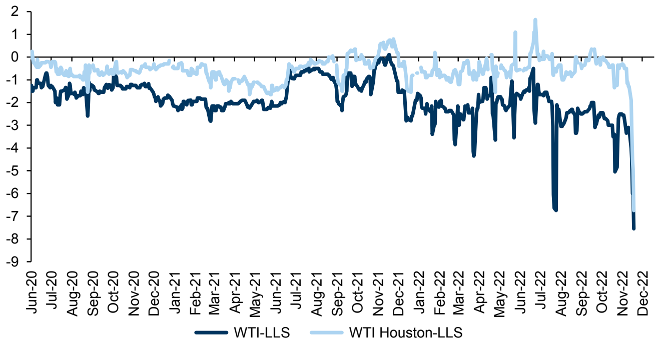
Secondly, the large increase in oil on water originating from Russia (plus returning volumes from Kazakhstan) is further tightening dirty tanker markets. Dirty freight rates have increased another 50% over the last month, much faster than expected, increasing the cost of transatlantic crude transportation by another $1/bbl for VLCCs (to c.$3/bbl versus c.$1/bbl pre-war). As marginal WTI barrels are exported much further on average[6], WTI suffers most from increases in freight rates. Given this redirection still has some way to go (Exhibit 11), risks to our 2023 WTI-Brent forecasts of $5.5/bbl, are still skewed wider.

Lastly, there remain quality concerns around WTI barrels due to both the potential blended nature of crudes meeting the WTI Cushing delivery specifications, as well as their high metals content (with pipelines to Houston typically having less strict requirements). This can be seen in recent pricing assessments of WTI (located at either Cushing or Houston) versus coastal grade Louisiana Light Sweet (LLS) which has a similar density (38.5 API gravity) and sulphur content (0.4%s) as WTI barrels. These spreads have increased by c.$5/bbl in a matter of days, an excessive figure given current product crack differentials could warrant a (pure) quality differential of potentially c.$1.5/bbl in our view (Exhibit 16). Assuming this exercise is correct, this suggests a non-negligible impact from the Zydeco outage.

Meanwhile, in Europe, labor strikes continues to impact refining operations in France and the Netherlands (Exhibit 17), leading to significant, counter-seasonal crude builds (Exhibit 18). The recent weakness in crude physical indicators therefore must be matched with robust cash diffs, prompt spreads, and margins for refined products (Exhibit 22) which remain near unprecedented levels.

6 North American crude exports typically travel twice as far as Middle Eastern exports.

Exhibit 15: WTI barrels have only discounted sharply versus similar grades in recent days
WTI Cushing and WTI Houston (MEH) versus Lousiana Light Sweet (LLS). USD/bbl.



Source: Platts, Goldman Sachs Global Investment Research

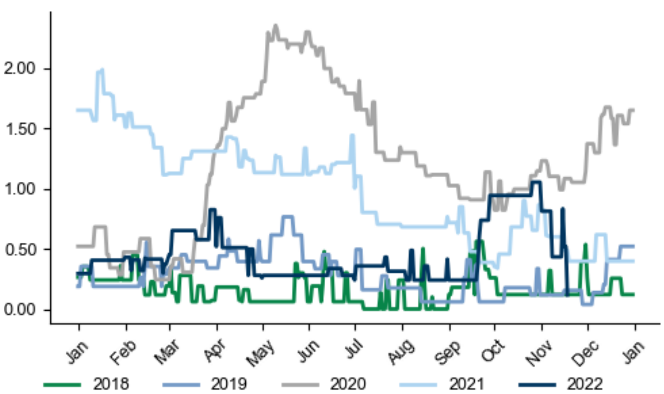
Exhibit 16: Possibly $1.5/bbl WTI quality differential versus Brent (Forties) could be warranted
WTI Cushing specification barrel (proxied by 95% WTI Light, 5% Canadian) versus Brent (Forties) product netbacks (USD/bbl)

	Crack	Relative yield*
Resid	-30	-2.6%
Middle Distillates	40	-3.2%
Gasoline/naphtha	-5	2.7%
LPG	-30	3.1%
Total	-1.5	0.0%

Blended WTI spec versus Forties (Brent)

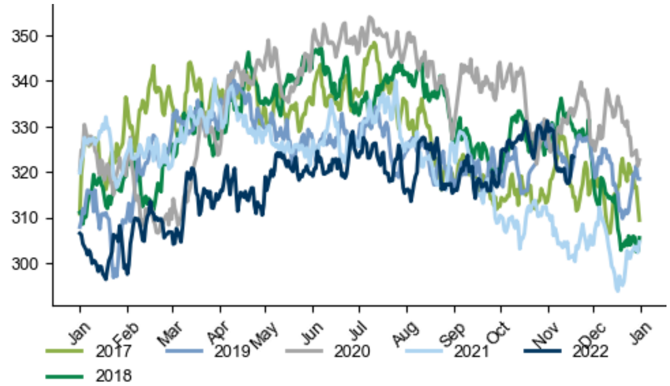
Source: Goldman Sachs Global Investment Research

Exhibit 17: European strikes continue to impact refining activity
European unplanned refinery CDU outages (mb/d)



Source: IIR, Goldman Sachs Global Investment Research

Exhibit 18: European crude stocks have built counterseasonally since October
European crude stocks (mb)



Source: Kpler, Goldman Sachs Global Investment Research

Fundamental data suggests the underlying thesis remains intact

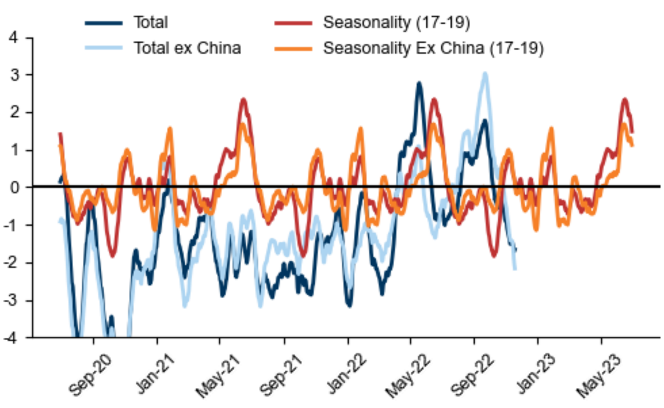
While the market has rightfully reassessed year-end fundamentals more bearishly, spot balances have pivoted into deep draws since late October of c.-1.5 mb/d versus a 2017-19 average build of +0.5 mb/d (Exhibit 19). This has been driven by both landed crude (ex China), as well as oil on water (ex-Russia origin). However, with Russia supply and China demand both tracking bearishly on our high frequency modeling, these draws are indicative of robust spot demand (ex-China). This is corroborated in our global hard current activity indicators, reflecting realized demand, versus soft activity indicators which tend to be more forward-looking (Exhibit 23).

Global oil stocks remain at very depleted levels, just 100 mb above the YTD lows. Moreover, OPEC+ has just started its preemptive 2mb/d quota cut (worth 1.2 mb/d in actual production in our view), into a market that was already in a seasonally-adjusted deficit (Exhibit 21). This is all despite Russia maintaining production just below pre-war levels.

The underlying trends in the balances therefore seem intact, in our view, with energy equity price action a testament to this. China's lockdowns, like all previous waves, will come to pass, and the country should reopen fully domestically next year. We still believe Russian production will decline sequentially c.0.6 mb/d from here, with risks of a deeper, more abrupt disruption, still present. Thus, while we downgrade our 4Q22 Brent forecasts by $10/bbl (to $100/bbl), we maintain our forecast for $110/bbl Brent next year, with risks still skewed higher should inventories fully deplete once again. This could occur in 1H23 if OPEC+ maintains its current quotas and global activity and employment remain at high levels.

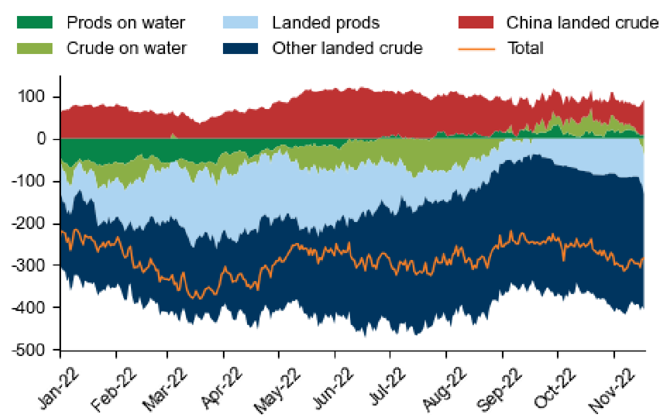
Therefore, for longer-term investors, the current sell-off provides an opportunity to add length on yet another speed bump that will come to pass. From a tactical perspective, uncertainties abound, while discretionary positioning is still long and CTAs flows will be selling, leaving risks skewed lower in the near-term.

Exhibit 19: Oil stocks have drawn sharply over the last month, with draws across most components, while China restocked crude
Global oil stock changes (28dma, mb/d)



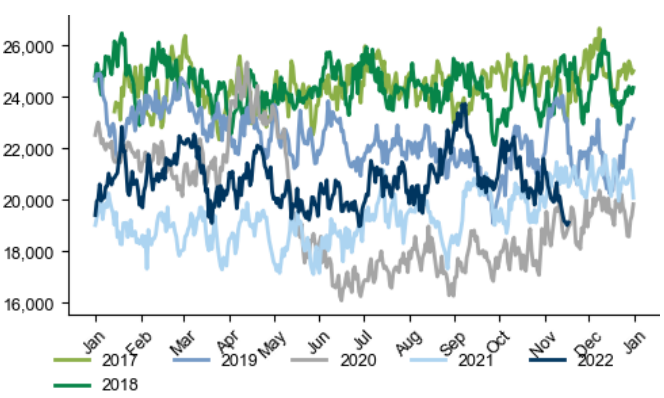
Source: Kpler, EIA, ICIS, QQ, PJK ARA, Kayrros, PAJ, Insights Global, Goldman Sachs Global Investment Research

Exhibit 20: Stocks levels have little buffer above their YTD lows, when price spikes were required
Global high frequency oil stocks (mb)



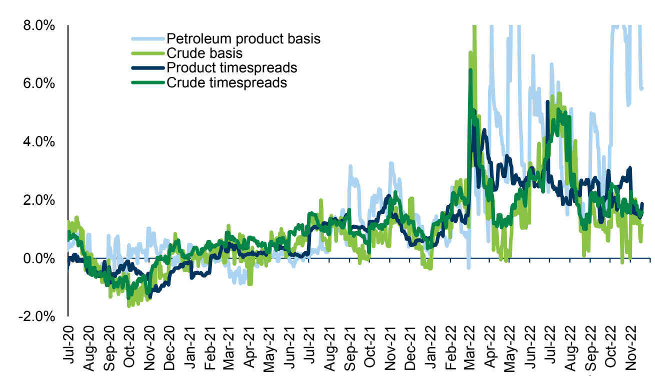
Source: Kpler, EIA, ICIS, QQ, PJK ARA, Kayrros, PAJ, Insights Global, Goldman Sachs Global Investment Research

Exhibit 21: OPEC has evidently been curtailing output in line with plans
Crude/condensate seaborne exports by OPEC countries (kb/d)



Source: Kpler, Goldman Sachs Global Investment Research

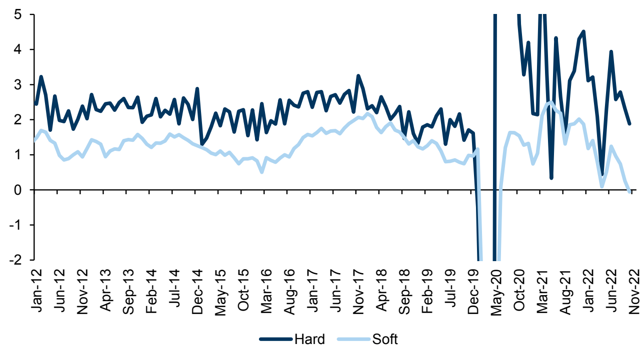
Exhibit 22: Physical markets have sequentially weakened but remain strong in absolute terms, especially for products, indicative of robust demand
Crude and products prompt timespreads and basis (% Brent)



Source: Platts, CME, ICE, DME, Goldman Sachs Global Investment Research

Exhibit 23: Hard indicators continue to suggest strong spot demand, even as softer, more anticipatory measures worsen

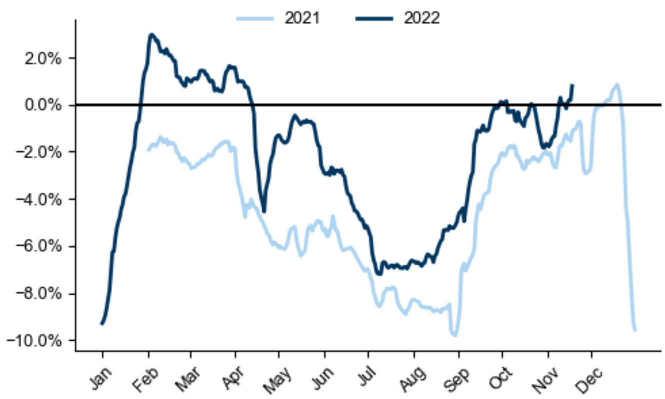
GS Global Hard and Soft Current Activity Indicators (CAI, %yoy)



Source: Goldman Sachs Global Investment Research

Exhibit 24: Mobility data suggests road demand is still higher year over year

Global congestion-based demand-weighted passenger road demand for oil (versus 2019)



Here we use TomTom congestion data as Google mobility data ended in Oct-22. Congestion data has different seasonality to overall mobility due to demand patterns (commuting versus vacation), meaning it tends to fall in summer even as actual demand seasonally increases.

Source: TomTom, Goldman Sachs Global Investment Research

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Reg AC

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