Goldman Sachs | Economics Research

13 June 2025 | 7:27PM BST

Global Rates Trader

Inflation Offers Relief, Oil Offers Risks

George Cole
+44(20)7552-1214 |
george.cole@gs.com
Goldman Sachs International

William Marshall
+1(212)357-0413 |
william.c.marshall@gs.com
Goldman Sachs & Co. LLC

Bill Zu
+1(212)357-8230 | bill.zu@gs.com
Goldman Sachs & Co. LLC

Simon Freycenet
+44(20)7774-5017 |
simon.freycenet@gs.com
Goldman Sachs International

Friedrich Schaper
+44(20)7774-7906 |
friedrich.schaper@gs.com
Goldman Sachs International

Inflation relief for global bond markets was short-lived as geopolitical tensions saw oil prices move sharply higher into the weekend. Even with some improvement in the underlying growth versus inflation trade-off and signs of duration risk appetite finding better footing, the macro impediments to a sharp move lower in US yields remain largely in place. Heading into the June FOMC decision, we continue to think any sustained reassertion of bearish pressure in the US is likely to be more belly than long-end led. In Europe, there was limited macro news for rates markets, apart from a sharp move higher in traded inflation. We think traded HICP still looks too low given the potential for fiscal expansion to drive cyclical improvement in 2026. Progress towards lower wages in the UK helped drive Gilt outperformance vs other markets—we think this trend will continue, although do not expect a major dovish pivot from next week's MPC. We do expect the Riksbank to cut next week, which will help steepen the SEK curve, while the Norges Bank is likely to remain patiently on hold. Supply considerations will be in focus in Japan as the BOJ updates its assessment on JGB purchases and MOF meets with primary dealers, with the 5-to-10y part of the curve most vulnerable to potential adjustments.

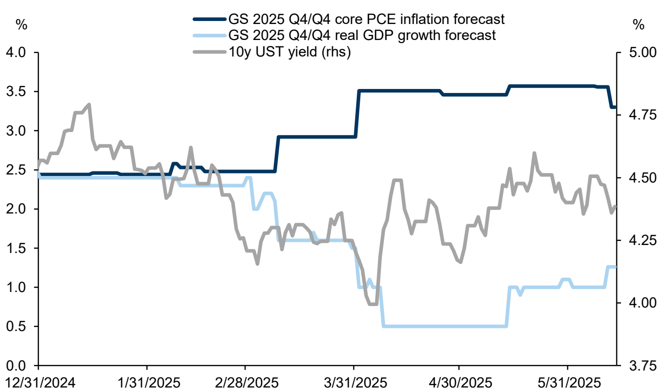
United States and Canada

- **A brief glimpse of a path to relief.** The softer than expected May CPI print in the context of an ebbing of growth downside risks extended the gradual erosion of the post-Liberation Day tension between the two sides of the Fed's mandate (Exhibit 1). Alongside some evidence that the reset cheaper had been sufficient to compensate for the deterioration in USTs' hedge value, a slightly friendlier macro backdrop has afforded some stabilization and a reemergence of duration risk appetite. While spot data has been a reminder of the path to a more benign form of rate relief, tariff-related headwinds to the Treasury market are still there (they just seem a bit less acute), as are medium-term fiscal pressures. Further, the increase in tensions in the Middle East and resulting jump in oil prices introduce another potential complication, with the reversal higher in yields despite still negative risk sentiment a reminder that inflation upside remains a challenge to bonds' traditional haven status. We continue to look for a relatively range-bound profile for US duration, with a bad growth outcome the most likely path towards lower yields.

The Fed will make its June decision in the context of this still uncertain backdrop, which may just mean a continuation of the "wait and see" mantra from May. Even if the stated message is relatively consistent, a new SEP may give the market something to latch onto; the market is about in line with the March dot plot, but the margin between a two and one cut 2025 median was a relatively narrow one. We would not expect a one-for-one shift in the event of a higher median dot—the historical beta of the front-end to shifts in the median dot is only about 0.2—but there nonetheless is some risk on the hawkish side. Despite the attention on the long-end of the curve, we think the most likely source of renewed bearish pressure flows through the belly (rather than long-end) of the curve. We continue to hold belly cheapening exposure through payers.

Exhibit 1: Tension between US growth downside and inflation upside remains pronounced, but has incrementally diminished over the last month

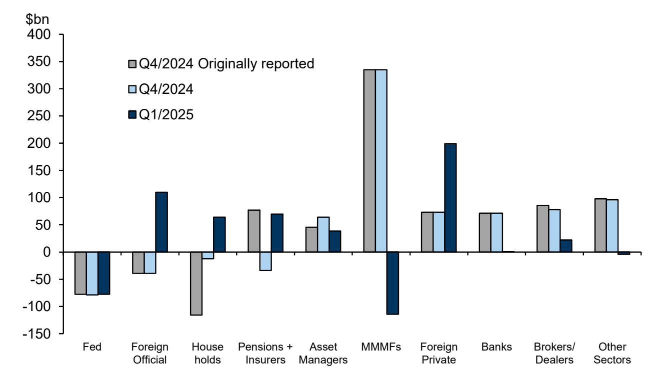
2025 Q4/Q4 core PCE and real GDP forecasts through time



Source: Goldman Sachs Global Investment Research

Exhibit 2: Foreign demand for USTs were strong in Q1 from both official and private sectors

Net demand of USTs by sector



Source: Goldman Sachs Global Investment Research, Federal Reserve

- **Foreign demand a solid source of pre-Liberation Day UST absorption, but likely a source of headwind going forward.** The latest Flow of Funds data reflected the robust foreign demand for USTs prior to Liberation Day, coming from a mix of both official ($110bn net buying) and private ($199bn) channels (Exhibit 2). While demand from domestic real money (pensions/insurance/asset managers) was also solid at $108bn—and levered buyers picked up some slack (the 'household' category that largely represented levered funds added $64bn)—money funds were net sellers as a result of the debt limit related bills redemptions. Higher frequency data suggests some shifting patterns in the buyer base in Q2, however, with banks becoming a more meaningful source of demand according to the H.8 data. Meanwhile, the latest H.4.1 weekly data suggests USTs held in custody at the Fed—a large but incomplete part of foreign official holdings—have fallen by $56bn since end-March despite USD depreciation, perhaps in part related to bill redemptions not being rolled over. Taken together, this continues to paint a picture of diminishing foreign appetite for USTs that shifts the burden of demand to more price elastic domestic investors.

- **Relative curve steepness may be sufficient to compensate for duration's lost hedge value for now.** Even with the aforementioned shifts in the UST demand landscape, we see some emerging evidence that the reset cheaper and steeper in

USTs may provide a sufficient buffer for duration's diminished hedge value against risk assets, at least for now. While tariffs and geopolitical developments present near-term upside to inflation, a more benign underlying inflation trend should allow USTs to reassert their properties as a risk hedge over time, especially in the front-end and belly of the curve. And while foreign demand concerns do argue for a compression in Treasury convenience yields, the reset to date points to a modest amount of excess risk premia already in place given the observed relationship between convenience yields and realized stock-bond correlations. To be clear, historically elevated debt and deficit levels and worries about US institutional risks can all justify some stickiness to the rise in risk premium—and the macro backdrop is not necessarily supportive of a sharp rally in yields—but history suggests that the combination of compressing convenience yields and rising term premium bodes a bit more favorably for excess returns to owning duration and suggests a diminished need for further rebuild in risk premia further out the curve.

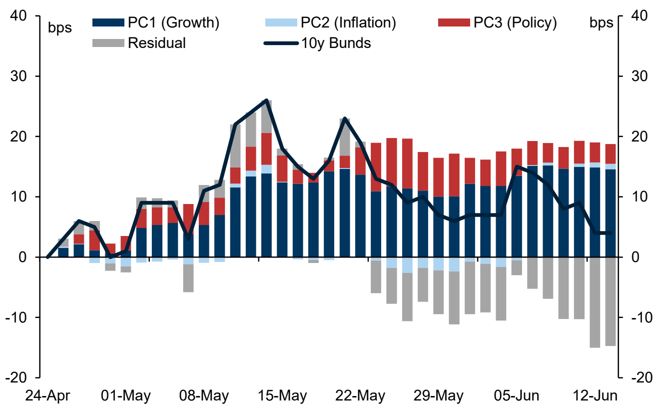
- **IORB elimination would erode front-end control to little benefit.** Senator Cruz's recent suggestion that Congress could eliminate the Fed's ability to pay interest on reserves as a cost saving measure seems unlikely to end up being part of the pending fiscal package. If it were to be taken into more serious consideration, however, it is unclear that it would have the intended fiscal effect. The elimination of interest on reserves would most likely simply see a migration of cash into the RRP facility, which might require some adjustment to the terms (counterparty cap size, eligible collateral, rate level) in order to achieve stability in short term funding markets, and would dilute the Fed's toolkit for managing short term funding costs (where today the RRP facility acts as something closer to a floor, offering an outlet for excess liquidity). While that would materially alter the liability composition of the Fed's balance sheet, the impact on net interest income (and subsequently Fed remittances to Treasury/its deferred asset) should be small. Even if the spirit of the proposal were taken literally—curtailing Fed interest payments to the financial sector in a return towards a pre-GFC norm of reserve scarcity—it would likely make for a disorderly a return towards a corridor system, wherein the Fed would have a smaller balance sheet (lowering interest income alongside expense), the market would have more Treasury supply to absorb, and the need for higher frequency management of system-wide liquidity would likely mean more funding market volatility.

Europe

- **EUR rates—eyes to the horizon.** Near-term risks swirl both on trade and geopolitics, but 2025 ECB pricing remains little changed over the week. We continue to expect the ECB to be close to the end of the cutting cycle with one more cut in September, depending on the incoming data flow. However, prospects for better growth in coming years from German fiscal expansion have received a modest boost from resilient sentiment, with manufacturing and constructing expectations holding up better than our economists expected. We continue to think this will keep terminal rate pricing at current or higher levels despite the near-term risks. Bund yields have drifted lower in the last month or so, despite relatively resilient growth pricing in other assets (Exhibit 3). We still forecast 10y Bund yields at 2.80% at end-2025, with higher rate expectations likely to drive yields up as much as term premium. We think this should imply a moderate "compression from below" against other EGBs, as the effective policy puts from both ECB and German fiscal policy dampen sovereign credit risk, and volatility in EUR rates, overall.

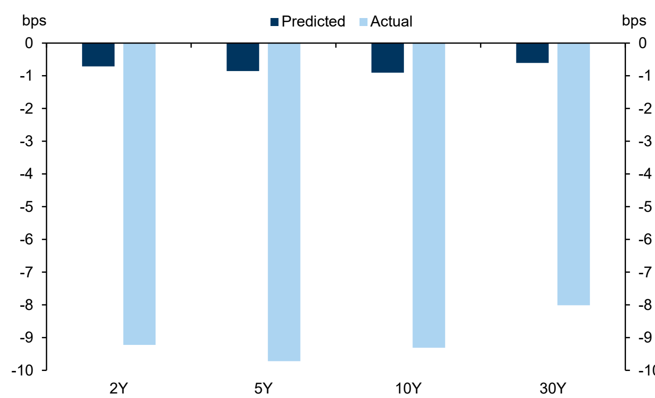
- **HICP upside: Short-term energy/long-term growth.** EUR Traded inflation moved higher this week, as tensions in the Middle East led to a spike in oil prices. HICP has exhibited a relatively high sensitivity to oil prices recently, pointing to further near-term upside pressure. At the same time, we see room for HICP to catch up to pricing the growth impulse already priced into other assets, as the more conciliatory tone on tariffs is reducing the expected growth drag from trade tensions. Over the summer, market focus is likely to shift back towards the fiscal expansion, when we expect more details on the German budget, which we think should present more long-lasting upside risk to 5y HICP.

Exhibit 3: Bunds pricing less growth upside than other assets
10y Bunds, Macro PCA Decomposition



Source: Goldman Sachs Global Investment Research, Goldman Sachs FICC and Equities

Exhibit 4: UK rates rally after the labour market data surprise is larger than expected
GBP OIS, 1d change, predicted by surprise in Average Weekly Earnings



Source: Goldman Sachs Global Investment Research, Goldman Sachs FICC and Equities, Bloomberg

- **Wage slowdown brings relief to UK rates.** Labour market data showed faster than expected wage disinflation this week, as well as weaker employment data. This offered relief across the curve (Exhibit 4), with Gilts outperforming most major bond markets in the last week or two. Weaker April GDP further spotlit a slowing economy, which together with progress on inflation increases our confidence that an eventual shift to sequential cuts is the right baseline for the MPC. Next week, however, we expect the BoE to emphasise their baseline for quarterly cuts at Thursday's MPC meeting. With the market already pricing this quarterly path, further front-end outperformance likely hinges on additional data weakening. As a result, we tighten stops on both our long Dec MPC and 10y10y Gilt-UST spread tightener recommendations.

- **Steeper SEK, Norges Bank to wait.** Hard data divergence between Sweden and Norway continued in May. Our economists still see the Riksbank cutting their target rate by 25bp at next week's meeting on the back of weaker than expected activity, including the notable downside surprise in Q1 GDP, and stronger core disinflation. However, further out, positive growth spillovers from Germany and plans to follow suit with respect to the fiscal expansion should boost expectations about future growth, and we continue to expect the 2s10s SEK curve to steepen. On the other hand, recent data from Norway suggest that, despite inflation moving more favourably since the May meeting, the resilient activity picture will allow Norges Bank to keep its interest rate unchanged next week before beginning to ease in September.

Japan

- **BOJ: Walking the duration tightrope.** Our economists expect the BOJ to leave the policy rate unchanged at next week's meeting. While growth data has been somewhat soft in recent months, wage momentum appears firm, which should allow the BOJ to have more confidence in taking rates higher once the near-term global risks recede. With ~70% chance of a hike priced into the January 2026 meeting we view front-end pricing as broadly fair given spot data but still see greater vulnerability further out the curve (5-10y) driven by supply considerations. The latter will come into focus next week as the BOJ updates its assessment on its JGB purchases. Our economists expect the BOJ to maintain its current plan (reduction to ¥3tn per month at a ¥400bn/quarter pace) until March 2026, while also announcing a plan to continue to reduce purchases beyond March 2026, albeit more gradually, to a level of around ¥2tn per month. We continue to see a high bar for the BOJ to engage in a twist operation to accommodate for the lack of long-end JGB demand. Instead, the burden is on the MOF—set to meet with primary dealers on June 20—to adjust long-end issuance to address the supply/demand imbalance, which would potentially pull more pressure onto intermediate maturities. Moreover, debates around consumption tax cut proposals leading up to the election could resurface as a challenge to debt sustainability in Japan, and in such an environment we would also expect the belly of the curve to bear greater pressure especially if the MOF is reducing long-end issuance in tandem.

Latest Thematic Research:

Global Rates Notes: HICP Inflation Pricing Too Low — 11 June 2025

US Daily: Section 899: A Potential Deterrent to Foreign Investment in the US — 5 June 2025

Euro Area Sovereign Credit Monitor: OATs at a Crossroads — 2 June 2025

Global Rates Notes: Identifying Country Risk Premium in Gilts — 28 May 2025

Global Rates Notes: 30y JGBs — Canary in the Duration Coalmine — 21 May 2025

Latest Global Markets Dailies:

G10 Rates—Looking For Relief — 13 June 2025

Are Treasuries Cheap Enough as a Risk Hedge Yet? — 12 June 2025

An External Imbalance Perspective on the EURUSD Cross-Currency Basis — 3 June

2025

European Front-End — Steep For A Reason — 23 May 2025

A Macro Rates View of the Dutch Pension Reform — 08 May 2025

The authors would like to thank Loïc Mathys for his contribution to this report. Loïc is an intern in the Markets team.

Summary of Views

	Core Views	Recommendation	Entry Date
Duration	The move lower in US yields has not yet taken the market into clear overshoot territory in our view. We think near-term risks are asymmetric to downside surprises in activity data, with the case for a yield reversal likely a function of time and accrued benign news.	--	--
	The reduced urgency to cut from the ECB has curtailed one path to lower core yields in Europe, but the possibility of a severe tariff outcome on Europe specifically (i.e. 20-50%) means markets are unlikely to fully price out the left tail for now. Beyond the immediate near term we continue to think fiscal policy led by Germany will support a gradually higher level of yields, above 3% in 2026.	--	--
	The improved macro outlook should over time compress risk premia throughout the Gilt curve, and see 10y Gilts rally towards our YE forecast of 4.25%. US spillovers and lower global duration demand present upside risks to yields, but accelerated BoE cuts on the back of inflation normalisation counterbalance them.	*Long 10y10y Gilts vs USTs* *Receive Dec25 BoE Meeting OIS*	16-May-25 30-May-25
	We expect the BOJ normalization cycle to be prolonged, with a medium-term neutral rate of 1.25-1.5%. This should lift yields across the curve, although in the near-term rising US recession risk presents a headwind to this view. Reduction in BOJ's JGB holdings should put most upward pressure on belly yields.	--	--
	Reemerging tariff - and thus, growth - concerns bias yields lower in the near term, as Riksbank is likely to ease further to contain labour market risks. Higher defence spending and hence, issuance, however biases duration higher further out and points to continuing steepening in the SEK curve.	--	--
Curve	While we see a path to steeper curves if growth disappoints more meaningfully, tariff risks will likely constrain the Fed's ability to fully front-load cuts and exert a flattening bias in the near-term. Exposure towards steepeners in a tail scenario makes sense, but in the baseline we think belly richening has greater value, providing insulation against tariffs while maintaining exposure to a lower terminal rate out the curve.	*Buy SFRZ5 96.25 put vs sell 0QZ5 96.25 put*	7-Mar-25
	As the easing cycle is nearing its end, markets have begun pricing in hike risk into the front-end, incorporating a constructive growth outlook, partially based on the expected fiscal expansion, and thus justifying a steeper front-end. We think the likely improvement in growth also justifies a steep curve further out, especially when combined with increasing bond supply.	--	--
	Downside risks to the market-implied path for Bank Rate, which remains 60bps below our economist's baseline, implies steepening risks in 2s10s. However, the improved macro outlook should over time allow investors to price out excessive risk premia at the long end, and we expect the 10s30s Gilt curve to flatten.	--	--
	We see less room for the SEK front-end to outperform in the near-term, as much easing is already priced. As long as the Norges Bank is holding onto their hawkish guidance the NOK curve has no room to steepen much, so we would await the eventual pivot towards growth before engaging again.	--	--
	Growth emphasis by the BoC and persistent slack in the Canadian economy remain consistent with some runway for further cuts, with the option of moving aggressively on softer data. We see scope for the implementation of tariffs to catalyze deeper cuts.	--	--
	The recent global bond selloff has seen 30y JGBs clearly underperforming both its beta to USTs as well as on a relative basis to other curve points. We think there is room for 10s30s JPY curve to unwind some of the recent steepening as liquidity conditions normalize, while any discussion of continued BOJ QT could put further pressure on the belly of the JGB curve.	--	--
Spreads	The dramatic tightening in US swap spreads since April 2nd has taken spreads to levels that generally screen cheap relative to fair value. The combined picture in funding and spread behavior suggests unwinds of levered longs played a role. We see risks as two sided. On the one hand, a more pronounced shift in the buyer mix from price-insensitive investors towards the levered community could drive significant further tightening. On the other hand, a material improvement in the risk picture, or greater visibility into the contours of potential regulatory reform, could provide further support for spreads from here.	*Long 3y SOFR-UST swap spreads*	2-May-25
	We continue to be positive on sovereign credit going into the summer, given the resilience of the asset class in recent months and the possibility of portfolio flows into EGBs, but tight valuations and a smaller carry cushion make further sovereign spread compression more difficult. But in light of the relative political calm and improved debt dynamics in Italy we have upgraded our view on BTPs, and in the absence of political turmoil think OATs can continue to trade on broader Euro Area risk.	--	--
	We expect continued Bund spreads tightening as ECB QT increases the Bund free-float and repo costs drift higher. Though constrained German issuance is a risk, we think it is manageable and unlikely to derail the tightening trend, especially as France and the EU continue to issue heavily.	--	--
	Though Gilt spread tightening has run some way, we think the trend can extend as the BoE remains intent on shrinking its balance sheet, and fiscal policy remains accommodative.	--	--
Vol	A relatively benign macro environment should be conducive for implied vols to reset lower, but trade uncertainty and tariff risks may act as an impediment to how far this reset can go, with increases in trade policy uncertainty generally corresponding to higher vol levels. Implied vols on 10y tails have lagged the rest of the tail curve in the April vol spike, driven by push-pull factors from deeper Fed cuts vs term premium reset.	*Long 3m10y USD payer on 3m 5s10s30s payer fly*	2-May-25
	Curtailed tail-risks have narrowed the range of outcomes for the EUR front end, and gamma has fallen substantially. Given the ongoing risks of tariff related growth scares, and the recent repricing, we view the outlook for gamma as more balanced. News about the German fiscal expansion, which we expect over summer, create near term event risks.	--	--
Money Market	We expect elevated coupon issuance to be absorbed in large part by levered investors, with the resulting leverage demand likely to pressure financing spreads wider. We expect repo rates to continue drifting higher relative to OIS and bill yields.	--	--
	While high frequency measures still point to relatively abundant liquidity, we see the upward trend in overnight repo spreads to IOR as indicative of the system moving from abundant to ample. We expect the Fed to taper QT again in May and end QT in September; the debt limit presents a source of volatility through this process.	--	--
Inflation	Inflation forwards have compressed by more than justified by growth and policy reassessments. Relaxation about growth concerns could see belly forwards reprice higher, from already low valuation levels.	*Long 5y TIPS vs short 0.7x 5y nominal USTs*	6-Jun-25
	With pricing in Europe already below the ECB's target out to the belly of the HICP curve, we see limited scope for a sell-off in inflation swap, although the recent stabilisation in energy prices may pose some modest pressure on breakevens. Instead, we think nominal rates will be pushed lower by the real component of rates, as markets price more ECB support to the economy through rate cuts.	--	--

Source: Goldman Sachs Global Investment Research

Forecasts

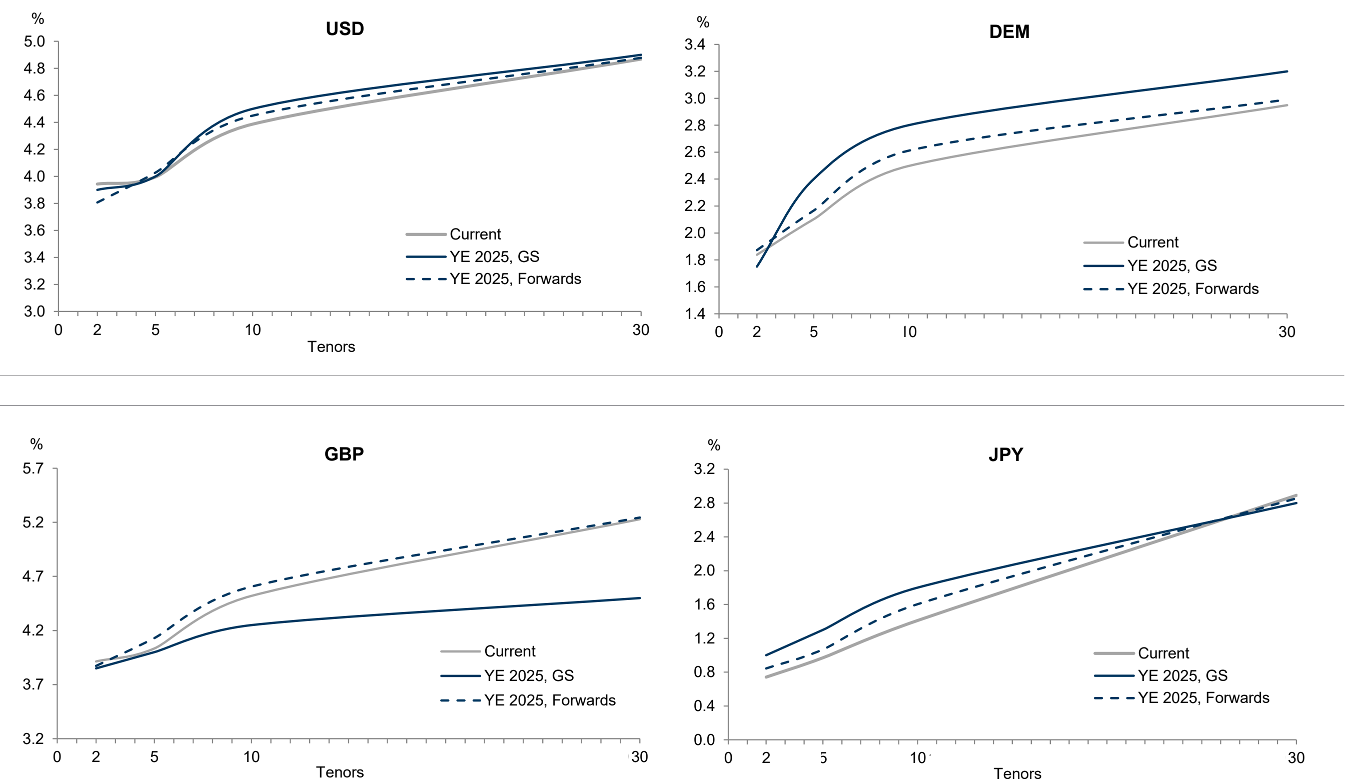
G10 10y yield forecast

G10 10-Year Yield Forecasts										
	USD	DEM	GBP	JPY	CAD	CHF	SEK	NOK	AUD	NZD
Spot	**4.39**	**2.50**	**4.52**	**1.41**	**3.35**	**0.26**	**2.31**	**4.08**	**4.15**	**4.55**
2Q25	4.50	2.80	4.40	1.60	3.25	0.50	2.75	3.85	4.50	4.70
3Q25	4.50	2.80	4.30	1.70	3.40	0.50	2.75	3.75	4.50	4.70
4Q25	**4.50**	**2.80**	**4.25**	**1.80**	**3.50**	**0.50**	**2.80**	**3.75**	**4.50**	**4.70**
1Q26	4.50	2.90	4.25	1.80	3.50	0.50	2.90	3.75	4.50	4.70
2Q26	4.50	3.00	4.25	1.85	3.50	0.55	3.15	3.75	4.50	4.70
3Q26	4.55	3.15	4.25	1.90	3.60	0.70	3.20	3.75	4.55	4.75
4Q26	**4.55**	**3.25**	**4.25**	**1.90**	**3.70**	**0.75**	**3.25**	**3.75**	**4.55**	**4.75**
1Q27	4.60	3.20	4.25	2.00	3.80	0.80	3.25	3.75	4.60	4.80

Deviation from Forwards										
	USD	DEM	GBP	JPY	CAD	CHF	SEK	NOK	AUD	NZD
2Q25	0.11	0.29	-0.13	0.17	-0.12	0.29	0.45	-0.23	0.34	0.14
3Q25	0.09	0.23	-0.27	0.16	-0.03	0.23	0.41	-0.31	0.29	0.06
4Q25	0.05	0.19	-0.36	0.20	0.04	0.20	0.43	-0.30	0.24	0.00
1Q26	0.01	0.25	-0.40	0.14	0.01	0.17	0.50	-0.31	0.19	-0.07
2Q26	-0.04	0.30	-0.45	0.13	-0.03	0.19	0.72	-0.32	0.14	-0.14

Source: Goldman Sachs Global Investment Research

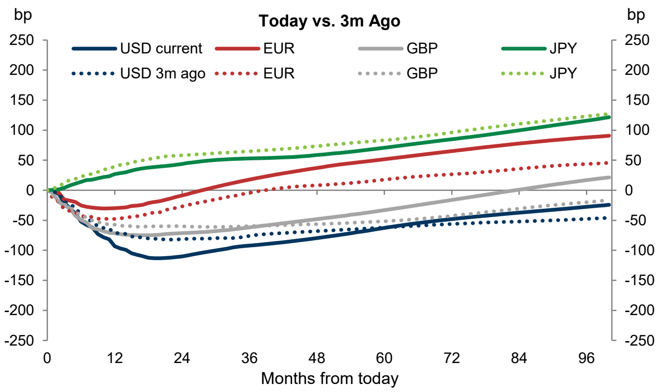
G4 Curve Forecast



Source: Bloomberg, Goldman Sachs Global Investment Research

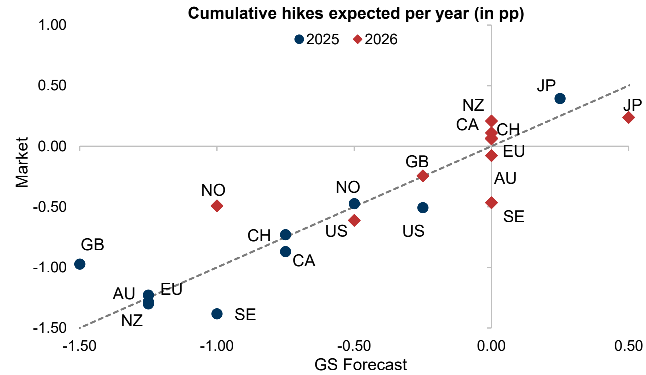
Central Bank Dashboard

Cumulative amount of hikes/cuts priced from today



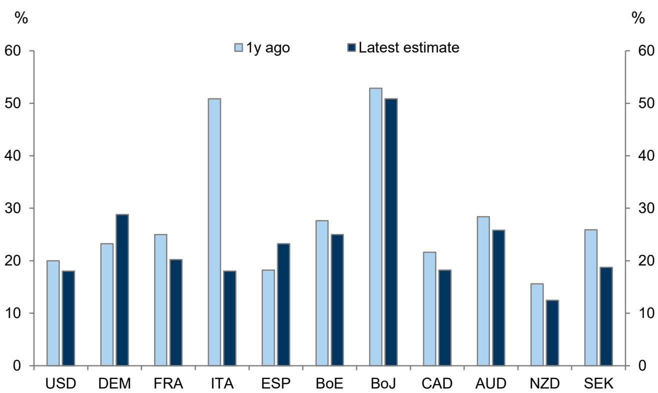
Source: Goldman Sachs Global Investment Research

Expected hikes by year, GS vs. Market



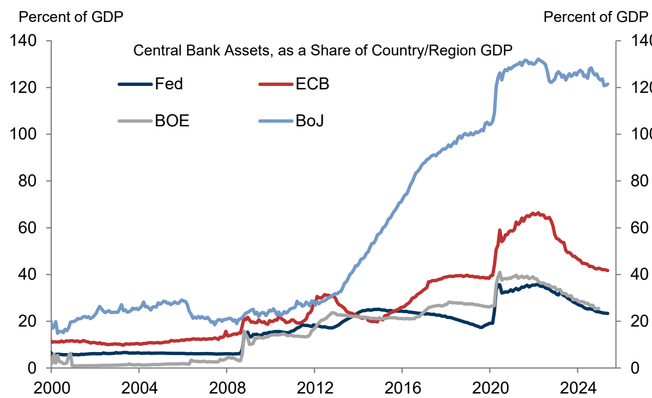
Source: Goldman Sachs Global Investment Research

Central bank ownership of sovereign bonds, current vs. 1y ago



Source: Haver Analytics

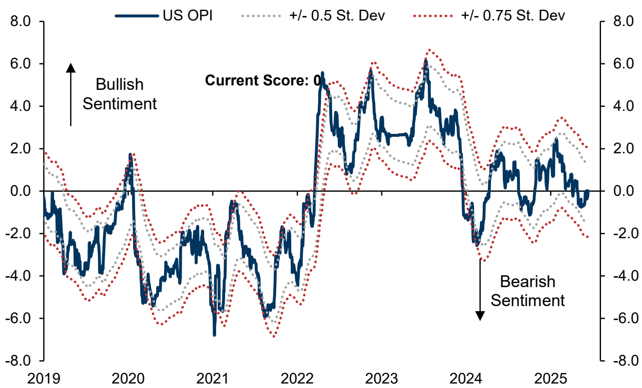
Central bank assets as a share of GDP



Source: Haver Analytics

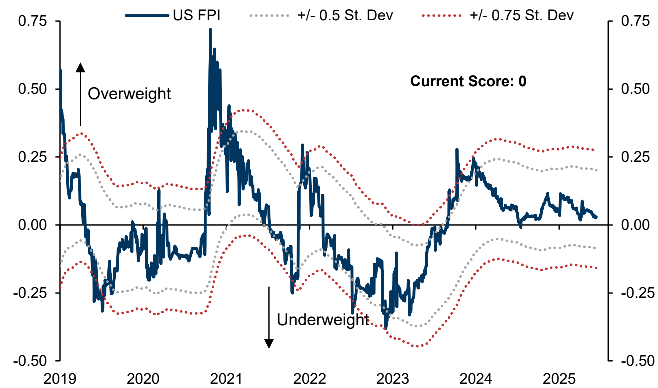
Positioning and Flows Monitor

Option implied position indicator



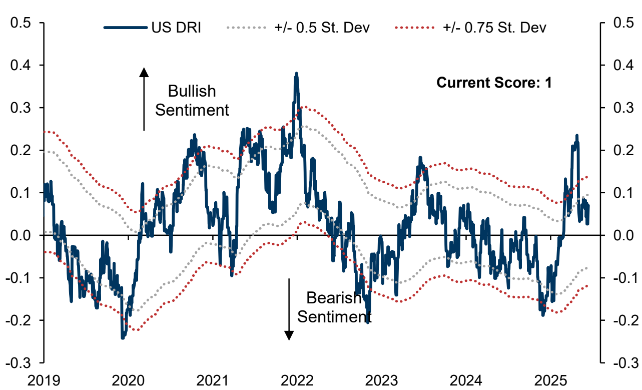
Source: Goldman Sachs Global Investment Research

GS Fund Positioning Indicator



Source: Goldman Sachs Global Investment Research

US Data Response Indicator (DRI)



Source: Goldman Sachs Global Investment Research

CFTC Commitment of Traders and Traders in Financial Futures

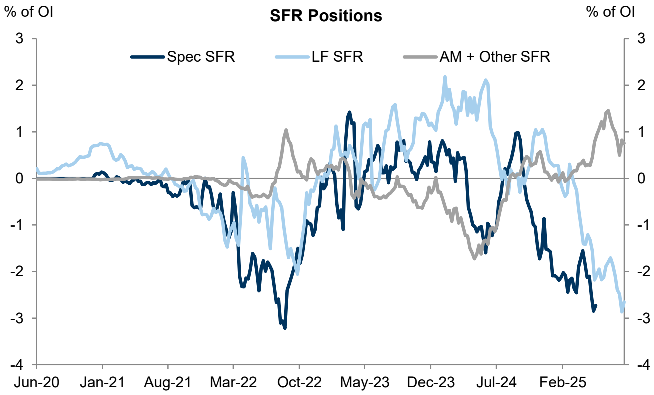
Duration-weighted net position by investor type

Duration-Weighted Positioning, by Contract

$mm/bp	SFR	TU	FV	TY	TN	US	WN
Spec Current	-34.1	-38.7	-99.7	-42.5	-32.0	-13.5	-40.8
Spec 1w Change	2.3	-1.0	-2.9	2.9	-6.2	-6.1	1.3
LF Current	-38.0	-59.1	-143.0	-120.8	-33.7	-64.4	-89.4
LF 1w Change	4.1	-0.1	-0.2	-2.4	-6.0	-3.5	8.3
AM + Other Current	15.0	61.5	166.4	136.0	53.8	75.3	100.7
AM + Other 1w Change	-1.5	2.2	3.5	0.5	7.1	5.4	5.3
Dealer Current	22.5	-6.5	-30.5	-19.6	-13.9	-22.9	-11.0
Dealer 1w Change	-3.0	1.6	-0.5	8.8	-0.3	-0.3	1.6

Source: CFTC, Goldman Sachs Global Investment Research

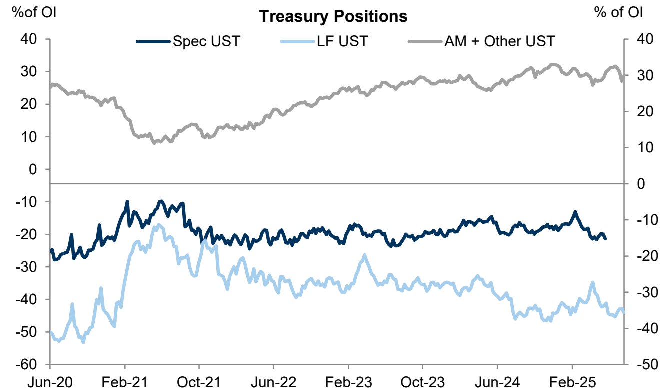
Net positions in Eurodollars



Note: Duration-weighted net position (long - short) as a % of duration-weighted gross exposure (long + short + spreading)

Source: CFTC, Goldman Sachs Global Investment Research

Net positions in UST futures

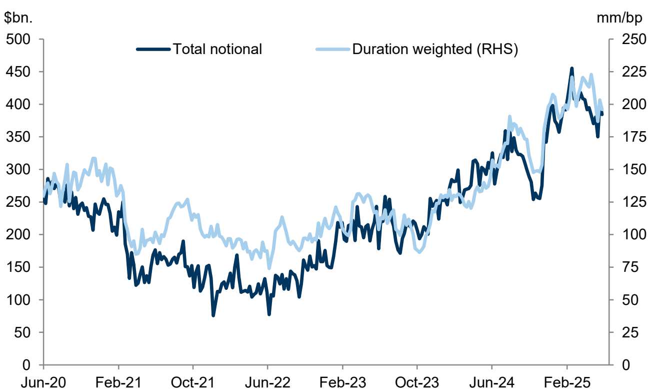


Note: Duration-weighted net position (long - short) as a % of duration-weighted gross exposure (long + short + spreading)

Source: CFTC, Goldman Sachs Global Investment Research

Primary dealer transactions

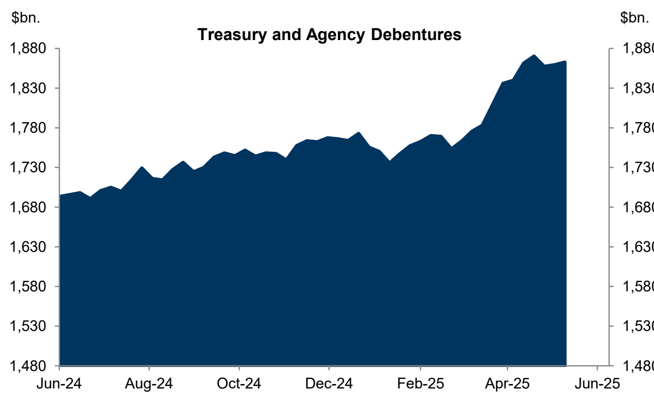
Net dealer position in US Treasuries



Source: Federal Reserve Bank of New York, Goldman Sachs Global Investment Research

US Commercial Banks' Holdings of Treasury and Agency Securities

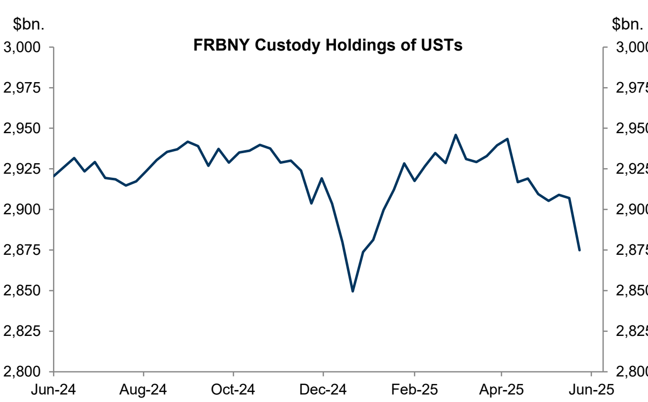
Total domestic and foreign holdings, all commercial banks



Source: Federal Reserve Board

NY Fed Custody Holdings

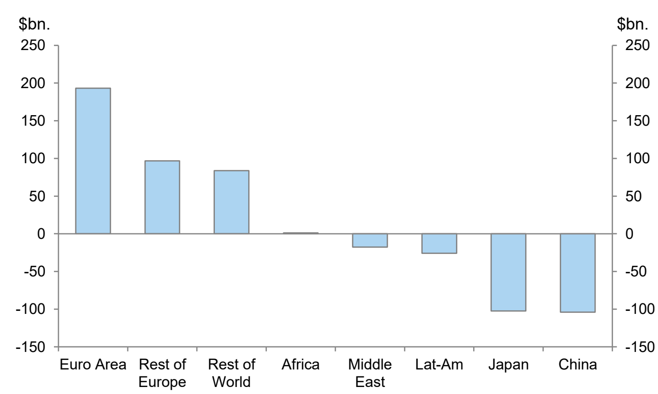
Marketable US Treasuries



Source: Federal Reserve Bank of New York

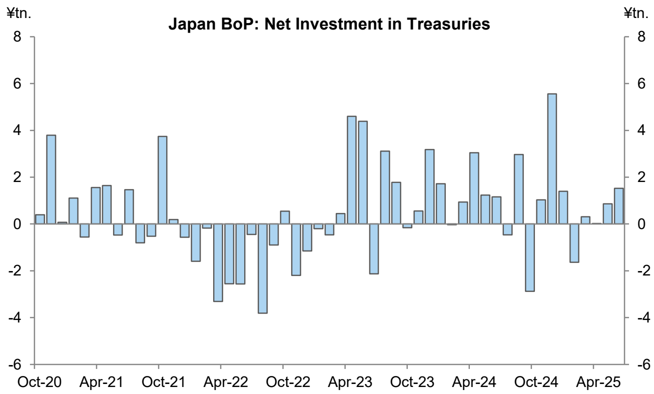
US TIC Treasury Flows

12m change in valuation-adjusted holdings of USTs, by holder of debt



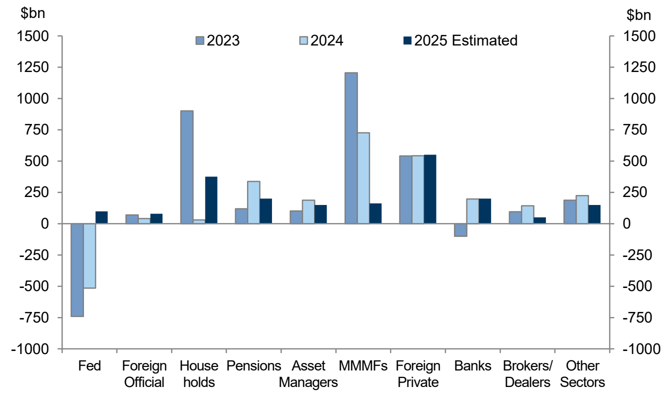
Source: US Treasury, Goldman Sachs Global Investment Research

Net monthly purchases of short and long term US Treasuries by Japanese investors



Source: Bank of Japan, Haver Analytics

Flow of Funds annual net purchases of US Treasuries, by sector

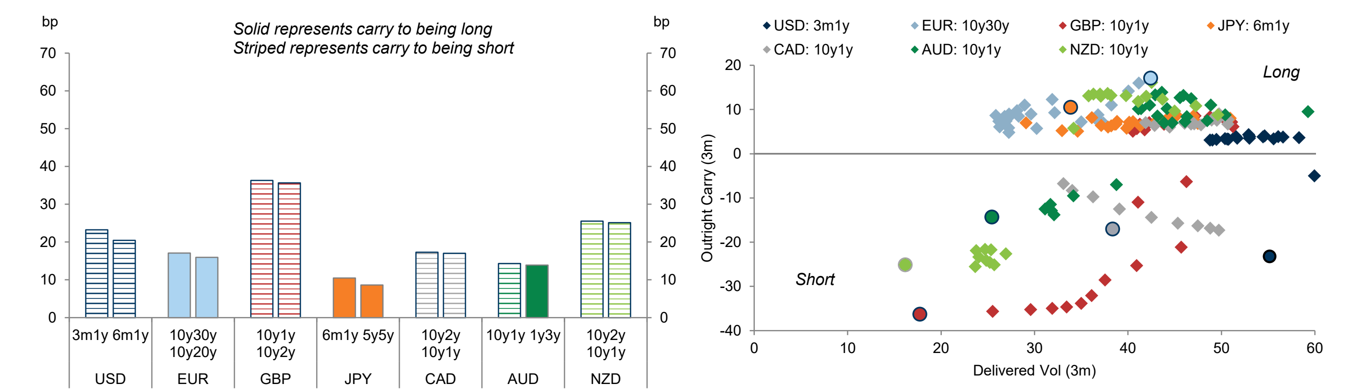


Source: Federal Reserve Board, Goldman Sachs Global Investment Research

Carry/Rolldown Monitor

Outright Carry

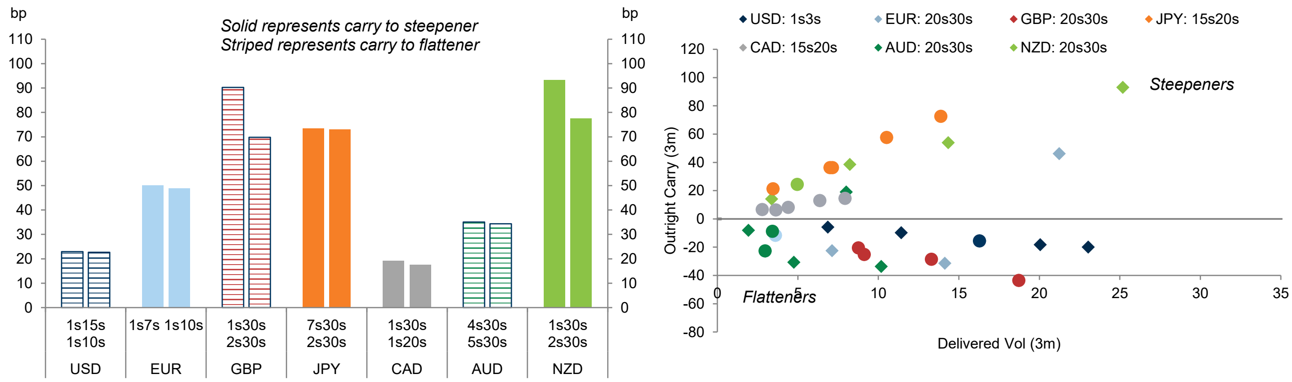
Bar chart shows top two carry points by currency, with solid reflecting carry to a long position and striped carry to a short position. Scatter illustrates top 25 carry/vol points by currency, with top point by currency noted



Source: Goldman Sachs Global Investment Research

Curve Carry

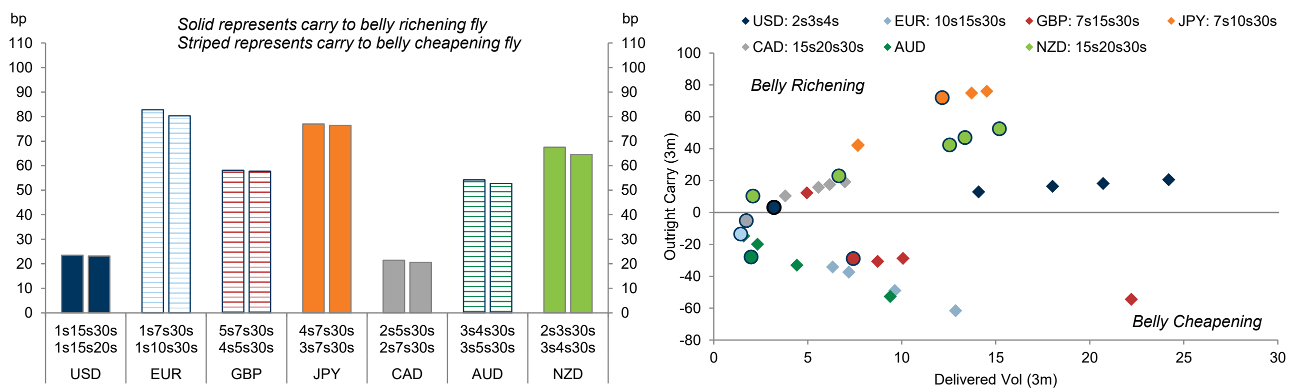
Bar chart shows top two carry curves by currency, with solid reflecting carry to a steepening position and striped carry to a flattening position. Scatter illustrates top 5 carry/vol curves by currency, with top curve by currency noted



Source: Goldman Sachs Global Investment Research

Fly Carry

Bar chart shows top two carry flies by currency, with solid reflecting carry to a belly-richening fly and striped carry to a belly-cheapening fly. Scatter illustrates top 5 carry/vol flies by currency, with top fly by currency noted.



Source: Goldman Sachs Global Investment Research

Treasury Supply Monitor

Gross Treasury auction size estimates by year end, with GS projections

Monthly Auction Amounts at End of Calendar Year ($ billions)	2y FRNs	2y	3y	5y	7y	10y	20y	30y	5y TIPS	10y TIPS	30y TIPS
YE-21 (CY)	26 / 24 (r)	56	54	57	56	39 / 36 (r)	23 / 20 (r)	25 / 22 (r)	19 / 17 (r)	16 / 14 (r)	9 / 8 (r)
YE-22 (CY)	24 / 22 (r)	42	40	43	35	35 / 32 (r)	15 / 12 (r)	21 / 18 (r)	21 / 19 (r)	17 / 15 (r)	9 / 8 (r)
YE-23 (CY)	28 / 26 (r)	57	50	58	40	40 / 37 (r)	16 / 13 (r)	24 / 21 (r)	22 / 20 (r)	17 / 15 (r)	9 / 8 (r)
YE-24 (CY)	30 / 28 (r)	69	58	70	44	42 / 39 (r)	16 / 13 (r)	25 / 22 (r)	24 / 22 (r)	19 / 17 (r)	9 / 8 (r)
YE-25 (CY, GS)	30 / 28 (r)	69	58	70	44	42 / 39 (r)	16 / 13 (r)	25 / 22 (r)	26 / 24 (r)	21 / 19 (r)	9 / 8 (r)
YE-26 (CY, GS)	32 / 30 (r)	79	68	80	54	46 / 43 (r)	18 / 15 (r)	27 / 24 (r)	27 / 25 (r)	23 / 21 (r)	10 / 9 (r)

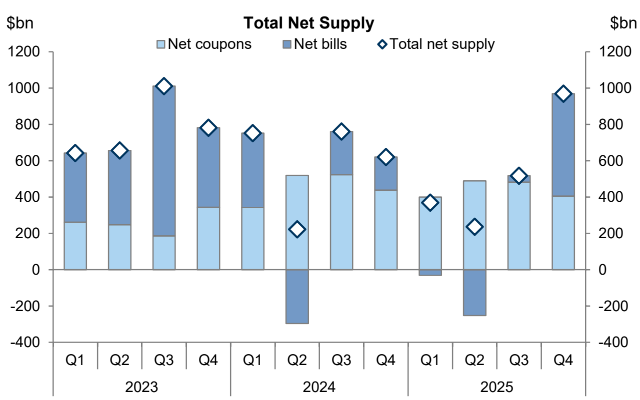
* Original Issue / Reopening listed for FRNs, 10s, 20s, 30s, and TIPS.

US Treasury Net Issuance by Calendar Year ($ billions)	Net Coupons	Fed	Net of Fed	Net Bills	Fed	Net of Fed
CY 2023	391	-648	1039	1978	-74	2053
CY 2024	1346	-475	1821	511	-23	534
CY 2025, GS	1730	-58	1789	316	12	304
CY 2026, GS	1612	198	1414	589	354	235

Duration supply ($bn 10y equiv)		
Gross supply	Fed	Net of Fed
2284	0	2284
2765	0	2765
2801	49	2752
2914	208	2707

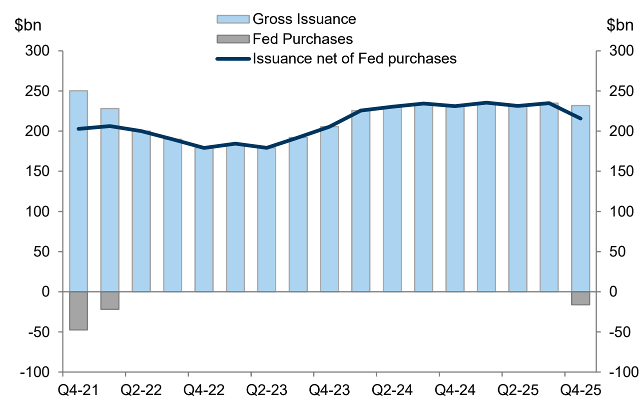
Source: Goldman Sachs Global Investment Research, US Department of the Treasury

Net issuance per quarter



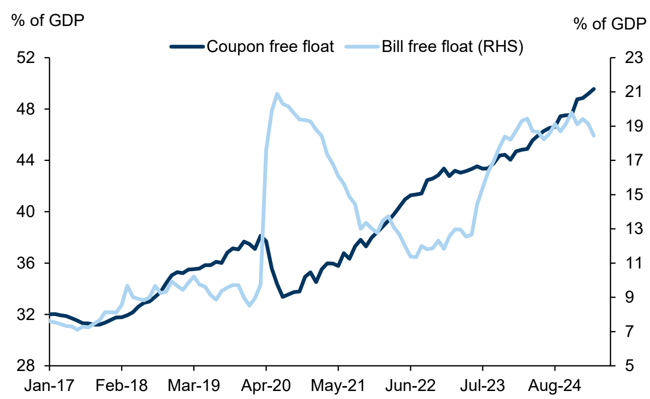
Source: Goldman Sachs Global Investment Research, US Department of the Treasury

Average monthly UST issuance, gross and net of Fed purchases; $bn 10y equivalents



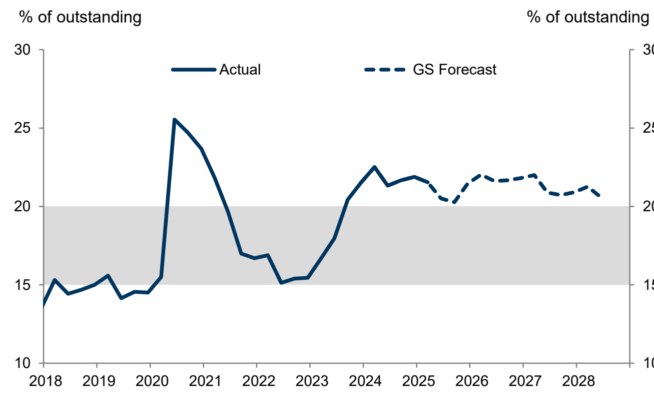
Source: Goldman Sachs Global Investment Research, US Department of the Treasury

Free float (Treasuries outstanding less Fed and foreign official holdings) as % of GDP



Source: Haver Analytics, US Treasury, Goldman Sachs Global Investment Research

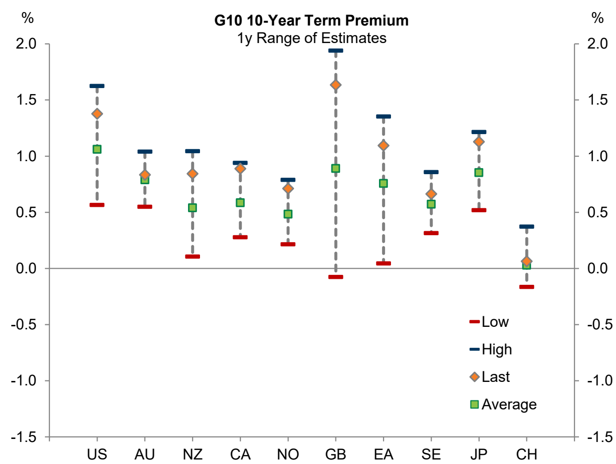
Bills as a share of Treasuries outstanding and GS forecast
Gray shading denotes TBAC recommended 15-20% range

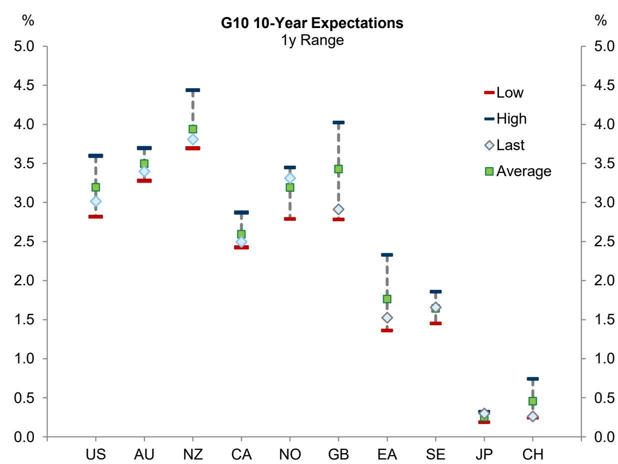


Source: US Treasury, Goldman Sachs Global Investment Research

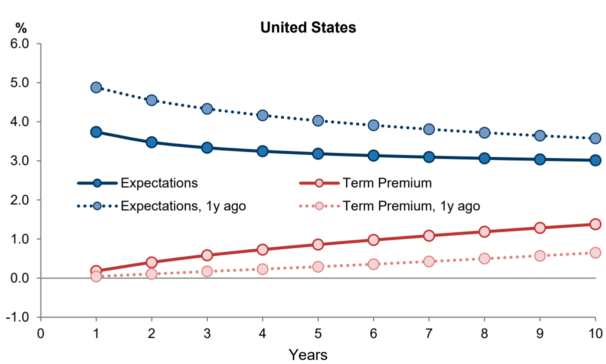
GS Term Premium Decomposition

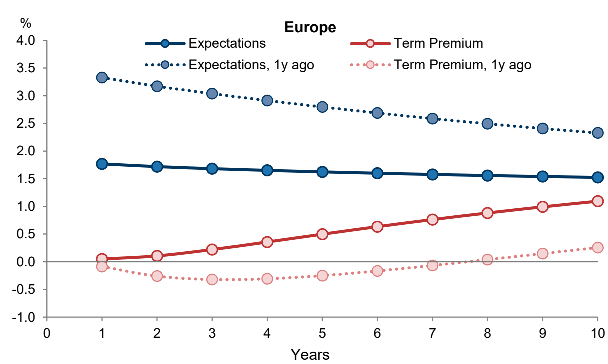
1y Range of G10 10y Yields, by Term Premium and Expectations Components

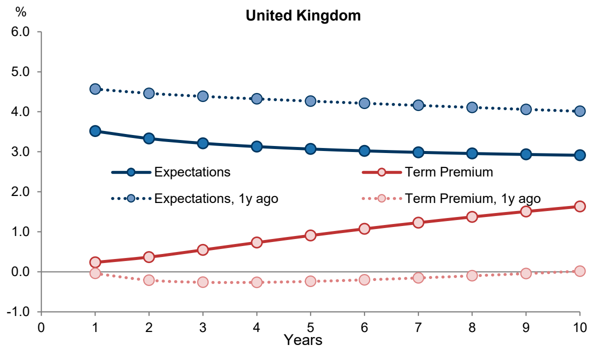


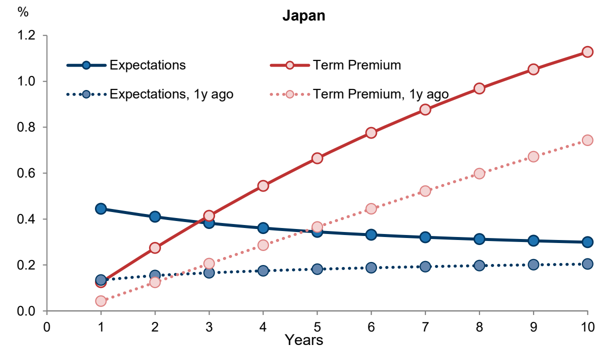


Term Structure of Fitted Yields, by Component









Source: Goldman Sachs Global Investment Research

2025 Trade Recommendations

GS Rates Trades						
Active	**Entry Date**	**Opened**	**Latest**	**Stop**	**Target**	**Performance**
1. Buy SFRZ5 96.25 put vs sell 0QZ5 96.25 put (in net premium)	07-Mar-25	-0.03	0.16	0.13	0.25	+19 bps
2. Long 3m10y USD payer on 3m 5s10s30s payer fly (return in bp running)	02-May-25	0.00	0.00	-0.05	0.10	+0 bps
3. Long 3y SOFR-UST swap spreads	02-May-25	-0.30	-0.27	-0.30	-0.23	+3 bps
4. Long 10y10y Gilts vs USTs	16-May-25	0.51	0.32	0.40	0.10	+19 bps
5. Receive December 2025 BoE meeting OIS	30-May-25	3.85	3.70	3.80	3.50	+15 bps
6. Long 5y TIPS vs short 0.7x 5y nominal UST	06-Jun-25	-1.13	-1.12	-1.05	-1.30	-1 bps
Closed	**Entry Date**	**Closed**	**Performance**			
1. Own 3y USTs vs SOFR	18-Nov-24	02-Jan-25	+5 bps			
2. Buy JPY 6m5y payer on 6m 2s5s10s payer fly	09-Aug-24	08-Jan-25	+7bps			
3. Sell USD 3m 2s10s curve cap	03-Jan-25	10-Jan-25	-6 bps			
4. Own 2y3y USTs vs SOFR	02-Jan-25	24-Jan-25	+4bps			
5. Own CORU5	17-Jan-25	31-Jan-25	+13bps			
6. Long 2y SEK IRS	17-Jan-25	31-Jan-25	+9bps			
7. Receive 5y5y AUD IRS vs pay CAD 5y5y	18-Nov-24	31-Jan-25	+1bp			
8. ERM5/Z5 flatteners	17-Jan-25	07-Feb-25	+5bps			
9. Buy USD 3m2y A-5/A-35bp receiver spreads (return in bp running)	19-Dec-24	13-Feb-25	-5 bps			
10. Pay 10s on weighted JPY 5s10s30s swap fly (weights 1.1x : 2x: 0.9x)	10-Jan-25	13-Feb-25	+10bps			
11. SFRZ5/Z6 flatteners	17-Jan-25	13-Feb-25	+7bps			
12. Receive June 2025 ECB OIS	07-Feb-25	18-Feb-25	-7 bps			
13. 2s5s CORRA steepeners vs 2s5s SOFR flatteners	31-Jan-25	28-Feb-25	+5bps			
14. Receive 2y1y on 1y1y/2y1y/5y5y SOFR fly	21-Feb-25	05-Mar-25	+7bps			
15. Long USD 5y5y ZC inflation swap and long 0.2x USD 5y5y OIS	06-Dec-24	06-Mar-25	-10 bps			
16. 10s30s TIPS breakeven steepeners	28-Feb-25	07-Mar-25	+2 bps			
17. UST-SOFR 3s5s30s belly cheapening flies	07-Mar-25	21-Mar-25	+2 bps			
18. Buy USD 6m5y A/A+30/A+60 payer fly	20-Sep-24	25-Mar-25	-5 bps			
19. Buy USD 6m5y straddle on 6m 2s5s10s straddle fly	08-Nov-24	28-Mar-25	0 bps			
20. 10s30s Gilt flatteners	31-Jan-25	28-Mar-25	-5 bps			
21. Long JPY 3m10y A/A+25bp payer spread (return in bp running)	14-Feb-25	01-Apr-25	+1 bps			
22. Pay 20s on 10s20s30s SOFR fly	18-Nov-24	04-Apr-25	+6 bps			
23. CORZ5/Z6 steepeners	07-Mar-25	04-Apr-25	+0 bps			
24. Buy 5y TIPS on a beta weighted basis versus nominals (1:0.75x)	21-Mar-25	04-Apr-25	+4 bps			
25. JPY 1y1y/2y1y swap steepener	21-Feb-25	04-Apr-25	-6 bps			
26. JGB 10s30s flattener	25-Apr-25	02-May-25	-14 bps			
27. Receive 5y AUD IRS vs pay 5y NZD	21-Feb-25	02-May-25	+1bp			
28. Pay 2y2y CORRA vs receive 2y2y SOFR	04-Apr-25	09-May-25	+8bps			
29. Sell 1x2 A/A+17 3m 2s10s curve cap spread	21-Mar-25	13-May-25	+2bps			
30. Receive July BoC meeting OIS	23-May-25	06-Jun-25	-5 bps			
31. Long 30y TIPS vs short 0.75x 30y nominal UST	17-Apr-25	06-Jun-25	+4 bps			

Note: Potential profit/loss estimates are given as per unit of duration risk, through yesterday's close.

Source: Goldman Sachs Global Investment Research

Disclosure Appendix

Reg AC

We, George Cole, William Marshall, Bill Zu, Simon Freycenet and Friedrich Schaper, hereby certify that all of the views expressed in this report accurately reflect our personal views, which have not been influenced by considerations of the firm's business or client relationships.

Unless otherwise stated, the individuals listed on the cover page of this report are analysts in Goldman Sachs' Global Investment Research division.

Disclosures

Option Specific Disclosures

Price target methodology: Please refer to the analyst's previously published research for methodology and risks associated with equity price targets.

Pricing Disclosure: Option prices and volatility levels in this note are indicative only, and are based on our estimates of recent mid-market levels(unless otherwise noted). All prices and levels exclude transaction costs unless otherwise stated.

General Options Risks – The risks below and any other options risks mentioned in this research report pertain both to specific derivative trade recommendations mentioned and to discussion of general opportunities and advantages of derivative strategies. Unless otherwise noted, options strategies mentioned in this report may be a combination of the strategies below and therefore carry with them the risks of those strategies.

Buying Options – Investors who buy call (put) options risk loss of the entire premium paid if the underlying security finishes below (above) the strike price at expiration. Investors who buy call or put spreads also risk a maximum loss of the premium paid. The maximum gain on a long call or put spread is the difference between the strike prices, less the premium paid.

Selling Options – Investors who sell calls on securities they do not own risk unlimited loss of the security price less the strike price. Investors who sell covered calls (sell calls while owning the underlying security) risk having to deliver the underlying security or pay the difference between the security price and the strike price, depending on whether the option is settled by physical delivery or cash-settled. Investors who sell puts risk loss of the strike price less the premium received for selling the put. Investors who sell put or call spreads risk a maximum loss of the difference between the strikes less the premium received, while their maximum gain is the premium received.

For options settled by physical delivery, the above risks assume the options buyer or seller, buys or sells the resulting securities at the settlement price on expiry.

Regulatory disclosures

Disclosures required by United States laws and regulations

See company-specific regulatory disclosures above for any of the following disclosures required as to companies referred to in this report: manager or co-manager in a pending transaction; 1% or other ownership; compensation for certain services; types of client relationships; managed/co-managed public offerings in prior periods; directorships; for equity securities, market making and/or specialist role. Goldman Sachs trades or may trade as a principal in debt securities (or in related derivatives) of issuers discussed in this report.

The following are additional required disclosures: **Ownership and material conflicts of interest:** Goldman Sachs policy prohibits its analysts, professionals reporting to analysts and members of their households from owning securities of any company in the analyst's area of coverage. **Analyst compensation:** Analysts are paid in part based on the profitability of Goldman Sachs, which includes investment banking revenues. **Analyst as officer or director:** Goldman Sachs policy generally prohibits its analysts, persons reporting to analysts or members of their households from serving as an officer, director or advisor of any company in the analyst's area of coverage. **Non-U.S. Analysts:** Non-U.S. analysts may not be associated persons of Goldman Sachs & Co. LLC and therefore may not be subject to FINRA Rule 2241 or FINRA Rule 2242 restrictions on communications with subject company, public appearances and trading securities held by the analysts.

Additional disclosures required under the laws and regulations of jurisdictions other than the United States

The following disclosures are those required by the jurisdiction indicated, except to the extent already made above pursuant to United States laws and regulations. **Australia:** Goldman Sachs Australia Pty Ltd and its affiliates are not authorised deposit-taking institutions (as that term is defined in the Banking Act 1959 (Cth)) in Australia and do not provide banking services, nor carry on a banking business, in Australia. This research, and any access to it, is intended only for "wholesale clients" within the meaning of the Australian Corporations Act, unless otherwise agreed by Goldman Sachs. In producing research reports, members of Global Investment Research of Goldman Sachs Australia may attend site visits and other meetings hosted by the companies and other entities which are the subject of its research reports. In some instances the costs of such site visits or meetings may be met in part or in whole by the issuers concerned if Goldman Sachs Australia considers it is appropriate and reasonable in the specific circumstances relating to the site visit or meeting. To the extent that the contents of this document contains any financial product advice, it is general advice only and has been prepared by Goldman Sachs without taking into account a client's objectives, financial situation or needs. A client should, before acting on any such advice, consider the appropriateness of the advice having regard to the client's own objectives, financial situation and needs. A copy of certain Goldman Sachs Australia and New Zealand disclosure of interests and a copy of Goldman Sachs' Australian Sell-Side Research Independence Policy Statement are available at: https://www.goldmansachs.com/disclosures/australia-new-zealand/index.html. **Brazil:** Disclosure information in relation to CVM Resolution n. 20 is available at https://www.gs.com/worldwide/brazil/area/gir/index.html. Where applicable, the Brazil-registered analyst primarily responsible for the content of this research report, as defined in Article 20 of CVM Resolution n. 20, is the first author named at the beginning of this report, unless indicated otherwise at the end of the text. **Canada:** This information is being provided to you for information purposes only and is not, and under no circumstances should be construed as, an advertisement, offering or solicitation by Goldman Sachs & Co. LLC for purchasers of securities in Canada to trade in any Canadian security. Goldman Sachs & Co. LLC is not registered as a dealer in any jurisdiction in Canada under applicable Canadian securities laws and generally is not permitted to trade in Canadian securities and may be prohibited from selling certain securities and products in certain jurisdictions in Canada. If you wish to trade in any Canadian securities or other products in Canada please contact Goldman Sachs Canada Inc., an affiliate of The Goldman Sachs Group Inc., or another registered Canadian dealer. **Hong Kong:** Further information on the securities of covered companies referred to in this research may be obtained on request from Goldman Sachs (Asia) L.L.C. **India:** Further information on the subject company or companies referred to in this research may be obtained from Goldman Sachs (India) Securities Private Limited, Research Analyst - SEBI Registration Number INH000001493, 951-A, Rational House, Appasaheb Marathe Marg, Prabhadevi, Mumbai 400 025, India, Corporate Identity Number U74140MH2006FTC160634, Phone +91 22 6616 9000, Fax +91 22 6616 9001. Goldman Sachs may beneficially own 1% or more of the securities (as such term is defined in clause 2 (h) the Indian Securities Contracts (Regulation) Act, 1956) of the subject company or companies referred to in this research report. Investment in securities market are subject to market risks. Read all the related documents carefully before investing. Registration granted by SEBI and certification from NISM in no way guarantee performance of the intermediary or provide any assurance of returns to investors. Goldman Sachs (India) Securities Private Limited compliance officer and investor grievance contact details can be found at this link:

https://publishing.gs.com/disclosures/hedge.html - /general/equity. **Japan:** See below. **Korea:** This research, and any access to it, is intended only for "professional investors" within the meaning of the Financial Services and Capital Markets Act, unless otherwise agreed by Goldman Sachs. Further information on the subject company or companies referred to in this research may be obtained from Goldman Sachs (Asia) L.L.C., Seoul Branch. **New Zealand:** Goldman Sachs New Zealand Limited and its affiliates are neither "registered banks" nor "deposit takers" (as defined in the Reserve Bank of New Zealand Act 1989) in New Zealand. This research, and any access to it, is intended for "wholesale clients" (as defined in the Financial Advisers Act 2008) unless otherwise agreed by Goldman Sachs. A copy of certain Goldman Sachs Australia and New Zealand disclosure of interests is available at: https://www.goldmansachs.com/disclosures/australia-new-zealand/index.html. **Russia:** Research reports distributed in the Russian Federation are not advertising as defined in the Russian legislation, but are information and analysis not having product promotion as their main purpose and do not provide appraisal within the meaning of the Russian legislation on appraisal activity. Research reports do not constitute a personalized investment recommendation as defined in Russian laws and regulations, are not addressed to a specific client, and are prepared without analyzing the financial circumstances, investment profiles or risk profiles of clients. Goldman Sachs assumes no responsibility for any investment decisions that may be taken by a client or any other person based on this research report. **Singapore:** Goldman Sachs (Singapore) Pte. (Company Number: 198602165W), which is regulated by the Monetary Authority of Singapore, accepts legal responsibility for this research, and should be contacted with respect to any matters arising from, or in connection with, this research. **Taiwan:** This material is for reference only and must not be reprinted without permission. Investors should carefully consider their own investment risk. Investment results are the responsibility of the individual investor. **United Kingdom:** Persons who would be categorized as retail clients in the United Kingdom, as such term is defined in the rules of the Financial Conduct Authority, should read this research in conjunction with prior Goldman Sachs research on the covered companies referred to herein and should refer to the risk warnings that have been sent to them by Goldman Sachs International. A copy of these risks warnings, and a glossary of certain financial terms used in this report, are available from Goldman Sachs International on request.

European Union and United Kingdom: Disclosure information in relation to Article 6 (2) of the European Commission Delegated Regulation (EU) (2016/958) supplementing Regulation (EU) No 596/2014 of the European Parliament and of the Council (including as that Delegated Regulation is implemented into United Kingdom domestic law and regulation following the United Kingdom's departure from the European Union and the European Economic Area) with regard to regulatory technical standards for the technical arrangements for objective presentation of investment recommendations or other information recommending or suggesting an investment strategy and for disclosure of particular interests or indications of conflicts of interest is available at https://www.gs.com/disclosures/europeanpolicy.html which states the European Policy for Managing Conflicts of Interest in Connection with Investment Research.

Japan: Goldman Sachs Japan Co., Ltd. is a Financial Instrument Dealer registered with the Kanto Financial Bureau under registration number Kinsho 69, and a member of Japan Securities Dealers Association, Financial Futures Association of Japan Type II Financial Instruments Firms Association, The Investment Trusts Association, Japan, and Japan Investment Advisers Association. Sales and purchase of equities are subject to commission pre-determined with clients plus consumption tax. See company-specific disclosures as to any applicable disclosures required by Japanese stock exchanges, the Japanese Securities Dealers Association or the Japanese Securities Finance Company.

Global product; distributing entities

Goldman Sachs Global Investment Research produces and distributes research products for clients of Goldman Sachs on a global basis. Analysts based in Goldman Sachs offices around the world produce research on industries and companies, and research on macroeconomics, currencies, commodities and portfolio strategy. This research is disseminated in Australia by Goldman Sachs Australia Pty Ltd (ABN 21 006 797 897); in Brazil by Goldman Sachs do Brasil Corretora de Títulos e Valores Mobiliários S.A.; Public Communication Channel Goldman Sachs Brazil: 0800 727 5764 and / or contatogoldmanbrasil@gs.com. Available Weekdays (except holidays), from 9am to 6pm. Canal de Comunicação com o Público Goldman Sachs Brasil: 0800 727 5764 e/ou contatogoldmanbrasil@gs.com. Horário de funcionamento: segunda-feira à sexta-feira (exceto feriados), das 9h às 18h; in Canada by Goldman Sachs & Co. LLC; in Hong Kong by Goldman Sachs (Asia) L.L.C.; in India by Goldman Sachs (India) Securities Private Ltd.; in Japan by Goldman Sachs Japan Co., Ltd.; in the Republic of Korea by Goldman Sachs (Asia) L.L.C., Seoul Branch; in New Zealand by Goldman Sachs New Zealand Limited; in Russia by OOO Goldman Sachs; in Singapore by Goldman Sachs (Singapore) Pte. (Company Number: 198602165W); and in the United States of America by Goldman Sachs & Co. LLC. Goldman Sachs International has approved this research in connection with its distribution in the United Kingdom.

Goldman Sachs International ("GSI"), authorised by the Prudential Regulation Authority ("PRA") and regulated by the Financial Conduct Authority ("FCA") and the PRA, has approved this research in connection with its distribution in the United Kingdom.

European Economic Area: GSI, authorised by the PRA and regulated by the FCA and the PRA, disseminates research in the following jurisdictions within the European Economic Area: the Grand Duchy of Luxembourg, Italy, the Kingdom of Belgium, the Kingdom of Denmark, the Kingdom of Norway, the Republic of Finland and the Republic of Ireland; GSI - Succursale de Paris (Paris branch) which is authorised by the French Autorité de contrôle prudentiel et de resolution ("ACPR") and regulated by the Autorité de contrôle prudentiel et de resolution and the Autorité des marches financiers ("AMF") disseminates research in France; GSI - Sucursal en España (Madrid branch) authorized in Spain by the Comisión Nacional del Mercado de Valores disseminates research in the Kingdom of Spain; GSI - Sweden Bankfilial (Stockholm branch) is authorized by the SFSA as a "third country branch" in accordance with Chapter 4, Section 4 of the Swedish Securities and Market Act (Sw. lag (2007:528) om värdepappersmarknaden) disseminates research in the Kingdom of Sweden; Goldman Sachs Bank Europe SE ("GSBE") is a credit institution incorporated in Germany and, within the Single Supervisory Mechanism, subject to direct prudential supervision by the European Central Bank and in other respects supervised by German Federal Financial Supervisory Authority (Bundesanstalt für Finanzdienstleistungsaufsicht, BaFin) and Deutsche Bundesbank and disseminates research in the Federal Republic of Germany and those jurisdictions within the European Economic Area where GSI is not authorised to disseminate research and additionally, GSBE, Copenhagen Branch filial af GSBE, Tyskland, supervised by the Danish Financial Authority disseminates research in the Kingdom of Denmark; GSBE - Sucursal en España (Madrid branch) subject (to a limited extent) to local supervision by the Bank of Spain disseminates research in the Kingdom of Spain; GSBE - Succursale Italia (Milan branch) to the relevant applicable extent, subject to local supervision by the Bank of Italy (Banca d'Italia) and the Italian Companies and Exchange Commission (Commissione Nazionale per le Società e la Borsa "Consob") disseminates research in Italy; GSBE - Succursale de Paris (Paris branch), supervised by the AMF and by the ACPR disseminates research in France; and GSBE - Sweden Bankfilial (Stockholm branch), to a limited extent, subject to local supervision by the Swedish Financial Supervisory Authority (Finansinpektionen) disseminates research in the Kingdom of Sweden.

General disclosures

This research is for our clients only. Other than disclosures relating to Goldman Sachs, this research is based on current public information that we consider reliable, but we do not represent it is accurate or complete, and it should not be relied on as such. The information, opinions, estimates and forecasts contained herein are as of the date hereof and are subject to change without prior notification. We seek to update our research as appropriate, but various regulations may prevent us from doing so. Other than certain industry reports published on a periodic basis, the large majority of reports are published at irregular intervals as appropriate in the analyst's judgment.

Goldman Sachs conducts a global full-service, integrated investment banking, investment management, and brokerage business. We have investment banking and other business relationships with a substantial percentage of the companies covered by Global Investment Research. Goldman Sachs & Co. LLC, the United States broker dealer, is a member of SIPC (https://www.sipc.org).

Our salespeople, traders, and other professionals may provide oral or written market commentary or trading strategies to our clients and principal trading desks that reflect opinions that are contrary to the opinions expressed in this research. Our asset management area, principal trading desks and investing businesses may make investment decisions that are inconsistent with the recommendations or views expressed in this research.

We and our affiliates, officers, directors, and employees will from time to time have long or short positions in, act as principal in, and buy or sell, the securities or derivatives, if any, referred to in this research, unless otherwise prohibited by regulation or Goldman Sachs policy.

The views attributed to third party presenters at Goldman Sachs arranged conferences, including individuals from other parts of Goldman Sachs, do not necessarily reflect those of Global Investment Research and are not an official view of Goldman Sachs.

Any third party referenced herein, including any salespeople, traders and other professionals or members of their household, may have positions in the products mentioned that are inconsistent with the views expressed by analysts named in this report.

This research is focused on investment themes across markets, industries and sectors. It does not attempt to distinguish between the prospects or performance of, or provide analysis of, individual companies within any industry or sector we describe.

Any trading recommendation in this research relating to an equity or credit security or securities within an industry or sector is reflective of the investment theme being discussed and is not a recommendation of any such security in isolation.

This research is not an offer to sell or the solicitation of an offer to buy any security in any jurisdiction where such an offer or solicitation would be illegal. It does not constitute a personal recommendation or take into account the particular investment objectives, financial situations, or needs of individual clients. Clients should consider whether any advice or recommendation in this research is suitable for their particular circumstances and, if appropriate, seek professional advice, including tax advice. The price and value of investments referred to in this research and the income from them may fluctuate. Past performance is not a guide to future performance, future returns are not guaranteed, and a loss of original capital may occur. Fluctuations in exchange rates could have adverse effects on the value or price of, or income derived from, certain investments.

Certain transactions, including those involving futures, options, and other derivatives, give rise to substantial risk and are not suitable for all investors. Investors should review current options and futures disclosure documents which are available from Goldman Sachs sales representatives or at https://www.theocc.com/about/publications/character-risks.jsp and https://www.fiadocumentation.org/fia/regulatory—disclosures/fia—uniform—futures—and—options—on—futures—risk—disclosures—booklet—pdf—version—2018. Transaction costs may be significant in option strategies calling for multiple purchase and sales of options such as spreads. Supporting documentation will be supplied upon request.

Differing Levels of Service provided by Global Investment Research: The level and types of services provided to you by Goldman Sachs Global Investment Research may vary as compared to that provided to internal and other external clients of GS, depending on various factors including your individual preferences as to the frequency and manner of receiving communication, your risk profile and investment focus and perspective (e.g., marketwide, sector specific, long term, short term), the size and scope of your overall client relationship with GS, and legal and regulatory constraints. As an example, certain clients may request to receive notifications when research on specific securities is published, and certain clients may request that specific data underlying analysts' fundamental analysis available on our internal client websites be delivered to them electronically through data feeds or otherwise. No change to an analyst's fundamental research views (e.g., ratings, price targets, or material changes to earnings estimates for equity securities), will be communicated to any client prior to inclusion of such information in a research report broadly disseminated through electronic publication to our internal client websites or through other means, as necessary, to all clients who are entitled to receive such reports.

All research reports are disseminated and available to all clients simultaneously through electronic publication to our internal client websites. Not all research content is redistributed to our clients or available to third-party aggregators, nor is Goldman Sachs responsible for the redistribution of our research by third party aggregators. For research, models or other data related to one or more securities, markets or asset classes (including related services) that may be available to you, please contact your GS representative or go to https://research.gs.com.

Disclosure information is also available at https://www.gs.com/research/hedge.html or from Research Compliance, 200 West Street, New York, NY 10282.