

Global Rates Notes: Debt Ceiling a Modest Tailwind to Funding Costs and Spreads

- The start of 2025 brings the end of the debt limit suspension period. Treasury likely won't have to dip into its extraordinary measures until the middle of January, but from that point it will generally have to operate under the constraints of cash on hand plus available extraordinary measures until there is a resolution. The deadline for debt limit action is likely not until July or August 2025.
- Debt ceiling limitations mean that until there is a deal there will be less bill supply and higher levels of broad liquidity than would have been the case otherwise. The TGA is historically high compared to past instances when the debt ceiling has been reached. If there is no resolution in the first half of the year, we expect the TGA drawdown would more than fully offset the draining of liquidity via QT alongside meaningfully negative bill supply.
- Past debt limit impasses have more often than not corresponded to tighter swap spreads and dollar funding costs. Some of this likely reflects differences in TGA dynamics ahead of pre-pandemic experiences, however, with potential for a more favorable picture this time around. That said, the rates market appears to anticipate this in to a significant degree, pricing easier funding conditions in the first half of the year. We retain a long spread bias, but favor shifting from spot 3y into 2y3y UST-SOFR swap spread wideners.

The start of 2025 brings with it the end of the debt limit suspension period on January 2, some 19-months after the suspension began. A last minute attempt to raise the debt limit preemptively alongside the year-end spending agreement fell short, though Republican leaders committed to raise the debt limit by \$1.5tn as part of a 2025 reconciliation bill. While Congress may attempt to address the debt limit early in the year, the deadline for action is likely July or August 2025. Until there is a resolution, Treasury will generally have to operate under the constraints of cash on hand plus available extraordinary measures.

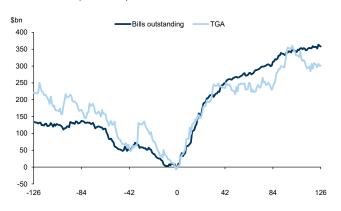
We estimate Treasury will start out with slightly more than \$1tn in headroom, reflecting the sum of the Treasury's cash balance plus extraordinary measures available up front. As Treasury Secretary Yellen noted in a <u>letter to Congress</u>, it likely won't be until the middle of January that Treasury actually has to start dipping into its extraordinary measures thanks to redemptions of nonmarketable securities on January 2. In addition to the capacity available to begin with, we assume some incremental headroom will come available each month alongside a more sizeable boost at mid-year.

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

Gustavo Pereira +1(917)343-3214 | gustavo.pereira@gs.com Goldman Sachs & Co. LLC There is uncertainty as to how exactly Treasury will manage its available levers—i.e. the pace at which it draws down the TGA versus depleting extraordinary measures via higher net marketable borrowing. Still, the overall effect will be less bill supply and higher levels of broad liquidity (thanks to a lower TGA) in the system than the counterfactual of no constraint. Exhibit 1 illustrates the average change in T-bills outstanding and cash balances normalized to past debt-limit resolutions (using a sample since 2011). On average bill supply falls by about \$130bn and the TGA drops roughly \$225bn in the 6 months into an agreement. The subsequent rebuild tends to be somewhat faster—on average bills outstanding and the TGA both reverse that decline within the month or two following a resolution.

Exhibit 1: Typical declines in bill supply and the TGA tend to be more gradual than the eventual rebound following a debt ceiling resolution

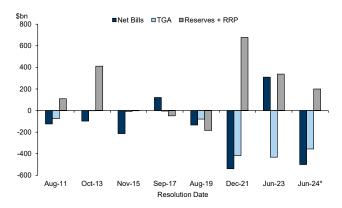
Average change in T-bills outstanding and TGA in 6m into/out of debt limit resolutions (2011-2023)



Source: Treasury, Goldman Sachs Global Investment Research

Exhibit 2: Even if the debt limit is resolved ahead of the x-date, the drop in bill supply and the TGA would likely be elevated by historical debt limit standards

Net bill supply and change in reserves plus RRP from when debt limit reached to point of resolution



*assumes end Q2 resolution for illustrative purposes

Source: Federal Reserve, Treasury, Goldman Sachs Global Investment Research

Compared to when Treasury has reached the debt ceiling in the past, the TGA will be starting off at a considerably higher level (the prior highs were around \$450bn in both 2021 and 2023). Even under an end-Q2 resolution (somewhat ahead of our estimated x-date), we expect the TGA drawdown would be comparable to the 2021 and 2023 experiences when cash balances fell roughly \$425bn in the window between reaching the debt ceiling and resolution (Exhibit 2). A process that drags into Q3 could see TGA fall significantly further still as July and August tend to be seasonally large deficit months. We estimate meaningful bill paydowns in the \$400 to \$600bn range over the first two quarters in this scenario, on par with the paydown observed in 2021 (also Exhibit 2).

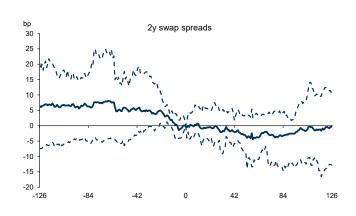
Balance sheet runoff means, however, that a given TGA drawdown is likely to translate to a smaller build in overall liquidity in the system (measured as reserves plus RRP)—we expect this would rise roughly \$150-250bn through mid-year under our <u>OT baseline</u> assuming no resolution ahead of then. As with the scope for a larger TGA drawdown, a more protracted process that spills into the second half of the year could see a sharper rise in overall liquidity that exceeds what was seen in 2023 when injections from the Bank Term Funding Program also helped offset the impact of QT. Conversely, a later tapering and/or end to QT than our baseline would dampen any potential rise in liquidity.

Absent any debt limit constraint, we expect bill supply would be roughly flat alongside a roughly \$350bn draining of overall liquidity from the system in the first half of the year.

Intuition would argue that backdrop of more liquidity and less collateral should be supportive of swap spreads and easier funding conditions. That has not necessarily been the case, however. 2y swap spreads have exhibited a tightening bias through past debt ceiling resolutions, compressing about 5bp on average in the months leading up to a deal (Exhibit 3). 2021 stands out as the instance in which swap spreads widened materially during the window when the debt limit posed a constraint, with that instance also corresponding to below-average pressure on measures of dollar funding costs as well (Exhibit 4). Still, for the most part, term dollar funding conditions in both repo and cross currency bases have tended to tighten during periods when the debt limit has been binding.

Exhibit 3: 2y swap spreads have tended to exhibit a tightening bias through past debt ceiling resolutions

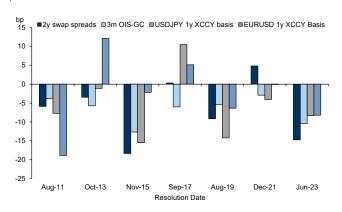
Average change in 2y UST-OIS swap spreads w/ max and min in 6m prior to and following debt limit resolution (2011-2023)



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

Exhibit 4: Across spreads and measures of dollar funding cost the bias is towards tightening while debt ceiling measures are in effect

Change in swap spreads and USD funding costs (negative = tighter spreads, more expensive USD funding) from when debt limit reached to point of resolution



Source: Goldman Sachs Global Investment Research, Goldman Sachs Global Investment Research

The overarching evidence suggests that a debt limit impasse does not reliably support easier dollar funding conditions. Some of this, especially pre-Covid, is possibly attributable to the fact that TGA balances had to be quite low heading into the end of a debt limit suspension period, which may have front-loaded some of these effects, leaving dynamics somewhat more varied in the period after reaching the debt limit. For example, pre-Covid, 2013 was the only instance that saw a particularly significant rise in liquidity in the system, and that was due primarily to QE. Indeed, we observe that with the exception of 2023, swap spreads were flat to wider alongside stable to easier secured funding costs in the three months prior to reaching the debt limit (Exhibit 5). It's also possible that precautionary measures and/or anticipation of a rebuild in supply following a resolution tend to see a premium build in term funding costs heading into an eventual deal.

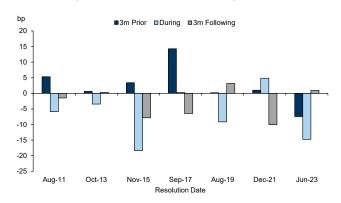
We think that the higher starting level for the TGA and magnitude of any potential bill paydown should at least support a more benign first half of the year in dollar funding conditions than would have been the case otherwise, dampening the tightening bias in

swap spreads that have prevailed in prior debt ceiling episodes. Our rough rule of thumb is that a \$100bn rise in liquidity from current levels is worth 0.5bp to SOFR-FF, while a \$100bn drop in bills outstanding is worth about 0.1bp. That said, the market prices that in to a large degree, with most SOFR-FF tightening backloaded into the second half of the year (Exhibit 6); we think this leaves vulnerability to a faster resolution of the debt limit (or a later/slower ending of QT). It's also worth noting that balance sheet capacity constraints (rather than the overall level of liquidity) have played a greater role in driving volatility in funding markets over the last year—these may ease now that year-end is behind us, but not because of the debt limit.

We've favored being long 3y swap spreads on account of our outlook for valuations, carry, and demand considerations. We remain comfortable retaining a long spread bias, but given the widening in spot swap spreads and easier funding conditions priced into the near-term already, we prefer shifting into forward space where recent outperformance has been less pronounced (both on an outright basis and versus our valuation framework). We close our 3y swap spread widener for a potential gain of 5bp and add a 2y3y swap spread widener (entry: -47bp, target: -37bp, stop: -52bp).

Exhibit 5: Widening in spreads has typically been more reliable prior to hitting the debt ceiling

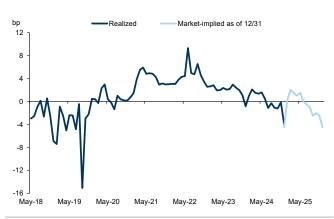
Change in 2y swap spreads in 3m prior to reaching debt ceiling, between hitting it and resolution, and 3m following resolution



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

Exhibit 6: The market prices easier funding conditions in the first half of the year before an eventual tightening

Realized and futures-implied spread between FF and SOFR



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

As a final consideration, we noted previously that Treasury tends to rebuild the TGA fairly quickly upon resolution, suggesting risks of a swift undoing of any tailwinds in funding and spread markets. The intersection of this episode with the more mature phase of Fed QT may see Treasury proceed somewhat more cautiously in eventually returning the TGA to target, however, particularly with Treasury's "steady-state" TGA target somewhat higher than it was pre-pandemic. August-September 2019 is perhaps the closest point of comparison—QT had ended, and the mid-September jump in the TGA coincided with the surge in funding market volatility that prompted Fed liquidity injections. While the end point would ultimately be the same, a more gradual replenishing of Treasury's cash balance would reduce the risk of excessive volatility that could arise from quickly withdrawing liquidity from the system.

Goldman Sachs Global Rates Notes

Disclosure Appendix

Reg AC

We, William Marshall and Gustavo Pereira, 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

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 Investor Grievance E-mail: india-client-support@gs.com. Compliance Officer: Anil Rajput |Tel: + 91 22 6616 9000 | Email: anil.m.rajput@gs.com. 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

Goldman Sachs Global Rates Notes

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.

Goldman Sachs Global Rates Notes

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_1/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.

© 2025 Goldman Sachs.

You are permitted to store, display, analyze, modify, reformat, and print the information made available to you via this service only for your own use. You may not resell or reverse engineer this information to calculate or develop any index for disclosure and/or marketing or create any other derivative works or commercial product(s), data or offering(s) without the express written consent of Goldman Sachs. You are not permitted to publish, transmit, or otherwise reproduce this information, in whole or in part, in any format to any third party without the express written consent of Goldman Sachs. This foregoing restriction includes, without limitation, using, extracting, downloading or retrieving this information, in whole or in part, to train or finetune a machine learning or artificial intelligence system, or to provide or reproduce this information, in whole or in part, as a prompt or input to any such system.