Goldman Sachs Research

Portfolio Strategy Research
1 June 2026 | 5:01AM BST

GOAL POSITIONING

Tracking positioning in the Tech rally

- **Our sentiment and positioning indicator has stabilized around the 59th-ile, at elevated levels but below historical peaks.** It has been supported by a rising Risk Appetite Indicator (>1 for the last 3 weeks), lower volatility, higher call/put ratios and bullish positioning in equities from long-only investors (NAAIM is at the highest level in 2026) through both futures and flows. However, surveys have turned less optimistic and fixed income flows remain skewed to safety: YTD inflows in defensive fixed income are the highest (US government bonds, Asia IG, linkers – Exhibit 8), while they were weaker for the riskier HY bonds.
- **Re-risking has been unusually fast and narrow, with particular focus on global Tech stocks.** Global hedge funds' net leverage rose from below 70% to above 80% in less than two months – the strongest acceleration since 'Liberation Day' (Exhibit 1). Hedge funds have doubled down on the AI trade, lifting their net exposure to IT by +853 bp – the largest quarterly increase on record – while keeping gross leverage elevated (Exhibit 61). The Tech optimism also further boosted US equities, with both foreign and domestic flows in the region (Exhibit 28). Options positioning in US Tech and Semis has returned to the top percentile of the 5-year range after a sharp rebound, with elevated spot/vol correlation (Exhibit 2).
- **Retail flows into Tech stocks have also picked up**. Retail participation and inflows into Tech-exposed segments such as Semiconductor stocks (constituents of the SOX) have surged to cycle highs (Exhibit 3). In Korea and Taiwan, domestic retail flows have similarly climbed to near historical highs, offsetting ongoing foreign outflows (Exhibit 4). Asset managers' Nasdaq futures net positioning is at highs, while leveraged funds remain short, likely due to more single stock exposure (Exhibit 5). Investors increasingly use leveraged instruments linked to the 'AI-trade' – assets in leveraged ETFs linked to AI and Tech themes have surged, with exposures in the US and Korea/Taiwan rising sharply – more than doubling in recent months (Exhibit 6).
- **Broad cross-asset signals are also shifting less defensive.** Risk-off skew has compressed across most asset classes (Exhibit 57), with some pockets of caution persisting in credit (e.g. HYG). Risk reversals point to a weakened impulse for USD upside versus the previous weeks, particularly versus selective G10 (e.g. NOK – Exhibit 47), and overall speculative positioning in the US

Christian Mueller-Glissmann, CFA
+44(20)7774-1714 | christian.mueller-glissmann@gs.com
Goldman Sachs International

Alessandro Giglio
+44(20)7051-6240 |
alessandro.giglio@gs.com
Goldman Sachs International

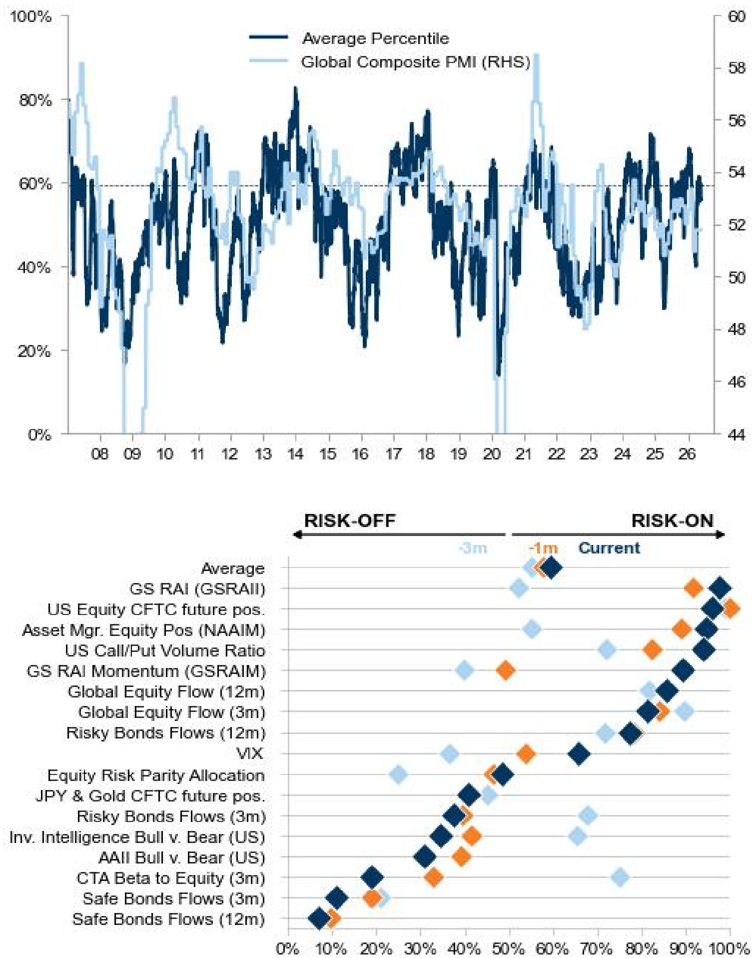
Andrea Ferrario
+44(20)7552-4353 |
andrea.ferrario@gs.com
Goldman Sachs International

Giovanni Ferrannini
+44(20)7051-2589 |
giovanni.ferrannini@gs.com
Goldman Sachs International

Peter Oppenheimer
+44(20)7552-5782 |
peter.oppenheimer@gs.com
Goldman Sachs International

Dollar is broadly neutral (Exhibit 46). Gold futures positioning continued to moderate (Exhibit 44), while it remains very elevated in other commodities, such as Copper (Exhibit 50).

Our positioning and sentiment indicator stabilized to the 59th-ile

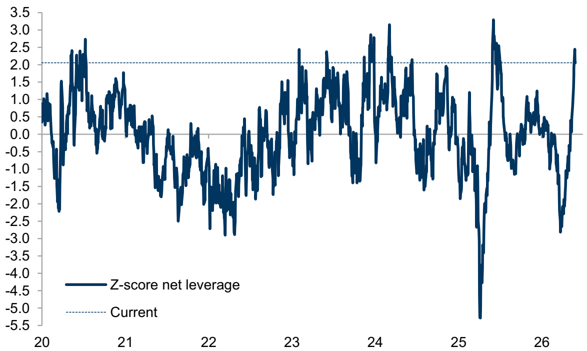


Source: Datastream, Haver Analytics, Goldman Sachs Global Investment Research

6 charts we are watching:Tracking positioning in the Tech rally

Exhibit 1: Net leverage increased with the fastest velocity since 'Liberation Day'

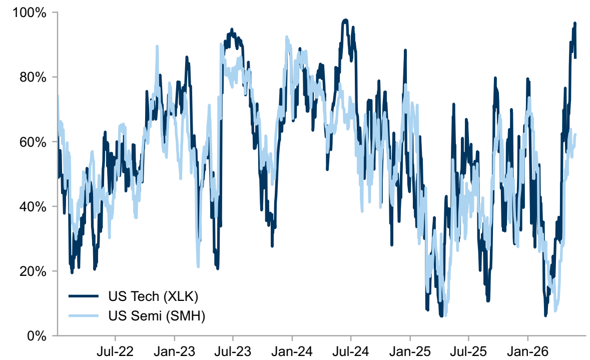
2y Z-score of chg. since April. Global hedge funds net leverage.



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

Exhibit 2: Option positioning in US-Tech ETF is very bullish

5y percentile of option positioning* in US Tech and Semi.

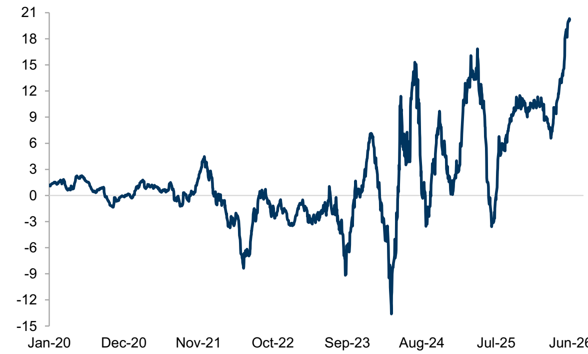


*Average across call/put volume (2w), call skew (25d) and spot/vol correlation.

Source: Bloomberg, Goldman Sachs Global Investment Research

Exhibit 3: Semiconductor stocks have been much in focus for retail investors

30d rolling net flows, daily data in $bn, since 2019. Sum of the net notional (retail buy-sell) for the 30 constituents in the PHLX Semiconductor (SOX).



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

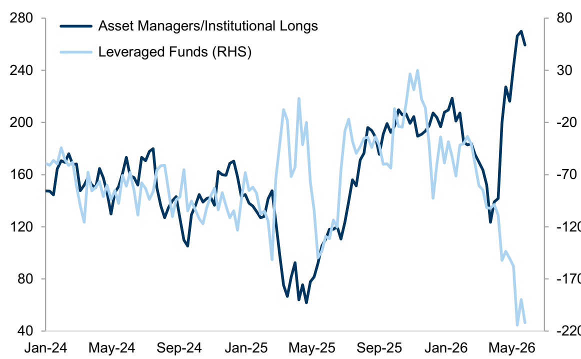
Exhibit 4: Retail investors in South Korea counterbalanced foreign investors' outflows

KOSPI ETF: 8w rolling ($bn), domestic retail net purchases

Source: Haver Analytics, Korea Exchange, Goldman Sachs Global Investment Research

Exhibit 5: Positioning in Tech has diverged across long-only managers and leveraged funds

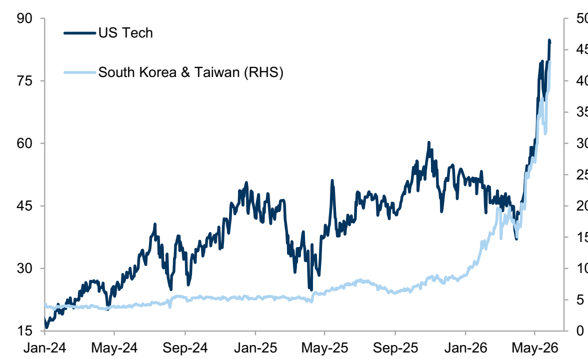
Net positioning in $bn on CME Nasdaq 100 consolidated, weekly data, futures only.



Source: CFTC, Haver Analytics, Goldman Sachs Global Investment Research

Exhibit 6: Leveraged ETFs' assets more than doubled in the last two months

Total net assets, in $bn



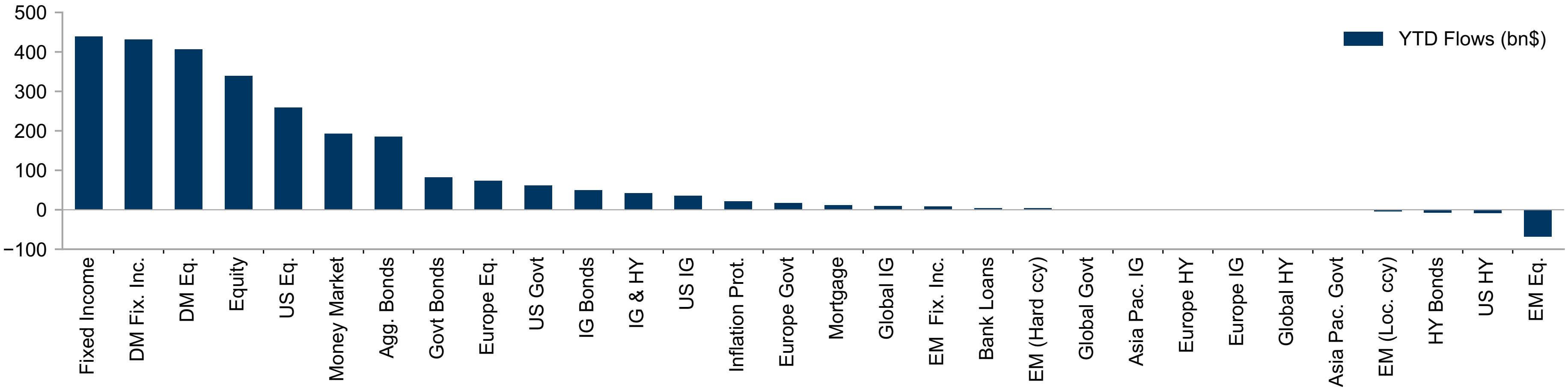
573 leveraged equity ETFs on US equities (AuM 174bn$), 52 ETFs on South Korea (AuM 30bn$) and 11 on Taiwan (AuM 7.7bn$).

Source: EPFR, Goldman Sachs Global Investment Research

Cross-Asset Global Fund Flows: YTD

Exhibit 7: Cross-asset YTD global fund flows ($bn)

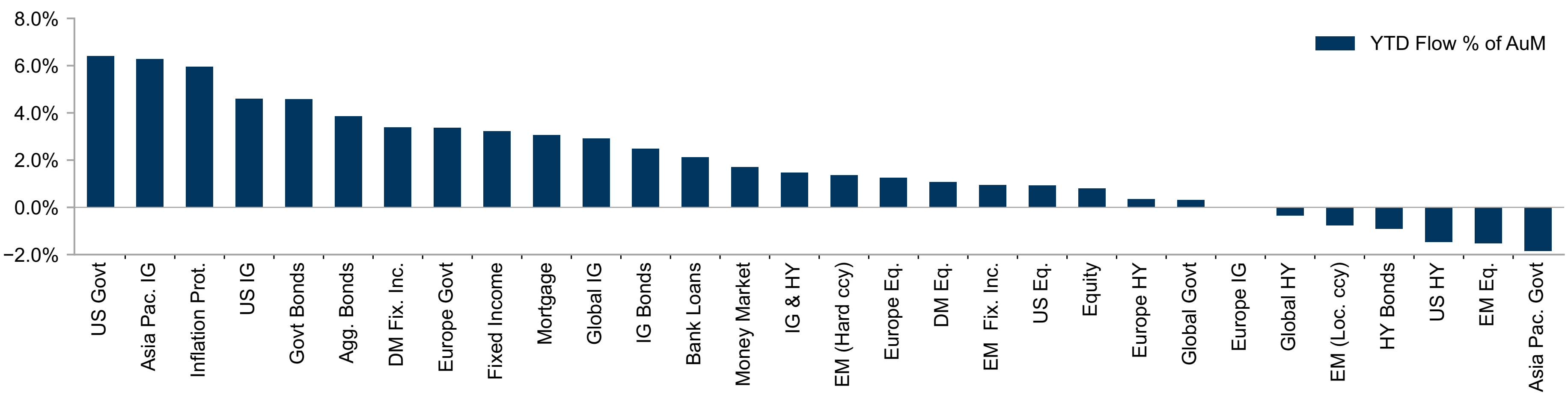
Monthly flows ($bn). MTD sum of weekly flows when monthly not yet available



Source: EPFR, Haver, Goldman Sachs Global Investment Research

Exhibit 8: Cross-asset YTD global fund flows as a percentage of AuM

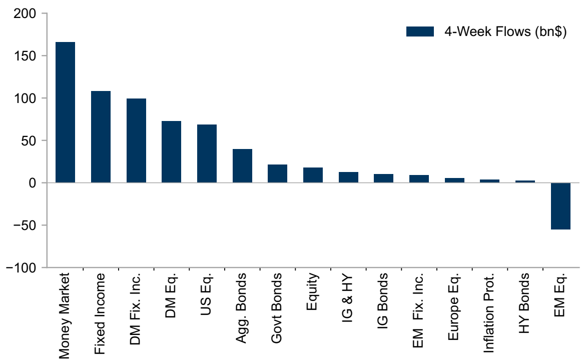
Monthly flows. MTD sum of weekly flows when monthly not yet available



Source: EPFR, Haver, Goldman Sachs Global Investment Research

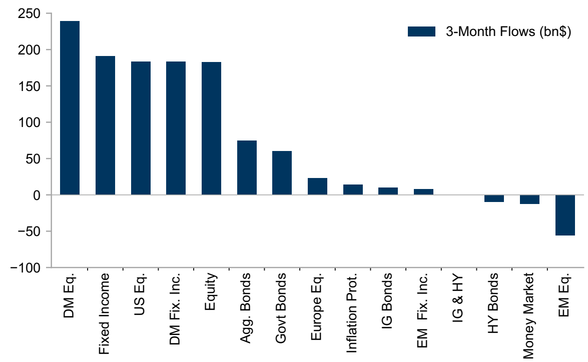
Cross-Asset Global Fund Flows: 4-week, 3-month, 12-month

Exhibit 9: 4-week cross-asset global fund flows ($bn)
All funds reporting weekly



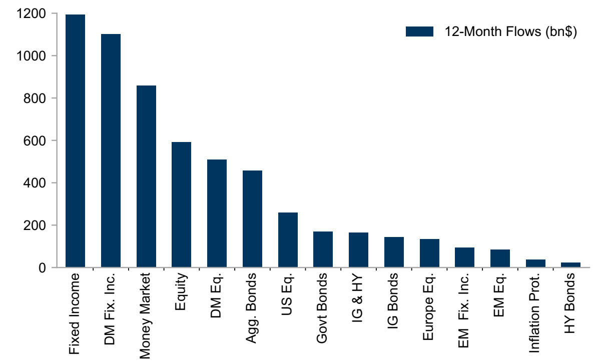
Source: EPFR, Haver, Goldman Sachs Global Investment Research

Exhibit 10: 3-month cross-asset global fund flows ($bn)
Monthly flows ($bn). MTD sum of weekly flows when monthly not yet available



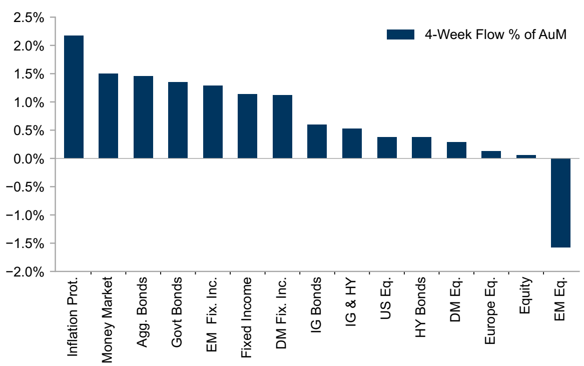
Source: EPFR, Haver, Goldman Sachs Global Investment Research

Exhibit 11: 12-month cross-asset global fund flows ($bn)
Monthly flows ($bn). MTD sum of weekly flows when monthly not yet available



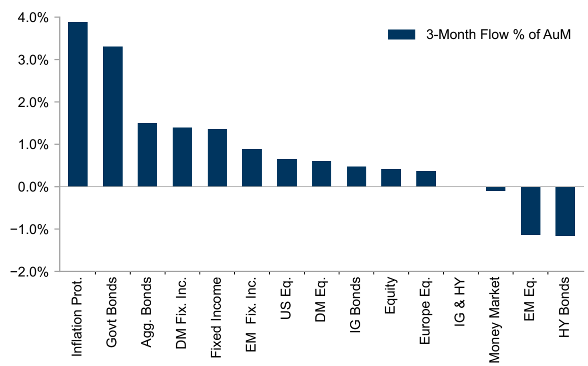
Source: EPFR, Haver, Goldman Sachs Global Investment Research

Exhibit 12: 4-week cross-asset global fund flows as a percentage of AuM
All funds reporting weekly



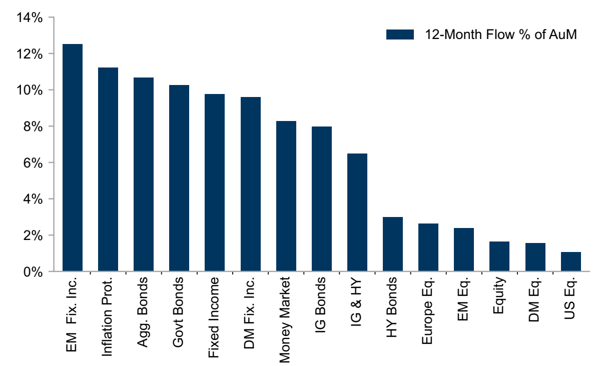
Source: EPFR, Haver, Goldman Sachs Global Investment Research

Exhibit 13: 3-month cross-asset global fund flows as a percentage of AuM
Monthly flows. MTD sum of weekly flows when monthly not yet available



Source: EPFR, Haver, Goldman Sachs Global Investment Research

Exhibit 14: 12-month cross-asset global fund flows as a percentage of AuM
Monthly flows. MTD sum of weekly flows when monthly not yet available

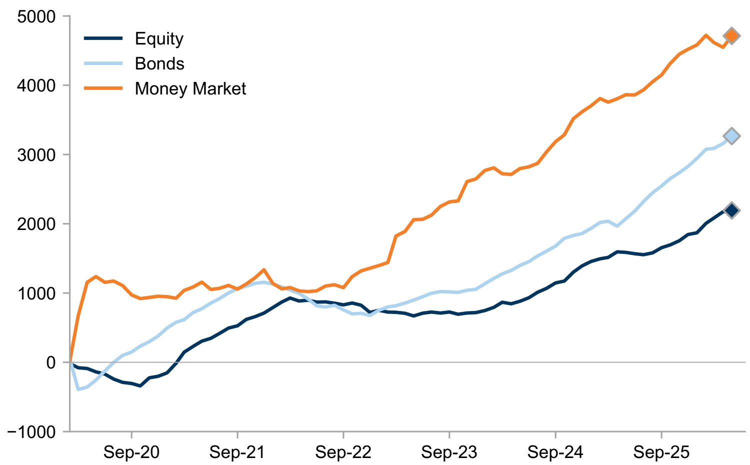


Source: EPFR, Haver, Goldman Sachs Global Investment Research

Cross-Asset Global Fund Flows: Cumulative & 1-month rolling by asset class and region

Exhibit 15: Cumulative global fund flows across assets

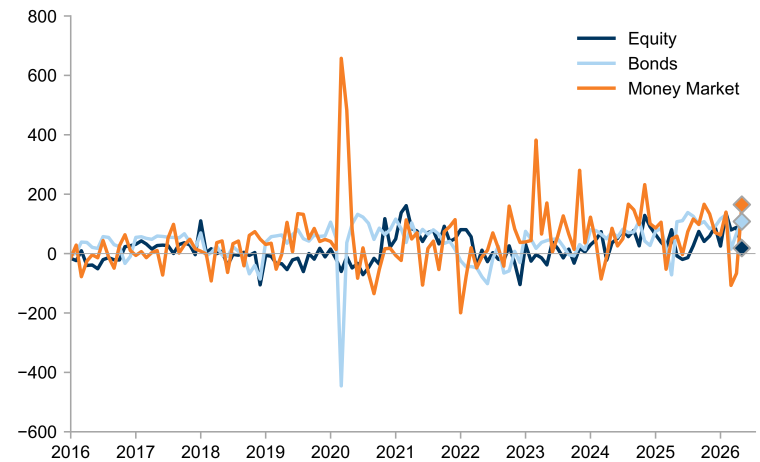
Monthly flows ($bn). MTD sum of weekly flows when monthly not yet available



Source: EPFR, Haver, Goldman Sachs Global Investment Research

Exhibit 16: 1-month global fund flows across assets

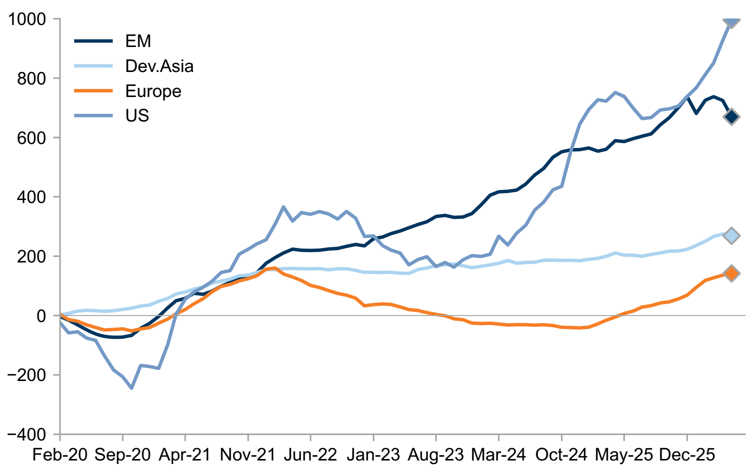
Monthly flows ($bn). MTD sum of weekly flows when monthly not yet available



Source: EPFR, Haver, Goldman Sachs Global Investment Research

Exhibit 17: Cumulative global equity fund flows across regions

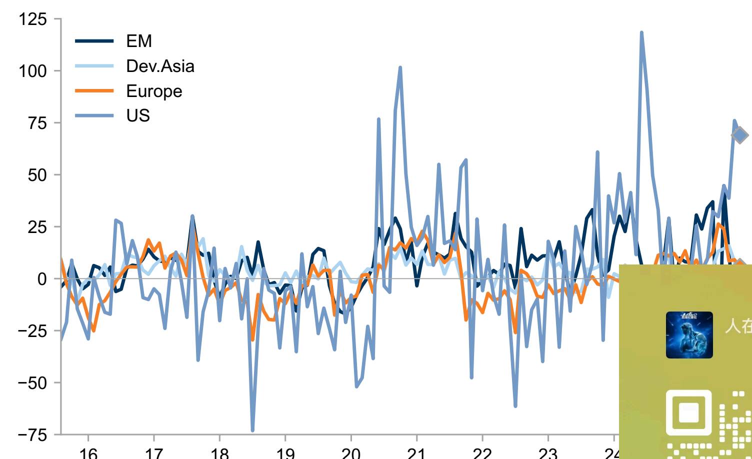
Monthly flows ($bn). MTD sum of weekly flows when monthly not yet available



Source: EPFR, Haver, Goldman Sachs Global Investment Research

Exhibit 18: 1-month global equity fund flows across regions

Monthly flows ($bn). MTD sum of weekly flows when monthly not yet available



Source: EPFR, Haver, Goldman Sachs Global Investment Research

Cross-Asset Global Fund Flows: Risky vs. Safe Assets

Exhibit 19: Risky vs. safe assets: 1-month rolling globalund flows

Monthly flows ($bn). MTD sum of weekly flows when monthly not yet available

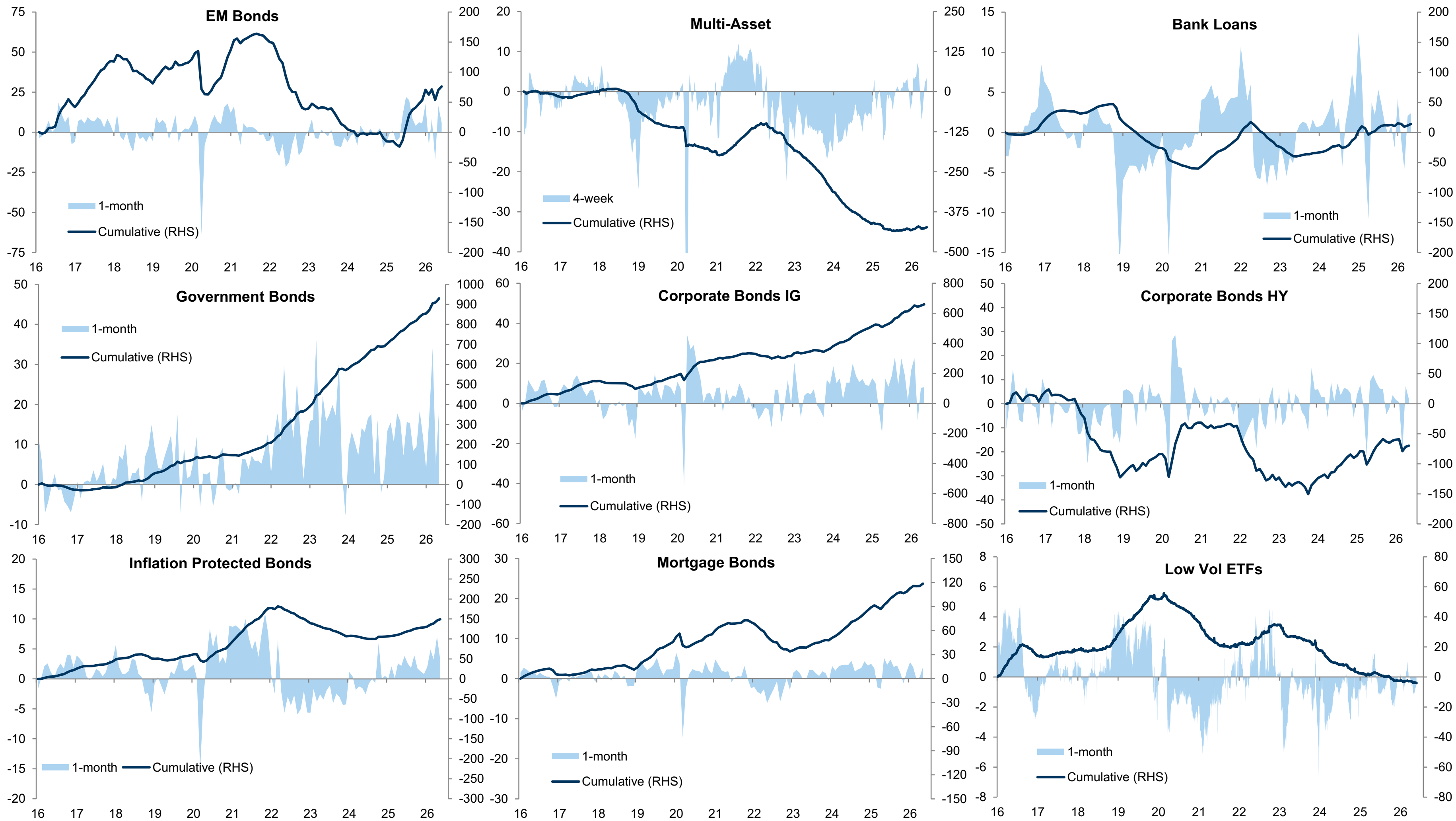
Exhibit 20: Risky vs. safe assets: 3-month rolling globalund flows

Monthly flows ($bn). MTD sum of weekly flows when monthly not yet available

Cross-Asset Global Fund Flows: Cumulative & 1-month

Exhibit 23: Cumulative and 1-month rolling global fund flows ($bn)

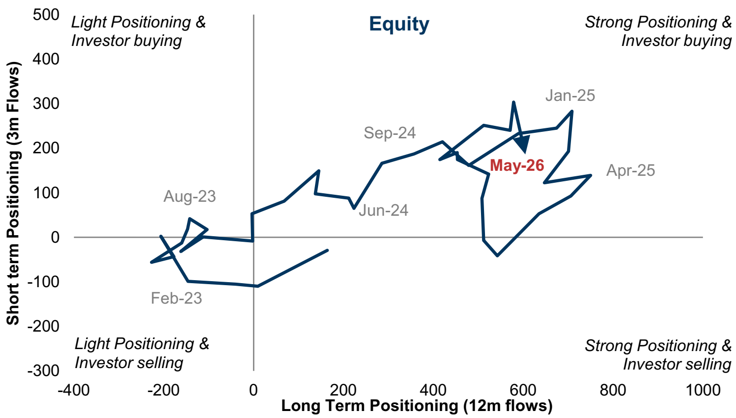
Monthly flows ($bn). MTD sum of weekly flows when monthly not yet available. Weekly flows for Multi-Asset and Low Vol ETFs



Source: EPFR, Haver, Goldman Sachs Global Investment Research

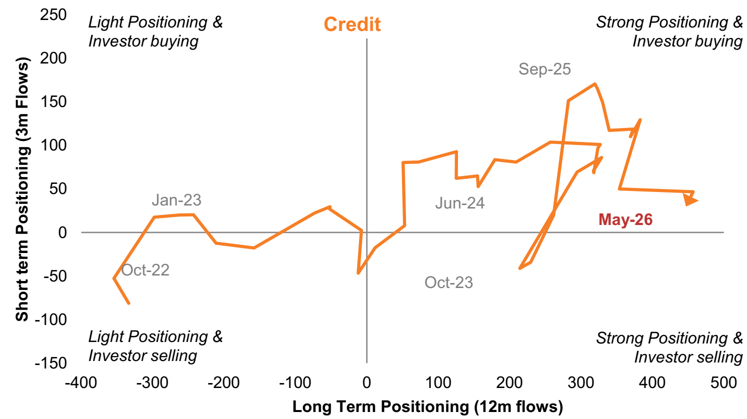
Cross-Asset Global Fund Flows: Fund Flows Cycle Across Assets

Exhibit 24: Equity: short- & long-term global fund flow cycle
Monthly data until Apr-26, 4-week sum for May-26



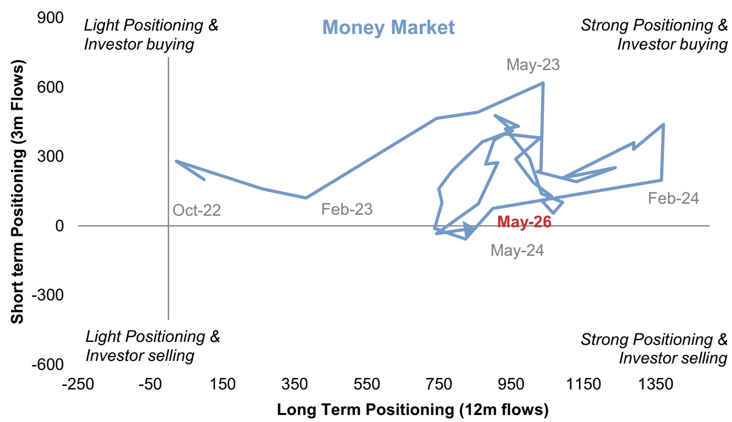
Source: EPFR, Haver Analytics, Goldman Sachs Global Investment Research

Exhibit 25: Credit: short- & long-term global fund flow cycle
Monthly data until Apr-26, 4-week sum for May-26



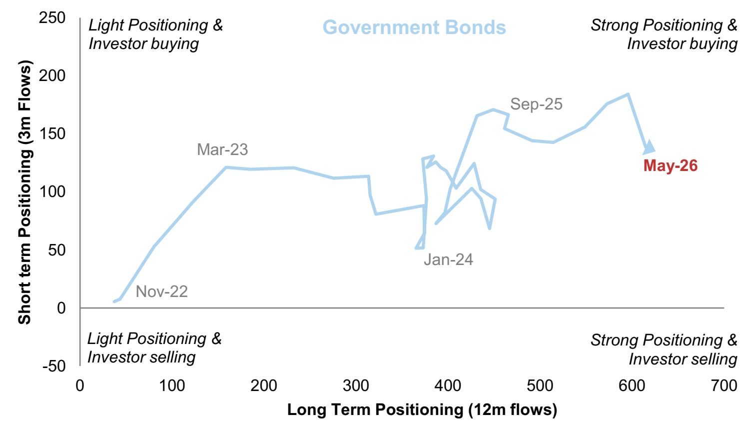
Source: EPFR, Haver, Goldman Sachs Global Investment Research

Exhibit 26: Money market: short- & long-term global fund flow cycle
Monthly data until Apr-26, 4-week sum for May-26



Source: EPFR, Haver, Goldman Sachs Global Investment Research

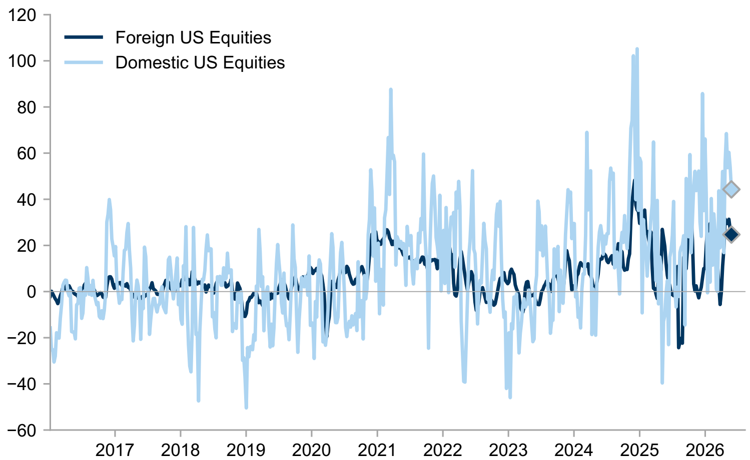
Exhibit 27: Government bonds: short- & long-term global fund flow cycle
Monthly data until Apr-26, 4-week sum for May-26



Source: EPFR, Haver, Goldman Sachs Global Investment Research

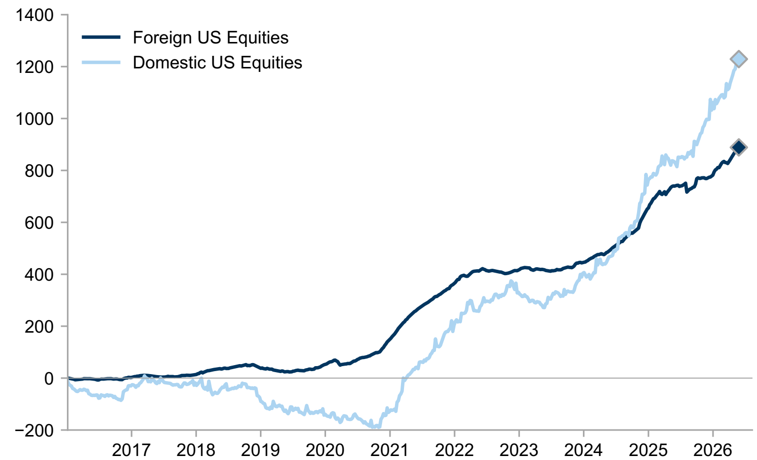
Equity Global Fund Flows: Foreign/Domestic Investor Flows

Exhibit 28: US equity foreign/domestic 4-week global fund flows



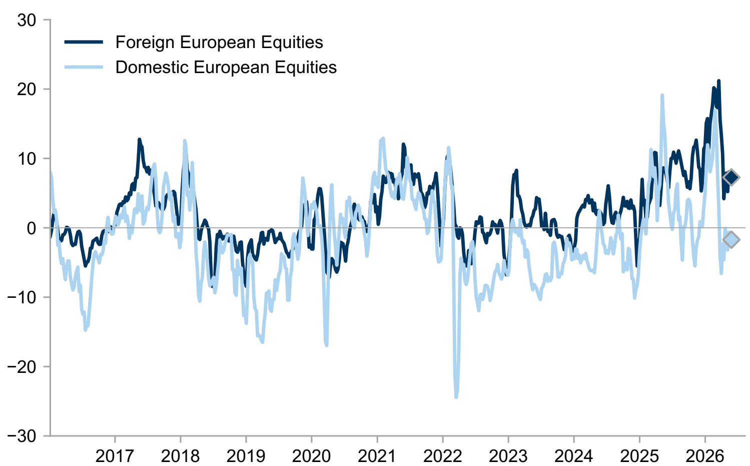
Source: EPFR, Haver, Goldman Sachs Global Investment Research

Exhibit 29: US equity foreign/domestic cumulative fund flows



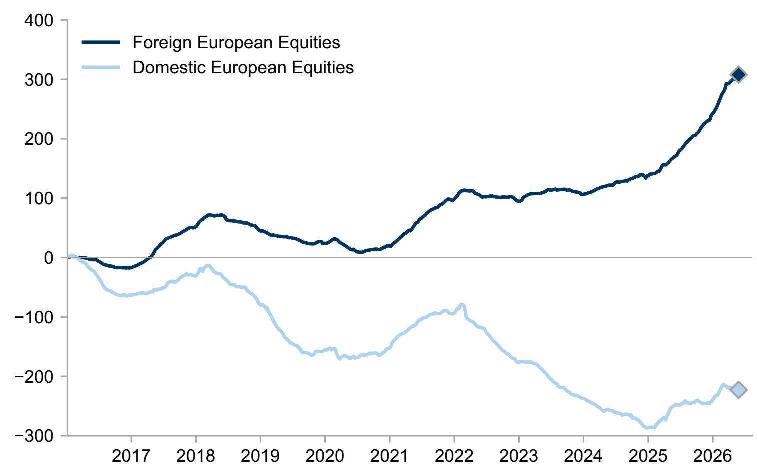
Source: EPFR, Haver, Goldman Sachs Global Investment Research

Exhibit 30: European equity foreign/domestic 4-week global fund flows



Source: EPFR, Haver, Goldman Sachs Global Investment Research

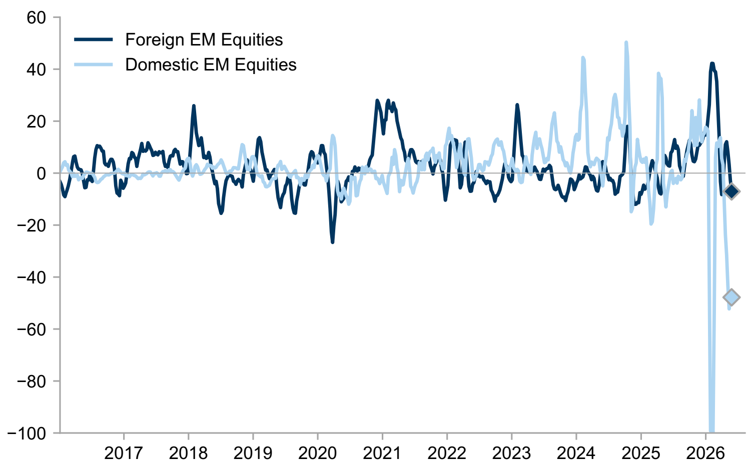
Exhibit 31: European equity foreign/domestic cumulative global fund flows



Source: EPFR, Haver, Goldman Sachs Global Investment Research

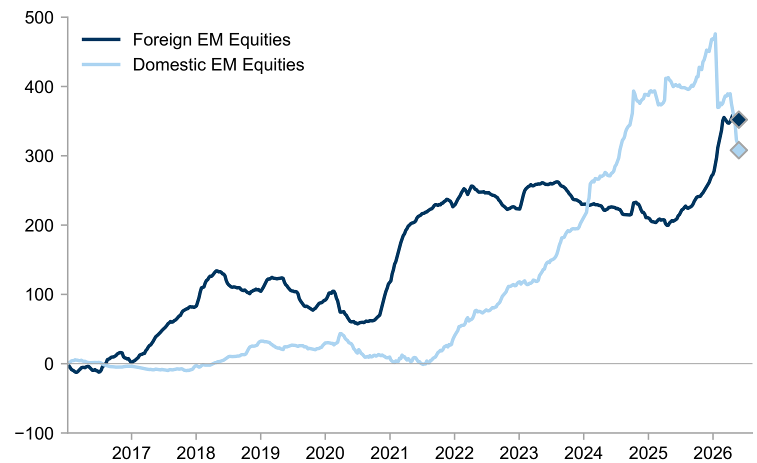
Equity Global Fund Flows: Foreign/Domestic Investor Flows

Exhibit 32: EM equity foreign/domestic 4-week global fund flows



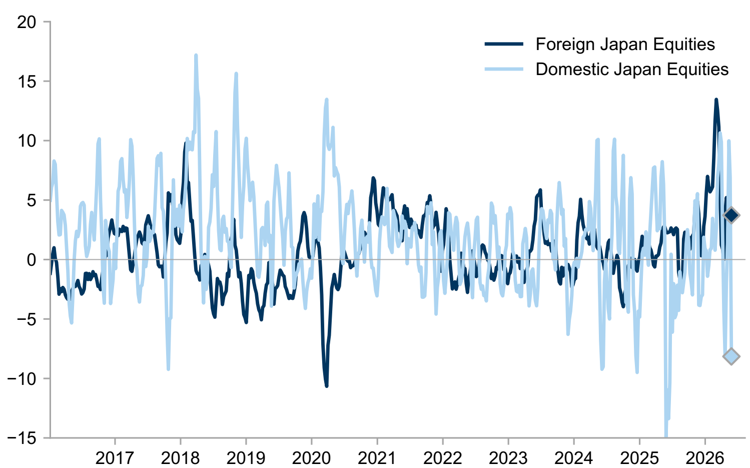
Source: EPFR, Haver, Goldman Sachs Global Investment Research

Exhibit 33: EM equity foreign/domestic cumulative global fund flows



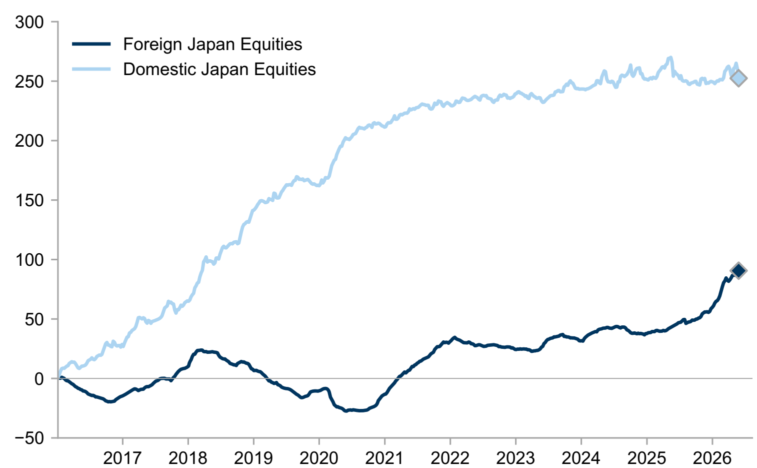
Source: EPFR, Haver, Goldman Sachs Global Investment Research

Exhibit 34: Japan equity foreign/domestic 4-week global fund flows



Source: EPFR, Haver, Goldman Sachs Global Investment Research

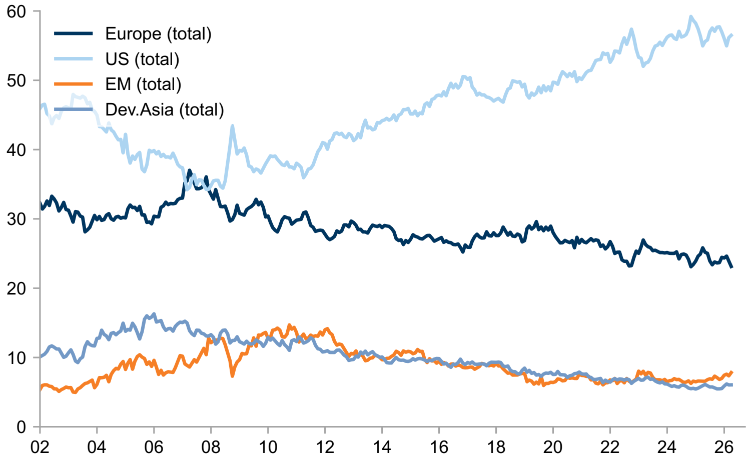
Exhibit 35: Japan equity foreign/domestic cumulative global fund flows



Source: EPFR, Haver, Goldman Sachs Global Investment Research

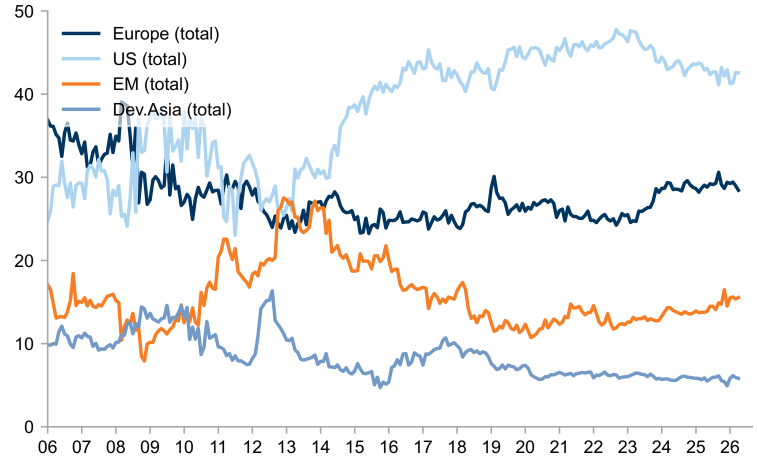
Global Equity & Bonds Mutual Funds Allocation

Exhibit 36: Global equity mutual funds' regional allocation
As of April 2026



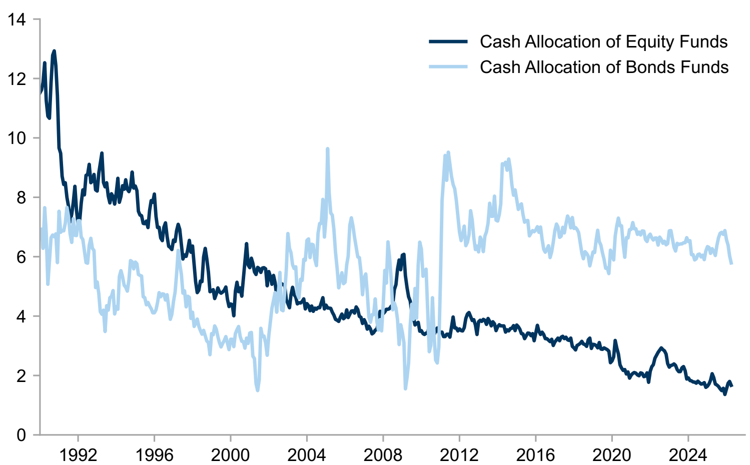
Source: EPFR, Haver Analytics, Goldman Sachs Global Investment Research

Exhibit 37: Global bonds mutual funds' regional allocation
As of April 2026



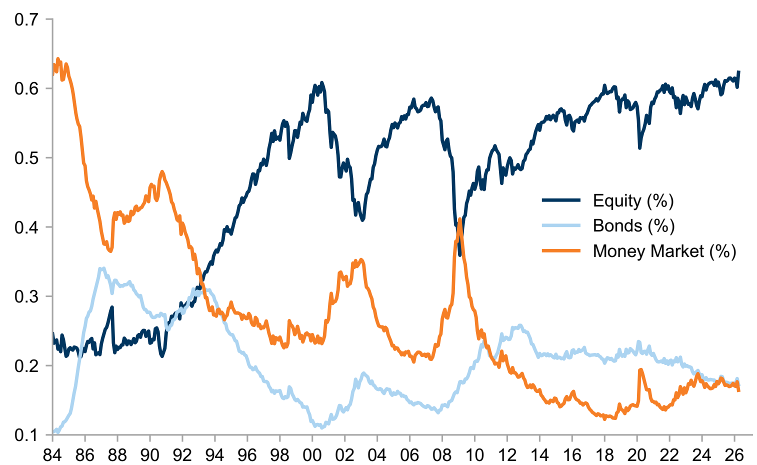
Source: EPFR, Haver, Goldman Sachs Global Investment Research

Exhibit 38: Cash allocation of equity and bond funds
US domiciled funds (as of April 26)



Source: ICI, Haver, Goldman Sachs Global Investment Research

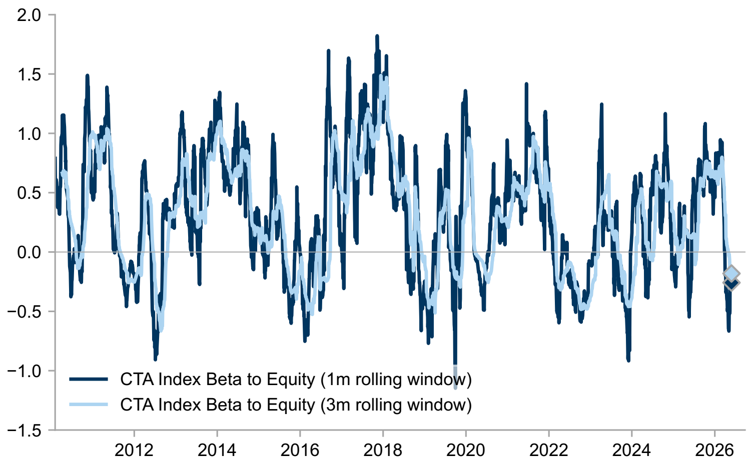
Exhibit 39: US mutual funds & ETFs – AUM breakdown into equity, bonds and money market
US domiciled mutual funds (as of April 26)



Source: ICI, Haver, Goldman Sachs Global Investment Research

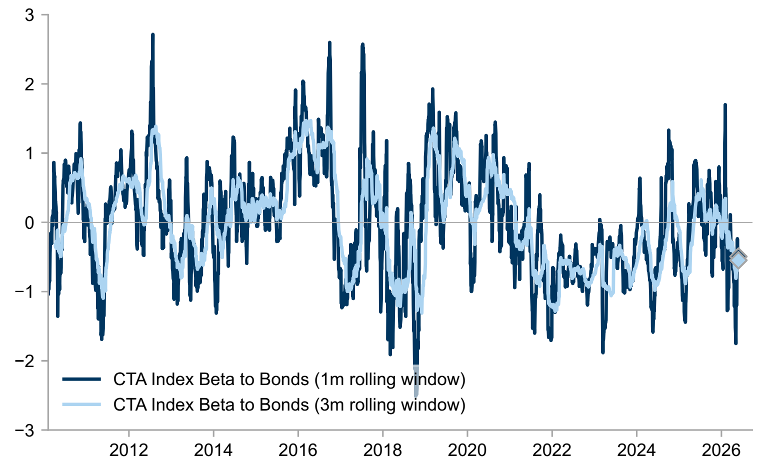
CTAs: Performance Sensitivities

Exhibit 40: Global CTAs performance beta to equity



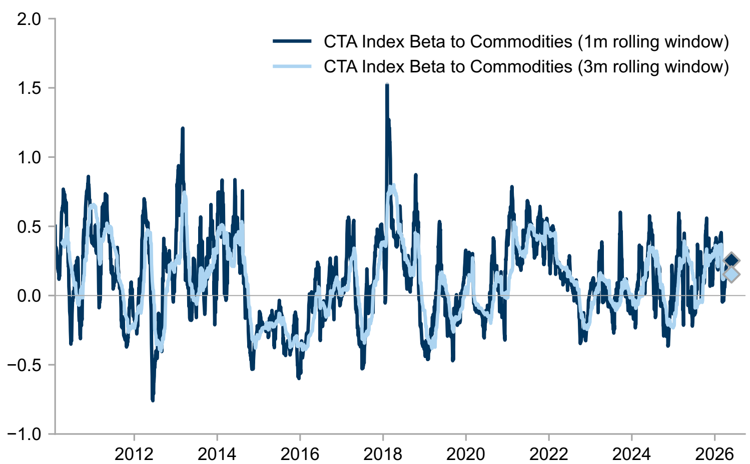
Source: Bloomberg, Goldman Sachs Global Investment Research

Exhibit 41: Global CTAs performance beta to US 10y bonds



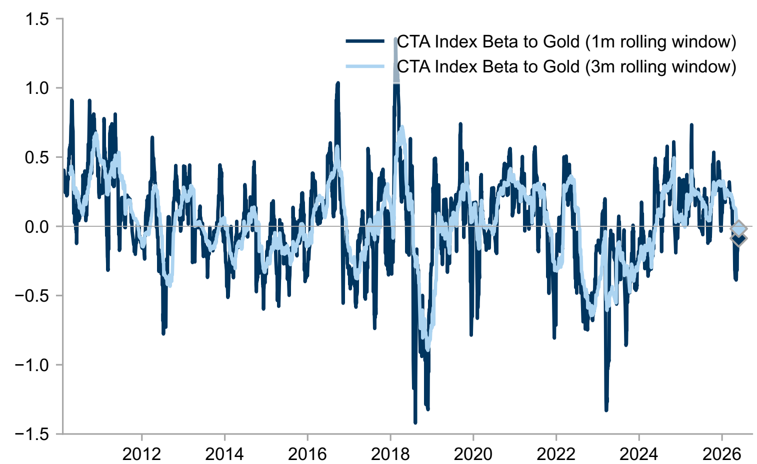
Source: Bloomberg, Goldman Sachs Global Investment Research

Exhibit 42: Global CTAs performance beta to S&P GSCI



Source: Bloomberg, Goldman Sachs Global Investment Research

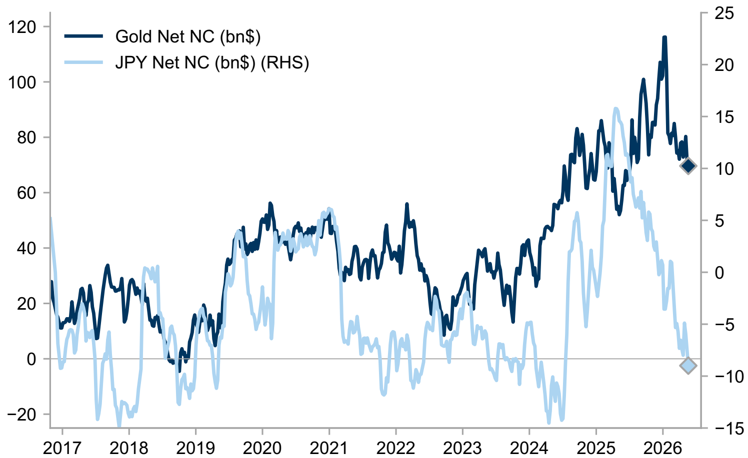
Exhibit 43: Global CTAs performance beta to Gold



Source: Bloomberg, Goldman Sachs Global Investment Research

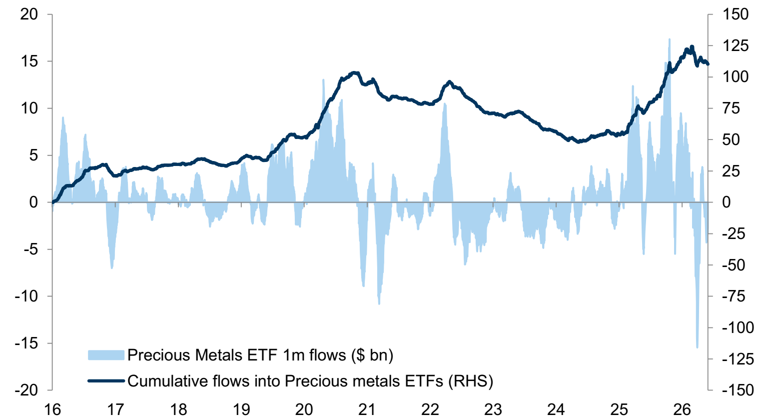
Gold, JPY and the Dollar

Exhibit 44: Gold and USD/JPY net non-commercial future positions



Source: CFTC, Haver, Goldman Sachs Global Investment Research

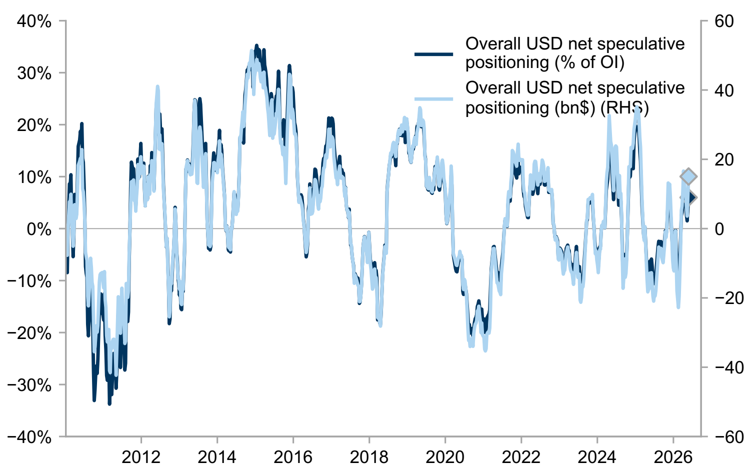
Exhibit 45: Precious metal ETFs global flows



Source: Bloomberg, Goldman Sachs Global Investment Research

Exhibit 46: Net non-commercial future positions in USD vs. other FX

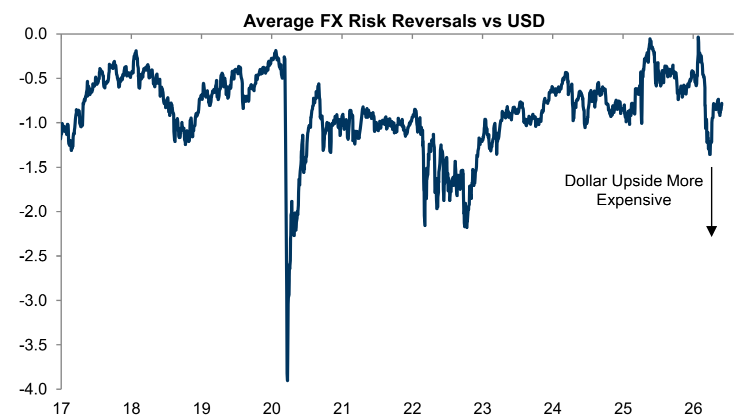
FX included: EUR, JPY, GBP, AUD, NZD, CAD, CHF, MXN, BRL, RUB



Source: CFTC, Goldman Sachs Global Investment Research

Exhibit 47: Average FX risk reversal vs. USD

3m 25-delta FX risk reversal vs. USD



Source: Bloomberg, Goldman Sachs Global Investment Research

CFTC Cross-Asset Positioning

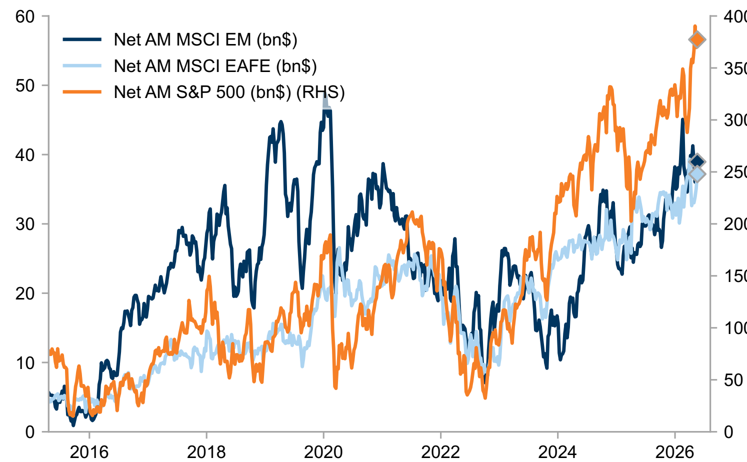
Exhibit 48: Cross-asset CFTC positioning indicators

Asset	Positioning vs last 5y Short (Min) Long (Max)	Net Future Pos. (% of Open Int.)	Net Future Pos. ($ bn)	Open Int. ($ bn)
US Equity		42%	430	1019
S&P 500		47%	378	799
Nasdaq 100		26%	52	198
Copper		27%	11	41
EAFE Mini		50%	37	74
EM Mini		39%	39	101
USD		6%	16	250
Gold		44%	70	159
VIX		-13%	-1	7
Nikkei		19%	1	7
EUR		4%	4	120
WTI		8%	16	196
US 10-year		-13%	-79	625
US 2-year		-25%	-251	992
US Bond		-20%	-462	2302
JPY		-27%	-9	34
CHF		-33%	-6	17
GBP		-22%	-5	24

Source: CFTC, Haver, Goldman Sachs Global Investment Research

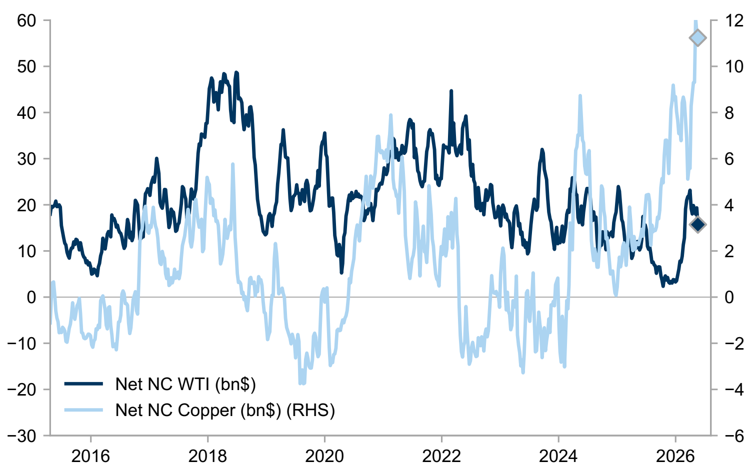
Exhibit 49: Equity future asset managers' positions

Asset manager net positioning in $bn



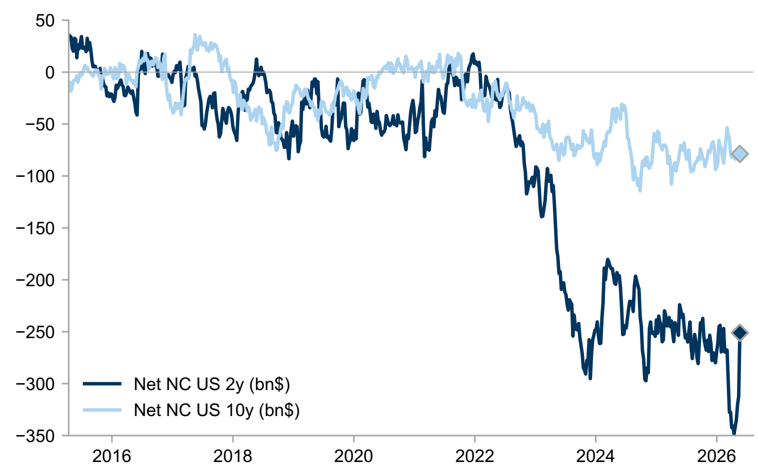
Source: CFTC, Haver, Goldman Sachs Global Investment Research

Exhibit 50: Commodity net non-commercial future positions



Source: CFTC, Goldman Sachs Global Investment Research

Exhibit 51: US bond net non-commercial future positions

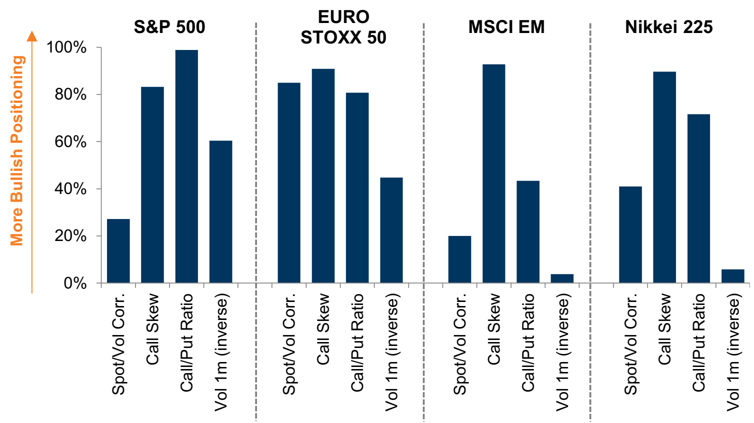


Source: CFTC, Goldman Sachs Global Investment Research

Equity Options Positioning Indicators

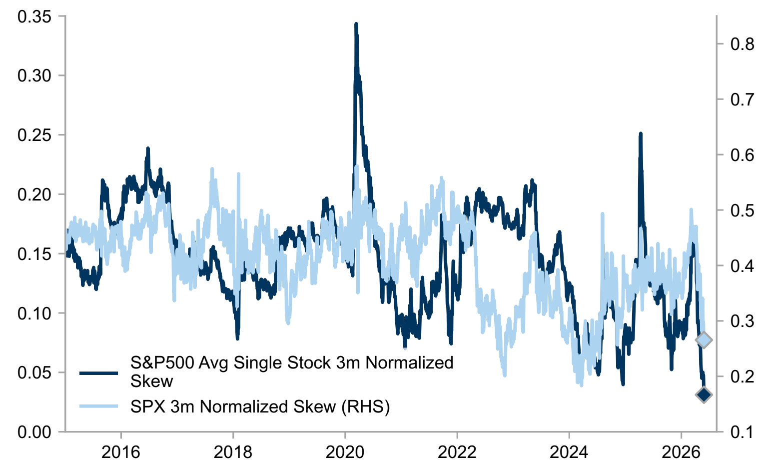
Exhibit 52: Option positioning indicators

Percentile since 2015



Source: Bloomberg, Goldman Sachs Global Investment Research

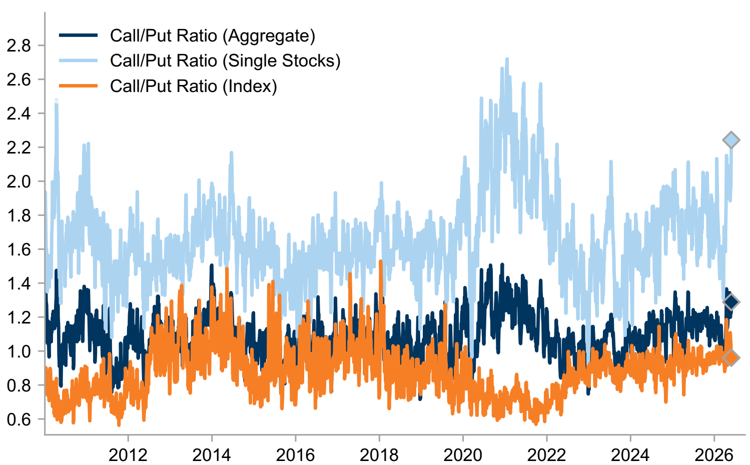
Exhibit 53: Single stock and S&P 500 skew



Source: Goldman Sachs Global Investment Research

Exhibit 54: US equity call/put volumes ratio

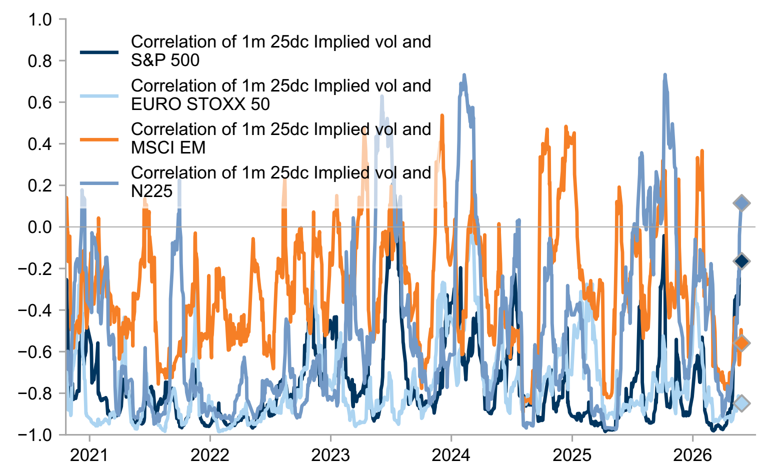
CBOE Index



Source: Haver, Goldman Sachs Global Investment Research

Exhibit 55: Spot/vol correlation across indices

1m rolling correlation of daily change/return

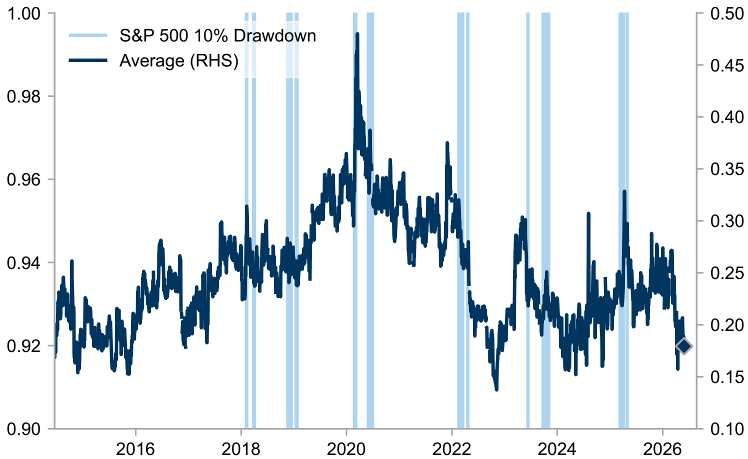


Source: Goldman Sachs Global Investment Research

Cross-Asset Skew Monitor

Exhibit 56: Average cross-asset skew

3m 25d normalised skew across assets

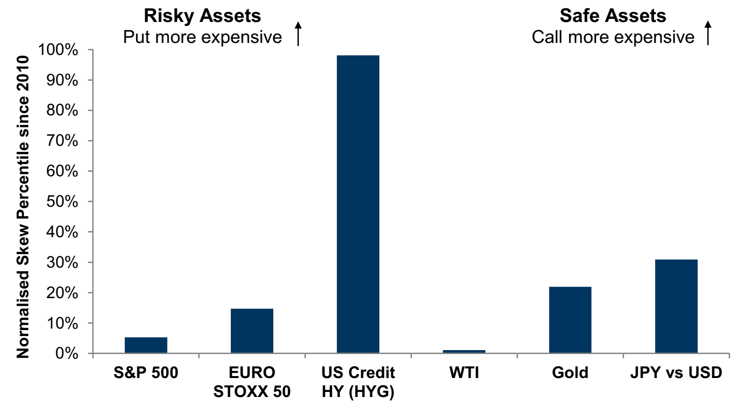


Assets: S&P 500, EURO STOXX 50, US Credit HY (HYG), WTI, Gold, JPY vs USD

Source: Goldman Sachs Global Investment Research

Exhibit 57: Percentile of skew across assets

Percentile since 2010. 3m 25-delta normalised skew



Source: Goldman Sachs Global Investment Research

Exhibit 58: Put skew across equity indices

3m 25-delta normalised skew (last 10y percentile)

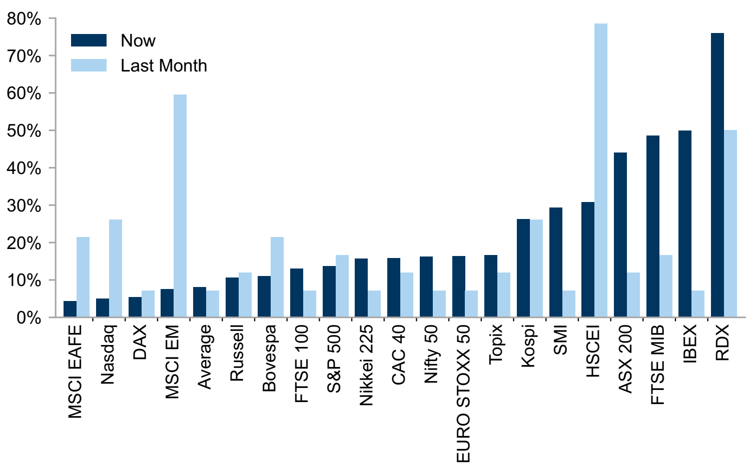
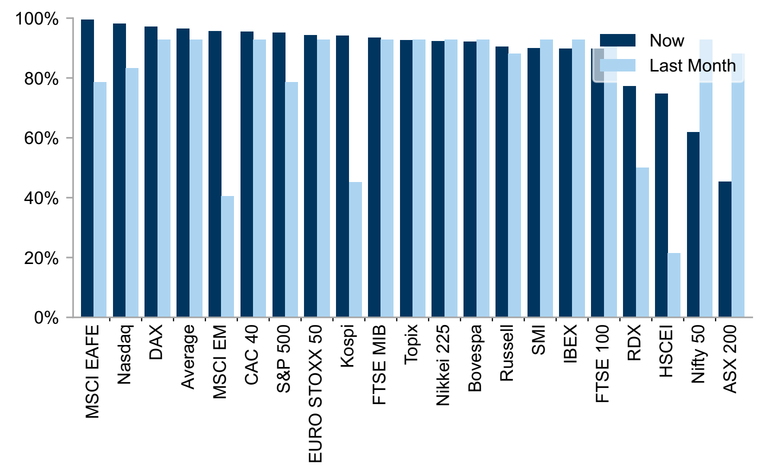


Exhibit 59: Call skew across equity indices

3m 25-delta normalised skew (last 10y percentile)

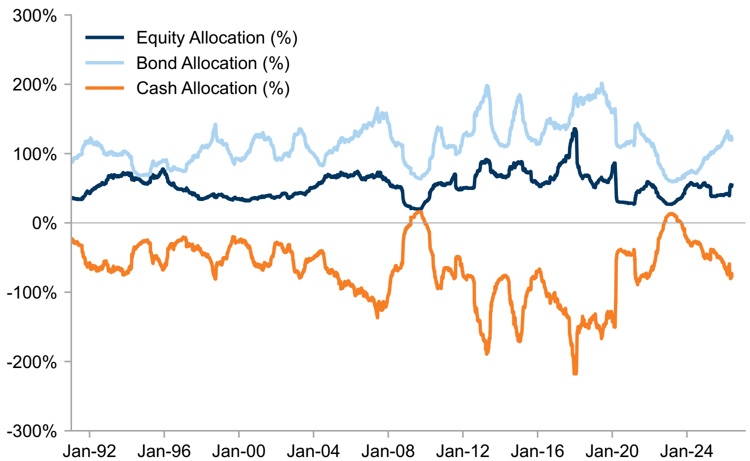


Source: Goldman Sachs Global Investment Research

Risk Parity, Hedge Fund Leverage and Surveys

Exhibit 60: US risk parity allocation

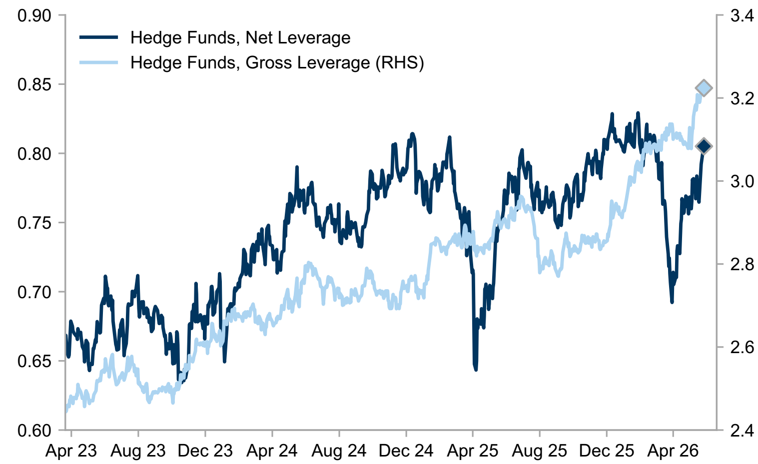
US risk parity strategy allocation based on: vol target at 10%, volatility lookback period 1y, using leverage, assets: S&P 500 and US 10y bonds



Source: Haver, Goldman Sachs Global Investment Research

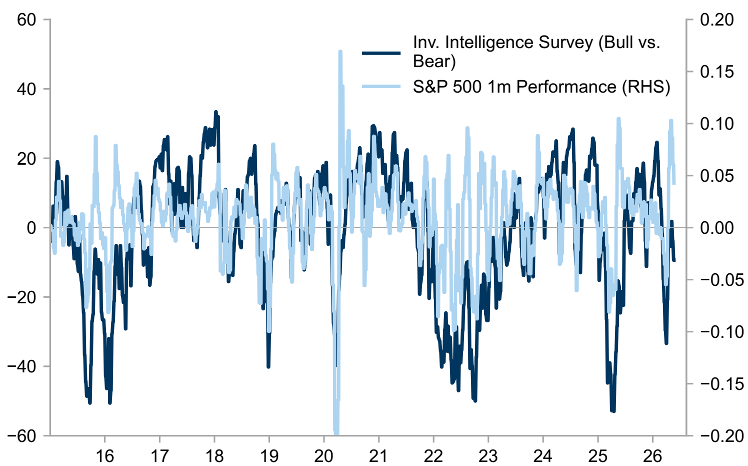
Exhibit 61: Hedge fund net and gross leverage (ex. options)

Aggregated data from Goldman Sachs Prime Services, should not be relied upon as a comprehensive view of the market.



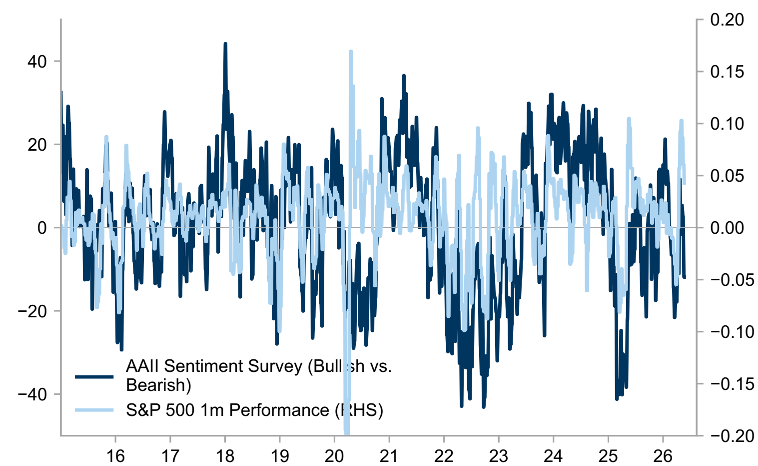
Source: Goldman Sachs Prime Services

Exhibit 62: Investor Intelligence Survey Indicator



Source: Datastream, Goldman Sachs Global Investment Research

Exhibit 63: American Association of Individual Investors



Source: Bloomberg, Goldman Sachs Global Investment Research

Appendix

Investors Intelligence Survey: Created in 1963. The survey is carried out by the investment services provider Investors Intelligence and covers the market views of 130 independent newsletters (brokerage house letters excluded), most of which are published weekly. The list of advisers is reviewed thanks to Barron's or web searches. The survey reports the findings as the percentage of advisers who are bullish/ bearish/ expect a correction, and is based on the question "are you telling their readers to buy or sell?" The survey is released each Wednesday morning, with most of the opinions written prior to the previous Friday's market close.

AAII Sentiment Survey: Sentiment of individual investors (bullish or bearish) towards the stock market over the next 6 months. The data are weekly since 1987 and are collected by the AAII (The American Association of Individual Investors) via a survey of a subset of their members. Response rates vary, but on average they obtained 315 responses each week from the start of 2013, for example, with the weekly period defined as from Thursday to Wednesday. During this window, AAII members participate by visiting the Sentiment Survey page on AAII.com and voting. The survey is open to all members, although a weekly email is sent to a rotating group of members reminding them to participate. Results are published online early each Thursday morning. Prior to the year 2000, members responded by physically mailing a postcard back to the AAII offices. The typical AAII member is a male in his mid-60s with a bachelor's or graduate degree. AAII members tend to be affluent with a median portfolio size in excess of $1 million. The typical member self-describes as having a moderate level of investment knowledge and engaging primarily in fundamental analysis. AAII has in excess of 160,000 members and, simply due to the sheer size of membership, there are wide variances in wealth, investment knowledge and investing styles.

CBOE Put/Call Ratio: Calculated as the ratio of put options volume traded relative to the call options volume traded as reported at the end of each day. It is compiled at a daily frequency and comprises single stock and index options. It excludes exchange-traded products.

CFTC Future data: CFTC reports are published on Friday each week, reflecting current positioning as of the close on the previous Tuesday for markets in which 20 or more traders hold positions equal to or above the reporting levels established by the CFTC.

EPFR Fund Flows Data: Fund flows data track more than $25trn AuM of global mutual funds and ETFs. We collect data with a weekly frequency, and they reflect fund flows as of Wednesday's close.

Disclosure Appendix

Reg AC

We, Christian Mueller-Glissmann, CFA, Alessandro Giglio, Andrea Ferrario, Giovanni Ferrannini and Peter Oppenheimer, 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.

Contributing Authors: Christian Mueller-Glissmann, CFA Goldman Sachs International, Alessandro Giglio Goldman Sachs International, Andrea Ferrario Goldman Sachs International, Giovanni Ferrannini Goldman Sachs International, Peter Oppenheimer Goldman Sachs International.

Unless otherwise stated, the individuals listed in the Contributing Authors disclosure of this report are analysts in Goldman Sachs' Global Investment Research division.

Disclosures

MSCI Disclosure

All MSCI data used in this report is the exclusive property of MSCI, Inc. (MSCI). Without prior written permission of MSCI, this information and any other MSCI intellectual property may not be reproduced or redisseminated in any form and may not be used to create any financial instruments or products or any indices. This information is provided on an "as is" basis, and the user of this information assumes the entire risk of any use made of this information. Neither MSCI, any of its affiliates nor any third party involved in, or related to, computing or compiling the data makes any express or implied warranties or representations with respect to this information (or the results to be obtained by the use thereof), and MSCI, its affiliates and any such third party hereby expressly disclaim all warranties of originality, accuracy, completeness, merchantability or fitness for a particular purpose with respect to any of this information. Without limiting any of the foregoing, in no event shall MSCI, any of its affiliates or any third party involved in, or related to, computing or compiling the data have any liability for any direct, indirect, special, punitive, consequential or any other damages (including lost profits) even if notified of the possibility of such damages. MSCI and the MSCI indexes are service marks of MSCI and its affiliates. The Global Industry Classification Standard (GICS) were developed by and is the exclusive property of MSCI and Standard & Poor's. GICS is a service mark of MSCI and S&P and has been licensed for use by The Goldman Sachs Group.

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 a subject company, public appearances and trading in securities covered 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, 10th Floor, Ascent-Worli, Sudam Kalu Ahire Marg, Worli, 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: https://www.goldmansachs.com/worldwide/india/documents/Grievance-Redressal-and-Escalation-Matrix.pdf, and a copy of the annual audit compliance report can be found at this link: https://publishing.gs.com/content/site/india-annual-compliance-report.html. **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, and Investment Management Association of Japan. 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: 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 within the European Economic Area.

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.