Note: The following is a redacted version of the original report published November 14, 2024 [17 pgs].

Goldman Sachs | Economics Research

14 November 2024 | 6:00PM GMT

Global Markets Analyst

Markets Outlook 2025: Trading Tails and Tailwinds

Kamakshya Trivedi
+44(20)7051-4005 | kamakshya.trivedi@gs.com
Goldman Sachs International

Dominic Wilson
+1(212)902-5924 | dominic.wilson@gs.com
Goldman Sachs & Co. LLC

Vickie Chang
+1(212)902-6915 | vickie.chang@gs.com
Goldman Sachs & Co. LLC

Victor Engel
+44(20)7051-3862 | victor.engel@gs.com
Goldman Sachs International

We recently laid out our *Global Macro Outlook for 2025—Tailwinds (Probably) Trump Tariffs*. We provide more detail on our Global Markets Outlook here, highlighting as usual 10 core investment themes that drive many of our market views. More detailed outlooks for the individual asset classes are forthcoming.

1. **A wider distribution after the soft landing:** Solid growth, higher equities and stronger Dollar in base case, but markets have moved and tails are fatter.

2. **Weighing the tariff tail:** Tariffs on China are largely expected and manageable; 'across-the-board' tariffs would be more inflationary, more USD-positive and more 'risk-off'.

3. **Finding terminal rates in a world of fiscal risks**: US post-election fiscal expansion (joining Japan, UK and some EMs) raises risks of higher terminal rates.

4. **Renewed divergence reinforces Dollar strength:** US growth stronger than DM peers, and consensus; broader tariff agenda is where the real Dollar upside remains.

5. **China in the cross-hairs but some scope to respond:** Ultimately, challenges and prospects for China asset picture still mainly rest on domestic policy delivery.

6. **Europe and EM—a more challenging picture:** European growth and EM face headwinds from Trump agenda, raising bar for capital inflows.

7. **Energy markets—ample supply, watch the tails**: Range-bound oil: upside from geopolitics in short term, downside from spare capacity as the year goes on.

8. **A bit more inflation risk but growth shocks still in focus:** Equity-yield correlations likely to drift higher; value in Treasuries/TIPS, and especially Bunds and Gilts, in portfolios.

9. **The growing valuation challenge:** US equity valuations highlight long-term challenge; valuation penalty normally paid when cycle turns, fattening downside tail.

10. **Diversification, tails and hedges:** Friendly (US) base case with protection. Optionality in equities after vol reset; long USD alongside tails in oil and gold; 2017 parallel suggests non-US assets could benefit if risks recede.

Investors should consider this report as only a single factor in making their investment decision. For Reg AC certification and other important disclosures, see the Disclosure Appendix, or go to www.gs.com/research/hedge.html.

Markets Outlook 2025: Trading Tails and Tailwinds

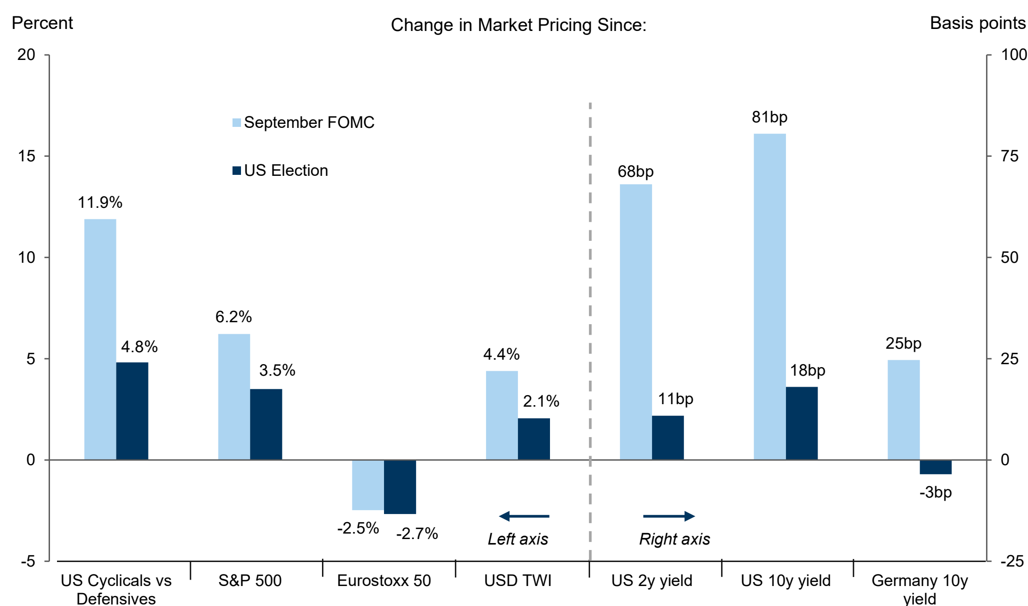
1. A wider distribution after the soft landing

- Solid US growth, low inflation still the right base case
- Trump policy agenda reinforces divergence but markets have moved
- Wider distribution of policy shifts and market outcomes, especially risk of broader trade war
- Higher equities, higher rates, stronger Dollar in central scenario but hedge the tails

Our baseline forecast remains essentially benign for the US: solid growth, cooling inflation and further non-recessionary rate cuts, alongside a range of policies that could be friendly to corporate earnings. And while the US is a clear outperformer, non-US economies still see stable growth, falling inflation and monetary easing in our central scenario. This backdrop would naturally push towards a friendly risk asset backdrop, alongside US outperformance. Although our forecasts for 2025 have that flavour, two issues complicate those judgments. The first issue is that markets have already moved a long way towards pricing this kind of outlook. Both ahead of and since the election, markets have upgraded US growth, pushing US equities and the USD higher, and building in a larger divergence between US and European rate markets. We think our baseline forecasts justify higher equity prices and further USD outperformance, but that judgment is more finely balanced than it was. As US equity markets take more credit for potential favourable policies, the risks of disappointment as the policy agenda ultimately becomes reality will rise.

The second issue is that the tails around our base case look quite fat and the US election outcome—the broad mandate it has given to President-elect Trump—widens the distribution of possible policy shifts. We generally worry less about a sustained increase in fiscal risk premia in bond markets, though ongoing fiscal support could push views on the neutral rate higher. But while the market has focused on risks to the most likely tariff recipients, the risks of a broader trade war look underpriced. If the market comes to place more weight on that outcome, we think that would reinforce USD upside, but add to pressures on non-US, and ultimately US, equities. Unusually high US equity valuations may amplify the reaction to any economic weakness and dampen long-term expected returns. Positive tailwinds are also possible if tariffs are narrowly targeted, if oil prices fall more sharply on enhanced supply, or if inflation or fiscal fears prove overdone. We think this backdrop justifies investors maintaining upside exposure to US equities, while diversifying or using options to limit the major tail risks.

Exhibit 1: Market Pricing Has Already Shifted Towards Our More Positive US Growth View



Source: Bloomberg, Goldman Sachs Global Investment Research

2. Weighing the tariff tail

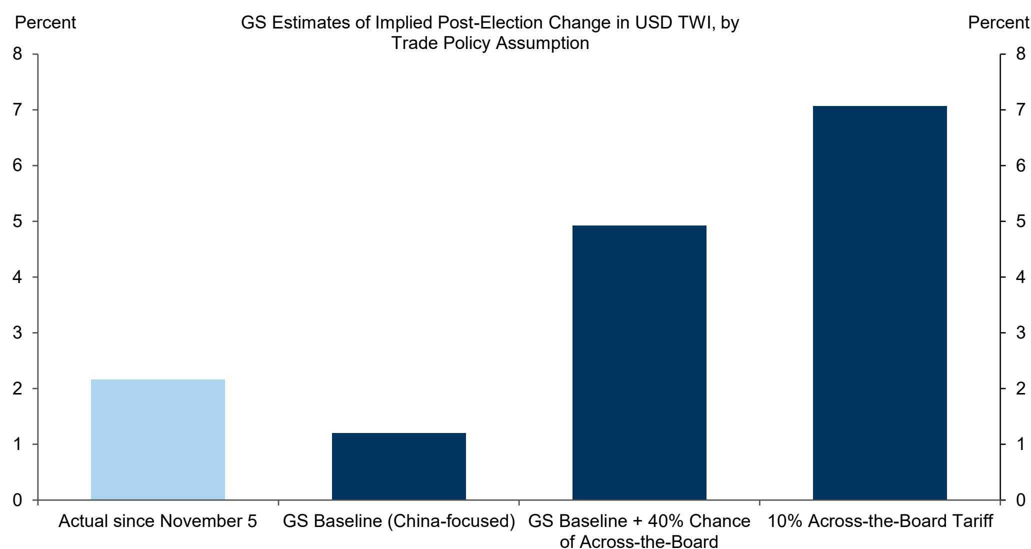
- China tariff in base case is largely expected and manageable; real tail risks beyond (Mexico/Autos/elsewhere)
- Across-the-board tariffs would be more inflationary and more 'risk off'
- Broader trade war would have much larger impacts on FX and likely on equities
- Rates impact ambiguous but increases risks of flattening, lower term yields

Tariffs pose a direct threat to our benign central economic forecast of solid growth and lower inflation. Unlike many market participants, our expectation is that tariffs against China taking the effective rate up to 20% could be implemented relatively early in the administration. But we suspect that this would be less disruptive this time around—both to the US economic picture and to China's trade and markets—given the experience since the first round of tariffs in 2018-19 and China's reduced trade exposure to the US. The larger impacts are likely to come if other countries are targeted or if tariffs are applied 'across the board', neither of which is part of our baseline expectations. Even as US imports have rotated away from China, they have increased from other countries, such as Mexico, Korea and India. In the case of Mexico, tariff threats have been articulated a number of times, and reflected in the pressure on the Mexican Peso. Looking ahead, the USMCA review process may prove the point of maximum risk, although ultimately we think it is in the interest of both countries to have a constructive relationship on the border and trade.

A tariff on Europe or an across-the-board tariff would be more disruptive to global trading arrangements, have a larger impact on US inflation (upwards of 1 percentage point on core PCE on our US team's estimates) and, as a consequence, drive more

financial conditions tightening with higher front-end rates, a flatter curve and lower equities. The impact on the rest of the world would also be substantial, with significant further broad Dollar upside beyond what has already been priced since the elections. We would not be surprised if at some point in the coming months and years the threat of an across-the-board tariff becomes a serious market focus. Ultimately, the disruptive macro and market impacts in that case, which could spill back into the US, are part of the reason we don't have across-the-board tariffs in our baseline scenario. But we do see a 40% chance of them being enacted, making them an underpriced tail risk.

Exhibit 2: Markets Have Not Yet Priced a High Risk of Broader Tariffs



We use the market reaction to tariff announcements in the 2018-2019 China trade war to estimate the USD move associated with shifts in tariff expectations

Source: Bloomberg, Goldman Sachs Global Investment Research

3. Finding terminal rates in a world of fiscal risks

- Republican sweep raises risks of fiscal expansion, inflation and higher terminal rates
- Higher term premium already from macro performance, but accentuated by new policy agenda
- Japan likely to stay on path towards higher terminal rates
- Post-election fiscal loosening across UK, Japan, EMs likely to push terminal rates higher globally
- UK at the cutting edge of DM fiscal worry, but may be overpriced

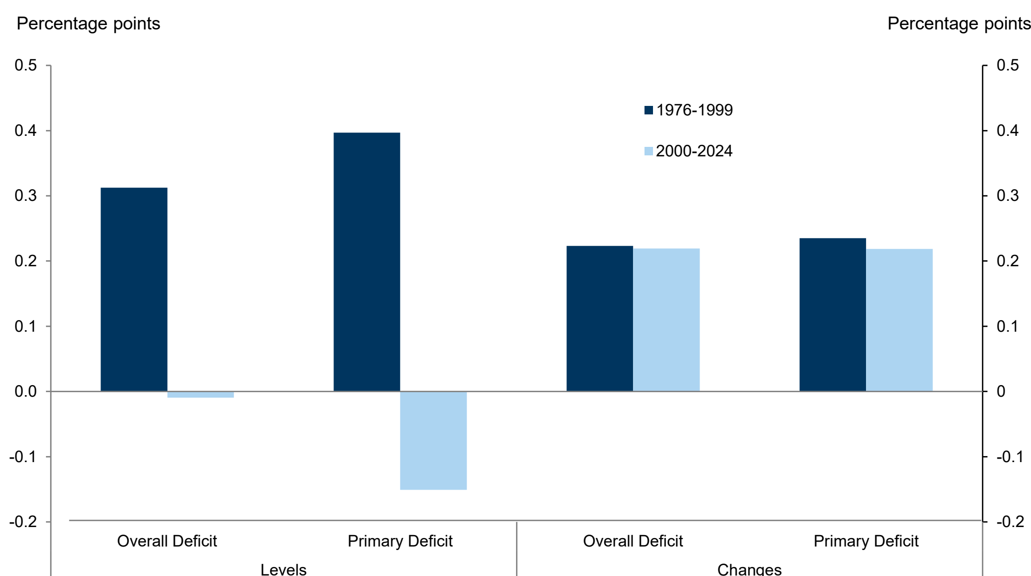
Apart from tariffs, the Republican sweep also raises the prospect of more expansionary fiscal policies. Any incremental expansion is likely to be much more modest than after the 2016 or 2020 election: we expect that congressional Republicans would support a scaled-down version of additional tax cuts to accommodate some of Trump's campaign proposals, primarily focused on individuals and domestic manufacturers, representing a few tenths of a percent of GDP. We also expect federal spending to rise somewhat, particularly on defence, though a clearer majority in both houses may increase the support for spending cuts. Alongside lower immigration and higher tariffs, even a

modest further fiscal loosening risks putting upward pressure on inflation and the Fed stopping the easing process earlier. It is not just the terminal rate that is biased upwards by the new policy agenda, but changes in long-term yields have also been consistently responsive to changes in the fiscal picture.

In reality, the potential for higher terminal rates than in the last cycle and higher term premia is a broader global phenomenon with a number of reinforcing impulses. In Japan, fiscal policy is also likely to be loosened after a disappointing election outcome for the ruling LDP, and we are increasingly confident in a domestic wage-price spiral and the ability of the BoJ to take policy rates to a higher terminal rate than the consensus among many market participants. The new UK government has also just recently proposed a substantial front-loaded fiscal expansion and while there is some justifiable scepticism that more restraint can be delivered in subsequent years, we do think that concerns around a 'Truss-style' fiscal risk premium are overdone. That said, the additional spending will keep the BoE on only a gradual easing path with higher terminal rates again possible. Similar concerns are more pressing in EM, where Brazil has already been forced to dial back some of its rate cuts in the face of fiscal concerns. So the picture is more mixed across EM: more focus on fiscal consolidation post-elections in South Africa, but scope for looser fiscal policy, for example in Indonesia, and higher terminal rates in this cycle.

Exhibit 3: Yield Levels Have Become Less Responsive to Deficit Levels, Changes in Fiscal Outlook Still Matters

Regression coefficients of 5y5y Treasury yields on the level of, and changes in, CBO's 5-year-ahead projected deficit-to-GDP ratio, controlling for 5y-ahead CBO projected GDP growth, inflation expectations, and the equity risk premium following Laubach (2009)



Source: Goldman Sachs Global Investment Research

4. Renewed divergence reinforces Dollar strength

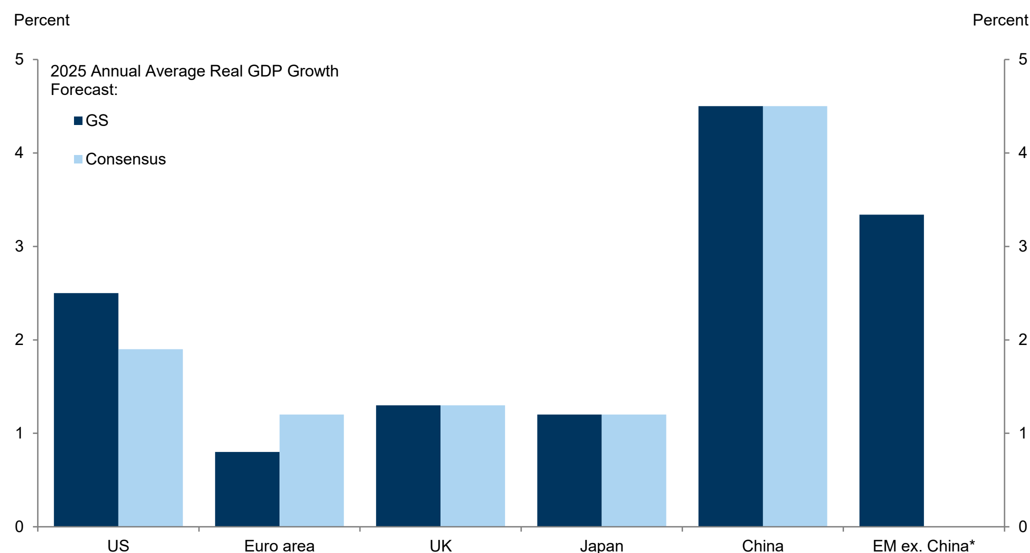
- US growth stronger than DM peers, and stronger than consensus
- Trade uncertainty to weigh heavily on Europe, actual tariffs on China

- Hard to see capital moving to rest of the world, and mix should strengthen Dollar
- But watch for fiscal responses and 'deals'; broader tariff agenda is where the real Dollar upside remains

Going into the US elections, our economic outlook envisaged a global picture where US growth was stronger than DM peers and stronger than consensus expectations. That picture has been reinforced by the Republican sweep at the polls. Tariffs are likely to feature prominently in the new Trump Administration, coupled with modest additional tax cuts, more federal spending, and a light touch on regulation. That combination, meant to boost domestic business and weigh on foreign activity levels, should continue to keep capital flows tilted towards the US versus the rest of the world and support the Dollar on a broad basis. So a Dollar that is stronger for longer is the correct modal view under the economic and policy outlook we expect.

As with many parts of the Trump agenda, a number of conflicting dynamics mean that there is a wide distribution of risks around that view. So even with tariffs on the agenda, Dollar strength is far from guaranteed. While a 'currency pact' that weakens the Dollar is unlikely to be sustainable without a shift in underlying macro factors, it is possible that a strong fiscal policy response abroad could mitigate or even dominate the effect of tariff threats. Already China's ongoing fiscal stimulus package has helped offset some of the potential impact, and Germany's evolving fiscal debate bears watching. The more subtle issue revolves around market pricing. In many cases, the Dollar has already reset higher in response to the election results, and has been highly valued for some time in recognition of sustained strong US economic and market performance. So the scope for sharper Dollar strength—that sends the EUR towards parity and beyond—is only likely if the tariff agenda broadens and deepens beyond our base case, or if bolder fiscal ambitions and a steeper rates curve don't weigh on US equity markets.

Exhibit 4: US Growth Still Above Consensus and Above DM Peers



*Bloomberg consensus data not readily available for EM ex. China GDP growth.

Source: Bloomberg, Goldman Sachs Global Investment Research

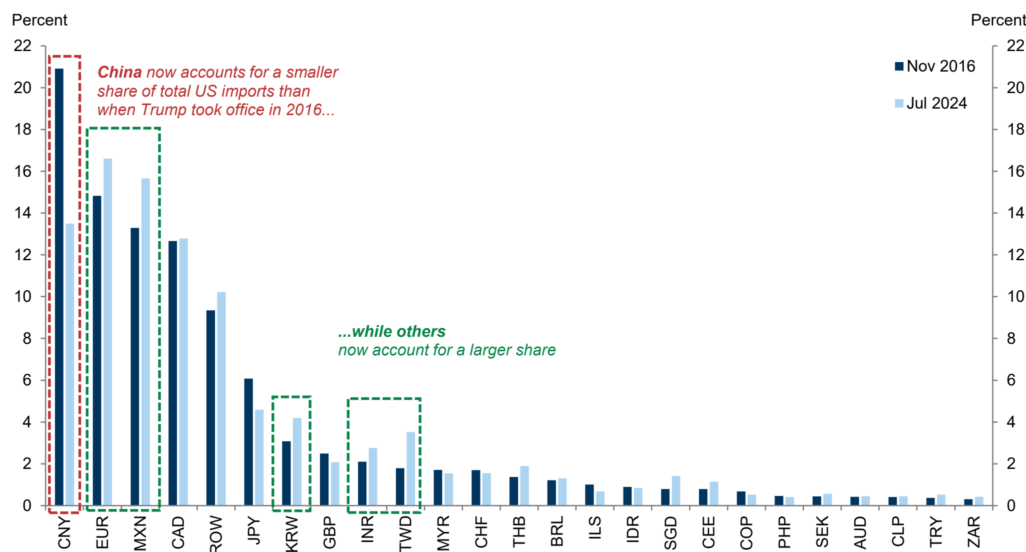
5. China in the cross-hairs but some scope to respond

- China may not be hit as hard by tariffs given lower US exports than in 2016
- FX/fiscal/monetary response should offset hit—more weight on fiscal versus currency compared with 2018/19
- Ultimately, challenges and prospects for China asset picture still mainly domestic
- Underwhelming response so far, but policymakers may wait to show their hand

We expect the US to impose additional tariffs averaging 20% on Chinese goods, with much or all of this imposed in the first half of 2025. A fresh hit to external demand and investor sentiment would come on top of what is already a tough cyclical picture for the Chinese economy. But it is also possible that tariffs will have a smaller impact than in 2018-19. First, tariffs on China are widely expected at this point, so it should constitute less of a surprise. Second, China's export exposure to the US has declined as a consequence of the tariffs in the first Trump term. And third, it is not likely to change the broader policy efforts to foster a rotation of Chinese growth towards domestic demand in 2025. To the extent that China responds to any tariffs with a mix of retaliatory measures, currency depreciation, and monetary and fiscal policy, the emphasis on the latter may be greater relative to the 2018-19 episode.

Ultimately we still think that the bigger challenges and prospects for the China macro and market picture are domestic rather than international. While renewed trade disruptions may impede any rebound in international capital flows to China, the reality is that international investors have already shed a large proportion of China risk on perceived disappointments on stimulus delivery. So the key to China and China-linked assets is whether policymakers succeed in putting a floor under local activity and equities in line with their objectives. Recent data have been stabilising, and while the recently concluded NPC meeting offered only limited detail beyond measures on local government debt resolution, our China team still expects the official fiscal deficit target to be raised to 3.6% of GDP in 2025 from 3.0% in 2024, and an increase in government bond issuance quotas. While the overall urgency seems less than investors would like, it is also possible that policymakers are waiting to see measures from the new Trump administration to respond.

Exhibit 5: A Shift in Trade Patterns Following The First Round of Trump Tariffs
Fraction of US goods imports exported from the displayed country or region. 'ROW' stands for Rest of World.



Source: Haver Analytics, Goldman Sachs Global Investment Research

6. Europe and EM—a more challenging picture

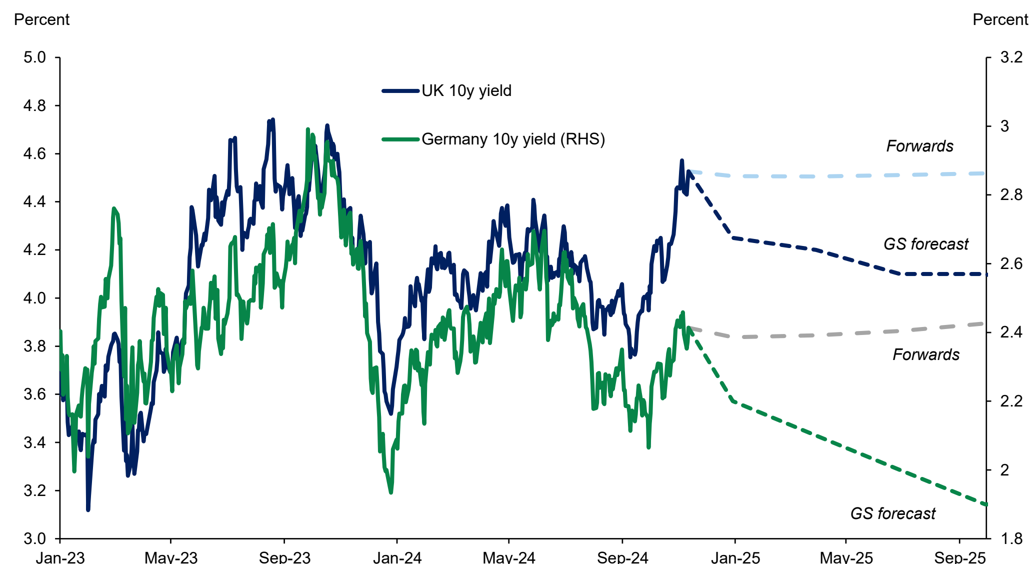
- Renewed risks to European growth from Trump agenda, while policy space is constrained (by defence spending)
- Deeper ECB cuts, European rates should outperform US, though market has moved to reflect this
- EM headwinds from higher rates, stronger USD
- Focus on markets that can withstand shocks, provide support (India/China stocks, CEE rates)

Our European economists have downgraded their GDP forecasts across the region in anticipation of higher trade uncertainty, the ongoing pressures from China competition in key industries, and other spillovers. Moreover, the policy space to respond to these headwinds is already limited given fiscal concerns in core economies such as France, alongside the typical worries in the periphery. That space is likely to be further constrained by pressure to increase spending on Ukraine and the broader security architecture of Europe. That leaves the ECB again as the primary and perhaps only institution that will need to respond, and a deeper rate cut path is the most likely outcome. That should sustain the outperformance of European rates relative to the US, although the market has moved a long way to reflect this. Better market opportunities may therefore lie in outright longs in Bunds, or a renewed compression of rate spreads between core Europe and Central and Eastern Europe, where the lower growth and rate outlook should spill over eventually. Given the otherwise soggy growth outlook in Europe, the UK's relative outperformance is likely to stand out and benefit a procyclical currency like the Pound and other UK assets on a relative basis.

Tariffs, higher US rates, and a stronger Dollar also provide a negative backdrop for EM.

As with Europe, many EMs are open economies that are vulnerable in a global trade war, further delaying the prospect for portfolio capital flows. So the EM complex will need to rely on its own macro and asset market fundamentals. That should favour EM jurisdictions where vulnerabilities to external risks are lower (higher reserve buffers and smaller overall current account deficits, although bilateral surpluses with the US may also pose a risk); internal imbalances are smaller (fiscal/inflation constraints less binding), and ultimately where policymakers can find room to support domestic growth and asset markets. Given subdued valuations and a pro-cyclical backdrop, EM equities are likely to outperform fixed income, with greater room for policy support in China (and to a lesser extent India). EM equities will likely struggle to generate higher returns relative to US equities, however, especially in vol-adjusted terms. And while EM hard currency fixed income should prove more defensive than local currency in a strong Dollar environment, tight hard currency spreads mean that local currency assets have more scope to outperform if the tails are avoided, especially in procylical markets, including Brazil and Mexico, which already embed decent premium in FX and rates.

Exhibit 6: European Rates Heading Back Lower



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

7. Energy markets—ample supply, watch the tails

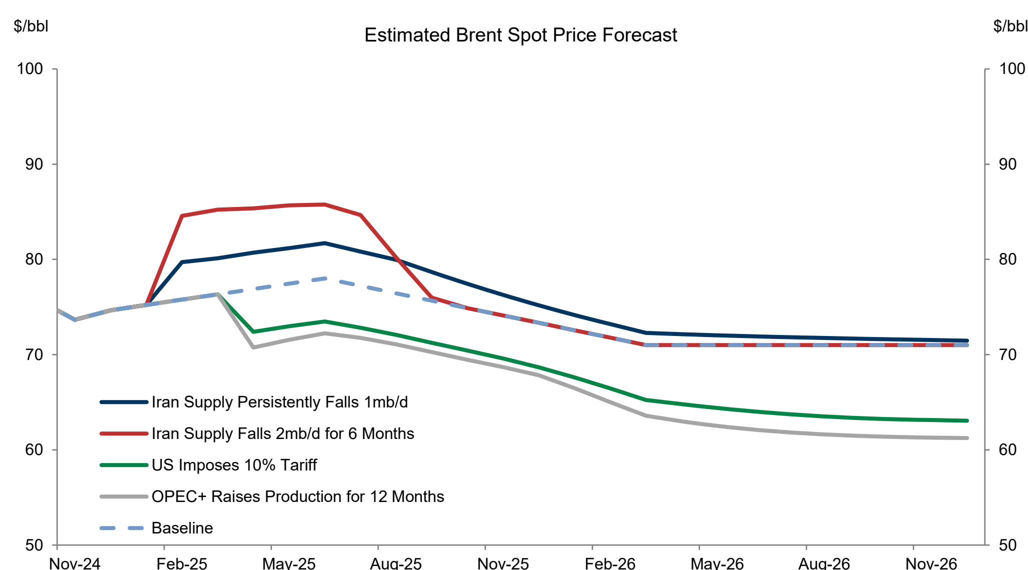
- Oil market still range-bound in the central case
- But US election reinforces tails on both sides
- Upside tail from geopolitical risk, Iran supply in short term
- Downside risks from spare capacity, trade escalation, as the year goes on

In our baseline forecast, we continue to see oil prices as range-bound, with Brent likely to stay in a $70-$85/bbl range. Including the roll return, this means that energy and our broader commodity indices should offer modest positive returns in the central case. But we think the risks of breaking outside those ranges are growing and the US election

outcome reinforces that. In the short term, we think the new Administration raises the risks to Iranian supply, where disruption risks have already been elevated due to the Israel-Iran conflict. That upside tail risk adds to the value of commodity longs in a portfolio context.

But we think the medium-term risks skew to the downside of our forecast range. In part, that is because ample supply is still being kept off the market, which could begin to find its way back into the system in 2025. But it is also because a clear shift towards a broad-based tariff agenda from the Trump Administration could hurt global demand. In those scenarios, oil prices might again become a tailwind for disinflation trends. If supply increases, rather than demand shortfalls, that would push prices lower and would constitute a positive global supply shock at a time when other recent favourable supply dynamics (higher immigration, for instance) are fading.

Exhibit 7: Oil: Upside Risks From Disruptions, Downside Risks from Supply and Trade War



Source: Goldman Sachs Global Investment Research

8. A bit more inflation risk but growth shocks still in focus

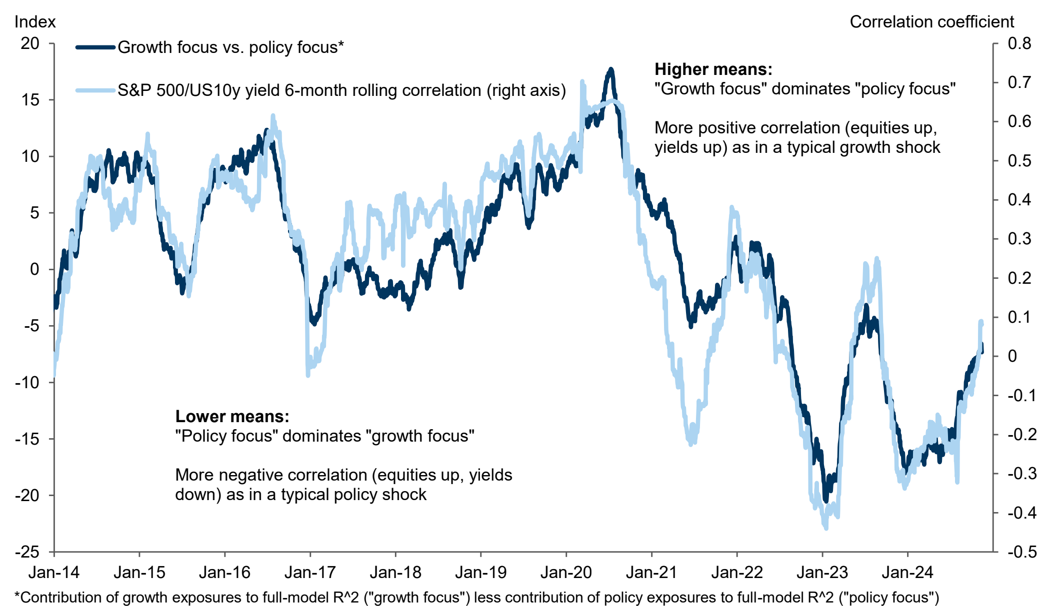
- Inflation declines allowing central banks to focus more on growth downside
- Trade/fiscal agenda could put a sting in the tail-end of inflation normalisation
- Recession fears have faded fast but could return; equity-yield correlation should drift higher
- Value in Treasuries/TIPS, and especially Bunds and Gilts, in portfolios

The ongoing decline in inflation across a range of economies in 2024 has allowed central banks, including the Fed, to focus more on the risks to growth and begin to lower policy rates from restrictive levels. With markets also worrying more about potential risks to growth, the period of a strong negative correlation between equities and Treasury yields has given way to a more mixed picture (over the past six months, the correlation between US equities and Treasury yields has been close to zero). In our baseline

forecast, the process of inflation normalisation is on course to continue. We estimate that an across-the-board US tariff would raise US core inflation to 3%, however. And although we expect any US fiscal impulse to be modest even with a new Administration, there is clearly some risk that a mix of higher term premium or higher neutral rate assumptions lead to upward pressure on the bond yield path too. On the other side of the ledger, a more positive oil supply backdrop could provide a tailwind to inflation declines, particularly in EM.

Set against that, we think downside growth risks are likely to remain in focus, particularly outside the US. A broader trade war would clearly increase global growth risks, as would some potential geopolitical shocks. Markets priced real recession fear as recently as early August. We have seen a sharp cyclical upgrade since then, both before and after the US election, but this means that markets are more vulnerable if we revisit those fears. We see risks from both growth and inflation/policy shocks, particularly in the next few months as the Trump policy agenda takes shape. But although the market may still oscillate between these two kinds of risks, we think the correlation of bond yields and equities is more likely to drift higher than lower over the medium term. This means that Treasuries and TIPS, and even more so Bunds and Gilts, can still play an important diversifying role in portfolios.

Exhibit 8: Easing Inflation Has Helped Push Correlation Between US Equities and Yields Higher



Source: Bloomberg, Goldman Sachs Global Investment Research

9. The growing valuation challenge

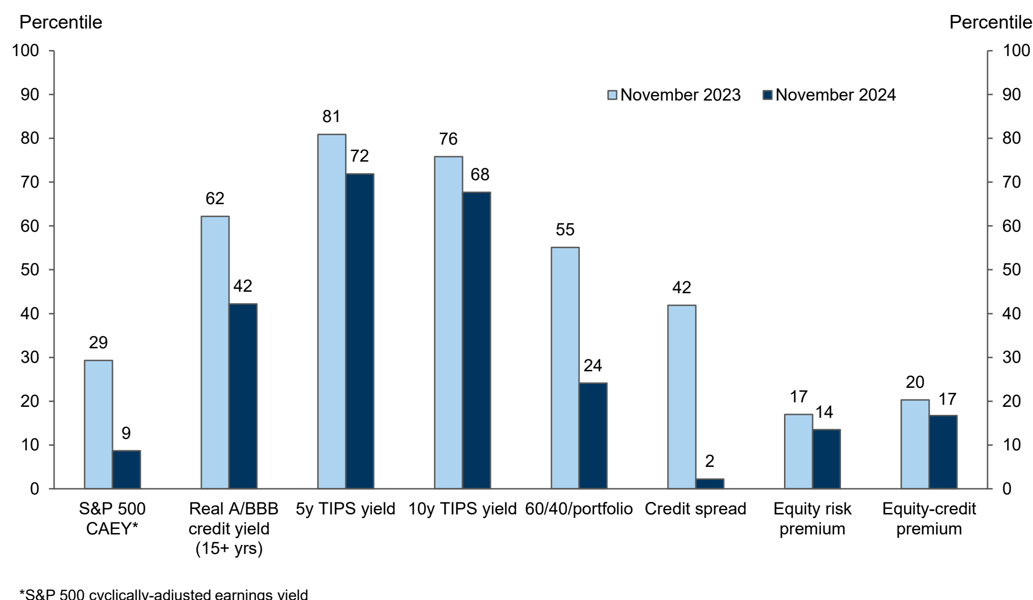
- US equities and credit spreads highlight growing valuation challenge
- But valuation penalty normally paid the most when cycle turns
- Credit premium compressed but protected by high all-in yield
- Watch for a different 'valuation challenge' when macro themes are fully priced

US equity valuations continue to climb and are now at levels that have not been

exceeded in the post-war era except in the late 1990s. Some of the recent uplift is coming on expectations that upcoming policies will boost after-tax earnings. But even after adjusting for the macro backdrop, which makes that comparison a little more favourable, US equity valuations look historically high. Credit spreads too are at the 6th percentile of the last 15 years, and even those segments of the market that were pricing more elevated risk premium have now compressed. As our Portfolio Strategy team recently showed, long-term expected returns from equities now look low as a result (they estimate 3% annualized returns over the next decade when accounting for the risks from unusually high market concentration). The prospective returns on government bonds on that longer horizon now look relatively better, as do the returns on credit (though largely from the risk-free yield).

High valuations are not an obstacle to further gains if the cyclical tailwinds are powerful, as we have seen already in 2024—although we can expect more of the back-and-forth where upside growth surprises make rate cuts less likely. High all-in yields are also supporting demand for credit even with compressed spreads. We have shown that in equities, the price for higher valuations is often paid disproportionately when the cycle deteriorates. Our baseline forecast means that challenge will most likely be avoided in 2025. But it means that if growth risks do rise more sharply than we anticipate, equity downside could be faster and deeper than normal. The sharp drops in risk assets, and spikes in volatility, that we saw in early August may be a harbinger of that kind of sensitivity. That fatter downside tail also highlights the importance of keeping an eye on another kind of 'valuation challenge'—the point at which our more optimistic macro forecasts seem fully reflected in assets. That has been the story in 2024 too—to push harder when the market is clearly in doubt about elements of our macro picture and to take more care to protect against downside tails when those views seem more clearly reflected (as they are starting to now).

Exhibit 9: Equity Valuations High Relative to Bonds, Dampening Long-Run Expected Returns
Percentile rank, 1999-present



Source: Goldman Sachs Global Investment Research

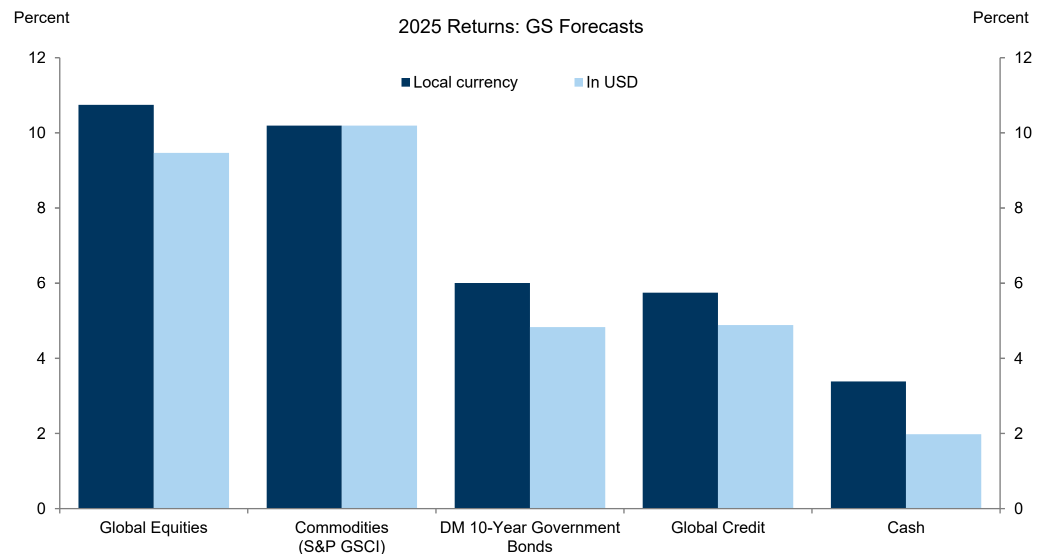
10. Diversification, tails and hedges

- Friendly (US) base case with protection still the key; optionality in equities more appealing post-election vol reset
- Positive returns in core assets but benefits from diversification
- A wider distribution of outcomes with tariffs, rate upside among key risks
- Long USD (vs EUR) attractive in portfolios, alongside tails in oil and gold
- 2017 parallel suggests non-US assets could benefit if policy risks recede

Despite the heightened tension between our baseline macro forecasts, high valuations and markets that have moved to reflect the better US growth picture, we still forecast modest positive returns across the key asset classes. US growth resilience is reflected in outperformance of US equities and underperformance of US bonds, alongside some further expected upside to the US Dollar. The challenge is that tail risks are greater than before, and the new Administration's policy agenda creates a wider distribution of potential outcomes. The prospect of a broader trade war is the clearest example and a risk that looks under-priced, and upward pressure on US yields is still clearly possible, particularly in the near term. Diversification can help address some of these challenges. Bonds, particularly non-US bonds, should provide some protection against growth risks including those from a deeper trade war. Although US inflation risks are quite well-priced at the front end of the curve, expectations are more moderate further along the curve, so TIPS may offer a good portfolio hedge too. And broadening US equity exposure towards mid-cap equities or a more equal-weighted allocation may mitigate concentration and valuation risks. Long USD positions should also provide protection against both US rate upside and broadening tariff risks, reinforcing the case for US investors to keep hedging their overseas bonds (and equity) exposures.

As in 2024, we think there are strong arguments for using options to provide protection against macro tails. Equity volatility has fallen post-election, making it easier to gain upside exposure to US assets through calls again. Deeper downside exposure (including in European equities, which are vulnerable to some key risks) also looks more attractively priced. Long USD optionality also remains appealing (especially against EUR, CAD, SGD and KRW), while upside in gold and oil can also protect against some key tails. With the market already pricing the impact of some potential US policy shifts, it is also possible that some assets could benefit if those policy risks fail to materialise. 2017, the first year of the first Trump Administration, was ultimately a year of strong outperformance for EM stocks and currencies. A more restrained US fiscal impulse, or a more narrowly focused trade agenda, could now provide relief, particularly in parts of the EM universe where those risks have been most clearly reflected. So while the outlook for non-US equities looks more challenging than before, some exposure to that kind of upside tail may be useful too. The wider range of potential market outcomes means that any declines in volatility across assets in 2025 are likely to be opportunities to add hedges.

Exhibit 10: Modest Positive Returns Across Assets In Our Base Case



Source: Bloomberg, Bloomberg-Barclays, Datastream, iBoxx, ICE-BAML, Goldman Sachs Global Investment Research

Disclosure Appendix

Reg AC

We, Kamakshya Trivedi, Dominic Wilson, Vickie Chang and Victor Engel, 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

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_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.

© 2024 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.