Global Markets Analyst Dollar Direction and the Election (Cahill)

- Recent developments reinforce the pillars that have supported the Dollar's high valuation for much of the last decade. But the approaching US election could change this big picture in a number of ways. Tariffs have a direct influence on exchange rates, so we expect that to be the focus for FX markets in different election scenarios.
- More specifically, we expect the strongest Dollar response to come from a Republican sweep, which would open the door to larger tariff increases in combination with domestic tax cuts. We expect a narrower, smaller Dollar rally in response to a divided Republican government outcome. A Democratic sweep or divided Democratic government would likely result in some initial Dollar downside as markets reprice the prospect of more dramatic changes in tariffs. After recent market moves, we would expect some quick relief in China- and policy-sensitive currencies like MXN, CNH, KRW, EUR and AUD.
- Drawing from our previous research, we outline a number of ways to gauge the potential impact of tariffs on the Dollar. Using event studies from 2018-19 and the recent campaign, CNY could weaken to around 7.40 under our economists' baseline scenario for increased US tariffs on China under a Republican government. Diverging monetary policy implications for the US and Europe could weaken the Euro by about 3% in this case, or closer to 10% in the case of a global baseline tariff and commensurate tax cuts.
- Competing influences on the safe-haven Yen cloud the outlook for USD/JPY, so it is not our preferred FX expression in this particular case. Fundamental analysis generally points to smaller FX impacts than event studies or policy-focused analysis, so we think investors should treat estimates based on the 2018-19 experience with care. And we think markets will not fully reflect our tariff expectations immediately. As a result, we favor longer-dated trade expressions in Republican outcomes than Democratic ones.
- US policies are just one (important) part of the FX outlook. We see upside risks to our baseline expectations of shallow Dollar depreciation off the 2022 peak from continued 'US exceptionalism', but downside risks if China stimulus has a bigger influence on rebalancing global growth than we currently expect.

Michael Cahill +44(20)7552-8314 | michael.e.cahill@gs.com Goldman Sachs International

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.

Dollar Direction and the Election

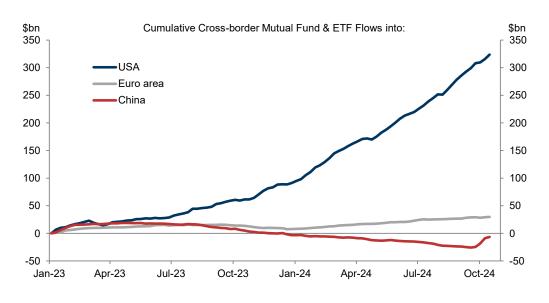
Recent developments reinforce the pillars that have supported the Dollar's high valuation for much of the last decade. We expect that high valuation to gradually fade as global activity and policy settings move into better balance. But, with mounting evidence that 'US exceptionalism' is still very much intact, we still think the risks are in favor of the Dollar being 'stronger for longer' than in our baseline forecasts. The approaching US election could change this big picture in a number of ways, but we continue to think the risks around different policy outcomes are also skewed towards more Dollar strength. This is mostly on the prospect of much higher tariffs, which would shift relative terms of trade and create divergent policy impulses in the Dollar's favor through a number of different channels.

The setup

It is notable that the two most prominent periods of sustained Dollar depreciation in the recent era were in 2017 and 2021, both conspicuously right after US elections. But we think the global circumstances were more important, with both episodes driven primarily by strong growth optimism in the rest of the world. A repeat of 2017- or 2021-style broad, sustained and significant Dollar depreciation seems unlikely to be driven by the US election outcome alone. That kind of shift would likely require some assistance from the outlook for the rest of the world, such as a stronger impact from China stimulus measures than we currently expect. However, with the market becoming more focused on 'tariff trades' in recent weeks, there is a building case for more two-directional near-term hedges into the event.

In our <u>previous note</u> about how the election would influence FX markets for much of this year, we argued that US outperformance and uncertainty associated with the approaching US election would limit Dollar downside. This has largely played out. Though there have been a number of <u>ups and downs</u>, Dollar downside proved to be mostly short-lived. More importantly, even in periods when US data softened, portfolio flows into other jurisdictions were moribund (<u>Exhibit 1</u>). However, outside of the last few weeks, we <u>attribute</u> the majority of the Dollar's strength to divergent economic outcomes and commensurate shifts in policy expectations. Our basic refrain remains that the Dollar's '<u>challengers</u>' are falling short of what would be required to reverse the portfolio flows into US assets that have <u>formed the pillars</u> of the Dollar's high valuation, and the election seems unlikely to undermine that position.





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

The scenarios

We believe that FX markets will turn initially on the prospect of higher tariffs and other potential changes in US <u>trade policy</u>, which means the presidential outcome matters more for FX than the composition of Congress. This is partly because our economists expect only <u>minor differences</u> on fiscal policies, but mostly it is because tariffs have a direct impact on currencies. There are a number of channels at work; tariffs raise the cost of US imports, reduce demand for foreign products, and so on. Flexible exchange rates can offset this shift in countries' terms of trade and respond to the diverging growth and inflation impulses tariffs create.

We expect the strongest Dollar response to come from a **Republican sweep**. Even though some tariffs can be imposed by executive action alone, this scenario provides the widest potential for broad tariff changes as some of the proposals could require congressional action. It is also important to note that the Republican party platform has proposed using revenue from a 'baseline tariff' to cut domestic taxes. This would support the Dollar even more as it would act as a domestic fiscal stimulus. In effect, this combination would raise the cost of US imports and lower the cost of doing business domestically. We believe this would have direct and powerful implications for the Dollar on a broad basis.

A **divided Republican government** would likely result in a narrower, and somewhat smaller, Dollar rally. While Republicans could still pursue broader tariff increases through executive action alone, we think markets would ascribe a smaller probability to this outcome given the uncertainty, and the prospect of combining it with a comprehensive change in tax policy would diminish considerably (our economists have <u>estimated</u> that recycling tariff revenues into tax cuts reverses about 60% of the impact on real GDP). In this outcome, we expect FX markets would initially focus on the US-China trade policy implications because the 'groundwork' has already been laid for potential action soon

after the next term begins. That is not to say that FX moves would be limited to USD/CNH. As we discuss in the next section, US-China trade policy still has far-reaching implications for FX markets.

On the other hand, a **Democratic sweep** or **divided Democratic government** would likely result in some initial Dollar downside as markets reprice the prospect of more dramatic changes in tariffs. The extent of this reset is a moving target, but we expect the downside to grow in coming weeks as the market will likely continue to price some event risk as the election draws near. The difference between these two Democratic outcomes hinges on the small fiscal boost our economists expect under a sweep, but this should be relatively minor (for FX in particular) relative to shifting tariff probabilities. More broadly though, our main expectation under a Democratic outcome is that FX markets should revert relatively quickly to trading the current macro backdrop rather than political developments. In the current context, that means the Dollar should remain relatively well supported following the initial reaction.

Still, we previously argued that markets were not obviously pricing big dislocations from fundamentals, so there did not appear to be much room to 'price out' tariff risks. That is no longer true. With the moves in recent weeks as markets have focused more directly on the election, there are building trade opportunities for a Democratic outcome that preserves something close to the status quo. For example, recent underperformance in the Mexican Peso now rivals its underperformance vs macro factors heading into the 2016 election, although domestic political factors have also <u>played a role</u> for MXN this time (<u>Exhibit 2</u>). Therefore, we think investors should consider hedges like short USD/MXN, USD/KRW and USD/CNH or long AUD/USD and EUR/USD if market probabilities continue to drift, targeting moves back towards (but not all the way back to) levels that prevailed just after the September US employment report a few weeks ago. That said, we would be more inclined to keep these tenors on the shorter side, unlike under Republican outcomes where we would expect markets to price our policy expectations over a longer period.

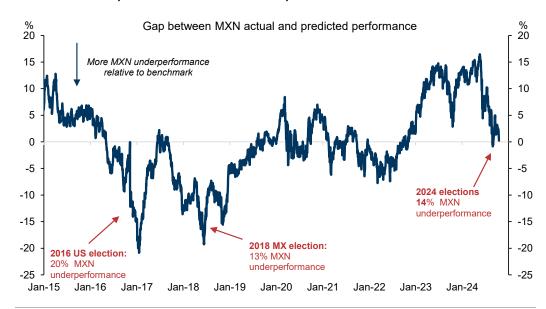


Exhibit 2: MXN underperformance now rivals the lead-up to the 2016 election

Source: Bloomberg, Goldman Sachs Global Investment Research

The sources

There are many ways to study the impact of tariffs on exchange rates. These can be broken down into three categories: (i) event studies, (ii) potential policy responses, and (iii) fundamental analysis of the impact of tariffs on trade. In general, the magnitude of predicted FX responses based on the 2018-9 experience runs roughly in that order, with event studies producing the largest moves and fundamental analysis the smallest.

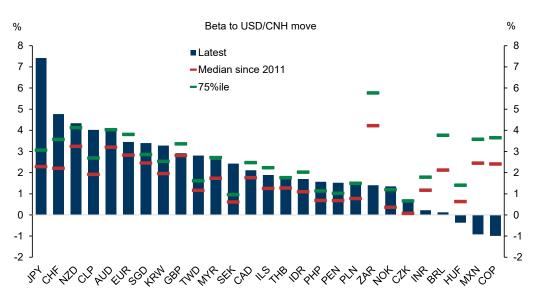
Event studies

Using event study analysis, we <u>have found</u> that USD/CNH increased about 0.7% for each \$10bn in implied tariff revenue. Our China economics team <u>estimates</u> that a 60% tariff on all US imports of Chinese goods would raise about \$250bn in revenue. Taking into account <u>changes</u> in the importance of US-bound exports to the Chinese economy over the last few years, this implies that USD/CNH could rise to around 8 if policymakers employ the same reaction function. Something closer to our <u>baseline</u> scenario under a Republican government of graduated tariff rates would imply that USD/CNH could rise to around 7.40 using the same analysis. We have found <u>similar results</u> using event studies around key election developments in this campaign.

Back in 2018, we also ran event studies to demonstrate that tariffs on China can affect FX markets through <u>three different channels</u>: (i) weaker <u>China growth</u> expectations, (ii) worsening risk sentiment, and (iii) weakening the Yuan, which is an important <u>regional</u> <u>anchor</u>. Notably, this analysis demonstrates competing influences on the Yen, which tends to depreciate with the Yuan (or higher <u>inflation expectations</u> and <u>steeper curves</u>), but appreciates in periods of rising recession risk. For this reason, we think JPY implications are not as straightforward, and it would not be our preferred vehicle for tariff hedges in either direction without being more confident on the risk market reaction.

In all cases, we expect smaller reactions than these event studies imply. This is partly because both policymakers and markets may be more confident about the resilience of Chinese exports to higher tariffs after the experiences of the last few years. Even in 2019, the FX market response was somewhat larger to the first tariff announcements than later ones. Today, policymakers, companies and investors would all have more experience dealing with shifting trade policies. This is especially important for China-centric moves, because the Yuan is a managed currency and a policy variable, and policymakers could choose to keep the currency more contained, while movements in other currencies would also be limited until it is clear how far the Yuan anchor moves (Exhibit 3). Relatedly, we would not expect the market to fully price these tariff scenarios immediately on election night or even in the subsequent weeks; one reason why event studies yield such large results is because markets do not price tariffs until a policy change is clear and imminent, especially when it is depends on China's currency response. In 2017, when a border adjustment tax was seriously considered in DC, FX markets never fully reflected this potential policy shift despite substantial FX implications. We think a debate around a new baseline tariff would follow a similar pattern.

Exhibit 3: The timing and magnitude of changes in USD/CNH are important components of the broad FX market reaction



Predicted move in each currency versus USD (versus EUR for CEE and Scandies) for a 5% move lower in USD/CNH. Calculated over rolling 1-year horizons and controlling for changes in US Cyclical vs Defensive equities, US 10-year real yields, MSCI China Index and oil and copper prices.

Source: Bloomberg, Goldman Sachs Global Investment Research

Policy responses

Academic research often focuses on the diverging policy implications of shifting trade barriers to <u>gauge</u> the impact on foreign exchange. In principle, higher US tariffs should reduce demand for foreign goods, which in turn lowers foreign inflation, while boosting US consumer prices. These diverging policy impulses have important implications for currency markets. For example, our economists have <u>estimated</u> that a 10% across-the-board tariff in addition to higher tariffs on China would result in around a 150-200bp change in the appropriate policy rate differential between the US and Euro area using a standard Taylor Rule (<u>Exhibit 4</u>). Mapping that into forward rate differentials for a policy-sensitive cross like EUR/USD, it could be worth an 8-10% depreciation on our models.

A narrower trade war focusing on US-China tariffs would follow the same pattern, but to a lesser degree. Our economists <u>estimate</u> this would be worth about 55bps on the Taylor Rule-implied US-EA rate differential, which translates to a roughly 3% depreciation in EUR/USD. Again, a few caveats are in order. There are layers of uncertainty in these estimates and it is far from clear that policymakers would follow the Taylor Rule prescription (or even that they <u>should</u>, because tariffs cause changes in price *levels*). But, as our economists have <u>noted</u>, more protectionist US trade policies would be yet another reason for lower rates in Europe, and the ECB has <u>hinted</u> that policy could be more proactive if <u>trade policy uncertainty</u> is back in play. Lately, US-EA yields have been remarkably correlated, frustrating EUR bears, and we think tariffs should put a limit on that. For this reason, we are inclined to 'bump up' these estimates a bit because tariffs would amplify the already-divergent outlook. But once again, the full effect would not be immediate.

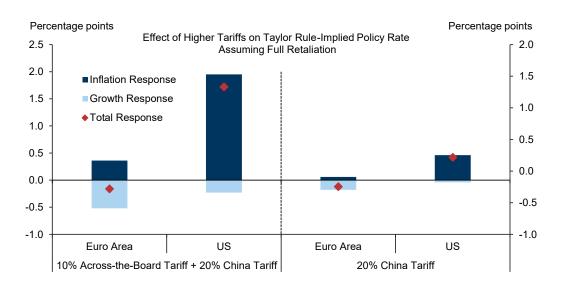


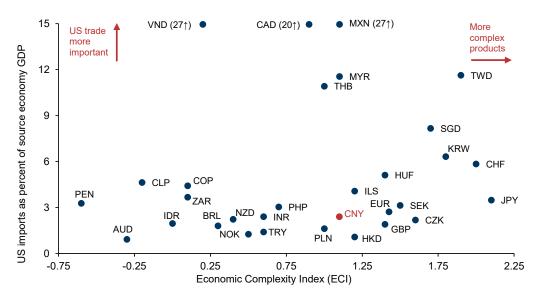
Exhibit 4: Taylor Rule shows diverging policy implications from tariffs for the US and Euro area

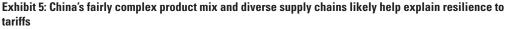
Source: Goldman Sachs Global Investment Research

Fundamental analysis

Other academic research focuses on how much currencies 'need' to respond to changing trade rules in order to offset the tariff impact. This is an oversimplification, but higher US tariffs can be paid through some combination of higher US consumer prices, lower US firm margins, and lower foreign firm margins. The more price-sensitive US buyers are for a particular import from a particular country, the more the exchange rate needs to adjust to shift the cost to foreign producers. Along these lines, we have tried to calibrate the FX impact on <u>EM currencies</u> and <u>Asian FX</u> more specifically by assessing the importance of US trade for different economies and the complexity of the products they produce (<u>Exhibit 5</u>). A growing body of literature has <u>found</u> that the 2018-19 US

tariff increases were passed through completely to US prices, which suggests that the exchange rate did not 'need' to adjust much. While this runs counter to historical tariff episodes, it appears that China's more complex product mix and shifting supply chains help explain the surprising result.





Source: OEC World, Haver Analytics, Goldman Sachs Global Investment Research

The other side

We often encounter the argument that former President Trump frequently states that he wants a weaker Dollar, and would likely push back on the Dollar appreciation that we think his policies would entail. <u>We think</u> this is likely to result in occasional FX volatility, as it did many times in his first term, but not change the overall direction. In our view, if a president *wants* a weaker currency, that is certainly an achievable outcome. But it would require a concerted, cohesive policy effort that runs counter to the rest of the Republican fiscal and trade policies we have discussed in this report. And we are skeptical that a comprehensive 'currency pact' like the <u>Smithsonian Agreement</u> or <u>Plaza</u> <u>Accord</u> can be achieved without a substantially different policy mix. A more plausible (but still unlikely) path to a currency 'deal' in the current context would be if other countries respond to the threat of tariffs by substantially boosting fiscal spending.

It is also perhaps worth noting that we <u>do not see</u> a material downside risk to the Dollar from a 'Truss-style' episode in US fixed income and currency markets, which is another common investor concern we encounter. First, at least initially, the Fed may respond in a conventional hawkish fashion to the fiscal impulse. Second, the pressures on the Pound seem difficult to replicate in the world's global reserve currency. Although wider current account deficits could <u>eventually undermine</u> foreigners' willingness to hold Dollar reserves, higher interest rates could substitute for a weaker currency, and at any rate we have argued that there is currently <u>no real alternative</u> to Dollar assets.

As we mentioned in the introduction, it is conspicuous that the two most significant

periods of sustained Dollar depreciation occurred in 2017 and 2021—right after US elections. But we think the context is important. With the benefit of hindsight, <u>we see</u> that Dollar depreciation in 2017 was strongly correlated with portfolio inflows to the Euro area following surprisingly strong growth that was likely catalyzed by China stimulus in 2016. And in 2021, the Covid vaccine discovery less than a week after the US election accounts for the shift in sentiment and growth outturns.

Still, these experiences serve as an important reminder that tariff policy and other fiscal decisions are just one component of a broad range of factors that can influence exchange rates. Estimates of the trade war impact on FX in 2018-19 are relatively small in the broader context, and there are reasons to believe this impact would not be linear if tariff rates rise more dramatically. As the 2017 and 2021 experiences show, there are also important uncertainties stemming from abroad. For example, the size and global impact of recent China stimulus measures are a proximate downside risk to the Dollar if they push global growth in a more balanced direction.

Michael Cahill

Disclosure Appendix

Reg AC

I, Michael Cahill, hereby certify that all of the views expressed in this report accurately reflect my 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 analyst's 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.; 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 (<u>https://www.sipc.org</u>).

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 <u>https://www.theocc.com/about/publications/character-risks.jsp</u> 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.