

Japan Economic Flash: First Shunto Wage Hike Data Release Indicates 3.7% Base Pay Rise; We Raise Our Wage Growth Estimates

- According to the initial *shunto* wage increase data for agreements between labor unions and companies, the base pay rise for 2024 is 3.7%, well above last year's final figure of +2.1%. Headline wage growth, including scheduled wage hikes, is 5.3% (2023 final: 3.6%).
- The data also show an increase in part-time hourly wages of 6.5%, exceeding last year's already strong growth of 5.1%.
- We raise our 2024 estimate for *shunto* base pay hike to 3.2% from 2.5% in view of the strong *shunto* results so far. If this is realized, we estimate that overall macro wage growth, including bonuses and part-time wages, will rise 3.2% in FY2024. Real disposable income would rise 1.2% (previous forecast +0.8%).
- The high base pay rise in the 2024 *shunto* reaffirms the relationship that in a high inflation period of more than 2%, wages respond more strongly to price rises. Based on our CPI forecast of 2.5% for 2024, our model implies *shunto* base pay rise of 2.2% in 2025, suggesting a strong possibility of achieving over 2% base pay for three straight years.
- As such, the BOJ could deem an increase in the base pay rise in the 2024 *shunto* as an important factor in achieving a virtuous cycle between wages and prices as well as sustainable inflation.

Yuriko Tanaka
+81(3)6437-9964 |
yuriko.tanaka@gs.com
Goldman Sachs Japan Co., Ltd.

Tomohiro Ota
+81(3)6437-9984 |
tomohiro.ota@gs.com
Goldman Sachs Japan Co., Ltd.

First Data Release Indicates 3.7% Base Pay Rise, Above 3% Level for the First Time Since 1991

The Japanese Trade Union Confederation (JTUC-RENGO) released its FY2024 *shunto* initial wage negotiation data for agreements between labor unions and companies. The data indicate a base pay rise of 3.7% and a headline wage increase, including scheduled wage increases, of 5.3%. Although these figures are below the respective rises of 4.3% and 5.9% requested by the unions, they are well above last year's final wage agreement figures (+2.1% and +3.6%; data release of July 2023). Base pay rose above the 3% handle for the first time since 1991 (see Exhibit 1 and Exhibit 2).

The inflation rate, which is used as a benchmark for wage hikes, was gradually slowing in December, when many trade unions began to consider specific wage hike requests, but average headline nationwide CPI remained relatively high for the average of 2023, at 3% yoy. In addition, we believe that bullish wage requests were encouraged by high corporate profits and labor shortages, and we think companies

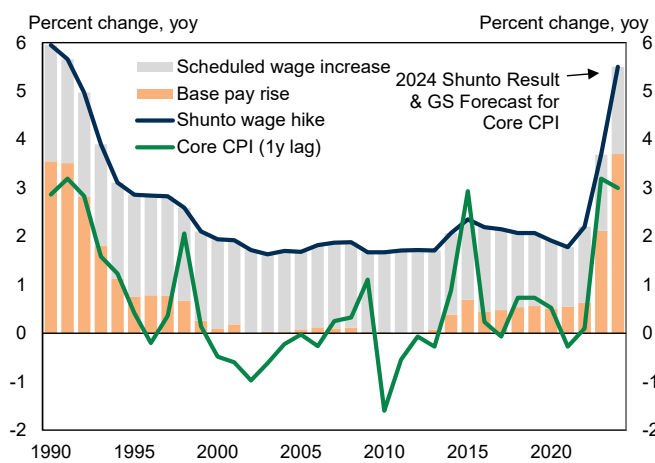
are responding to these requests.

Of note, the major Japanese steel companies, which have many trade union members, have responded with base pay rises of over 10%. We estimate that these three companies alone contribute 0.4 pp to the base pay rise in the first data release. Steel majors have a tradition to negotiate wage hikes once every two years, and despite high inflation, steel majors did not hold wage negotiation in 2023, and implemented a low base pay rise (around 0.7%) which was already decided in the 2022 negotiation. Thus, this year's high wage agreement covers wage growth to complement two years' of high inflation and others. Assuming that 10%+ pay rise should have been two installments of annual 5% wage hike, this factor could overestimate the initial aggregate base pay rise by 0.2pp or so.

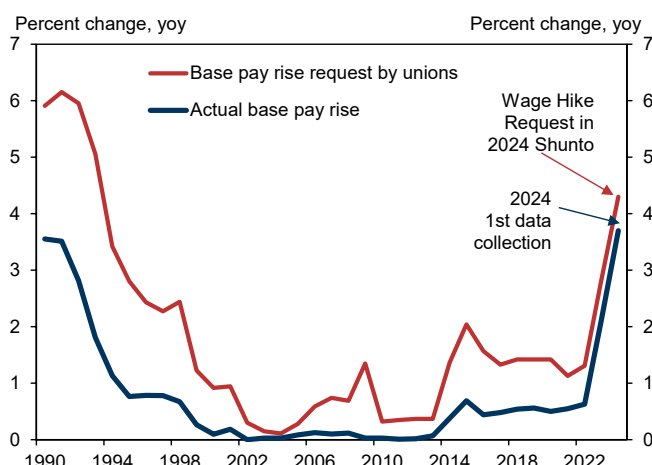
By company size, the initial base pay rise was 3.72% for companies with more than 300 workers and 2.98% for companies with fewer than 300 workers. The gap is eye-catching, as it was much smaller in last years' final reading (2.14% for large and 1.96% for smaller companies). SME weighting in *shunto* is just 12%. Even fewer SMEs respond to wage hikes early, and the weighting of SMEs in the initial data collection is less than 3%.

The *shunto* negotiations also include wages negotiations for part-time workers. Agreements for part-time hourly wage increases came in at +6.5% in the initial data, above last year's already high growth rate of +5.1% ([Exhibit 3](#)). In recent years, companies have been required to shift towards equal-pay-for-equal-work and to correct the wage gap between different forms of employment, and wage increases for part-timers have been higher than for permanent employees.

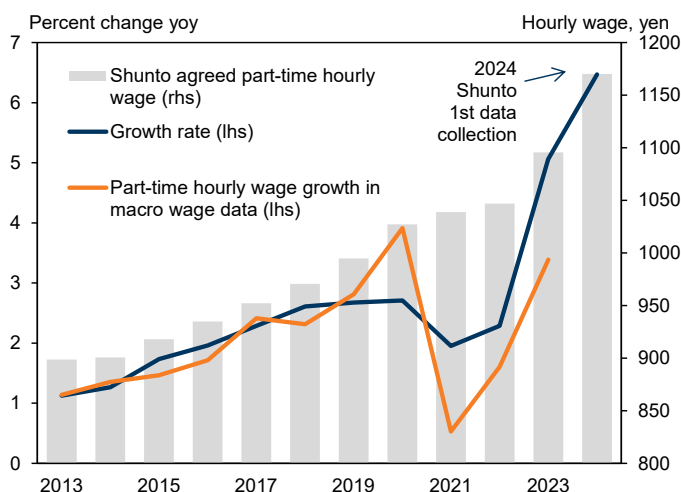
Labor union workers represented in *shunto* negotiation is around 3 million (July 2023 JUTC-RENGO final data), only 5% of all workers in the economy, including part-time workers. *Shunto* is also characterized by a high proportion of large manufacturers with large trade union organizations. As such, slower wage growth in the service sector and in SMEs which account for 80% of the economy as a whole, tends to result in gap between macro wage growth and the *shunto* agreed wage hike. We will therefore need to keep an eye on whether large wage hikes take root across service industries and SMEs as well.

Exhibit 1: Shunto Wage Increases and Consumer Price Index

Source: JTUC-RENGO, Keidanren, Ministry of Internal Affairs and Communications, Goldman Sachs Global Investment Research

Exhibit 2: Shunto Wage Increase Requests and Actual Base Pay Raises

Source: JTUC-RENGO, Keidanren, Goldman Sachs Global Investment Research

Exhibit 3: Shunto Agreed Part-Time Hourly Wages

Source: JTUC-RENGO, Ministry of Internal Affairs and Communications, Data compiled by Goldman Sachs Global Investment Research

We Raise our Wage Growth Estimates to Reflect the Strong Shunto Wage Data

The *shunto* wage growth figures tend to be gradually revised down in subsequent data releases as the wage agreements of SMEs are added in. Even so, we expect the *shunto* wage increase in the final data collection (to be released in July) to come in above our initial estimate. We had previously forecast a base pay increase of 2.5%, which was above last year's 2.1%, but we now raise this to 3.2%.

We estimate that FY2024 macro basic wage for full time workers would rise 3.1%, up from the expected 2.0% growth in FY2023. We forecast that bonuses and overtime wages will grow by around 1.3%, as in FY2023. We also factor in an acceleration in the part-time workers hourly wage growth, to 4.3% in FY2024 from 3.2% in FY2023.

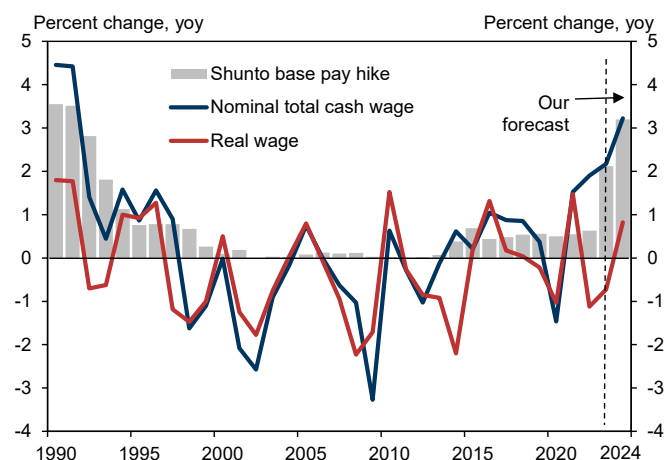
Putting all together, we now estimate that nominal overall wage growth for all workers will rise 3.2% in FY2024 (our previous estimate was 3.1%), up sharply from 2.2% in FY2023¹ ([Exhibit 4](#)).

Incorporating the above higher wage growth and others, nominal disposable income would rise 3.7% in 2024². Meanwhile, we expect core CPI to slow to 2.5% on average in 2024, from 3.1% in 2023, and therefore we forecast that real disposable income growth will turn positive for the first time in four years, at 1.2% (previously 0.8%), accelerating sharply from -2.8% from 2023 ([Exhibit 5](#)). However, we note that even after this increase in income, real disposable income would still be 0.8% lower than in 2019, before the pandemic (2.2% below 2019 level without the 2024 temporary tax rebate).

The improving real income environment should boost the consumption recovery. However, as the elasticity of consumption relative to real disposable income is around 0.3 pp³, and as we had already factored in wage recovery to some extent, the upward revision to our real disposable income forecast (+0.4 pp) provides only a modest boost to our consumption outlook (+0.1 pp).

Exhibit 4: We Estimate Real Wage Growth above +1% in 2024

Shunto Base Pay Rise, Nominal/Real Wages

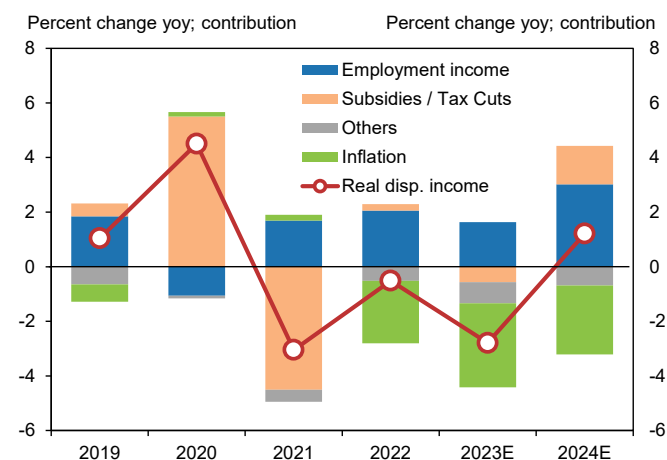


Real wage deflated using core CPI.

Source: Ministry of Health, Labour and Welfare, Ministry of Internal Affairs and Communications, JTUC-RENGO, Goldman Sachs Global Investment Research

Exhibit 5: Real Disposable Income Finally Turning Positive in 2024

Decomposition of Real Disposable Income Growth



Real disposable income deflated using core CPI.

Source: Cabinet Office, Ministry of Internal Affairs and Communications, Goldman Sachs Global Investment Research

With the Base Pay Rise Likely to Remain Above 2% in 2025, Continuous Price and Wage

¹ The magnitude of revision to macro nominal overall wage growth is smaller compared to the upward revision to the shunto base pay hike. Explanations are, in addition to adjusting the boost from the strong wage hikes by the steel majors and incorporating the gap wage hike between large and smaller companies, (1) our real GDP forecast for 2024 is lower compared to October 2023 when we made our previous forecast, which lowers the contribution of bonus/overtime wage by 0.3pp, and (2) running rate of wage growth upto January has been slower than we assumed in October, which reduces the FY2023 outlook for a lower starting base for FY2024.

² Disposable income includes tax refunds and support for low-income households (total ¥5 tn), the bulk of which will be paid out by summer 2024. On the other hand, increase in personal income tax and social security contribution, accompanying wage growth, reducing disposable income.

³ We estimate marginal propensity to consume based on yoy changes in real disposable income and real household spending for FY1994-FY2019. Our estimation results are broadly similar to those of the Cabinet Office (2010) and the Bank of Japan (2016).

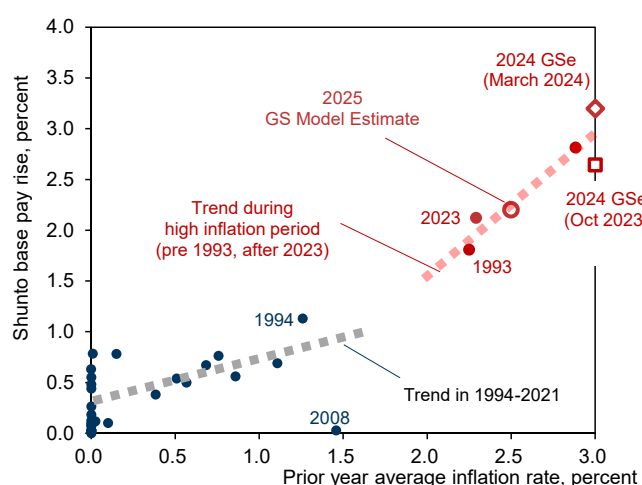
Rises Increase the Likelihood of a Virtuous Cycle Between Wages and Prices

The high base pay rise in the 2024 *shunto* reaffirms the relationship that we have noted previously that in a high inflation period of more than 2%, heightened inflation concerns change the negotiating attitude of labor and management, with wages responding more strongly to price rises (Exhibit 6).

Given this relationship, the wage increase in the 2025 *shunto* is also likely to be relatively high one year from now. As our 2024 core CPI forecast is +2.5% (the BOJ's FY2024 price outlook is +2.4%), we model for a base pay rise in the 2025 *shunto* of +2.2%, which would mark a rise of more than 2% for the third straight year.⁴

Exhibit 6: Base Pay Rise Reacts Strongly to Inflation During Periods of High Inflation Exceeding 2%

Correlation Between Inflation (Headline CPI) and Shunto Base Pay Rise



1990 and 1991 were eliminated as outliers, because these were at the peak of the bubble economy. Unemployment rate in 1990-91 was 2.1%, and the rate has not been below the level even once since then. The model estimate for 2025 is estimated with our inflation rate forecast (see the footnote 4 for the model. Nominal productivity growth in 2024 is assumed to be zero).

Source: JTUC-RENGO, Keidanren, Ministry of Internal Affairs and Communications, Goldman Sachs Global Investment Research

The high wage rise forecast for the 2025 *shunto* means that we expect prices and wages will continue to rise by more than 2% over 3 years in Japan. It is widely known that persistent inflation itself alters the mindset of consumers and companies, and increases the likelihood of this leading to higher inflation expectations (so-called adaptive expectations).

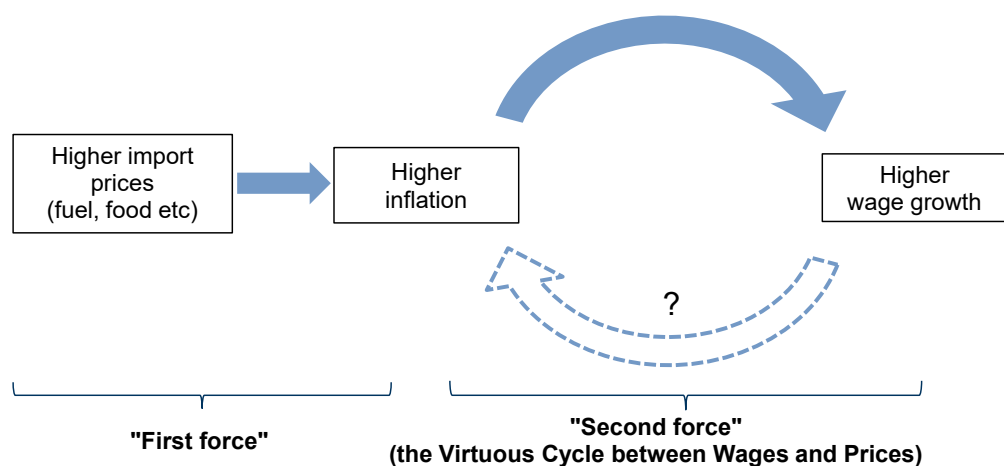
A rise in inflation expectations is a decisive factor in the creation of a virtuous cycle between wages and prices. Trade unions that expect prices to rise take wage hikes seriously, and companies that expect wage increases to continue are more likely to choose to raise sales prices. In other words, persistent inflation could increase the likelihood of achieving a virtuous cycle.

⁴ This estimate is derived from the following model. *Shunto* base pay rise = $0.23^{***} + 0.15^{**} \times \text{previous year's core CPI} + 0.64^{***} \times \text{high-inflation period dummy} \times \text{previous year's core CPI} + 0.08^{**} \times \text{previous year's nominal labor productivity growth rate}$. All regression coefficients have a 1-period lag. The estimation period is 1992-2024. *** and ** are statistically significant at the 1% and 5% levels respectively. Our 2025 *shunto* model estimate assumes zero nominal labor productivity growth in 2024.

As such, the BOJ could deem an increase in the base pay rise in the 2024 *shunto* as an important factor in achieving a virtuous cycle between wages and prices as well as sustainable inflation.

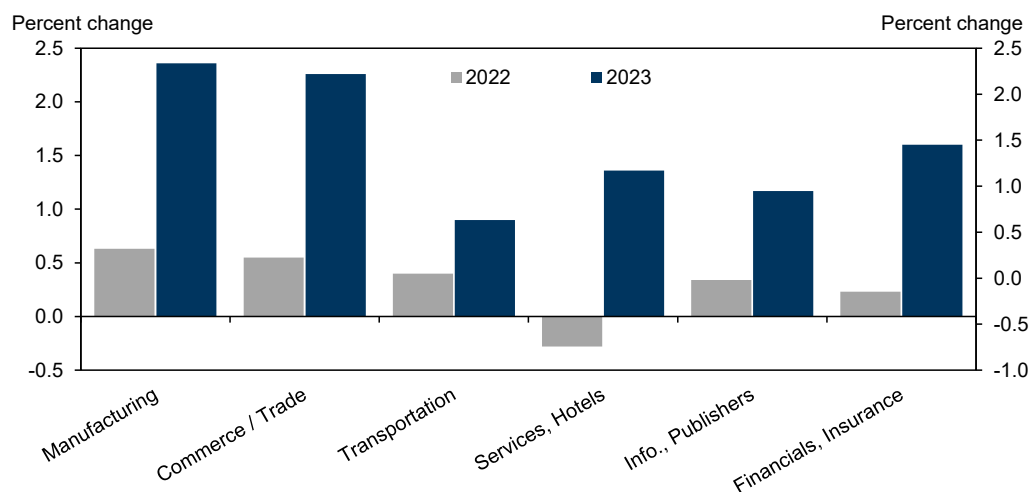
However, as we have noted previously, we think it is essential for wage growth to increase in the labor-intensive services industry in order to create a channel for wage increases to flow to price increases ([Exhibit 7](#)). Indeed, in the 2023 *shunto* the base pay rise in the services industry was only around 1% ([Exhibit 8](#)), and this could have prevented the BOJ from confirming the aforementioned channel. Therefore, we believe the breakdown of wage increases by industry in the third *shunto* data release on April 4 will be the next key indicator to watch, especially to consider the timing for the second rate hike, which we expect in October 2024.

Exhibit 7: Virtuous Cycle Between Wages and Prices



Source: Goldman Sachs Global Investment Research

Exhibit 8: Services Industry Base Pay Rise Was Only Around 1% in the 2023 Shunto
Shunto Base Pay Rise by Industry



Source: JTUC-RENGO, Goldman Sachs Global Investment Research

Yuriko Tanaka and Tomohiro Ota

Disclosure Appendix

Reg AC

We, Yuriko Tanaka and Tomohiro Ota, 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 résolution ("ACPR") and regulated by the Autorité de contrôle prudentiel et de résolution and the Autorité des marchés 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 (Finansinspektionen) 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.

No part of this material may be (i) copied, photocopied or duplicated in any form by any means or (ii) redistributed without the prior written consent of The Goldman Sachs Group, Inc.