Wistron (3231.TW): July and 2Q26 beat; AI server rack in a strong ramp-up with customer expansion and specification upgrades; Buy

Wistron's July revenue was up 61% YoY to NT$308bn, or 30% higher than our estimate, reflecting strong AI server rack demand from neo-cloud and enterprises, offsetting the impact of the model transition. We expect sequential revenue growth ahead through Dec 2026, driven by new GPU AI server racks entering mass production in 4Q26, which will drive up the ASP, along with strong AI spending and the expansion of company's customer base. The new GPU AI server racks have various racks across GPU, CPU, and LPU, supporting ODM growth in coming quarters. On PC, the company's July shipments were at 1.6m units (-20% MoM / YoY), reflecting modest demand under high memory costs. Despite PC shipments likely being negative HoH considering the strong pull-in since late 2025, we expect the strong AI server rack ramp-up to offset the impact, driving 2H26 revenue up +28% HoH. Maintain Buy with TP raised to NT$281 (13.1x 2027E PE vs. 29% NI YoY in 2027-28E).

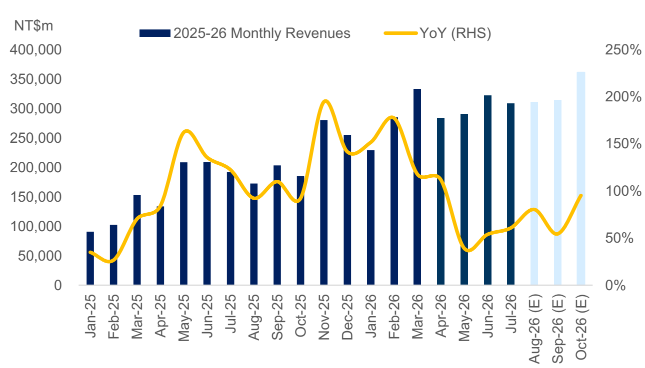
We remain positive on Wistron's AI servers, driven by (1) rack-level AI server migration towards next-generation models with higher ASP, (2) major customers' positive guidance on continuous AI spending, (3) client base expansion towards new enterprise and CSP clients, and (4) Wistron's global capacity expansion to better capture the strong demand. Wistron announced new AI server capacity expansion plans in Taiwan, US, and Vietnam, supported by the company's new global depository receipts issuance. Overall, we expect that the strong earnings growth ahead, driven by AI, could well cover the dilution and capex / R&D investments.

Verena Jeng
+852-2978-1681 | verena.jeng@gs.com
Goldman Sachs (Asia) L.L.C.

Allen Chang
+852-2978-2930 |
allen.k.chang@gs.com
Goldman Sachs (Asia) L.L.C.

Yifan Hu
+852-2978-0996 | yifan.hu@gs.com
Goldman Sachs (Asia) L.L.C.

Exhibit 1: Wistron monthly revenues



Source: Company data, Goldman Sachs Global Investment Research

Exhibit 2: Wistron 3-month revenue preview

	26-Jul	Aug-26 (E)	Sep-26 (E)	Oct-26 (E)	Nov-26 (E)	Dec-26 (E)	3Q26 (E)	4Q26 (E)
Rev (NT$m)	308,219	311,301	314,144	361,266	422,681	518,740	933,665	1,302,688
Rev YoY	61%	80%	54%	95%	51%	103%	64%	81%
Rev MoM / QoQ	-4%	1%	1%	15%	17%	23%	4%	40%
GS estimates	237,902							
Act. Vs. GS	30%							

Source: Company data, Goldman Sachs Global Investment Research

2Q26 beat: Wistron's 2Q26 revenue is 6% higher than our estimate, and its GM of 5.7% is higher than our estimate (5.4%) and the Bloomberg consensus (5.5%), which we attribute to Wistron's enhanced production efficiency in AI server racks and Wiwynn's business model switch from 'buy & sell' to consignment for general servers. 2Q26 opex ratio is largely in line with our estimate, along with the higher than expected non-op income, mainly on FX gain, leading 2Q26 net income 26% / 31% higher than our estimate / Bloomberg consensus.

Exhibit 3: Wistron's 2Q26 result snapshot

NT m	2Q25	1Q26	2Q26	QoQ	YoY	GS	Act / GS	Cons.	Act/Cons.
Revenue	551,291	846,303	895,443	6%	62%	847,071	6%	873,954	2%
GP	24,453	44,094	50,664	15%	107%	45,901	10%	48,216	5%
OP	10,787	29,137	33,447	15%	210%	30,931	8%	30,767	9%
Net income	6,504	9,631	14,827	54%	128%	11,789	26%	11,292	31%
Margins									
GM	4.4%	5.2%	5.7%			5.4%		5.5%	
OPM	2.0%	3.4%	3.7%			3.7%		3.5%	
NM	1.2%	1.1%	1.7%			1.4%		1.3%	

Source: Company data, Goldman Sachs Global Investment Research, Bloomberg

Earnings revision: We factor in Wistron's Jul revenue and 2Q26 result and raise our 2026-28E net incomes by 5% / 16% / 14%, mainly on higher revenue. Our 2026-28E revenue is revised up by 21% / 37% / 39%, mainly on higher rack-level AI server shipments and higher ASP of next-generation AI server, reflecting the company's client base and global capacity expansion. Our 2026-28E GMs are revised down, as rack-level AI server business usually carries a lower GM than other product lines. Our 2026-28E opex ratios are largely unchanged.

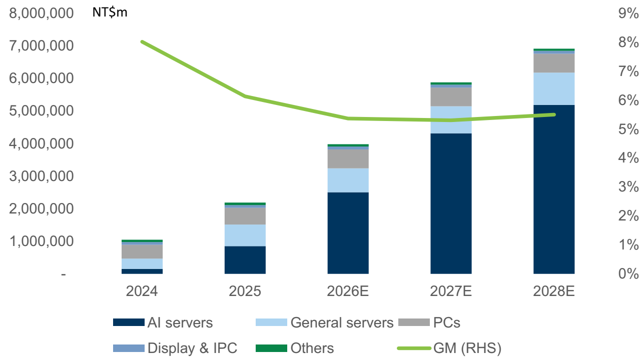
Exhibit 4: Earnings revision

	2026E			2027E			2028E		
NT m	Old	New	Chg	Old	New	Chg	Old	New	Chg
Revenue	3,291,847	3,978,099	21%	4,285,249	5,877,711	37%	4,989,536	6,912,921	39%
GP	196,001	213,484	9%	260,686	311,688	20%	305,540	379,867	24%
OP	134,761	136,383	1%	177,124	199,975	13%	203,255	238,152	17%
Net income	49,880	52,350	5%	63,536	73,751	16%	75,483	85,687	14%
Margins									
GM	6.0%	5.4%		6.1%	5.3%		6.1%	5.5%	
OPM	4.1%	3.4%		4.1%	3.4%		4.1%	3.4%	
NM	1.5%	1.3%		1.5%	1.3%		1.5%	1.2%	

Source: Company data, Goldman Sachs Global Investment Research

Valuation: We continue to use near-term P/E to derive our 12M TP. Our target multiple is updated to 13.1x 2027E EPS (vs. 13.2x previously), which is derived from the refreshed peers' correlation between forward trading P/E and earnings growth. With our updated earnings estimates and target multiple, our 12M TP is raised to NT$281 (vs. NT$246 previously). Our target P/E is still between the company's historical avg. and avg.+1stv. trading P/E, reflecting our positive view on Wistron's market leading position in AI server ODM. **Maintain Buy.**

Exhibit 5: Wistron's revenue and GM trends

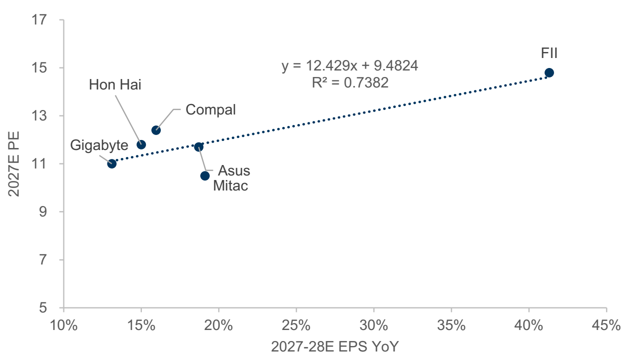


Source: Company data, Goldman Sachs Global Investment Research

Exhibit 6: Wistron 12m forward P/E

Source: Company data, Goldman Sachs Global Investment Research

Exhibit 7: Wistron peers' 2027E P/E vs. 2027-28E avg. EPS YoY



Source: Company data, Goldman Sachs Global Investment Research

Exhibit 8: Wistron's QFII

Source: TEJ

Price Target Risks and Methodology - Wistron

Our 12-month target price of NT$281 is based on a 13.1x 2027E P/E, which is derived from PC/server peer EPS growth vs. P/E multiple correlation. We see EPS growth as a major factor for the stock's share price performance.

Key downside risks: 1) weaker-than-expected PC market recovery, 2) slower-than-expected AI server demand ramp-up, and 3) weaker-than-expected demand on general servers.

3231.TW	12m Price Target: **NT$281.00**	Price: **NT$193.00**	Upside: **45.6%**

Buy

Market cap: NT$657.9bn / $20.4bn
Enterprise value: NT$1.1tr / $35.1bn
3m ADTV: NT$11.9bn / $373.5mn
Taiwan
Greater China Technology
M&A Rank: 3
Leases incl. in net debt & EV?: Yes

GS Forecast

	12/25	12/26E	12/27E	12/28E
Revenue (NT$ mn) New	**2,186,522.6**	**3,978,099.0**	**5,877,711.1**	**6,912,920.9**
Revenue (NT$ mn) Old	2,186,522.6	3,291,846.9	4,285,248.6	4,989,536.2
EBITDA (NT$ mn)	91,491.4	150,161.8	217,156.4	261,628.1
EPS (NT$) New	**9.10**	**16.65**	**23.45**	**27.25**
EPS (NT$) Old	9.10	15.86	20.21	24.01
P/E (X)	13.2	11.6	8.2	7.1
P/B (X)	2.2	3.3	2.9	2.6
Dividend yield (%)	4.5	5.1	7.2	8.3
CROCI (%)	32.5	8.6	6.6	7.6

	6/26	9/26E	12/26E	3/27E
EPS (NT$)	4.72	3.88	4.99	4.63

Source: Company data, Goldman Sachs Research estimates, FactSet. Price as of 10 Aug 2026 close.

Disclosure Appendix

Reg AC

We, Verena Jeng, Allen Chang and Yifan Hu, hereby certify that all of the views expressed in this report accurately reflect our personal views about the subject company or companies and its or their securities. We also certify that no part of our compensation was, is or will be, directly or indirectly, related to the specific recommendations or views expressed in this report.

Unless otherwise stated, the individuals listed on the cover page of this report are analysts in Goldman Sachs' Global Investment Research division.

Contributing Authors: Verena Jeng Goldman Sachs (Asia) L.L.C., Allen Chang Goldman Sachs (Asia) L.L.C., Yifan Hu Goldman Sachs (Asia) L.L.C..

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

GS Factor Profile

The Goldman Sachs Factor Profile provides investment context for a stock by comparing key attributes to the market (i.e. our universe of rated stocks) and its sector peers. The four key attributes depicted are: Growth, Financial Returns, Multiple (e.g. valuation) and Integrated (a composite of Growth, Financial Returns and Multiple). Growth, Financial Returns and Multiple are calculated by using normalized ranks for specific metrics for each stock. The normalized ranks for the metrics are then averaged and converted into percentiles for the relevant attribute. The precise calculation of each metric may vary depending on the fiscal year, industry and region, but the standard approach is as follows:

Growth is based on a stock's forward-looking sales growth, EBITDA growth and EPS growth (for financial stocks, only EPS and sales growth), with a higher percentile indicating a higher growth company. **Financial Returns** is based on a stock's forward-looking ROE, ROCE and CROCI (for financial stocks, only ROE), with a higher percentile indicating a company with higher financial returns. **Multiple** is based on a stock's forward-looking P/E, P/B, price/dividend (P/D), EV/EBITDA, EV/FCF and EV/Debt Adjusted Cash Flow (DACF) (for financial stocks, only P/E, P/B and P/D), with a higher percentile indicating a stock trading at a higher multiple. The **Integrated** percentile is calculated as the average of the Growth percentile, Financial Returns percentile and (100% - Multiple percentile).

Financial Returns and Multiple use the Goldman Sachs analyst forecasts at the fiscal year-end at least three quarters in the future. Growth uses inputs for the fiscal year at least seven quarters in the future compared with the year at least three quarters in the future (on a per-share basis for all metrics).

For a more detailed description of how we calculate the GS Factor Profile, please contact your GS representative.

M&A Rank

Across our global coverage, we examine stocks using an M&A framework, considering both qualitative factors and quantitative factors (which may vary across sectors and regions) to incorporate the potential that certain companies could be acquired. We then assign a M&A rank as a means of scoring companies under our rated coverage from 1 to 3, with 1 representing high (30%-50%) probability of the company becoming an acquisition target, 2 representing medium (15%-30%) probability and 3 representing low (0%-15%) probability. For companies ranked 1 or 2, in line with our standard departmental guidelines we incorporate an M&A component into our target price. M&A rank of 3 is considered immaterial and therefore does not factor into our price target, and may or may not be discussed in research.

Quantum

Quantum is Goldman Sachs' proprietary database providing access to detailed financial statement histories, forecasts and ratios. It can be used for in-depth analysis of a single company, or to make comparisons between companies in different sectors and markets.

Disclosures

The rating(s) for Wistron is/are relative to the other companies in its/their coverage universe: AAC, ACM Research, AMEC, ASMPT, AVC, AccoTest, Anji Micro, Asus, Auras, BOE, BYDE, Biren, CR Micro, Cambricon, Chenbro, China Mobile (HK), China Telecom, China Tower Corp., China Unicom, Chinasoft Intl, Compal, Desay SV, E Ink, E-Town Semis, EHang, Empyrean, Eoptolink, FOCI, Fositek, Foxconn Industrial Internet, Gigabyte, Gigadevice, Glodon Co., HTC Corp., Hikvision, Hon Hai, Horizon Robotics, Hua Hong, Huace Navigation, Huaqin Co.(A), Huaqin Co.(H), Hwatsing, Iluvatar, InnoScience, Inspur, Insta360, Inventec, JCET, Kematek, King Slide, Kingdee, Kingsoft Office, LandMark, Largan, Lenovo, Lingyi, Maxscend, Meitu, MetaX, Mitac, Montage (A), Montage (H), NAURA, NSIG, Nexchip, OmniVision, Pegatron, Pony AI Inc. (ADR), Pony AI Inc. (H), Quanta, RoboTechnik, Ruijie Networks, SG Micro, SICC, SMIC (A), SMIC (H), SZS, Sangfor, SenseTime, Shengyi Tech, Shennan Circuits, StarPower, Sunny Optical, TFC Optical, Thundersoft, Tongyu Communication, Transsion, UMT, UNIS, VPEC, Vanchip, VeriSilicon, Victory Giant, WNC, WUS, WeRide, Wistron, Wiwynn, YJ Semitech, YOFC, Yonyou, ZTE (A), ZTE (H), iFlytek

Company-specific regulatory disclosures

The following disclosures relate to relationships between The Goldman Sachs Group, Inc. (with its affiliates, "Goldman Sachs") and companies covered by Goldman Sachs Global Investment Research and referred to in this research.

Goldman Sachs beneficially owned 1% or more of common equity (excluding positions managed by affiliates and business units not required to be aggregated under US securities law) as of the month end preceding this report: Wistron (NT$193.00)

Goldman Sachs expects to receive or intends to seek compensation for investment banking services in the next 3 months: Wistron (NT$193.00)

Goldman Sachs had an investment banking services client relationship during the past 12 months with: Wistron (NT$193.00)

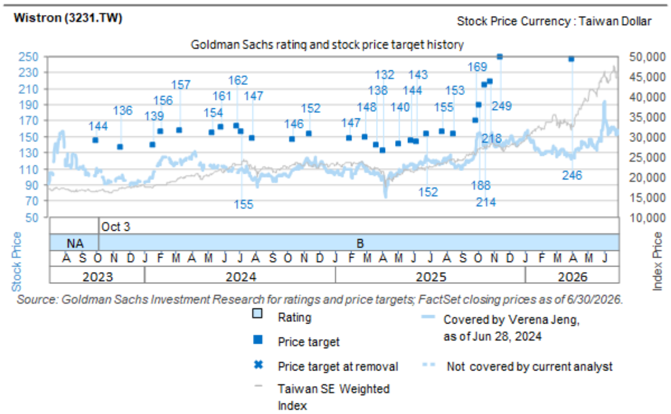
Distribution of ratings/investment banking relationships

Goldman Sachs Investment Research global Equity coverage universe

	Rating Distribution			Investment Banking Relationships		
	Buy	Hold	Sell	Buy	Hold	Sell
Global	50%	34%	16%	65%	59%	43%

As of July 1, 2026, Goldman Sachs Global Investment Research had investment ratings on 3,104 equity securities. Goldman Sachs assigns stocks as Buys and Sells on various regional Investment Lists; stocks not so assigned are deemed Neutral. Such assignments equate to Buy, Hold and Sell for the purposes of the above disclosure required by the FINRA Rules. See 'Ratings, Coverage universe and related definitions' below. The Investment Banking Relationships chart reflects the percentage of subject companies within each rating category for whom Goldman Sachs has provided investment banking services within the previous twelve months.

Price target and rating history chart(s)



The price targets shown should be considered in the context of all prior published Goldman Sachs research, which may or may not have included price targets, as well as developments relating to the company, its industry and financial markets.

Target price history table(s)
Wistron (3231.TW)

Date of report	Target price (NT$)	Closing price (NT$)
02-Apr-26	246.00	125.00
17-Nov-25	249.00	138.00
28-Oct-25	218.00	148.00
17-Oct-25	214.00	136.50
07-Oct-25	188.00	156.00
01-Oct-25	169.00	146.00
19-Aug-25	153.00	115.50
28-Jul-25	155.00	120.00
28-Jun-25	152.00	121.00
08-Jun-25	143.00	110.00
29-May-25	144.00	116.50
06-May-25	140.00	109.00
06-Apr-25	132.00	101.00
24-Mar-25	138.00	103.50
01-Mar-25	148.00	112.00
31-Jan-25	147.00	-
15-Nov-24	152.00	117.50
14-Oct-24	146.00	109.00
29-Jul-24	147.00	95.00
09-Jul-24	155.00	108.50
28-Jun-24	162.00	106.00
29-May-24	161.00	116.00
12-May-24	154.00	114.00
11-Mar-24	157.00	121.00
04-Feb-24	156.00	120.00
19-Jan-24	139.00	107.00
19-Nov-23	136.00	99.00
03-Oct-23	144.00	108.00

Price targets shown in table(s) are unadjusted for corporate actions.

Regulatory disclosures

Disclosures required by United States laws and regulations

See company-specific regulatory disclosures above for any of the following disclosures required as to companies referred to in this report: manager or co-manager in a pending transaction; 1% or other ownership; compensation for certain services; types of client relationships; managed/co-managed public offerings in prior periods; directorships; for equity securities, market making and/or specialist role. Goldman Sachs trades or may trade as a principal in debt securities (or in related derivatives) of issuers discussed in this report.

The following are additional required disclosures: **Ownership and material conflicts of interest:** Goldman Sachs policy prohibits its analysts, professionals reporting to analysts and members of their households from owning securities of any company in the analyst's area of coverage. **Analyst compensation:** Analysts are paid in part based on the profitability of Goldman Sachs, which includes investment banking revenues. **Analyst as officer or director:** Goldman Sachs policy generally prohibits its analysts, persons reporting to analysts or members of their households from serving as an officer, director or advisor of any company in the analyst's area of coverage. **Non-U.S. Analysts:** Non-U.S. analysts may not be associated persons of Goldman Sachs & Co. LLC and therefore may not be subject to FINRA Rule 2241 or FINRA Rule 2242 restrictions on communications with a subject company, public appearances and trading in securities covered by the analysts.

Additional disclosures required under the laws and regulations of jurisdictions other than the United States

The following disclosures are those required by the jurisdiction indicated, except to the extent already made above pursuant to United States laws and regulations. **Australia:** Goldman Sachs Australia Pty Ltd and its affiliates are not authorised deposit-taking institutions (as that term is defined in the Banking Act 1959 (Cth)) in Australia and do not provide banking services, nor carry on a banking business, in Australia. This research, and any access to it, is intended only for "wholesale clients" within the meaning of the Australian Corporations Act, unless otherwise agreed by Goldman Sachs. In producing research reports, members of Global Investment Research of Goldman Sachs Australia may attend site visits and other meetings hosted by the companies and other entities which are the subject of its research reports. In some instances the costs of such site visits or meetings may be met in part or in whole by the issuers concerned if Goldman Sachs Australia considers it is appropriate and reasonable in the specific circumstances relating to the site visit or meeting. To the extent that the contents of this document contains any financial product advice, it is general advice only and has been prepared by Goldman Sachs without taking into account a client's objectives, financial situation or needs. A client should, before acting on any such advice, consider the appropriateness of the advice having regard to the client's own objectives, financial situation and needs. A copy of certain Goldman Sachs Australia and New Zealand disclosure of interests and a copy of Goldman Sachs' Australian Sell-Side Research Independence Policy Statement are available at: https://www.goldmansachs.com/disclosures/australia-new-zealand/index.html. **Brazil:** Disclosure information in relation to CVM Resolution n. 20 is available at https://www.gs.com/worldwide/brazil/area/gir/index.html. Where applicable, the Brazil-registered analyst primarily responsible for the content of this research report, as defined in Article 20 of CVM Resolution n. 20, is the first author named at the beginning of this report, unless indicated otherwise at the end of the text. **Canada:** This information is being provided to you for information purposes only and is not, and under no circumstances should be construed as, an advertisement, offering or solicitation by Goldman Sachs & Co. LLC for purchasers of securities in Canada to trade in any Canadian security. Goldman Sachs & Co. LLC is not registered as a dealer in any jurisdiction in Canada under applicable Canadian securities laws and generally is not permitted to trade in Canadian securities and may be prohibited from selling certain securities and products in certain jurisdictions in Canada. If you wish to trade in any Canadian securities or other products in Canada please contact Goldman Sachs Canada Inc., an affiliate of The Goldman Sachs Group Inc., or another registered Canadian dealer. **Hong Kong:** Further information on the securities of covered companies referred to in this research may be obtained on request from Goldman Sachs (Asia) L.L.C. **India:** Further information on the subject company or companies referred to in this research may be obtained from Goldman Sachs (India) Securities Private Limited, Research Analyst - SEBI Registration Number INH000001493, 10th Floor, Ascent-Worli, Sudam Kalu Ahire Marg, Worli, Mumbai-400 025, India, Corporate Identity Number U74140MH2006FTC160634, Phone +91 22 6616 9000, Fax +91 22 6616 9001. Goldman Sachs may beneficially own 1% or more of the securities (as such term is defined in clause 2 (h) the Indian Securities Contracts (Regulation) Act, 1956) of the subject company or companies referred to in this research report. Registration granted by SEBI and certification from NISM in no way guarantee performance of the intermediary or provide any assurance of returns to investors. Goldman Sachs (India) Securities Private Limited compliance officer and investor grievance contact details, a copy of the annual compliance audit report and other relevant information and disclosures can be found at this link: https://www.goldmansachs.com/worldwide/india/research-analyst. **Japan:** See below. **Korea:** This research, and any access to it, is intended only for "professional investors" within the meaning of the Financial Services and Capital Markets Act, unless otherwise agreed by Goldman Sachs. Further information on the subject company or companies referred to in this research may be obtained from Goldman Sachs (Asia) L.L.C., Seoul Branch. **New Zealand:** Goldman Sachs New Zealand Limited and its affiliates are neither "registered banks" nor "deposit takers" (as defined in the Reserve Bank of New Zealand Act 1989) in New Zealand. This research, and any access to it, is intended for "wholesale clients" (as defined in the Financial Advisers Act 2008) unless otherwise agreed by Goldman Sachs. A copy of certain Goldman Sachs Australia and New Zealand disclosure of interests is available at: https://www.goldmansachs.com/disclosures/australia-new-zealand/index.html. **Russia:** Research reports distributed in the Russian Federation are not advertising as defined in the Russian legislation, but are information and analysis not having product promotion as their main purpose and do not provide appraisal within the meaning of the Russian legislation on appraisal activity. Research reports do not constitute a personalized investment recommendation as defined in Russian laws and regulations, are not addressed to a specific client, and are prepared without analyzing the financial circumstances, investment profiles or risk profiles of clients. Goldman Sachs assumes no responsibility for any investment decisions that may be taken by a client or any other person based on this research report. **Singapore:** Goldman Sachs (Singapore) Pte. (Company Number: 198602165W), which is regulated by the Monetary Authority of Singapore, accepts legal responsibility for this research, and should be contacted with respect to any matters arising from, or in connection with, this research. **Taiwan:** This material is for reference only and must not be reprinted without permission. Investors should carefully consider their own investment risk. Investment results are the responsibility of the individual investor. **United Kingdom:** Persons who would be categorized as retail clients in the United Kingdom, as such term is defined in the rules of the Financial Conduct Authority, should read this research in conjunction with prior Goldman Sachs research on the covered companies referred to herein and should refer to the risk warnings that have been sent to them by Goldman Sachs International. A copy of these risks warnings, and a glossary of certain financial terms used in this report, are available from Goldman Sachs International on request.

European Union and United Kingdom: Disclosure information in relation to Article 6 (2) of the European Commission Delegated Regulation (EU) (2016/958) supplementing Regulation (EU) No 596/2014 of the European Parliament and of the Council (including as that Delegated Regulation is implemented into United Kingdom domestic law and regulation following the United Kingdom's departure from the European Union and the European Economic Area) with regard to regulatory technical standards for the technical arrangements for objective presentation of investment recommendations or other information recommending or suggesting an investment strategy and for disclosure of particular interests or indications of conflicts of interest is available at https://www.gs.com/disclosures/europeanpolicy.html which states the European Policy for Managing Conflicts of Interest in Connection with Investment Research.

Japan: Goldman Sachs Japan Co., Ltd. is a Financial Instrument Dealer registered with the Kanto Financial Bureau under registration number Kinsho 69, and a member of Japan Securities Dealers Association, Financial Futures Association of Japan Type II Financial Instruments Firms Association, and Investment Management Association of Japan. Sales and purchase of equities are subject to commission pre-determined with clients plus consumption tax. See company-specific disclosures as to any applicable disclosures required by Japanese stock exchanges, the Japanese Securities Dealers Association or the Japanese Securities Finance Company.

Ratings, coverage universe and related definitions

Buy (B), Neutral (N), Sell (S) Analysts recommend stocks as Buys or Sells for inclusion on various regional Investment Lists. Being assigned a Buy or Sell on an Investment List is determined by a stock's total return potential relative to its coverage universe. Any stock not assigned as a Buy or a Sell on an Investment List with an active rating (i.e., a stock that is not Rating Suspended, Not Rated, Early-Stage Biotech, Coverage Suspended or Not Covered), is deemed Neutral. Each region manages Regional Conviction Lists, which are selected from Buy rated stocks on the respective region's Investment Lists and represent investment recommendations focused on the size of the total return potential and/or the likelihood of the realization of the return across their respective areas of coverage. The addition or removal of stocks from such Conviction Lists are managed by the Investment Review Committee or other designated committee in each respective region and do not represent a change in the analysts' investment rating for such stocks.

Total return potential represents the upside or downside differential between the current share price and the price target, including all paid or anticipated dividends, expected during the time horizon associated with the price target. Price targets are required for all covered stocks. The total return potential, price target and associated time horizon are stated in each report adding or reiterating an Investment List membership.

Coverage Universe: A list of all stocks in each coverage universe is available by primary analyst, stock and coverage universe at https://www.gs.com/research/hedge.html.

Not Rated (NR). The investment rating, target price and earnings estimates (where relevant) are removed pursuant to Goldman Sachs policy when Goldman Sachs is acting in an advisory capacity in a merger or in a strategic transaction involving this company, when there are legal, regulatory or policy constraints due to Goldman Sachs' involvement in a transaction, and in certain other circumstances. **Early-Stage Biotech (ES).** An investment rating and a target price are not assigned pursuant to Goldman Sachs policy when this company has neither a drug, treatment or medical device that has passed a Phase II clinical trial nor a license to distribute a post-Phase II drug, treatment or medical device. **Rating Suspended (RS).** Goldman Sachs Research has suspended the investment rating and price target for this stock, because there is not a sufficient fundamental basis for determining an investment rating or target price. The previous investment rating and target price, if any, are no longer in effect for this stock and should not be relied upon. **Coverage Suspended (CS).** Goldman Sachs has suspended coverage of this company. **Not Covered (NC).** Goldman Sachs does not cover this company.

Global product; distributing entities

Goldman Sachs Global Investment Research produces and distributes research products for clients of Goldman Sachs on a global basis. Analysts based in Goldman Sachs offices around the world produce research on industries and companies, and research on macroeconomics, currencies, commodities and portfolio strategy. This research is disseminated in Australia by Goldman Sachs Australia Pty Ltd (ABN 21 006 797 897); in Brazil by Goldman Sachs do Brasil Corretora de Títulos e Valores Mobiliários S.A.; Public Communication Channel Goldman Sachs Brazil: 0800 727 5764 and / or contatogoldmanbrasil@gs.com. Available Weekdays (except holidays), from 9am to 6pm. Canal de Comunicação com o Público Goldman Sachs Brasil: 0800 727 5764 e/ou contatogoldmanbrasil@gs.com. Horário de funcionamento: segunda-feira à sexta-feira (exceto feriados), das 9h às 18h; in Canada by Goldman Sachs & Co. LLC; in Hong Kong by Goldman Sachs (Asia) L.L.C.; in India by Goldman Sachs (India) Securities Private Ltd.; in Japan by Goldman Sachs Japan Co., Ltd.; in the Republic of Korea by Goldman Sachs (Asia) L.L.C., Seoul Branch; in New Zealand by Goldman Sachs New Zealand Limited; in Russia by OOO Goldman Sachs; in Singapore by Goldman Sachs (Singapore) Pte. (Company Number: 198602165W); and in the United States of America by Goldman Sachs & Co. LLC. Goldman Sachs International has approved this research in connection with its distribution in the United Kingdom.

Goldman Sachs International ("GSI"), authorised by the Prudential Regulation Authority ("PRA") and regulated by the Financial Conduct Authority ("FCA") and the PRA, has approved this research in connection with its distribution in the United Kingdom.

European Economic Area: Goldman Sachs Bank Europe SE ("GSBE") is a credit institution incorporated in Germany and, within the Single Supervisory Mechanism, subject to direct prudential supervision by the European Central Bank and in other respects supervised by German Federal Financial Supervisory Authority (Bundesanstalt für Finanzdienstleistungsaufsicht, BaFin) and Deutsche Bundesbank and disseminates research within the European Economic Area.

General disclosures

This research is for our clients only. Other than disclosures relating to Goldman Sachs, this research is based on current public information that we consider reliable, but we do not represent it is accurate or complete, and it should not be relied on as such. The information, opinions, estimates and forecasts contained herein are as of the date hereof and are subject to change without prior notification. We seek to update our research as appropriate, but various regulations may prevent us from doing so. Other than certain industry reports published on a periodic basis, the large majority of reports are published at irregular intervals as appropriate in the analyst's judgment.

Goldman Sachs conducts a global full-service, integrated investment banking, investment management, and brokerage business. We have investment banking and other business relationships with a substantial percentage of the companies covered by Global Investment Research. Goldman Sachs & Co. LLC, the United States broker dealer, is a member of SIPC (https://www.sipc.org).

Our salespeople, traders, and other professionals may provide oral or written market commentary or trading strategies to our clients and principal trading desks that reflect opinions that are contrary to the opinions expressed in this research. Our asset management area, principal trading desks and investing businesses may make investment decisions that are inconsistent with the recommendations or views expressed in this research.

The analysts named in this report may have from time to time discussed with our clients, including Goldman Sachs salespersons and traders, or may discuss in this report, trading strategies that reference catalysts or events that may have a near-term impact on the market price of the equity securities discussed in this report, which impact may be directionally counter to the analyst's published price target expectations for such stocks. Any such trading strategies are distinct from and do not affect the analyst's fundamental equity rating for such stocks, which rating reflects a stock's return potential relative to its coverage universe as described herein.

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 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.goldmansachs.com/disclosures/cftc_fcm_disclosures. 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.