

## Intel

### Intel AI Everywhere Takeaways: Executing On Roadmaps With Launch Of Meteor Lake and Emerald Rapids; Rolling Out AI Everywhere Strategy

Intel hosted its 2023 AI Everywhere event and highlighted how their silicon/hardware/software solutions are helping bring Artificial Intelligence across data centers, cloud, edge, and client applications; Intel is pushing AI into every corner of tech. Intel confirmed its five nodes in four years process technology plan remains on track. The team is in a unique position to help unlock AI technology/capabilities across the different end devices given its broad compute product portfolio, software solutions, extensive ecosystem, and R&D scale. Key takeaways in our view were: 1) As expected, this event was a platform for Intel to launch their latest generation of PC client product, Intel Core Ultra processor (Meteor Lake), which utilizes its Intel 4 manufacturing process node technology and integrates a neural processing engine in a single platform for AI processing capabilities. 2) The team also took this opportunity to announce the launch of its Emerald Rapids-based 5th Gen Xeon server platform (Intel 7 manufacturing) reflecting the team's ability to execute on their product and manufacturing roadmaps. 3) The team rolled out its 'AI Everywhere' strategy across client, server, and edge/client end markets. The team highlighted their commitment to getting to 100M+ AI-enabled PCs by 2025, 100+ ISVs, 300+ AI-accelerate features, and 3x AI apps. All of these AI-enabled capabilities (e.g. video editing, data analyze, crunching data, co-pilot/assistant, and creating graphics) are embedded in most of their recent PC client products which they believe will be in 80% of PCs by 2028.

- **Executing well on PC and manufacturing roadmaps. . . launch of Intel Core Ultra Processor (Meteor Lake).** From a product roadmap perspective, the team is on track with its near and intermediate product launches. The team officially launch their Intel Core Ultra processor (Meteor Lake) which is using Intel 4 process node/EUV litho and Foveros advanced packaging technology in a multi-chip die architecture that integrates CPU and neural processing engine in a single platform. The launch of Intel Core Ultra is another step forward to enabling AI software development within the PC ecosystem. Intel expects to have 300 AI accelerated features on the PC and are going to have 100 software partners such as Adobe, Dolby, and Zoom.

## Underweight

INTC, INTC US  
Price (14 Dec 23):\$45.18  
Price Target (Dec-24):\$37.00

### Semiconductors & Semiconductor Capital Equipment / IT Hardware

**Harlan Sur** <sup>AC</sup>  
(1-415) 315-6700  
harlan.sur@jpmorgan.com  
**Bloomberg** JPMA SUR <GO>  
**Peter K Peng** <sup>AC</sup>  
(1-415) 315-8327  
peter.k.peng@jpmchase.com

**Pritesh Patel**  
(1-415) 315-3933  
pritesh.n.patel@jpmorgan.com  
J.P. Morgan Securities LLC

### Quarterly Forecasts (FYE Dec)

Adj. EPS (\$)	2022A	2023E	2024E
Q1	0.87	(0.04)A	0.38
Q2	0.29	0.13A	0.41
Q3	0.59	0.41A	0.50
Q4	0.10	0.45	0.60
FY	1.84	0.96	1.90

### Style Exposure

Quant Factors	Current %Rank	Hist %Rank (1=Top)			
		6M	1Y	3Y	5Y
Value	30	20	17	17	26
Growth	86	98	91	64	79
Momentum	15	87	81	95	31
Quality	49	20	22	13	28
Low Vol	30	21	16	24	23
ESGQ	6	29	27	16	6

Sources for: Style Exposure – J.P. Morgan Quantitative and Derivatives Strategy; all other tables are company data and J.P. Morgan estimates.

### See page 6 for analyst certification and important disclosures.

J.P. Morgan does and seeks to do business with companies covered in its research reports. As a result, investors should be aware that the firm may have a conflict of interest that could affect the objectivity of this report. Investors should consider this report as only a single factor in making their investment decision.

## Price Performance



	YTD	1m	3m	12m
Abs	70.9%	14.6%	16.8%	59.9%
Rel	48.0%	9.7%	12.1%	41.7%

## Company Data

Shares O/S (mn)	4,154
52-week range (\$)	47.07-24.73
Market cap (\$ mn)	187,677.70
Exchange rate	1.00
Free float(%)	100.0%
3M - Avg daily vol (mn)	37.84
3M - Avg daily val (\$ mn)	1,456.0
Volatility (90 Day)	37
Index	S&P 500
BBG BUY HOLD SELL	12 29 7

## Key Metrics (FYE Dec)

\$ in millions	FY22A	FY23E	FY24E
<b>Financial Estimates</b>			
Revenue	63,054	53,923	61,641
Adj. EBIT	7,915	4,289	9,235
Adj. EBITDA	20,908	13,922	19,175
Adj. net income	7,593	4,033	8,035
Adj. EPS	1.84	0.96	1.90
BBG EPS	1.95	0.95	1.84
Cashflow from operations	15,433	9,615	16,268
FCFF	(9,411)	(15,939)	(13,384)
<b>Margins and Growth</b>			
Revenue Growth Y/Y (%)	(15.6%)	(14.5%)	14.3%
EBIT margin	12.6%	8.0%	15.0%
EBIT growth	(64.4%)	(45.8%)	115.3%
EBITDA margin	33.2%	25.8%	31.1%
EBITDA Growth Y/Y (%)	(38.4%)	(33.4%)	37.7%
Net margin	12.0%	7.5%	13.0%
Adj. EPS growth	(66.3%)	(48.0%)	98.2%
<b>Ratios</b>			
Adj. tax rate	4.1%	12.8%	13.0%
Interest cover	-	-	-
Net debt/Equity	0.1	0.3	0.4
Net debt/EBITDA	0.7	2.0	2.2
ROE	7.6%	3.9%	7.4%
<b>Valuation</b>			
FCFF yield	(5.1%)	(8.4%)	(7.0%)
Dividend yield	3.3%	3.3%	3.3%
EV/Revenue	2.4	3.0	2.9
EV/EBITDA	7.1	11.7	9.2
Adj. P/E	24.5	47.1	23.8

## Summary Investment Thesis and Valuation

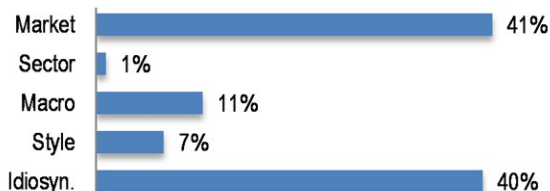
### Investment Thesis

Given the market has time to gain confidence in Intel's ability to execute in its core compute and diversification initiatives, we believe INTC will be an underperformer relative to the group over the next 12-18 months, which drives our Underweight rating on INTC. It is important to note that our rating on INTC is a relative call vs. the group, for which we see a positive move over the next 12-18 months and where we see INTC stock participating, but we think at a slower pace.

### Valuation

Our December 2024 price target of \$37 is based on an 18-20x group multiple on earnings power of \$1.90 in CY24E.

## Performance Drivers



Factors	6M Corr	1Y Corr
Market: MSCI US	0.72	0.64
Sect: Technology	0.11	0.13
Ind: Semicond & S Equip	0.27	0.10
<b>Macro:</b>		
US 10yr Breakeven	0.03	-0.36
US 10yr yield	0.00	-0.29
Non-Energy Commodity	0.36	0.18
<b>Quant Styles:</b>		
DivYld	0.17	0.22
Quality	-0.12	0.20
Growth	0.19	-0.17

Source: J.P. Morgan Quantitative and Derivatives Strategy for Performance Drivers; company data, Bloomberg Finance L.P. and J.P. Morgan estimates for all other tables. Note: Price history may not be complete or exact.

- **Server product roadmap tracking with the launch of Intel's next-gen server CPU (Emerald Rapids) on Intel 7.** Intel is executing well on its product/technology roadmap with the launch of Emerald Rapids-based 5th Gen Xeon platform (Intel 7). The 5th Gen Xeon processor offers 21% average performance gain over the previous generation. Intel has built AI accelerators in every one of the processor's 64 cores which gives users 42% higher inference performance versus the previous generation creating a more cost-effective way to run generative AI models like LAMA 2. Servers based on 5th Gen Xeon will be broadly available starting 1Q24 from providers such as Cisco, Dell, and HPE. For its accelerator product family, the team displayed, for the first time in public, Gaudi 3 which will be available in 2024.
- **AI processing capabilities in everything from client to server to edge/client end markets.** Intel is leveraging its scale and ecosystem to develop and enable AI processing ability across different compute devices. An example is Intel Core Ultra processor (Meteor Lake), which enables power-efficient AI acceleration and local inference on your PC. The team touched on their partnership with Microsoft and how their Core Ultra AI PCs are running CoPilot and Windows Studios FX as well as workloads spanning video to image editing, audio transcription/summarization/translation, and vision teleconferencing capabilities on the PC.

## Investment Thesis, Valuation and Risks

### Intel (*Underweight; Price Target: \$37.00*)

#### Investment Thesis

Over the past 20 years, INTC has consistently underperformed the SOX index in each of the 3-, 5-, 10-, and 20-year periods. From a company fundamental perspective, the company is facing tough macro headwinds and a highly competitive compute environment exacerbated by lingering questions on its ability to execute on its technology/product/diversification road maps. And from a financial perspective, the stock should continue to be under pressure as the market continues to be concerned about the sustainability of dividend payments (currently ~\$6B/yr commitment) as revenue/margins come under pressure during an industry downturn combined with the team's capital intensity target of ~35% of revenue during its "investment phase" in 2023/2024 crimping FCF (we estimate roughly breakeven FCF in 2023, consistent with management guidance). Given the market has time to gain confidence in Intel's ability to execute in its core compute and diversification initiatives, we believe INTC will be an underperformer relative to the group over the next 12-18 months, which drives our Underweight rating on INTC. It is important to note that our rating on INTC is a relative call vs. the group, for which we see a positive move over the next 12-18 months and where we see INTC stock participating, but we think at a slower pace.

#### Valuation

Our December 2024 price target of \$37 is based on an 18-20x group multiple on earnings power of \$1.90 in CY24E. We use a group multiple as we believe INTC should trade in line with its peers.

#### Risks to Rating and Price Target

- Intel executing better than planned on its technology/product road maps could result in gaining technology parity or better earlier than expected, which poses an upside risk.
- Shorter than expected industry downturn period could result in a quicker recovery in both PC and datacenter server CPU markets, posing an upside risk.
- Higher customer uptake for Intel Foundry Services (IFS) could help Intel realize quicker revenue scale, posing an upside risk.

## Intel: Summary of Financials

Income Statement - Annual					Income Statement - Quarterly				
	FY21A	FY22A	FY23E	FY24E		1Q23A	2Q23A	3Q23A	4Q23E
Revenue	74,718	63,054	53,923	61,641	Revenue	11,715A	12,949A	14,158A	15,101
COGS	-	-	-	-	COGS	-	-	-	-
Gross profit	-	-	-	-	Gross profit	-	-	-	-
SG&A	(6,543)	(7,002)	(5,424)	(5,756)	SG&A	(1,303)A	(1,374)A	(1,340)A	(1,407)
Adj. EBITDA	33,942	20,908	13,922	19,175	Adj. EBITDA	2,072A	2,753A	4,409A	4,688
D&A	(11,737)	(12,993)	(9,633)	(9,940)	D&A	(2,366)A	(2,297)A	(2,485)A	(2,485)
Adj. EBIT	22,205	7,915	4,289	9,235	Adj. EBIT	(294)A	456A	1,924A	2,203
Net Interest	-	-	-	-	Net Interest	-	-	-	-
Adj. PBT	24,743	7,905	4,755	9,235	Adj. PBT	16A	656A	1,880A	2,203
Tax	(1,835)	249	1,403	1,448	Tax	(1,610)A	2,289A	362A	362
Minority Interest	-	-	(5)	-	Minority Interest	-	8A	(13)A	0
Adj. Net Income	22,357	7,593	4,033	8,035	Adj. Net Income	(169)A	547A	1,739A	1,916
Reported EPS	4.86	1.95	0.01	1.08	Reported EPS	(0.67)A	0.35A	0.07A	0.24
Adj. EPS	5.47	1.84	0.96	1.90	Adj. EPS	(0.04)A	0.13A	0.41A	0.45
DPS	1.39	1.48	1.48	1.48	DPS	0.37A	0.37A	0.37A	0.37
Payout ratio	28.6%	76.0%	14269.7%	137.3%	Payout ratio	NMA	104.8%A	526.8%A	151.4%
Shares outstanding	4,090	4,116	4,207	4,229	Shares outstanding	4,154A	4,196A	4,229A	4,229
Balance Sheet & Cash Flow Statement					Ratio Analysis				
	FY21A	FY22A	FY23E	FY24E		FY21A	FY22A	FY23E	FY24E
Cash and cash equivalents	28,413	28,338	21,198	7,314	Gross margin	52.9%	42.6%	39.3%	43.9%
Accounts receivable	9,457	4,133	5,028	5,540	EBITDA margin	45.4%	33.2%	25.8%	31.1%
Inventories	10,776	13,224	10,907	11,726	EBIT margin	29.7%	12.6%	8.0%	15.0%
Other current assets	9,072	4,712	4,389	4,409	Net profit margin	29.9%	12.0%	7.5%	13.0%
Current assets	57,718	50,407	41,522	28,989	ROE	25.3%	7.6%	3.9%	7.4%
PP&E	63,245	80,860	95,832	117,404	ROA	13.9%	4.3%	2.2%	4.2%
LT investments	7,138	5,912	5,700	5,700	ROCE	16.1%	5.4%	2.5%	5.1%
Other non current assets	40,305	44,924	45,509	44,114	SG&A/Sales	8.8%	11.1%	10.1%	9.3%
Total assets	168,406	182,103	188,563	196,207	Net debt/equity	0.1	0.1	0.3	0.4
Short term borrowings	4,591	4,367	2,288	2,288	P/E (x)	8.3	24.5	47.1	23.8
Payables	22,871	27,788	26,326	26,326	P/BV (x)	1.9	1.8	1.8	1.7
Other short term liabilities	0	0	0	0	EV/EBITDA (x)	4.3	7.1	11.7	9.2
Current liabilities	27,462	32,155	28,614	28,614	Dividend Yield	3.1%	3.3%	3.3%	3.3%
Long-term debt	33,510	37,684	46,591	46,591	Sales/Assets (x)	0.5	0.4	0.3	0.3
Other long term liabilities	12,043	8,978	7,946	7,946	Interest cover (x)	-	-	-	-
Total liabilities	73,015	78,817	83,151	83,151	Operating leverage	301.8%	412.2%	316.4%	805.9%
Shareholders' equity	95,391	103,286	105,412	113,056	Revenue y/y Growth	(4.0%)	(15.6%)	(14.5%)	14.3%
Minority interests	-	-	-	-	EBITDA y/y Growth	(9.6%)	(38.4%)	(33.4%)	37.7%
Total liabilities & equity	168,406	182,103	188,563	196,207	Tax rate	9.0%	4.1%	12.8%	13.0%
BVPS	23.29	24.99	24.93	26.73	Adj. Net Income y/y Growth	(0.3%)	(66.0%)	(46.9%)	99.2%
y/y Growth	18.4%	7.3%	(0.3%)	7.3%	EPS y/y Growth	3.1%	(66.3%)	(48.0%)	98.2%
Net debt/(cash)	9,688	13,713	27,681	41,565	DPS y/y Growth	5.3%	6.5%	0.0%	0.0%
Cash flow from operating activities	29,991	15,433	9,615	16,268					
o/w Depreciation & amortization	11,737	12,993	9,633	9,940					
o/w Changes in working capital	(4,873)	(3,266)	(4,081)	(1,331)					
Cash flow from investing activities	(25,167)	(10,477)	(25,223)	(29,652)					
o/w Capital expenditure	(18,733)	(24,844)	(23,554)	(29,652)					
as % of sales	25.1%	39.4%	43.7%	48.1%					
Cash flow from financing activities	(5,862)	1,361	8,228	(500)					
o/w Dividends paid	(5,644)	(5,997)	(3,086)	(2,100)					
o/w Net debt issued/(repaid)	2,474	1,564	7,351	0					
Net change in cash	(1,038)	6,317	(7,380)	(13,884)					
Adj. Free cash flow to firm	11,258	(9,411)	(15,939)	(13,384)					
y/y Growth	(46.7%)	(183.6%)	69.4%	(16.0%)					

Source: Company reports and J.P. Morgan estimates.

Note: \$ in millions (except per-share data). Fiscal year ends Dec. o/w - out of which

**Analyst Certification:** The Research Analyst(s) denoted by an “AC” on the cover of this report certifies (or, where multiple Research Analysts are primarily responsible for this report, the Research Analyst denoted by an “AC” on the cover or within the document individually certifies, with respect to each security or issuer that the Research Analyst covers in this research) that: (1) all of the views expressed in this report accurately reflect the Research Analyst’s personal views about any and all of the subject securities or issuers; and (2) no part of any of the Research Analyst’s compensation was, is, or will be directly or indirectly related to the specific recommendations or views expressed by the Research Analyst(s) in this report. For all Korea-based Research Analysts listed on the front cover, if applicable, they also certify, as per KOFIA requirements, that the Research Analyst’s analysis was made in good faith and that the views reflect the Research Analyst’s own opinion, without undue influence or intervention.

All authors named within this report are Research Analysts who produce independent research unless otherwise specified. In Europe, Sector Specialists (Sales and Trading) may be shown on this report as contacts but are not authors of the report or part of the Research Department.

### Important Disclosures

---

- **Market Maker:** J.P. Morgan Securities LLC makes a market in the securities of Intel.
- **Market Maker/ Liquidity Provider:** J.P. Morgan is a market maker and/or liquidity provider in the financial instruments of/related to Intel.
- **Manager or Co-manager:** J.P. Morgan acted as manager or co-manager in a public offering of securities or financial instruments (as such term is defined in Directive 2014/65/EU) of/for Intel within the past 12 months.
- **Analyst Position:** An analyst on the Equity or Credit coverage team, non-fundamental analyst who may produce trade recommendations, or a member of their respective household(s) has a financial interest in the debt or equity securities of Intel.
- **Client:** J.P. Morgan currently has, or had within the past 12 months, the following entity(ies) as clients: Intel.
- **Client/Investment Banking:** J.P. Morgan currently has, or had within the past 12 months, the following entity(ies) as investment banking clients: Intel.
- **Client/Non-Investment Banking, Securities-Related:** J.P. Morgan currently has, or had within the past 12 months, the following entity(ies) as clients, and the services provided were non-investment-banking, securities-related: Intel.
- **Client/Non-Securities-Related:** J.P. Morgan currently has, or had within the past 12 months, the following entity(ies) as clients, and the services provided were non-securities-related: Intel.
- **Investment Banking Compensation Received:** J.P. Morgan has received in the past 12 months compensation for investment banking services from Intel.
- **Potential Investment Banking Compensation:** J.P. Morgan expects to receive, or intends to seek, compensation for investment banking services in the next three months from Intel.
- **Non-Investment Banking Compensation Received:** J.P. Morgan has received compensation in the past 12 months for products or services other than investment banking from Intel.
- **Debt Position:** J.P. Morgan may hold a position in the debt securities of Intel, if any.

**Company-Specific Disclosures:** Important disclosures, including price charts and credit opinion history tables, are available for compendium reports and all J.P. Morgan–covered companies, and certain non-covered companies, by visiting <https://www.jpmm.com/research/disclosures>, calling 1-800-477-0406, or e-mailing [research.disclosure.inquiries@jpmorgan.com](mailto:research.disclosure.inquiries@jpmorgan.com) with your request.



Intel (INTC, INTC US) Price Chart



Date	Rating	Price (\$)	Price Target (\$)
22-Jan-21	OW	62.46	80
23-Jul-21	OW	55.96	78
22-Oct-21	OW	56.00	64
15-Feb-22	NR	47.58	--
11-Nov-22	UW	29.76	32
27-Jan-23	UW	30.09	28
28-Apr-23	UW	29.86	30
28-Jul-23	UW	34.55	35
27-Oct-23	UW	32.52	37

Source: Bloomberg Finance L.P. and J.P. Morgan; price data adjusted for stock splits and dividends.  
Initiated coverage Sep 12, 2002. All share prices are as of market close on the previous business day.

The chart(s) show J.P. Morgan's continuing coverage of the stocks; the current analysts may or may not have covered it over the entire period.  
J.P. Morgan ratings or designations: OW = Overweight, N= Neutral, UW = Underweight, NR = Not Rated

#### Explanation of Equity Research Ratings, Designations and Analyst(s) Coverage Universe:

J.P. Morgan uses the following rating system: Overweight [Over the next six to twelve months, we expect this stock will outperform the average total return of the stocks in the analyst's (or the analyst's team's) coverage universe.] Neutral [Over the next six to twelve months, we expect this stock will perform in line with the average total return of the stocks in the analyst's (or the analyst's team's) coverage universe.] Underweight [Over the next six to twelve months, we expect this stock will underperform the average total return of the stocks in the analyst's (or the analyst's team's) coverage universe.] Not Rated (NR): J.P. Morgan has removed the rating and, if applicable, the price target, for this stock because of either a lack of a sufficient fundamental basis or for legal, regulatory or policy reasons. The previous rating and, if applicable, the price target, no longer should be relied upon. An NR designation is not a recommendation or a rating. In our Asia (ex-Australia and ex-India) and U.K. small- and mid-cap equity research, each stock's expected total return is compared to the expected total return of a benchmark country market index, not to those analysts' coverage universe. If it does not appear in the Important Disclosures section of this report, the certifying analyst's coverage universe can be found on J.P. Morgan's research website, <https://www.jpmorganmarkets.com>.

**Coverage Universe: Sur, Harlan:** Advanced Micro Devices (AMD), Analog Devices (ADI), Applied Materials (AMAT), Arm Holdings Plc (ARM), Broadcom Inc (AVGO), Cadence Design Systems (CDNS), GlobalFoundries (GFS), Intel (INTC), KLA Corporation (KLAC), Lam Research (LRCX), MACOM (MTSI), Marvell Technology Inc (MRVL), Microchip Technology (MCHP), Micron Technology (MU), NVIDIA Corporation (NVDA), NXP Semiconductors (NXPI), ON Semiconductor Corporation (ON), Qorvo (QRVO), Skyworks Solutions (SWKS), Synopsys Inc (SNPS), Texas Instruments (TXN), Western Digital (WDC)**Peng, Peter K:** Silicon Laboratories Inc (SLAB), Synaptics Inc (SYNA)

#### J.P. Morgan Equity Research Ratings Distribution, as of October 07, 2023

	Overweight (buy)	Neutral (hold)	Underweight (sell)
J.P. Morgan Global Equity Research Coverage*	47%	39%	14%
IB clients**	47%	45%	33%
JPMS Equity Research Coverage*	46%	41%	13%
IB clients**	65%	64%	51%

\*Please note that the percentages may not add to 100% because of rounding.

\*\*Percentage of subject companies within each of the "buy," "hold" and "sell" categories for which J.P. Morgan has provided investment banking services within the previous 12 months.

For purposes of FINRA ratings distribution rules only, our Overweight rating falls into a buy rating category; our Neutral rating falls into a hold rating category; and our Underweight rating falls into a sell rating category. Please note that stocks with an NR designation are not included in the table above. This information is current as of the end of the most recent calendar quarter.

**Equity Valuation and Risks:** For valuation methodology and risks associated with covered companies or price targets for covered companies, please see the most recent company-specific research report at <http://www.jpmorganmarkets.com>, contact the primary analyst or your J.P. Morgan representative, or email [research.disclosure.inquiries@jpmorgan.com](mailto:research.disclosure.inquiries@jpmorgan.com). For material information about the proprietary models used, please see the Summary of Financials in company-specific research reports and the Company Tearsheets, which are available to download on the company pages of our client website, <http://www.jpmorganmarkets.com>. This report also sets out within it the material underlying

assumptions used.

A history of J.P. Morgan investment recommendations disseminated during the preceding 12 months can be accessed on the Research & Commentary page of <http://www.jpmorganmarkets.com> where you can also search by analyst name, sector or financial instrument.

**Analysts' Compensation:** The research analysts responsible for the preparation of this report receive compensation based upon various factors, including the quality and accuracy of research, client feedback, competitive factors, and overall firm revenues.

## Other Disclosures

---

J.P. Morgan is a marketing name for investment banking businesses of JPMorgan Chase & Co. and its subsidiaries and affiliates worldwide.

**UK MIFID FICC research unbundling exemption:** UK clients should refer to [UK MIFID Research Unbundling exemption](#) for details of JPMorgan's implementation of the FICC research exemption and guidance on relevant FICC research categorisation.

All research material made available to clients are simultaneously available on our client website, J.P. Morgan Markets, unless specifically permitted by relevant laws. Not all research content is redistributed, e-mailed or made available to third-party aggregators. For all research material available on a particular stock, please contact your sales representative.

Any long form nomenclature for references to China; Hong Kong; Taiwan; and Macau within this research material are Mainland China; Hong Kong SAR (China); Taiwan (China); and Macau SAR (China).

J.P. Morgan Research may, from time to time, write on issuers or securities targeted by economic or financial sanctions imposed or administered by the governmental authorities of the U.S., EU, UK or other relevant jurisdictions (Sanctioned Securities). Nothing in this report is intended to be read or construed as encouraging, facilitating, promoting or otherwise approving investment or dealing in such Sanctioned Securities. Clients should be aware of their own legal and compliance obligations when making investment decisions.

Any digital or crypto assets discussed in this research report are subject to a rapidly changing regulatory landscape. For relevant regulatory advisories on crypto assets, including bitcoin and ether, please see <https://www.jpmorgan.com/disclosures/cryptoasset-disclosure>.

The author(s) of this research report may not be licensed to carry on regulated activities in your jurisdiction and, if not licensed, do not hold themselves out as being able to do so.

**Exchange-Traded Funds (ETFs):** J.P. Morgan Securities LLC ("JPMS") acts as authorized participant for substantially all U.S.-listed ETFs. To the extent that any ETFs are mentioned in this report, JPMS may earn commissions and transaction-based compensation in connection with the distribution of those ETF shares and may earn fees for performing other trade-related services, such as securities lending to short sellers of the ETF shares. JPMS may also perform services for the ETFs themselves, including acting as a broker or dealer to the ETFs. In addition, affiliates of JPMS may perform services for the ETFs, including trust, custodial, administration, lending, index calculation and/or maintenance and other services.

**Options and Futures related research:** If the information contained herein regards options- or futures-related research, such information is available only to persons who have received the proper options or futures risk disclosure documents. Please contact your J.P. Morgan Representative or visit <https://www.theocc.com/components/docs/riskstoc.pdf> for a copy of the Option Clearing Corporation's Characteristics and Risks of Standardized Options or [http://www.finra.org/sites/default/files/Security\\_Futures\\_Risk\\_Disclosure\\_Statement\\_2018.pdf](http://www.finra.org/sites/default/files/Security_Futures_Risk_Disclosure_Statement_2018.pdf) for a copy of the Security Futures Risk Disclosure Statement.

**Changes to Interbank Offered Rates (IBORs) and other benchmark rates:** Certain interest rate benchmarks are, or may in the future become, subject to ongoing international, national and other regulatory guidance, reform and proposals for reform. For more information, please consult: [https://www.jpmorgan.com/global/disclosures/interbank\\_offered\\_rates](https://www.jpmorgan.com/global/disclosures/interbank_offered_rates)

**Private Bank Clients:** Where you are receiving research as a client of the private banking businesses offered by JPMorgan Chase & Co. and its subsidiaries ("J.P. Morgan Private Bank"), research is provided to you by J.P. Morgan Private Bank and not by any other division of J.P. Morgan, including, but not limited to, the J.P. Morgan Corporate and Investment Bank and its Global Research division.

**Legal entity responsible for the production and distribution of research:** The legal entity identified below the name of the Reg AC Research Analyst who authored this material is the legal entity responsible for the production of this research. Where multiple Reg AC Research Analysts authored this material with different legal entities identified below their names, these legal entities are jointly responsible for the production of this research. Research Analysts from various J.P. Morgan affiliates may have contributed to the production of this material but may not be licensed to carry out regulated activities in your jurisdiction (and do not hold themselves out as being able to do so). Unless otherwise stated below, this material has been distributed by the legal entity responsible for production. If you have any queries, please contact the relevant Research Analyst in your jurisdiction or the entity in your jurisdiction that has distributed this research material.

### Legal Entities Disclosures and Country-/Region-Specific Disclosures:

**Argentina:** JPMorgan Chase Bank N.A Sucursal Buenos Aires is regulated by Banco Central de la República Argentina ("BCRA" - Central Bank of Argentina) and Comisión Nacional de Valores ("CNV" - Argentinian Securities Commission) - ALYC y AN Integral N°51). **Australia:** J.P. Morgan Securities Australia Limited ("JPMSAL") (ABN 61 003 245 234/AFS Licence No: 238066) is regulated by the Australian



Securities and Investments Commission and is a Market, Clearing and Settlement Participant of ASX Limited and CHI-X. This material is issued and distributed in Australia by or on behalf of JPMSAL only to "wholesale clients" (as defined in section 761G of the Corporations Act 2001). A list of all financial products covered can be found by visiting <https://www.jpmm.com/research/disclosures>. J.P. Morgan seeks to cover companies of relevance to the domestic and international investor base across all Global Industry Classification Standard (GICS) sectors, as well as across a range of market capitalisation sizes. If applicable, in the course of conducting public side due diligence on the subject company(ies), the Research Analyst team may at times perform such diligence through corporate engagements such as site visits, discussions with company representatives, management presentations, etc. Research issued by JPMSAL has been prepared in accordance with J.P. Morgan Australia's Research Independence Policy which can be found at the following link: [J.P. Morgan Australia - Research Independence Policy](#). **Brazil:** Banco J.P. Morgan S.A. is regulated by the Comissão de Valores Mobiliários (CVM) and by the Central Bank of Brazil. Ombudsman J.P. Morgan: 0800-7700847 / [ouvidoria.jp.morgan@jpmorgan.com](mailto:ouvidoria.jp.morgan@jpmorgan.com). **Canada:** J.P. Morgan Securities Canada Inc. is a registered investment dealer, regulated by the Canadian Investment Regulatory Organization and the Ontario Securities Commission and is the participating member on Canadian exchanges. This material is distributed in Canada by or on behalf of J.P.Morgan Securities Canada Inc. **Chile:** Inversiones J.P. Morgan Limitada is an unregulated entity incorporated in Chile. **China:** J.P. Morgan Securities (China) Company Limited has been approved by CSRC to conduct the securities investment consultancy business. **Dubai International Financial Centre (DIFC):** JPMorgan Chase Bank, N.A., Dubai Branch is regulated by the Dubai Financial Services Authority (DFSA) and its registered address is Dubai International Financial Centre - The Gate, West Wing, Level 3 and 9 PO Box 506551, Dubai, UAE. This material has been distributed by JP Morgan Chase Bank, N.A., Dubai Branch to persons regarded as professional clients or market counterparties as defined under the DFSA rules. **European Economic Area (EEA):** Unless specified to the contrary, research is distributed in the EEA by J.P. Morgan SE ("JPM SE"), which is subject to prudential supervision by the European Central Bank ("ECB") in cooperation with BaFin and Deutsche Bundesbank in Germany. JPM SE is a company headquartered in Frankfurt with registered address at TaunusTurm, Taunustor 1, Frankfurt am Main, 60310, Germany. The material has been distributed in the EEA to persons regarded as professional investors (or equivalent) pursuant to Art. 4 para. 1 no. 10 and Annex II of MiFID II and its respective implementation in their home jurisdictions ("EEA professional investors"). This material must not be acted on or relied on by persons who are not EEA professional investors. Any investment or investment activity to which this material relates is only available to EEA relevant persons and will be engaged in only with EEA relevant persons. **Hong Kong:** J.P. Morgan Securities (Asia Pacific) Limited (CE number AAJ321) is regulated by the Hong Kong Monetary Authority and the Securities and Futures Commission in Hong Kong, and J.P. Morgan Broking (Hong Kong) Limited (CE number AAB027) is regulated by the Securities and Futures Commission in Hong Kong. JP Morgan Chase Bank, N.A., Hong Kong Branch (CE Number AAL996) is regulated by the Hong Kong Monetary Authority and the Securities and Futures Commission, is organized under the laws of the United States with limited liability. Where the distribution of this material is a regulated activity in Hong Kong, the material is distributed in Hong Kong by or through J.P. Morgan Securities (Asia Pacific) Limited and/or J.P. Morgan Broking (Hong Kong) Limited. **India:** J.P. Morgan India Private Limited (Corporate Identity Number - U67120MH1992FTC068724), having its registered office at J.P. Morgan Tower, Off. C.S.T. Road, Kalina, Santacruz - East, Mumbai - 400098, is registered with the Securities and Exchange Board of India (SEBI) as a 'Research Analyst' having registration number INH000001873. J.P. Morgan India Private Limited is also registered with SEBI as a member of the National Stock Exchange of India Limited and the Bombay Stock Exchange Limited (SEBI Registration Number - INZ000239730) and as a Merchant Banker (SEBI Registration Number - MB/INM000002970). Telephone: 91-22-6157 3000, Facsimile: 91-22-6157 3990 and Website: <http://www.jpimipl.com>. JPMorgan Chase Bank, N.A. - Mumbai Branch is licensed by the Reserve Bank of India (RBI) (Licence No. 53/ Licence No. BY.4/94; SEBI - IN/CUS/014/ CDSL : IN-DP-CDSL-444-2008/ IN-DP-NSDL-285-2008/ INBI00000984/ INE231311239) as a Scheduled Commercial Bank in India, which is its primary license allowing it to carry on Banking business in India and other activities, which a Bank branch in India are permitted to undertake. For non-local research material, this material is not distributed in India by J.P. Morgan India Private Limited. Compliance Officer: Spurthi Gadamsetty; [spurthi.gadamsetty@jpmchase.com](mailto:spurthi.gadamsetty@jpmchase.com); +912261573225. Grievance Officer: Ramprasadh K, [jpimipl.research.feedback@jpmorgan.com](mailto:jpimipl.research.feedback@jpmorgan.com); +912261573000.

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.

**Indonesia:** PT J.P. Morgan Sekuritas Indonesia is a member of the Indonesia Stock Exchange and is registered and supervised by the Otoritas Jasa Keuangan (OJK). **Korea:** J.P. Morgan Securities (Far East) Limited, Seoul Branch, is a member of the Korea Exchange (KRX). JPMorgan Chase Bank, N.A., Seoul Branch, is licensed as a branch office of foreign bank (JPMorgan Chase Bank, N.A.) in Korea. Both entities are regulated by the Financial Services Commission (FSC) and the Financial Supervisory Service (FSS). For non-macro research material, the material is distributed in Korea by or through J.P. Morgan Securities (Far East) Limited, Seoul Branch. **Japan:** JPMorgan Securities Japan Co., Ltd. and JPMorgan Chase Bank, N.A., Tokyo Branch are regulated by the Financial Services Agency in Japan. **Malaysia:** This material is issued and distributed in Malaysia by JPMorgan Securities (Malaysia) Sdn Bhd (18146-X), which is a Participating Organization of Bursa Malaysia Berhad and holds a Capital Markets Services License issued by the Securities Commission in Malaysia. **Mexico:** J.P. Morgan Casa de Bolsa, S.A. de C.V. and J.P. Morgan Grupo Financiero are members of the Mexican Stock Exchange and are authorized to act as a broker dealer by the National Banking and Securities Exchange Commission. **New Zealand:** This material is issued and distributed by JPMSAL in New Zealand only to "wholesale clients" (as defined in the Financial Markets Conduct Act 2013). JPMSAL is registered as a Financial Service Provider under the Financial Service providers (Registration and Dispute Resolution) Act of 2008. **Pakistan:** J. P. Morgan Pakistan Broking (Pvt.) Ltd is a member of the Karachi Stock Exchange and regulated by the Securities and Exchange Commission of Pakistan. **Philippines:** J.P. Morgan Securities Philippines Inc. is a Trading Participant of the Philippine Stock Exchange and a member of the Securities Clearing Corporation of the Philippines and the Securities Investor Protection Fund. It is regulated by the Securities and Exchange Commission. **Russia:** CB J.P. Morgan Bank International LLC is regulated by the Central Bank of Russia. **Singapore:** This material is issued and distributed in Singapore by or through J.P. Morgan Securities Singapore Private Limited (JPMSS) [MCI (P) 030/08/2023 and Co. Reg. No.: 199405335R], which is a member of the Singapore Exchange Securities Trading Limited, and/or JPMorgan Chase Bank, N.A., Singapore branch (JPMCB Singapore), both of

which are regulated by the Monetary Authority of Singapore. This material is issued and distributed in Singapore only to accredited investors, expert investors and institutional investors, as defined in Section 4A of the Securities and Futures Act, Cap. 289 (SFA). This material is not intended to be issued or distributed to any retail investors or any other investors that do not fall into the classes of "accredited investors," "expert investors" or "institutional investors," as defined under Section 4A of the SFA. Recipients of this material in Singapore are to contact JPMSS or JPMCB Singapore in respect of any matters arising from, or in connection with, the material. As at the date of this material, JPMSS is a designated market maker for certain structured warrants listed on the Singapore Exchange where the underlying securities may be the securities discussed in this material. Arising from its role as a designated market maker for such structured warrants, JPMSS may conduct hedging activities in respect of such underlying securities and hold or have an interest in such underlying securities as a result. The updated list of structured warrants for which JPMSS acts as designated market maker may be found on the website of the Singapore Exchange Limited: <http://www.sgx.com>. **South Africa:** J.P. Morgan Equities South Africa Proprietary Limited and JPMorgan Chase Bank, N.A., Johannesburg Branch are members of the Johannesburg Securities Exchange and are regulated by the Financial Services Board. **Taiwan:** J.P. Morgan Securities (Taiwan) Limited is a participant of the Taiwan Stock Exchange (company-type) and regulated by the Taiwan Securities and Futures Bureau. Material relating to equity securities is issued and distributed in Taiwan by J.P. Morgan Securities (Taiwan) Limited, subject to the license scope and the applicable laws and the regulations in Taiwan. According to Paragraph 2, Article 7-1 of Operational Regulations Governing Securities Firms Recommending Trades in Securities to Customers (as amended or supplemented) and/or other applicable laws or regulations, please note that the recipient of this material is not permitted to engage in any activities in connection with the material that may give rise to conflicts of interests, unless otherwise disclosed in the "Important Disclosures" in this material. **Thailand:** This material is issued and distributed in Thailand by JPMorgan Securities (Thailand) Ltd., which is a member of the Stock Exchange of Thailand and is regulated by the Ministry of Finance and the Securities and Exchange Commission, and its registered address is 3rd Floor, 20 North Sathorn Road, Silom, Bangrak, Bangkok 10500. **UK:** Unless specified to the contrary, research is distributed in the UK by J.P. Morgan Securities plc ("JPMS plc") which is a member of the London Stock Exchange and is authorised by the Prudential Regulation Authority and regulated by the Financial Conduct Authority and the Prudential Regulation Authority. JPMS plc is registered in England & Wales No. 2711006, Registered Office 25 Bank Street, London, E14 5JP. This material is directed in the UK only to: (a) persons having professional experience in matters relating to investments falling within article 19(5) of the Financial Services and Markets Act 2000 (Financial Promotion) (Order) 2005 ("the FPO"); (b) persons outlined in article 49 of the FPO (high net worth companies, unincorporated associations or partnerships, the trustees of high value trusts, etc.); or (c) any persons to whom this communication may otherwise lawfully be made; all such persons being referred to as "UK relevant persons". This material must not be acted on or relied on by persons who are not UK relevant persons. Any investment or investment activity to which this material relates is only available to UK relevant persons and will be engaged in only with UK relevant persons. Research issued by JPMS plc has been prepared in accordance with JPMS plc's policy for prevention and avoidance of conflicts of interest related to the production of Research which can be found at the following link: [J.P. Morgan EMEA - Research Independence Policy](#). **U.S.:** J.P. Morgan Securities LLC ("JPMS") is a member of the NYSE, FINRA, SIPC, and the NFA. JPMorgan Chase Bank, N.A. is a member of the FDIC. Material published by non-U.S. affiliates is distributed in the U.S. by JPMS who accepts responsibility for its content.

**General:** Additional information is available upon request. The information in this material has been obtained from sources believed to be reliable. While all reasonable care has been taken to ensure that the facts stated in this material are accurate and that the forecasts, opinions and expectations contained herein are fair and reasonable, JPMorgan Chase & Co. or its affiliates and/or subsidiaries (collectively J.P. Morgan) make no representations or warranties whatsoever to the completeness or accuracy of the material provided, except with respect to any disclosures relative to J.P. Morgan and the Research Analyst's involvement with the issuer that is the subject of the material. Accordingly, no reliance should be placed on the accuracy, fairness or completeness of the information contained in this material. There may be certain discrepancies with data and/or limited content in this material as a result of calculations, adjustments, translations to different languages, and/or local regulatory restrictions, as applicable. These discrepancies should not impact the overall investment analysis, views and/or recommendations of the subject company(ies) that may be discussed in the material. J.P. Morgan accepts no liability whatsoever for any loss arising from any use of this material or its contents, and neither J.P. Morgan nor any of its respective directors, officers or employees, shall be in any way responsible for the contents hereof, apart from the liabilities and responsibilities that may be imposed on them by the relevant regulatory authority in the jurisdiction in question, or the regulatory regime thereunder. Opinions, forecasts or projections contained in this material represent J.P. Morgan's current opinions or judgment as of the date of the material only and are therefore subject to change without notice. Periodic updates may be provided on companies/industries based on company-specific developments or announcements, market conditions or any other publicly available information. There can be no assurance that future results or events will be consistent with any such opinions, forecasts or projections, which represent only one possible outcome. Furthermore, such opinions, forecasts or projections are subject to certain risks, uncertainties and assumptions that have not been verified, and future actual results or events could differ materially. The value of, or income from, any investments referred to in this material may fluctuate and/or be affected by changes in exchange rates. All pricing is indicative as of the close of market for the securities discussed, unless otherwise stated. Past performance is not indicative of future results. Accordingly, investors may receive back less than originally invested. This material is not intended as an offer or solicitation for the purchase or sale of any financial instrument. The opinions and recommendations herein do not take into account individual client circumstances, objectives, or needs and are not intended as recommendations of particular securities, financial instruments or strategies to particular clients. This material may include views on structured securities, options, futures and other derivatives. These are complex instruments, may involve a high degree of risk and may be appropriate investments only for sophisticated investors who are capable of understanding and assuming the risks involved. The recipients of this material must make their own independent decisions regarding any securities or financial instruments mentioned herein and should seek advice from such independent financial, legal, tax or other adviser as they deem necessary. J.P. Morgan may trade as a principal on the basis of the Research Analysts' views and research, and it may also engage in transactions for its own account or for its clients' accounts in a manner inconsistent with the views taken in this material, and J.P. Morgan is under no obligation to ensure that such other communication is brought to the attention of any recipient of this material. Others within J.P. Morgan, including Strategists, Sales staff and other Research Analysts, may take

views that are inconsistent with those taken in this material. Employees of J.P. Morgan not involved in the preparation of this material may have investments in the securities (or derivatives of such securities) mentioned in this material and may trade them in ways different from those discussed in this material. This material is not an advertisement for or marketing of any issuer, its products or services, or its securities in any jurisdiction.

**Confidentiality and Security Notice:** This transmission may contain information that is privileged, confidential, legally privileged, and/or exempt from disclosure under applicable law. If you are not the intended recipient, you are hereby notified that any disclosure, copying, distribution, or use of the information contained herein (including any reliance thereon) is STRICTLY PROHIBITED. Although this transmission and any attachments are believed to be free of any virus or other defect that might affect any computer system into which it is received and opened, it is the responsibility of the recipient to ensure that it is virus free and no responsibility is accepted by JPMorgan Chase & Co., its subsidiaries and affiliates, as applicable, for any loss or damage arising in any way from its use. If you received this transmission in error, please immediately contact the sender and destroy the material in its entirety, whether in electronic or hard copy format. This message is subject to electronic monitoring: <https://www.jpmorgan.com/disclosures/email>

**MSCI:** Certain information herein ("Information") is reproduced by permission of MSCI Inc., its affiliates and information providers ("MSCI") ©2023. No reproduction or dissemination of the Information is permitted without an appropriate license. MSCI MAKES NO EXPRESS OR IMPLIED WARRANTIES (INCLUDING MERCHANTABILITY OR FITNESS) AS TO THE INFORMATION AND DISCLAIMS ALL LIABILITY TO THE EXTENT PERMITTED BY LAW. No Information constitutes investment advice, except for any applicable Information from MSCI ESG Research. Subject also to [msci.com/disclaimer](https://www.msci.com/disclaimer)

"Other Disclosures" last revised October 21, 2023.

---

**Copyright 2023 JPMorgan Chase & Co. All rights reserved. This material or any portion hereof may not be reprinted, sold or redistributed without the written consent of J.P. Morgan. It is strictly prohibited to use or share without prior written consent from J.P. Morgan any research material received from J.P. Morgan or an authorized third-party ("J.P. Morgan Data") in any third-party artificial intelligence ("AI") systems or models when such J.P. Morgan Data is accessible by a third-party. It is permissible to use J.P. Morgan Data for internal business purposes only in an AI system or model that protects the confidentiality of J.P. Morgan Data so as to prevent any and all access to or use of such J.P. Morgan Data by any third-party.**

Completed 14 Dec 2023 06:40 PM EST

Disseminated 14 Dec 2023 08:00 PM EST