

Update (first published 18 March 2024) (See disclosures for details)

This material is neither intended to be distributed to Mainland China investors nor to provide securities investment consultancy services within the territory of Mainland China. This material or any portion hereof may not be reprinted, sold or redistributed without the written consent of J.P. Morgan.

The J.P. Morgan View

Week of central bank decisions

Cross-Asset Strategy: While we expect little change in this week's FOMC meeting statement, risks are skewed to a hawkish delivery on its projections that raises the risk of 2024 and long-run median dots moving higher. We thus stay neutral on US duration outright and long 5s/30s steepeners, and see risks for the USD skewing moderately higher. Euro area bonds sold off mainly from US data given softer domestic activity data and ECB commentary that suggested convergence toward a June start to an easing cycle. We tactically stop out of longs in 5Y Germany and long 1Yx1Y €STR, but keep steepeners. In equities, we believe market volatility is being suppressed by large option supply from call overwriting ETFs, and we see alpha opportunities to be OW SMid vs. Large and OW India within EM. The path of least resistance for US HG spreads appears to be tighter, as near-term the market is driven by technicals and there appears to be a shortage of bonds to meet the demand. In Euro Credit, we are not convinced that 'this time is different' given heavier than anticipated supply, and the economic consensus potentially stale after a string of hot inflation prints. We expect a contentious June OPEC+ meeting, as after June Russia would likely have to cut exports to accommodate lower crude production. Copper prices jumped higher on a surge of financial inflows following a meeting of Chinese smelters to discuss the current tightness in concentrate markets.

JPM Clients' View: [Click here to take this week's survey](#). This week we poll investors on US rates, equity crowding, ECB policy and gold, in addition to our running sentiment questions. Our last survey results indicated: (1) equity exposure/sentiment among respondents is ~58th percentile on average; (2) 41% planned to increase equity exposure, and 82% to increase bond duration near-term; (3) the largest number (27%) saw expensive valuations as the biggest market risk, and 82% believe the risk of a correct is high over the next 6M; (4) respondents were evenly split on whether the ECB's inflation forecast is too benign; (5) the median respondent believes there is a low chance the Fed will not cut at all this year.

Risk premium compression: The Equity Risk Premium and slope of the risk-return trade off line are both near the lows seen at previous market peaks, and well below their long-term averages. Risk premia have compressed by so much over the past few months that both equity and credit investors look vulnerable to a potential normalization.

New Trades: SX5E dividend option trades ([Silvestrini](#)); Japan consumption plays ([Lee](#)).

Upcoming Catalysts: BoJ meeting, US housing starts (3/19); FOMC rates decision, UK CPI/PPI (3/20); BoE meeting, US, Euro, India & Japan PMI, US leading index, Japan CPI (3/21).

Global Markets Strategy

Marko Kolanovic, PhD ^{AC}

(1-212) 622-3677
marko.kolanovic@jpmorgan.com
J.P. Morgan Securities LLC

Nikolaos Panigirtzoglou ^{AC}

(44-20) 7134-7815
nikolaos.panigirtzoglou@jpmorgan.com
J.P. Morgan Securities plc

Bram Kaplan, CFA ^{AC}

(1-212) 272-1215
bram.kaplan@jpmorgan.com
J.P. Morgan Securities LLC

Mika Inkinen ^{AC}

(44-20) 7742 6565
mika.j.inkinen@jpmorgan.com
J.P. Morgan Securities plc

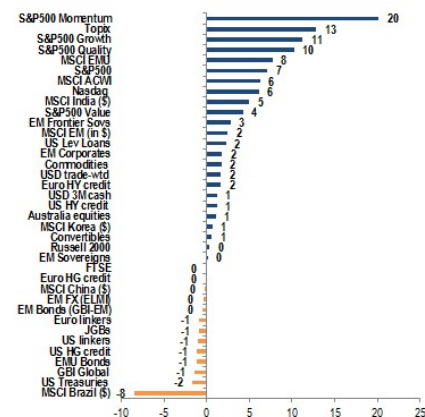
Thomas Salopek ^{AC}

(1-212) 834-5476
thomas.salopek@jpmorgan.com
J.P. Morgan Securities LLC

Amy Ho ^{AC}

(1-212) 270 0331
amy.ho@jpmchase.com
J.P. Morgan Securities LLC

YTD returns by asset



Source: J.P. Morgan.

See page 12 for analyst certification and important disclosures, including non-US analyst 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.

Cross-Asset Strategy

Economics

Data support forecasts for broader growth, sticky inflation, and shallow easing. The evidence for broadening global growth remains limited. Activity readings have yet to show a convincing revival in European or Japanese consumption or a pickup in global factory output. However, ongoing upside US growth surprises and constructive signals elsewhere point in the right direction. More clear-cut evidence supports our view that disinflation will stall at a still-elevated 3%_{ar} during 1H24. Building confidence in our 1H24 views contrasts with a lack of conviction in what lies beyond. Prospects for sustained high-for-long policy stances should weigh on growth by promoting tighter financial conditions and increasing debt service costs. With tight labor markets sustaining elevated wage gains, diminished corporate pricing power and modest productivity gains should also compress profit margins. This erosion of private sector health underscores our “boil the frog” narrative of a gradual path to an expansion end, though some recent developments bolster the case for an alternative soft-landing scenario.

FOMC expected to guide to June while raising median policy rate dot. Since the start of this year, expectations about 2024 central bank easing have been pared back materially, but that has not disrupted the general trend toward an easing in global financial conditions. Meanwhile, corporate profits are displaying surprising resilience, and the past year has seen the US deliver strong labor force and productivity gains that take pressure off tight labor markets. These developments are connected, raising the prospect that the DM expansion may be able to survive higher policy rates than is commonly perceived. The US FOMC is likely to lean in this direction at next meeting. While continuing to guide toward a June start to easing, we expect the SEP to pare rate cuts by 25bp across the 2024-26 median profile, along with a similar-sized step up in the Committee’s long-run rate.

BoJ expected to pivot on balance sheet while holding off on NIRP end. We see the BoJ likely abandoning its QQE with YCC framework and ending ETF purchases, while maintaining a flexible JGB purchase program to manage long yields. Rate hikes should follow soon after, probably by mid-year. Outside of wages, economic indicators since the January meeting have fallen short of the BoJ’s expectations and are consistent with this pivot preceding rate hikes ([Global Data Watch](#), Mar 15th).

Equities

Option-based ETFs are suppressing market volatility. AUM in US-listed option-based ETFs has surged to ~\$100Bn (growing ~700% over the past 3Y). Call overwriting ETFs

have become a large source of volatility supply that has been increasingly weighing on market volatility levels, in our view. We don’t see crash risks from overwriting ETFs, despite their large volatility supply; however, in case of a large market sell-off, the volatility suppressing force from these strategies is likely to quickly disappear, leaving markets more vulnerable to other selling flows. Capital is likely to be relatively sticky (and any outflows fairly gradual) from these strategies, suggesting their market impacts are likely to persist for some time ([Option-Based ETFs](#), Mar 14th).

OW India within EM. India’s share has grown steadily to all-time highs of 18% in the MSCI EM Index. We estimate that India will continue to increase its weight within EM to 23% by 2033E. Strong GDP growth, favorable demographic dividend, consumption tailwinds, EPS compounding, widening bond market and a government looking to unlock this potential set the stage for a potential multi-year bull run for India ([EM Lighthouse](#), Mar 13th).

Time to Revise Brazil’s Elevator Pitch? 1) Incoming data skew toward later starts for DM easing; a data-dependent Fed combined with USD strength could reduce the scope for EM easing in 2H24. 2) The decline in popularity of Brazil’s president could foster internal government discussion to adjust the level of macro and micro regulatory policy activism. From a macro perspective things have been unfolding well and our view on fiscal policy has also improved, but politics could be moving to a new phase: we are no longer in the phase of political de-leveraging, perhaps moving to a neutral scenario. Foreigners continue to pull money away from Brazil, with total YTD outflows equivalent to 40% of the inflow from last year, and local equity funds continue to see equity outflows ([Brazil Equity Strategy](#), Mar 14th).

In SMids, we see negative forward returns but big alpha opportunity vs. Large. There is no shortage of credit risk yet HY spreads are near record lows. Equities are facing meaningful headwinds in a tense geopolitical environment and yet equity valuations imply below historical avg risk premia. Macro indicators signal deceleration/recession while analysts/corporates expect earnings growth to accelerate to record levels. And all with SMid-Caps selling off while Large-Caps (not immune to all the above) are reaching new highs in a bifurcation of performance never seen before ([The SMid View](#), Mar 12th).

Bonds

Bonds sold off on the back of stronger US CPI/PPI data and lower-than-expected initial claims. The strength in activity, labor market and inflation data thus far in 2024 means we now expect the Fed to cut rates by 75bp this year vs. 125bp previously. While [our economists](#) expect little change in the

20 March 2024

FOMC statement, risks are skewed to a hawkish delivery on its projections that raises the risk of 2024 and long-run median dots moving higher. While valuations look cheap, the risk of hawkish Fed delivery keeps us neutral on duration outright. We retain 5s/30s steepeners to position for an approaching easing cycle and repricing of term premia at the long end.

In the **Euro area**, the sell-off was driven more by US data given softer domestic activity data and ECB commentary that suggested convergence toward a June start to an easing cycle. We tactically stop out of longs in 5Y Germany and long 1Yx1Y €STR, but keep steepeners in 10Yx15Y Germany and 2Yx2Y/10Yx10Y on the EUR swap curve. In the **UK**, we stay cautious on duration given risks of hawkish Fed delivery. We keep Aug24/Nov24 MPC OIS curve flatteners.

In **EM**, global growth indicators have been supportive and less US-centric, keeping the backdrop supportive for EM. While recent US inflation prints may imply less easing, this points to a shallower cutting cycle rather than 'higher for longer'. We stay OW EM local duration, with an OW in Brazil, Colombia, Uruguay, Czechia, Poland and Indonesia, partially offset by a short duration overlay and UW in Romania ([EM Fixed Income Focus](#), Mar 14th).

Credit

The path of least resistance for US HG spreads is tighter.

We recognize that at such tight spreads historically one should be selling bonds rather than adding to positions. But near term the market is driven by technicals and the supply/demand balance seems to suggest that there is a shortage of bonds to meet the demand. We raised our full year supply [forecast](#) by nearly \$100bn to \$1.3tr. But even with this increase, we expect the monthly pace of supply to halve going forward, from \$198bn/month YTD to \$97bn/month. Fund flows have been strong all year, and dealers have net sold \$8bn of bonds since the last Fed reported data and we estimate that positions are net negative now ([Credit Market Outlook & Strategy](#), Mar 15th).

In **Euro Credit**, we are not convinced that 'this time is different'. We are starting to get uncomfortable, with spreads breaking what we thought was the floor, heavier than anticipated supply, and the economic consensus potentially stale after a string of hot inflation prints. We take a look at five arguments for why "this time might be different": i) yields are all that matter; ii) AI will change the world; iii) dealer liquidity has improved; iv) sovereign bonds are risky; and v) private credit means peak capital markets. Altogether, we do not find these views convincing ([European Credit Weekly](#), Mar 15th).

Currencies

A plethora of central bank meetings await FX markets this week. Risks to the USD around the March FOMC skew moderately higher given sticky inflation data in the run-up and odds of a dot plot shift towards fewer cuts. Market expectations for a BOJ NIRP exit this week have increased sharply of late, but out-delivering such hawkish expectations is a high bar; hence, the Yen is more likely to weaken after the event. European 'Super Thursday' central bank meetings likely provide more tradeable opportunities for NOK and CHF.

Macro trade recommendations: Enter NOK short vs CAD, SEK basket in cash. Add SEK long vs CHF in cash to existing EUR/SEK digi put. Keep modest USD longs (vs EUR, CAD) on US exceptionalism. Hold yield convergence trades (long SEK/CZK, long JPY vs CHF, EUR, USD). Stay OW EM FX ([FXMW](#), Mar 15th).

Commodities

Russia can maintain current oil exports until June. Expect contentious June OPEC+ meeting. We believe Russia can maintain oil exports at current levels through June even as it cuts 0.5 mbd crude production. Russia can achieve this by offsetting 200 kbd reduction in banned gasoline exports with higher crude oil shipments, as constrained refinery runs due to drone attacks and maintenance that runs from April through June lower processing rates. After June, Russia would likely have to cut exports to accommodate lower crude production, setting the stage for a contentious June OPEC+ meeting ([Oil Markets Weekly](#), Mar 15th).

The lack of March and April weather pushed our end-October storage trajectory toward 4.4 Tcf, forcing producers to respond to very weak near-term prices. Lower-for-longer price can structurally change the profile of production for summer 2024 and cal year 2025, causing us to lower our production and storage trajectory estimates. We remain bullish 2025 Henry Hub price based on midstream issues ([US Natural Gas](#), Mar 15th).

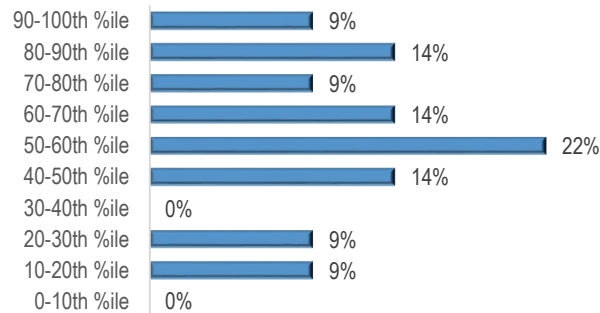
Copper prices jumped higher on a surge of financial inflows following a meeting of Chinese smelters to discuss the current tightness in concentrate markets. No formal coordinated production cut was agreed to but smelter maintenance has grouped heavily in 2Q24. Copper prices are finally responding to the intensifying supply tightness. With refined supply looking most at risk in the coming quarter and Chinese demand entering its seasonal peak period as well, we still think a broader move higher towards our bullish targets is in the offing, even if the road there is bumpy ([Metals Weekly](#), Mar 15th).

JPM Clients' View

[Click here to take this week's survey](#)

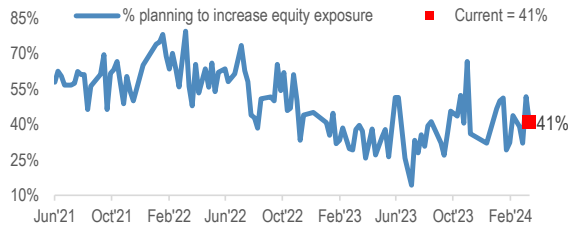
This week, we poll investors on US rates, equity crowding, ECB policy and gold, in addition to our running survey questions on equity positioning/sentiment, and intentions for near-term changes to equity allocation and bond duration. The results from the last survey are shown below.¹

Figure 1: What is your current equity positioning or sentiment in historical terms, expressed from most bearish (0th percentile) to most bullish (100th percentile)?



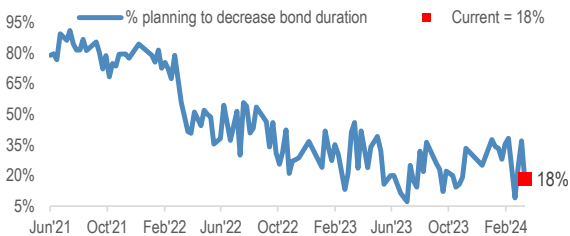
Source: J.P. Morgan.

Figure 2: Are you more likely to increase or decrease equity exposure over the coming days/weeks?



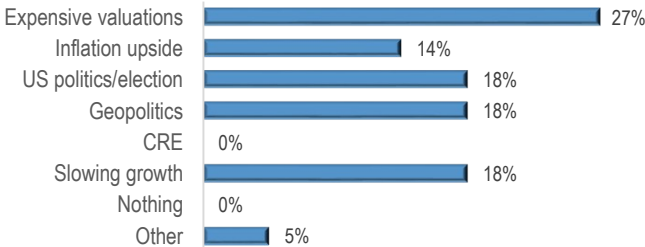
Source: J.P. Morgan.

Figure 3: Are you more likely to increase or decrease bond portfolio duration over the coming days/weeks?



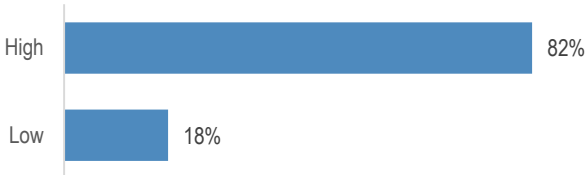
Source: J.P. Morgan.

Figure 4: What presents the biggest risk to markets over the next 6 months in your view?



Source: J.P. Morgan.

Figure 5: Do you believe the risk of an equity market correction at some point over the next 3-6 months is high or low?



Source: J.P. Morgan.

Figure 6: Was the ECB's inflation forecast in the March meeting too benign in your view?



Source: J.P. Morgan.

Figure 7: What do you believe is the probability the Fed won't cut at all this year?



Source: J.P. Morgan.

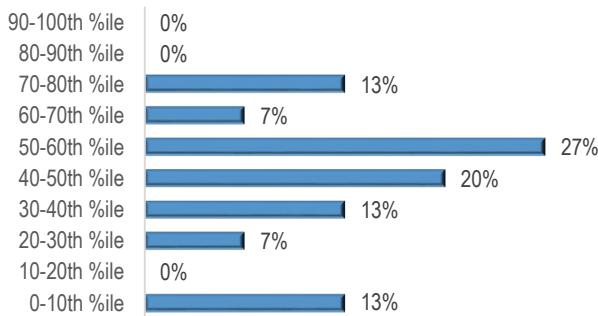
1. Results are based on 22 responses received from clients in our survey conducted Mar 11-18th

20 March 2024

JPM Clients' View – This Week's Interim Survey Results

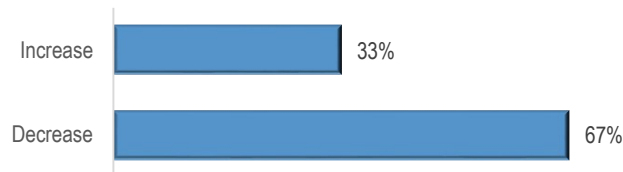
The charts below show interim results from this week's survey, collected over the first ~24 hours it was live. The survey remains open [here](#), and we will show updated results in the next J.P. Morgan View publication

Figure 8: What is your current equity positioning or sentiment in historical terms, expressed from most bearish (0th percentile) to most bullish (100th percentile)?



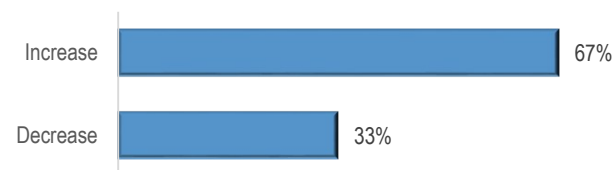
Source: J.P. Morgan

Figure 9: Are you more likely to increase or decrease equity exposure over the coming days/weeks?



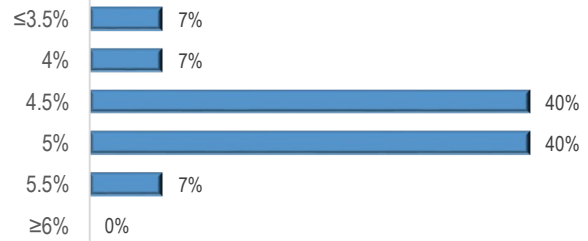
Source: J.P. Morgan

Figure 10: Are you more likely to increase or decrease bond portfolio duration over the coming days/weeks?



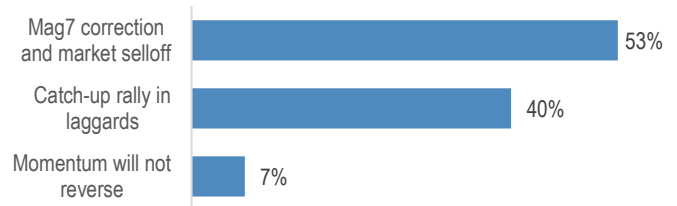
Source: J.P. Morgan

Figure 11: Where do you see Fed policy rates at year-end? (current = 5.5%)



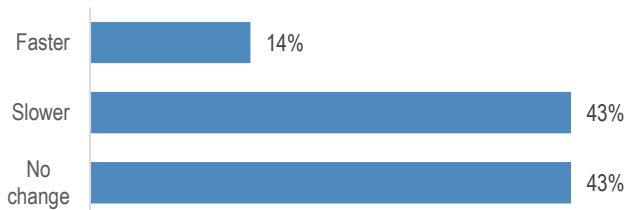
Source: J.P. Morgan

Figure 12: Given the extreme crowding in equity momentum, how do you expect a reversal to materialize?



Source: J.P. Morgan

Figure 13: What do you believe are the implications of the ECB's policy review on the pace of balance sheet normalization? The pace of normalization will be:



Source: J.P. Morgan

Figure 14: Is there a link between gold's recent rally and the rally in Bitcoin?



Source: J.P. Morgan

Risk premium compression

Despite higher than expected core inflation prints over the past week's US CPI and PPI releases, risk markets continue to defy our expectation of a correction. Global equities continue to drift higher in an almost straight line since the end of last October (Figure 15). At the same time credit spreads are making new lows with US HY corporate bond credit spreads over USTs reaching their lowest level since the summer of 2007 (Figure 16). Ultra-low credit spreads add to market frothiness and in our opinion offer little compensation in a backdrop of 3% default rates. In fact, as highlighted by our colleagues in HY research, February registered a post-pandemic high in actual defaults and a 10-month high in volume affected by defaults/distressed transactions. The \$12.9bn of defaults/distressed exchanges in 2024 is tracking only slightly below last year's pace, pointing to default rate stickiness. Our credit strategists look for around 3% par-weighted default rates in US HY bonds and loans for 2024, which assuming average recovery rates of around 40%, would imply a loss due to default of $3\% \times (1-40\%) = 180\text{bp}$. With the US HY corporate bond spread over USTs at 340bp at the moment, this leaves only 160bp as remaining compensation for credit risk, showing how vulnerable credit investors are at the moment to potential normalization in credit risk premia.

The picture on equity risk premia is not different. The Equity Risk Premium is proxied in Figure 17 by the difference between the Equity Discount Rate (EDR), or real equity yield for the S&P 500 index minus the 10y real UST yield. On our estimates, the current real yield of the S&P 500 index stands at 4.7% compared to 2.1% for the real 10y UST (proxied by the difference between the nominal 10y UST yield of 4.3% minus the most recent Philly Fed survey of professional forecasters' 10y inflation expectation of 2.2%). In other words, there is an Equity Risk Premium (i.e. the difference between the EDR and the 10y real yield) of around 2.6% at the moment, which is some way below its long-term historical average of 3.2%. This compares to an Equity Risk Premium of around 2.4% in 2007 before the Lehman crisis, when the EDR was similarly at 4.7%.

As explained in our sister publication *Flows & Liquidity*, Feb 28th, an alternative way to look at risk premia is to compare them across asset classes via the so-called "risk-return trade-off line", i.e. the regression line of the Internal Rate of Return (IRR) of various asset classes, including equities, high yield corporate bonds, high grade corporate bonds and government bonds, with the intercept of the regression line fixed at the cash rate (which we proxy with the 9-12 month Bloomberg T-bill index yield). This regression line is shown in Figure 18 for US assets. In Figure 18 the S&P 500 IRR is proxied by the Equity Discount Rate from our dividend discount model described above plus expected long-term inflation (proxied

by Philly Fed survey of professional forecasters' 10yr US CPI inflation forecast) to convert it to nominal. For US government bonds, the IRR is simply the yield of the Bloomberg UST bond index. For high grade corporate bonds, the IRR is the yield of the Bloomberg US HG corporate bond index less 50bp to take into account the average historical loss due to downgrades. For high yield corporate bonds, the IRR is the yield of the Bloomberg US HY corporate bond index less 250bp to take into account the average historical loss due to defaults.

How low is the current slope of the "risk-return trade-off line" relative to its longer history? Figure 19 depicts this slope over time. The slope appears to have been on a declining trend since the Lehman crisis. It currently stands at 0.09, i.e. the "expected Sharpe Ratio" embedded across asset classes is 0.09 at the moment, which is well below its historical average since 1989. The "expected Sharpe Ratio" had declined to as low as 0.10 in 2007 or 1989 and 0.09 in 1999. In other words, markets appear to be at the frothier risk premia backdrop of previous cycle peaks.

All the above suggest that risk premia have compressed by so much over the past few months that both equity and credit investors look vulnerable to potential normalization in risk premia. This is one reason we maintain a defensive stance in our model portfolio and recommend investors to hedge their risk assets via long vol exposures. As shown in Figure 20, implied vols stand at the low end of the past year's range across asset classes at the moment. Implied vol risk premia, proxied by the ratio between implied and realised vols in the last column of Figure 20, look also low by historical standards. In credit we recommend LQD puts to take advantage of negative implied spread/rates correlation. In fact, the negative spread-rate correlation implied by LQD options is at multi-year extremes (see [CD Player](#)). In equities we recommend resettable put spreads on the S&P 500 (see [Volatility Review](#)).

While in principle gold should serve as a hedge, we see some headwinds in the near term as gold appears to have been propagated along with bitcoin by both retail investors and speculative institutional investors. In particular, speculative institutional investors including momentum traders such as CTAs appear to have been heavily buying both gold and bitcoin futures since February. To the extent momentum traders such as CTAs have been behind this futures impulse, the risk of mean reversion looks high at the moment for both gold and bitcoin given the extremity of the momentum signals at around 1.5 standard deviations (see [Flows & Liquidity](#), Mar 14th).

20 March 2024

Moreover, MicroStrategy's recent announcement that it acquired more than \$800m of bitcoin between Feb 26th and March 10th alone funded via the sale of convertible notes, shows that the company, by appearing to transform itself to a leveraged play on bitcoin, has also played a part in amplifying the rally. MicroStrategy has bought more than \$1bn of bitcoin YTD after more than \$1bn of purchases in Q4 2023. And it is planning another \$500m of convertible-debt offering that would enable it to purchase even more bitcoin. In our mind, these debt-funded bitcoin purchases add froth to the current crypto rally by raising the risk of severe deleveraging in a potential downturn in the future. If a crypto market downturn materializes over the coming months, gold would likely be negatively affected.

A second reason we maintain a defensive stance in our model portfolio is inflation. The latest US CPI print for February marked a third consecutive upside surprise in both core and headline CPI. Moreover, there is a tendency for serial correlation in inflation surprises. For example, using a transition matrix approach on the Citi inflation surprise index (Figure 21) for the US using quarterly observations (to avoid introducing artificial serial correlation given it looks at surprises over a 3-month rolling window), there a strong tendency of positive readings in the surprise index in one quarter to be followed by positive readings in the following quarter. These upside surprises in US inflation readings have also started to see upward revisions in inflation forecasts by economists, with the BlueChip survey showing US CPI forecasts for both 2024 and 2025 were revised upwards. Again, these forecast revisions tend to exhibit strong serial correlation. Figure 22 shows the transition matrix for US CPI inflation in the BlueChip survey, using a 1-year ahead constant horizon, and shows how often upward and downward revisions or no changes in the current month (t) are followed by upward and downward moves or no changes in the following month (t+1). It suggests that both upward and downward revisions to inflation forecasts tend to be followed by a revision in the same direction around two-thirds of the time.

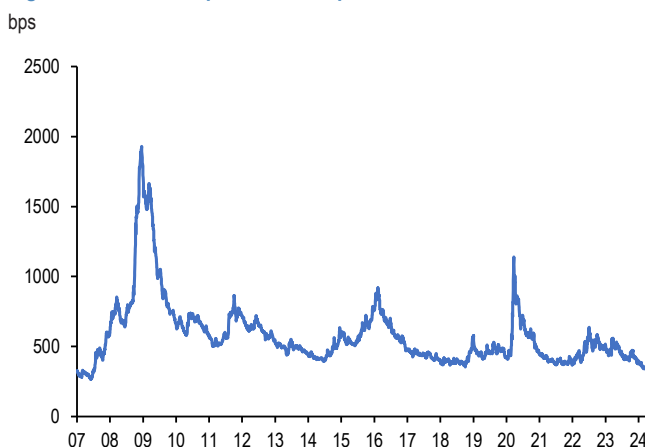
Clearly, these inflation surprises have also seen a repricing of Fed expectations, with Fed funds futures markets now pricing in just under 75bp of Fed cuts by end-2024 currently, compared to nearly 170bp at the peak in mid-January (Figure 23), which was well beyond the 125bp of cuts our economists had forecast for the year. However, given the strength in activity and labor market data as well as the inflation data in recent months, while they still expect the Fed to begin easing in June, our economists now see cuts at every other meeting, with 75bp of cumulative cuts by year-end. Mindful of this strong serial correlation and risk of further revisions to the inflation outlook, there is if anything some risk of further pricing out by markets of Fed cuts in the near term.

Figure 15: MSCI AC World Index



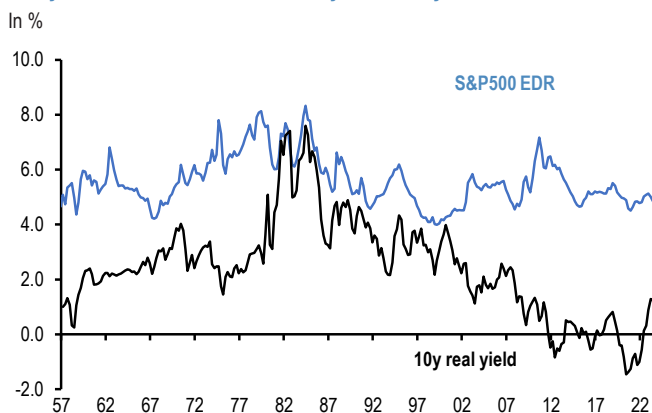
Source: Bloomberg Finance L.P., J.P. Morgan.

Figure 16: US HY corporate bond spread vs USTs



Source: Bloomberg Finance L.P., J.P. Morgan.

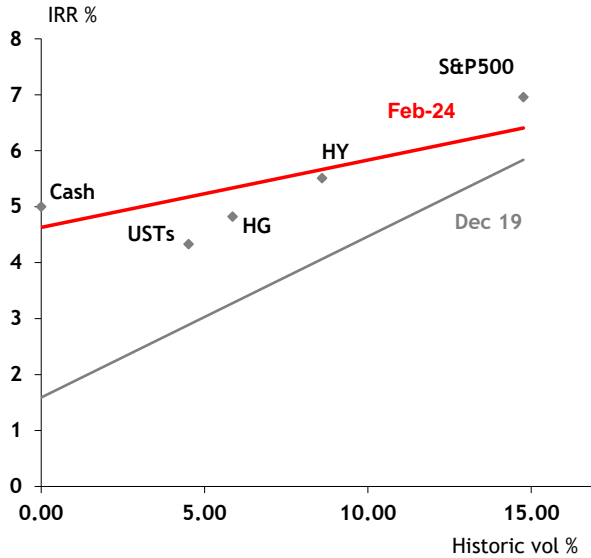
Figure 17: Our model-driven estimate of the Equity Discount Rate or real yield of the S&P500 vs. the 10y real UST yield



Source: J.P. Morgan.

Figure 18: Risk-return trade-off line

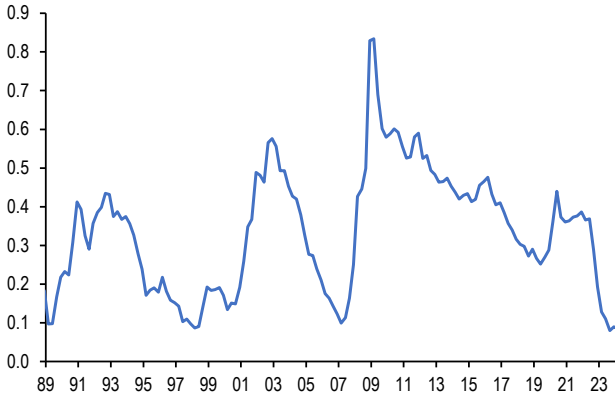
Nominal Internal Rate of Return (IRR) across assets classes as a function of historical return volatility. For a detailed explanation, please see main text. Quarterly data since 1989. Last observation is for Feb'24.



Source: J.P. Morgan.

Figure 19: Slope of the risk-return trade-off line

Slope of risk-return trade-off line since 1989. For a detailed explanation, please see main text. Quarterly data since 1989. Last observation is for Feb'24



Source: J.P. Morgan.

Figure 20: Cross Asset Volatility Monitor – 3m ATM Implied Volatility (1y history) as of 14-Mar-24

This table shows the richness/cheapness of current 3m implied volatility levels (red dot) against their 1 year historical range (thin blue bar) and the ratio to current realized volatility. Assets with implied volatility outside their 25th/75th percentile range (thick blue bar) are highlighted. The implied-to-realized volatility ratio uses 3-month implied volatilities and 1-month (around 21 trading days) realized volatilities for each asset.

Asset	Current	Low	Low date	High	High date	Upside	Downside	Implied/realized volatility
S&P 500	13%	12%	23-Jan-24	22%	17-Mar-23	9%	1%	1.00x
EuroSTOXX	13%	12%	27-Feb-24	24%	17-Mar-23	11%	1%	1.40x
Nikkei 225	18%	15%	12-May-23	21%	26-Oct-23	3%	3%	1.19x
Hang Seng	23%	20%	14-Jun-23	26%	20-Mar-23	4%	3%	1.04x
MSCI EM	15%	12%	29-Jan-24	32%	26-Jan-24	17%	3%	1.29x
Gold	12%	10%	27-Feb-24	18%	20-Mar-23	6%	2%	1.03x
Oil (Brent)	20%	25%	31-Aug-23	40%	17-Mar-23	20%	1%	1.25x
Copper	18%	15%	1-Mar-24	27%	16-Mar-23	9%	4%	1.08x
BB commodity index	14%	13%	16-Feb-24	20%	17-Mar-23	6%	1%	1.67x
EUR/USD	5%	5%	13-Mar-24	10%	15-Mar-23	4%	0%	1.68x
USD/INR	10%	10%	13-Mar-24	18%	15-Mar-23	6%	0%	1.35x
USD/JPY	9%	8%	27-Feb-24	14%	15-Mar-23	5%	1%	1.36x
GBP/USD	6%	6%	13-Mar-24	11%	15-Mar-23	5%	0%	1.13x
USD/CHF	6%	6%	13-Mar-24	10%	15-Mar-23	4%	0%	1.48x
30y US swaps	101%	98%	13-Mar-24	149%	15-Mar-23	49%	3%	1.05x
10y Eur swaps	77%	76%	13-Mar-24	131%	15-Mar-23	76%	0%	1.06x
CDX IG	43%	37%	12-Dec-23	65%	17-Mar-23	23%	5%	1.22x
CDX HY	35%	32%	13-Dec-23	62%	17-Mar-23	26%	4%	1.24x
ITraxx	43%	37%	22-Nov-23	75%	17-Mar-23	33%	5%	1.20x
ITraxx X/O	41%	32%	22-Nov-23	67%	17-Mar-23	33%	9%	1.24x

Source: Bloomberg Finance L.P., J.P. Morgan.

Figure 21: US Inflation surprise transition matrix

Transition matrix for quarterly data on the Citi US inflation surprise index, 1997-2024

Citi Inflation surprise index:			
Quarter t+1			
		Negative	Positive
Quarter t	Negative	0.78	0.22
	Positive	0.38	0.59

Source: Bloomberg Finance L.P., J.P. Morgan.

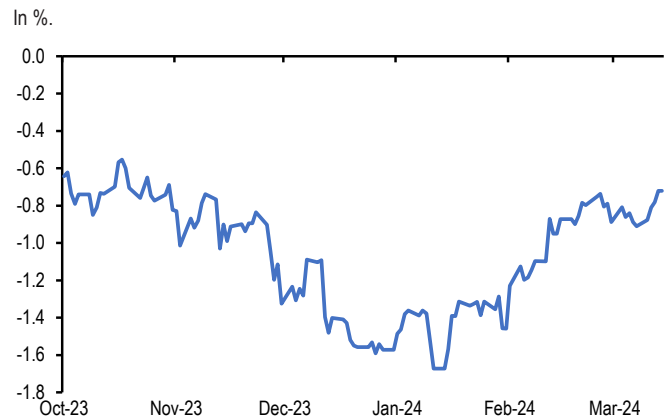
Figure 22: Forecast transition matrix

Transition matrix for monthly US inflation forecast changes, 1987-2024.

		Inflation forecasts: Month t+1		
		Down	Up	No change
Month t	Down	0.67	0.18	0.15
	Up	0.18	0.66	0.15
	No change	0.30	0.32	0.39

Source: Blue Chip Economic Indicators, J.P. Morgan

Figure 23: Cumulative Fed policy rate cuts by end-2024



Source: Bloomberg Finance L.P., J.P. Morgan.

20 March 2024

Global Research Digest

Macro & Cross-Asset Views

[Equity Strategy: Momentum Crowding, AI Halo Effect, Market Dislocations](#), Dubravko Lakos-Bujas

A combination of High for Longer and the Halo Effect of LLM stocks has created market dislocations across global equities over the past year. These have been key catalysts for investor crowding into quality mega-cap companies. The unique feature of the current extreme crowding into Momentum (99.8%ile) is the non-linearity in Momentum with extreme tail crowding into the Size and Growth factors (i.e. Mag7 effect). Our analysis suggests the broad market is more vulnerable to negative shocks from AI theme as the market exhibits higher bear beta than bull beta relative to NVDA and Mag7 returns.

[CBO Budget and Economic Outlook 2024-2034: The familiar and the new: The most predictable crisis in history?](#), Jan Loeys

Even with modest improvement compared to last year on US federal debt and deficit assumptions due to higher growth, the question is not whether the US will face a moment of reckoning on government debt but rather when it will happen and how painful the necessary adjustment will be. Based on economic fundamentals alone, we are inclined to the view that the trajectory of debt as a share of GDP is likely to be somewhat worse than projected by the CBO. Investors should position for a steeper yield curve as near-term considerations should bring lower rates at the short end of the curve, while higher volatility, increased issuance, and weakening demand of price-insensitive buyers should bring a higher term premium.

[Flows & Liquidity: Are investors shifting from gold to bitcoin?](#), Nikolaos Panigirtzoglou

We believe that private investors and individuals have propagated both gold and bitcoin YTD rather than shifting from the former to the latter. However, simply looking at ETF flows portrays a rather misleading picture under-estimating the buying of gold by individuals and private investors in the form of bars and coins and over-estimating their purchases of bitcoin as retail investors rotate from bitcoins previously held via digital wallets to the convenience and regulatory protection of the new spot bitcoin ETFs.

Global Economics

[Surprisingly resilient global profits to be tested in 2024](#), Joseph Lupton

Although the profit resilience has bolstered market sentiment for a soft-landing, the risk is that pressures on profits build through margins. Profit margins are elevated but are leveling out. Higher policy rates, elevated wage inflation, and a large downshift in the pace of revenue expansion were stiff headwinds to earnings. However, both inflation and real activity surprised to the upside, resulting in a robust 6.2%oya gain in nominal global GDP last year. The resulting resilience in business revenues helped to sustain a modest 2.6%oya gain in corporate profits. While profits are still growing, the pace is slowing from the boom after the pandemic across most sectors including consumers, health care, financials, and IT.

[US: Home sales are hurting, but homebuilding holds in](#), Michael Feroli

Housing construction and construction employment have held up much better than expected despite 525bp in Fed rate hikes. Home sales have behaved normally but other housing indicators have been acting strange. A secular housing shortage is the likely explanation for the unusual behavior of the sector in this cycle. Relative to the high level of housing completions, the surprisingly modest increase in vacancies is partly due to the surprisingly high level of immigration. However, even with a potential change in immigration policies we think homebuilding should be well-supported for several quarters.

[BoJ Preview: Data dependence or political decision](#), Ayako Fujita

We believe the expected strong wage increases will support further progress in the BoJ's strategic "gradual policy normalization." We think upcoming meetings will continue to be live meetings, but the key issue is the order and pace in normalizing various easing measures. Although we can't rule out the possibility that the NIRP will be lifted early as a political decision, there is still a distance between the easing bias in the statement and NIRP removal as a start of hiking cycle.

[Japan: Now we're all Mrs. Watanabe](#), Ben Shatil & Ikue Sai-to

Rising retail allocations to overseas assets, if they persist, may mark an important inflection point for Japanese household flows. First, while institutional investors' search for yield in foreign debt markets had characterized Japan's capital account over the past decade, retail flows into equity markets may emerge as a more material future flow. Second, rising retail capital outflows can serve to accelerate yen depreciation, and there is already evidence that USD/JPY's resilience this year has been supported by these flows. Third,

a longer-term rise in foreign assets risks increasing household exposure to currency swings; this dynamic may have some influence on FX policy and the design of future investment schemes.

Global Market Implications

[The SMid View: Launching our NEW SMid View: Broader, Deeper, and Better](#), Eduardo Lecubarri

In this new version of our SMid View report, we provide a brief summary of our world view, and any new trends or noteworthy developments. We include a summary of the SMid themes that we find most appealing and help narrow the thousands of SMid stocks that trade in each region down to a few hundred that are facing fundamental tailwinds. We also include a more in-depth explanation of our allocation recommendations including regional views from our local teams.

[2024 High Grade Bond Issuance Forecast: Raising our supply forecast by 7% to \\$1.3tr, up 9% YoY](#), Eric Beinstein

We raise our full year supply forecast by \$86bn to \$1.31tr, up 8.6% YoY (net issuance of \$490bn). Simply put, with spreads near post GFC tight and UST curves still deeply inverted, issuers have found themselves in an opportune position to raise capital at relatively attractive coupons and are taking advantage of this backdrop to a greater degree than we expected late last year. Sector wise, the largest changes to our prior forecast have come in Healthcare/Pharma (+\$25bn) and Tech (+\$16bn) while we have not changed our full year forecast in Financials, Energy or Utilities.

[EM Corporate Spread to Sovereign: Is it tight, or could it be right?](#), Alisa Meyers

There exists a wide debate on whether EM corporates trading through their own sovereigns is justified and we believe selectively so. Such observations have been common in countries including Ukraine, Turkey and Argentina, in cases when corporate standalone fundamentals were solid but the respective sovereign was under stress. Other situations which may warrant corporates to trade through sovereigns relate to rating differential, business dynamics, as well as technical. We take a look at some dislocations in Asia, LatAm and Middle East where we think the CEMBI spread to sovereign compression may have gone too far.

[Introducing the J.P. Morgan ESG Asia Pacific Credit Index: Rules and Methodology](#), Ravindra Bhandari

We introduce the J.P. Morgan ESG Asia Pacific Credit Index (JESG JACI APAC), an integrated ESG benchmark covering IG and HY debt markets across the Asia

Pacific region. Issuers with better ESG scores will have higher weights compared with the baseline index. JESG JACI APAC delivers similar risk-adjusted returns as the flagship, with a 22% better JESG score than the baseline index and excluding ~19.75% of instruments by market value relative to the flagship due to issuer involvement in controversial sectors, low JESG scores or the minimum notional criteria.

Sector Level Views

[EE/MI: J.P. Morgan Industrials Conference Wrap](#), C. Stephen Tusa, Jr CFA

We come away from the J.P. Morgan Industrials Conference with little change to our view with a bit more confidence in short cycle recovery trend, but mostly because it's not getting worse, and a lot more confidence in the strength and sustainability in data center demand. We remain OW Electricals>HVAC broadly and prefer value names where earnings revisions cycles are turning with short cycle trends. We remain UW ROK and LII, both of which did not attend the conference.

[UBS vs. Morgan Stanley: Prefer UBS over MS: the only Global Wealth Manager](#), Kian Abouhossein

UBS in our view has a better business mix than MS, with both generating c60% of earnings from Asset gathering businesses in 2027E; UBS IB only contributing 15% to Group earnings consuming <25% of RWAs vs. 40% of earnings and 50% of Equity at MS and UBS having the stability of the combined Swiss Bank generating almost 1/3rd of earnings and c20% market share. We forecast an acceleration in capital returns from UBS in 2026 and expect TBV/Sh growth of 5% p.a. for UBS vs. 4% at MS over 2023-27.

[China Equity Strategy: CGR entered Expansion in Jan; what about Feb?](#), Wendy Liu

JPM's China Growth Reading (CGR) entered Expansion in Jan 2024. The question is whether it will stay there in the coming months. MXCN's monthly returns have tracked CGR readings; peak gap seen in Jan 24 may narrow further. A stay in Expansion will help end three years of EPS declines by MXCN, the worst among APAC markets.

20 March 2024

Strategy & Forecasts

GAA Long Only Model Portfolio

Asset Classes		Active Weights	UW OW
Equities		-8%	
Govt. Bonds		1%	
Corp. Bonds		-3%	
Commodities		5%	
Cash		5%	
Sectors		Active Weights	UW OW
Equities	US	-2%	
	EMU	-6%	
	Japan	1%	
	UK	2%	
	EM	5%	
	Other	0%	
Govt. Bonds	US Nominal	-2%	
	US TIPs	0%	
	Europe Core	4%	
	Europe Periphery	0%	
	Japan	-2%	
	UK	0%	
	EM Local	0%	
	Australia	0%	
Corp. Bonds	US HG	3%	
	Europe HG	1%	
	UK HG	0%	
	US HY	-1%	
	Europe HY	-3%	
	US Loans	0%	
	EM Sovereigns	0%	
Commodities	EM Corporates	0%	
	Energy	3%	
	Industrial metals	-3%	
	Agriculture	0%	
	Precious metals	2%	
	Livestock	-2%	

Equity sector recommendations and YTD returns

	US		Europe		Japan		EM	
Energy	9%	OW	2%	OW	19%	N	6%	OW
Materials	6%	N	1%	N	9%	UW	-6%	UW
Industrials	7%	UW	8%	UW	12%	N	2%	N
Discretionary	3%	UW	13%	UW	15%	OW	2%	OW
Staples	6%	OW	-1%	OW	3%	OW	-3%	OW
Healthcare	7%	OW	9%	OW	9%	N	-2%	UW
Financials	9%	N	7%	UW	24%	OW	4%	N
Technology	12%	N	18%	N	16%	UW	9%	N
Comm Service	12%	N	1%	OW	12%	N	0%	N
Utilities	1%	OW	-7%	OW	11%	N	5%	N
Real Estate	-2%	UW	-8%	OW	5%	N	-4%	N
Overall	8.2%		6.3%		13.4%		3%	

Source: J. P. Morgan, Bloomberg Finance L.P.

JPM Forecasts

Rates	Current	Jun-24	Sep-24	Dec-24	Mar-25
US (SOFR)	5.31	5.10	4.80	4.60	-
10-year yields	4.31	4.20	4.00	3.90	-
Euro area (depo)	4.00	3.75	3.50	3.00	2.50
10-year yields	2.44	2.20	2.05	1.90	1.80
Italy-Germany 10Y (bp)	126	150	160	170	170
Spain-Germany 10Y (bp)	80	80	75	80	80
United Kingdom (repo)	5.25	5.25	5.00	4.50	4.00
10-year yields	4.10	4.05	3.95	3.80	3.65
Japan (call rate)	-0.10	-0.10	0.00	0.25	0.25
10-year yields	0.79	0.75	0.85	1.05	1.05
EM Local (GBI-EM yield)	6.25		6.10		5.76
Currencies	Current	Jun-24	Sep-24	Dec-24	Mar-25
JPM USD Index	130.4	132.2	132	130.3	128.8
EUR/USD	1.09	1.05	1.05	1.09	1.12
USD/JPY	149	148	146	144	142
GBP/USD	1.27	1.22	1.22	1.25	1.29
AUD/USD	0.66	0.67	0.69	0.68	0.68
USD/CNY	7.20	7.25	7.2	7.15	7.1
USD/KRW	1330	1335	1290	1275	1275
USD/MXN	16.72	17.25	17.5	17.5	17.25
USD/BRL	4.99	5	5.05	5.1	5.05
USD/TRY	32.20	34	36	38	40
USD/ZAR	18.77	18.5	18.35	18.3	18.25
Commodities	Current	Mar-24	Jun-24	Sep-24	Dec-24
Brent (\$/bbl, qtr end)	85	80	81	88	85
WTI (\$/bbl, qtr end)	81	76	77	84	81
Gold (\$/oz, qtr avg)	2,162	1,950	1,980	2,100	2,175
Copper (\$/ton, qtr avg)	8,786	8,500	8,600	8,700	9,200
Aluminum (\$/ton, qtr avg)	2,207	2,200	2,100	2,200	2,325
Iron ore (US\$/dt, qtr avg)	106	125	115	110	110
Wheat (\$/bu, qtr avg)	5.3	6.0	6.3	6.5	6.5
Soybeans (\$/bu, qtr avg)	11.9	14.0	14.2	13.8	13.5
Credit				Current	Dec-24
US High Grade (bp over UST)	JPM JULI			107	125
Euro High Grade (bp over Bunds)	iBoxxx HG			124	150
US High Yield (bp vs. UST)	JPM HY			341	475
Euro High Yield (bp over Bunds)	iBoxxx HY			331	500
EM Sovereigns (bp vs. UST)	JPM EMBIGD			354	475
EM Corporates (bp vs. UST)	JPM CEMBI			242	330
Equities				Current	Dec-24
S&P 500				5110	4200
MSCI Eurozone				293	256
FTSE 100				7727	7700
TOPIX				2671	2500
MSCI EM (\$)				1049	1070
MSCI China				56	66
MSCI Korea				856	835
MSCI Taiwan				778	650
MSCI India				2600	2500
Brazil (Ibovespa)				126678	142000
Mexico (MEXBOL)				56160	57000
MSCI South Africa (USD)				382	395

Source: J.P. Morgan, Bloomberg Finance L.P., Datastream.

Correction: Update: Survey results added on page 5.

Companies Discussed in This Report (all prices in this report as of market close on 19 March 2024, unless otherwise indicated) Lennox International(LII/\$482.99/UW), Morgan Stanley(MS/\$88.42/N), Rockwell Automation(ROK/\$278.19/UW), UBS(UBSG.S/CHF27.42[20 March 2024]/OW)

Disclosures

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.

Research excerpts: This material may include excerpts from previously published reports. For access to the full reports, including analyst certification and important disclosures, please contact your sales representative or the covering analyst’s team, or visit <https://www.jpmorganmarkets.com>.

Important Disclosures

- **Market Maker/ Liquidity Provider:** J.P. Morgan is a market maker and/or liquidity provider in the financial instruments of/related to Lennox International, Morgan Stanley, Rockwell Automation, UBS.
- **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 Lennox International, UBS 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 Morgan Stanley.
- **Client:** J.P. Morgan currently has, or had within the past 12 months, the following entity(ies) as clients: Lennox International, Morgan Stanley, Rockwell Automation, UBS.
- **Client/Investment Banking:** J.P. Morgan currently has, or had within the past 12 months, the following entity(ies) as investment banking clients: Lennox International, Morgan Stanley, UBS.
- **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: Lennox International, Morgan Stanley, Rockwell Automation, UBS.
- **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: Lennox International, Morgan Stanley, Rockwell Automation, UBS.
- **Investment Banking Compensation Received:** J.P. Morgan has received in the past 12 months compensation for investment banking services from Lennox International, Morgan Stanley, UBS.
- **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 Lennox International, Morgan Stanley, UBS.
- **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 Lennox International, Morgan Stanley, Rockwell Automation, UBS.
- **Debt Position:** J.P. Morgan may hold a position in the debt securities of Lennox International, Morgan Stanley, Rockwell Automation, UBS, 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 with your request.

Lennox International (LII, LII US) Price Chart



Date	Rating	Price (\$)	Price Target (\$)
27-Apr-21	UW	332.49	270
04-Oct-21	UW	297.39	250
07-Jul-22	UW	216.89	205
29-Jul-22	UW	234.57	210
01-Nov-22	N	233.57	226
01-May-23	N	281.91	260
28-Jul-23	N	356.46	300
06-Oct-23	N	372.02	344
21-Nov-23	N	407.51	370
01-Feb-24	UW	428.16	330
13-Feb-24	UW	450.11	350

Source: Bloomberg Finance L.P. and J.P. Morgan; price data adjusted for stock splits and dividends.
Initiated coverage Dec 30, 2003. All share prices are as of market close on the previous business day.

Morgan Stanley (MS, MS US) Price Chart



Date	Rating	Price (\$)	Price Target (\$)
19-Apr-21	OW	78.59	85
16-Jun-21	OW	90.70	105
15-Oct-21	OW	101.01	103
06-Jan-22	OW	101.68	108
20-Jan-22	OW	95.73	114
14-Mar-22	OW	85.18	102
01-Apr-22	OW	87.40	103
18-Apr-22	OW	84.76	104
23-May-22	OW	79.37	100
05-Jul-22	OW	76.75	96
11-Oct-22	OW	78.41	95
06-Dec-22	OW	89.81	100
24-Feb-23	OW	97.94	101
20-Apr-23	OW	90.45	97
07-Jul-23	OW	83.33	91
19-Jul-23	OW	91.94	93
05-Oct-23	OW	79.09	92
09-Jan-24	OW	93.51	94
17-Jan-24	N	85.97	87

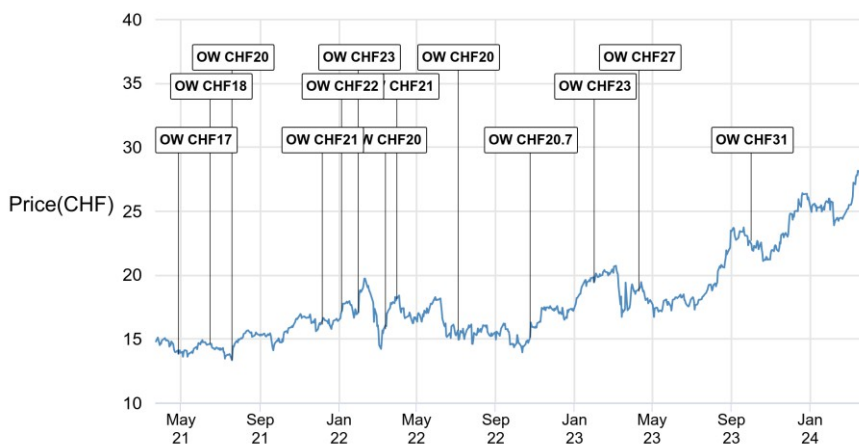
Source: Bloomberg Finance L.P. and J.P. Morgan; price data adjusted for stock splits and dividends.
Initiated coverage May 01, 1999. All share prices are as of market close on the previous business day.

Rockwell Automation (ROK, ROK US) Price Chart



Source: Bloomberg Finance L.P. and J.P. Morgan; price data adjusted for stock splits and dividends. Initiated coverage Dec 27, 2005. All share prices are as of market close on the previous business day.

UBS (UBSG.S, UBSG SW) Price Chart



Source: Bloomberg Finance L.P. and J.P. Morgan; price data adjusted for stock splits and dividends. Initiated coverage Sep 30, 1998. 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 duration of the price target indicated in this report, we expect this stock will outperform the average total return of the stocks in the Research Analyst's, or the Research Analyst's team's, coverage universe); Neutral (over the duration of the price target indicated in this report, we expect this stock will perform in line with the average total return of the stocks in the Research Analyst's, or the Research Analyst's team's, coverage universe); and Underweight (over the duration of the price target indicated in this report, we expect this stock will underperform the average total return of the stocks in the Research Analyst's, or the Research Analyst's team's, coverage universe. NR is Not Rated. In this case, 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 Research Analysts' coverage universe. If it does not appear in the Important Disclosures section of this report, the certifying Research Analyst's coverage universe can be found on J.P. Morgan's Research website, <https://www.jpmorganmarkets.com>.

J.P. Morgan Equity Research Ratings Distribution, as of January 01, 2024

	Overweight (buy)	Neutral (hold)	Underweight (sell)
J.P. Morgan Global Equity Research Coverage*	47%	39%	13%
IB clients**	48%	43%	32%
JPMS Equity Research Coverage*	46%	42%	12%
IB clients**	68%	63%	46%

*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. 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.

Morgan Stanley - J.P. Morgan Credit Opinion History

	Date	Action	Rating/Designation	Ticker/ISIN
Issuer	17 Jan 23	Upgrade	Overweight	MS
3.772% '29 *	17 Jan 23	Upgrade	Overweight	US61744YAP34
3.125% '26	21 Aug 17	Terminate	Not Covered	US61761J3R84
3.750% '23	09 Sep 16	Terminate	Not Covered	US61746BDJ26
3.875% '24	09 Sep 16	Terminate	Not Covered	US61746BDQ68
3.875% '26	09 Sep 16	Terminate	Not Covered	US61746BDZ67
3.950% '27	17 Aug 18	Terminate	Not Covered	US61761JZN26
4.100% '23	09 Sep 16	Terminate	Not Covered	US61747YDU64

UBS - J.P. Morgan Credit Opinion History

	Date	Action	Rating/Designation	Ticker/ISIN
Issuer	16 Sep 15	Upgrade	Overweight	UBS
5Y Senior CDS *	16 Sep 15	Rating Change	Long Risk	—

*Indicates representative/primary bond/instrument.

The table(s) above show the recommendation changes made by J.P. Morgan Credit Research Analysts in the subject company and/or instruments over the past three years (or, if no recommendation changes were made during that period, the most recent change). Notes: Effective April 11, 2016, J.P. Morgan changed its Credit Research Ratings System. Please see the Explanation of Credit Research Ratings below for the new definitions. The previous rating system no longer should be relied upon. For the history prior to April 11, 2016, please call 1-800-447-0406 or e-mail research.disclosure.inquiries@jpmorgan.com.

Explanation of Credit Research Valuation Methodology, Ratings and Risk to Ratings:

J.P. Morgan uses a bond-level rating system that incorporates valuations (relative value) and our fundamental view on the security. Our fundamental credit view of an issuer is based on the company's underlying credit trends, overall creditworthiness and our opinion on whether the issuer will be able to service its debt obligations when they become due and payable. We analyze, among other things, the company's cash flow capacity and trends and standard credit ratios, such as gross and net leverage, interest coverage and liquidity ratios. We also analyze profitability, capitalization and asset quality, among other variables, when assessing financials. Analysts also rate the issuer, based on the rating of the benchmark or representative security. Unless we specify a different recommendation for the company's individual securities, an issuer recommendation applies to all of the bonds at the same level of the issuer's capital structure. We may also rate certain loans and preferred securities, as applicable. This report also sets out within it the material underlying assumptions used. We use the following ratings for bonds

(issues), issuers, loans, and preferred securities: Overweight (over the next three months, the recommended risk position is expected to outperform the relevant index, sector, or benchmark); Neutral (over the next three months, the recommended risk position is expected to perform in line with the relevant index, sector, or benchmark); and Underweight (over the next three months, the recommended risk position is expected to underperform the relevant index, sector, or benchmark). J.P. Morgan Emerging Markets Sovereign Research uses Marketweight, which is equivalent to Neutral. NR is Not Rated. In this case, J.P. Morgan has removed the rating for this particular security or issuer because of either a lack of a sufficient fundamental basis or for legal, regulatory or policy reasons. The previous rating no longer should be relied upon. An NR designation is not a recommendation or a rating. NC is Not Covered. An NC designation is not a rating or a recommendation. For CDS, we use the following rating system: Long Risk (over the next three months, the credit return on the recommended position is expected to exceed the relevant index, sector or benchmark); Neutral (over the next three months, the credit return on the recommended position is expected to match the relevant index, sector or benchmark); and Short Risk (over the next three months, the credit return on the recommended position is expected to underperform the relevant index, sector or benchmark).

J.P. Morgan Credit Research Ratings Distribution, as of January 01, 2024

	Overweight (buy)	Neutral (hold)	Underweight (sell)
Global Credit Research Universe*	27%	57%	16%
IB clients**	62%	60%	62%

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

**Percentage of subject companies within each of the "Overweight," "Neutral" and "Underweight" 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. The Credit Research Rating Distribution is at the issuer level. Issuers with an NR or an NC designation are not included in the table above. This information is current as of the end of the most recent calendar quarter.

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.

Registration of non-US Analysts: Unless otherwise noted, the non-US analysts listed on the front of this report are employees of non-US affiliates of J.P. Morgan Securities LLC, may not be registered as research analysts under FINRA rules, may not be associated persons of J.P. Morgan Securities LLC, and may not be subject to FINRA Rule 2241 or 2242 restrictions on communications with covered companies, public appearances, and trading securities held by a research analyst account.

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 J.P. Morgan'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 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

Notification for Credit Ratings: If this material includes credit ratings, such credit ratings provided by Japan Credit Rating Agency, Ltd. (JCR) and Rating and Investment Information, Inc. (R&I), are credit ratings provided by Registered Credit Rating Agencies (credit rating agencies registered under the Financial Instruments and Exchange Law of Japan (FIEL)). With respect to credit ratings that are provided by credit rating agencies other than JCR and R&I and have no stipulation that such credit ratings are provided by Registered Credit Rating Agencies, this means that such credit ratings are Non Registered Ratings (credit ratings provided by credit rating agencies not registered under the FIEL). Among the Non Registered Ratings, with respect to those credit ratings provided by S&P Global Ratings (S&P), Moody's Investors Service (Moody's), or Fitch Ratings (Fitch), prior to making investment decision based on such Non Registered Ratings, please carefully read the "Explanation Letter regarding Non Registered Ratings" for the corresponding credit rating agency, which we separately have sent or will send.

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 Participant of ASX Limited, a Clearing and Settlement Participant of ASX Clear Pty Limited and a Clearing Participant of ASX Clear (Futures) Pty Limited. 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 / 0800-7700810 (For Hearing Impaired) / 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 authorised as a credit institution by the Federal Financial Supervisory Authority (Bundesanstalt für Finanzdienstleistungsaufsicht, BaFin) and jointly supervised by the BaFin, the German Central Bank (Deutsche Bundesbank) and the European Central Bank (ECB). 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.jpmipl.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; +912261573225. Grievance Officer: Ramprasadh K, jpmipl.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. **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. **Singapore:** This material is issued and distributed in Singapore by or through J.P. Morgan Securities Singapore Private Limited (JPMS) [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 JPMS or JPMCB Singapore in respect of any matters arising from, or in connection with, the material. **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 Conduct Authority (FSCA). **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") ©2024. 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)

©2024 Sustainalytics. All Rights Reserved. The information, data, analyses and opinions contained herein: (1) includes the proprietary information of Sustainalytics; (2) may not be copied or redistributed except as specifically authorized; (3) do not constitute investment advice nor an endorsement of any product or project; (4) are provided solely for informational purposes; and (5) are not warranted to be complete, accurate or timely. Sustainalytics is not responsible for any trading decisions, damages or other losses related to it or its use. The use of the data is subject to conditions available at <https://www.sustainalytics.com/legal-disclaimers>.

"Other Disclosures" last revised March 09, 2024.

Copyright 2024 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 18 Mar 2024 04:52 PM EDT

Disseminated 18 Mar 2024 04:57 PM EDT