Arch Capital

Robust MI and Reinsurance Margins Drive 4Q Results

Neutral

ACGL, ACGL US
Price (13 Feb 23):$65.25
Price Target (Dec-23):$58.00

Insurance - Life & Nonlife

Jimmy S. Bhullar, CFA AC
(1-212) 622-6397
jimmy.s.bhullar@jpmorgan.com
Bloomberg JPMA BHULLAR <GO>

Pablo S. Singzon
(1-212) 622-2295
pablo.s.singzon@jpmorgan.com

Nicholas M Annitto
(1-212) 622-6705
nicholas.annitto@jpmorgan.com

Scott Haveman, CPA
(1-212) 622 9937
scott.haveman@jpmchase.com
J.P. Morgan Securities LLC

ACGL's results were robust, with upside in EPS and strong business trends. We consider ACGL a premier franchise, but are Neutral on the stock due to valuation.

- **Sizable EPS beat.** Operating EPS of $2.14 was well above our $1.40 estimate and consensus of $1.33. The upside to our model was driven partly by more favorable PYD (+$0.30 variance) and lower cat losses (+$0.10 variance), but EPS would have still exceeded forecasts, helped by robust investment income and slightly better than assumed core margins (ex. cats and PYD). Premiums benefited from a few non-recurring deals, which did not affect income.
- **Business trends were strong overall.** MI results were especially robust, marked by weak written premiums (-5%, close to our assumption) but strong margins (CR -27.1% vs. our 6.2% estimate and CR ex. cats and PYD 45.0% vs. 41.2%E). While pleased with results, we do not expect MI margins and earnings to sustain at the 4Q22 level. P&C insurance results were better than expected as well, with strong premium growth (+17%, slightly below our +22% assumption) and upside in margins on both a reported and core basis (CR 92.1% vs. 92.6%E; CR ex. cats and PYD 89.6% vs. 91.3%E). Similarly, P&C reinsurance margins were robust (CR 78.5% vs. 85.6%E; CR ex. cats and PYD 83.0% vs. 83.6%E). Reinsurance written premiums more than doubled on a reported basis, but increased 61% ex. non-recurring specialty transactions, considerably above our +13% assumption. Investment income benefited from the rise in interest rates. As expected, ACGL did not repurchase stock in 4Q22.
- **We project ACGL to report robust results in the near term, but our long-term fundamental outlook is mixed.** In our view, ACGL's results in the next few quarters will be marked by robust margins and top-line growth in the re/insurance business, strong margins in the MI division, and weak premium growth in MI. Longer term, margins in the MI business should stay healthy, but are likely to moderate considerably from recent levels, which have been boosted by reserve releases. A weaker housing market and higher unemployment pose risks to the MI business as well. Meanwhile, our long-term outlook for the P&C reinsurance market is cautious. ACGL is one of the best positioned carriers to benefit from the current hard market. However, we remain skeptical of sustained hard pricing and expect structural issues such as increased 3rd party participation, higher mobility of capital, and broker consolidation to bring additional capacity to the market. Arch has flexibility to supplement organic growth with repurchases, although we expect buybacks to be modest in the next year, partly due to the higher stock price.
- **We affirm our Neutral rating.** We view Arch as a top-tier insurance franchise, but in relatively commoditized markets. Also, we feel that ACGL is among the best positioned carriers to take advantage of hard reinsurance pricing. On the other hand, our long-term outlook for the reinsurance market remains downbeat. Furthermore, we feel that ACGL's valuation is not too enticing considering the company's long-term ROE and growth profile.

Quarterly Forecasts (FYE Dec)

Adj. EPS ($)

	2022A	2023E	2024E
Q1	1.10	1.51	
Q2	1.34	1.43	
Q3	0.28	1.02	
Q4	2.14	1.35	
FY	4.87	5.31	5.63

Style Exposure

Quant Factors	Current %Rank	Hist %Rank (1=Top) 6M	1Y	3Y	5Y
Value	100	100	100	100	100
Growth	1	100	100	1	1
Momentum	100	1	1	1	1
Quality	1	1	1	1	100
Low Vol	1	1	100	1	1
ESGQ	12	12	13	91	98

4Q22 EPS: $2.14A vs. $1.40E

Positives

Reinsurance & insurance margins

MI margins

Negatives

MI accident year loss ratio

Bloomberg: JPMA Bhullar <GO>

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

See page 15 for analyst certification and important disclosures.

Price Performance

	YTD	1m	3m	12m
Abs	3.9%	2.3%	14.9%	40.1%
Rel	-3.9%	-1.1%	11.3%	46.1%

Company Data

Shares O/S (mn)	370
52-week range ($)	65.67-41.05
Market cap ($ mn)	24,165.08
Exchange rate	1.00
Free float(%)	96.6%
3M - Avg daily vol (mn)	1.77
3M - Avg daily val ($ mn)	108.1
Volatility (90 Day)	30
Index	S&P 500
BBG BUY|HOLD|SELL	10|2|0

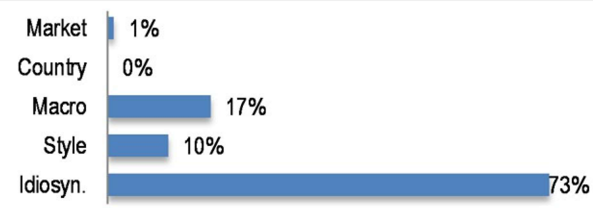
Key Metrics (FYE Dec)

$ in millions	FY22A	FY23E	FY24E
Financial Estimates			
NEP (Premium)	9,678	11,091	12,254
Underwriting income	1,796	1,798	1,791
Net investment income	497	648	739
Operating income	2,293	2,446	2,529
Adj. PBT	1,562	2,193	2,280
Adj. net income	1,840	1,977	2,057
Adj. EPS	4.87	5.31	5.63
BBG EPS	4.06	5.58	6.35
DPS	0.00	0.00	0.00
Investments	12,106	13,583	14,640
BVPS	34.86	39.23	43.34
NAVPS	34.86	39.23	43.34
Margins and Growth			
Adj. EPS growth	36.0%	8.9%	6.0%
Ratios			
Adj. tax rate	5.1%	8.0%	8.0%
Loss ratio	(51.9%)	(53.1%)	(54.9%)
Combined ratio	(22.5%)	(22.4%)	(24.4%)
Invest inc. % of Investments	-	-	-
Regulatory solvency ratio	-	-	-
Leverage (Debt/Debt+Equity)	-	-	-
ROE	14.4%	14.5%	13.8%
Valuation			
Dividend yield	0.0%	0.0%	0.0%
Adj. P/E	13.4	12.3	11.6
P/ BV	1.9	1.7	1.5

Summary Investment Thesis and Valuation

We consider Arch a premier franchise and expect it to generate higher and less volatile underwriting margins than most peers. However, we remain Neutral on the stock given a cautious long-term outlook for the P&C reinsurance market. In our view, near-term results in the MI business will benefit from reserve releases, while results in the P&C reinsurance business will be boosted by hard pricing and tighter terms/ conditions. However, our long-term outlook for ACGL's business is less upbeat. We expect MI returns to be held back by the commoditized nature of the product, black box pricing, and higher capital requirements. Moreover, we remain negative on the P&C reinsurance business and expect greater third-party participation, increased mobility of capital, and consolidation among brokers to preclude a prolonged hard market.

Performance Drivers



Factors	6M Corr	1Y Corr
Market: MSCI EM Latam	0.05	0.20
Country: Bermuda	-0.25	0.01
Macro:		
JP Morgan GBI-EM Global Div	0.23	0.32
JP Morgan EMBI Global Spread	-0.18	-0.29
JPM EM Currency(EMCI) Fixing	0.20	0.24
Quant Styles:		
Value	-0.29	-0.28
LowVol	0.32	0.20
DivYld	-0.22	-0.15

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.

Jimmy S. Bhullar, CFA
(1-212) 622-6397
jimmy.s.bhullar@jpmorgan.com

Table Of Contents

Jimmy S. Bhullar, CFA
(1-212) 622-6397
jimmy.s.bhullar@jpmorgan.com

Investment Thesis

Please see Page 5 for a detailed review of 4Q22 results. ACGL will hold its earnings conference call at 11:00 AM Eastern on February 14, 2023. Conference call participants need to register at this link: https://register.vevent.com/register/BI08afe77d104845d98076df218af2df6a. The call replay can be accessed at: ir.archcapgroup.com.

In our view, ACGL is a premier franchise that should benefit from near-term tailwinds in the reinsurance market, but we remain Neutral on valuation. We believe that ACGL has an industry-leading reinsurance business with a unique culture and approach to underwriting that we expect to drive superior returns and less volatile margins over time. In addition, Arch is a top competitor in the mortgage insurance (MI) market, which we view as structurally superior to reinsurance. In primary P&C, ACGL has gained share and expanded margins, helped by the favorable pricing environment. We expect ACGL's near-term results to benefit from reserve releases in the MI book and healthy re/insurance pricing. On the other hand, despite favorable conditions in the reinsurance market currently, our long-term outlook for the business remains cautious given structural headwinds such as low barriers to entry and limited pricing power. Lastly, ACGL's valuation is not enticing following its recent outperformance.

P&C Reinsurance: N-T Tailwinds, L-T Outlook Downbeat

Hard reinsurance pricing and tighter terms/conditions bode well for ACGL's results in the near term, but our long-term outlook for the market remains cautious. Arch has historically generated better, and less volatile, margins than most reinsurers, which we attribute to its focus on specialty reinsurance (where pricing tends to be less competitive), conservative underwriting philosophy, ability to shift target segments based on changing market conditions, and judicious management of cat risk. In particular, ACGL prices business using the risk-free rate (leading to more conservative underwriting) and uses a long-term compensation plan for underwriters that pays based on underwriting margins over a multi-year period. Also, the creation of 3rd party capital vehicles such as Premia Re has allowed Arch to earn fee income from its reinsurance franchise. We view Arch as a top-tier reinsurer and expect firmer reinsurance pricing to boost results through 2023. However, our long-term outlook for the reinsurance market remains cautious given its structural issues, including its commoditized nature, the ease of entry of new capital, and a broader set of capital providers (many, such as pension funds, that have lower return thresholds). As such, we are skeptical of a prolonged hard market. We believe that any signs of additional capacity entering the market would weigh on investor sentiment on reinsurance stocks, which have become consensus longs in recent months.

Mortgage Insurance: Growth to be Poor, Margins Healthy

ACGL expanded in mortgage insurance through acquisitions (CMG in 2014 and United Guaranty in 2016) during a time when market conditions were favorable, marked by appreciating home prices, relatively stringent lending standards at mortgage issuers, and disciplined pricing by mortgage insurers. The company's MI business has generated healthy margins since and, despite the temporary setback from COVID-related delinquencies in 2020, results have been strong overall. In our opinion, near-term MI results will benefit from reserve releases, particularly in 1H23, as more loans delinquent at the onset of the pandemic become current. On the other hand, higher interest rates will suppress mortgage origination volumes and although not imminent, a recession would increase defaults and pressure margins in the business.

Jimmy S. Bhullar, CFA
(1-212) 622-6397
jimmy.s.bhullar@jpmorgan.com

4Q22 Details

This evening, ACGL announced 4Q22 operating EPS of $2.14, well above our $1.40 assumption and consensus of $1.33. Compared with our model, underwriting income was better across all divisions (mortgage insurance, reinsurance, insurance) and investment income was significantly higher as well. The upside to our model was driven partly by higher than assumed favorable PYD (+$0.30 variance per share) and lower cat losses (+$0.10 variance), but earnings would have exceeded forecasts regardless, helped by robust investment income and slightly better than assumed core underwriting margins (ex. cats and PYD). While premiums benefited from a few non-recurring transactions in the reinsurance business, these did not contribute materially to income.

Table 1: 4Q22 Operating Earnings: Actual versus Expected

$ in millions, except per share amounts

	4Q22E	4Q22A	Upside / (downside) to EPS	Comments
Underwriting Income by Division:				
Mortgage	272	374	$0.27	margins (CR -27.1% vs. 6.2%E) benefited from elevated reserve release
Insurance	90	98	$0.02	healthy margins (CR 92.1% vs. 92.6%E) and higher premiums drove beat
Reinsurance	141	263	$0.33	margins (78.5% vs. 85.6%E) and premiums better than expected
Underwriting income	**503**	**734**	**$0.62**	
Net investment income	134	181	$0.13	pre-tax investment yield of 2.80% in 4Q22 vs.2.06% in 3Q22 and 1.46% in 4Q21
Earnings from affiliates	20	36	$0.04	
Other income (losses) / COLI	4	6	$0.00	
Other expenses / corporate	48	44	$0.01	
Interest expense	33	32	$0.00	
Pretax operating income	**580**	**882**	**$0.81**	
Income tax expense	46	66	-$0.05	effective tax rate of 7.5% vs. assumed tax rate of 8.0%E
Preferred dividends	10	10	$0.00	
Operating income	**523**	**806**	**$0.76**	
Weighted average dilutive shares	373.9	375.9	-$0.01	no share buybacks as expected
Operating EPS	**$1.40**	**$2.14**	**$0.74**	**no significant unusual items**

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

Business trends were strong. MI results were especially robust, marked by weak written premiums (-5%, close to our assumption) but strong margins (CR -27.1% vs. our 6.2% estimate and CR ex. cats and PYD 45.0% vs. 41.2%E). While pleased with results, which benefited from considerably higher than assumed favorable development, we do not expect MI margins and earnings to sustain at the 4Q22 level. P&C insurance results were better than expected as well, with strong premium growth (+17%, slightly below our +22% assumption) and upside in margins on both a reported and core basis (CR 92.1% vs. 92.6%E; CR ex. cats and PYD 89.6% vs. 91.3%E). Similarly, P&C reinsurance margins were robust (CR 78.5% vs. 85.6%E; CR ex. cats and PYD 83.0% vs. 83.6%E). Reinsurance written premiums more than doubled on a reported basis, but

Jimmy S. Bhullar, CFA
(1-212) 622-6397
jimmy.s.bhullar@jpmorgan.com

increased 61% ex. non-recurring specialty transactions, considerably above our +13% assumption. Investment income benefited from the rise in interest rates. As expected, ACGL did not repurchase stock.

Table 2: 4Q22 Key Financial Metrics

$ in millions

	4Q22E	4Q22A
Net premiums written	2,339	3,035
% change (y-o-y)	15.0%	49.2%
Net investment income	134	181
% change (y-o-y)	48.1%	100.2%
Loss ratio ex cats and PYD	51.7%	53.5%
Catastrophe losses	2.7%	1.3%
PYD (favorable) / unfavorable	-5.3%	-9.8%
Loss ratio	49.1%	45.0%
Expense ratio	30.8%	28.5%
Combined ratio	80.0%	73.5%
Combined ratio ex cats & PYD	82.5%	82.0%
Share buybacks ($ mil.)	-	-

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

Jimmy S. Bhullar, CFA
(1-212) 622-6397
jimmy.s.bhullar@jpmorgan.com

Mortgage Insurance: Reserve Releases Boosted Earnings

We expect higher interest rates to suppress growth in the mortgage insurance (MI) business, and margins to compress from recent levels but remain healthy overall. The MI business reported underwriting income of $374 million, well above our $272 million estimate, driven by upside in margins (combined ratio of -27.1% versus our 6.2% estimate) and, to a lesser extent, higher than expected net earned premiums (-2.9% vs. decline of 5.6%E). As in recent quarters, earnings were lifted by the release of COVID-related reserves (-72.1% vs. -35.0%E ; $211 million vs. $100 million in dollar terms), which more than offset worse than assumed core margins (CR ex. cats and PYD 45.0% vs. 41.2%E). The lower core margin was driven by an uptick in the attritional loss ratio (25.2% vs. 21.0%E), partly reflecting higher default rates in 4Q22, which more than offset a lower expense ratio (19.8% vs. 20.2%E). Net written premiums declined 5.1% to $275 million, close to our $273 million forecast.

In 2020 and early 2021, MI margins were pressured by artificially high delinquencies caused by homeowners availing of government forbearance programs. However, after spiking initially in 2Q20, the number of delinquent loans has steadily declined, benefiting MI margins. With the expiry of the programs, a significant portion of previously delinquent loans has cured, particularly loans by borrowers who were taking advantage of the mortgage payment holiday but were not in financial stress. At the same time, the significant appreciation in house prices has provided a cushion to homeowners under stress who are truly struggling to pay their mortgages, limiting losses for MI carriers. The percent of loans in default in the U.S. primary MI business was 1.8% at 12/31/22, down from 2.4% at 12/31/21 but up from 1.7% at 9/30/22.

Table 3: Mortgage Insurance Key Metrics

$ in millions

	4Q20	2020	1Q21	2Q21	3Q21	4Q21	2021	1Q22	2Q22	3Q22	4Q22E	4Q22A
Net written premiums	332	1,280	335	336	301	289	1,261	288	294	276	273	275
Premium Growth (y/y)	5.1%	1.4%	3.3%	3.3%	0.8%	-12.8%	-1.5%	-14.0%	-12.5%	-8.2%	-5.5%	-5.1%
Losses and LAE ex. cats and PYD	27.3%	39.2%	22.3%	16.1%	19.2%	14.8%	18.2%	17.6%	18.8%	21.0%	21.0%	25.2%
Catastrophe losses	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
PYD (favorable) / unfavorable	-2.4%	-1.4%	-3.4%	-13.1%	-15.5%	-24.2%	-13.7%	-36.5%	-40.7%	-45.1%	-35.0%	-72.1%
Loss ratio	**24.9%**	**37.8%**	**18.9%**	**3.0%**	**3.7%**	**-9.4%**	**4.4%**	**-18.9%**	**-21.9%**	**-24.1%**	**-14.0%**	**-46.9%**
Acquisition expense ratio	7.7%	9.6%	8.9%	9.0%	7.7%	4.4%	7.6%	3.6%	3.4%	2.4%	3.2%	4.4%
Operating expense ratio	12.5%	11.6%	14.6%	14.5%	14.8%	16.7%	15.1%	18.4%	17.0%	16.5%	17.0%	15.4%
Expense ratio	**20.2%**	**21.2%**	**23.6%**	**23.5%**	**22.6%**	**21.1%**	**22.7%**	**22.1%**	**20.4%**	**18.8%**	**20.2%**	**19.8%**
Combined ratio	**45.1%**	**59.0%**	**42.4%**	**26.5%**	**26.3%**	**11.6%**	**27.1%**	**3.2%**	**-1.5%**	**-5.2%**	**6.2%**	**-27.1%**
Combined ratio ex cats & PYD	47.5%	60.4%	45.8%	39.6%	41.8%	35.8%	40.9%	39.7%	39.2%	39.9%	41.2%	45.0%
Underwriting Income (Loss)	**189**	**593**	**200**	**250**	**234**	**269**	**953**	**285**	**298**	**299**	**272**	**374**

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

We expect MI margins to continue to benefit from reserve releases, but to a significantly lesser extent than in 2022. Under U.S. GAAP accounting, Arch sets reserves for its primary U.S. MI business based on reported delinquencies (unlike for P&C lines, an IBNR component is not permitted under U.S. GAAP for primary MI business). An increase in reported delinquencies at the onset of COVID led Arch and its

Jimmy S. Bhullar, CFA
(1-212) 622-6397
jimmy.s.bhullar@jpmorgan.com

MI peers to establish corresponding reserves despite the healthy labor market and appreciation in house prices. However, a meaningful portion of these delinquencies arose from homeowners taking advantage of the government's forbearance protection programs (mainly to preserve liquidity), not actual financial hardship. As such, most of these delinquent loans have cured following the expiration of forbearance programs (initially set for 12/31/20, but then extended through 9/30/21 and, in some cases, year-end 2021 or beyond), resulting in the release of previously incurred reserves. The interplay of cures on previously delinquent loans and how new delinquencies emerge in response to the economic environment, which is beginning to soften, will be the key driver of MI margins through 2023. Overall, we project MI margins to remain healthy given strong labor and housing markets, cures on previously delinquent loans, and the equity cushion accumulated by homeowners due to the appreciation in house prices. On a cautious note, top-line growth in the business is likely to be weak as higher interest rates reduce mortgage originations. Also, a weaker economy could deflate home prices and lead to higher defaults on mortgages, particularly among borrowers that have weaker credit profiles, although a material increase in losses seems unlikely in the near term. Barring a recession, we expect core margins to stay healthy, but a declining tailwind from reserve releases should suppress reported margins in the MI division even if economic trends stay favorable.

ACGL has become a formidable competitor in the mortgage insurance market through acquisitions and could expand further via M&A. ACGL entered the mortgage re/insurance business in 2011 but was only marginally involved in the market at the onset, competing as a primary insurer through credit unions and as a reinsurer through the GSE credit risk transfer program. The company's 2014 acquisition of CMG Mortgage Insurance from Cuna Mutual gave it a bigger foothold as it received a ratings upgrade for its MI business (from BBB+ to A- at S&P) and gained distribution in the bank channel. Following the deal, Arch became a top 10 competitor in the domestic private MI market. Arch's market position strengthened further following its 2017 acquisition of United Guaranty (UGC) from AIG, which catapulted it to a top-3 spot (as part of the deal AIG retained 50% of mortgage insurance blocks originated by UGC pre 2017). Arch has also expanded in foreign MI markets through M&A, including its acquisition of Westpac's MI business in Australia (closed in August 2021).

Insurance: Lower Expense Ratio Drove Earnings Upside

The insurance business reported strong underwriting margins and healthy, but lower than expected, net written premium growth. Underwriting income in 4Q22 was $98 million, higher than our $90 million estimate, driven by a better combined ratio (CR 92.1% vs. 92.6%E). Net earned premium growth was higher than our forecast (+24.0% vs. +21.7%E) while net written premium growth was lower (+17.4% vs. +21.9%E, +18.6% in 3Q22, and +23.7% in 4Q21), which management partly attributed to some moderation in price increases, particularly in casualty lines. The lower combined ratio resulted from a favorable expense ratio (33.5% vs. 35.2%E), which more than offset higher than expected catastrophe losses (2.8% vs. 1.5%E) and slight unfavorability in the attritional loss ratio (56.2% vs. 56.1%E). Similar to the past few quarters, the acquisition expense ratio rose from the prior year due to a business mix shift to lines such as travel and professional liability, but this was mostly offset by a lower operating expense ratio given the benefit of healthy premium growth.

Jimmy S. Bhullar, CFA
(1-212) 622-6397
jimmy.s.bhullar@jpmorgan.com

Table 4: Insurance Key Metrics

$ in millions

	4Q20	2020	1Q21	2Q21	3Q21	4Q21	2021	1Q22	2Q22	3Q22	4Q22E	4Q22A
Net written premiums	838	3,163	995	964	1,154	1,036	4,148	1,207	1,228	1,369	1,263	1,217
Premium Growth (y/y)	21.6%	19.7%	20.0%	43.3%	40.0%	23.7%	31.2%	21.3%	27.5%	18.6%	21.9%	17.4%
Losses and LAE ex. cats and PYD	64.3%	63.6%	61.0%	60.2%	59.5%	57.5%	59.5%	55.5%	56.0%	56.0%	56.1%	56.2%
Catastrophe losses	8.3%	9.5%	5.1%	3.2%	12.2%	2.0%	5.6%	3.1%	1.5%	13.4%	1.5%	2.8%
PYD (favorable) / unfavorable	-0.2%	-0.2%	-0.7%	-0.3%	-0.5%	-0.3%	-0.4%	-0.1%	-0.4%	-0.1%	-0.2%	-0.3%
Loss ratio	**72.4%**	**72.9%**	**65.4%**	**63.1%**	**71.2%**	**59.2%**	**64.6%**	**58.5%**	**57.1%**	**69.3%**	**57.4%**	**58.7%**
Acquisition expense ratio	13.5%	14.6%	15.6%	15.8%	16.2%	18.8%	16.7%	19.1%	19.4%	19.6%	19.5%	19.6%
Operating expense ratio	15.8%	17.0%	16.7%	15.4%	14.8%	14.9%	15.4%	16.2%	14.6%	13.9%	15.7%	13.8%
Expense ratio	**29.3%**	**31.6%**	**32.4%**	**31.2%**	**31.0%**	**33.7%**	**32.1%**	**35.3%**	**34.0%**	**33.5%**	**35.2%**	**33.5%**
Combined ratio	**101.7%**	**104.5%**	**97.7%**	**94.3%**	**102.3%**	**93.0%**	**96.8%**	**93.8%**	**91.1%**	**102.8%**	**92.6%**	**92.1%**
Combined ratio ex cats & PYD	93.6%	95.2%	93.3%	91.4%	90.6%	91.3%	91.6%	90.8%	90.0%	89.5%	91.3%	89.6%
Underwriting Income (Loss)	**(13)**	**(129)**	**18**	**49**	**(21)**	**71**	**117**	**63**	**98**	**(34)**	**90**	**98**

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

In our view, ACGL has attractive opportunities in the primary P&C market, and we expect premium growth and margins to remain healthy. After shrinking its "cycle managed" business (now dubbed as wholesale/large capacity) from 2012 to 2017, ACGL is seeing healthy growth in this part of its primary P&C book, driven by price increases in the broader market, particularly E&S. This, coupled with consistent performance in the less opportunistic parts of its book (specialty small/middle market and franchise), should drive healthy results in the business. On a cautious note, we believe that the market is past the midpoint of the current hard pricing cycle, and that exposure growth could decelerate if the economy slows. As such, although tailwinds in the insurance business should persist as premiums are earned and certain lines of business see harder pricing following Hurricane Ian (e.g. property coverage), we expect overall price increases to moderate through 2023.

Reinsurance: Strong 4Q, N-T Outlook Incrementally Upbeat

Arch's reinsurance segment reported robust premium and healthy underwriting results. The division generated underwriting income in 4Q22 of $263 million, well above our $141 million estimate. Reported margins were better than assumed (CR of 78.4% vs. 85.6%E), primarily due to lower cat losses (none versus 5.0%E) and better than expected prior year development (-4.5% vs. -3.0%E). Margins were better than assumed on a core basis as well (CR ex. cats and PYD of 82.9% vs. 83.6%E) due to a lower expense ratio (25.5% vs. 28.5%E). We usually do not analyze reinsurance results on ex. cats basis due to the concentration in catastrophe exposed business. Net written premium growth was robust, up 117.6% to $1.8 billion, well above our 13.2% expectation. Management noted that results in the quarter included non-recurring transactions related to other specialty lines of business (property FAC and other non-cat property). Excluding the impact of the transaction, net written premiums would have grown 61.0% (roughly $400 million impact), the loss ratio would have been 5 points lower, and the expense ratio would have been 2 point higher. On a normalized basis, we estimate that the segment generated roughly $265 million of underwriting income (combined ratio of roughly 75.5%). Management sounded upbeat on ACGL's position

Jimmy S. Bhullar, CFA
(1-212) 622-6397
jimmy.s.bhullar@jpmorgan.com

in the market amid constricted capacity from competitors. Also, it noted that primary insurers have been retaining more risk, which contributed to the low cat loss figure in the quarter.

Table 5: Reinsurance Key Metrics

$ in millions

	4Q20	2020	1Q21	2Q21	3Q21	4Q21	2021	1Q22	2Q22	3Q22	4Q22E	4Q22A
Net written premiums	491	2,457	999	925	621	709	3,254	1,139	1,163	1,079	803	1,543
Premium Growth (y/y)	44.9%	53.3%	25.3%	63.6%	2.8%	44.5%	32.4%	14.0%	25.7%	73.6%	13.2%	117.6%
Losses and LAE ex. cats and PYD	58.0%	61.8%	56.3%	62.9%	57.4%	54.9%	57.9%	52.6%	55.3%	58.4%	55.1%	57.4%
Catastrophe losses	16.1%	19.1%	22.7%	2.5%	32.6%	6.7%	15.4%	6.7%	7.1%	39.1%	5.0%	0.0%
PYD (favorable) / unfavorable	-6.9%	-5.6%	-3.8%	-2.5%	-9.6%	-6.4%	-5.6%	-2.8%	-4.5%	-4.9%	-3.0%	-4.5%
Loss ratio	**67.2%**	**75.3%**	**75.2%**	**62.9%**	**80.4%**	**55.2%**	**67.8%**	**56.5%**	**57.9%**	**92.6%**	**57.1%**	**52.9%**
Acquisition expense ratio	16.9%	16.4%	18.3%	18.1%	19.1%	20.0%	18.9%	21.4%	20.4%	20.8%	21.0%	19.9%
Operating expense ratio	7.2%	7.8%	9.4%	6.1%	6.7%	7.9%	7.5%	8.7%	7.1%	6.3%	7.5%	5.6%
Expense ratio	**24.1%**	**24.1%**	**27.7%**	**24.2%**	**25.8%**	**27.9%**	**26.4%**	**30.1%**	**27.5%**	**27.1%**	**28.5%**	**25.5%**
Combined ratio	**91.3%**	**99.5%**	**102.9%**	**87.1%**	**106.2%**	**83.1%**	**94.2%**	**86.6%**	**85.5%**	**119.7%**	**85.6%**	**78.5%**
Combined ratio ex cats & PYD	82.1%	85.9%	84.0%	87.1%	83.2%	82.8%	84.3%	82.7%	82.9%	85.5%	83.6%	83.0%
Underwriting Income (Loss)	**53**	**16**	**(20)**	**96**	**(39)**	**133**	**170**	**109**	**139**	**(197)**	**141**	**263**

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

We remain skeptical of a sustained hard reinsurance market, but ACGL is better positioned than most peers to take advantage of favorable market conditions in the near term. ACGL's reinsurance business was initially established to take advantage of the hard market for casualty risk in the early 2000s. Over the years, however, management has shifted Arch Re's business mix away from casualty coverage towards other specialty lines such as surety, accident and health, agriculture, and trade credit, which are generally less competitive and have more attractive risk-reward. Firm pricing has benefited results in recent years and should drive continued strong premiums and margins in the near term, especially following Hurricane Ian. Still, we expect the pace of price hikes to moderate longer term and remain skeptical of a sustained hard reinsurance market given the expected entry of additional capacity. Factors that contributed to a multi-year soft market prior to 2018 (glut of capital, greater fluidity/speed of capital, more providers of capacity, broker consolidation) are still prevalent, and should preclude a prolonged hard reinsurance market. On a positive note, ACGL's reinsurance results could benefit from the release of COVID-related reserves, a significant proportion of which remain in IBNR. Similarly, we believe that loss reserves which were set up for Ian could ultimately prove to be too conservative (most primary companies booked lower Ian-related losses than reinsurers).

Jimmy S. Bhullar, CFA
(1-212) 622-6397
jimmy.s.bhullar@jpmorgan.com

Maintaining EPS Estimates

We are maintaining our 1Q23 and 2023 EPS estimates at $1.51 and $5.31, respectively. Our 2024 estimate of $5.63 is unchanged as well. Although we do not expect the MI reserve release in 4Q22 to recur to the same extent in future periods, thereby implying lower MI earnings in 2023, we project ACGL's higher run-rate net investment income to be an offset. We plan to re-assess our model after the company's earnings call tomorrow. In our opinion, cat losses (which would affect reinsurance and insurance margins) and housing market trends (which affect MI margins and premium growth) are the key sources of potential variance in reported results and our projections.

Jimmy S. Bhullar, CFA
(1-212) 622-6397
jimmy.s.bhullar@jpmorgan.com

Investment Thesis, Valuation and Risks

Arch Capital *(Neutral; Price Target: $58.00)*

Investment Thesis

We consider Arch a premiere franchise and are incrementally positive on near-term trends in the reinsurance market, but we remain Neutral on the stock. In our opinion, ACGL has an industry-leading reinsurance business that will generate superior and less volatile underwriting margins over time due to its unique culture and approach to the market. In addition, Arch has established itself as one of the top competitors in the mortgage insurance (MI) market, which we consider structurally better than P&C reinsurance. In insurance, ACGL has been able to grow premiums and improve margins, helped by the firm pricing market. We expect near-term results in MI to benefit from reserve releases. Furthermore, hard pricing should boost premium growth and margins in the reinsurance segment. Still, our long-term outlook for the reinsurance business remains cautious due to structural issues facing the market, including low barriers to entry, increased participation by third-party capital, and limited pricing power. Moreover, we believe that valuation is not too compelling given the company's long-term ROE and EPS growth potential.

Valuation

We maintaining our December 2023 price target of $58. Our price target assumes a 1.3x multiple on our 12/31/23E BV ex. AOCI forecast, a 1.4x multiple on our 12/31/23E BV forecast, and an 11.0x multiple on our 2024 EPS estimate, and we corroborate this approach with a sum-of-the-parts analysis that values ACGL's re/insurance business separately from mortgage insurance. Our target multiples for ACGL reflect its current business mix, which has become more skewed to mortgage insurance. ACGL trades at 1.9x BV and 12.3x 2023E EPS compared to 1.7x and 9.4x for the reinsurance sector, 1.0x and 7.2x for MI peers, and 2.0x and 13.0x for the broader P&C group.

Risks to Rating and Price Target

In our opinion, ACGL could outperform and exceed our price target if:

- **Re/insurance pricing stays firm for an extended period.** A prolonged hard market could drive upside to our EPS estimates and lift sentiment on the stock.
- **Management sustains insurance underwriting margins close to the recent level.** In our view, investor sentiment could improve if ACGL is able to sustain insurance combined ratios in the low to mid 90s, a significant improvement from ~100% previously, as the tailwind from the current hard market recedes.
- **Management remains proactive with share repurchases.** ACGL has repurchased more stock than expected in 2H21 and 1H22, partly to take advantage of its depressed trading multiples. A continuation of the trend could drive upward revisions in EPS forecasts as well as boost sentiment on the stock.

We feel that the stock could underperform the group and fail to reach our target if:

- **The housing market deteriorates.** Given Arch's meaningful exposure to mortgage insurance and the more systematic nature of mortgage insurance risk, rising unemployment, higher mortgage defaults, and decreasing home values would pressure the company's results and hurt sentiment on the stock.
- **ACGL and/or peers raise capital to take advantage of the hard reinsurance**

market. This, in turn, could result in a reversal in pricing trends and potentially drive reduction in EPS estimates as well as hurt sentiment on the sector.

- **The pace of reserve development moderates.** Favorable reserve development has been a notable contributor to ACGL's results in recent years. A slowdown in the pace of development could pressure margins and returns.
- **Cat losses stay elevated.** While prices for cat re/insurance have hardened, the frequency and severity of losses have increased by a larger magnitude over time. This implies that reinsurance prices need to rise significantly for carriers to earn adequate returns, especially if cat losses are close to those in recent years.

Jimmy S. Bhullar, CFA
(1-212) 622-6397
jimmy.s.bhullar@jpmorgan.com

Arch Capital: Summary of Financials

Income Statement - Annual	FY22A	FY23E	FY24E
Earned premiums	-	-	-
Policy charges and fee income	-	-	-
Net investment income	-	-	-
Other income	-	-	-
Total revenues	**-**	**-**	**-**
Insurance and annuity benefits	-	-	-
Interest credited	-	-	-
Interest expense	(130)	(132)	(132)
Acquisition & operating expenses	(1,740)	(2,047)	(2,271)
Amortization of acquisition costs (net)	-	-	-
Other expenses	-	-	-
Total expenses	**-**	**-**	**-**
Pretax income	1,562	2,193	2,280
Income taxes	(80)	(175)	(182)
Total net income	1,436	1,977	2,057
Total operating income	1,840	1,977	2,057
Weighted average diluted shares	378	372	365
EPS - operating	**4.87**	**5.31**	**5.63**

Income Statement - Quarterly	1Q23E	2Q23E	3Q23E	4Q23E
Earned premiums	-	-	-	-
Policy charges and fee income	-	-	-	-
Net investment income	-	-	-	-
Other income	-	-	-	-
Total revenues	**-**	**-**	**-**	**-**
Insurance and annuity benefits	-	-	-	-
Interest credited	-	-	-	-
Interest expense	(33)	(33)	(33)	(33)
Acquisition & operating expenses	(493)	(511)	(524)	(519)
Amortization of acquisition costs (net)	-	-	-	-
Other expenses	-	-	-	-
Total expenses	**-**	**-**	**-**	**-**
Pretax income	625	589	424	556
Income taxes	(50)	(47)	(34)	(44)
Total net income	564	531	380	502
Total operating income	564	531	380	502
Weighted average diluted shares	374	372	372	372
EPS - operating	**1.51**	**1.43**	**1.02**	**1.35**

Balance Sheet and Capital Data	FY22A	FY23E	FY24E
Shareholders' equity	-	-	-
Shareholders' equity ex. AOCI	-	-	-
Shares outstanding	370	367	356
Book value per share	34.86	39.23	43.34
Book value per share (ex. AOCI)	39.30	43.72	47.96
Capital for share repurchases	-	-	-
Capital for dividends	-	-	-
Dividends	0.00	0.00	0.00

Ratio Analysis	FY22A	FY23E	FY24E	FY25E
EPS growth - operating	36.0%	8.9%	6.0%	-
Book value per share (ex. AOCI) growth	16.5%	11.2%	9.7%	-
Return on equity (ROE)	14.4%	14.5%	13.8%	-
Return on equity (ex. AOCI)	-	-	-	-
Dividend payout ratio	0.0%	0.0%	0.0%	-
Total revenue growth	-	-	-	-
Total expense growth	-	-	-	-
Tax rate	5.1%	8.0%	8.0%	-

Source: Company reports and J.P. Morgan estimates.
Note: $ in millions (except per-share data).Fiscal year ends Dec

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 Arch Capital.
- **Market Maker/ Liquidity Provider:** J.P. Morgan is a market maker and/or liquidity provider in the financial instruments of/related to Arch Capital.
- **Client:** J.P. Morgan currently has, or had within the past 12 months, the following entity(ies) as clients: Arch Capital.
- **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: Arch Capital.
- **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: Arch Capital.
- **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 Arch Capital.
- **Debt Position:** J.P. Morgan may hold a position in the debt securities of Arch Capital, 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.

Arch Capital (ACGL, ACGL US) Price Chart

Date	Rating	Price ($)	Price Target ($)
14-Apr-20	N	29.22	34
04-May-20	N	23.11	30
04-Jan-21	N	36.07	36
09-Feb-21	N	34.15	38
28-Apr-21	N	40.49	40
01-Jul-21	N	38.94	44
28-Oct-21	N	42.33	46
09-Feb-22	N	48.20	48
01-Apr-22	N	48.42	51
27-Apr-22	N	46.51	52
06-Jul-22	N	44.44	53
27-Jul-22	N	44.24	54
26-Oct-22	N	49.22	57
04-Jan-23	N	62.46	58

Source: Bloomberg Finance L.P. and J.P. Morgan; price data adjusted for stock splits and dividends.
Initiated coverage Dec 15, 2003. 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: Bhullar, Jimmy S: AFLAC, Inc. (AFL), Allstate (ALL), American International Group (AIG), Aon (AON), Arch Capital (ACGL), Brighthouse Financial (BHF), Chubb Ltd (CB), Corebridge Financial (CRBG), Equitable Holdings Inc (EQH), Globe Life Inc (GL), Hartford Financial Services (HIG), Lincoln National (LNC), Marsh & McLennan (MMC), MetLife, Inc. (MET), Principal Financial Group (PFG), Progressive (PGR), Prudential Financial (PRU), Reinsurance Group of America (RGA), RenaissanceRe (RNR), Ryan Specialty Group (RYAN), Travelers Cos (TRV), Unum Group (UNM), Voya Financial, Inc. (VOYA)

J.P. Morgan Equity Research Ratings Distribution, as of January 01, 2023

	Overweight (buy)	Neutral (hold)	Underweight (sell)
J.P. Morgan Global Equity Research Coverage*	48%	37%	14%
IB clients**	47%	45%	35%
JPMS Equity Research Coverage*	47%	40%	13%
IB clients**	65%	66%	55%

***Please note that the percentages might 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 only of FINRA ratings distribution rules, 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.

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 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

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 Comissao de Valores Mobiliarios (CVM) and by the Central Bank of Brazil. Ombudsman J.P. Morgan: 0800-7700847 / ouvidoria.jp.morgan@jpmorgan.com. **Canada**: J.P. Morgan Securities Canada Inc. is a registered investment dealer, regulated by the Investment Industry Regulatory Organization of Canada 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.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. **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) 060/08/2022 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.

"Other Disclosures" last revised February 04, 2023.

Completed 13 Feb 2023 08:04 PM EST

Disseminated 13 Feb 2023 08:04 PM EST