J.P.Morgan

Asia Pacific Equity Research

Zijin Mining Group - H (2899 HK)

1H16 results miss - Hit by hedging and fair value losses

Zijin Mining (Zijin) reported a disappointing 1H16 result with NP of Rmb538m, -60% y/y. The result was in line with its prior warning but is well behind current FY16 consensus estimates. The bottom line was heavily hit by investment and fair value losses from its gold leasing and hedging operations (cRmb1.3bn). Operationally, Zijin continued to deliver impressive volume growth and remains on-track to meet its unchanged FY16 output guidance (gold +14%, copper +3%, zinc/lead +21%). Zijin shares have risen 35% YTD, outperforming the broader market (HSCEI -1% YTD). Maintain an OW rating.

- **1H16 NP down 60% y/y, hit by hedging and fair value losses.** Zijin reported 1H16 NP of Rmb538m, -60% y/y (+71% h/h), in line with its prior warning. The result is tracking well behind consensus, representing 25% of current FY16 NP estimates of of Rmb2.17bn. Excluding non-recurring items, we estimate 1H16 core NP of Rmb569m, -59% y/y (-32% h/h) with 2Q16 core NP at Rmb521m, -59% y/y (-32% h/h, 1Q16 core NP Rmb48m). The result was heavily impacted by investment/fair value losses largely from gold leasing Rmb994m (pre-tax loss) and commodity hedging (Rmb658m pre-tax loss), which are considered 'core' operations. Excluding these, we estimate NP at Rmb1.55bn, +77% y/y (2H15 Rmb76m). 1H16 revenue was flat at Rmb38.9bn, 0% y/y (+10% h/h), with higher refined copper output, +49% y/y (+58% h/h) offsetting lower mined copper revenue, -22% y/y (-7% h/h). On costs, mined-gold unit cost rose to Rmb143/g, +3% y/y (+8% h/h), mined copper costs fell to Rmb15,626/t, -5% y/y (-16% h/h) with GP increased to Rmb3.91bn, +15% y/y (+87% h/h), driven by higher refined copper GP (+221% y/y, +409% h/h).
- FCF positive, A-share place to reduce net-gearing. Zijin's 1H16 OCF fell to Rmb3.63bn, -6% y/y (-43% h/h) as a result of falling metals prices. Capex rose to Rmb2.25bn, +17% y/y (-23% h/h) with FCF reduced to Rmb1.38bn, -28% y/y (-60% h/h). Continuing heavy investment led ND/E to rise to 71%, +17pps y/y (-3pps h/h) while ND/EBITDA increased to 4.2x (1H15 2.2x, 2H15 5.0x). Zijin is currently proposing a private placement of 1.58bn A-shares at Rmb3.03/share, which recently gained approval from Fujian province's SASAC (announcement) and is subject to CSRC approval. The proceeds will be utilised primarily for the Kolwezi copper mine (Zijin 72%) in the DRC, which the company hopes to bring online in 1H17.
- Maintain FY16 output target, 1H16 on-track. Zijin maintained its FY16 output target of 42.5t mined-gold (+14% y/y), 155kt of mined copper (+3% y/y) and 270kt of mined zinc and lead (+21% y/y). In 1H16, mined gold output climbed to 20.4t, +17% y/y (+4% h/h) or 48% of FY16 target, driven by Porgera gold mine in PNG (1H16: 3.5t, 4Q15: 2.7t) which was acquired in Aug-15. Mined copper fell to 74.8kt, -3% y/y (+2% h/h) or 48% of FY16 target with Qinghai Deerni (1H16 7.2kt, -42% y/y, +9% h/h) and Duobaoshan (1H16 11.4kt, -17% y/y, -26% h/h) output falling. Mined zinc/lead output surged to 141kt, +79% y/y (-2% h/h), or 52% of FY16 target, driven by Tuvac mine (1H16 31.8kt, 2H15 51.7kt) which commissioned in Jul-15.

Impact - negative

Given Zijin's prior warning, we expect a muted response to its 1H16 miss. While FY16 consensus downgrades are likely, we believe the company's solid organic growth pipeline and a resilient gold price outlook should underpin support for Zijin shares.

Results briefing

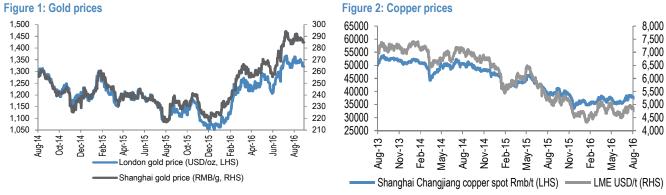
Zijin is hosting an analyst investor presentation on 29th Aug 2016 (Mandarin).

Date: Monday, 29th August, 9:30am. Location: Conrad Hong Kong, Pacific Place, 88 Queensway, Central, Hong Kong

29 August 2016

Overweight

Price: HK\$2.74 26 Aug 2016 Price Target: HK\$2.50 PT End Date: 31 Dec 2016



Source: Bloomberg, J.P. Morgan.

Source: Bloomberg, J.P. Morgan.

Table 1: Zijin's quarterly financial summary

2014	1Q15	2Q15	3Q15	4Q15	2015	1Q16	2Q16	1H16	QoQ% 2Q16	YoY% 2Q16	HoH% 1H16	YoY% 1H16
58,761	15,896	22,937	22,365	13,106	74,304	19,398	19,492	38,890	0%	-15%	10%	0%
-50,882	-14,334	-20,681	-20,849	-12,144	-68,008	-17,195	-17,399	-34,594	1%	-16%	5%	-1%
-838	-201	-215	-198	-196	-810	-204	-186	-390	-9%	-13%	-1%	-6%
7.040	1.361	2.041	1.319	765	5.486	1.998	1.908	3.906	-5%	-7%	87%	15%
	-194	,	,	-142		,	-143			-27%		-15%
	-617					-700	-642		-8%		-7%	15%
-363	-50	-32	-24	-364	-471	3	-9	-6	nm	-72%	-99%	-93%
-141	204	133	-221	-242	-126	-296	-423	-720	43%	nm	55%	nm
	174		490	451			-139		-71%			nm
												2%
												-10%
												-64%
,		,			,							1%
												nm
												-68%
					,							-92%
												-92 % nm
												-60%
					,							-00%
2,754	451	932	34 380	455	2,218	48	53 521	569	993%	-44%	-29%	-1% -59%
12%	9%	9%	6%	6%	7%	10%	10%	10%	-0 5nns	0 gnns	4 2nns	1.3pps
												-4.2pps
												-4.2pps
												-19.5pps
8.8	9.5	9.1	5.9	2.7	6.8	4.2	8.6	5.9	104%	-20.5pp3 -5%	27%	-13.5pp3 -37%
6 321	1 393	2 459	1 547	4 871	10 269	442	3 190	3 6 3 2	622%	30%	-43%	-6%
	,						,					-14%
	,			,	,	,	,					17%
												-28%
	110	1,111	020	2,000		020	1,700	1,002		1070	0070	2070
-534					3,453							
54%	55%	54%	67%	74%	74%	68%	71%	71%	-6.0pps	12.9pps	-2.7pps	17.4pps
2.7	2.8	1.8	3.5	9.1	3.7	4.6	3.9	4.2	-50%	64%	-15%	95%
												-3%
												6%
												-2%
												-43%
												-43/6
												-3%
		33 11.4%	33 4.3%	55 -0.5%	39 5.2%	42 0.8%	35 6.2%	35 3.5%	-24% 1.3pps	-12% -4.1pps	-13% 1.5pps	-9% -4.7pps
7.0%	4.9%											
	58,761 -50,882 -838 7,040 -906 -2,175 -363 -141 751 237 -373 4,071 -768 21 3,324 -689 -290 2,345 -409 162 2,754 12% 7% 4% 21% 8.8 6,321 -9,252 -6,221 100 634 -534	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	

Source: company data, J.P. Morgan

Table 2: Zijin operational summary

	2014	1Q15	2Q15	3Q15	4Q15	2015	1Q16	2Q16	1H16	QoQ% 2Q16	YoY% 2Q16	HoH% 1H16	YoY 1H1
Sales volume													
Mined gold (t)	33.8	7.6	9.4	9.2	9.4	35.6	10.4	10.0	20.3	-4%	6%	9%	209
Refinery gold (t)	125.1	37.9	68.8	74.1	29.3	210.2	45.7	44.7	90.4	-2%	-35%	-13%	-15
Ained silver (t)	171.6	46.2	55.2	58.7	52.0	212.0	49.8	58.5	108.4	18%	6%	-2%	7
Mined copper (kt)	136.8	34.6	42.7	41.8	32.1	151.2	40.5	33.3	73.8	-18%	-22%	0%	-4
· · · · ·													
Refinery copper (kt)	234.9	66.2	66.9	54.1	71.4	258.6	97.0	100.9	197.8	4%	51%	58%	49
Mined zinc (kt)	96.4	32.0	36.0	48.3	61.0	177.2	63.2	63.4	126.5	0%	76%	16%	86
Refinery zinc (kt)	207.3	54.2	55.4	48.0	60.0	217.5	56.5	45.0	101.5	-20%	-19%	-6%	-7
Iron concentrates (mt)	2.8	0.2	0.6	-0.1	0.2	0.9	0.5	0.3	0.7	-39%	-54%	386%	-4
ASP (ex-VAT)													
Mined gold (RMB/g)	232	225	217	211	209	215	223	218	220	-2%	0%	5%	0
Refinery gold (Rmb/g)	249	246	226	239	230	235	251	259	255	3%	15%	8%	9
Mined silver (RMB/g)	2.47	2.20	2.13	2.16	2.16	2.16	2.02	2.28	2.16	13%	7%	0%	0
Mined copper (RMB/t)	35,804	30,241	31,466	28,082	25,827	29,052	25,697	24,845	25,313	-3%	-21%	-7%	-18
Refinery copper (RMB/t)	41,872	36,071	37,659	34,073	31,762	34,874	30,579	30,826	30,705	1%	-18%	-6%	-17
Mined zinc (RMB/t)	8,146	8,219	8,319	6,000	6,916	7,186	6,057	7,309	6,684	21%	-12%	3%	-19
Refinery zinc (RMB/t)	13,612	13,775	14,042	12,725	11,566	13,002	11,567	12,960	12,184	12%	-8%	1%	-12
Iron concentrates (RMB/t)	535	501	379	-6	326	419	404	399	402	-1%	5%	-19%	0
Revenue (RMBm)													
Vined gold	7,836	1,705	2,034	1,945	1,975	7,659	2,313	2,167	4,480	-6%	7%	14%	20
Refinery gold	31,128	9,312	15,546	17,701	6,749	49,307	11,476	11,573	23,049	1%	-26%	-6%	-7
Mined silver	424	102	117	127	112	458	101	133	234	33%	14%	-2%	7
Mined copper	4,899	1,045	1,343	1,174	829	4,392	1,042	826	1,868	-21%	-38%	-7%	-22
				,					,				
Refinery copper	9,837	2,388	2,519	1,843	2,268	9,018	2,965	3,109	6,074	5%	23%	48%	24
Mined zinc	785	263	299	290	422	1,274	383	463	846	21%	55%	19%	51
Refinery zinc	2,822	746	777	611	694	2,828	654	583	1,237	-11%	-25%	-5%	-19
Iron concentrates	1,514	78	227	0	73	379	182	110	292	-40%	-52%	295%	-4
Others	7,121	258	3,677	-4,929	7,318	6,324	282	1,102	1,384	290%	-70%	-42%	-65
Less: internal sales	-7,606	230	-3,604	,		-7,334	202	-574	-574		-84%	-42 %	-03
	,		,	3,604	-7,334	,				nm			
Total	58,761	15,896	22,937	22,365	13,107	74,305	19,398	19,492	38,890	0%	-15%	10%	0
Unit cost													
Mined gold (RMB/g)	144	145	135	135	130	136	140	147	143	5%	9%	8%	3
Refinery gold (Rmb/g)	248	245	225	239	230	234	248	256	252	3%	14%	7%	9
Mined silver (RMB/g)	1.62	1.54	1.48	1.56	1.45	1.51	1.19	1.19	1.19	0%	-20%	-21%	-21
Mined copper (RMB/t)	18,467	17,991	15,054	15,904	22,320	17,504	15,427	15,868	15,626	3%	5%	-16%	-5
Refinery copper (RMB/t)		36,463	35,763		30,326	34,238	29,036	29,100	29,069	0%	-19%	-10%	-20
	41,391	,	,	34,793	,	,	,	,	,				
Mined zinc (RMB/t)	3,509	4,194	4,279	2,874	4,044	3,800	3,352	3,304	3,328	-1%	-23%	-6%	-21
Refinery zinc (RMB/t)	12,971	13,353	13,102	12,619	11,385	12,584	10,712	11,443	11,036	7%	-13%	-8%	-17
Iron concentrates (RMB/t)	189	194	155	(22)	144	173	152	206	172	35%	33%	-24%	6
Cost of sales (RMBm)													
Mined gold	4,862	1,103	1,264	1,243	1,223	4,833	1,451	1,465	2,915	1%	16%	18%	23
Refinery gold	31,053	9,282	15,510	17,686	6,753	49,232	11,351	11,459	22,810	1%	-26%	-7%	-8
Mined silver	278	71	82	92	75	320	59	70	129	18%	-15%	-23%	-16
Mined copper	2,527	622	643	665	717	2,646	625	528	1,153	-16%	-18%	-17%	-9
Refinery copper	9,724	2,414	2,393	1,882	2,165	8,854	2,815	2,935	5,750	4%	23%	42%	20
		,	,		,								
Mined zinc	338	134	154	139	247	673	212	209	421	-1%	36%	9%	46
Refinery zinc	2,689	723	725	606	683	2,737	606	515	1,120	-15%	-29%	-13%	-23
Iron concentrates	536	30	93	2	32	157	69	56	125	-18%	-39%	268%	2
Less: internal sales	-1,126	-45	-182	-1,465	249	-1,444	8	162	170	1956%	nm	nm	n
Total	50,882	14,334	20,681	20,849	12,144	68,008	17,195	17,399	34,594	1%	-16%	5%	-1
Gross Margin													
Mined gold	38.0%	35.3%	37 20/	36 10/	38.1%	36 00/	37.3%	30 /10/	34.9%	_/ Qnno	-5 5000	-2 2000	1 0-
0			37.8%	36.1%		36.9%		32.4%		-4.9pps	-5.5pps	-2.2pps	-1.8p
Refinery gold	0.2%	0.3%	0.2%	0.1%	-0.1%	0.2%	1.1%	1.0%	1.0%	-0.1pps	0.8pps	1.0pps	0.8p
Mined silver	34.4%	30.0%	30.2%	27.6%	32.9%	30.1%	41.1%	47.8%	44.9%	6.7pps	17.6pps	14.8pps	14.8p
Mined copper	48.4%	40.5%	52.2%	43.4%	13.6%	39.7%	40.0%	36.1%	38.3%	-3.8pps	-16pps	7.2pps	-8.8p
Refinery copper	1.1%	-1.1%	5.0%	-2.1%	4.5%	1.8%	5.0%	5.6%	5.3%	0.6pps	0.6pps	3.8pps	3.3p
Mined zinc	56.9%	49.0%	48.6%	52.1%	41.5%	47.1%	44.7%	54.8%	50.2%	10.2pps	6.2pps	4.4pps	1.5p
Refinery zinc	4.7%	3.1%	6.7%	0.8%	1.6%	3.2%	7.4%	11.7%	9.4%				
										4.3pps	5.0pps	8.2pps	4.5p
Iron concentrates Gross profit (RMBm)	64.6%	61.3%	59.2%	-255%	55.9%	58.6%	62.3%	48.4%	57.1%	-14pps	-11pps	3.1pps	-2.6pj
Mined gold	2,974	603	770	702	752	2,827	862	702	1,564	-19%	-9%	8%	14
Refinery gold	75	29	36	14	-4	76	125	114	240	-9%	219%	2172%	268
Mined silver	146	31	35	35	37	138	41	64	105	54%	80%	46%	59
Vined copper	2,372	423	701	509	113	1,746	416	299	715	-28%	-57%	15%	-36
Refinery copper	113	-26	127	-39	103	164	150	174	324	16%	37%	409%	221
Mined zinc	447	129	145	151	175	600	171	254	425	49%	75%	30%	55
Refinery zinc	133	23	52	5	11	91	48	68	423	43%	31%	628%	56
•													
Iron concentrates	978	48	135	-1	41	222	114	53	167	-53%	-61%	318%	-8
	-198	102	41	-58	-461	-376	71	180	251	155%	340%	nm	75
Others Total	-190												

Investment Thesis

Zijin is China's second-largest gold and copper miner. Within our gold coverage, the company is most vulnerable to the copper price shock, with gold and copper (from its mines and byproduct credits) accounting for 70% and 20% of its revenue, respectively. While we believe the company's effort over recent years to replenish gold assets and reduce costs will help Zijin to better weather the commodity storm, Zijin will be negatively affected should copper prices remain at current levels. We maintain an OW rating on Zijin's strong volume growth.

Valuation

Our Dec-16 price target for Zijin-H is HK\$2.5/share. Our valuation is based on a blended average of P/BV-ROE valuation, EV/EBITDA multiple, P/E multiple, DCF-based NPV and EV/reserve method.

Risks to Rating and Price Target

- Upside risk: Stronger-than-expected gold prices, better-than-expected cost performance, faster-than-expected production growth, ongoing share buybacks, higher dividend distribution and M&As.
- **Downside risk:** Weaker-than-expected gold prices, higher-than-expected cost pressure, slower-than-expected production growth, worse-than-expected working capital control, higher-than-expected capex requirement.

Asia Metals and Mining Daniel Kang ^{AC} (852) 2800 8570 daniel.kang@jpmorgan.com Bloomberg JPMA KANG <GO> Michael W Ng (852) 2800 8561

michael.w.ng@jpmorgan.com J.P. Morgan Securities (Asia Pacific) Limited

www.jpmorganmarkets.com

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 his or her 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, they also certify, as per KOFIA requirements, that their analysis was made in good faith and that the views reflect their own opinion, without undue influence or intervention.

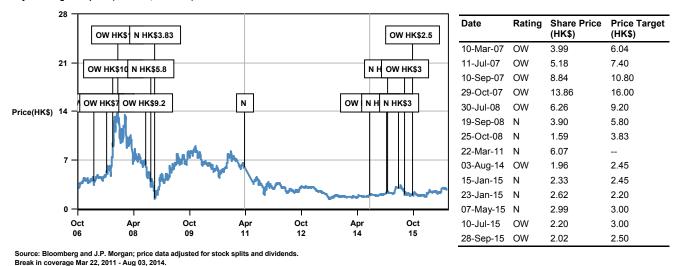
J.P. Morgan does and seeks to do business with companies covered in its research reports. As a result, investors should be aware that the firm may have a conflict of interest that could affect the objectivity of this report. Investors should consider this report as only a single factor in making their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

Important Disclosures

• Market Maker/Liquidity Provider: J.P. Morgan Securities plc and/or an affiliate is a market maker and/or liquidity provider in securities issued by Zijin Mining Group - H.

• Other Significant Financial Interests: J.P. Morgan owns a position of 1 million USD or more in the debt securities of Zijin Mining Group - H.

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 by visiting <u>https://jpmm.com/research/disclosures</u>, calling 1-800-477-0406, or e-mailing <u>research.disclosure.inquiries@jpmorgan.com</u> with your request. J.P. Morgan's Strategy, Technical, and Quantitative Research teams may screen companies not covered by J.P. Morgan. For important disclosures for these companies, please call 1-800-477-0406 or e-mail <u>research.disclosure.inquiries@jpmorgan.com</u>.



Zijin Mining Group - H (2899.HK, 2899 HK) Price Chart

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.] 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 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, www.jpmorganmarkets.com.

Coverage Universe: Kang, Daniel: Aluminum Corporation of China - A (601600.SS), Aluminum Corporation of China - H (2600.HK), Angang Steel - A (000898.SZ), Angang Steel - H (0347.HK), Anhui Conch - A (600585.SS), Anhui Conch - H (0914.HK), Baoshan Iron & Steel - A (600019.SS), China Coal Energy - A (601898.SS), China Coal Energy - H (1898.HK), China Hongqiao Group (1378.HK),

China National Building Material (3323.HK), China Northern Rare Earth - A (600111.SS), China Shenhua Energy - A (601088.SS), China Shenhua Energy - H (1088.HK), Huaxin Cement - A (600801.SS), Hyundai Steel Company (004020.KS), Jiangxi Copper - A (600362.SS), Jiangxi Copper - H (0358.HK), Maanshan Iron & Steel - A (600808.SS), Maanshan Iron & Steel - H (0323.HK), Mongolian Mining Corporation (0975.HK), POSCO (005490.KS), Shandong Gold - A (600547.SS), Yanzhou Coal Mining - A (600188.SS), Yanzhou Coal Mining - H (1171.HK), Zhaojin Mining Industry (1818.HK), Zhongjin Gold - A (600489.SS), Zijin Mining Group - A (601899.SS), Zijin Mining Group - H (2899.HK)

J.P. Morgan Equity Research Ratings Distribution, as of July 1, 2016

	Overweight	Neutral	Underweight
	(buy)	(hold)	(sell)
J.P. Morgan Global Equity Research Coverage	43%	45%	12%
IB clients*	52%	49%	37%
JPMS Equity Research Coverage	42%	50%	8%
IB clients*	68%	65%	51%

*Percentage of investment banking clients in each rating category.

For purposes only of FINRA/NYSE 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.

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.

Equity Analysts' Compensation: The equity 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 JPMS, are not registered/qualified as research analysts under NASD/NYSE rules, may not be associated persons of JPMS, and may not be subject to FINRA Rule 2711 and NYSE Rule 472 restrictions on communications with covered companies, public appearances, and trading securities held by a research analyst account.

Other Disclosures

J.P. Morgan ("JPM") is the global brand name for J.P. Morgan Securities LLC ("JPMS") and its affiliates worldwide. J.P. Morgan Cazenove is a marketing name for the U.K. investment banking businesses and EMEA cash equities and equity research businesses of JPMorgan Chase & Co. and its subsidiaries.

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

Options related research: If the information contained herein regards options related research, such information is available only to persons who have received the proper option risk disclosure documents. For a copy of the Option Clearing Corporation's Characteristics and Risks of Standardized Options, please contact your J.P. Morgan Representative or visit the OCC's website at http://www.optionsclearing.com/publications/risks/riskstoc.pdf

Legal Entities Disclosures

U.S.: JPMS is a member of NYSE, FINRA, SIPC and the NFA. JPMorgan Chase Bank, N.A. is a member of FDIC. U.K.: JPMorgan Chase N.A., London Branch, is authorised by the Prudential Regulation Authority and is subject to regulation by the Financial Conduct Authority and to limited regulation by the Prudential Regulation Authority. Details about the extent of our regulation by the Prudential Regulation Authority are available from J.P. Morgan on request. J.P. Morgan Securities plc (JPMS plc) 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. Registered in England & Wales No. 2711006. Registered Office 25 Bank Street, London, E14 5JP. South Africa: J.P. Morgan Equities South Africa Proprietary Limited is a member of the Johannesburg Securities Exchange and is regulated by the Financial Services Board. 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/or J.P. Morgan Broking (Hong Kong) Limited (CE number AAB027) is regulated by the Securities and Futures Commission in Hong Kong. Korea: This material is issued and distributed in Korea by or through J.P. Morgan Securities (Far East) Limited, Seoul Branch, which is a member of the Korea Exchange(KRX) and is regulated by the Financial Services Commission (FSC) and the Financial Supervisory Service (FSS). Australia: J.P. Morgan Australia Limited (JPMAL) (ABN 52 002 888 011/AFS Licence No: 238188) is regulated by ASIC and J.P. Morgan Securities Australia Limited (JPMSAL) (ABN 61 003 245 234/AFS Licence No: 238066) is regulated by ASIC and is a Market, Clearing and Settlement Participant of ASX Limited and CHI-X. 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. 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 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 (SEBI Registration Number - INB 230675231/INF 230675231/INE 230675231) and Bombay Stock Exchange Limited (SEBI Registration Number - INB 010675237/INF 010675237). Telephone: 91-22-6157 3000, Facsimile: 91-22-6157 3990 and Website: www.jpmipl.com. For non local research reports, this material is not distributed in India by J.P. Morgan India Private Limited. 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. Indonesia: PT J.P. Morgan Securities Indonesia is a member of the Indonesia Stock Exchange and is regulated by the OJK a.k.a. BAPEPAM LK. 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. Brazil: Banco J.P. Morgan S.A. is regulated by the Comissao de Valores Mobiliarios (CVM) and by the Central Bank of Brazil. Mexico: J.P. Morgan Casa de Bolsa, S.A. de C.V., J.P. Morgan Grupo Financiero is a member of the Mexican Stock Exchange and authorized to act as a broker dealer by the National Banking and Securities Exchange Commission. Singapore: This material is issued and distributed in Singapore by or through J.P. Morgan Securities Singapore Private Limited (JPMSS) [MCI (P) 193/03/2016 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 document are to contact JPMSS or JPMCB Singapore in respect of any matters arising from, or in connection with, the document. **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 a holder of Capital Markets Services License issued by the Securities commission in Malaysia. **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. **Saudi Arabia**: J.P. Morgan Saudi Arabia Ltd. is authorized by the Capital Market Authority of the Kingdom of Saudi Arabia (CMA) to carry out dealing as an agent, arranging, advising and custody, with respect to securities sunder licence number 35-07079 and its registered address is at 8th Floor, Al-Faisaliyah Tower, King Fahad Road, P.O. Box 51907, Riyadh 11553, Kingdom of Saudi Arabia. **Dubai**: 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 - Building 3, Level 7, PO Box 506551, Dubai, UAE.

Country and Region Specific Disclosures

U.K. and European Economic Area (EEA): Unless specified to the contrary, issued and approved for distribution in the U.K. and the EEA by JPMS plc. Investment research issued by JPMS plc has been prepared in accordance with JPMS plc's policies for managing conflicts of interest arising as a result of publication and distribution of investment research. Many European regulators require a firm to establish, implement and maintain such a policy. Further information about J.P. Morgan's conflict of interest policy and a description of the effective internal organisations and administrative arrangements set up for the prevention and avoidance of conflicts of interest is set out at the following link https://www.jpmorgan.com/jpmpdf/1320678075935.pdf. This report has been issued in the U.K. only to persons of a kind described in Article 19 (5), 38, 47 and 49 of the Financial Services and Markets Act 2000 (Financial Promotion) Order 2005 (all such persons being referred to as "relevant persons"). This document must not be acted on or relied on by persons who are not relevant persons. Any investment or investment activity to which this document relates is only available to relevant persons and will be engaged in only with relevant persons. In other EEA countries, the report has been issued to persons regarded as professional investors (or equivalent) in their home jurisdiction. Australia: This material is issued and distributed by JPMSAL in Australia to "wholesale clients" only. This material does not take into account the specific investment objectives, financial situation or particular needs of the recipient. The recipient of this material must not distribute it to any third party or outside Australia without the prior written consent of JPMSAL. For the purposes of this paragraph the term "wholesale client" has the meaning given in section 761G of the Corporations Act 2001. Germany: This material is distributed in Germany by J.P. Morgan Securities plc, Frankfurt Branch and J.P.Morgan Chase Bank, N.A., Frankfurt Branch which are regulated by the Bundesanstalt für Finanzdienstleistungsaufsicht. Hong Kong: The 1% ownership disclosure as of the previous month end satisfies the requirements under Paragraph 16.5(a) of the Hong Kong Code of Conduct for Persons Licensed by or Registered with the Securities and Futures Commission. (For research published within the first ten days of the month, the disclosure may be based on the month end data from two months prior.) J.P. Morgan Broking (Hong Kong) Limited is the liquidity provider/market maker for derivative warrants, callable bull bear contracts and stock options listed on the Stock Exchange of Hong Kong Limited. An updated list can be found on HKEx website: http://www.hkex.com.hk. Japan: There is a risk that a loss may occur due to a change in the price of the shares in the case of share trading, and that a loss may occur due to the exchange rate in the case of foreign share trading. In the case of share trading, JPMorgan Securities Japan Co., Ltd., will be receiving a brokerage fee and consumption tax (shouhizei) calculated by multiplying the executed price by the commission rate which was individually agreed between JPMorgan Securities Japan Co., Ltd., and the customer in advance. Financial Instruments Firms: JPMorgan Securities Japan Co., Ltd., Kanto Local Finance Bureau (kinsho) No. 82 Participating Association / Japan Securities Dealers Association, The Financial Futures Association of Japan, Type II Financial Instruments Firms Association and Japan Investment Advisers Association. Korea: This report may have been edited or contributed to from time to time by affiliates of J.P. Morgan Securities (Far East) Limited, Seoul Branch. Singapore: As at the date of this report, 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 report. Arising from its role as 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.sg. In addition, JPMSS and/or its affiliates may also have an interest or holding in any of the securities discussed in this report - please see the Important Disclosures section above. For securities where the holding is 1% or greater, the holding may be found in the Important Disclosures section above. For all other securities mentioned in this report, JPMSS and/or its affiliates may have a holding of less than 1% in such securities and may trade them in ways different from those discussed in this report. Employees of JPMSS and/or its affiliates not involved in the preparation of this report may have investments in the securities (or derivatives of such securities) mentioned in this report and may trade them in ways different from those discussed in this report. Taiwan: This material is issued and distributed in Taiwan by J.P. Morgan Securities (Taiwan) Limited. India: For private circulation only, not for sale. Pakistan: For private circulation only, not for sale. New Zealand: This material is issued and distributed by JPMSAL in New Zealand only to persons whose principal business is the investment of money or who, in the course of and for the purposes of their business, habitually invest money. JPMSAL does not issue or distribute this material to members of "the public" as determined in accordance with section 3 of the Securities Act 1978. The recipient of this material must not distribute it to any third party or outside New Zealand without the prior written consent of JPMSAL. Canada: The information contained herein is not, and under no circumstances is to be construed as, a prospectus, an advertisement, a public offering, an offer to sell securities described herein, or solicitation of an offer to buy securities described herein, in Canada or any province or territory thereof. Any offer or sale of the securities described herein in Canada will be made only under an exemption from the requirements to file a prospectus with the relevant Canadian securities regulators and only by a dealer properly registered under applicable securities laws or, alternatively, pursuant to an exemption from the dealer registration requirement in the relevant province or territory of Canada in which such offer or sale is made. The information contained herein is under no circumstances to be construed as investment advice in any province or territory of Canada and is not tailored to the needs of the recipient. To the extent that the information contained herein references securities of an issuer incorporated, formed or created under the laws of Canada or a province or territory of Canada, any trades in such securities must be conducted through a dealer registered in Canada. No securities commission or similar regulatory authority in Canada has reviewed or in any way passed judgment upon these materials, the information contained herein or the merits of the securities described herein, and any representation to the contrary is an offence. Dubai: This report has been issued to persons regarded as professional clients as defined under the DFSA rules. Brazil: Ombudsman J.P. Morgan: 0800-7700847 / ouvidoria.jp.morgan@jpmorgan.com.

General: Additional information is available upon request. Information has been obtained from sources believed to be reliable but JPMorgan Chase & Co. or its affiliates and/or subsidiaries (collectively J.P. Morgan) do not warrant its completeness or accuracy except with respect to any disclosures relative to JPMS and/or its affiliates and the analyst's involvement with the issuer that is the subject of the research. All pricing is indicative as of the close of market for the securities discussed, unless otherwise stated. Opinions and estimates constitute our judgment as of the date of this material and are subject to change without notice. Past performance is not indicative of future results. 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. The recipient of this report must make its own independent decisions regarding any securities or financial instruments mentioned herein. JPMS distributes in the U.S. research published by non-U.S. affiliates and accepts responsibility for its contents. Periodic updates may be provided on companies/industries based on company specific developments or announcements, market conditions or any other publicly available information. Clients should contact analysts and execute transactions through a J.P. Morgan subsidiary or affiliate in their home jurisdiction unless governing law permits otherwise.

Copyright 2016 JPMorgan Chase & Co. All rights reserved. This report or any portion hereof may not be reprinted, sold or redistributed without the written consent of J.P. Morgan.