Memory Market Update

Perplexing top-down vs bottom-up view; Thoughts into 3Q earnings; NT earnings conviction to calm fears

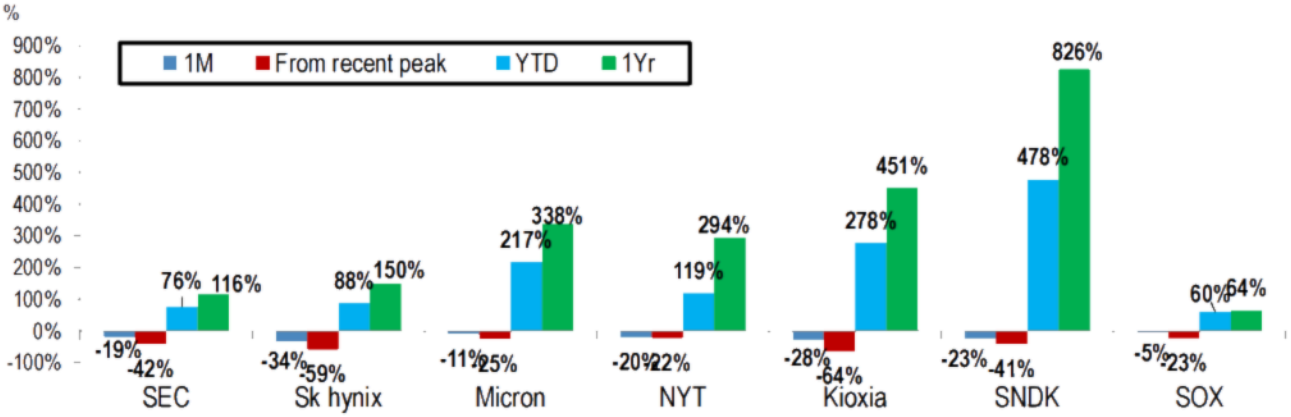
- **Global top three memory shares are down -42% from the 2026 peak; what are the share prices pricing-in?** Memory shares (SEC/SKH/MU) have dropped sharply (down 42% from recent peaks in September on average), likely on negative macro developments such as softer-than-expected Frontier AI model lab annual-revenue-runrate trend (link), widening Neo-Cloud CDS spread (report), tightening risk appetite and rising doubts about AI capex sustainability. This likely marks the third interim share correction post the AI trade (the first correction in July-2024 on the Yen-carry trade unwind and the second correction in mid-2025 on HBM ASP correction speculation), and we believe the current share price action presumes the market pricing-in a down-cycle as early as 2027 with the Q/Q memory price trend turning negative. **This is perplexing to us since we see limited signs of a crack from a bottom-up memory supply/demand fundamental angle (spot price trending upwards, HBM ASP negotiation bias to the upside, LTA order visibility extended, etc.),** and we believe the biggest disconnects seem to be : 1) what if the AI capex run-rate slows to <$1.5T in 27 from funding risks (report from US hardware team), and 2) what are the catalysts to reverse this dampened sentiment? Historically, memory stocks have fallen 49% from peak-to-trough over the past four downcycles (vs GFC: -71% and pre-AI: -53%) and bottomed at 0.9-1.2x trailing P/B (see Table 3).

Technology - Semiconductors

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Figure 1: Global memory makers' share price performance, including SOX (Philadelphia Semiconductor index)



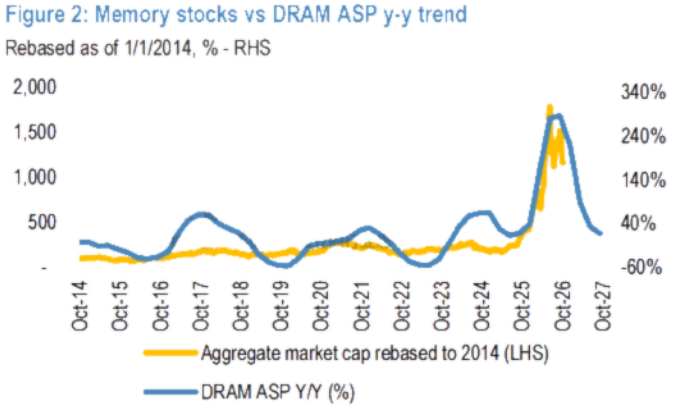
Source: Bloomberg Finance L.P. Note: Past performance is not an indicator of future results.

See page 8 for analyst certification and important disclosures, including non-US analyst disclosures.

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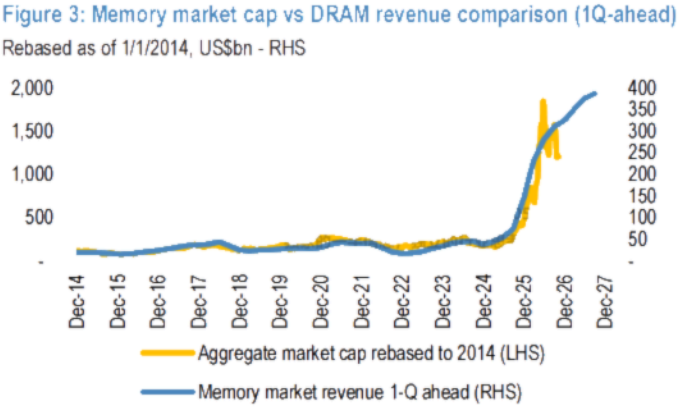
- **What are the downcycle signals and current status quo?** Each downcycle has been unique in itself but commonalities between the downcycles were: 1) spot/contract prices plateauing followed by a sharp correction; 2) unexpected inventory building both at memory and OEMs, an early signal of demand slowdown; and 3) signals of demand slowdown from other tech supply chains (wafers, foundry, memory controller, equipment, etc.). As of current: 1) 8Gb DDR4/5 spot prices were flat/+4% MTD; 2) inventory remains extremely tight with order/pricing discussions centered in 2028/2029 (i.e. extended order visibility echoing MU's order commentary – report); and 3) limited signs of order-cuts in other AI complex, while sensing continuous price hikes that support the tight supply thesis. CXMT's 4F² development stoked another round of fear in memory stocks, but anecdotally, we believe the rudimentary cause of previous downcycles originated from demand equations more so than supply expansions, and we expect CXMT's 4F² development to be less of a threat (see our report). In summary, we see limited evidence to support any down-cycle scenario signals; we only pick up evidence of a stronger and longer up-cycle in the last 1-3 months.
- **Heading into 3Q earnings, near-term earnings color outweighs longer-term cycle evidence.** Based on our conversations with investors, the **memory trade has transformed into a battleground between momentum** (largely following EPS upward/downward revisions and memory y-y pricing trends) **and value investors**banking on a higher-for-longer cycle as memory advances as the AGI enabler. As the AI trade enters its fourth year, investors appear increasingly focused on signs that the memory price upcycle is cooling, particularly after exceptionally strong DRAM ASP growth of +54% /+27% /+236% y-y in 24/25/26E. Sentiment also remains cautious on 2027E pricing, with macro headwinds in focus given the linkage between CSPs' AI capex sustainability (i.e., widening negative FCF into next year) and the stability of AI funding amidst a rate hike environment. While LTA (long-term agreement) disclosures can help frame the mid- to long-term cycle, we believe near-term earnings color is the primary driver of current share-price moves. Against investor concerns, we remain constructive on both the short-term and medium-term cycle and we believe any favorable 2027 demand read-throughs (i.e. indications that HBM is being sold out, capex discipline is being maintained, and pricing trends are stable) could act as a near-term support for the sector. Fundamentally, we continue to maintain our view that the agentic CPU-related memory demand is the most under-appreciated source of demand upside.

Figure 2: Memory stocks vs DRAM ASP y-y trend



Source: Company data, Bloomberg Finance L.P, J.P. Morgan estimates. Note: Memory market cap includes SKH/MU/SEC/NYT

Figure 3: Memory market cap vs DRAM revenue comparison (1Q-ahead)



Source: Company data, Bloomberg Finance L.P, J.P. Morgan estimates. Note: memory market cap includes SKH/MU/SEC/NYT/Kioxia/SNDK.

- **Company-level catalysts and drivers to monitor going into 3Q26 earnings conferences.** Beyond the broader memory pricing trend (a common read-through for all vendors), we believe HBM should remain the key differentiator across DRAM makers. HBM specifications and execution strategies, such as die speed, thermal management, yield ramp, and the approach to logic-die sourcing, vary by company and are likely to influence both product competitiveness and pricing/bargaining power. At the company level, our key watch items include: **1) SKH:** HBM4 execution progress, particularly in light of recent market noise around potential yield hiccups; **2) SEC:** Updates to HBM business targets and progress on HBM4 pricing negotiations; and **3) Kioxia:** 4Q26 NAND blended pricing trend and QLC NAND demand update. More broadly, we will assess how effectively vendors can offset B2C demand softness with B2B strength, and how management teams frame the shift towards a more server-centric revenue mix heading into 2027E. We also believe the 2027E DRAM/NAND bit supply growth commentary could ease over-supply concerns.
- **Narratives/catalysts that can reverse the sentiment.** In the past 3M, the perceived detachment between larger AI context windows and slower HBM content upgrades raised doubts about the inelasticity of AI-driven memory demand, reinforced by the HBM4E de-spec in Rubin Ultra. We see four pillars that could reset sentiment: 1) **HBM content re-acceleration** – either higher capacity per SiP and/or bandwidth gains that directly refute the rolling de-spec narrative; 2) **Supply discipline** – capex/bit-growth restraint and a profitability-first posture that supports a more durable pricing framework; 3) **Broader AI demand drivers** – new applications beyond query/coding that expand use cases and compute intensity; and 4) **Shareholder returns (most important near-term)** – investors have indicated prior return announcements were insufficient (report), and at depressed valuations a meaningful buyback is viewed as the cleanest tool to prevent further multiple de-rating. Both Korean and Japanese large-cap memory stocks have retraced to pre-buyback-announcement price levels and now trade around ~3x FTM P/E, below prior-cycle peak-earnings trailing multiples, implying skepticism on through-cycle cash generation. A more progressive, credible capital return framework – combining buybacks and dividends – could signal management confidence and shift the debate from 'how elastic is AI memory demand?' to 'how much downside is already priced in and what sets a floor under the multiple?'
- **Stock price views: DCF-based FVPS indicates a much earlier price downcycle.** Based on our DCF exercise (report), SEC/SKH are trading at 2-3x P/E (27/28E) and 0.9x-1.5x P/B (27/28E), pricing-in a memory downcycle without clear evidence of it materializing. If the share prices are correct, then we believe the market is forecasting a memory earnings peakout as early as 1H27E given the historical pattern of memory stocks reacting 6-9M ahead. Global top 3 memory shares have fallen 42% from the recent peak in July-26 and, in our view, this price action has already assimilated an historical downcycle share performance which we believe hasn't materialized (-50% in the 14/16 downcycle, -43% in the 18/19 server downcycle, and -47% in the 21/23 rate-hike downcycle, with the only exception being during the GFC, when shares corrected -71% from peak-to-trough). Our short-term stock preference is **SKH (OW)** over **SEC (OW)** based upon the former's superior shareholder return policy and higher TSR yield. We also like **Kioxia (OW)** and **NYT (OW)** in Asia.

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Table 1: SEC DCF – FVPS under various scenarios

Wbn	JPMe			Bull case		Base case		Bear case (protected under LTA)		Extreme Bear case	
	2026	2027E	2028E	2029E	2030E	2029E	2030E	2029E	2030E	2029E	2030E
Revenue (Wbn)	695,364	907,321	1,098,839	1,304,652	1,559,211	1,218,444	1,295,858	1,099,654	960,362	951,493	615,003
Revenue (%y/y)	108%	30%	21%	19%	20%	11%	6%	0%	-13%	-13%	-35%
DRAM revenue (US$M)	242,264	387,279	513,325	641,656	802,070	597,381	658,613	523,591	451,597	442,742	243,508
y/y, %	382%	60%	33%	25%	25%	16%	10%	2%	-14%	-14%	-45%
DRAM bit shipment (1Gb Equiv, M)	151,404	181,641	226,426	283,032	353,790	277,372	339,780	271,711	312,468	260,390	286,429
y/y, %	28%	20%	25%	25%	25%	23%	23%	20%	15%	15%	10%
DRAM ASP (US$/Gb)	1.60	2.13	2.27	2.27	2.27	2.15	1.94	1.93	1.45	1.70	0.85
y/y, %	283%	33%	6%	0%	0%	-5%	-10%	-15%	-25%	-25%	-50%
DRAM OP (US$M)	188,995	303,422	402,695	482,625	573,464	441,532	439,060	370,922	249,692	296,435	58,429
DRAM OPM, %	78%	78%	78%	75%	71%	74%	67%	71%	55%	67%	24%
DRAM cost / bit (US$/Gb)	0.35	0.46	0.49	0.56	0.65	0.56	0.65	0.56	0.65	0.56	0.65
y/y, %	44%	31%	6%	15%	15%	15%	15%	15%	15%	15%	15%
NAND revenue (US$M)	97,753	137,832	148,594	173,855	203,410	153,795	150,334	138,935	106,980	109,217	57,339
y/y, %	331%	41%	8%	17%	17%	3%	-2%	-7%	-23%	-27%	-48%
NAND bit shipment (8Gb Equiv, M)	338,152	399,318	466,795	546,151	638,996	536,815	617,337	513,475	564,822	490,135	514,642
y/y, %	18%	18%	17%	17%	17%	15%	15%	10%	10%	5%	5%
NAND ASP (US$/8Gb)	0.29	0.35	0.32	0.32	0.32	0.29	0.24	0.27	0.19	0.22	0.11
y/y, %	265%	19%	-8%	0%	0%	-10%	-15%	-15%	-30%	-30%	-50%
NAND OP (US$M)	66,265	94,570	99,642	114,863	132,319	95,811	81,652	83,472	44,141	56,275	82
NAND OPM, %	68%	69%	67%	66%	65%	62%	54%	60%	41%	52%	0%
NAND cost / bit (US$/Gb)	0.09	0.11	0.10	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11
%y/y	27%	16%	-3%	3%	3%	3%	3%	3%	3%	3%	3%
EBIT (Wbn)	357,339	522,618	664,508	792,011	937,125	711,416	689,131	600,265	385,113	464,007	69,781
EBIT Margin	51.4%	57.6%	60.5%	60.7%	60.1%	58.4%	53.2%	54.6%	40.1%	48.8%	11.3%
NOPAT	278,049	407,642	518,316	617,768	730,957	554,904	537,522	468,207	300,388	361,926	54,430
%y/y	598%	47%	27%	19%	18%	7%	-3%	-10%	-36%	-30%	-85%
Depreciation and amortization	53,174	61,665	75,144	91,367	109,194	85,330	90,751	84,711	73,981	79,961	51,684
Change in working capital	(4,240)	(6,037)	(7,647)	(9,079)	(10,851)	(8,479)	(9,018)	(7,653)	(6,683)	(6,622)	(4,280)
Capital expenditure	(79,137)	(99,300)	(107,300)	(130,465)	(155,921)	(121,844)	(129,586)	(120,962)	(105,640)	(114,179)	(73,800)
Capital intensity, %	-11%	-11%	-10%	-10%	-10%	-10%	-10%	-11%	-11%	-12%	-12%
Free cash flows	247,845	363,970	478,513	569,591	673,379	509,910	489,669	424,304	262,046	321,086	28,033
Discounted FCF	247,845	313,110	354,126	362,626	368,797	324,631	268,183	270,130	143,518	204,417	15,353
PV of FCF				1,646,505		1,507,895		1,328,730		1,134,852	
PV of terminal value				2,784,783		1,882,869		883,551		84,157	
Enterprise value				4,431,288		3,390,764		2,212,281		1,219,009	
WACC assumptions											
WACC				16.2%		16.2%		16.2%		16.2%	
Long-term growth				3.0%		2.0%		0.0%		-2.0%	
Equity Value bridge											
Value of core operation				4,431,288		3,390,764		2,212,281		1,219,009	
Net Debt/(cash)				(287,341)		(287,341)		(287,341)		(287,341)	
Preferred Equity				119		119		119		119	
NCI				14,820		14,820		14,820		14,820	
Equity value				4,703,689		3,663,165		2,484,682		1,491,410	
Number of common shares outstanding (millions)				5,827.8		5,827.8		5,827.8		5,827.8	
DCF-base Fair Value per share (Won)				810,000		630,000		430,000		260,000	
Current share price				218,000		218,000		218,000		218,000	
Upside/downside potential				272%		189%		97%		19%	
Valuation based on DCF-based FVPS (x)											
P/E (2027E)				11.7		9.1		6.2		3.8	
P/E (2028E)				9.1		7.0		4.8		2.9	
P/B (2027E)				4.6		3.6		2.4		1.5	
P/B (2028E)				3.3		2.5		1.7		1.0	
Valuation based on current shares (x)											
P/E (2027E)				3.2							
P/E (2028E)				2.4							
P/B (2027E)				1.2							
P/B (2028E)				0.9							

Source: J.P. Morgan estimates; Note: 29E/30E base case estimates not JPM published view.

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Table 2: SKH DCF - FVPS under various scenarios

Wbn	JPMe			Bull case		Base case		Bear case (protected under LTA)		Extreme Bear case	
	2026	2027E	2028E	2029E	2030E	2029E	2030E	2029E	2030E	2029E	2030E
Revenue (Wbn)	338,830	511,166	666,675	822,788	1,016,202	759,236	820,470	701,473	627,679	589,983	377,336
Revenue (%y/y)	249%	51%	30%	23%	24%	14%	8%	5%	-11%	-12%	-36%
DRAM revenue (US$M)	182,234	297,498	401,586	501,983	627,478	467,346	515,249	433,713	399,016	369,459	243,843
y/y, %	246%	63%	35%	25%	25%	16%	10%	8%	-8%	-8%	-34%
DRAM bit shipment (1Gb Equiv, M)	111,199	138,860	171,510	214,387	267,984	210,100	257,372	205,812	236,684	197,236	216,960
y/y, %	25%	25%	24%	25%	25%	23%	23%	20%	15%	15%	10%
DRAM ASP (US$/Gb)	1.64	2.14	2.34	2.34	2.34	2.22	2.00	2.11	1.69	1.87	1.12
y/y, %	176%	31%	9%	0%	0%	-5%	-10%	-10%	-20%	-20%	-40%
DRAM OP (US$M)	142,479	237,035	314,483	376,772	447,488	344,639	342,386	313,511	240,048	254,265	98,123
DRAM OPM, %	78%	80%	78%	75%	71%	74%	66%	72%	60%	69%	40%
DRAM cost / bit (US$/Gb)	0.36	0.44	0.51	0.58	0.67	0.58	0.67	0.58	0.67	0.58	0.67
y/y, %	48%	22%	17%	15%	15%	15%	15%	15%	15%	15%	15%
NAND revenue (US$M)	57,019	82,775	94,739	110,844	129,688	98,054	95,848	88,581	68,207	69,633	36,557
y/y, %	292%	45%	14%	17%	17%	3%	-2%	-6%	-23%	-27%	-48%
NAND bit shipment (1Gb Equiv, M)	199,113	236,440	278,249	325,551	380,894	319,986	367,984	306,073	336,681	292,161	306,769
y/y, %	19%	19%	18%	17%	17%	15%	15%	10%	10%	5%	5%
NAND ASP (US$/Gb)	0.29	0.35	0.34	0.34	0.34	0.31	0.26	0.29	0.20	0.24	0.12
y/y, %	230%	22%	-3%	0%	0%	-10%	-15%	-15%	-30%	-30%	-50%
NAND OP (US$M)	38,666	57,750	64,422	74,310	85,660	62,145	53,313	54,232	29,290	36,846	1,098
NAND OPM, %	68%	70%	68%	67%	66%	63%	56%	61%	43%	53%	3%
NAND cost / bit (US$/Gb)	0.09	0.11	0.11	0.11	0.12	0.11	0.12	0.11	0.12	0.11	0.12
%y/y	22%	15%	3%	3%	3%	3%	3%	3%	3%	3%	3%
EBIT (Wbn)	255,389	395,125	507,846	604,562	714,531	545,203	530,350	492,888	361,027	390,202	133,069
EBIT Margin	75.4%	77.3%	76.2%	73.5%	70.3%	71.8%	64.6%	70.3%	57.5%	66.1%	35.3%
NOPAT	196,122	302,434	388,712	462,740	546,912	417,306	405,937	377,263	276,335	298,665	101,853
%y/y	388%	54%	29%	19%	18%	7%	-3%	-3%	-27%	-23%	-66%
Depreciation and amortization	17,606	26,802	40,225	49,645	61,315	47,719	51,568	45,852	41,028	41,531	26,562
Change in working capital	(28,907)	(27,281)	(35,405)	(43,696)	(53,968)	(40,321)	(43,573)	(37,253)	(33,334)	(31,332)	(20,039)
Capital expenditure	(47,328)	(60,000)	(80,000)	(98,735)	(121,944)	(94,905)	(102,559)	(91,192)	(81,598)	(82,598)	(52,827)
Capital intensity, %	-14.0%	-11.7%	-12.0%	-12%	-12%	-13%	-13%	-13%	-13%	-14%	-14%
Free cash flows	137,493	241,954	313,532	369,954	432,315	329,799	311,373	294,670	202,431	226,266	55,548
Discounted FCF	137,493	206,167	227,643	228,879	227,900	204,037	164,144	182,304	106,714	139,984	29,283
PV of FCF				1,028,082		939,483		860,320		740,570	
PV of terminal value				1,587,235		1,068,764		614,771		151,268	
Enterprise value				2,615,317		2,008,247		1,475,091		891,838	
WACC assumptions											
WACC				17.4%		17.4%		17.4%		17.4%	
Long-term growth				3.0%		2.0%		0.0%		-2.0%	
Equity Value bridge											
Value of core operation				2,615,317		2,008,247		1,475,091		891,838	
Net Debt/(cash)				(150,106)		(150,106)		(150,106)		(150,106)	
Equity value				2,765,423		2,158,353		1,625,196		1,041,943	
Number of common shares outstanding (millions)				709.1		709.1		709.1		709.1	
Equity value per share (Won)				3,900,008		3,043,872		2,291,975		1,469,427	
DCF-base Fair Value per share (Won)				3,900,000		3,040,000		2,290,000		1,470,000	
Current share price				1,277,000		1,277,000		1,277,000		1,277,000	
Upside/downside potential				205%		138%		79%		15%	
Valuation based on DCF-based FVPS (x)											
P/E (2027E)				8.5		6.6		5.0		3.2	
P/E (2028E)				6.0		4.7		3.5		2.3	
P/B (2027E)				4.7		3.7		2.7		1.8	
P/B (2028E)				3.1		2.4		1.8		1.2	
Valuation based on current shares (x)											
P/E (2027E)				2.8							
P/E (2028E)				2.0							
P/B (2027E)				1.5							
P/B (2028E)				1.0							

Source: J.P. Morgan estimates; Note: 29E/30E base case estimates not JPM published view.

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Table 3: Historical memory up/downcycle share price, valuation, % change analysis

LC for share price, %, # of days, x

07-08 GFC downcycle	Peak	Bottom	% change	no. of days	Peak trailing P/B (x)	Bottom Trailing P/B (x)
SEC	13,740	8,150	-41%	469	2.0	1.0
SKH	39,200	5,850	-85%	493	2.0	0.5
MU	14	1.7	-88%	493		
Avg.			**-71%**	**485**	**2.00**	**0.77**
2011-2014 smartphone upcycle	**Bottom**	**Peak**	**% change**	**no. of days**	**Bottom Trailing P/B (x)**	**Peak trailing P/B (x)**
SEC	13,600	30,060	121%	1,307	1.0	1.3
SKH	15,600	51,900	233%	1,054	1.2	2.3
MU	4	36	743%	1,159		
Avg.			**365%**	**1,173**	**1.10**	**1.79**
2014-2016 downcycle	**Peak**	**Bottom**	**% change**	**no. of days**	**Peak trailing P/B (x)**	**Bottom Trailing P/B (x)**
SEC	30,060	22,520	-25%	306	1.3	0.9
SKH	51,900	25,750	-50%	671	2.3	0.9
MU	36	9.6	-74%	525		
Avg.			**-50%**	**501**	**1.79**	**0.89**
2016-2018 upcycle	**Bottom**	**Peak**	**% change**	**no. of days**	**Bottom Trailing P/B (x)**	**Peak trailing P/B (x)**
SEC	22,520	57,220	154%	653	0.9	1.7
SKH	25,750	95,300	270%	744	0.9	1.8
MU	9.6	63	555%	746		
Avg. 17/18 upcycle			**326%**	**714**	**0.89**	**1.74**
2018-2019 downcycle	**Peak**	**Bottom**	**% change**	**no. of days**	**Peak trailing P/B (x)**	**Bottom Trailing P/B (x)**
SEC	57,220	37,450	-35%	429	1.7	1.0
SKH	95,300	57,700	-39%	225	1.8	0.9
MU	63	29.0	-54%	209		
Avg. 18/19 downcycle			**-43%**	**288**	**1.74**	**0.95**
2019-2021 upcycle	**Bottom**	**Peak**	**% change**	**no. of days**	**Bottom Trailing P/B (x)**	**Peak trailing P/B (x)**
SEC	37,450	91,000	143%	738	1.0	2.0
SKH	57,700	148,500	157%	784	0.9	1.9
MU	29	96	229%	840		
Avg. 19/21 upcycle			**177%**	**787**	**0.95**	**1.92**
2021-2023 downcycle	**Peak**	**Bottom**	**% change**	**no. of days**	**Peak trailing P/B (x)**	**Bottom Trailing P/B (x)**
SEC	91,000	52,600	-42%	626	2.0	1.0
SKH	148,500	75,000	-49%	672	1.9	0.9
MU	96	49	-49%	532		
Avg. 21/23 downcycle			**-47%**	**610**	**1.92**	**0.93**
2023-2024 interim upcycle	**Bottom**	**Peak**	**% change**	**no. of days**	**Bottom Trailing P/B (x)**	**Peak trailing P/B (x)**
SEC	52,600	85,300	62%	553	1.0	1.4
SKH	75,000	241,000	221%	560	0.9	2.7
MU	49	153	214%	631		
Avg. 23/24 upcycle			**166%**	**581**	**0.93**	**2.03**
2024-2025 bottom	**Peak**	**Bottom**	**% change**	**no. of days**	**Peak trailing P/B (x)**	**Bottom Trailing P/B (x)**
SEC	85,300	51,000	-40%	305	1.4	0.8
SKH	241,000	164,800	-32%	270	2.7	1.7
MU	153	65	-58%	290		
Avg. correction			**-43%**	**288**	**2.03**	**1.22**
2025 bottom -2026 peak	**Bottom**	**Peak**	**% change**	**no. of days**	**Bottom Trailing P/B (x)**	**Peak trailing P/B (x)**
SEC	51,000	363,500	613%	500	0.8	3.3
SKH	164,800	2,959,000	1696%	441	1.7	8.0
MU	65	1,214	1775%	447		
Avg.			**1361%**	**463**	**1.22**	**5.63**
2026 peak -Today	**Peak**	**Today**	**% change**	**no. of days**	**Peak trailing P/B (x)**	**Today Trailing P/B (x)**
SEC	363,500	211,500	-42%	124	3.3	1.8
SKH	2,959,000	1,223,000	-59%	120	8.0	2.8
MU	1,214	905	-25%	117		
Avg.			**-42%**	**120**	**5.63**	**2.30**

Avg. upcycle	479%	744	2.5	
Avg. downcycle	-49%	382	1.2	

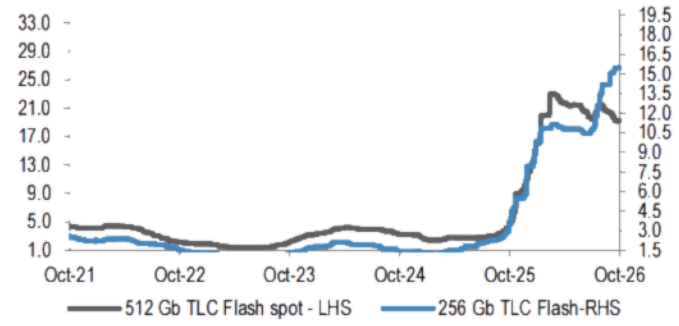
Avg. upcycle (ex-AI)	289%	892	1.9	
Avg. downcycle (ex-AI)	-53%	471	0.9	

Source: Bloomberg Finance L.P., J.P. Morgan estimates for trailing P/B

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Figure 4: NAND spot price trend

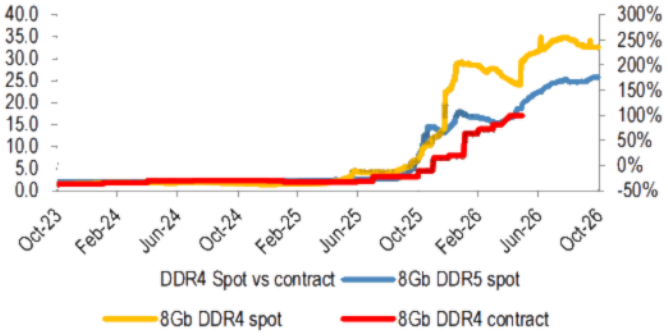
US$



Source: Bloomberg Finance L.P.

Figure 5: 8Gb DDR4 spot vs contract price trend

US$/8Gb, % - RHS



Source: Bloomberg Finance L.P.