

# Semi

## Hyperscalers' FY23 results review

Amazon, Microsoft, Google and Meta, collectively known as Hyperscaler 3 & Meta, have recently announced their CY4Q23 results, unanimously claiming to increase investments in AI-related infrastructure from the current levels. Per Bloomberg consensus, **the capex of Hyperscaler 3 & Meta will grow 22.6% in 2024, higher than prior forecasts of 16.6%**. This capex boost further confirms our perspective on the ongoing AI momentum into 2024, driven by strong demand for building computing capacity. We think **the growing capex from Hyperscalers will continue to benefit AI GPU manufacturers and networking suppliers**, i.e., Nvidia (NVDA US), AMD (AMD US), Broadcom (AVGO US), Marvell (MRVL US), Arista (ANET US), etc.

**We reiterate our positive view on optical transceiver suppliers**, i.e., Innolight (300308 CH, BUY) and TFC (300394 CH, NR), the key beneficiaries that have capitalized on the strong demand for high data rate optical modules (400G/800G). We update our forecasts for Innolight based on the latest capex of the hyperscalers with 2024/25E revenue revised slightly up by 3%/4%. **We maintain BUY on Innolight, with unchanged TP of RMB136, implying 29.2x 2024E P/E, close to its 5-year historical average of 30.9x.**

- **Microsoft:** Cash paid for PPE (property, plant and equipment) was US\$35.2bn in 2023 (+42.1% YoY) and US\$9.7bn in CY4Q23 (+55.2% YoY and -1.8% QoQ), lower than consensus due to a delayed delivery from a 3rd-party provider. Revenue growth of Azure and other Cloud services accelerated to 30% in 4Q (vs. 27%/26%/29% in the prior quarters), including 6% of growth from AI services. Mgmt. expect capex to increase materially on a sequential basis, and expected the acceleration in investment to continue in the coming quarters.
- **Google:** Capex was US\$32.3bn in 2023 (+2.4% YoY) and US\$11.0bn in CY4Q23 (+45.1% YoY and +36.8% QoQ), as a larger portion of the spending was in 2H23. The growth of Google Cloud revenue decelerated in 3Q, but reaccelerated in 4Q, driven by customers' interest in and early adoption of AI, as well as cost optimization. Mgmt. expects 2024 capex to be notably larger than the previous year, reflecting the positive outlook for growth potential brought by AI.
- **Meta:** Capex was US\$28.1bn in 2023 (-12.3% YoY) and US\$7.9bn in CY4Q23 (-14.4% YoY and +16.8% QoQ), driven by investments in servers, data centers and network infrastructure. The Company expects to continue investing aggressively to have sufficient compute capacity. Mgmt. plans to add 350k H100s this year. Guidance? for full-year capex is in the range of US\$30bn to US\$37bn, considering capacity demand (upper limit) and supply availability (lower limit).
- **Amazon:** Capex was US\$52.7bn in 2023 (-17.2% YoY) and US\$14.6bn in CY4Q23? (-12.1% YoY and +16.9% QoQ), driven by investments in cloud infrastructure to support its AWS segment as well as additional capital for its GenAI and LLM developments. Mgmt. expects capex to rebound in 2024 on its plan to add capacity in AWS for regional expansion.
- **Risks:** Sino-US geopolitical tension, supply chain bottleneck, and slower-than-expected capacity ramp-up.

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## Hyperscaler 3 & Meta's capex to grow 22.6% in 2024E

**Hyperscaler 3 & Meta** have announced their CY4Q23 results recently, **unanimously claiming to increase investments in AI-related infrastructure from the current levels.** **Microsoft** expects capex to increase materially on a sequential basis this year, while **Google** projects 2024 capex to be notably larger than 2023. **Meta** gave a wide range of capex growth forecast (6.8%-31.7% YoY), reflecting the fast-growing capacity demand amid the supply chain bottleneck. **Amazon** will also increase spending in infrastructure to support AWS business, including investment in Generative AI and LLMs.

According to the latest Bloomberg consensus, capex of the big 4 has been revised up to US\$181.8bn (+22.6% YoY) from previous US\$173.4bn (+16.6% YoY) in 2024E, reflecting the optimistic view on the sustainability of AI infrastructure investments.

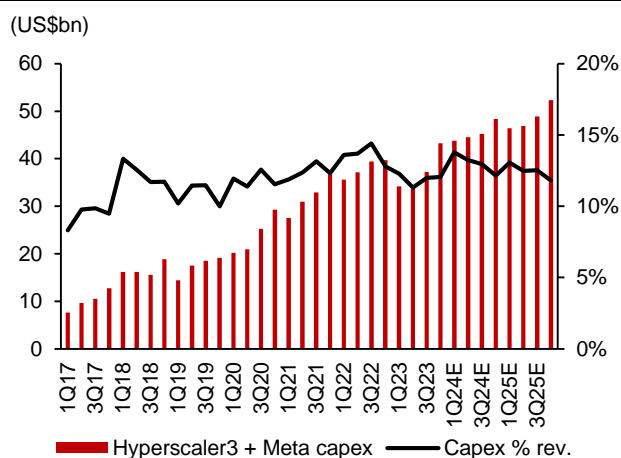
**Figure 1: Big 4's capex growth and capex to revenue ratio**

(US\$bn)	2018	2019	2020	2021	2022	2023	2024E Consensus		2024E Guidance
							Prior	Latest	
<b>Microsoft</b>	<b>14</b>	<b>14</b>	<b>18</b>	<b>23</b>	<b>25</b>	<b>35</b>	<b>44</b>	<b>45</b>	Capex to increase materially on a sequential basis
...YoY	63.6%	-4.8%	29.9%	32.0%	6.7%	42.1%	26.1%	29.1%	
Capex to revenue%	12.0%	10.1%	11.5%	12.6%	12.1%	16.1%	17.2%	17.5%	
<b>Google</b>	<b>25</b>	<b>24</b>	<b>22</b>	<b>25</b>	<b>32</b>	<b>32</b>	<b>36</b>	<b>42</b>	2024 Capex will be notably larger than 2023
...YoY	90.7%	-6.3%	-5.4%	10.6%	27.8%	2.4%	11.8%	29.1%	
Capex to revenue%	18.4%	14.5%	12.2%	9.6%	11.1%	10.5%	10.5%	12.1%	
<b>Amazon</b>	<b>13</b>	<b>17</b>	<b>40</b>	<b>61</b>	<b>64</b>	<b>53</b>	<b>60</b>	<b>61</b>	2024 capex to increase YoY
...YoY	12.3%	25.6%	138%	52.1%	4.3%	-17.2%	13.5%	14.7%	
Capex to revenue%	5.8%	6.0%	10.4%	13.0%	12.4%	9.2%	9.4%	9.4%	
<b>Meta</b>	<b>14</b>	<b>16</b>	<b>16</b>	<b>19</b>	<b>32</b>	<b>28</b>	<b>33</b>	<b>34</b>	Full-year capex will be in the range of US\$30bn to US\$37bn
...YoY	108%	12.0%	0.4%	22.4%	42.1%	-12.3%	17.4%	21.9%	
Capex to revenue%	25.0%	22.1%	18.3%	16.3%	27.5%	20.8%	21.8%	21.9%	
<b>Aggregated capex</b>	<b>67</b>	<b>70</b>	<b>96</b>	<b>128</b>	<b>152</b>	<b>148</b>	<b>173</b>	<b>182</b>	Aggregated capex to grow 22.6% in 2024 (vs. previous 16.6%)(consensus)
...YoY	64.6%	4.3%	37.5%	33.9%	18.6%	-2.4%	16.6%	22.6%	
Capex to revenue%	12.3%	10.8%	11.9%	12.4%	13.6%	11.9%	12.5%	13.0%	

Source: Company data, Bloomberg consensus (as of 5 Feb 2024), CMBIGM

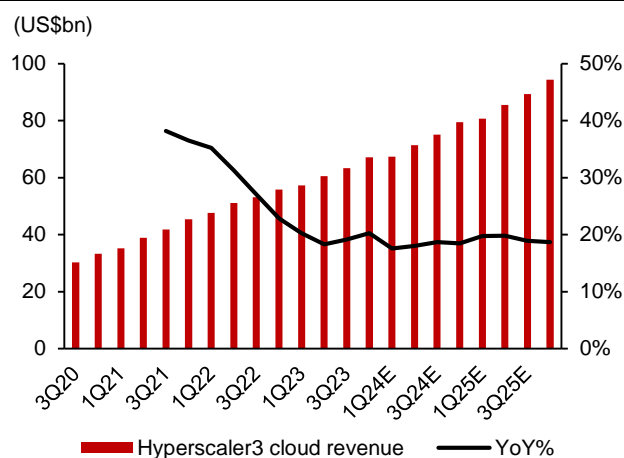
Although the capex is forecasted to be higher, capex to revenue ratio will gradually decrease to 12% by the end of 2025, according to Bloomberg consensus. This implies a healthy spending trend with AI monetization in steady progress.

**Figure 2: Hyperscaler 3 & Meta's quarterly capex is projected to grow**



Source: Company data, Bloomberg, CMBIGM

**Figure 3: Hyperscaler 3's cloud revenue is projected to grow by 18%-20% YoY in the following quarters**

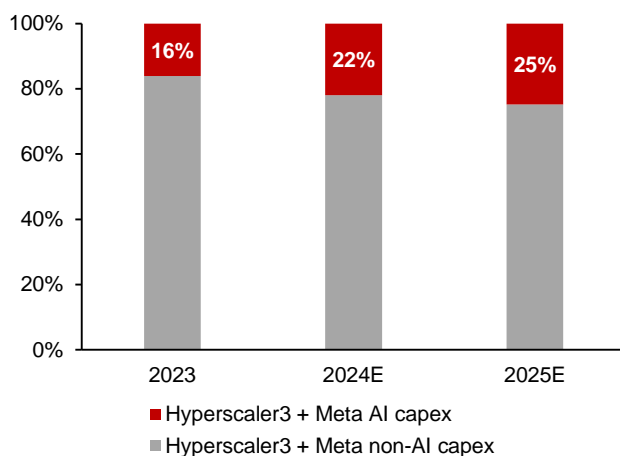


Source: Company data, Bloomberg, CMBIGM

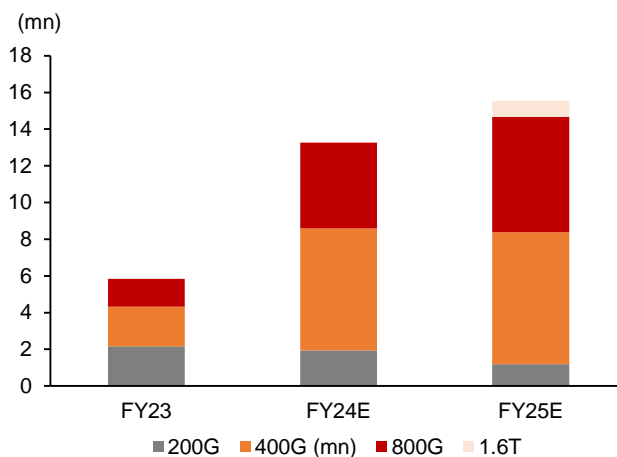
**Figure 4: Hyperscalers' cloud revenue growth**

(US\$bn)	1Q22	2Q22	3Q22	4Q22	1Q23	2Q23	3Q23	4Q23 Consensus	4Q23 Actual	1Q24E Consensus
Microsoft Cloud	23.4	25.1	25.7	27.1	28.5	30.3	31.8	32.2	33.7	33.9
...YoY	32.2%	28.7%	24.2%	22.6%	21.8%	20.7%	23.7%	18.9%	24.4%	18.9%
Google Cloud	5.8	6.3	6.9	7.3	7.5	8.0	8.4	9.0	9.2	9.4
...YoY	43.8%	35.6%	37.6%	32.0%	28.1%	28.0%	22.5%	22.7%	25.7%	25.8%
AWS	18.4	19.7	20.5	21.4	21.4	22.1	23.1	24.2	24.2	24.1
...YoY	36.6%	33.3%	27.5%	20.2%	15.8%	12.2%	12.3%	13.2%	13.2%	13.0%
Cloud revenue	47.7	51.1	53.1	55.8	57.3	60.5	63.3	65.4	67.1	67.4
...YoY	35.2%	31.3%	27.0%	22.8%	20.2%	18.3%	19.1%	17.2%	20.3%	17.6%

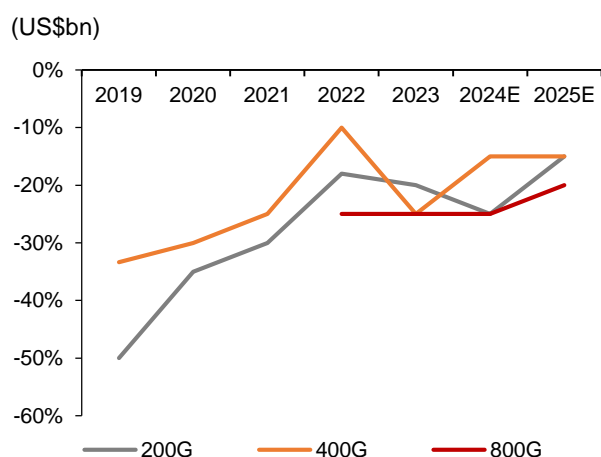
Source: Company data, Bloomberg consensus (as of 5 Feb 2024), CMBIGM

**Figure 5: Hyperscaler 3 & Meta to spend more on AI to meet the growing demand for computing capacity**

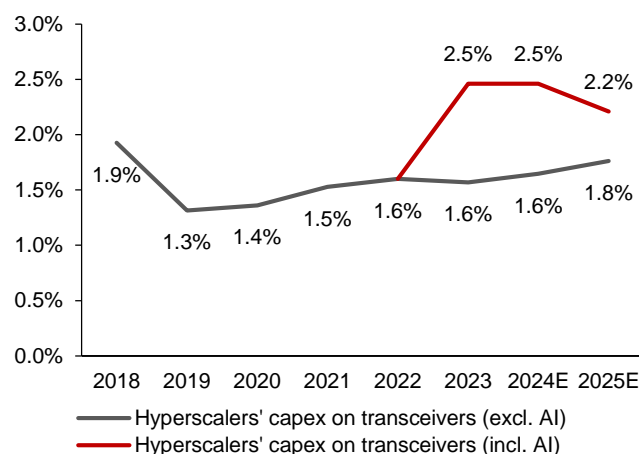
Source: LightCounting, CMBIGM

**Figure 6: Estimated demand for optical transceivers driven by Gen AI**

Source: LightCounting, CMBIGM

**Figure 7: Transceivers ASP trend**

Source: LightCounting, CMBIGM

**Figure 8: Transceivers spending to account for a higher portion of total cloud capex**

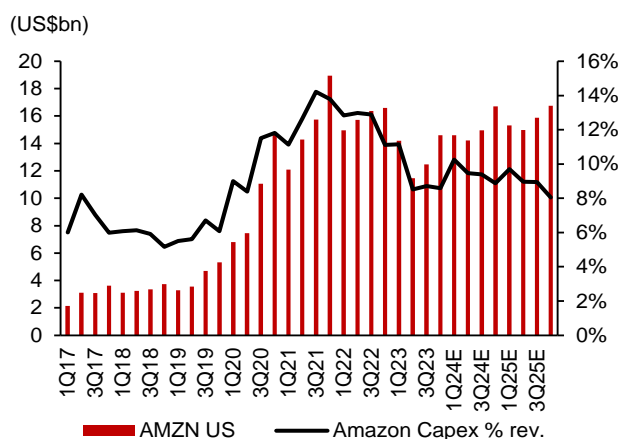
Source: LightCounting, CMBIGM

## CY4Q23 earnings takeaway: comments on Hyperscalers capex and Cloud revenue growth

### Microsoft (MSFT US)

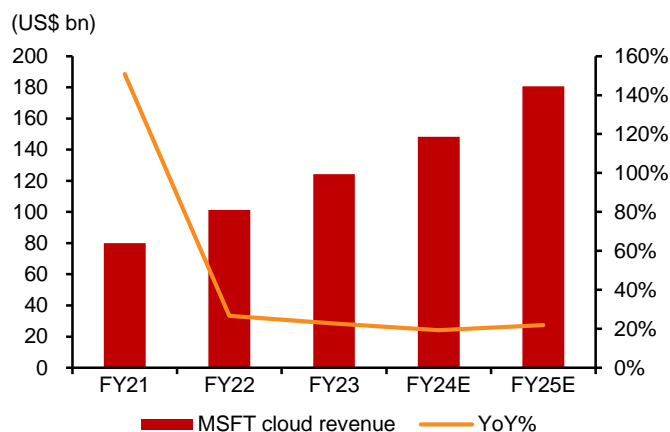
Microsoft has reported robust earnings for CY4Q23, with its cash paid for PPE (US\$9.7bn) expanding by 55.2% YoY. This increase is primarily driven by substantial investments in cloud infrastructure. The company also anticipates a considerable sequential rise in its capex for the upcoming quarter, attributed to a delayed delivery from a 3rd-party provider. Additionally, Microsoft's capex as a percentage of revenue also climbed to 16.1%, exceeding the previously expected 15.8%.

Figure 9: Microsoft capex



Source: Company data, Bloomberg, CMBIGM

Figure 10: Microsoft Cloud revenue

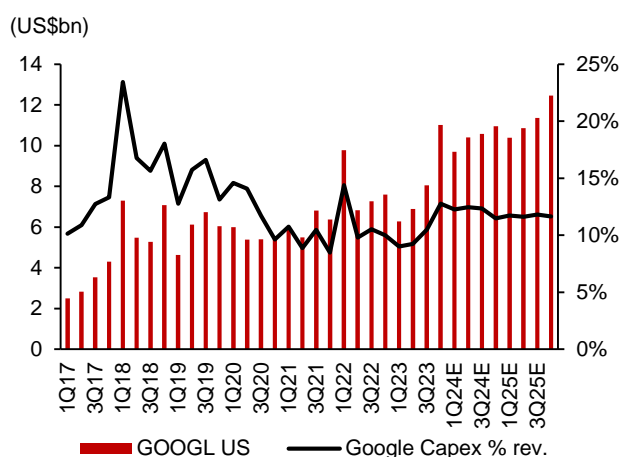


Source: Company data, Bloomberg, CMBIGM

### Alphabet (GOOGL US)

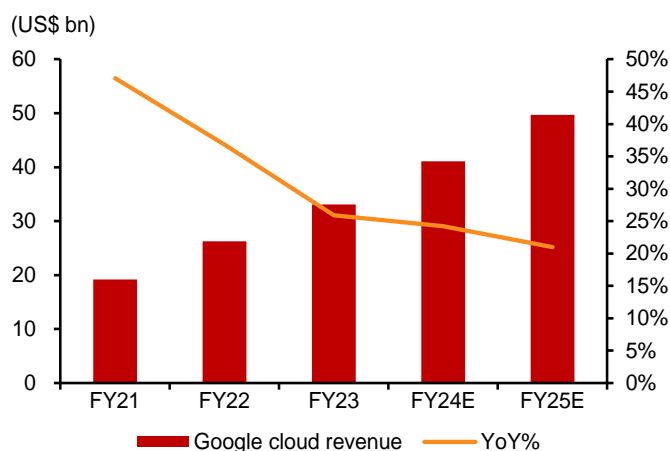
Google is set for continued growth in capex in 2024, projecting a full-year figure substantially higher than in 2023. The company has already experienced a 2.4% YoY increase in its capex in 2023. The robust capex forecast for 2024 is mainly fueled by ongoing investments in technical infrastructure, with a significant focus on servers, followed by data centers. The increased capex in 4Q23 strongly affirms Google's commitment to harnessing the extraordinary applications of AI for users and end customers.

Figure 11: Google capex



Source: Company data, Bloomberg, CMBIGM

Figure 12: Google Cloud revenue

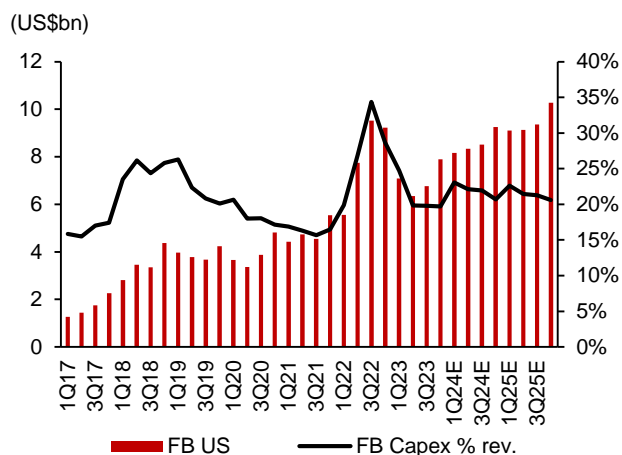


Source: Company data, Bloomberg, CMBIGM

## Amazon (AMZN US)

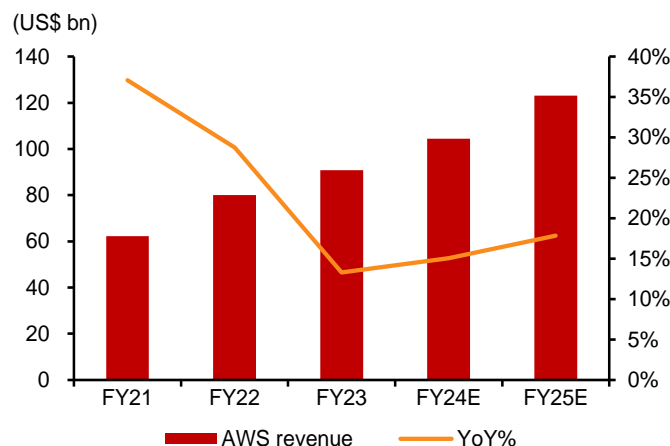
Amazon is observing a downward trend in its capex due to a rapid ramp-up in previous years. In FY23, the company witnessed a 17.2% YoY decline in its capex, slightly more than the anticipated 15.1% decrease. For 2024, Amazon expects its capex to rise, driven by augmented infrastructure spending to support AWS business growth and additional investments in GenAI and LLMs.

Figure 13: Amazon capex



Source: Company data, Bloomberg, CMBIGM

Figure 14: Amazon Cloud revenue

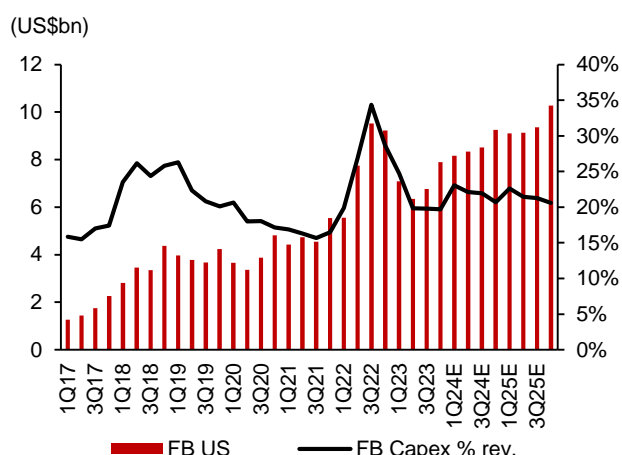


Source: Company data, Bloomberg, CMBIGM

## Meta (META US)

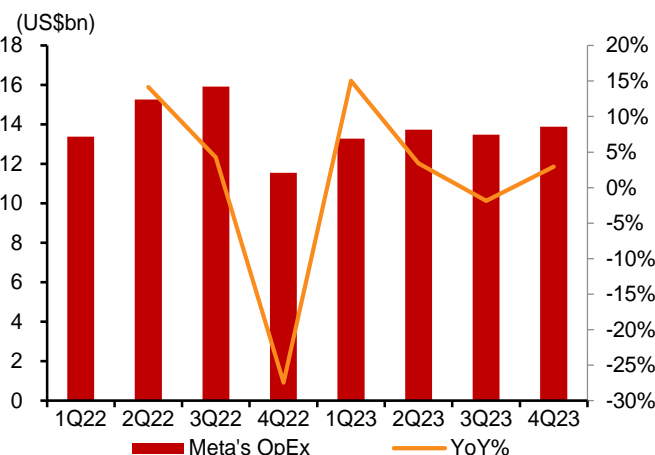
Meta reported a 10.8% YoY decrease in its capex for 2023, slightly more than the Bloomberg-forecasted 8.6% drop. Looking forward to 2024, the company anticipates a dramatic increase in its capex, propelled by investments in servers, including both AI and non-AI hardware, and the expansion of data centers as construction of its new data centers gathers pace. The company plans to add 350k H100s, and including other GPUs, it estimates these will be ~600k H100 equivalent of compute. Meta is also designing its own custom silicon. Meta recognizes the growing importance of AI capacity demand. However, the company does not anticipate its GenAI products to significantly drive revenue in 2024, suggesting that substantial returns from AI investments may take some time to materialize.

Figure 15: Meta capex



Source: Company data, Bloomberg, CMBIGM

Figure 16: Meta OpEx



Source: Company data, Bloomberg, CMBIGM

## Cloud Service Providers' (CSPs) cloud segment growth

### Microsoft

**Microsoft's Cloud segment outperformed consensus expectations in CY4Q23, with revenue (US\$33.7bn) growing by more than 24% YoY or 6% QoQ (vs. the prev. expected 19%),** driven by the widespread implementation of AI technologies. Bloomberg forecasts an additional 18.9% YoY growth for Microsoft's cloud segment in the coming quarter.

**Azure and other cloud services revenue grew 30% YoY in CY4Q23, including 6% of growth from AI services, which we see as a very positive catalyst showing AI monetization is making steady progress.** Azure AI, with its leading performance and diverse choices of AI accelerators from AMD, NVIDIA, and Azure's own Maia, continued to gain market share.

The Azure AI platform now boasts 53,000 customers, over a third of whom are new to Azure. As stated by the CEO during the 2Q24 earnings call, Microsoft has successfully moved into a phase of integrating AI advancements into applications on a large scale by "infusing AI across every layer of its tech stack." The company is not only attracting more customers to its Azure service but also securing "larger and more strategic Azure deals with existing customers."

Azure Open AI Service has also seen significant growth, adding support for GPT-4, Turbo GPT, Vision DALL E 3, and fine-tuning capabilities. Over half of the Fortune 500 companies use Azure Open AI. Mgmt. expects revenue growth of Azure to remain stable in CY1Q24.

### Google

**Google Cloud exhibited robust revenue growth of 25.7% YoY in 4Q23 (vs. the prev. expected 22.7%).** The company experienced a resurgence in cloud growth during the quarter, driven by the momentum in AI leading to a higher adoption rate. As mentioned in its latest earnings call, over 70% of GenAI unicorns are currently using Google Cloud. The cloud team at Google is actively working to bring its LLM Gemini to a broader range of end customers, anticipating increased engagement levels.

Google Cloud's AI hypercomputer, a revolutionary supercomputing architecture, combines TPUs, GPUs, AI software, and advanced technology, offering unmatched performance and cost-efficiency. This has attracted clients like Anthropic and Mistral AI, who use it for building and serving models. Bloomberg consensus points to a growth rate of 25.8% YoY for Google Cloud in 1Q24.

### Amazon

**AWS, Amazon's cloud segment, reported 3.2% YoY growth in 4Q23 revenue, aligning with previous expectations.** Despite experiencing a slower-yet-steady rate of cloud growth in recent quarters, Amazon is focusing on expanding AWS's capacity for regional expansion. Besides, the company is also seeing less impact from cost optimization at end users, stating "companies are turning their attention to newer initiatives and re-accelerating existing migrations" during its earnings call.

Amazon is also witnessing a growing interest from end customers in running GenAI applications or building LLMs and foundational models on AWS with an influx of major deals with companies like Salesforce, BMW, NVIDIA, and others. AWS's pipeline remains robust, with customers extending commitments and increasing migration rates.



## Innolight (300308 CH, BUY, TP: RMB136.0)

We have updated our forecasts based on the latest capex of the hyperscalers with 2024/25E revenue revised slightly up by 3%/4%. We maintain BUY on Innolight, with unchanged TP of RMB136, implying 29.2x 2024E P/E, close to its 5-year historical average of 30.9x.

**Figure 17: CMBIGM estimates vs. consensus**

RMB mn	CMBI estimates			Consensus			Diff (%)		
	FY23E	FY24E	FY25E	FY23E	FY24E	FY25E	FY23E	FY24E	FY25E
Revenue	11,188	18,681	21,342	11,619	24,128	29,596	-4%	-23%	-28%
Gross profit	3,649	6,326	7,019	3,725	7,752	9,460	-2%	-18%	-26%
Net profit	2,045	3,740	4,100	2,070	4,232	5,161	-1%	-12%	-21%
EPS (RMB)	2.55	4.66	5.11	2.56	5.20	6.32	-1%	-10%	-19%
Gross margin	32.6%	33.9%	32.9%	32.1%	32.1%	32.0%	0.6 ppt	1.7 ppt	0.9 ppt
Net margin	18.3%	20.0%	19.2%	17.8%	17.5%	17.4%	0.5 ppt	2.5 ppt	1.8 ppt

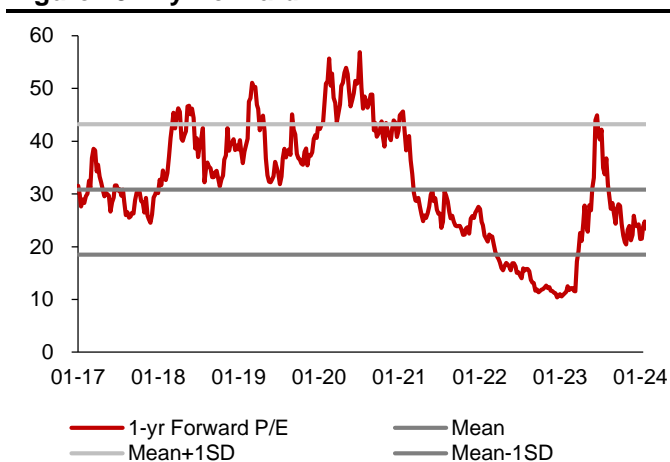
Source: Bloomberg, CMBIGM estimates

**Figure 18: CMBIGM estimate revision**

RMB mn	New			Old			Diff (%)		
	FY23E	FY24E	FY25E	FY23E	FY24E	FY25E	FY23E	FY24E	FY25E
Revenue	11,188	18,681	21,342	11,127	18,074	20,524	1%	3%	4%
Gross profit	3,649	6,326	7,019	3,631	6,144	6,782	0%	3%	3%
Net profit	2,045	3,740	4,100	2,035	3,645	3,978	0%	3%	3%
EPS (RMB)	2.55	4.66	5.11	2.54	4.54	4.96	0%	3%	3%
Gross margin	32.6%	33.9%	32.9%	32.6%	34.0%	33.0%	0 ppt	-0.1ppt	-0.2ppt
Net margin	18.3%	20.0%	19.2%	18.3%	20.2%	19.4%	0 ppt	-0.1ppt	-0.2ppt

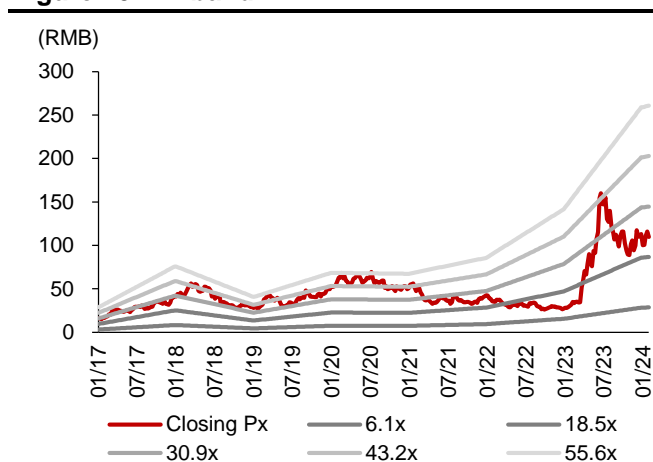
Source: CMBIGM estimates

**Figure 19: 1-yr forward PE**



Source: Bloomberg, CMBIGM

**Figure 20: PE band**



Source: Bloomberg, CMBIGM

INCOME STATEMENT	2020A	2021A	2022A	2023E	2024E	2025E
YE 31 Dec (RMB mn)						
Revenue	7,050	7,695	9,642	11,188	18,681	21,342
Cost of goods sold	(5,257)	(5,727)	(6,816)	(7,539)	(12,355)	(14,323)
Gross profit	1,793	1,968	2,826	3,649	6,326	7,019
Operating expenses	(803)	(1,005)	(1,499)	(1,336)	(2,133)	(2,411)
Selling expense	(22)	(21)	(63)	(25)	(82)	(71)
SG&A expense	(477)	(507)	(598)	(578)	(948)	(1,093)
R&D expense	(506)	(541)	(767)	(679)	(1,115)	(1,253)
Others	202	64	(71)	(53)	13	7
Operating profit	990	963	1,327	2,313	4,193	4,608
Other income	0	1	28	2	29	18
Other expense	(3)	(4)	(4)	2	(2)	0
Pre-tax profit	987	960	1,352	2,317	4,220	4,626
Income tax	(111)	(73)	(118)	(243)	(442)	(485)
After tax profit	876	886	1,234	2,074	3,777	4,141
Minority interest	11	10	10	29	38	41
Net profit	865	877	1,224	2,045	3,740	4,100

BALANCE SHEET	2020A	2021A	2022A	2023E	2024E	2025E
YE 31 Dec (RMB mn)						
Current assets	7,982	10,022	9,587	12,173	16,274	19,071
Cash & equivalents	1,679	3,515	2,831	5,087	6,845	9,068
Account receivables	1,514	1,997	1,509	2,169	2,949	2,898
Inventories	3,774	3,799	3,888	3,754	5,046	5,549
Prepayment	40	72	64	112	187	213
Other current assets	973	638	1,295	1,051	1,247	1,343
Non-current assets	5,634	6,543	6,970	7,536	8,615	9,796
PP&E	2,726	3,152	3,217	3,567	4,313	5,224
Right-of-use assets	0	21	11	5	7	8
Deferred income tax	38	46	48	108	136	158
Intangibles	360	382	322	263	209	160
Goodwill	1,915	1,980	1,949	1,917	1,886	1,854
Other non-current assets	595	962	1,422	1,676	2,063	2,391
Total assets	13,616	16,565	16,557	19,709	24,889	28,868
Current liabilities	3,772	3,166	3,264	3,351	4,218	4,531
Short-term borrowings	1,041	794	385	58	144	161
Account payables	1,367	1,205	1,136	1,756	2,306	2,403
Tax payable	35	68	93	145	183	212
Other current liabilities	1,128	932	1,349	1,290	1,453	1,603
Contract liabilities	22	1	22	6	9	11
Accrued expenses	179	166	279	96	122	141
Non-current liabilities	1,850	1,796	1,224	1,864	2,613	2,568
Long-term borrowings	1,430	1,262	696	1,396	2,021	1,882
Bond payables	29	0	0	0	0	0
Deferred income	154	277	264	159	201	233
Other non-current liabilities	238	258	264	310	391	453
Total liabilities	5,622	4,962	4,488	5,215	6,830	7,099
Share capital	713	800	801	803	803	803
Retained earnings	2,090	2,861	3,893	5,752	9,176	12,739
Other reserves	5,086	7,828	7,251	7,787	7,889	7,995
Total shareholders equity	7,889	11,489	11,945	14,342	17,868	21,537
Minority interest	104	114	124	153	190	232
Total equity and liabilities	13,616	16,565	16,557	19,709	24,889	28,868



CASH FLOW	2020A	2021A	2022A	2023E	2024E	2025E
<b>YE 31 Dec (RMB mn)</b>						
<b>Operating</b>						
<b>Profit before taxation</b>	<b>987</b>	<b>960</b>	<b>1,352</b>	<b>2,317</b>	<b>4,220</b>	<b>4,626</b>
Depreciation & amortization	340	436	493	488	544	674
Tax paid	(111)	(73)	(118)	(243)	(442)	(485)
Change in working capital	(1,096)	(587)	291	521	(1,520)	(343)
Others	(99)	77	432	(321)	64	170
<b>Net cash from operations</b>	<b>22</b>	<b>813</b>	<b>2,449</b>	<b>2,763</b>	<b>2,866</b>	<b>4,643</b>
<b>Investing</b>						
Capital expenditure	(956)	(840)	(792)	(1,050)	(1,754)	(2,003)
Acquisition of subsidiaries/ investments	(3,728)	(1,529)	(5,967)	0	0	0
Net proceeds from disposal of short-term investments	3,959	1,109	5,167	577	0	0
Others	(147)	42	40	102	94	103
<b>Net cash from investing</b>	<b>(873)</b>	<b>(1,219)</b>	<b>(1,553)</b>	<b>(371)</b>	<b>(1,660)</b>	<b>(1,900)</b>
<b>Financing</b>						
Dividend paid	(121)	(168)	(233)	(239)	(349)	(581)
Net borrowings	1,421	(259)	(699)	(515)	712	(122)
Proceeds from share issues	0	2,665	33	461	0	0
Others	0	26	(742)	102	120	120
<b>Net cash from financing</b>	<b>1,300</b>	<b>2,264</b>	<b>(1,641)</b>	<b>(192)</b>	<b>483</b>	<b>(583)</b>
<b>Net change in cash</b>						
Cash at the beginning of the year	1,236	1,648	3,489	2,809	5,073	6,826
Exchange difference	(37)	(17)	64	64	64	64
Others	449	1,859	(745)	2,200	1,689	2,161
<b>Cash at the end of the year</b>	<b>1,648</b>	<b>3,489</b>	<b>2,809</b>	<b>5,073</b>	<b>6,826</b>	<b>9,052</b>

Source: Company data, CMBIGM estimates

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