Yardeni Research

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Morning Briefing

On Data Centers, Semis & Stablecoin

Check out the accompanying chart collection.

Executive Summary: The rapid revenue growth of cloud providers that meet AI data storage needs has enticed lots of players to build new data center capacity. Some, like Amazon and Open AI, are doing so to meet their own AI needs and others to farm out storage capacity to others. With capacity buildouts so enormous, Jackie asks, will there be enough juicy profits to go around? … Also: Nvidia is still the undisputed AI semiconductor chip leader, but alternatives to Nvidia's chips are proliferating. … And: The Genius Act prohibits the paying of interest to investors, but not the paying of "rewards." What's the difference? None, say banks, fearing lost deposits and demanding rule revisions.

Information Technology I: Too Much of a Good Thing? The lure of riches and tight capacity today has money flooding into the construction of artificial intelligence (AI) data centers. Data center construction—just the cost of building the building—has increased to an annual rate of $43.0 billion, up 30% y/y and 322% higher than $10.2 billion four years ago (*Fig. 1*). Add in the costs of chips and servers, and you're talking about real money.

The irony is that, typically, the more money that floods into an area, the less likely any of the players will make the same juicy profits that attracted them, reaped in the years before the spending boom. Cloud providers like Microsoft, Alphabet, and Amazon enjoyed 20%-30% annual revenue growth rates last year. So it's understandable that players like Oracle, xAI, Meta, and others would jump into the lucrative market.

One of the biggest users of AI data center capacity is OpenAI. The company—which is expected to generate $13 billion in revenue this year but earn no profit—recently said it was likely to spend around $16 billion to rent computing servers alone this year, and that the number *could rise to $400 billion* in 2029. And now it too is building data centers for its own use.

Let's take a look at OpenAI's grandiose plans and what the competition is doing:

(1) *Moving beyond Microsoft.* In 2019, OpenAI entered into an arrangement to exclusively use Microsoft Azure as its cloud provider. But this year with Microsoft reportedly capacity constrained, OpenAI amended the contract, adding more vendors to its data center lineup despite Microsoft's early investment in the company.

In June, OpenAI *announced* plans to use Alphabet's Google Cloud service, though the terms of the deal were not disclosed. More recently, CEO Sam Altman *signed a $300 billion deal* to purchase another 4.5 gigawatts of cloud-computing power from Oracle over five years.

OpenAI has also shown a willingness to buy capacity from new players. In March, OpenAI signed a five-year contract worth $11.9 billion with CoreWeave. As part of CoreWeave's IPO, OpenAI received shares worth $350 million.

(2) *OpenAI gets into infrastructure.* Earlier this year, OpenAI, Oracle, SoftBank, and MGX announced plans to fund the $500 billion Stargate Project, which will develop AI data centers across the US. The first leg of the project is being developed by Crusoe Energy Systems in Texas; another five US sites have also been picked out.

Since then, OpenAI has gone on a chip-buying spree. In late September, the company announced that it would use the $100 billion Nvidia is investing in OpenAI over the next decade to purchase chips from Nvidia. Under the terms of the deal, OpenAI will use Nvidia's chips to deploy up to 10 gigawatts of computing power in AI data centers.

"Usually … a cloud service provider buys from us, and [OpenAI] rents from a cloud service provider. And so now it's going to be a direct partnership," Nvidia CEO Jensen Huang *said* on CNBC. Nvidia's OpenAI partnership is "incremental" to the work the company has done with other AI providers such as Oracle and CoreWeave.

Earlier this week, OpenAI committed to purchasing 6 gigawatts worth of AMD's chips, starting with the MI450 chip next year. The ChatGPT maker will buy the chips either directly or through its cloud computing partners.

(3) *Others building furiously, too.* Elon Musk's xAI has built Colossus 1, a data center with 200,000 Nvidia chips, and is in *the process* of building Colossus 2, which is expected to be even bigger. Both are in Memphis and will be powered by an electrical plant that xAI is also building. All of this is being done to have the computer capacity to train xAI's Grok.

CEO Mark Zuckerberg says Meta Platforms will invest $65 billion into AI, mostly to build data centers this year. One of his projects in northern Louisiana is a 4 million-square-foot data center with two gigawatts of computing power that's expected to cost $10 billion.

In Indiana, Amazon is *in the midst of building* around 30 data centers, which will consume 2.2 gigawatts of electricity. It is expected to serve a single customer, AI startup Anthropic (creator of Claude AI), in which Amazon has invested $8 billion. It's part of Amazon's Project Rainier, which will also include facilities in Mississippi and possibly North Carolina and Pennsylvania.

Microsoft plans on spending $7 billion on its Fairwater project in Wisconsin, which will include 1.2 million square feet of space. Earlier this month, Google *announced* the start of a data center project in Memphis that will involve $4 billion of investment through 2027. Overall, the company has said it *will spend* $25 billion over the next two years on data centers and AI infrastructure in the mid-Atlantic and parts of the Midwest and South.

(4) *A look at the numbers.* OpenAI is privately held, but many of the other cloud providers are public. Microsoft and Oracle are members of the S&P 500 Systems Software stock price index, which has climbed 24.8% ytd through Tuesday's close (*Fig. 2*). The industry is expected to grow earnings by 15.2% this year and 14.3% in 2026 (*Fig. 3*). Its forward P/E is 33.7, near the top end of its range in all periods except the 2000 dotcom bubble (*Fig. 4*).

Alphabet and Meta are in the S&P 500 Interactive Media Services stock price index, which has climbed 26.6% ytd (*Fig. 5*). The industry is expected to grow earnings 21.5% in 2025 and 6.7% next year (*Fig. 6*). At 23.6, the index's forward P/E is near recent highs but still well below its highs around 30 back in 2020 (*Fig. 7*).

Information Technology II: Chip Competition Fiercens. The big news in the AI realm this week—that OpenAI would buy chips for some of its data centers from AMD—was the latest sign that Nvidia faces competition. When OpenAI signed on to use Google's data centers, it also gained access to Nvidia alternatives, specifically *tensor processing units* (a.k.a. TPUs), which are AI accelerator application-specific integrated circuits (a.k.a. ASICs) that Google developed for neural network machine learning.

While Nvidia remains the undisputed AI chip leader, other companies have developed alternatives as well. Here are some examples:

(1) *Tesla makes chips.* Samsung Electronics was *tapped* by Tesla to manufacture its next

generation of AI chips in Texas in a $16.5 billion multi-year deal. Tesla plans to use the AI6 chips in its humanoid robots, self-driving cars, and AI data centers. Elon Musk's company also has developed Dojo, a chip to process the reams of data that autonomous vehicles are expected to produce.

(2) *Amazon makes chips.* Amazon's gigantic Indiana data center will use the company's own chips, called "Trainium 2," instead of those from Nvidia. While the Amazon chips aren't as powerful, they are more energy efficient.

(3) *Groq makes chips.* US unicorn Groq makes chips and software to run AI models. Valued at almost $7 billion after raising $750 million in the private market, the company *established* more than 12 data centers around the world this year and plans to top that number next year. The company claims that its chips, which have embedded memory, can be produced and deployed faster while using less power than GPUs (a.k.a. graphics processing units). That makes them a cheaper alternative to the competition's offerings.

(4) *China makes chips, too.* Nvidia also faces competition from Chinese companies, including Cambricon Technologies and Huawei. All eyes have been on these two companies since the US government blocked the sale of Nvidia's most sophisticated chip to Chinese companies, and the Chinese government blocked Chinese companies from buying Nvidia's less sophisticated chips. Cambricon's share price has doubled ytd and risen by more than 350% over the past year on hopes that the company will be China's alternative to Nvidia.

A third AI chip competitor is Moore Threads. Its CEO spent 14 years at Nvidia's Chinese operations before leaving in 2020 to launch Moore. Similarly, the founder and CTOs of Chinese AI chip company MetaX previously worked at AMD Shanghai.

Nvidia's market share in China has reportedly slipped to 50% from a dominant 95% four years ago.

(5) *A look at semiconductors.* The S&P 500 Semiconductors stock price index has risen 39.2% ytd (*Fig. 8*). It's dominated by Nvidia, which represents 54.9% of the industry's market capitalization (*Fig. 9*). The industry's forward revenues per share, profit margins, and operating earnings per share all are at record highs (*Fig. 10*, *Fig. 11*, and *Fig. 12*). Analysts forecast earnings growth of 44.3% this year and 41.1% in 2026 (*Fig. 13*). At 29.7, the index's forward P/E is near the top of its range of the past three years but well below its P/Es during periods when the cyclical industry's earnings were negligible (*Fig. 14*).

Disruptive Technologies: Stablecoin Interest vs Rewards. When we described the Genius Act in the September 25 *Morning Briefing*, we said it would provide guardrails and clarity to the stablecoin market. Well, the first half was correct, but the law falls short of bringing crystal clarity to how the market will operate. It turns out that bankers and crypto bros still have something to disagree about.

The Genius legislation clearly says that stablecoin issuers are prohibited from paying interest to investors. It does not, however, prohibit crypto exchanges from making payments to customers. So investors who buy the stablecoin USDC on the Coinbase exchange, for example, don't receive any interest from the stablecoin. But they do receive a Coinbase "*reward*" of 4.1% for holding their assets on the exchange, writes Ian Katz, a managing director at *Capital Alpha Partners*, in a recent report that highlights this issue (available by request via *inquiries@capalphadc.com*).

Call a duck a "duck," the bankers object: The payments that the exchanges are making look, swim, and quack like interest payments. Banking advocates *argue* that if exchanges pay "rewards," demand for stablecoins will double. If that occurs, deposits at banks could decline sharply, and banks will have less money to lend.

Crypto players counter that they're following the rules and contend that the banks are just mad because they're losing and expect to be bailed out.

Bankers are urging the Treasury Department, which is writing regulations for the Genius Act, to stop the exchanges from offering rewards, writes Katz. They're also urging senators to prohibit the exchange payments in the crypto market structure legislation that's now being drafted. Neither route guarantees success or expediency. We'll keep watching.

Calendars

US: Thurs: Powell; Barr; Daly; Bowman. **Fri:** Consumer Sentiment 53.5; Goolsbee. (Source: FX Street)

Global: Thurs: Eurogroup Meetings; ECB Publishes Account of Monetary Policy Meeting; Lane; Balz; Mann. **Fri:** Italy Industrial Production -0.3%; ECOFIN Meetings; Germany Buba Monthly Report; BoE FPC Meeting Minutes; Lagarde; Elderson; Pill. (Source: FX Street)

Strategy Indicators

S&P 500 Earnings, Revenues, Valuation & Margins (*link*): During the October 2 week, the S&P 500's forward revenues rose 0.5% w/w to a record high. Forward earnings rose 1.1% w/w to another new record high as the forward profit margin rose 0.1ppt w/w to a record high. The forward profit margin is now 3.7ppts above its seven-year low of 10.3% during April 2020. The consensus expectations for forward revenues growth rose 0.1ppt w/w to a 38-month high of 6.3%. From a longer-term perspective, that's well above its 20-year average of 5.2%. It has gained 4.0ppts from its 33-month low of 2.3% during the February 23, 2023 week. That's down from a record high of 9.6% growth at the end of May 2021 and compares to 0.2% forward revenues growth during April 2020, which was the lowest reading since June 2009. The forward earnings growth forecast rose 0.3ppt w/w to an eight-month high of 13.4%, up 2.5ppts from its 15-month low of 10.9% during the May 29 week. That's a bit stronger than its 20-year average of 11.4%, and is just 0.9 ppts below its 38-month high of 14.3% during the December 12 week. That's also down from its 23.9% reading at the end of April 2021, which was boosted by the recovery from the pandemic to its highest reading since June 2010 and up substantially from its record low of -5.6% at the end of April 2020. Analysts expect revenues to rise 5.7% in 2025 (unchanged w/w) and 6.3% in 2026 (unchanged w/w), compared to a 5.0% rise in 2024. They expect an earnings gain of 11.4% in 2025 (unchanged w/w) and a 13.9% rise in 2025 (up 0.1ppt w/w) compared to 2024's earnings gain of 11.4%. Analysts expect the profit margin to rise 0.7ppt y/y to 13.2% in 2025 (unchanged w/w) and 0.9ppt y/y to 14.1% in 2026 (unchanged w/w), compared to 2024's 12.5%. Looking at valuation data as of October 2, the S&P 500's weekly forward P/E was steady w/w at a five-year high of 22.9. It's now up 3.7pts from its 16-month low of 19.2 during the April 17 week. It also compares to 23.1 in early September 2020, which was the highest level since July 2000, and to a 77-month low of 14.0 in March 2020. The S&P 500 weekly price-to-sales ratio gained 0.01pt w/w to a new record high of 3.20. That's up from a six-month low of 2.22 during the October 26, 2023 week and compares to a 49-month low of 1.65 in March 2020.

S&P 500 Sectors Revenues, Earnings, & Margins (*link*): During the October 2 week, all 11 S&P 500 sectors posted gains in their forward revenues; 10 posted gains in their forward earnings; and the forward profit margin rose for five sectors. These five sectors had post pandemic- or record-high forward revenues this week: Financials, Health Care, Industrials, Information Technology, and Utilities. These two are less than 0.2% from their very recent record high revenues: Communication Services and Consumer Discretionary. Consumer Staples' would be near a record high too, but is instead 6.2% below due to Drug Retail's exit

in late August. Energy's is improving now from its three-year low in May, but remains depressed at 29.0% below its September 2008 record and 16.3% below its cyclical high in October 2022. Materials' has improved to a 26-month high to 3.9% below its June 2022 record high. These six sectors had record-high forward earnings this week: Communication Services, Consumer Discretionary, Financials, Industrials, Information Technology, Real Estate, and Utilities. Consumer Staples and Health Care are less than 0.9% from their record highs. Forward earnings remains depressed for the last two sectors, Energy and Materials, but have improved in recent months to 37.8% and 22.9% below their respective highs during 2022. Looking at the forward profit margin, five sectors rose w/w and three fell. Information Technology rose to a new record high again. These five sectors remain close: Communication Services, Consumer Discretionary, Financials, Industrials, and Utilities. Consumer Staples, Energy, Materials, and Real Estate are improving somewhat from their recent multi-year lows, but Health Care's is still at a record low. Here's how the S&P 500 and its 11 sectors rank based on their current forward profit margin forecasts along with their record highs: Information Technology (28.3%, up 0.2ppt w/w for its seventh straight record high and for the first time since September 2024 when low-margin Dell's addition to the index lowered the margin 1.3ppts then to 26.3%), Financials (20.9, up 0.1ppt w/w to a record high), Communication Services (19.5, down 0.1ppt w/w and down from its 19.8 record high during the August 7 week), Real Estate (16.8, up 0.1ppt w/w to a 32-week high and down from its 19.2 record high in 2016), Utilities (14.8, at a 43-month high and 0.3ppt below its 15.1 record high in April 2021), S&P 500 (14.0, up 0.1ppt to a record high), Materials (10.8, up 0.1ppt w/w and 0.4ppt from 51-month low in late February and down from a 20-month high of 11.6 in July 2023 and a 13.6 record high in June 2022), Consumer Discretionary (9.4, its first record high since early April), Energy (8.9, up 0.4ppt from a 55-month low of 8.5 during the during the May 15 week and down from its 12.8 record high in November 2022), Industrials (11.2, up 0.1ppt w/w to 0.1ppt below its 11.3 record high in early January), Health Care (8.1, at a record low and down from its 11.5 record high in February 2022), and Consumer Staples (7.2, up 0.5ppt from a 21-month low following Drug Retail's exit during the 9/4 week and down from its 7.7 record high in June 2020).

Global Economic Indicators

Germany Industrial Production (*link*): German industrial production plunged in August, posting its biggest monthly drop since March 2022. August's *industrial production* contracted 4.3%, considerably weaker than the consensus estimate of a 1.0% shortfall, and more than reversing July's 1.3% gain. The less volatile *three-month over three-month* comparison saw a 1.3% decline, while output was 3.9% below a year ago—reversing the

1.5% y/y increase posted in July. The drop in production during August was led by an 18.5% slide in the automotive industry during the month due to annual holiday plant closures coupled with production changeovers. Also contributing to the weakness were output declines in pharmaceuticals (-10.3), machinery & equipment (-6.2), and computer, electronic, and optical products (-6.1). *Excluding energy and construction*, production sank 5.6% and was 5.1% below a year ago. *By sector*, there was widespread weakness, with capital (-9.6%), consumer (-4.7), and intermediate (-0.2) goods production all contracting.

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