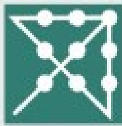
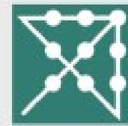
 Yardeni Research 

November 7, 2024

Morning Briefing

AI, Cardboard & More AI

Check out the accompanying chart collection.

Executive Summary: Amazon and Meta are benefiting from artificial intelligence in two ways, gaining efficiencies by using AI to optimize their internal operations and gaining revenue by selling AI-optimized products and services. Jackie summarizes what both companies' CEOs recently said about their manifold AI initiatives. … Also: In an economy where shopping often means shipping, cardboard is strong. International Paper earned much more than analysts anticipated last quarter, and the industry's revenues and earnings are expected to improve sharply next year. … One downside of AI: It's an energy hog. But solutions to that problem are being developed, as recapped in today's Disruptive Technologies segment.

Information Technology: AI Adopters & Developers. What intrigues investors about many of the MegaCap-8 stocks (i.e., Alphabet, Amazon, Apple, Meta, Microsoft, Netflix, Nvidia, and Tesla) is the double exposure they have to artificial intelligence (AI). Not only do they sell products optimized by AI, boosting their revenues, but they're deploying AI throughout their operations, gaining efficiencies that expand their profit margins and lift their earnings. AI allows them both to offer superior products and become more productive at the same time.

Here's a quick rundown of what Meta and Amazon had to say on their recent earnings conference calls on all things AI related:

(1) *Meta: An AI evangelist.* Meta has used AI extensively in improving existing products and in new product offerings as well. Meta AI has made more than 500 monthly active improvements to Meta's AI-driven feed and video recommendations. Those changes have led to an 8% increase in time spent on Facebook and a 6% increase in time spent on Instagram, CEO Mark Zuckerberg said on Meta's October 30 *conference call*.

Meta AI is a chatbot powered by Llama, a company's large language model that rivals ChatGPT. Meta AI answers questions from any of the 3.2 billion users of Meta's products

each day. Meta's Business AI is used to create content, and its AI Studio can create AI characters. Meta's AI tools were used to create more than 15 million ads over the last month, and businesses using image generation saw a 7% increase in conversions. "It's clear that there are a lot of new opportunities to use new AI advances to accelerate our core business that should have a strong ROI over the next few years," Zuckerberg forecast.

Meta is using AI internally as well. The parent of Facebook and WhatsApp expects AI will help it become more efficient, reduce costs, and increase productivity over time, particularly in content moderation. None of this comes cheap. Meta plans to spend $38 billion to $40 billion on capital expenditures this year, and it will spend "significantly" more next year as well.

(2) *Amazon's AI.* Amazon is using AI to help its advertisers. "We're continuing to support brands of all sizes with our generative AI-powered creative tools across display, video and audio, including our video generator that uses a single product image to curate custom AI-generated videos," said CEO Andy Jassy on the company's earnings *conference call* last week. "While we're generating a lot of advertising revenue today, there remains considerable upside."

The company's cloud service, Amazon Web Services (AWS), also offers a host of AI services to clients. Amazon SageMaker helps customers manage AI data, build AI models, experiment with AI, and deploy it to production. Amazon Bedrock offers a broad selection of generative AI models. Amazon Q is a generative AI-powered assistant for software development.

"In the last 18 months, [AWS] has released nearly twice as many machine learning and GenAI features as the other leading cloud providers combined. AWS's AI business is a multibillion-dollar-revenue run-rate business that continues to grow at a triple-digit, year-over-year percentage. [It] is growing more than three times faster at this stage of its evolution than AWS itself grew—and we felt like AWS grew pretty quickly," said Jassy.

Amazon is also using AI across its retailing businesses. Rufus is a generative AI-powered shopping assistant. There are AI shopping guides that simplify product research for customers. Project Amelia is an AI system that helps companies selling products on Amazon boost productivity and growth. AI has been added to the Kindle's Scribe note-taking function, it will be used to update Alexa, and it will be a "big piece" of Amazon's robotics network.

And like Meta, Amazon is deploying AI internally. For example, Amazon coders who used Q saved $260 million and 4,500 developer years when migrating over 30,000 applications to new versions of the Java JDK. Also not cheap: Amazon's 2024 capital spending will come to about $75 billion.

(3) *Amazon & Meta's charts.* While Amazon and Meta both have embraced AI, their businesses are extremely different primarily because of Amazon's exposure to retailing. Meta's shares are at record highs, having risen 61.7% ytd through Tuesday's close, and they're up 543.8% from an eight-year low in November 2022 (*Fig. 1*). Amazon's stock price, on the other hand, is up 31.3% ytd and 144.8% from its four-year low in December 2022 (*Fig. 2*).

One of the biggest differences between the two companies is their profit margins: Amazon's forward profit margin at 9.2% is dwarfed by Meta's forward profit margin of 34.8% (*Fig. 3* and *Fig. 4*). Amazon's forward earnings forecast has soared 98.5% y/y, well above Meta's 53.2% increase (*Fig. 5* and *Fig. 6*). But oddly enough, despite Amazon's lower forward profit margin, it has a loftier forward P/E than Meta does: 33.6 versus 23.1 (*Fig. 7* and *Fig. 8*).

(FYI: Forward earnings and revenues are the time-weighted average of industry analysts' consensus estimates for this year and next; the forward profit margin we derive from forward earnings and revenues.)

Materials: Checking Out Cardboard. The share prices of paper manufacturing companies International Paper (IP) and Packaging Corporation of America have had a banner year, climbing 59.2% and 42.8% ytd through Tuesday's close, respectively. The industry in general has benefitted from rising cardboard prices, and IP specifically should benefit from its restructuring program. Strength in the cardboard industry can signal the economy is healthy, particularly if prices are rising because businesses and consumers need more boxes to ship their goods.

Here's a look at International Paper's Q3 results and the state of the industry:

(1) *Box prices rising.* Large paper manufacturers began raising prices at the start of this year for both linerboard—the sheets used on the outside edges of cardboard—and the fluted medium that goes between the linerboard. Cardboard prices last rose sharply in 2021 and 2022 thanks to the pandemic-fueled demand for goods and companies' desire to bulk up inventories to meet that demand. Cardboard prices subsequently fell sharply as companies trimmed inventories and customers pulled back spending on goods, opting

instead to spend more on services.

Inventory destocking appears to have run its course this year. While shipments are still far below 2022 levels, cardboard prices began to rise once again. Manufacturers increased the price of 42lb unbleached kraft linerboard from roughly $825 in November 2023 to north of $900 in June, according to a June 24 Fastmarkets *article*.

(2) *Improving IP.* International Paper has undergone a lot of change this year, including the appointment of a new CEO, Andy Silvernail. He has laid out a wide-ranging restructuring program that includes considering strategic options for the company's global cellulose fibers business, shuttering plants in areas with excess capacity, and acquiring London-based packaging company DS Smith for $7.2 billion.

"We will drive profitable growth by being the low-cost producer and the most reliable and innovative sustainable packaging solutions provider in North America and EMEA," said Silvernail on the company's October 31 earnings *conference call*.

IP's Q3 adjusted earnings of 44 cents a share were lower than the 64 cents a share earned a year earlier but well above Wall Street's 26 cents consensus. Sales rose a modest 1.6% y/y to $4.7 billion. The company's industrial packaging business revenues climbed 3.7% y/y to $3.9 billion, while revenue in the division that's being evaluated for sale, Global Cellulose Fibers, declined 2.1% y/y to $710 million.

During the quarter, cardboard prices rose, but volume dipped. "Higher prices across the portfolio, including benefits from our packaging go-to-market strategy, were supported by a moderately improving box demand environment. We also had higher operating costs and lower volumes due to seasonality and commercial actions to improve profitability," said Silvernail in an earnings *press release*. On the conference call, he highlighted stable to moderately improving demand in North America, offset by some softening in Europe. Wall Street analysts are calling for the company to earn $1.20 a share this year, up from 87 cents last year, and $3.00 a share in 2025.

(3) *A look at the industry.* International Paper is a member of the S&P 500 Paper & Plastic Packaging Products & Materials industry. Its stock price index—which has jumped 27.5% ytd and 53.4% from its recent low in June 2023—has almost returned to peak levels last seen in June 2021 (*Fig. 9*). The industry suffered through negative net earnings estimate revisions for nearly two years from September 2022 until June, but analysts' estimate revisions turned net positive in July and have remained that way since (*Fig. 10*).

Both revenues and earnings are forecast to improve sharply next year. Revenues are expected to flip from a decline of 0.3% this year to a 6.9% increase in 2025, and earnings are forecasted to fall 4.4% this year before surging 33.2% in 2025 (*Fig. 11* and *Fig. 12*). The industry's forward P/E at 17.5 is higher than at most times in the past; but as earnings improve, it may fall closer to its historical average of 16.4 (*Fig. 13*).

Disruptive Technology: AI's Power Problem. The electricity needed to power AI programs is growing so rapidly that there's mounting concern about how utilities will meet the demand. Higher costs for electricity could stunt the growth of AI development or make AI programs available only to those with deep pockets. Engineers are working on ways to rework how semiconductor chips work, how server farms operate, and even when AI programs run to help slow electricity demand growth.

Here are just a few of the solutions they're evaluating:

(1) *Changing chips.* Training AI models and using them consume substantial energy when huge volumes of data are moved between computing and memory chips. Researchers are working on shortening the distance data must travel by performing some computing functions within memory chips, an October 17 *article* in *Nature* reports. Lowering chips' energy consumption becomes increasingly important if programmers hope to push AI applications out of servers and "to the edge" onto computers and cell phones with limited battery capacity.

Other researchers are exploring the use of analog computing instead of digital computing as a more energy efficient way to run AI programs. Analog devices can store more data in a given area and are more energy efficient, but their error levels can be higher than digital alternatives. EnCharge AI is working on developing an analog static random access memory chip, which can reportedly run machine learning algorithms at 150 tera operations per second (TOPS) per watt, six times faster than the 24 TOPS per watt capability of a comparable Nvidia chip. Nvidia counters that converting the data from digital to analog and other issues reduces the energy savings.

And at Northeastern University, researchers used a combination of GPU and CPU chips instead of just using GPU chips when processing AI models. Doing so decreased energy use by 10%-20% yet didn't increase how long it took the model to respond to an inquiry, an October 5, 2023 MIT *publication* reported.

(2) *Changing data center rules.* GPUs are energy hogs when unchecked. Researchers at

MIT's Lincoln Laboratory Supercomputing Center limited the amount of power that a GPU was allowed to draw. They found that when the energy consumed by the GPU was reduced by 12%-15%, the time it took to complete a task increased by 3%, which may be a tradeoff worth making, the MIT article stated.

Another benefit: The supercomputers ran 30 degrees Fahrenheit cooler and at a more consistent temperature, reducing the stress on the cooling system and potentially increasing the lifespan of the equipment. Other server farms are opting to schedule certain jobs that generate excess heat at night or during the winter to reduce their systems' cooling needs.

Calendars

US: **Thurs:** Fed Interest Rate Decision 4.75%; Nonfarm Productivity & Unit Labor Costs 2.3%/0.9%; Initial Claims 220k; Consumer Credit $14.3b. **Fri:** University of Michigan Consumer Sentiment Index 70.6; Baker-Hughes Rig Count; Bowman. (FXStreet estimates)

Global: **Thurs:** Eurozone Retail Sales 0.4%; Germany Industrial Production -1.1%; Spain Industrial Production; BoE Interest Rate Decision 4.75%; UK Halifax House Price Index 0.2%; Lane; Schnabel; Buch; Elderson; Bailey. **Fri:** Italy Industrial Production -0.2%; Canada Employment Chang 33.2k; Canada Unemployment Rate 6.6%; Japan Leading Index 108.9; McCaul; Pill. (FXStreet estimates)

Strategy Indicators

Stock Market Sentiment Indicators (*link*): The *Bull-Bear Ratio* eased for the second week to 2.61 this week after rising from 2.62 to 2.69 two weeks ago. *Bullish sentiment* slipped for the second week to 56.7% this week after climbing the prior two weeks by 5.1ppts (to 58.3% from 53.2%)—which was the most bulls since late July (when the report noted seven consecutive weeks with bulls over 60%, ending at 64.2%). Bullish sentiment was at 43.5% eight weeks ago—which was the lowest percentage since last August. Meanwhile, *bearish sentiment* edged down to 21.7% this week, after climbing from 21.7% to 22.0% last week, remaining in a tight range. Both are still far above the mid-July percentage of just 14.9%. The *correction count* edged up for the second week to 21.6% after falling from 24.2% to 20.0% two weeks ago. Recent readings are down from 33.9% in early September and now nearing the low levels during early summer. In the AAII Sentiment Survey (as of October

31), both bullish and bearish sentiment among individual investors about the short-term outlook for stocks increased during the latest week, while neutral sentiment fell. *Bullish sentiment* climbed 1.8ppts to 39.5%, remaining above its historical average of 37.5% for the 51st time in 52 weeks, while *bearish sentiment* edged up 1.0ppt to 30.9%—below its historical average of 31.0% for the 11th time in 12 weeks. *Neutral sentiment* declined 2.8ppts to 29.6%, below its historical average of 31.5% for the 16th in 17 weeks.

S&P 500 Earnings, Revenues, Valuation & Margins (*link*): The S&P 500's forward profit margin was unchanged w/w at a record high of 13.4% during the October 31 week. It is now 3.1ppts above its seven-year low of 10.3% during April 2020. Forward revenues and earnings were both at record highs during the October 3 week, but each edged down less than 0.1% w/w to 0.2% and 0.4% below their respective highs. Prior to that, revenues and earnings had been steadily making new record highs for just over 12 months. That compares to its prior 16-month string of record highs from March 2021 to June 2022; prior to that, they peaked just before Covid-19 in February 2020. The consensus expectations for forward revenues growth was steady w/w at 5.6%, and remains close to its 23-month high of 5.8% during the August 1 week. It has gained 3.3ppts 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 fell 0.4pt w/w to a nine-week low of 13.7% and has dropped 0.5pt from a 36-month high of 14.2% during the October 17 week. It's now 10.4ppts above its 31-month low of 3.3% during the February 16, 2023 week. That's down from its 23.9% reading at the end of April 2021, which was at its highest since June 2010 and up substantially from its record low of -5.6% at the end of April 2020. Analysts expect revenues to rise 4.6% in 2024 (up 0.1ppt w/w) and 5.6% in 2025 (unchanged w/w) compared to a revenues gain of 2.1% in 2023. They expect an earnings gain of 9.7% in 2024 (up 0.5ppt w/w) and a 14.5% rise in 2025 (down 0.5ppt w/w) compared to an earnings gain of 2.4% in 2023. Analysts expect the profit margin to rise 0.5ppt y/y to 12.4% in 2024 (unchanged w/w), compared to 11.9% in 2023, and to rise 1.1ppts y/y to 13.5% in 2025 (unchanged w/w). The S&P 500's weekly reading of its forward P/E edged up 0.1pt w/w to 21.9, matching its 42-month high during the October 17 week. It's up 2.2pts from a 14-week low of 19.7 during the August 8 week and 6.6pts from a 30-month low of 15.3 in October of 2022. 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 rose 0.01pt w/w to 2.92 and is just 0.01pt below its 2.93 record high during the October 17 week. That's up from a six-month low of 2.22 during the October 26, 2023 week and compares to 49-month low of 1.65 in March 2020.

S&P 500 Sectors Earnings, Revenues, Valuation & Margins (*link*): During the October 31 week, forward revenues rose for three of the 11 S&P 500 sectors and forward earnings rose for four sectors. This led to rising forward profit margins w/w for three sectors. Two sectors posted record-high forward revenues this week: Communication Services and Health Care. These six sectors are not far from their record-high forward revenues recently during the past few weeks: Consumer Discretionary, Consumer Staples, Financials, Information Technology, Real Estate, and Utilities. Industrials' forward revenues is 3.5% below its early September record due to Boeing's strike. Energy and Materials are the biggest laggards at 5.5% and 13.4% below, respectively. These two sectors had record-high forward earnings this week: Communication Services and Financials. These eight sectors are less than 3.5% below their recent records: Consumer Discretionary, Consumer Staples, Health Care, Industrials, Information Technology, Real Estate, and Utilities. Forward earnings remains depressed for Energy and Materials; which are 30.8% and 22.0% below their respective post-pandemic highs. Looking at the forward profit margin, most of the sectors have recovered from their early 2023 forward profit margin lows to near-record high readings again. In recent weeks, the Consumer Discretionary, Financials, Industrials, and Information Technology sectors were in that club. Among the laggards, Energy's forward margin has cratered 1.3pts to a 31-month low of 9.6% from its six-month high of 10.9% in mid-June; Consumer Staples' 6.9% is just 0.2ppt above its seven-year low in March 2023; and Health Care's 8.7% is only 0.2ppt above its record low in April. The annual profit margin is expected to fall y/y in 2024 for Energy, Materials, and Real Estate and to improve for the other eight sectors. 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 (26.4%, down 0.1ppt w/w and from its 27.6% record high in September), Financials (19.4, down from its 19.8 record high in August 2021), Communication Services (18.2, up 0.2ppt w/w to a record high this week), Real Estate (17.3, down 0.1ppt w/w and down from its 19.2 record high in 2016), Utilities (14.2, down from its 14.8 record high in April 2021), S&P 500 (13.4, a record high in eight of the past nine weeks), Materials (11.2, down 0.1ppt w/w and from a 20-month high of 11.6 in July and a 13.6 record high in June 2022), Energy (9.6, at a 31-month low and down from its 12.8 record high in November 2022), Industrials (11.1, down from its 11.2 record high in early October), Consumer Discretionary (9.1, down 0.1ppt w/w from its 9.2 record high a week earlier), Health Care (8.7, up 0.2ppt from its 8.5 record low at the end of April and down from its 11.5 record high in February 2022), and Consumer Staples (6.9, down from its 7.7 record high in June 2020).

Global Economic Indicators

Global Composite PMIs (*link*): Global economic growth got a boost in October from a reviving service sector. The global *C-PMI* rose to 52.3 in October from 51.9 in September, signaling growth for the 12th successive month. The NM-PMI was in expansionary territory for the 21st straight month, climbing to 53.1 in October from September's five-month low of 52.9, while the manufacturing activity remained lackluster, though production did stabilize. *Geographically*, activity expanded in 11 of the 15 countries for which October data were available—with *emerging markets* showing a broad-based expansion; India and Brazil finished number one and two in the growth rankings. Looking at the *developed nations*, the US recorded the strongest growth for the sixth straight month, while growth stabilized (on average) across the Eurozone and moderated in the UK. Meanwhile, Japan contracted for the first time in four months. Looking at *pricing*, *input price* inflation slowed to an eight-month low, while *output price* inflation eased to its slowest pace in four years. *Business optimism* in October rose to a five-month high in the *service sector*, from September's near two-year low, as positive sentiment rose.

Germany Factory Orders (*link*): Germany factory orders in September were stronger than expected, rebounding from August's steep decline. *Orders* expanded 4.2% (vs an expected 1.6% gain), following a 5.4% drop in August. Excluding large-scale orders, new orders climbed 2.2%. Domestic orders climbed 3.6% in September, while foreign orders showed a 4.4% increase, with billings from within the Eurozone rising at a double-digit pace of 14.6% while orders from outside the Eurozone dropped 1.6%. According to *Destatis*, September's increase was mainly attributable to a 117.1% increase in other transport equipment, with a 2.9% rise in auto also adding to the gain. Meanwhile, these gains were partially offset by a steep 10.0% decline in basic metals and a 3.6% shortfall in machinery and equipment. *Versus a year ago*, manufacturing orders rose 1.0% after posting a decline of 3.4% in August. Looking ahead, Germany's M-PMI (to 43.0 from 40.6) recorded its highest reading since July, though remained considerably below 50.0—the breakeven point between expansion and contraction.

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